

24V Power Supply Unit **PSA-24**

Instruction Manual Fourth Edition ME0379-4C



PSA-24 Specifications	Chapter 1
Specifications	Chapter 2
Installation and Wiring	Chapter 3
Operation	Chapter 4
Before Considering Failure	Chapter 5
Maintenance and Inspection	Chapter 6
Warranty	Chapter 7
Appendix	Chapter 8

Please Read Before Use

Thank you for purchasing our product.

This instruction manual explains the handling methods, structure and maintenance of this product, providing the information you need in order to use the product safely.

Before using the product, be sure to read this manual and fully understand the contents explained herein to ensure safe use of the product.

Please download the user's manual from our website.

You can download it free of charge. User registration is required for the first time downloading.

URL : www.iai-robot.co.jp/data_dl/CAD_MANUAL/

When using the product, print out of the necessary portions of the relevant manual, or please display it on your computer, tablet terminal, etc. so that you can check it immediately.

After reading the instruction manual, keep it in a convenient place so that whoever is handling the product can refer to it quickly when necessary.

[Important]

- This instruction manual is an original document dedicated for this product.
- This product cannot be used in ways not shown in this instruction manual. IAI shall not be liable for any result whatsoever arising from the use of the product in any other way than what is noted in the manual.
- The information contained in this instruction manual is subject to change without notice for the purpose of product improvement.
- If any issues arise regarding the information contained in this instruction manual, contact our customer center or the nearest sales office.
- Use or reproduction of this instruction manual in full or in part without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the text are registered trademarks.

PSA-24 Power Supply Unit Instruction Manual Configuration

Product name	Instruction manual name	Control number
24V Power Supply Unit PSA-24	Instruction Manual (this document)	ME0379

Contents

Safety Guide	Intro-1
Precautions for Handling	Intro-8
International Standard Compliance	Intro-9
EMC specifications	Intro-9
Safety standard specifications	Intro-10

Chapter 1 PSA-24 Specifications

1.1 Overview	1-1
1.2 Features	1-2
1.3 Part Names and Functions	1-3
1.3.1 Part Names	1-3
1.3.2 Functions of each part	1-5

Chapter 2 Specifications

2.1 Checking the Product	2-1
2.1.1 Components	2-1
2.1.2 How to Read the Model Nameplate	2-2
2.1.3 How to Read the Model Number	2-3
2.2 General Specifications	2-4
2.2.1 Input specifications	2-4
2.2.2 Output specifications	2-5
2.2.3 Protective function specifications	2-6
2.2.4 Insulation specifications	2-8
2.3 Specification Details	2-9
2.3.1 Output voltage	2-9
2.3.2 Output Current Characteristics during Parallel Operation	2-11
2.4 External Dimensions	2-12

Chapter 3 Installation and Wiring

3.1 Environmental Conditions	3-1
3.2 Heat Dissipation and Mounting	3-3
3.3 Connection to Peripheral Devices (Overall Electrical Wiring Diagram)	3-5
3.4 Connection Cables	3-6
3.4.1 Communication cable	3-6
3.4.2 Power supply cable	3-7
3.5 Wiring for Case of Parallel Operation	3-8
3.5.1 Conditions Available for Parallel Operation	3-8
3.5.2 Caution Regarding Wiring	3-8
3.5.3 Example of Wiring in Parallel Operation	3-9

Chapter 4 Operation

4.1 Power ON/OFF sequence	4-1
4.2 Inrush current prevention circuit	4-2
4.3 Overload detection	4-3

Chapter 5 Before Considering Failure

5.1 Before Considering Failure 5-1

Chapter 6 Maintenance and Inspection

6.1 Precautions for inspection 6-1
6.1.1 Precautions for inspection 6-1
6.2 Consumable Parts 6-2
6.3 Replace components 6-3
6.3.1 Replacement of Fan Unit 6-3
6.4 Preventive Maintenance Function 6-5
6.4.1 Connection method 6-5
6.4.2 Status data 6-8
6.4.3 Fan installation 6-9

Chapter 7 Warranty

7.1 Warranty Period 7-1
7.2 Scope of the Warranty 7-1
7.3 Honoring the Warranty 7-1
7.4 Limited Liability 7-2
7.5 Conformance with applicable standards/regulations, etc.,
and application conditions 7-2
7.6 Other items excluded from warranty 7-2

Chapter 8 Appendix

8.1 Connected Unit Count Determination Method 8-1
8.2 Relation of Actuator and Power Supply Current 8-3
8.3 Index 8-13

Revision History Post-1

Safety Guide

“Safety Guide” has been written to use the machine safely and so prevent personal injury or property damage beforehand. Make sure to read it before the operation of this product.

Safety Precautions for Our Products

The common safety precautions for the use of any of our robots in each operation.

No.	Operation Description	Description
1	Model Selection	<ul style="list-style-type: none"> ● This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications. <ol style="list-style-type: none"> 1) Medical equipment used to maintain, control or otherwise affect human life or physical health. 2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility) 3) Important safety parts of machinery (Safety device, etc.) ● Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product. ● Do not use it in any of the following environments. <ol style="list-style-type: none"> 1) Location where there is any inflammable gas, inflammable object or explosive 2) Place with potential exposure to radiation 3) Location with the ambient temperature or relative humidity exceeding the specification range 4) Location where radiant heat is added from direct sunlight or other large heat source 5) Location where condensation occurs due to abrupt temperature changes 6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid) 7) Location exposed to significant amount of dust, salt or iron powder 8) Location subject to direct vibration or impact ● For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.

No.	Operation Description	Description
2	Transportation	<ul style="list-style-type: none"> ● When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. ● Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the instruction manual for each model. ● Do not step or sit on the package. ● Do not put any heavy thing that can deform the package, on it. ● When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. ● When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment’s capability limit. ● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. ● Do not get on the load that is hung on a crane. ● Do not leave a load hung up with a crane. ● Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	<ul style="list-style-type: none"> ● The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. ● Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.
4	Installation and Start	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> ● Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake. ● Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. ● When using the product in any of the places specified below, provide a sufficient shield. <ol style="list-style-type: none"> 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	<p>(2) Cable Wiring</p> <ul style="list-style-type: none"> ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. <p>(3) Grounding</p> <ul style="list-style-type: none"> ● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. ● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). For detail, follow the description in an instruction manual of each controller or controller built-in actuator. ● Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below).





No.	Operation Description	Description
4	Installation and Start	<p>(4) Safety Measures</p> <ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot’s movable range. When the robot under operation is touched, it may result in death or serious injury. ● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. ● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. ● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. ● When the installation or adjustment operation is to be performed, give clear warnings such as “Under Operation; Do not turn ON the power!” etc. Sudden power input may cause an electric shock or injury. ● Take the measure so that the work part is not dropped in power failure or emergency stop. ● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. ● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	<ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign “Under Operation” at the position easy to see. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>

No.	Operation Description	Description
6	Trial Operation	<ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation. ● When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation. ● Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc. ● Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.
7	Automatic Operation	<ul style="list-style-type: none"> ● Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence. ● Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication. ● Make sure to operate automatic operation start from outside of the safety protection fence. ● In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product. ● When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.

No.	Operation Description	Description
8	Maintenance and Inspection	<ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. ● When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign “Under Operation” at the position easy to see. ● For the grease for the guide or ball screw, use appropriate grease according to the instruction manual for each model. ● Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. ● The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation. ● Pay attention not to lose the removed cover or screws, and make sure to put the product back to the original condition after maintenance and inspection works. <p>Use in incomplete condition may cause damage to the product or an injury.</p> <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>
9	Modification and Dismantle	<ul style="list-style-type: none"> ● Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	<ul style="list-style-type: none"> ● When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. ● When removing the actuator for disposal, pay attention to drop of components when detaching screws. ● Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.
11	Other	<ul style="list-style-type: none"> ● Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device. ● See Overseas Specifications Compliance Manual to check whether complies if necessary. ● For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure the safety. ● Using the devise in a way not indicated by IAI may lose the protection performance equipped to the device.

Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the instruction manual for each model.

Level	Degree of Danger and Damage	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	 Warning
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	 Caution
Notice	This indicates lower possibility for the injury, but should be kept to use this product properly.	 Notice

Precautions for Handling

- **The Safety Guide attached with the product is intended to permit safe use of the product and thus to prevent risks and property damage. Be sure to read it before handling the product.**
- Do not attempt any handling or operation that is not indicated in this instruction manual.
- PSA-24 Power Supply is a power supply unit dedicated for IAI controllers which utilize 24V DC.
- Specifications include a wide input voltage range of 100 to 230V AC.
- Even when this unit has insufficient power capacity, there is no need to replace it with a larger-capacity power supply.
- Another identical power supply unit can be added to the connection to perform parallel operation. Connection of up to 5 units is supported.
- This power supply unit has some voltage fluctuation so that it can be used in parallel operation. (24V \pm 10%)
- Do not connect power supply units other than PSA-24 in parallel. Do not connect with PS-24 in parallel either.
- Do not connect PSA-24 (without fan) and PSA-24L (with fan) in parallel.
- Make sure that the connection to I/O terminals is configured properly, as shown in this Instruction Manual.
- When wiping dirt off the product, use a neutral detergent. Do not use alcohol, etc., which may damage the paint and silk printing on the surface.

International Standard Compliance

EMC specifications

This power supply unit satisfies the following EMC specifications.

Item	Condition	Specifications
Noise-resistance ability (Impulse noise test)	±2,000V Pulse width (100/1,000ns, repeating cycle 30-100Hz, normal/common mode, 10-minute positive/negative polarity switching)	No output DC fluctuations or malfunctions
Electrostatic discharge	EN 61000-4-2 compliant Air discharge: 8kV / Contact discharge: 6kV Implemented in FG/case Application: Each location 10 times (1s/1 time)	No malfunction/failure
Radioactive radio frequency electromagnetic fields	EN 61000-4-3 compliant 10V/m (80-1,000MHz) 3V/m (1.4-2GHz) 1V/m (2-2.7GHz)	No malfunction/failure
Fast transient burst	EN 61000-4-4 compliant Line/PE: ±2kV	No malfunction/failure
Lightning surge	EN 61000-4-5 compliant Normal: ±1kV / Common: ±2kV Application: 5 times each	No malfunction/failure
Conductive radio frequency electromagnetic fields	EN 61000-4-6 compliant 10V	No malfunction/failure
Power-frequency magnetic field immunity	EN 61000-4-8 compliant 30A/m	No malfunction/failure
Voltage dip/fluctuations	EN 61000-4-11 compliant Continuous rated output 330W	100% voltage dip, 1 cycle (20ms) Continues normal operation 60% voltage dip, 10 cycles (200ms) 30% voltage dip, 25 cycles (500ms) 100% voltage dip, 250 cycles (5s) Recovers upon reboot
Noise terminal voltage	VCCI/FCC/CISPR22/EN55022 Class B · Rated input / continuous rated output 330W	Power supply unit alone satisfies the standards
Radiated disturbance	VCCI/FCC/CISPR22/EN55022 Class B · Rated input / continuous rated output 330W	Power supply unit alone satisfies the standards

 **Safety standard specifications**

This power supply unit meets the following safety standards.

Item	Standards
UL/cUL	UL61010-1
CE Marking	LVD: EN61010 / EMC: EN55011

Power supply unit

Chapter 1

PSA-24 Specifications

1.1 Overview.....	1-1
1.2 Features	1-2
1.3 Part Names and Functions.....	1-3
1.3.1 Part Names	1-3
1.3.2 Functions of each part	1-5

1.1 Overview

"PSA-24" is tuned so that this power supply unit varies the setting voltage in accordance with the operation of a motor thus increase and decrease of load current.

As it operates always varying the setting voltage to the optimum in accordance with the acceleration/deceleration of an actuator, it possesses the specifications that has less chance of generating the over-voltage or voltage drop error compared to a general fixed voltage power supply.

It is the power supply optimum to IAI products which rapidly changes the load.



PSA-24
(204W / Standard type)



PSA-24
(330W / Fan-Equipped Type)

PSA-24 is applicable for the input power supply 100 to 230V AC, and there are continuous rating 204W (standard type) and 330W (fan-equipped type)^(*1) in the output power supply.

Monitor output during operation is available and each type of status data is available to output via the field network.

* Add the fan unit PSA-FU to PSA-24 and it can be used as 330W.

1.2 Features

(1) Input Power Supply and Output Power Supply

- The input voltage is applicable for the wide input from 100 to 230V AC. Also, as it is equipped with PFC, it is also applicable for the harmonic regulations.
- The output power supply is a continuous rating 204W and transient peak 408W (condition with no fan unit). In addition, by making it equipped with a fan, it can be used as a continuous rating 330W and transient peak 408W.

(2) Monitoring during Operation is Available

Monitoring of each type of status data (output voltage, output current, peak current and load ratio) on the PC tool is available.

