Panasonic

No. SX- DSV03452

REFERENCE SPECIFICATIONS

MODEL

Product Name. Book style servo system
Product No. MINAS A6 Multi Series
- Power supply module section

Issued on Apr. 11, 2019
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Revisions

Date Date of submission	Page Changed point Changed drawing No.	Rev. Revision No.	Description Reason for change, change contents	Signed
Apr. 11, 2019		0.0	Initial Release	Y. Shimogaki
Aug. 29, 2019		0.1	Totally revised	K. Shimizu
Oct. 31, 2019		0.2	Totally revised	H. Ichikawa
Dec. 10, 2019	Page 1, 14, 15 Page 4 Page 8 Page 13 Page 13, 14 Page 17 Page 17 Page 21 Page 25 Page 26	0.3	1., 7-3, 7-6 Added explanation about parameter setting. 4. Updated Power supply module Basic specifications. 5. Corrected figure of rating plate. 7-2 Corrected description of pin assignment and added explanation about parameter setting. 7-2, 7-3 Corrected the figure of connection example. 8-1 Updated cross section of applicable wire. 8-2 Added recommended ferrule terminal. 8-4 Corrected explanation of grounding resistance. 9-2-1 Corrected wiring diagram. 9-2-4 Added recommended insulated power supply.	M. Kawabe
Dec. 26, 2019	Page 2 Page 18 Page 22	1.0	2. Update “Model Designation”. 8-2 Updated examples of ferrule terminals. 8-5 Added explanation of regenerative resistor.	M. Kawabe
Feb. 28, 2020	Page 1 Page 3 Page 4 Page 10, 11 Page 16 Page 18 Page 22 Page 25	1.1	1. Update the figure. Add notes on IMPOTANT. 3-2. Revise the table. 4. Update Environmental conditions 6. Update the figure. 7-9. Add notes for connecting bus bar. 8-2. Add screw torque condition for bus bar cover. 8-5. Add notes for selecting regenerative braking register. 9-1. Update the table.	T. Fukuda
Aug, 25, 2020	Page 4 Page 8 Page 25	1.2	4. Corrected the output voltage value. 5. Updated the figure. 9-1. Updated the table.	T. Fukuda

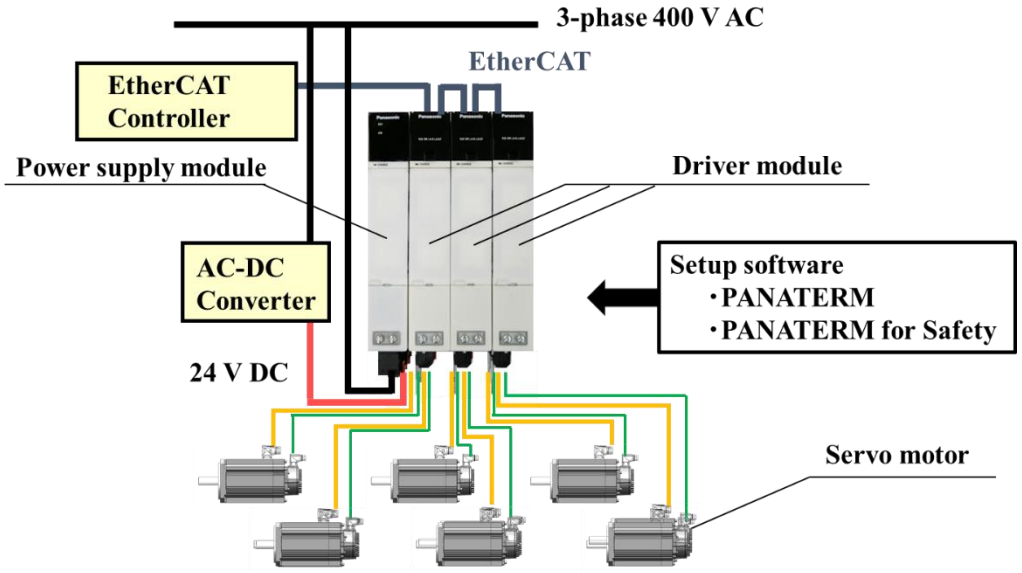
Contents

1. Scope

The contents of this specification document are related to the Book style servo system MINAS A6 Multi series manufactured by the Industrial Device Solution Business Unit, Industrial Device Business Division, Industrial Solutions Company Panasonic Corporation.

This product is intended for industrial equipment. It cannot be used for any other purposes (e.g. for household).

System over view of MINAS A6 Multi



<Related documents>

REFERENCE SPECIFICATIONS - Driver module section -	: SX-DSV03454
TECHNICAL REFERENCE - Function Specification -	: SX-DSV03455
TECHNICAL REFERENCE - EtherCAT Communication Specification -	: SX-DSV03456
TECHNICAL REFERENCE - Safety Installation Manual -	: SX-DSV03514
TECHNICAL REFERENCE - PANATERM for Safety Programming Manual -	: SX-DSV03508

* See our Web site for the above documents.

<IMPORTANT>

• Industrial Device Solution Business Unit, Panasonic Corporation reserves the right to make modifications and improvements to its products and/or documentation, including specifications and software, without prior notice.

• This product might require upgrade according to the specifications change requested by ETG (EtherCAT Technology Group).
We do not have liability for expenses of such upgrades.

• This product is designed for use in the control panel. When using this product in an environment with strong vibration, such as a transfer robot, pay special attention to vibration.

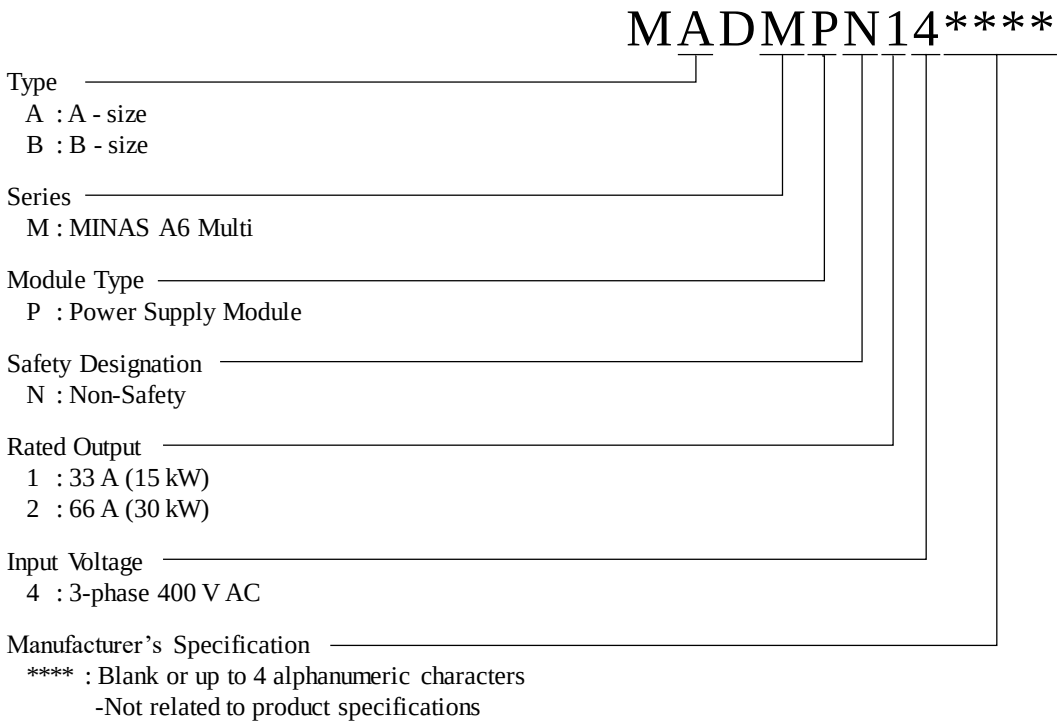
• This product has two 1st-encoder connectors, 2nd-encoder connectors and two motor connectors.
Using the wrong combination will cause abnormal operation and failure of the servo driver and servo motor.
Be sure to check that the combination is correct before turning on the power.

• The two motors are represented as A-axis and B-axis. Each axis are found out by suffix A or B.

• Power supply module has some parameters. The operation of power supply module is changed by depending on its parameters. Refer to “TECHNICAL REFERENCE - Function Specification –” for detail. The contents of the parameters are described in the section “List of power supply module parameters”, and how to change the parameters is described in the section “Connector for Inter-module communication”.

2. Model Designation

Each segment of the product number has the following meaning.



3. Product Line-up

3-1 Power supply module

Model No.	Size	Mains Power Supply Input	Rated output (*Note 1)
MADMPN14	A	3-phase 380 to 480 V AC	15 kW
MBDMPN24	B	3-phase 380 to 480 V AC	30 kW

Note 1) The total motor rated output must be selected so that it is less than or equal to the listed value. See "4. Specifications (Load conditions)" for detail.

3-2 Accessories (included connectors)

Connector	Quantity[pcs]		Manufacturer	Manufacturer part number
	A - size	B - size		
Contactor control output connector	1	1	Weidmüller Interface GmbH & Co. KG	BLF5.08HC/02/180LR SN OR BX
External device signal input connector	1	1	Weidmüller Interface GmbH & Co. KG	B2CF 3.50/06/180LR SN OR BX PRT
DC24V control power supply connector	1	1	Weidmüller Interface GmbH & Co. KG	BUF 10.16IT/02/180MF2 AG BK BX SO
Braking resistor connector	1	1	Weidmüller Interface GmbH & Co. KG	BUF 10.16IT/02/180MF2 AG BK BX SO
Main power supply connector	1	1	Weidmüller Interface GmbH & Co. KG	BUF 10.16IT/04/180MF4 AG BK BX SO
50mm Feed bus bar	2	0	Weidmüller Interface GmbH & Co. KG	PB-FEED 160 50/02RF AG BK BX
100mm Feed bus bar	0	2	Weidmüller Interface GmbH & Co. KG	PB-FEED 160 100/02RF AG BK BX
Endcap	2	2	Weidmüller Interface GmbH & Co. KG	PB-ENDCAP 160 02RF BK BX

4. Specifications

Power supply module Basic specifications

Item	Parameter	Unit	Specification	
Model	Model No.	-	MADMPN14	MBDMPN24
	Frame Size (*Note 1)	-	A - size	B - size
	Rated output power	kW	15	30
Mains Power Supply Input	Input voltage	V	3-phase AC 380 to 480 –15 %, +10 %	
	Input current	A	27	54
	Power capacity (*Note 2)	kVA	59	118
	Power systems (*Note 3)	-	TN (with an earthed neutral)	
	Frequency	Hz	50/60	
	In-rush current (*Note 4)	A	30	60
Mains Power Output (DC-bus)	Output voltage	V	DC 537 to 679 – 15 %, +10 %	
	Rated output current	Arms	33	66
	Maximum output current	Arms	66	132
	DC-bus capacitance	μF	800	1,800
	DC-bus maximum capacitance (*Note 5)	μF	5,000	10,000
Control Power Supply Input	Voltage	V	DC 24 ± 15 % PELV or SELV (With holding brake DC 24 ± 5 %)	
	Maximum current (Only power supply module)	A	1.0	1.0
	In-rush current (*Note 34, 6)	A	24	24
Regenerative Braking function (*Note 7)	Regenerative method	-	Resistor regeneration	
	Regenerative braking resistor	-	External resistor	
	Allowable minimum braking resistor	Ω	15	8
	Over heat protection	-	Recommended (provide thermostat inside the resistor)	
Contactor Control Outputs	Number of channels	ch	1	
	Compatible contactor	-	DC24 V or AC200 V type	
	Maximum current	A	1.6	
Digital Inputs	Number of channels	-	2 (Mirror input of Contactor, Overheat sensing of Regenerative braking resistor)	
	Input type	-	Sink/Source	
	Power Supply	-	12 to 26.4 V (10 mA/channel)	
Indicator (*Note 8)	Status LED	-	Ready status lamp (green) Error status lamp (red)	
Network	Cross Communication	-	RS485. Communication inter modules.	
Cooling (*Note 9)		-	Forced Air Cooling	
Others	Dimensions	mm	W50 ×H298 ×D250	W100 ×H298 ×D250
	Weight	kg	3.6	6.8

Note 1) See “6. Dimensions” for specifications.