By connecting communication to the RCON gateway unit or SEL unit, monitoring of the status data via the field network is available.

(3) Applying to Predictive Maintenance

It is equipped with a predictive maintenance feature by detecting drop of fan revolution.

(4) Miniaturized Size

By adopting an efficient LLC resonant system, heat radiation is controlled and miniaturization was realized smaller than any other existing power supply unit. In addition, by having the R-unit controller on the same height, when used it in combination with RCON, RSEL or REC, it can be easily installed on the same control panel.

Also, installation can be performed both with DIN rails and with screw attachment.

(5) Parallel Connection of PSA-24

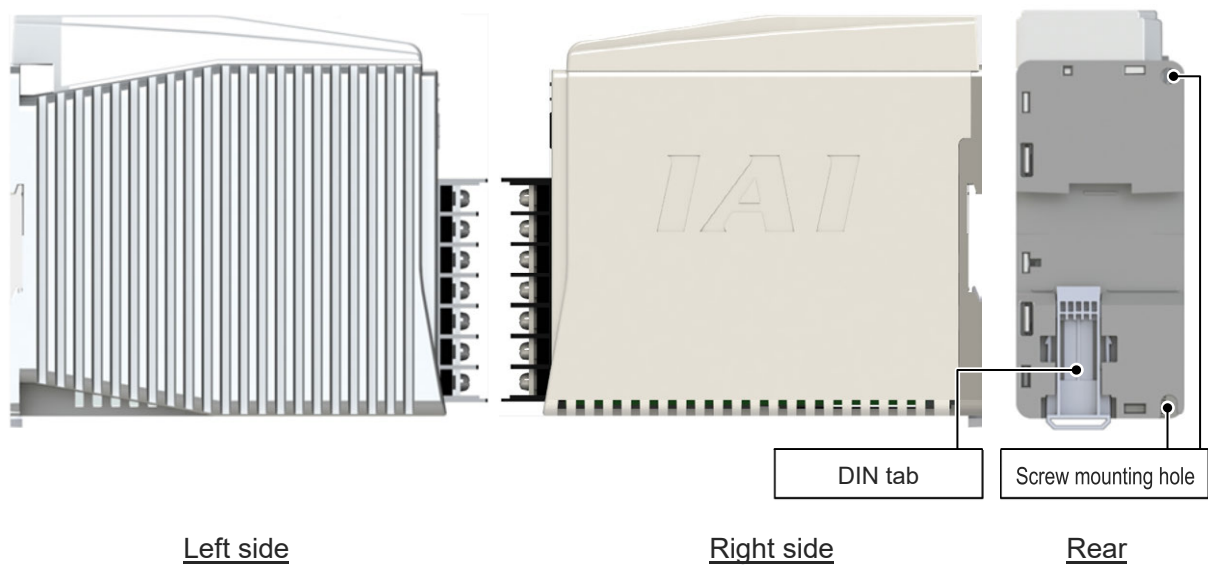
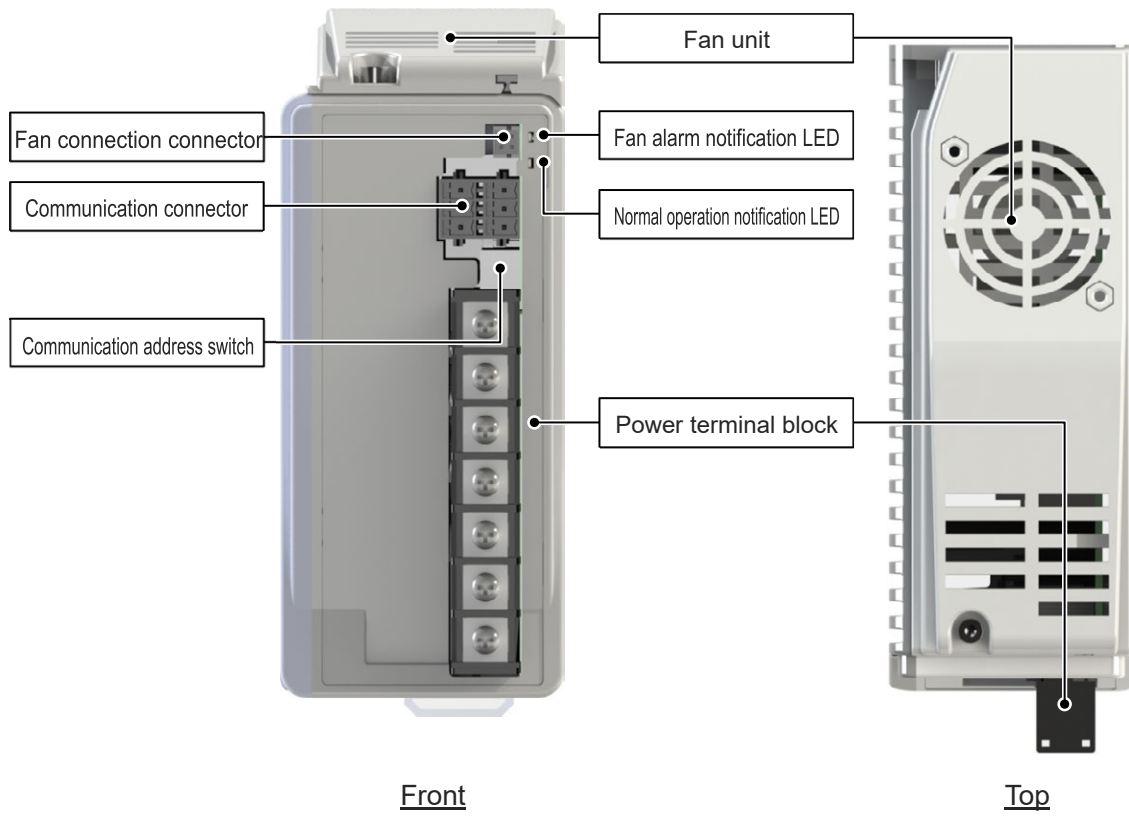
In order to have several motors run together, it is available to have five units at the maximum in parallel for operation.

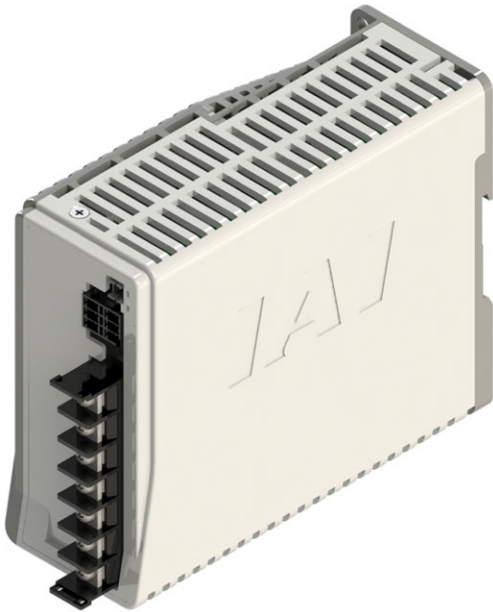
Refer to [Chapter 3 Installation and Wiring] for details.

1.3 Part Names and Functions

1.3.1 Part Names

1. PSA-24 Specifications





PSA-24 (204W / without fan)



PSA-24L (330W / with fan)



1.3.2 Functions of each part

(1) Fan alarm notification LED / normal operation notification LED

This power supply unit is equipped with the following two kinds of LED.



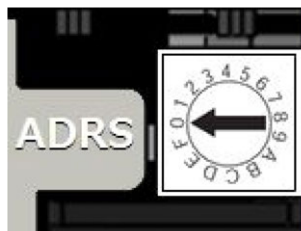
Name	Panel notation	Display color	Status	Description
Fan alarm notification LED	FAN	Orange	Light ON	Fan rotation speed abnormality
			Blinking	Fan rotation speed warning
			Light OFF	No fan abnormality *1
Normal operation notification LED	SYS	Green	Light ON	Normal operation
			Light OFF	Stopped *2

*1: The LED is OFF when the fan is not connected.

*2: During parallel operation at light load, this LED may be OFF even if an AC power supply is connected, since only some of the power supplies may be operating. It lights up when the load increases and operation starts.

(2) Communication address switch

Sets the allocation of the slave address for communication when multiple power supply units are connected by using multi-drop and while monitoring status via communication.

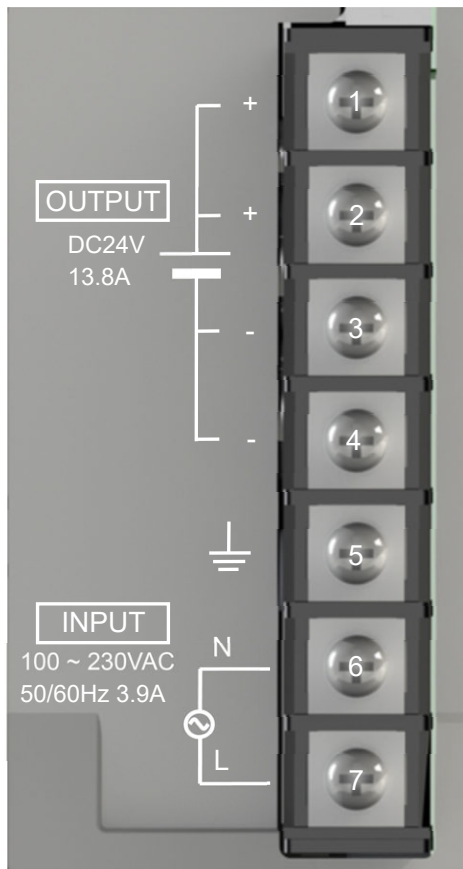


Switch name: DRR 7016C (Copal)

Item	Description
Initial value	"0"
Setting range	"0" to "F"


(3) Power terminal block

Terminal block for AC power supply input, frame ground, and output voltage wire connections.



Connector name: DT-5C-B84W-6717-07 (DINKLE)

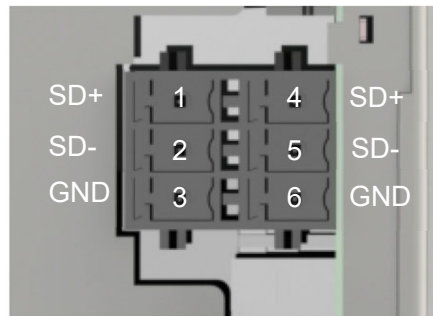
Pin No.	Signal	Description
1	+24 V	24V output terminal (Pins 1 and 2 are internally connected)
2	+24 V	
3	0 V	0V output terminal (Pins 3 and 4 are internally connected)
4	0 V	
5	FG	Frame ground terminal (ground terminal connected to power supply housing) *1
6	AC(N)	AC input neutral terminal (Grounded side)
7	AC(L)	AC input live terminal (Ungrounded side)

*1: "  " represents a functional earthing terminal.

(4) Communication connector

Connector for monitoring status data inside the power supply by communication. In order to enable communication of multiple power sources by multi-drop, two connection ports are provided. The differential signal of each connection port is short-circuited, so any port can be used for connection. The cable side connector is an accessory.

Even if the communication connector is not connected, it does not affect the operation of the power supply unit itself.



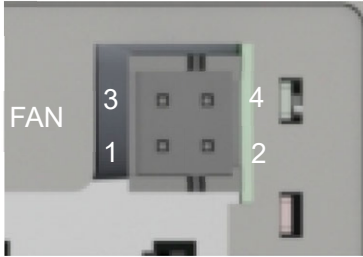
Board-side connector name : 0221-26-6615-06THT (DINKLE)

Cable-side connector name (accessory) : 0221-2403 (DINKLE)

Pin No.	Signal	Description
1	SD+	RS-485 differential signal + side
2	SD-	RS-485 differential signal - side
3	GND	
4	SD+	RS-485 differential signal + side
5	SD-	RS-485 differential signal - side
6	GND	

(5) Fan connection connector

Fan connection connector used when continuous rated output is at 330 W.