Note 42) Power factor is 0.7. The margin is 10% for 200% load condition. Please make decision of the power supply capacity with peak load of the actual machine.

Note 23) Maximum system voltage is 277 V.

Note 34) The current limit of power supply may be applied at turning on the power. Please thoroughly verify it with the actual machine.

Note 5) Be sure to check that the total capacitance of Power Supply Module and Driver Module keep less than value described in the table.

Note 6) In-rush Current will increase as number of Driver Module.

Note 7) See “8-5 Regenerative braking resistor” for resistor selection and “Technical reference -Function Specification -” for parameter setting. To make the regenerative braking resistor small, calculate the time average of regenerative power. It is applicable if the frequency of regenerative running is low. And check the instant tolerance of the resistor to avoid fires.

Note 8) See “5. Appearance and name of each part” for specifications.

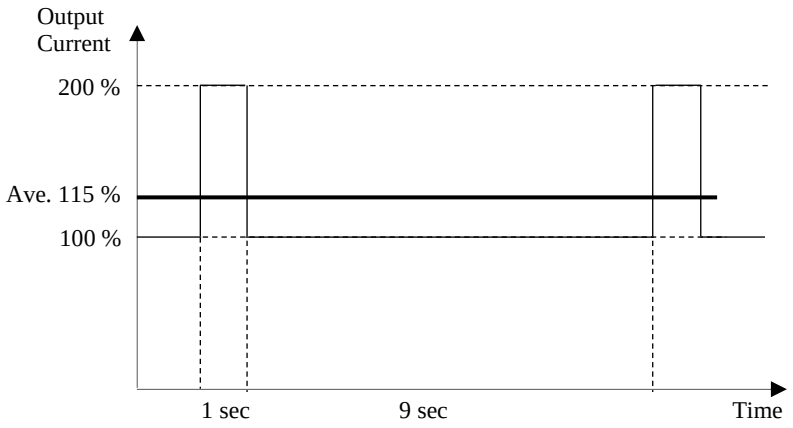
Note 9) Fan speed depends on internal temperature.

Environmental conditions

Working ambient condition	Temperature	Operation temperature 0 to 40 °C (without freezing) Storage temperature -20 to 55 °C (maximum temperature guarantee: 70 °C, 72 hours, without condensation)
	Humidity	Working/storage humidity 20 to 85 %RH (without condensation)
	Altitude	1,000 m or less
	Vibration	4.9 m/s^2 or less, 10 to 60 Hz (When using this product in an environment with strong vibration, such as a transfer robot, pay special attention to vibration.)
	Pollution degree	Pollution degree 2 or 1
Insulation voltage		Withstanding 1,500 V AC between the primary and grounding lines for one minute

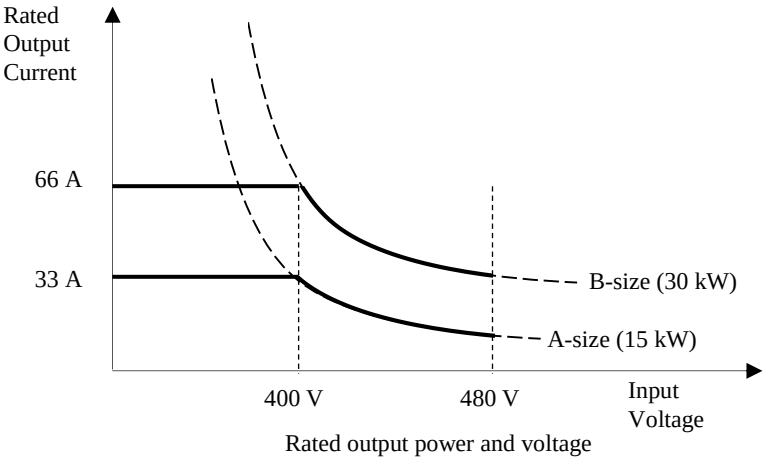
Load conditions

The maximum output current is 200 % (66 A at A-size, 132 A at B-size). Keep less than 10 % duty at 200 % output and 10 seconds cycle, or 115 % average.



Output cycle and average output power

The output current will increase as the input voltage go down. Keep less than the rated current at 400 V AC when the input voltage go down. For example, the output at 380 V AC input will be 14.3 kW (= 15 kW * 380 V/400 V).



Rated output power and voltage

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The maximum number of driver modules are limited by some terms below.

1. Rated output

   The sum of the rated output of driver modules should be kept equal or less than the rated output of power supply module. It depends on Driver modules, not motors.

   E.g. two MADM2AAKBX with 2 motors and one MADM2AAKBX with 1 motor will be 15 kW (= 3 kW × 5) and applied to MADMPN14.

2. DC-bus capacitance

   The sum of DC-bus capacitance of driver modules and power supply module should be kept equal or less than the DC-bus maximum capacitance.

   E.g. the sum of DC-bus capacitance of three MADM2AAKBX and MADMPN14 will be 2000 μF, and it is less than 5000 μF - the DC-bus maximum capacitance of MADMPN14.

3. Cross Communication

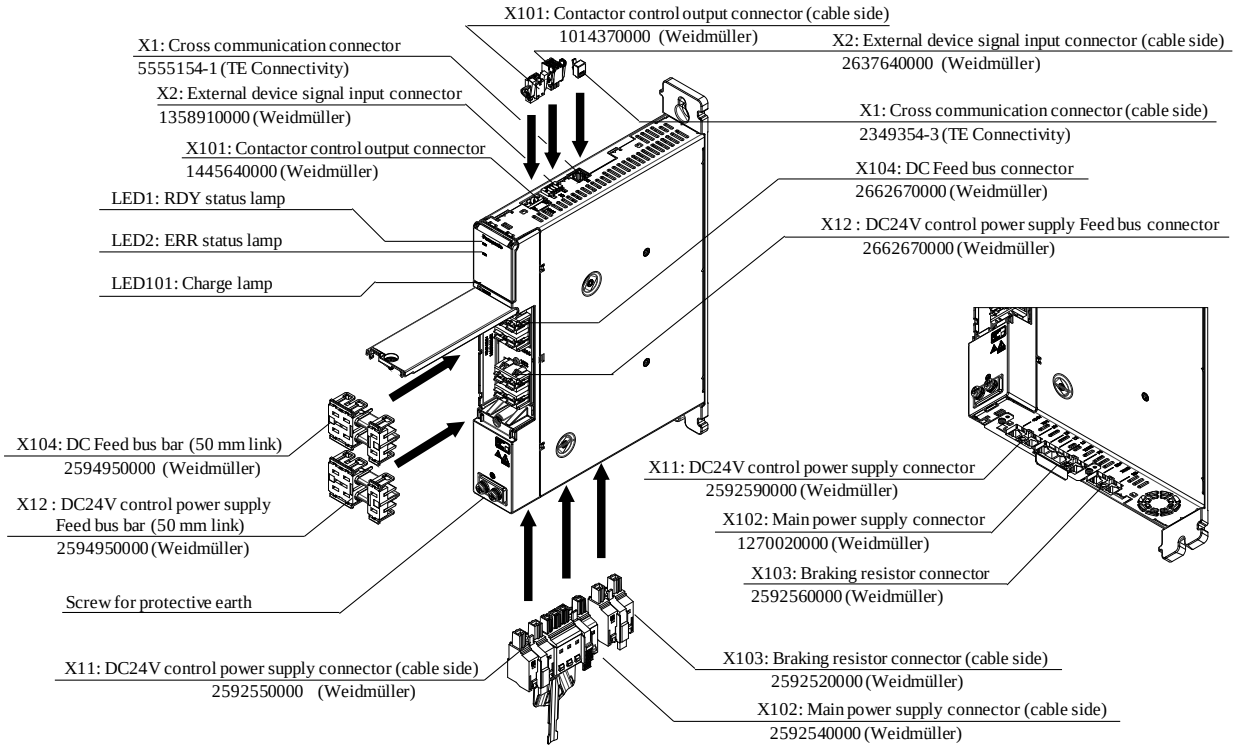
   The number of drive modules should be limited 10 (20 axis) for MADMPN14 (15 kW) and 20 (40 axis) for MBDMPN24 (30 kW).

The rated output and DC-bus capacitance are shown below.

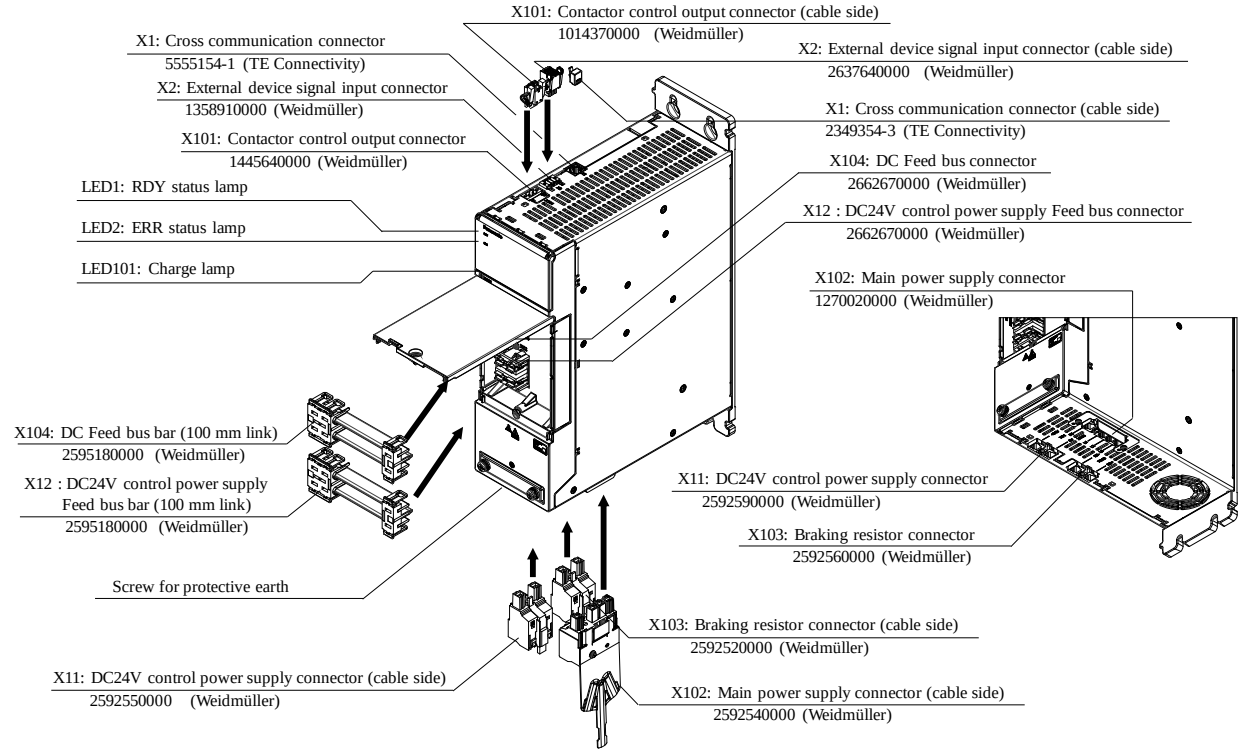
Model No.	Rated output (kW)	DC-bus capacitance (μF)
MADM2A4KBX	0.75, 2 axis	200
MADM2A6KBX	1.5, 2 axis	200
MADM2AAKBX	3.0, 2 axis	400
MBDM1ABKBX	5.0, 1 axis	820
MADMPN14	-	800
MBDMPN24	-	1,800

5. Appearance and name of each part

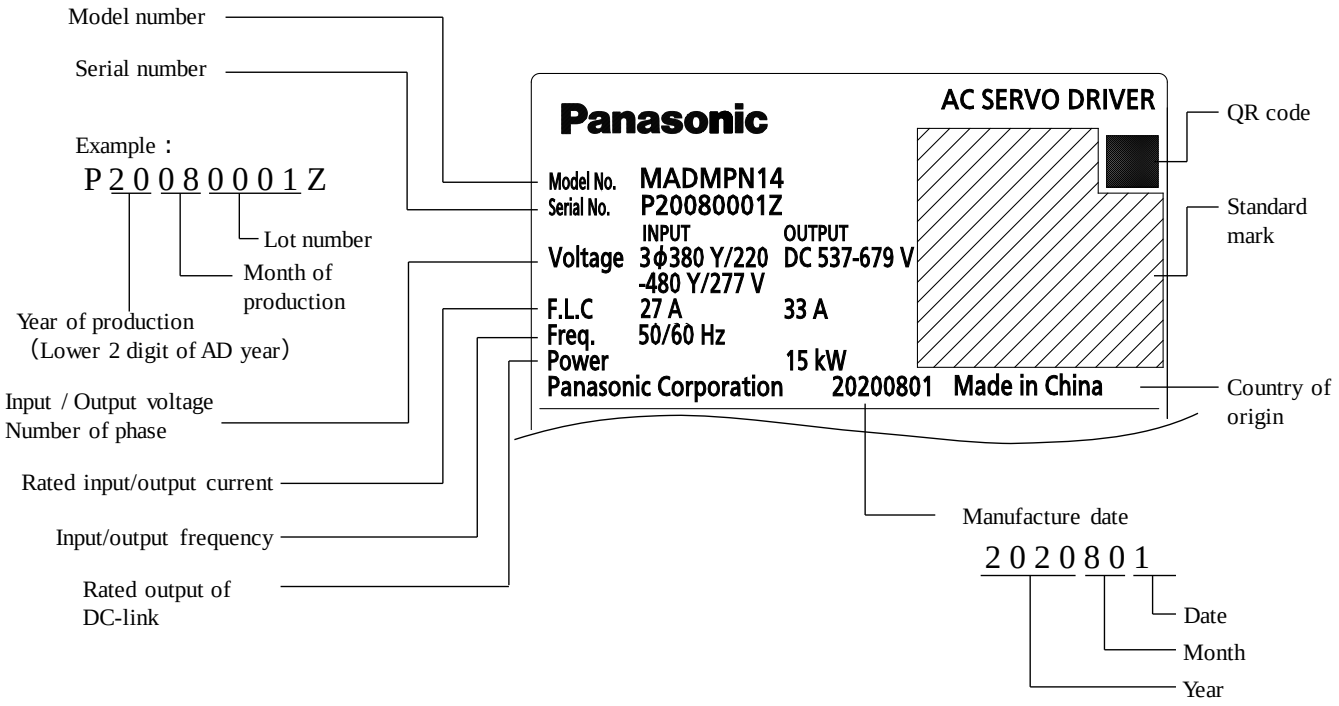
Power supply module/A - size



Power supply module/B - size



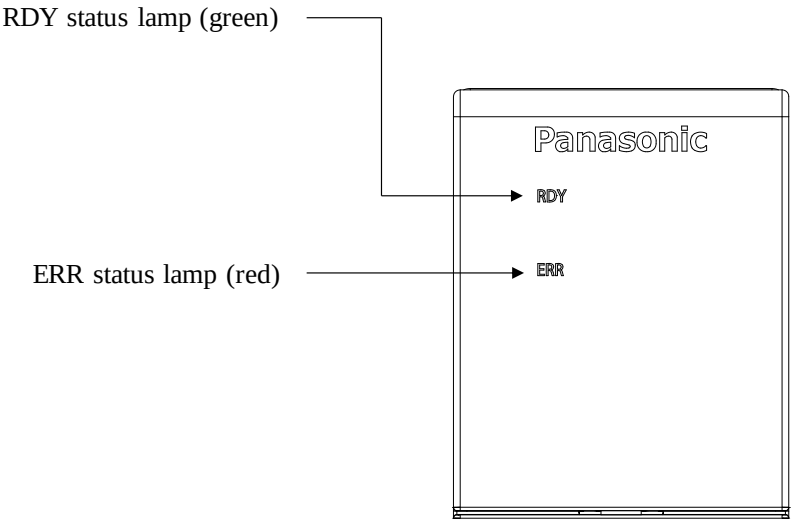
Example of a rating plate



The values of the serial number part of the lot number range from 1 to 33999. On the rating plate, it is indicated in four digits as in the format shown below.
“I” and “O” are not used for the fourth-digit alphabet.

Value of the serial number part	Indication on the rating plate
1 - 9999	0001 - 9999
10000 - 10999	A000 - A999
11000 - 11999	B000 - B999
⋮	⋮
17000 - 17999	H000 - H999
18000 - 18999	J000 - J999
⋮	⋮
22000 - 22999	N000 - N999
23000 - 23999	P000 - P999
⋮	⋮
33000 - 33999	Z000 - Z999

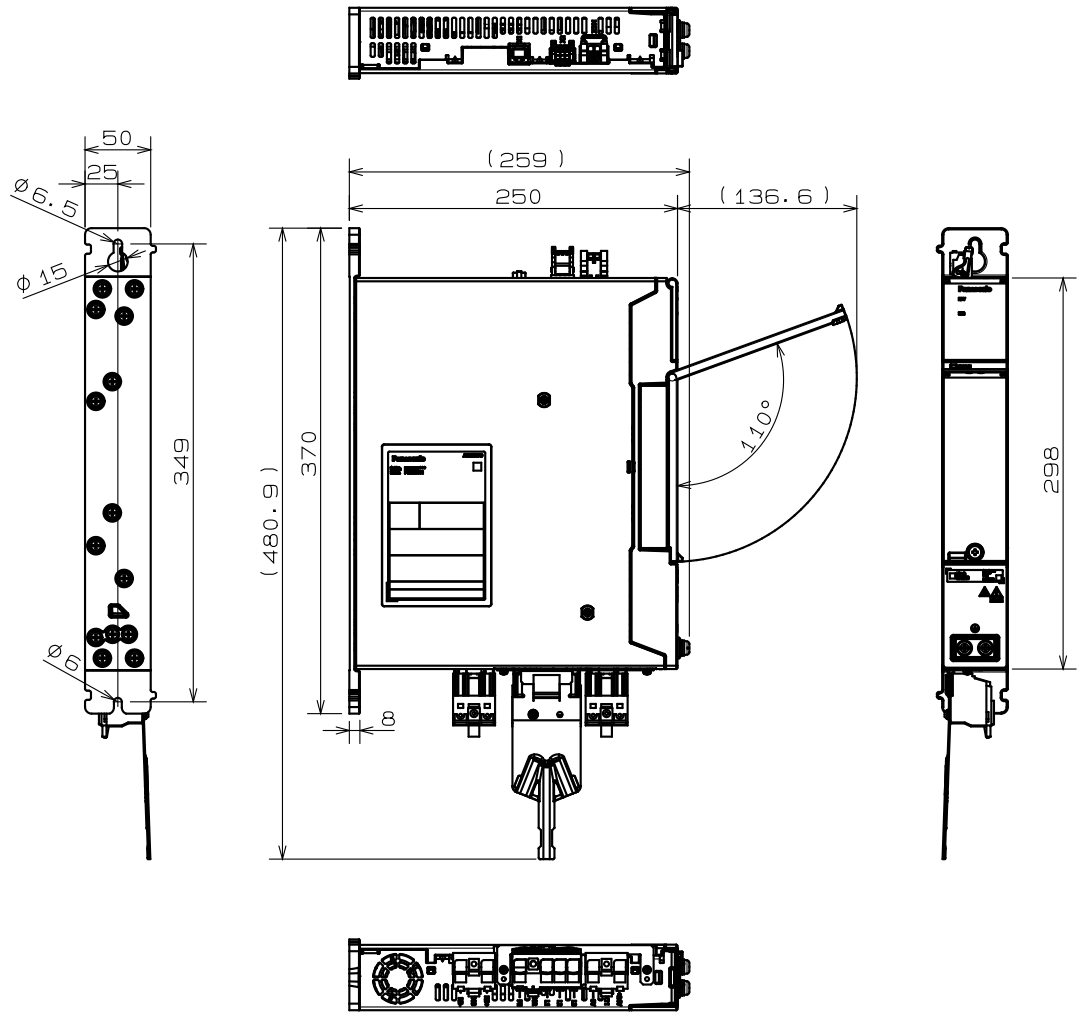
Front panel



Item	Status	Content
RDY status lamp (green)	ON	Main power supply established
	OFF	Main power off
ERR status lamp (red)	ON	Power supply module error detection
	Blinking	No power supply module error/warning detection
	OFF	No power supply module error/no warning

6. Dimensions

A - size



Unit: mm

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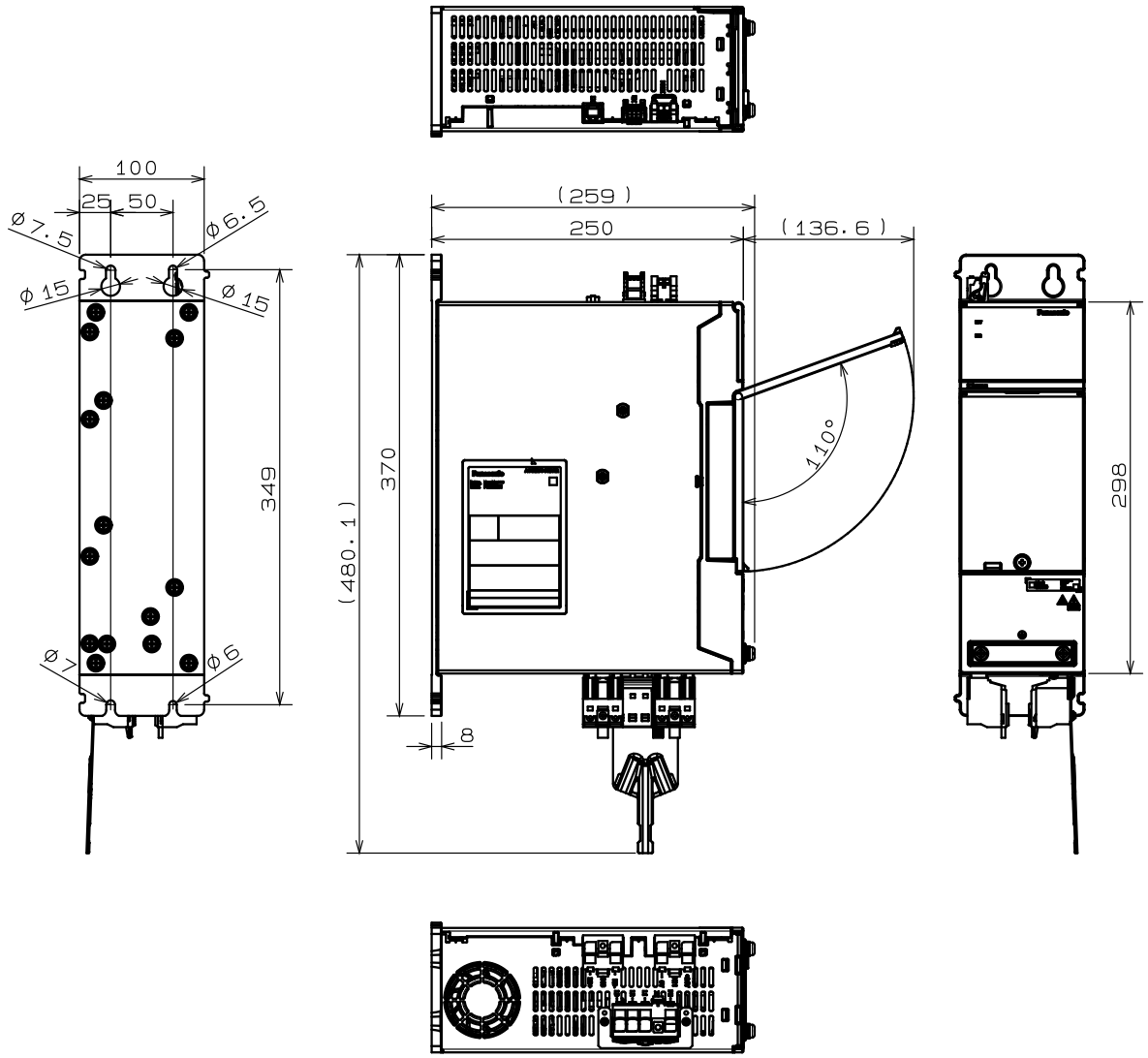
B - size