Board-side connector name: DF11-4DP-2DS(24) (HIROSE)

Pin No.	Signal	Description
1	24 V	Fan power supply
2	CONNECT	Connection recognition signal (Connected: H / Not connected: L)
3	GND	Fan GND
4	PULSE	Fan rotation speed pulse

Power supply unit

Chapter 2




Specifications

2.1 Checking the Product	2-1
2.1.1 Components	2-1
2.1.2 How to Read the Model Nameplate	2-2
2.1.3 How to Read the Model Number	2-3
2.2 General Specifications	2-4
2.2.1 Input specifications	2-4
2.2.2 Output specifications	2-5
2.2.3 Protective function specifications	2-6
2.2.4 Insulation specifications	2-8
2.3 Specification Details	2-9
2.3.1 Output voltage	2-9
2.3.2 Output Current Characteristics during Parallel Operation	2-11
2.4 External Dimensions	2-12

2.1 Checking the Product

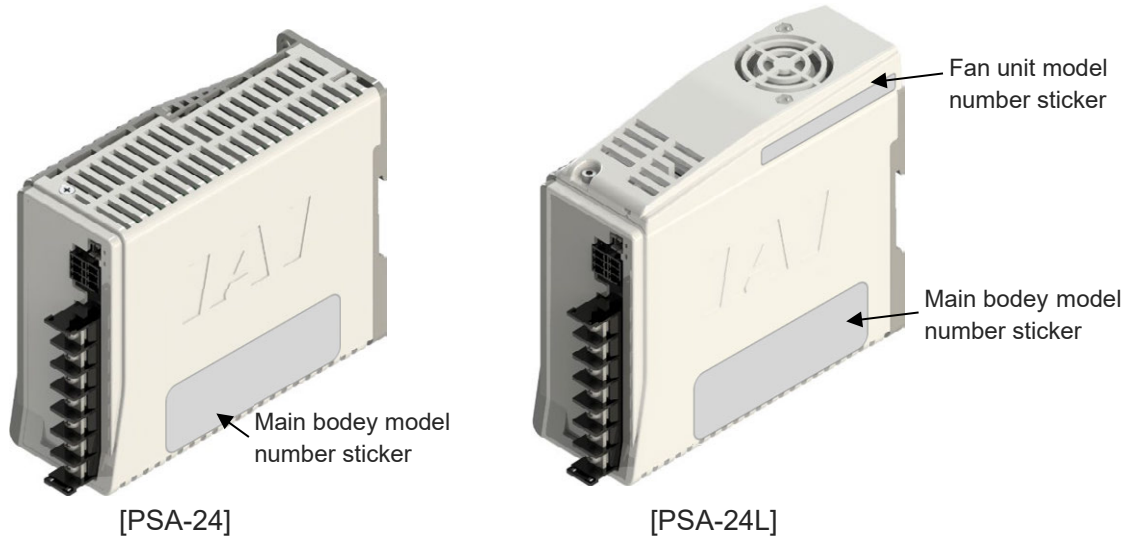
2.1.1 Components

The standard configuration of this product is comprised of the following parts.
In the unlikely case that any model number errors or missing parts come to light, contact your local IAI distributor.

	Part name	Shape	Quantity	Remarks
Main body	24V power supply		1	Model example : PSA-24 (L)
	Communication connector		2	Model : 0221-2403
Accessories	Safety Guide		1	M0194

2.1.2 How to Read the Model Nameplate

The place of the model nameplate attached on this product and how to read it are as explained below.



[PSA-24] Main body model number sticker

Model	→	IAI Corporation	QR
Serial number	→	MODEL PSA-24	
Rated input	→	S/ N 0123456789	
Rated output	→	INPUT : AC100~230V,50/60Hz,2.5A	
		OUTPUT : DC24V,8.5A typ	
		CE cULus	E 495010
		⚠ ⚠	MADE IN JAPAN

[PSA-24L] Main body model number sticker

Model	→	IAI Corporation	QR
Serial number	→	MODEL PSA-24L	
Rated input	→	S/ N 0123456789	
Rated output	→	INPUT : AC100~230V,50/60Hz,3.9A	
		OUTPUT : DC24V,13.8A typ	
		CE cULus	E 495010
		⚠ ⚠	MADE IN JAPAN

[English]
 ⚠ Caution: Refer to [Instruction manual]. Electric shock caution.
 ⚠ Hot surface: Hot temperature caution.

[French]
 ⚠ Prudence : Reportez-vous au [manuel d'instructions]. Attention aux chocs électriques.
 ⚠ Surface chaude : Avertissement de température chaude.

Fan unit model number sticker

Serial number	→	S/N 0123456789	
Model	→	MODEL PSA-FU	QR

2.2 General Specifications

2.2.1 Input specifications

Item	Specifications		Terms of use, etc.
Power input voltage range	100 to 230V AC \pm 10%		
Power supply current	100V AC	2.5A or less	Continuous rated output 204W
		3.9A or less	Continuous rated output 330W
	200V AC	1.4A or less	Continuous rated output 204W
		1.9A or less	Continuous rated output 330W
Power frequency range	50/60Hz \pm 5%		
Inrush current ^{*1}	100V AC	17A (typ)	At cold start (25°C)
	200V AC	34A (typ)	
	100V AC	27.4A (typ)	At cold start (40°C)
	200V AC	54.8A (typ)	
Momentary power failure resistance	50Hz	20ms	
	60Hz	16ms	
Electric shock protection mechanism	Class I		
Efficiency	100V AC	86% or more	Continuous rated output 204W
	200V AC	90% or more	
Power factor	100V AC	99% (typ)	Continuous rated output 204W
	200V AC	90% (typ)	

*1: The pulse width of flowing inrush current is less than 5 ms. In parallel operation, inrush current increases according to the number of units. Check the characteristics thoroughly before selection to prevent the breaker from tripping due to inrush current.

2.2.2 Output specifications

Item	Specifications		Terms of use, etc.
Rated output voltage	24V		
Output voltage range *1	24V ±10%		
Continuous rated output 204W	8.5A		Without fan
Continuous rated output 330W	13.8A		With fan
Peak output *2	17A (408W)		
Default initial voltage	25.5V (typ)		No load
Ripple voltage	0 to 70°C	120mV or less	0A to 13.8A
	10 to 0°C	160mV or less	
Ripple noise voltage	0 to 70°C	150mV or less	0A to 13.8A
	10 to 0°C	180mV or less	
Startup time	2 seconds or less		Rated input / continuous rated output 330W
Output retention time	20ms or more		Rated input / continuous rated output 204W
	12ms or more		Rated input / continuous rated output 330W

*1: In order to enable parallel operation, this power supply can vary the output voltage according to the load. Therefore, the power supply unit is dedicated for IAI controllers. Refer to [2.3.1 Output voltage] for the characteristics of output voltage by load.

*2: Peak output conditions are as follows.

- Peak current duty cycle is within 30%

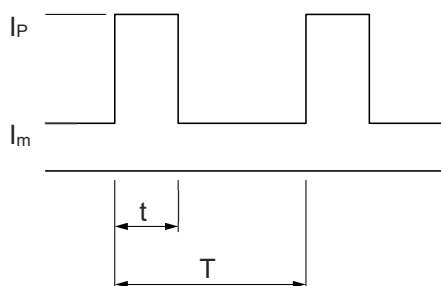
$$D \leq 0.3$$

- Peak current energization time is within 10 seconds

$$t \leq 10 \text{ [s]}$$

- The average current is within the continuous rated current value I_o defined by rated output derating (Refer to [3.1 Environmental Conditions / Figure 3.1.1 Derating with regard to ambient temperature] for derating)

$$\sqrt{(I_p^2 \times D) + (I_m^2 \times (1 - D))} \leq I_o$$



D = Duty cycle t/T [S]

t = Peak current pulse width [S]

T = Cycle [S]

I_p = Peak current value [A]

I_m = Minimum current value [A]

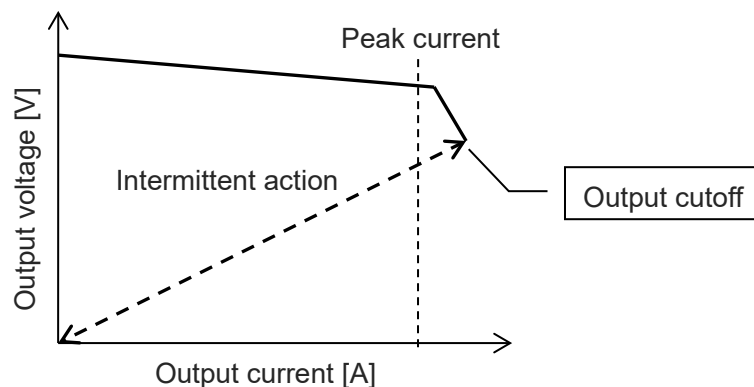
I_o = Rated current value specified in the Rated [A]

Figure 2.2.1 Peak output power conditions

2.2.3 Protective function specifications

Item		Specifications
Overcurrent protection	Operation	Output is cut off when a current exceeding the peak capacity flows (including short circuits) [Refer to "Output voltage" on page 4-1]
	Protection method	Intermittent action during dip ^{*1}
	Recovery	Automatic recovery
Overheat protection	Operation	Output is cut off when overheating is detected by the temperature sensor on the circuit board
	Protection method	Output stop (latch)
	Recovery	AC restart
Overload protection	Operation	Output is cut off when continuous operation is performed at continuous rated output or more ^{*2} (Continuous operation exceeding the peak output power conditions specified in Figure 2.2.1) [Refer to "Overload detection" on page 4-8]
	Protection method	Output voltage dip
	Recovery	Automatic recovery
Overvoltage protection	Operation	Output is cut off when the output voltage reaches 30 V or more
	Protection method	Output stop (latch)
	Recovery	AC restart
Input undervoltage protection	Operation	Output is cut off when the input voltage fails to reach 82 VAC
	Protection method	Output stop
	Recovery	Automatic recovery
Fan rotation detection	Operation	Detects errors when 50% or less of rated rotation speed is detected
	Protection method	· Notification by signal and LED · Overload protection level is switched to continuous rated output of 204W ^{*2}
	Recovery	Latch error condition

* 1: The overcurrent protection has the characteristics shown in the diagram below. After the output is cut off due to overcurrent, the unit recovers automatically. The output cutoff is repeated if the cause of the overcurrent is not removed (intermittent action).



- * 2: When fan connection is detected at startup, it can be used at continuous rated output 330W by switching the overload protection level. The overload protection level is decreased in case of fan malfunction, so the continuous rated output is restricted to 204W.

2.2.4 Insulation specifications

Item		Condition	Specifications
Dielectric withstand voltage	AC input-DC output	3,000V AC 1 min	Leakage current 10mA
	AC input-FG	2,000V AC 1 min	Leakage current 10mA
	DC output-FG	500V AC 1 min	Leakage current 25mA
Insulation resistance	AC input-DC output	–	50MΩ or more at 500V DC
	AC input-FG	–	50MΩ or more at 500V DC
	DC output-FG	–	50MΩ or more at 500V DC
Leakage current *1		100V AC	0.40mA typ
		200V AC	0.75mA typ

*1: Regulations for leakage current in power supply units.

2.3 Specification Details

2.3.1 Output voltage

General power supplies use control to maintain a constant output voltage and thus only supplies with the highest output voltage will bear the full load current when connected in parallel, preventing the output current from being balanced.

This power supply realizes parallel operation by varying the output voltage within the range of $24V \pm 10\%$ according to the output current as shown below. This characteristic is the same for single unit operation. Accordingly, parallel operation is made possible simply by connecting output voltage lines to each other.

The output voltage is 25.5V at no load and decreases with increases in load, but this is not a problem at all for operation of IAI 24V controllers.

Although the operation range differs between PSA-24 (204W) and PSA-24L (330W), the output voltage fluctuates within the range of the shaded area in both cases. The output voltage is cut off by the protection circuit if the overvoltage detection level is exceeded.