Unit: mm

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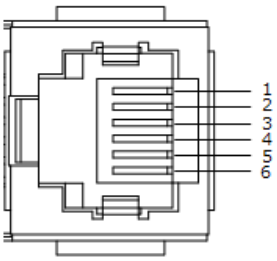
7. Configuration of connectors and terminal blocks

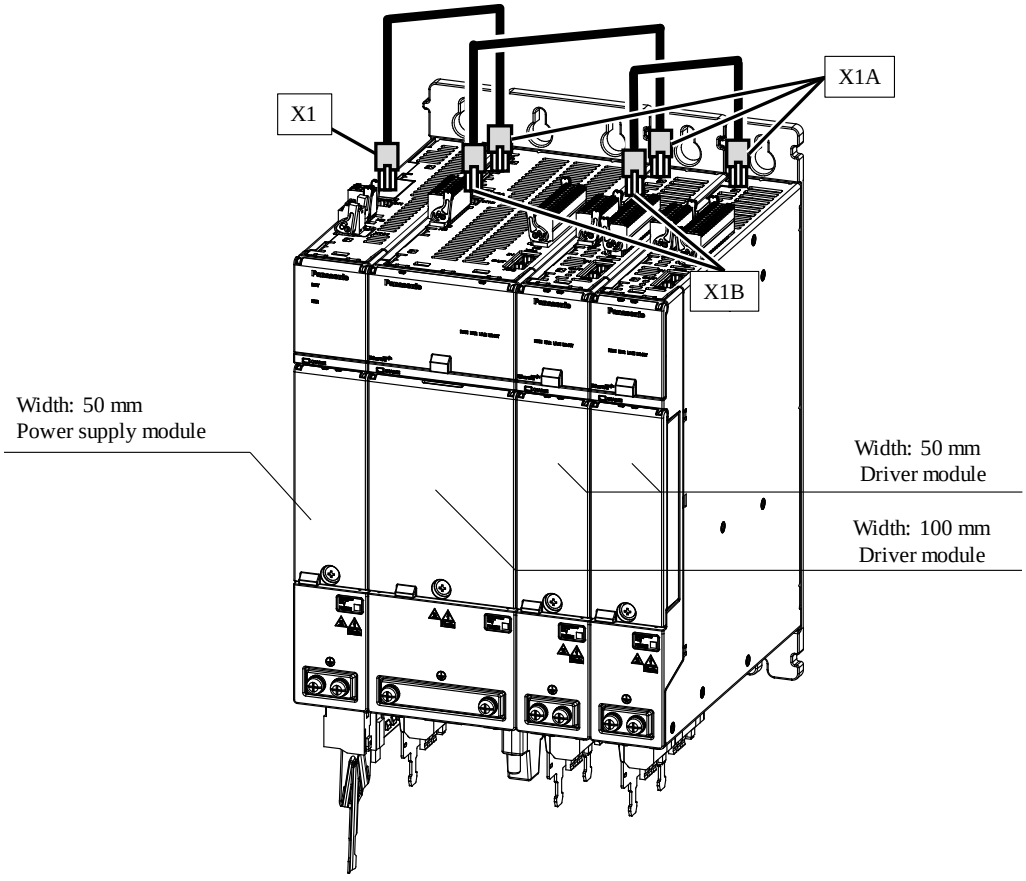
7-1 Cross communication connector (X1)

Pin No.	Symbol	Polarity	Description
1	DATA+	IN/OUT	Only for system-internal usage/communication.
2	DATA-	IN/OUT	
3	SYNC+	IN/OUT	
4	SYNC-	IN/OUT	
5	EMG	IN	
6	SG	-	

* Connect the Cross communication cable from X1 to X1A of the next driver module.



Terminal pin assignment of Cross communication connector X1



Description of Cross communication cable connection

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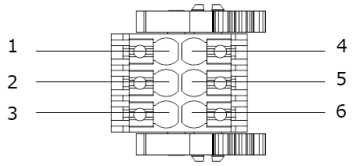
7-2 External device signal input connector (X2)

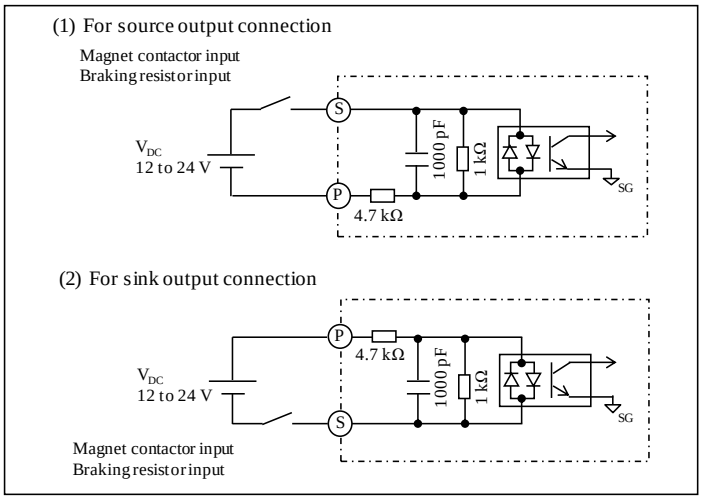
Pin No.	Symbol	Polarity	Description
1	DIN1	IN	Digital input 1 for magnet contactor feedback
2	DIN2	IN	Digital input 2 for regenerative braking resistor temperature feedback
3	FG	-	Frame ground
4	COM1	-	Digital input common 1
5	COM2	-	Digital input common 2
6	Not used	-	-



Terminal pin assignment of external device signal input connector X2

When temperature monitoring of the regenerative braking resistor is not used, change the parameter setting (Pr. 05).

i-1: Digital input

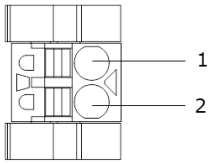


S : Terminal No. 1, 2

P : Terminal No. 4, 5

7-3 Contactor control output connector (X101)

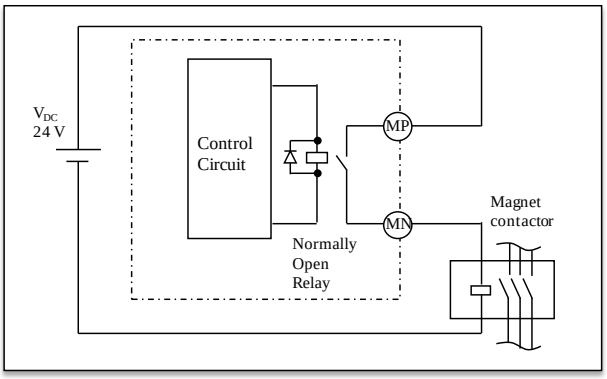
Pin No.	Symbol	Polarity	Description
1	MC1	-	Magnet contactor output 1
2	MC2	-	Magnet contactor output 2

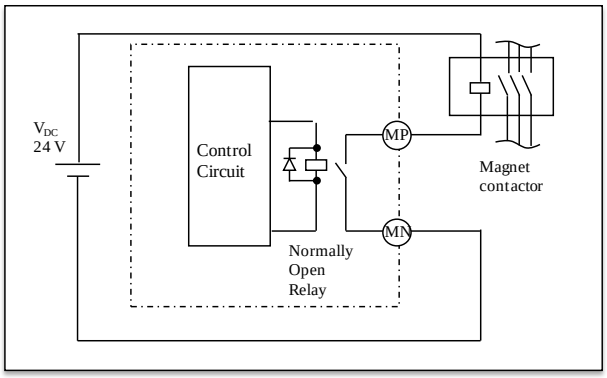


Terminal pin assignment of Contactor control output connector X101

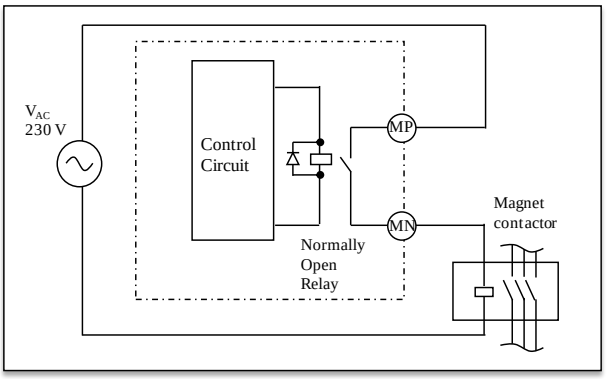
When magnet contactor is not used, change the parameter setting (Pr. 04).

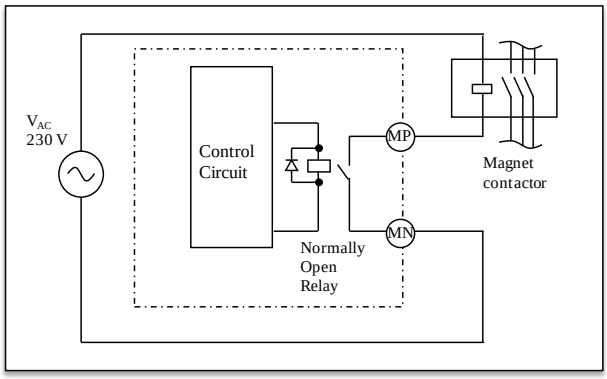
(1) For control voltage 24 V DC





(2) For control voltage 230 V AC



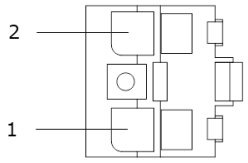


MN : Terminal No. 1
MP : Terminal No. 2

*Connect a varistor compatible with the contactor to protect the internal contact from contactor surge.

7-4 DC24V control power supply connector (X11)

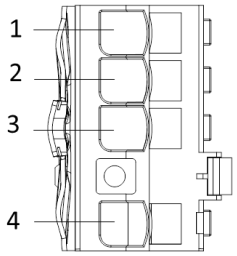
Pin No.	Symbol	Polarity	Description
1	0V	-	External ground
2	+24 V	-	+24 V Control supply



Terminal pin assignment of DC24V control power supply connector X11

7-5 Main power supply connector (X102)

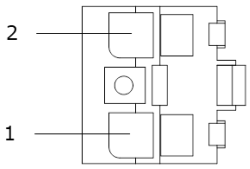
Pin No.	Symbol	Polarity	Description
1	L3	-	Main power supply input L3
2	L2	-	Main power supply input L2
3	L1	-	Main power supply input L1
4	PE	-	Protective earth



Pin assignment of main power supply connector X102

7-6 Braking resistor connector (X103)

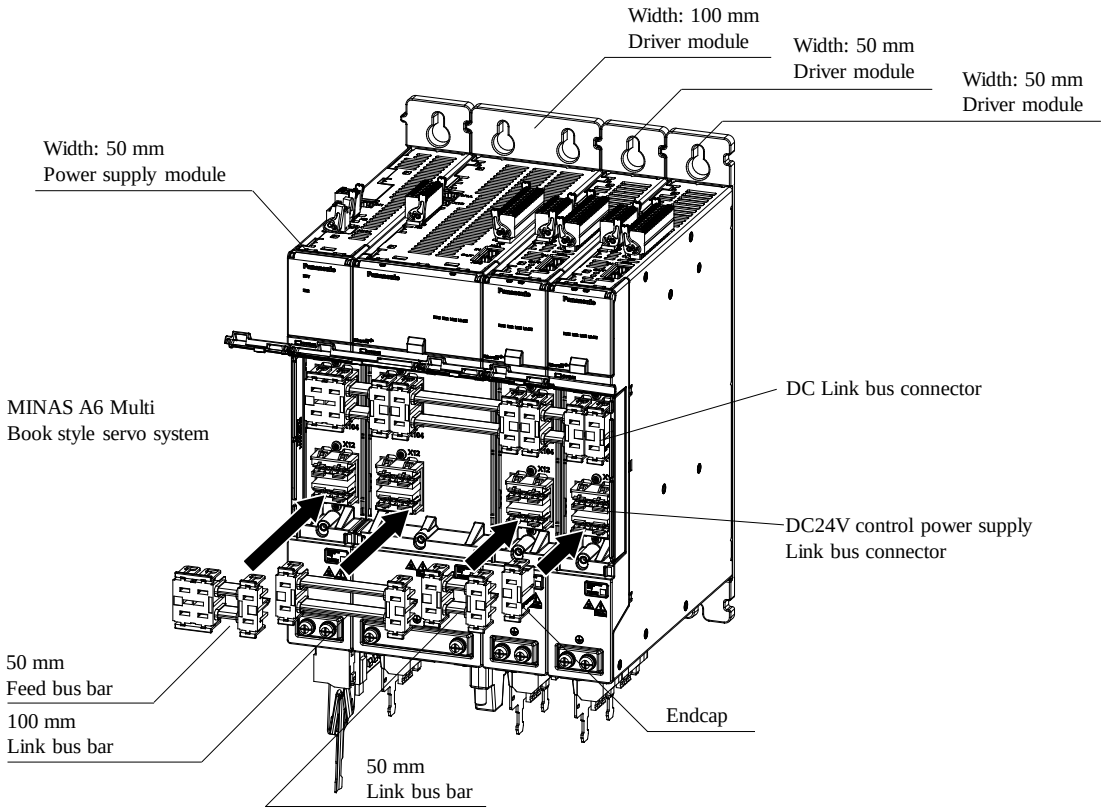
Pin No.	Symbol	Polarity	Description
1	RB-	-	Regenerative braking resistor connection -
2	RB+	-	Regenerative braking resistor connection +



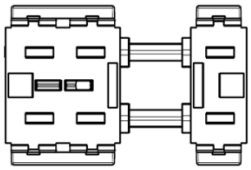
Terminal pin assignment of braking resistor connector X103

When regenerative braking resistor is not used, change the parameter setting (Pr. 00).

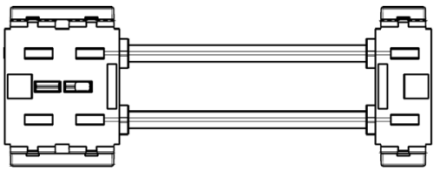
7-7 Power bus system



Bus bar for power supply module to driver module

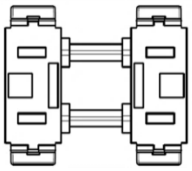


50 mm Feed bus bar

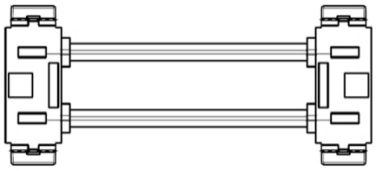


100 mm Feed bus bar

Bus bar for driver module to driver module

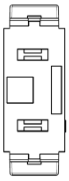


50 mm Link bus bar



100 mm Link bus bar

Terminator



Endcap

When installing the bus bar, remove unnecessary side covers and attach side covers only to the left and right ends.
For safe use, do not remove the side covers at both ends of the modules.
When installing the bus bar, make sure that the connection of the bus bar is inserted until it clicks into place.
When removing the bus bar, pinch the upper and lower hooks of the bus bar.
When the charge lamp is lit, do not attach or detach the bus bar, there is a risk of electric shock.

8. Wiring and system configuration

8-1 Wire diameter and maximum wiring length

Name	Symbol	Maximum wiring length (*Note 1)	Applicable wire (*Note 2)
External device signal input connector	X2	3 m	0.2 mm^2 to 1.5 mm^2
DC24V control power supply connector	X11	-	2.5 mm^2 to 16 mm^2 300V
Contactor control output connector	X101	3 m	0.2 mm^2 to 2.5 mm^2 300V
Main power supply connector	X102	-	2.5 mm^2 to 16 mm^2 600V
Braking resistor connector	X103	3 m	2.5 mm^2 to 16 mm^2 600V
Protective earth	⏚	-	

Note 1) The above wiring length is the maximum value under the evaluation environment of Panasonic. It does not guarantee the operation under the working environment of the customer.

Note 2) Select wire suitable for the actual current.

8-2 Wire processing

For wiring the connectors, ferrule terminal is recommended. Examples of ferrule terminals (Weidmüller Interface GmbH & Co. KG) are shown below. See datasheet of manufacturers for details.
Make sure to use tools recommended by manufacturers.

• External device signal input: X2 (B2CF 3.50)

No.	Manufacturer part number	Ordering number	Wire diameter (mm^2)	Contact surface length (mm)
1	H0,25/12 HBL	9025760000	0.25	8
2	H0,34/12 TK	9025770000	0.34	8
3	H0,5/16 OR	9025870000	0.50	10
4	H0,75/18 W	9025910000	0.75	12
5	H1,0/18 GE	9025930000	1.0	12

• DC24V control power supply: X11, Main power supply: X102, Braking resistor: X103 (BUF 10.16IT)

No.	Manufacturer part number	Ordering number	Wire diameter (mm^2)	Contact surface length (mm)
1	H2,5/25D BL	9019180000	2.5	18
2	H4,0/26D GR	9019210000	4.0	18
3	H6,0/26 SW	0565700000	6.0	18
4	H10,0/28 EB	0565800000	10	18
5	H16/28 GN	0566000000	16	18

• Contactor control output: X101 (BLF5.08)

No.	Manufacturer part number	Ordering number	Wire diameter (mm^2)	Contact surface length (mm)
1	H0,25/12 HBL	9025760000	0.25	8
2	H0,5/16 OR	9025870000	0.50	10
3	H0,75/16 W	9025860000	0.75	10
4	H1,0/16D R	9019100000	1.0	10
5	H1,5/16 R	0635100000	1.5	10
6	H2,5/10	9004080000	2.5	10

• Recommended crimping tools

No.	Manufacturer part number	Ordering number	Applicable wire diameter (mm^2)
1	PZ 3	0567300000	0.50 to 6.0
2	PZ 4	9012500000	0.50 to 4.0
3	PZ 6/5	9011460000	0.25 to 6.0
4	PZ 6Roto L	1444050000	0.14 to 6.0
5	PZ 10 HEX	1445080000	0.14 to 10
6	PZ 10 SQR	9012600000	0.14 to 10
7	PZ16	9006450000	6.0 to 16

For wiring the protective earth, the screw is M6. Make sure to tighten the screw scan with the recommended torque.
Thickness of earth terminal should be 0.5 mm or more.

Screw size	Recommended torque
M6	2.5 to 3.0 N・m

For locking the bus bar cover, the screw is M4. Make sure to tighten the screw scan with the recommended torque.

Screw size	Recommended torque
M4	0.4 to 0.6 N・m

8-3 Assembly instructions

8-3-1 B2CF and BLF5.08 series

Connector

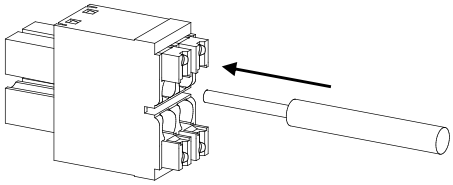
• External device signal input connector (X2)
• Contactor control output connector (X101)

Recommended tool

• Screwdriver blade 0.4 × 2.5
• Screwdriver blade standard DIN 5264

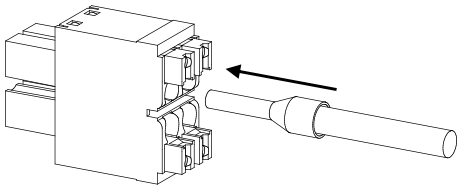
Connecting solid conductors

1. A stripped solid conductor is simply plugged into the contact point up to the end stop.



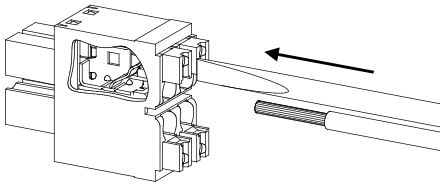
Connecting conductors with wire-end ferrule

1. Stranded conductors with crimped-on wire-end ferrules, with and without plastic collars, are simply plugged into the contact point up to the end stop. When plugging-in, an initial resistance (spring clamp) has to be overcome.

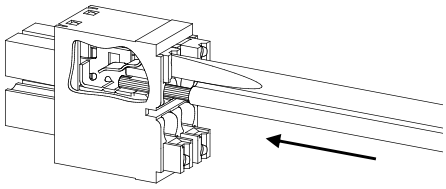


Connecting flexible conductors

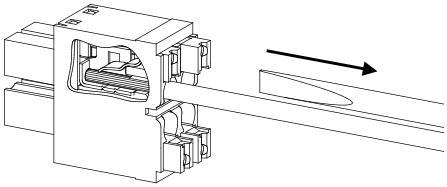
1. Open the contact point by activating the push-button (slider/pusher).



2. Insert stranded conductors, without crimped-on wire-end ferrules.



3. Remove tool from push-button (slider/pusher).



8-3-2 BUF series

Connector

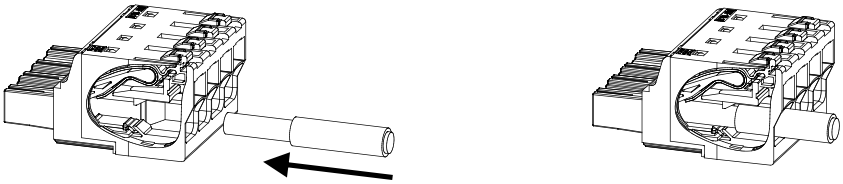
- DC24V control power supply connector (X11)
- Main power supply connector (X102)
- Braking resistor connector (X103)

Recommended tool

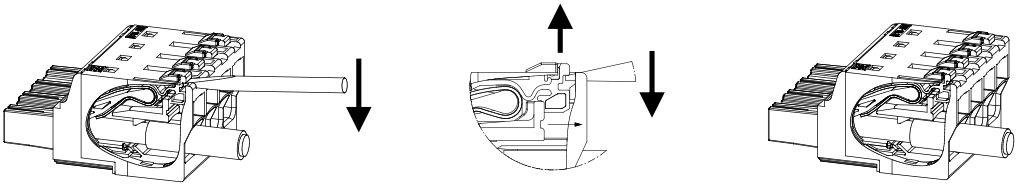
- Screwdriver blade 0.8 × 4.0
- Screwdriver blade standard DIN 5264

Connecting conductors

1. Connecting conductor: Plug in the conductor into the clamping unit up to the end stop.

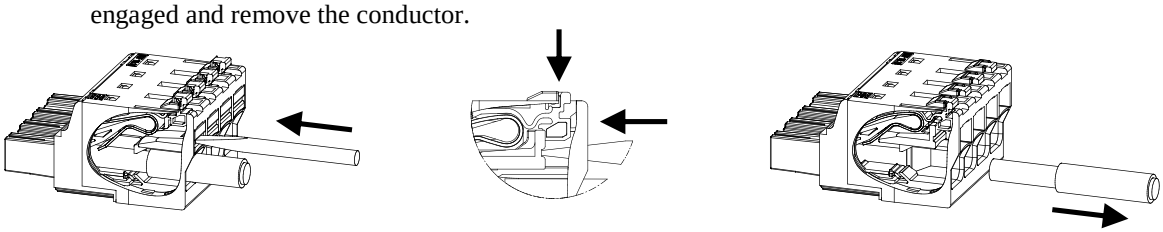


2. Closing clamping unit: Unlock the engaged push-button (slider/pusher) by levering the locking feature. Make sure that the conductor is inserted up to the end stop and ensure by gently pulling on the conductors that the clamping unit is securely engaged.