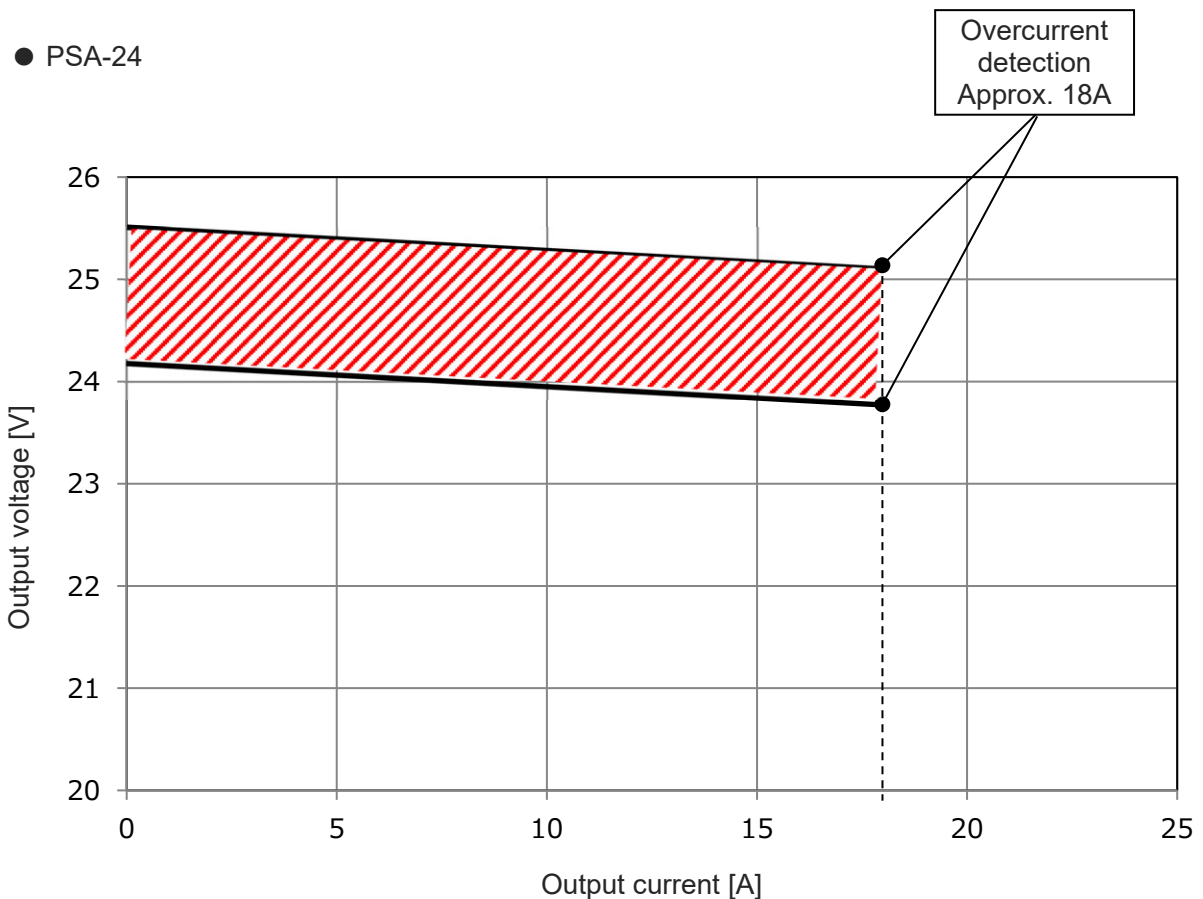


Figure 2.3.1 Output voltage fluctuation due to load (PSA-24)

● PSA-24L

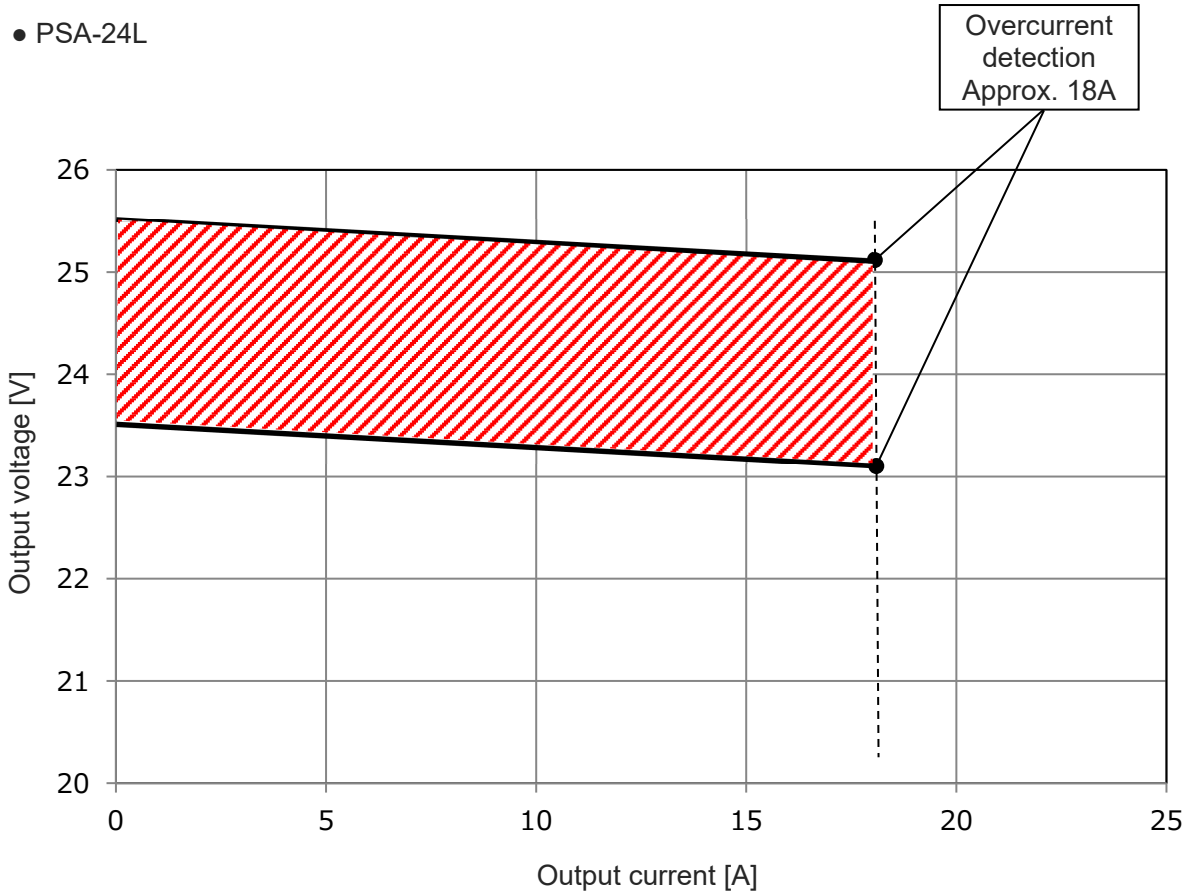


Figure 2.3.2 Output voltage fluctuation due to load (PSA-24L)

2.3.2 Output Current Characteristics during Parallel Operation

When connecting multiple power supplies in parallel, the upper limit of the output current characteristic should be 90%.

The number of units available for parallel connection and the allowable current are as shown in the table below.

No. of connected units [unit]	Rated current [A]		Peak current [A]
	PSA-24	PSA-24L	PSA-24/PSA-24L
1	8.5	13.8	17.0
2	15.3	24.8	30.6
3	22.95	37.3	45.9
4	30.6	49.7	61.2
5	38.25	62.1	76.5

1 unit Rated current (PSA-24/PSA-24L): 8.5 / 13.8A, Peak current: 17.0A

2 to 5 units... Rated current [A]: rated current of 1 unit x number of units x 0.9

Peak current [A]: peak current of 1 unit x number of units x 0.9

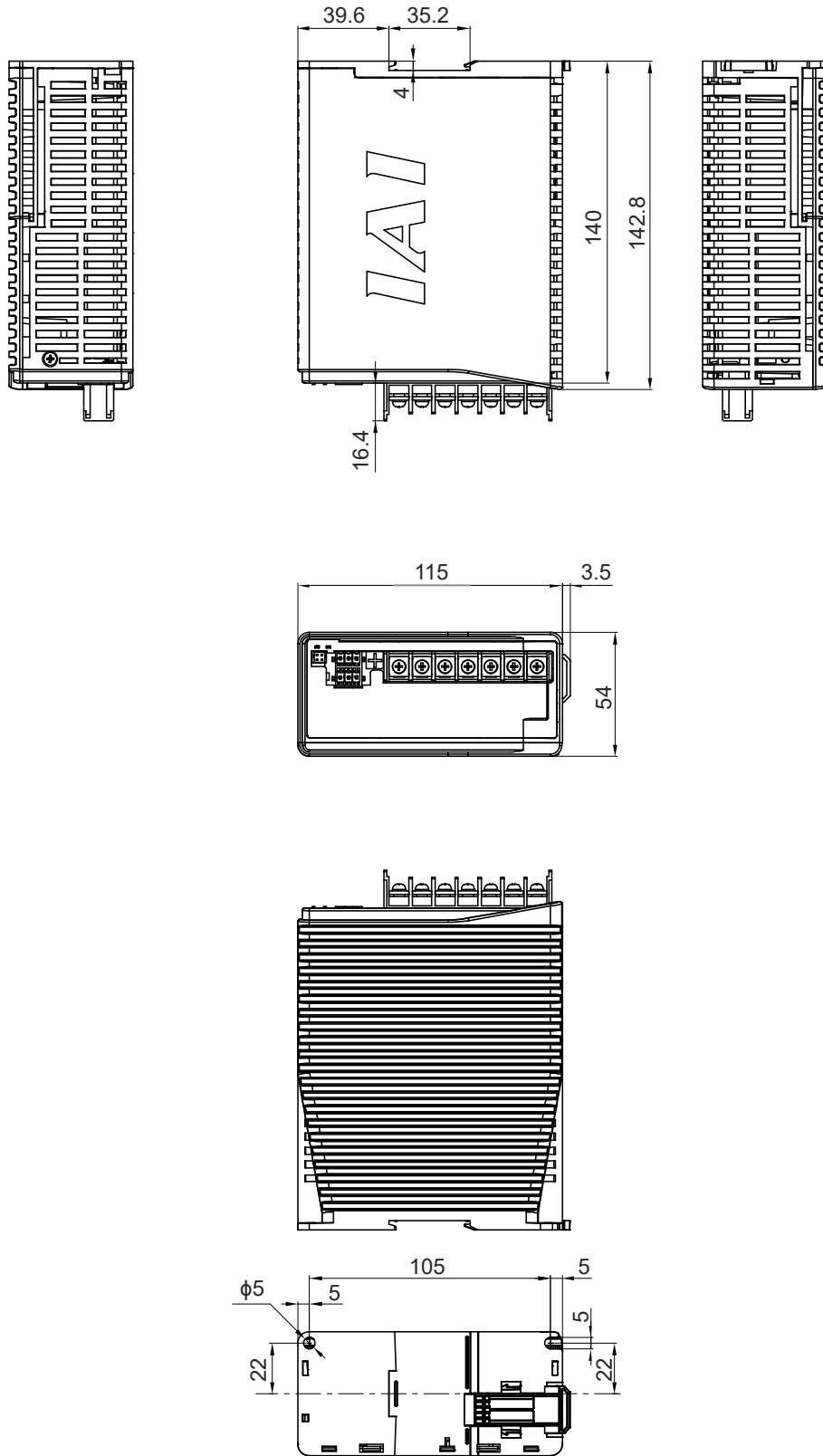
Example: Connecting 4 of PSA-24 units: Rated current: 8.5 x 4 x 0.9 = 30.6A, Peak current: 17 x 4 x 0.9 = 61.2A

2.4 External Dimensions

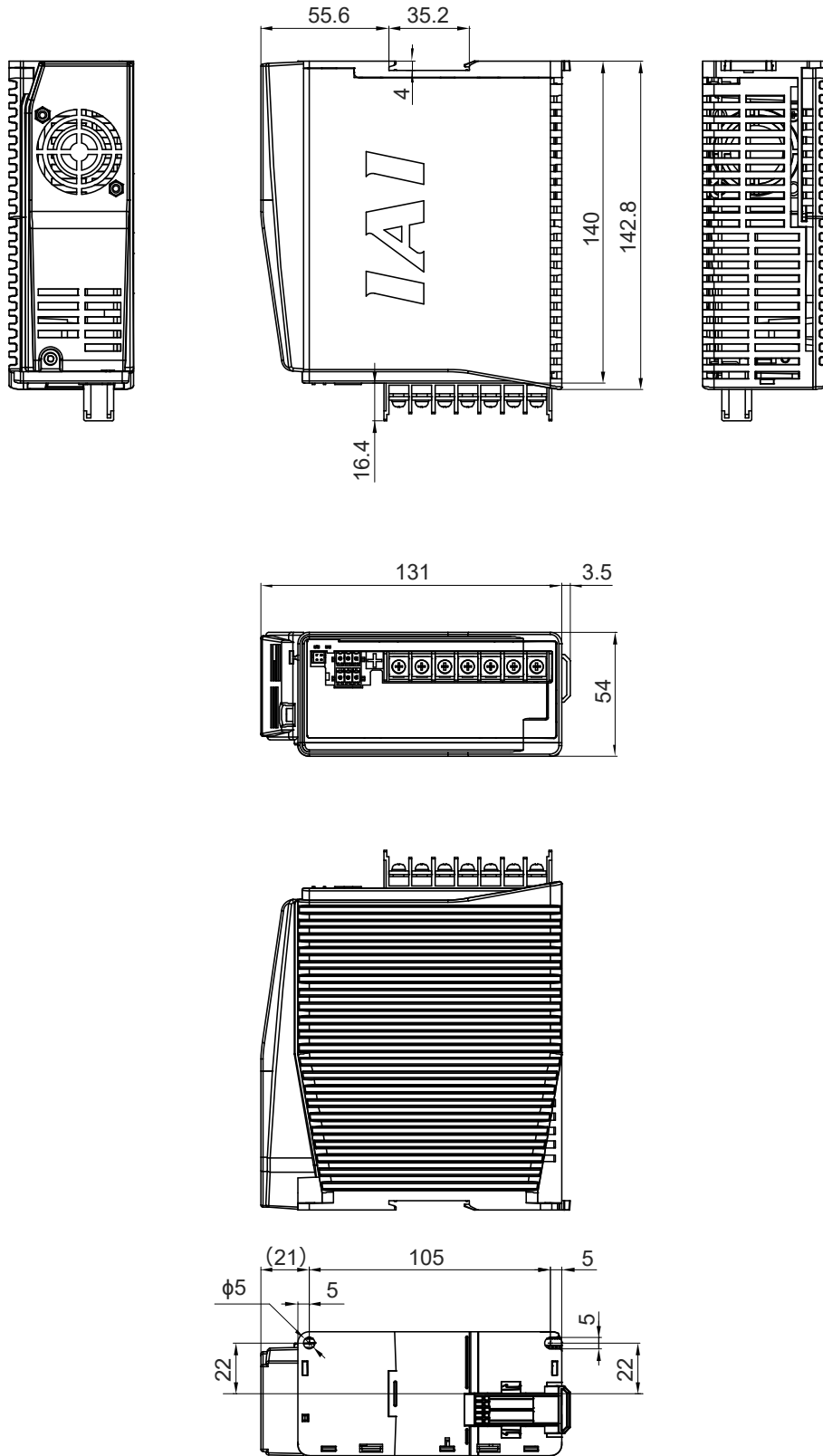
Item		Specifications
External dimensions	PSA-24	54 (W) x 115 (H) x 140 (D)
	PSA-24L	54 (W) x 131 (H) x 140 (D)
Mass	PSA-24	805g
	PSA-24L	845g
	PSA-FU	40g

2.4 External Dimensions

PSA-24



PSA-24L



Power supply unit

Chapter 3

Installation and Wiring

3.1 Environmental Conditions	3-1
3.2 Heat Dissipation and Mounting	3-3
3.3 Connection to Peripheral Devices (Overall Electrical Wiring Diagram)	3-5
3.4 Connection Cables	3-6
3.4.1 Communication cable	3-6
3.4.2 Power supply cable	3-7
3.5 Wiring for Case of Parallel Operation	3-8
3.5.1 Conditions Available for Parallel Operation	3-8
3.5.2 Caution Regarding Wiring	3-8
3.5.3 Example of Wiring in Parallel Operation	3-9

3.1 Environmental Conditions

Item	Specifications	Terms of use, etc.
Ambient operating temperature	0 to +55°C (With derating)	Natural air cooling (204W/without fan) Forced cooling (330W/with fan)
Ambient operating humidity	5 to 85%RH	Non-condensing or freezing
Ambient storage temperature	-20 to +70°C	
Atmosphere	Avoid corrosive gas and excessive dust	
Altitude	2,000m	
Vibration resistance	Frequency 10 to 57Hz / Amplitude: 0.075mm Frequency 57 to 150Hz / Acceleration 9.8m/s ² XYZ directions Sweep time: 10 minutes Number of sweeps: 10 times	
Package drop	Drop height: 800mm / 1 corner, 3 edges, 6 faces	
Overvoltage category	II	
Pollution degree	2	
Installation site	Indoors	
Degree of protection	Not applicable	
Generated heat	33W	100V AC 204W continuous rated
	23W	200V AC 204W continuous rated
	54W	100V AC 330W continuous rated
	37W	200V AC 330W continuous rated
Cooling method	Natural air cooling/ Forced cooling with a fan unit	

Reduce the output power in accordance with the following derating curve at high temperatures.

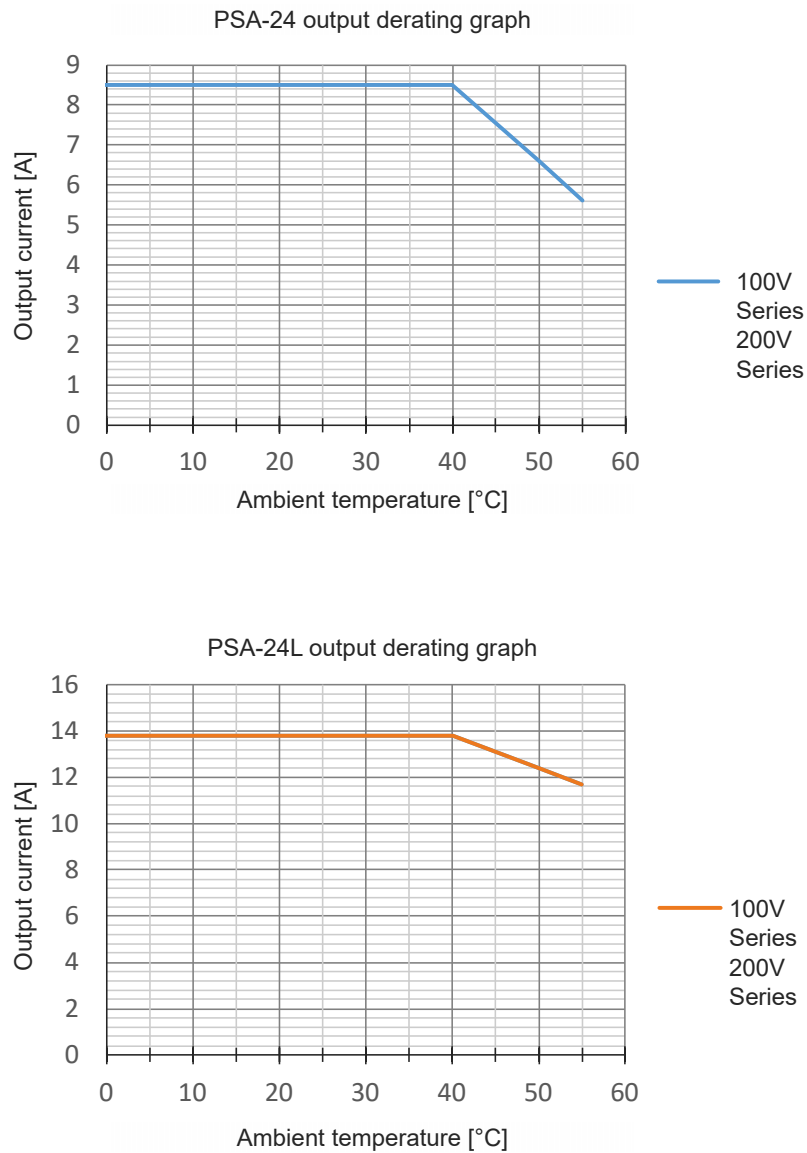


Figure 3.1.1 Derating with regard to ambient temperature

*However, when using the fan at 40°C or more, the fan life is excluded from the above derating.

3.2 Heat Dissipation and Mounting

Item		Specifications
Installation	Installation direction ^(*1)	Horizontally mounted
	Installation method	Screw mounted or DIN rail mounted
Ground		Independent grounding via class D grounding ^(*2)
Restrictions in ambient environment		Refer to [Figure 3.2.3] ^(*3)

*1: The only possible installation orientation is below.

Forced cooling (natural convection) airflow direction

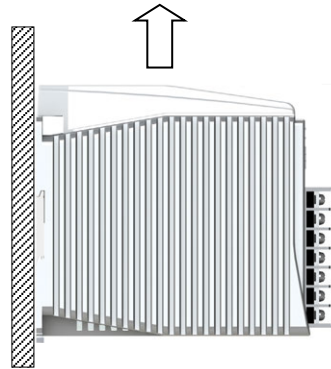
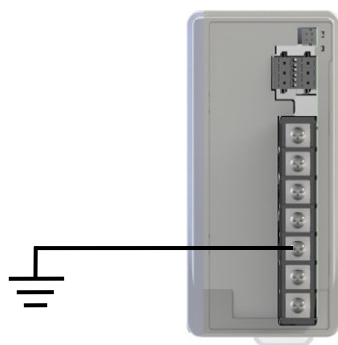
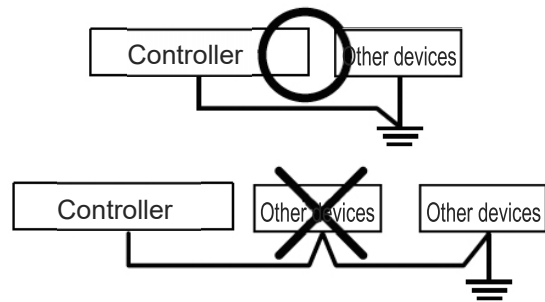


Figure 3.2.1 Control panel interior installation direction

*2: Grounding helps to prevent electric shocks and electrostatic charging, improves noise resistance performance, and suppresses unnecessary radiation, so should be conducted as shown below.



Class D grounding construction
(Former class 3 grounding: grounding resistance 100 Ω or less)



Grounding wires should not be connected in common with other devices and separate power supplies should be installed.

Figure 3.2.2 Grounding precautions

*3: The minimum distance to the control panel wall or the minimum distance for power supply spacing when operating in parallel is as below.

Note that control panels should be designed and manufactured such that the power supply ambient operating temperature is below that of the specifications.

● PSA-24

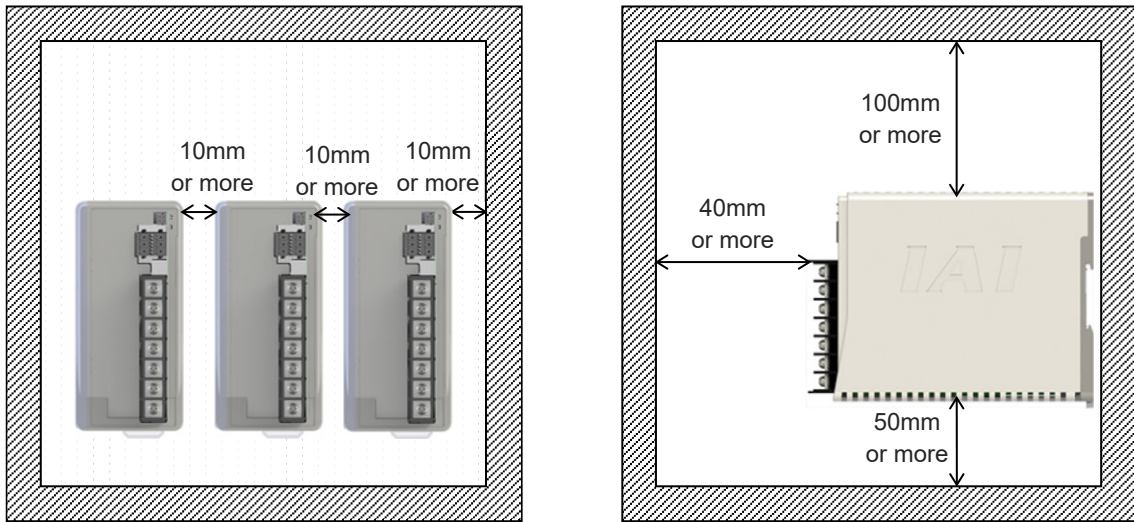


Figure 3.2.3a Restrictions in ambient environment (PSA-24)