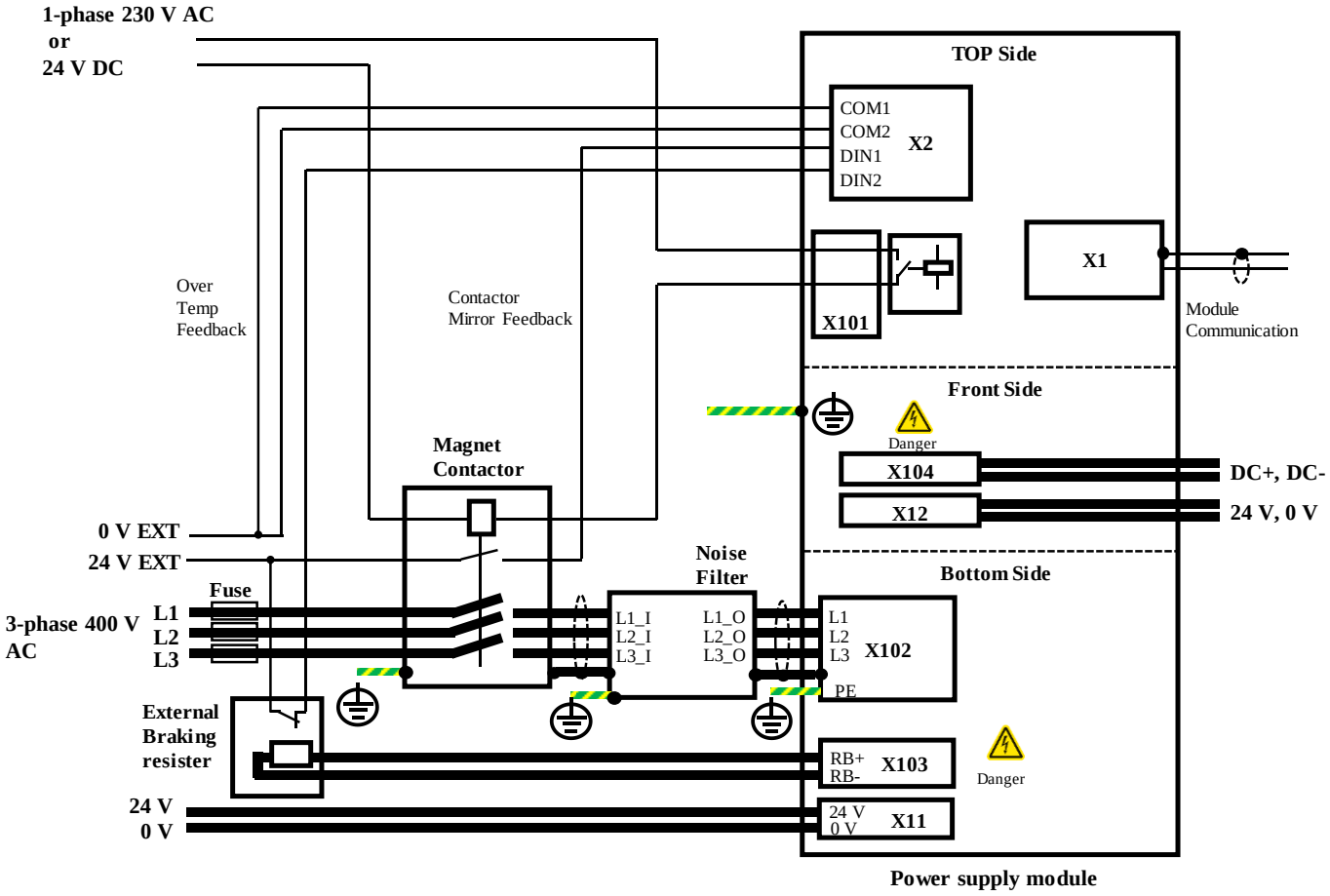
Releasing conductors

1. To open the clamping unit press the screwdriver individually onto the push-button (slider/pusher) until it is engaged and remove the conductor.



8-4 Precautions for wiring

8-4-1 Wiring the connectors and the terminal blocks



[1] Insert the connector securely until it is locked.

[2] Apply power supply voltage as specified in the rating plate.

[3] High voltage is applied to power connectors X102 X103 X104 . Make sure not to touch them. There is a risk to get an electric shock.

[4] The short circuit current for the power supply to be used should be equal to or less than the maximum input voltage of the product, and the symmetrical current should be 5,000 Arms or less. If the short circuit current for the power supply exceeds this value, install a track current limiting device (such as a current-limiting fuse, current-limiting breaker, or transformer) to limit the short circuit current.

[5] Make sure to connect the earth terminal of the motor and the earth terminal of the servo drive, and ground them with the earth terminal of the noise filter at a single point. The machine body should also be grounded. Grounding resistance should be less than 100 Ω. Tighten the earth screws of the servo drive with an appropriate torque designated for each size. Use the earth wire with the diameter described in the specifications for each model or more. To avoid influence by electrolytic corrosion, make sure that aluminum is not in direct contact with copper.

[6] To prevent noise, insert a surge absorber in the electromagnetic contactor installed around the power supply, the coil between relay contacts of the motor with brake.

[7] Install a molded-case circuit-breaker (MCCB), and in an emergency, be sure to shut off supply outside the power supply module.
When using an earth leakage breaker, take measures against high frequency.

[8] To reduce noise voltage of the terminal, install a noise filter.

[9] Apply power supply voltage after completing wiring.

8-5 Regenerative braking resistor

8-5-1 Regenerative braking resistor selection

Select a regenerative braking resistor with values in the following table below.

Resistor value for models	
MADMPN14	MBDMPN24
15 Ω, 10 kW	8 Ω, 20 kW

The power capacity of this register is a design value that assume continuous regeneration, so select it according to actual use conditions.

Make sure the following:

1. Check the surface temperature according to the specifications of the resistor used.
2. Do not place flammable materials in the surrounding area because the resistance generates heat.
3. Connect an appropriate wire between the power supply module and the resistor.

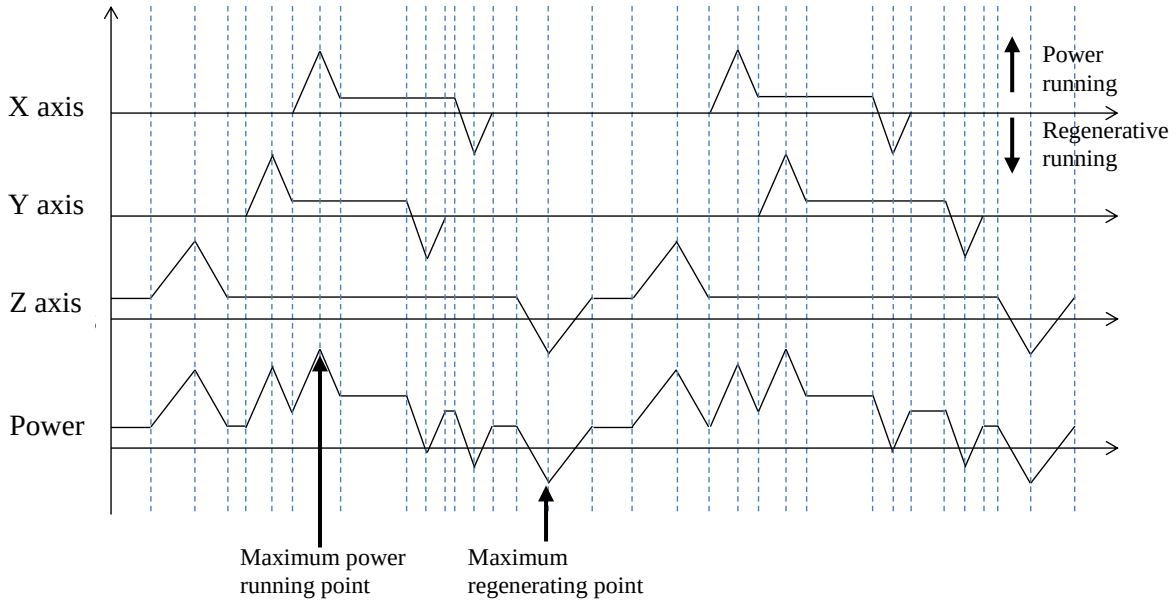
E.g. the peak current will be 53 A (= 800 V/15 Ω). Select the wire AWG 10/5.5 mm^2 in case of wire with UL 1015 (105 °C, 600 V).

8-5-2 Detailed regenerative braking resistor selection

Step 1. Decide the resistance value. Do not select a resistance less than the values in the table below.

No.	Model No.	Minimum resistance value
1	MADMPN14	15 Ω
2	MBDMPN24	8 Ω

Step 2. Draw the operating patterns of each motor. For example, xyz system is shown below. Then add the output of each motor to draw all the power.



Step 3. The power of maximum regenerating point will be power consumption at regenerative braking resistor. Take 1.5 times to twice margin for power capacity.

Additionally 1. To make the regenerative braking resistor small, calculate the time average of regenerative power. It is applicable if the frequency of regenerative running is low. And check the instant tolerance of the resistor to avoid fires. Please thoroughly verify it with the actual machine.

Additionally 2. For thermal protection of the regenerative braking resistor, recommend providing thermostat on the resistor. Thermostat signal input is also available.

Additionally 3. Optional parts shown below are available. Use them by combination, when rated power of regenerative braking resistor is not enough.

No.	Panasonic option number	Manufacturer part number	Specifications					Activation temperature of built-in thermal protector
			Resistance	Cable core Outside diameter	Weight	Rated power (reference) (*Note 1)		
						Free air	With fan 1 m/s	
			Ω	mm	kg	W	W	
1	DV0P4285	RH450F	20	φ1.27 (AWG18 stranded wire)	1.2	52	130	140 ± 5 °C B-contact Open/Close capacity (resistance load) 1 A 125 V AC 6000 times 0.5 A 250 V AC 10000 times
2	DV0PM20049	RH450F	80		1.2	65	190	

Manufacturer: Iwaki Musen Kenkyusho Co., Ltd.

Note 1) Power with which the driver can be used without activating the built-in thermal protector.
A built-in thermal fuse and a thermal protector are provided for safety.
The circuit should be so designed that the power supply will be turned off as the thermal protector operates.
The built-in thermal fuse blows depending on changes in heat dissipation condition, operating temperature limit, power supply voltage or load.
Mount the regenerative braking resistor on a machine operating under aggressive regenerating condition (high power supply voltage, large load inertia, shorter deceleration time, etc.) and make sure that the surface temperature will not exceed 100 °C.
Attach the regenerative braking resistor to a nonflammable material such as metal.
Cover the regenerative braking resistor with a nonflammable material so that it cannot be directly touched.
Temperatures of parts that may be directly touched by people should be kept below 70 °C.

8-6 Circuit breaker

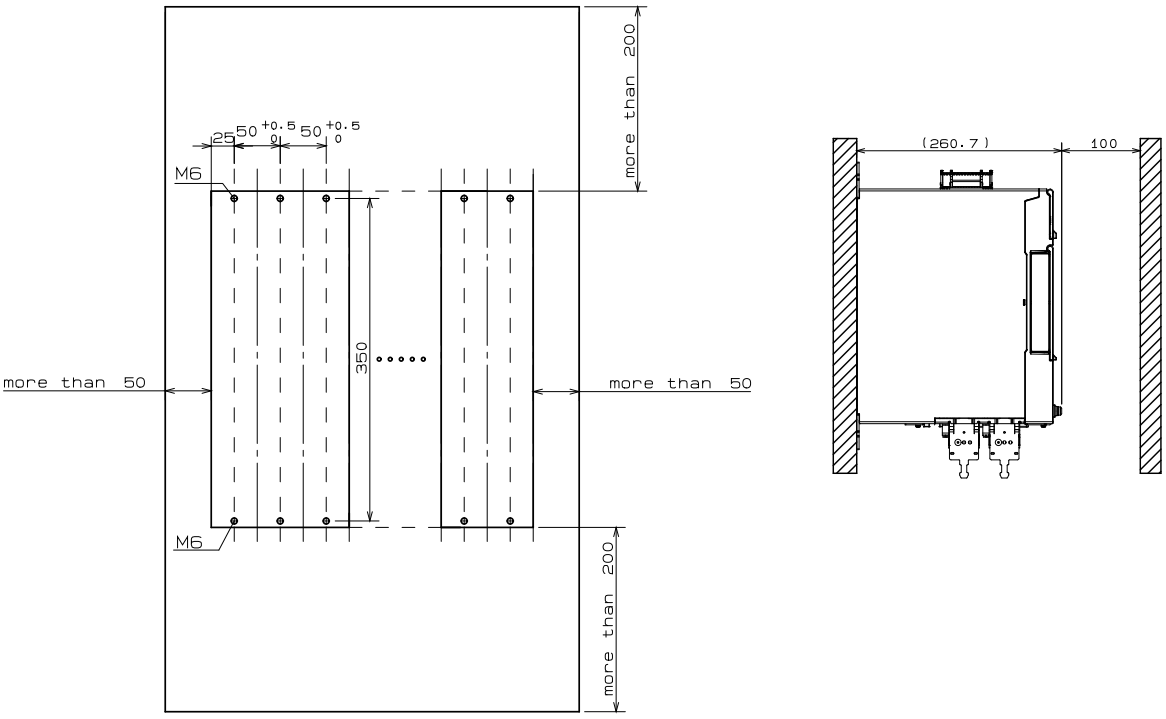
Examples of MCCB are shown below.

No.	Model No.	MCCB Type	Manufacturer
1	MADMPN14	BW103E0-75	Fuji Electric FA Components & Systems Co., Ltd.
2	MBDMPN24	BW163E0-125	Fuji Electric FA Components & Systems Co., Ltd.

The load condition of example is 200 %. Please select circuit breakers by the actual machine.

8-7 Mounting direction and interval

- Secure the surrounding space for effective cooling.
- Install a fan to equalize the temperature in the control panel.
- Sizes A to B have a cooling fan on the lower side. Keep the space for the air flow.
- Satisfy the environmental conditions for the inside of the control panel.
- Fix the servo drive to the grounded conductive size.
- If the servo drive is mounted to a painted portion, anti-noise measures can be taken by installing it after peeling off the paint.
- If you make a mounting bracket by yourself, apply conductive plating to the surface of the bracket.
- The temperature around the servo drive should be measured at a position 200 mm away from the side or bottom surface of the drive.
  If it is impossible to measure the temperature at a position 50 mm away from it, perform measurement at the midpoint in the clearance between the obstacle and the drive.
- Make sure to secure the cable so that there is no force on the connector.



Panasonic

9. Compliance with the international standards

9-1 List of compatible standards for the servo drive

Standard		No.
European Communities Directive	EMC Directive	EN61000-6-2 EN61800-3
	Low Voltage Directive	EN61800-5-1 EN50178
	Machinery Directive Functional safety	ISO13849-1 (PL e, Cat.4) EN61508 (SIL 3) EN62061 (SILCL 3) EN61800-5-2 EN61326-3-1 EN60204-1
UL standard		UL61800-5-1 (file No. E164620)
CSA standard		C22.2 No. 274
Radio Waves Act of South Korea (KC)		KN61800-3

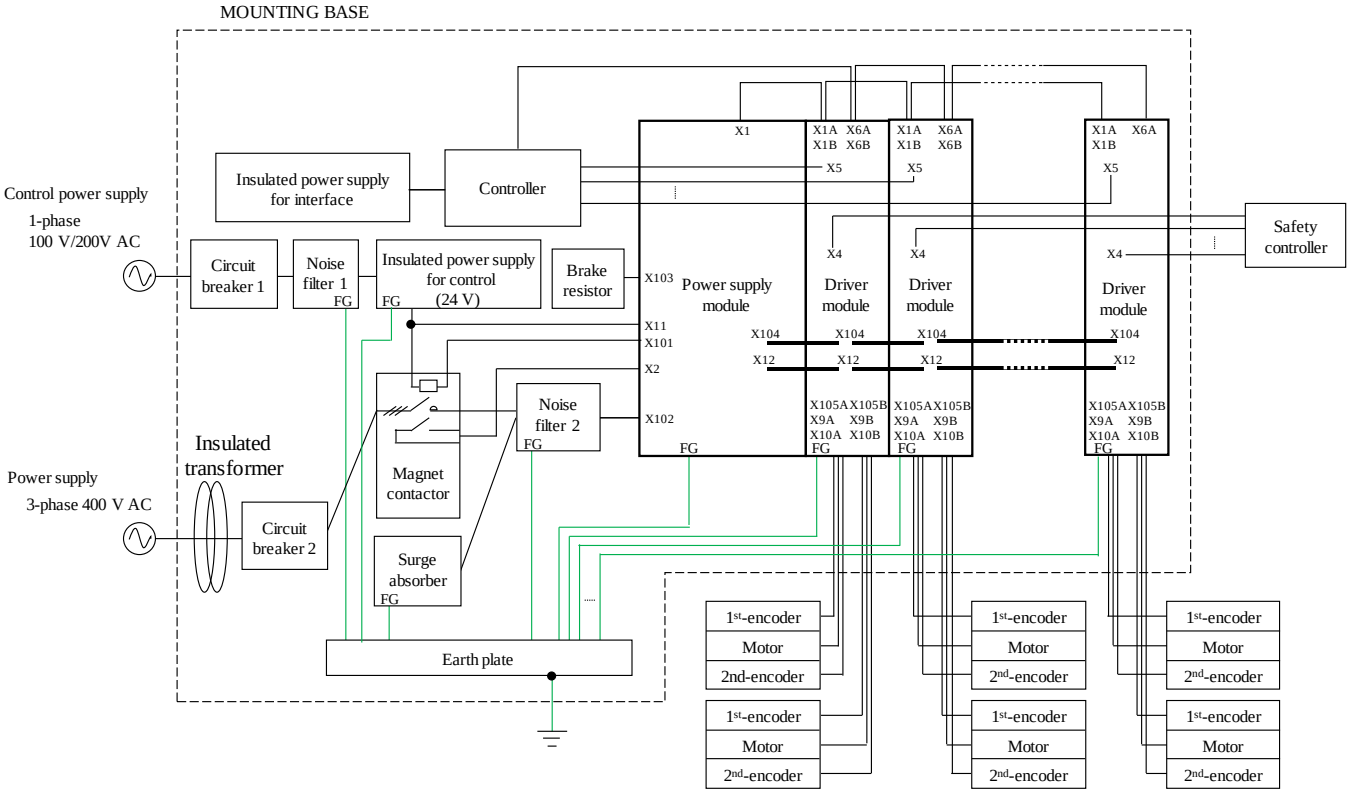
EN: Europaischen Norman
EMC: Electromagnetic Compatibility
UL: Under writers Laboratories
CSA: Canadian Standards Association

9-2 European Union (EU) Directive

We achieve compliance with the standards related to the Low Voltage Directive, so that the embedded machines and devices can easily comply with the EU Directive.

9-2-1 Compliance with the EMC Directive

The servo drive and the servo motor are not intended to be used on a low-voltage public network which supplies residential premises; Radio frequency interference is expected if used on such a network.
To comply with the EMC Directive, use a noise filter, surge absorber. To make the machines and devices comply with the EMC Directive, it is necessary to perform checking using the final machines/devices in which the servo system and the servo motor have been embedded.



* The number of driver module that can be connected is limited by the motor cables. The total length of motor cables connected to all driver modules is 300 m.

9-2-2 Power supply

400 V AC TN system	3-phase 380 V to 480 V	+10 % -15 %	50/60 Hz

(1) Use them under the environment of overvoltage category III stipulated in IEC60664-1.

(2) Use insulated-type 12 to 24 V DC power supply for I/O in compliance with the CE marking or the EN standard (EN60950).

9-2-3 Molded-case circuit-breaker (MCCB)

Be sure to connect a UL-certified MCCB in compliance with the IEC standard (LISTED, with mark) between the power supply and the noise filter.
The short circuit protective circuit of the product is not intended to protect the branch circuit.
Select the protection for the branch circuit in accordance with the NEC (National Electrical Code) standard and the local standard.

9-2-4 Insulated power supply for control (24 V)

• Recommended components

Manufacturer	Manufacturer part number	Applicable module
OMRON	S8VK-S series	A - size B - size

"S8VK-S48024" was used in the EMC compliance tests.

9-2-5 Noise filter 1

When using multiple units of servo drive and installing one noise filter collectively in the power supply section, consult with the noise filter manufacturer.

• Recommended components

Manufacturer	Manufacturer part number	Applicable module
OMRON	S8V-NF series	A - size B - size

"S8V-NFS206" was used in the EMC compliance tests.

9-2-6 Noise filter 2

When using multiple units of servo drive and installing one noise filter collectively in the power supply section, consult with the noise filter manufacturer.

• Recommended components

Manufacturer	Manufacturer part number	Voltage specifications for module	Applicable module
SCHAFFNER	FN3288 series	3-phase 400 V AC	A - size B - size

"FN3288-80-34-C35-R65" was used in the EMC compliance tests.

9-2-7 Surge absorber

Install a surge absorber on the primary side of the noise filter.
<Request>
When performing a withstand test for the machines and devices, be sure to remove the surge absorber. Otherwise, the surge absorber may get damaged.

• Recommended components

Manufacturer	Manufacturer part number	Voltage specifications for module	Applicable module
SOSHIN ELECTRIC	LT-C35G102WS	3-phase 400 V AC	A - size B - size

9-2-8 Grounding

(1) To avoid electric shocks, be sure to connect the protective earth terminal (⏚) of the servo drive and the protective earth (PE) of the control panel.

(2) Avoid co-fastening for the connection to the protective earth terminal (⏚). The servo drive is equipped with two protective earth terminals.

9-3 Compliance with the UL standard

[1] Installation environment
Install the servo drive under the environment at pollution level 2 stipulated in IEC60664-1.
Be sure to connect a UL-certified MCCB or fuse to the main power supply.
Use copper conductor wires whose temperature rating is 75 °C or higher.

[2] Short circuit current rating (SCCR)
This servo drive is compatible with power supply whose voltage is less than the maximum input voltage and symmetrical current is 5,000 A or less.

[3] Branch circuit protection
Protect the branch circuit in accordance with the NEC and the local standard.

[4] Load protection and overheating protection
The servo drive has a built-in function to protect against servo motor overload.
The overload protection function is operated based on the specified time limit characteristics when current has reached 115 % or more of the rating.
The servo motor is not provided with an overheating protection function. When it is necessary to satisfy the NEC, implement overheating protection measures for the servo motor.

9-4 Radio Waves Act of South Korea

The servo drive is a Class A device (broadcast communication device for business use) based on the Radio Waves Act of South Korea.
Use the product after understanding the following precautions.

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)

[Reference translation]

Class A device (broadcast communication device for business use)

This product is an electromagnetic wave generating device for business use (Class A), which is intended for the use in places other than household.

The distributor and the user should be attentive to this point.

(Applicable model: Servo Drive)

9-5 Harmonic suppression measures

Harmonic suppression measures are different depending on countries. Perform installation in accordance with regulations in each country.

⚠ Safety Precautions

10. Safety Precautions

■The degree of the injury or damage caused when using the product improperly is categorized and an explanation is provided.

⚠ DANGER	Indicates “actions carrying a significant risk of death or serious injury.”
⚠ CAUTION	Indicates “actions carrying the risk of the occurrence of minor injury or property damage.”

■The actions to be observed are explained with the following symbols.

	Indicates actions that must not be performed.
	Indicates actions that must be performed without fail.

⚠ DANGER

(1) Please use it in the environment of pollution degree 2 or 1 (where there is no foreign matter such as dust, metal powder, oil mist, etc., where it does not come in contact with liquids such as water, oil and grinding liquid). Avoid storing or using it near combustibles or in an atmosphere of corrosive gas (H2S, SO2, NO2, Cl2 etc.) or flammable gas.

(2) Do not place combustible objects near the motor, servo driver, or regenerative braking resistor.

(3) Do not drive the motor with external power. As the motor is driven from the outside, it becomes a generator, so a short circuit current will flow during the dynamic brake operation built into the servo driver, possibly causing smoke and dust. Also, the dynamic brake may break and the brake may not operate.

(4) Do not damage the cable, apply excessive stress, place heavy objects on it, or pinch it.

(5) Please do not use cable with oil and water soaked.

(6) Do not install near heating elements such as heaters or large winding resistors. (Provide a heat shield plate, etc. so that it is not affected by the heating element.)

(7) Do not connect commercial power directly to the motor.

(8) Please do not use in places subject to vibration/shock. When installing the servo driver near the vibration source, attach the vibration isolator to the servo driver mounting surface.

(9) Do not touch the rotating parts of the motor during operation.

(10) Do not touch the key groove of the motor output shaft with bare hands.

(11) Do not touch the inside of the servo driver.

(12) Temperature of the heat sink and peripheral devices of the motor/servo driver will increase, so please do not touch it.

(13) Do not wire or operate with wet hands.

⚠ Safety Precautions

(14) Wiring work should be done by an electrician's expert.

(15) Protective devices are not attached to motors other than those specified. Please protect with overcurrent protection device ·earth leakage circuit breaker, ·temperature overheat prevention device, ·emergency stop device etc.