● PSA-24L

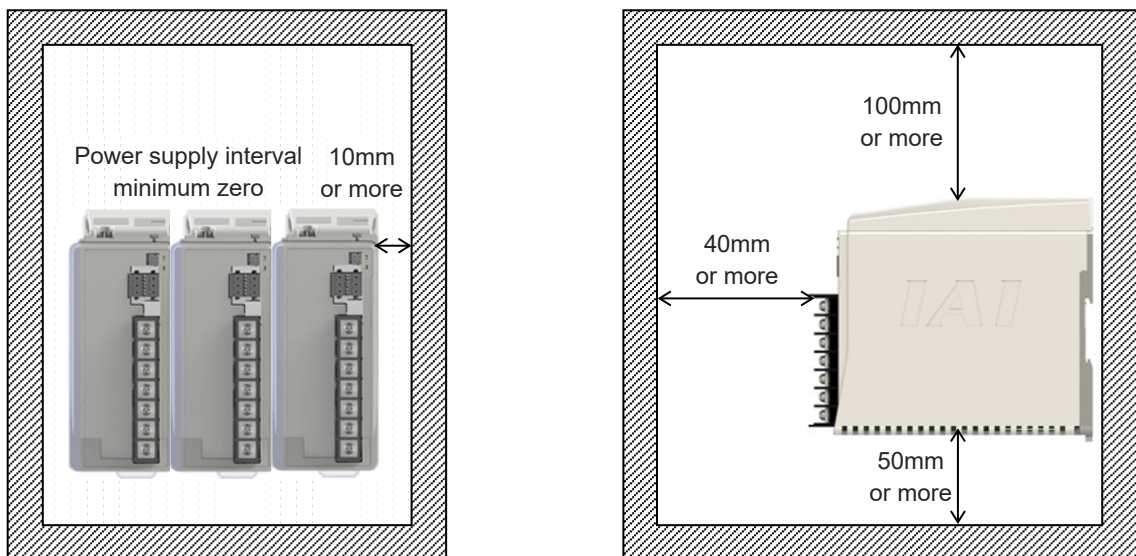
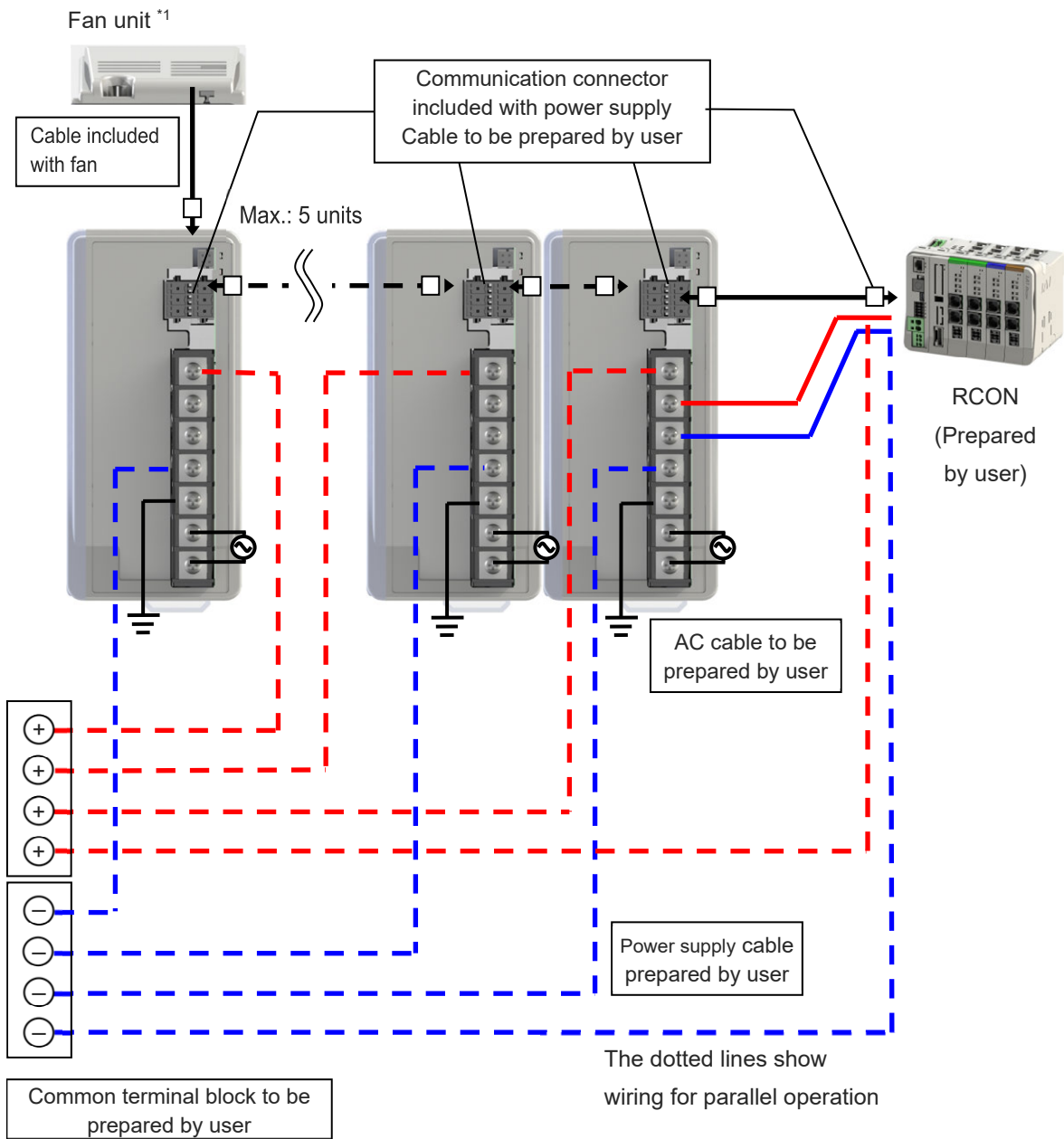


Figure 3.2.3b Restrictions in ambient environment (PSA-24L)

3.3 Connection to Peripheral Devices (Overall Electrical Wiring Diagram)

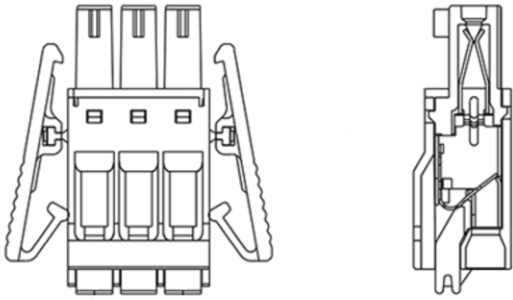
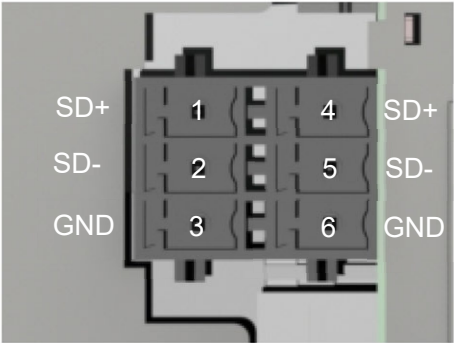


*1: Do not connect PSA-24 (without fan) and PSA-24L (with fan) in parallel.

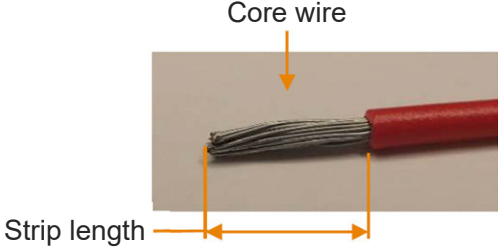
3.4 Connection Cables

3.4.1 Communication cable

This shows the applicable wire and strip length that can be used for the cable connector. Use twisted pair cables for differential signal lines.

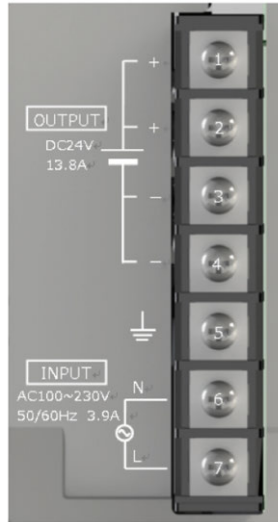


Cable side connector name
0221-2403 (DINKLE)



Item	Specifications
Compatible wire	AWG22 to 20
Strip length	10.0mm

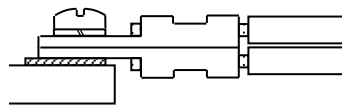
3.4.2 Power supply cable



The following shows the specifications for terminals and wiring for connections.

Item	Specifications
Terminal block screw diameter	M3.5
Rated torque	1.1 [N·m]
Applicable round terminal (applicable wire size)	1.25-M3.5 (AWG22 to 16) 2-M3.5 (AWG16 to 14)
Recommended wire size	AWG14 to 18

The number of crimped terminals connected at the same time per terminal screw should be 2 or less; they should be installed back-to-back as shown below.



3.5 Wiring for Case of Parallel Operation

3.5.1 Conditions Available for Parallel Operation

The conditions available for parallel operation are as shown below.

- Another identical power supply unit can be added to the connection to perform parallel operation. Connection of up to 5 units is supported.
- Do not connect power supply units other than PSA-24 in parallel. Do not connect with PS-24 in parallel either.
- Do not connect PSA-24 (without fan) and PSA-24L (with fan) in parallel.
- When performing parallel operation, turn on all AC inputs of the connected power supply units at the same time. If the load is large, the overcurrent detection circuit may trigger and operation may not start correctly.
- Load is to be connected via a terminal block, not to be connected directly a power source. Connecting the load directly to each of the power supplies and if the load is not evenly allocated ^(*), it may drop the output voltage due to in-rush current at the power supply turned on.
 - *1 "Evenly allocated" means that the model code of actuators, load condition and operation timing are exactly the same.
- Linear link operation is not available.

3.5.2 Caution Regarding Wiring

Pay attention to the following points when wiring.

- Use the same type of wire (recommended size: AWG 14 to 18) for the crossover cable (between two power supply units or between a power supply unit and terminal block) and keep the wire as short as possible while keeping lengths equal.
- Place the terminal block and each power supply unit close to the load, and use wires as thick as possible and within the specifications required for the load.
- Always separate the wiring used for parallel connection of the power supply units and the wiring to the load.
- It is recommended to wire the positive and negative wires as twisted pairs.

3.5.3 Example of Wiring in Parallel Operation

[1] For one load

Take out to the common terminal block and configure for parallel connection. The common terminal block is used to connect all power supply lines in this case, eliminating the need to run cables between power supply units. Variations in the output current of each power supply unit can be better suppressed if not connecting on the power supply side.

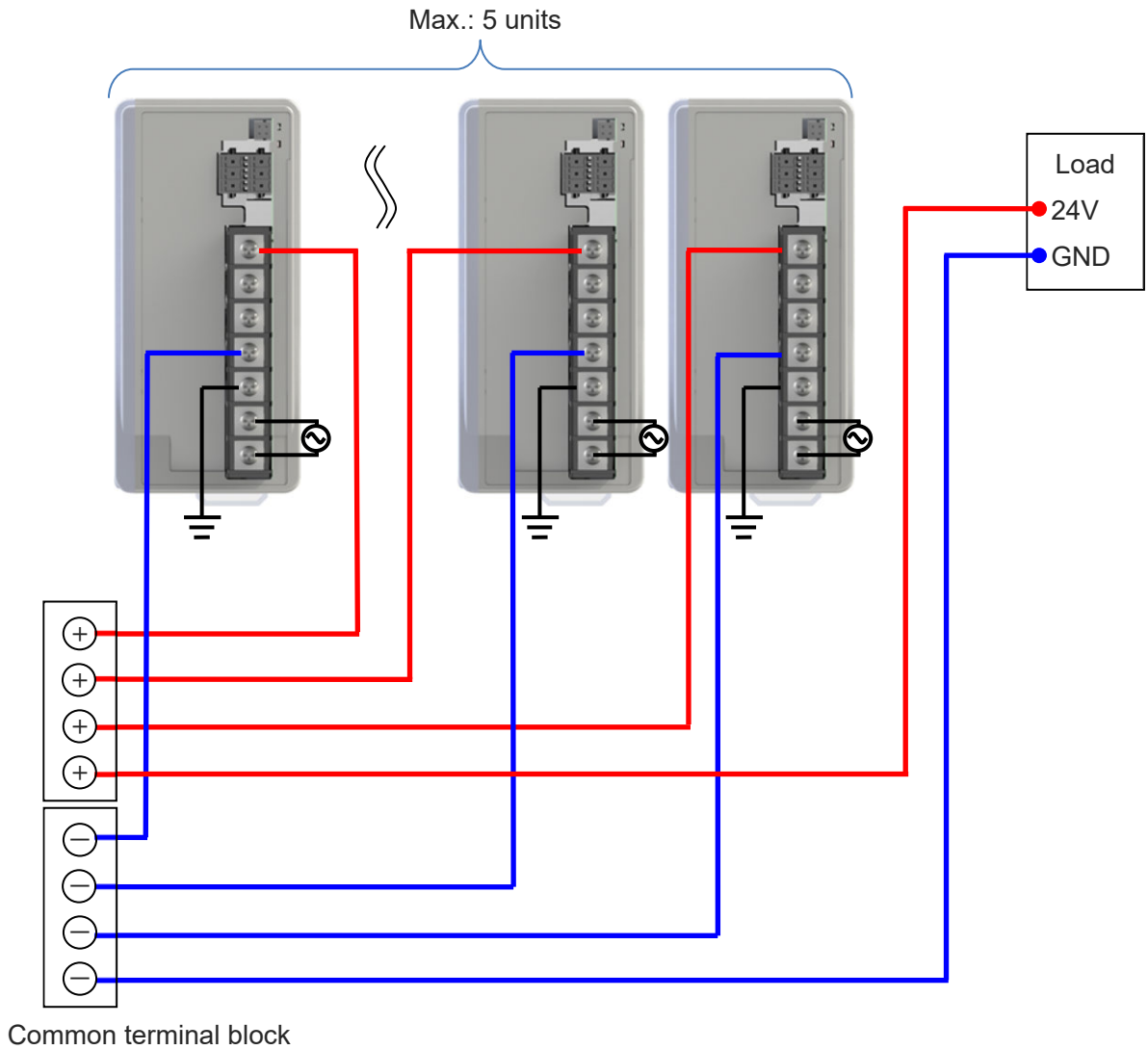


Figure 3.5.1 Connections for parallel operation (One load)

[2] When There are Several Loads

Take out to the common terminal block and configure for parallel connection. The common terminal block is used to connect all power supply lines in this case, eliminating the need to run cables between power supply units. Variations in the output current of each power supply unit can be better suppressed if not connecting on the power supply side.

The connection when there are several loads, establish the connection via a terminal block not having them connected directly to the power source.

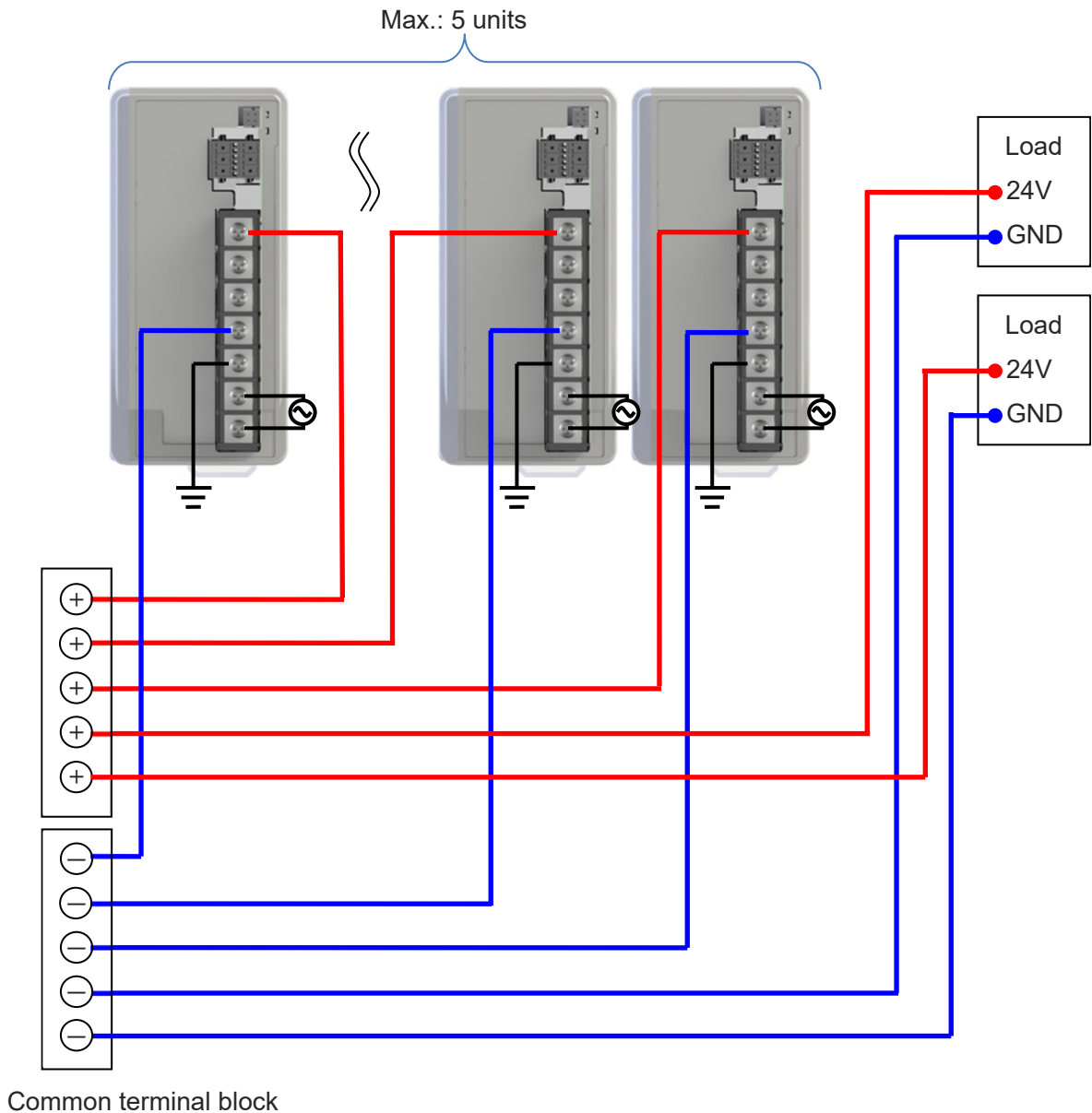


Figure 3.5.2 Connections for parallel operation (Multiple loads)

[3] Example of Defectives

If one load is connected without using the terminal block as shown in the figure below, the load current for the power supply unit closer to the load increases and the voltage drop due to the cables becomes larger, creating an unbalanced output current. To balance the cable voltage drop, always take out with the terminal block as shown in Figure 3.5.1 and Figure 3.5.2 before connecting the load.

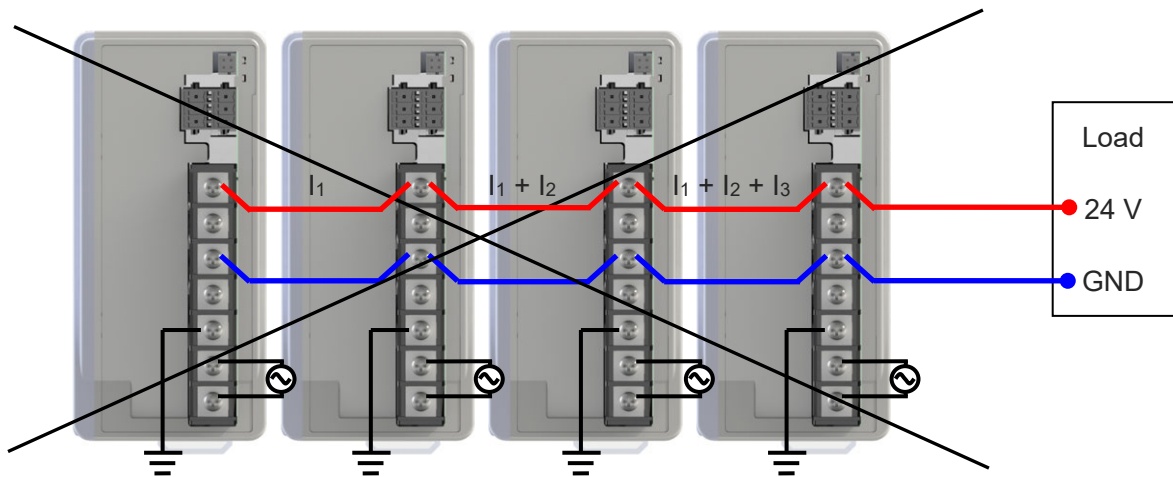


Figure 3.5.3 [Do not do this] Connections for parallel operation (One load)

Power supply unit

Chapter 4

Operation

4.1 Power ON/OFF sequence.....	4-1
4.2 Inrush current prevention circuit	4-2
4.3 Overload detection	4-3

4.1 Power ON/OFF sequence

The startup time and output retention time stipulated in "Output specifications" on page 1-4 define the following times.

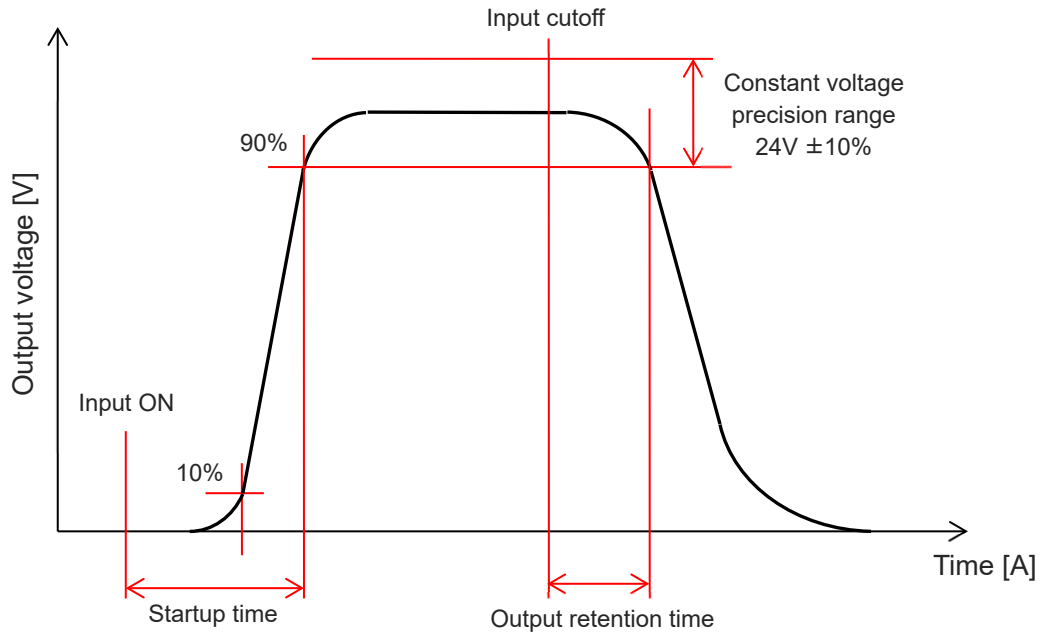


Figure 4.1.1 Overload detection range (PSA-24)

Item	Specifications
Startup time	The time until the output voltage rises to 90% after the input voltage is applied
Output retention time	The time from when the input voltage is cut off to when the output voltage retains a value within the specified range of constant voltage precision

4.2 Inrush current prevention circuit

This power supply unit uses a thermistor to suppress inrush current at startup. The thermistor has high resistance at low temperatures and low resistance at high temperatures. Therefore, when the power is turned on, the inrush current is suppressed by the high resistance, but as power is supplied the temperature rises and the resistance decreases, reducing the loss due to the thermistor.

Always note the following points due to the above characteristics.

- At low temperatures, the resistance of the thermistor is large, which may cause startup malfunction issues. When starting multiple controllers at the same time in a low temperature environment, startup malfunctions are less likely to occur if the inrush current is dispersed by shifting the timing at which the servos turn ON.
- If the input voltage is turned ON again before the power supply temperature drops sufficiently, the input voltage will be applied while the thermistor resistance is still low and a large inrush current will flow. Therefore, after turning OFF the input voltage, wait about 30 minutes for cooling before turning ON the input power again. ^(Note 1)

Note 1 Having high in-rush current flow repeatedly before cooling down enough could deteriorate the components inside PSA-24, which may cause malfunction. Also, if a magnet switch is mounted externally, it may cause overcurrent trip or contact sticking.

4.3 Overload detection

This power supply unit handles peak current values, so energization above the rated current for a short period of time is possible. However, if continuous current continues to flow beyond the rated current, there is a significant risk of decreasing service life or failure, so if excess current continues for more than a certain time, the overload detection function shuts down the output voltage.

The time it takes for the output voltage to be cut off with the overload detection function is determined by how much the rated current is exceeded by. If the rated current is greatly exceeded, the time limit characteristic shuts off the output quickly.

The dotted lines in Figure 4.1.2 and Figure 4.1.3 show the change in output voltage during continuous flow of a current exceeding the rated current. In this range, an overload error occurs after a certain time depending on the current value.