(16) When operating the servo driver after the earthquake, please check the installation condition of the servo driver/motor and the safety of the machine beforehand and check that there is no abnormality before driving.

(17) After turning off the power supply, the internal circuit is charged with high voltage for a while. When carrying out movement, wiring and inspection, completely shut off the power supply input outside the servo driver, leave it for 15 minutes or more, then perform the operation.

(18) When earthquakes occur, please ensure installation so that fire and personal injury will not occur due to installation.

(19) Install an emergency stop circuit externally so that operation can be immediately stopped and the power can be shut off in case of emergency. There is a possibility of smoking and dust generation due to malfunction of the motor and servo driver to be combined. As an example, if the regenerative control power transistor with built-in servo driver is energized with a short-circuit fault, smoke generation and dust generation due to overheating of the regenerative braking resistor installed outside the servo driver can occur. If a regenerative braking resistor is connected to the outside of the servo driver, install overheat detecting means such as a thermal protector to detect abnormal overheating and shut off the power supply.

(20) Mount the motor, servo driver and peripheral devices on incombustible materials such as metal.

(21) Wiring should be done correctly and reliably. Uncertain wiring and incorrect wiring may cause motor malfunction or thermal damage. Also, during installation/wiring work, please make sure that conductors such as wire scraps do not get inside the servo driver.

(22) Be sure to connect the cables, and insulate the current-carrying parts securely with insulation.

(23) When binding the wires and inserting them in a metal duct or the like for use, the permissible current of the wire will decrease due to the temperature rise, causing thermal damage. Please consider the current reduction coefficient and select the electric wire.

(24) Be sure to install the wiring breaker (MCCB) on the power supply. Be sure to ground the earth terminal or the ground wire. To prevent electric shock and malfunction, we recommend ground resistance 100 Ω or less.

(25) Tighten the screws of the terminal block for connection and the grounding screw securely and securely with the torque indicated in the specification sheet.

(26) When constructing a system using the safety function, please design so as to understand and comply with related safety standards and the description items of our manual or technical document.

⚠ CAUTION

(27) Do not hold the cable or motor shaft during transportation.

(28) In parameter adjustment of the servo driver, do not do extreme gain setting and action of changing the setting value greatly at once, as it may lead to unexpected unstable operation.

(29) Do not approach the machine because there is a possibility of a sudden restart after recovery at the time of a power failure. Please set up the machine to ensure safety to people even after restarting.

(30) Do not approach the motor and the machine driven by it during power-on in preparation for a malfunction.

(31) Do not apply strong impact to the motor shaft.

(32) Do not operate or stop the motor with the magnetic contactor installed on the main power supply side.

(33) Do not turn on/off the main power supply of the servo driver frequently.

(34) When the brake is built in the motor, the built-in brake is for holding, so do not use it for a stop device (braking) to ensure machine safety.

⚠ Safety Precautions

(35) Do not drop or fall over during transportation or installation work.

(36) Do not climb onto the motor or place heavy objects on it.

(37) Please block the heat release hole of the servo driver, please do not put foreign matter.

(38) Please do not use in direct sunlight. When saving, please save at direct sunlight and temperature and humidity within the use range.

(39) Do not disassemble, repair, or modify. Please disassemble repair at our company or our designated store.

(40) Do not start or stop by on/off of Servo ON command (SRV - ON). Dynamic brake circuit built into the servo driver may be damaged.

(41) Please use a combination of motor and servo driver in combination specified by us. Please check your company's performance and safety when combined with other servo driver s.

(42) Failure of the motor and the servo driver to be combined may cause thermal damage to the motor, smoke or dust. Please note that when used in a clean room etc.

(43) Make an appropriate fitting to match the output or body mass.

(44) Ambient temperature and ambient humidity of servo driver/motor should be within allowable ambient temperature and allowable ambient humidity range.

(45) Please observe the specified mounting method and direction.

(46) Set the distance between the servo driver and control panel inner surface or other equipment with a specified distance.

(47) When eye bolts are attached to the motor, use eye bolts only for motor transport and do not use for transporting equipment. Do not use it even when a speed reducer, a face plate, etc. are installed.

(48) Connect a relay that shuts off with an emergency stop in series with the relay for brake control.

(49) When performing trial operation, secure the motor firmly and confirm it in a state separated from the mechanical system.

(50) Make sure that the input power supply voltage is in accordance with the specifications of the servo driver, turn on the power supply and operate. Inputting a voltage higher than the rating may cause smoke or dust inside the servo driver, which may cause motor malfunction or thermal damage in some cases.

(51) When an alarm occurs, remove the cause and restart it. If you restart it unnecessarily without removing the cause, it may cause motor malfunction and thermal damage.

(52) When the brake is built in the motor, the built-in brake may not be able to be held due to the life and machine structure. Please install a stop device to ensure safety on the machine side.

(53) The motor and servo driver generate heat as the motor operates. If it is used in a sealed place, the ambient temperature may rise abnormally. Be careful that the ambient temperature of the motor/servo driver meets the usage range.

(54) Maintenance and inspection should be done by experts.

(55) When not using for a long time, be sure to turn off the power.

(56) When the dynamic brake built into the servo driver operates from high-speed operation, set a stop time of about 10 minutes. If it is used under more conditions, the internal circuit may be disconnected and the brake may not operate.

(57) Secure the cable so that stress is not applied to the connection part of the connector, terminal block, etc.

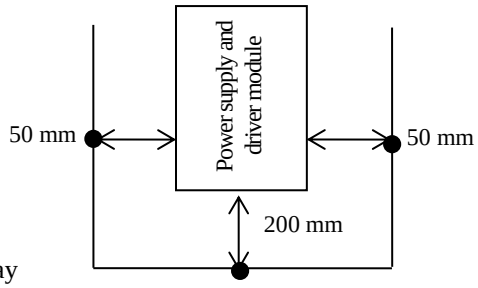
- Capacitance of the capacitors of power supply rectifier circuit drops over time. To avoid a secondary problem due to a failure, replacement of capacitors is recommended at an interval of approximately 5 years. Commission the manufacturer or sales agency authorized by the manufacturer to replace the parts.
- Be sure to read operating manual (safety guide) that shipped with product before use.

⚠ Safety Precautions

Temperature around the drive

The life span of the drive significantly depends on ambient temperature.
Make sure that temperature within 200 mm from the drive and power supply not exceed the working temperature range.

If it is impossible to measure temperature in a place 50 mm away from the servo drive, perform measurement at the mid point in the clearance between the obstacle and the servo drive.



Working temperature range: 0 to 40 °C

Panasonic

11. Life span

(This is not a guaranteed item.)

11-1 Expected life span of the power supply and driver module

When the servo drive is used continuously under the following conditions, the expected life span is 28,000 hours.
Definition of life ... The time from when the product is shipped until the capacity of the electrolytic capacitor is reduced by 20 %

Conditions

Input power supply	:	3-phase 400 V AC, 50/60 Hz,
Ambient temperature	:	40 ºC
Above sea level	:	1,000 m or less
Output torque	:	Constant rated torque
Rotation speed	:	Constant rated rotation speed

Life span changes significantly depending on working conditions.

11-2 Standard life span

11-2-1 In-rush current protection circuit

The expected life span of the in-rush current protection circuit is approx. 20,000 times. However, it varies depending on environmental conditions and usage.

11-2-2 Cooling fan

The standard replacement period of the cooling fan is approx. 20,000 hours. However, it varies depending on environmental conditions and usage.

12. Warranty

12-1 Warranty period

Warranty period shall be 12 months from the ex-factory date or 18 months from the date of manufacturing.
This Warranty shall be exempted in the following cases,

(1) defects resulting from misuse and/or repair or modification by the customer.

(2) defects resulting from drop of the Product or damage during transportation.

(3) defects resulting from improper usage of the Product beyond the Specifications.

(4) defects resulting from fire, earthquake, lightening, flood, damage from salt, abnormal voltage or other natural disasters.

(5) defects resulting from the intrusion of foreign material to the Product, such as water, oil or metallic particles.

(6) when the typical life of components that is described exceeds.

12-2 Warranty scope

When failure occurs due to our responsibility during the warranty period, we will respond only to the replacement or repair of the failed part of the single unit delivered by our company. In addition, the responsibility of our company is limited to the replacement and repair of the single unit delivered by our company, we shall not bear any responsibility for damages of your company and third parties caused by equipment malfunction delivered by our company. We are not responsible for any of the exclusion items stated in 12-1 above or any malfunction of the equipment which occurred in any of the cases and damages of your company and third party.

(1) If the equipment is incorporated or used contrary to the instructions or notices stipulated in this specification.

(2) When there is a cause for the combination of the equipment and the product incorporating the equipment.

(3) If you cannot respond to the items you are asking for in this specification.

(4) In case of malfunction of equipment other than our responsibility.

12-3 Warranty service

If you need to receive warranty service (troubleshooting cause repair/repair etc.), please contact us.
If you send us directly to our company after consent of the purchaser, please receive "repair/survey request form" from the supplier, after filling in the necessary items, attach it to the product and send it to our motor service reception. As a rule shipping fee will be paid by the customer.

13. Network security

When using this product connected to a network, the following damages may occur.

(1) Leakage of information via this product.

(2) Unauthorized operation of this product by a malicious third party.

(3) Interference of this product by a malicious third party.

In order to prevent such damage, take sufficient network security countermeasures including the following under your responsibility.
We are not responsible for any damage caused by insufficient network security.

<Notes on network security>

- Please use this product in an environment where only a limited member can enter.
- Do not install this product in a place where the product and accessories such as cables can be easily destroyed.
- Use this product on a network that is not connected to the Internet.
- If an external device such as a PC or tablet is connected to this product, there is a concern about the effects of computer viruses and malicious programs. Take appropriate security measures for external devices, such as checking for computer virus infection and periodic removal before connecting external devices.

14. Others

(1) Precautions for exporting this product and equipment incorporating this product.
When the end user of this product and the end use relates to military or weapons etc., it may become subject to export restrictions prescribed by the "Foreign Exchange and Foreign Trade Control Law", so when it is exported, the examination and necessary export. Please take a procedure.

(2) This product is designed for general industrial products etc. Do not use it in nuclear power control, aerospace equipment, transportation equipment, medical equipment, various safety devices, devices requiring cleanliness such as devices related to human life, special environment.

(3) Please confirm the conformity of the standards, laws, etc. in the finished equipment, and the matching of the structure, dimensions, life span, characteristics, etc. with your equipment and parts installed at your company.

(4) Since it is possible that your completed equipment will malfunction due to malfunction of our products (signal breakage, signal phase loss, etc.) and external noise/static electricity applied operation, so your company to ensure safe operation within the operable range at the operation location.

(5) Since overloading of products causes load collapse, please follow the display.

(6) If the machine is operated in a state where the motor shaft is not electrically grounded, there is a risk of electric corrosion of the motor bearing occurring depending on the actual machine and the installation environment and the bearing sound may become large, so at your company please confirm.

(7) Tighten properly the tightening torque of the mounting screw of the product so as not to loosen or break, considering the strength of the screw to be used and the material of the installation destination.

(8) Since there is a possibility that noise resistance performance may be influenced by the wiring situation (earth grounding method, cable length, signal line shielding situation) etc., please check noise immunity even if placed in your completed equipment.

(9) When discarding the servo driver/motor, please handle it as industrial waste.

(10) When disposing of the battery, please insulate the battery with tape etc. and dispose according to the ordinance of the municipality.

(11) For performance improvement or other reasons, some components of this product may be modified in a range that satisfies the specifications given in this document.

(12) Specification change shall be made by our specifications or documents specified by your company, and if there is an influence on function/characteristics, we will change specification after reviewing on prototype.

(13) If there is a change in the specification, the product price may change.

(14) Please contact us beforehand with items that are not described in this specification and in particular need to be arranged.

(15) When a problem occurs, we will respond after consultation on both sides based on the items described in this specification.

(16) There is a possibility of smoking of about 1 cigarette depending on the content of breakdown of this product. Please note that when used in a clean room etc.

(17) Do not use benzene, thinner, alcohol, acidic or alkaline detergents as they may discolor or break the exterior.

(18) Do not reverse engineer, decompile, or disassemble this product.