- PSA-24

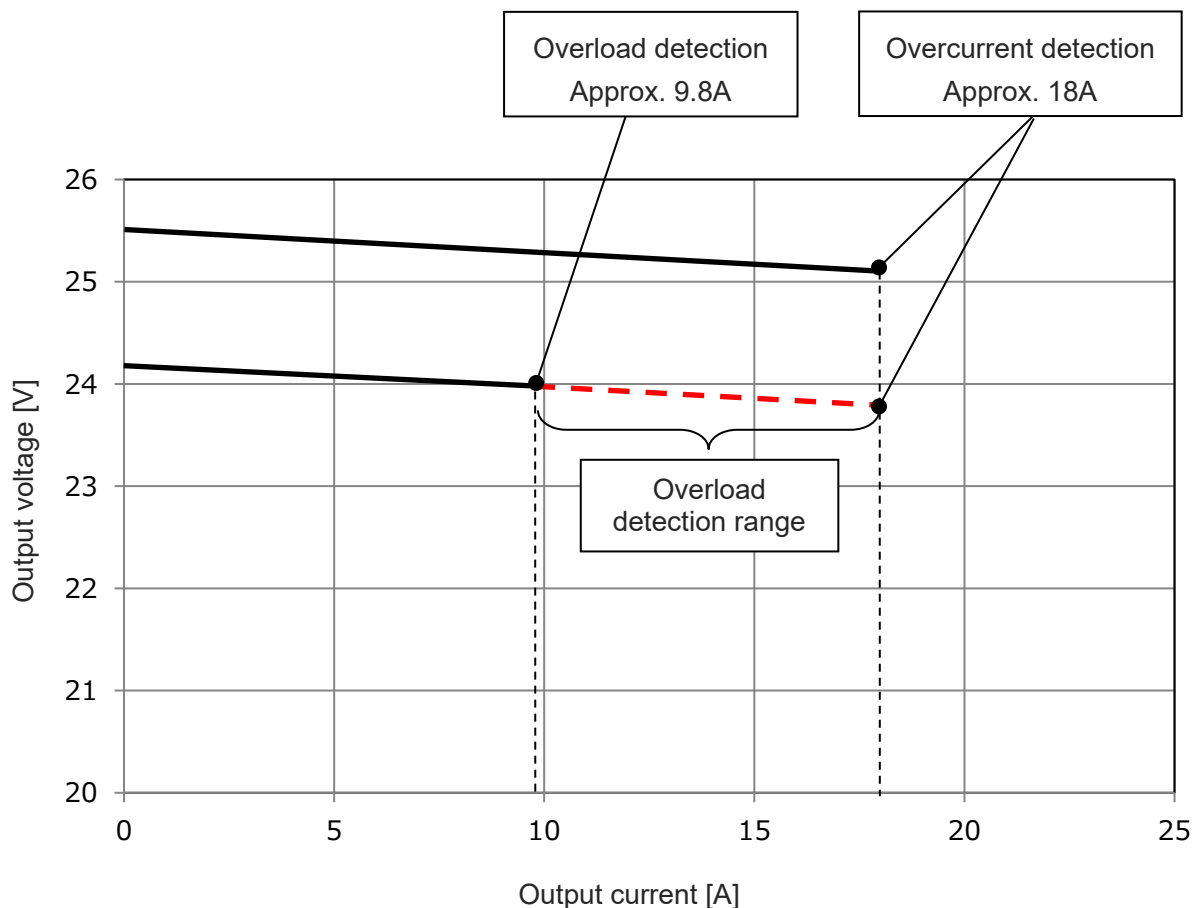
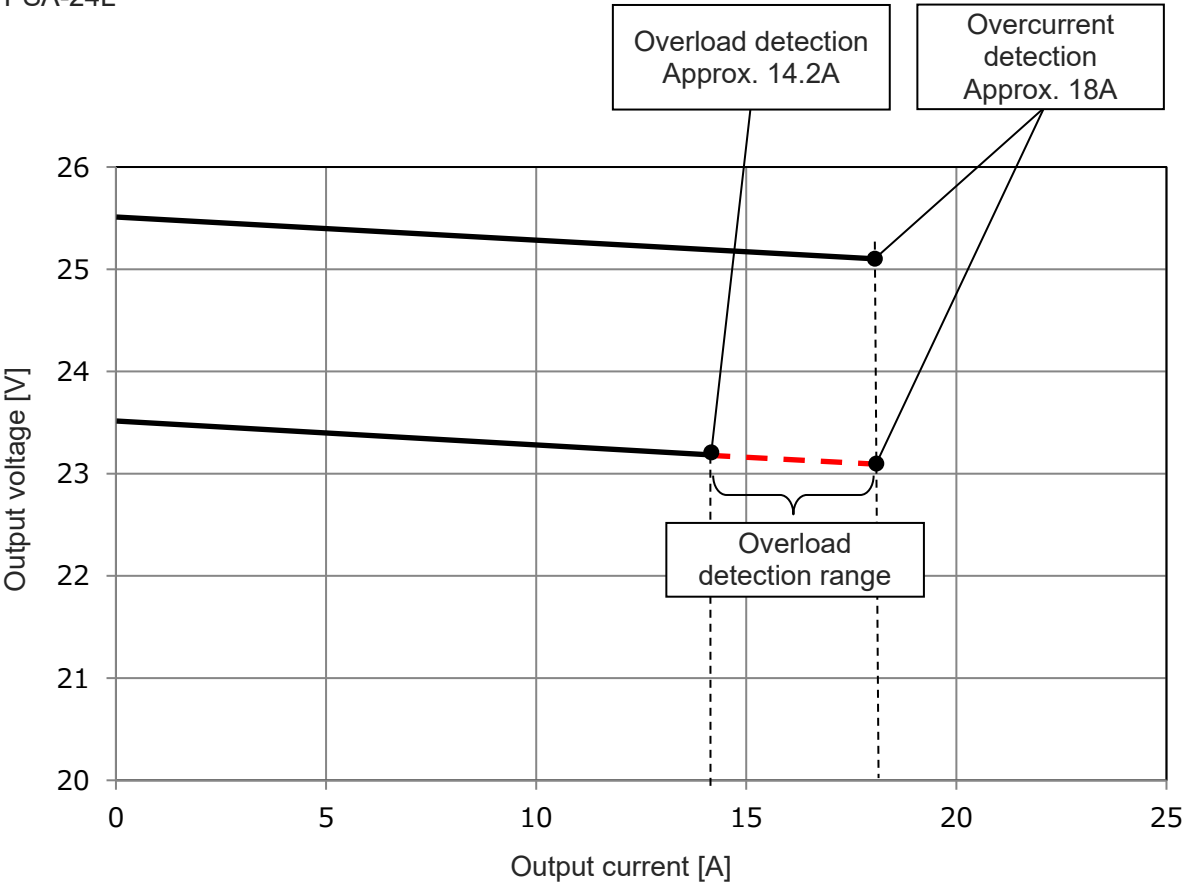


Figure 4.1.2 Overload detection range (PSA-24)

● PSA-24L



4. Operation

Figure 4.1.3 Overload region (PSA-24L)



Power supply unit

Chapter 5

Before Considering Failure

5.1 Before Considering Failure 5-1

5.1 Before Considering Failure

Content	Countermeasures
No output voltage	<ul style="list-style-type: none">• Is the specified input voltage connected?• Is there a short circuit or ground fault in the output circuit?• Has the power supply unit been rebooted immediately after the overvoltage circuit / overheat protection circuit activated?• Is the power on at the same time during parallel operation?• Is the ambient temperature high?• Is there an overload?
Low output voltage	<ul style="list-style-type: none">• Is there an overload?

Power supply unit

Chapter 6

Maintenance and Inspection

6.1 Precautions for inspection	6-1
6.1.1 Precautions for inspection	6-1
6.2 Consumable Parts	6-2
6.3 Replace components	6-3
6.3.1 Replacement of Fan Unit	6-3
6.4 Preventive Maintenance Function	6-5
6.4.1 Connection method	6-5
6.4.2 Status data	6-8
6.4.3 Fan installation	6-9

6.1 Precautions for inspection

6.1.1 Precautions for inspection

- Because there are heat generating parts inside the power supply unit die cast section and interior, perform inspection after allowing sufficient cooling time after turning OFF the power supply unit.
- Do not touch the terminals for 10 minutes after shutting down the power, as there is a danger of electric shock.

6.2 Consumable Parts

The life of components used in this product is as follows. Refer to [6.4 Preventive Maintenance Function] for information about preventive and predictive maintenance.

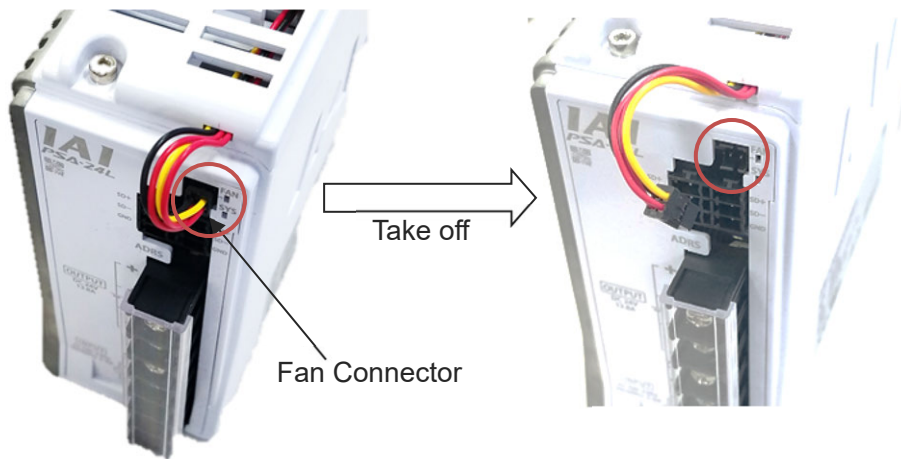
Item	Life	Conditions
Electrolytic capacitor	5 years	Ambient temperature 40°C Continuous rated output
Fan	3 years	

6.3 Replace components

6.3.1 Replacement of Fan Unit

Here, explains how to replace the fan unit connected to PSA-24L.

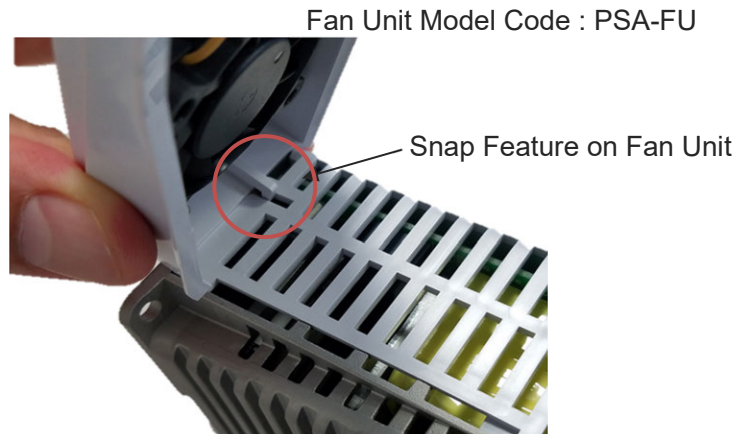
- 1) Take the black connector on the fan unit off the fan connector.



- 2) Remove the hex socket head cap screw holding the fan unit, and pull up the fan unit to take out the power supply unit.



- 3) Hand the snap feature on the fan unit (Model code: PSA-FU) for replacement at the hole on the power supply unit to mount the fan unit.



- 4) Insert the cable on the fan unit referring to the figure below.
Fix the fan unit with the hex socket head cap screw and the replacement work is complete.



6.4 Preventive Maintenance Function

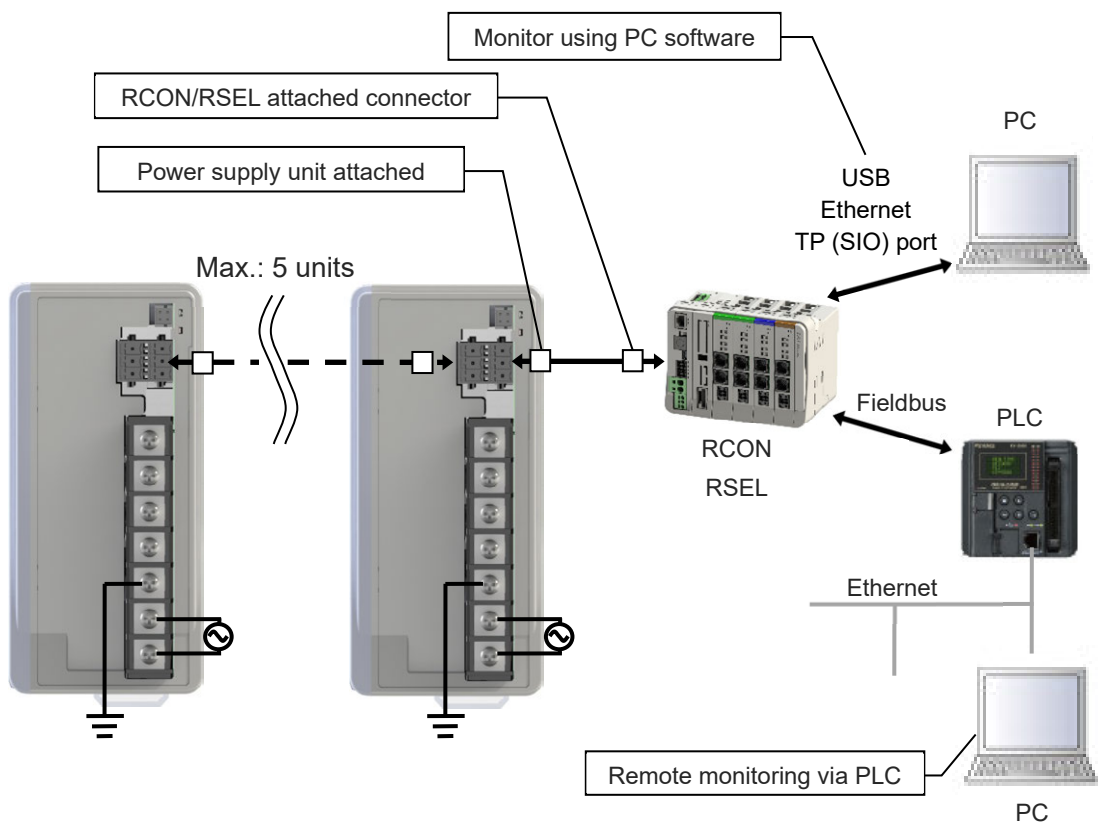
This power supply unit is equipped with a communication function that enables monitoring of status data from the host as a preventive maintenance function aimed at improving the operation and maintenance efficiency of the equipment.

The communication interface is equipped with an asynchronous serial bus interface conforming to RS485, as with the serial communication of the controller for ROBO Cylinder.

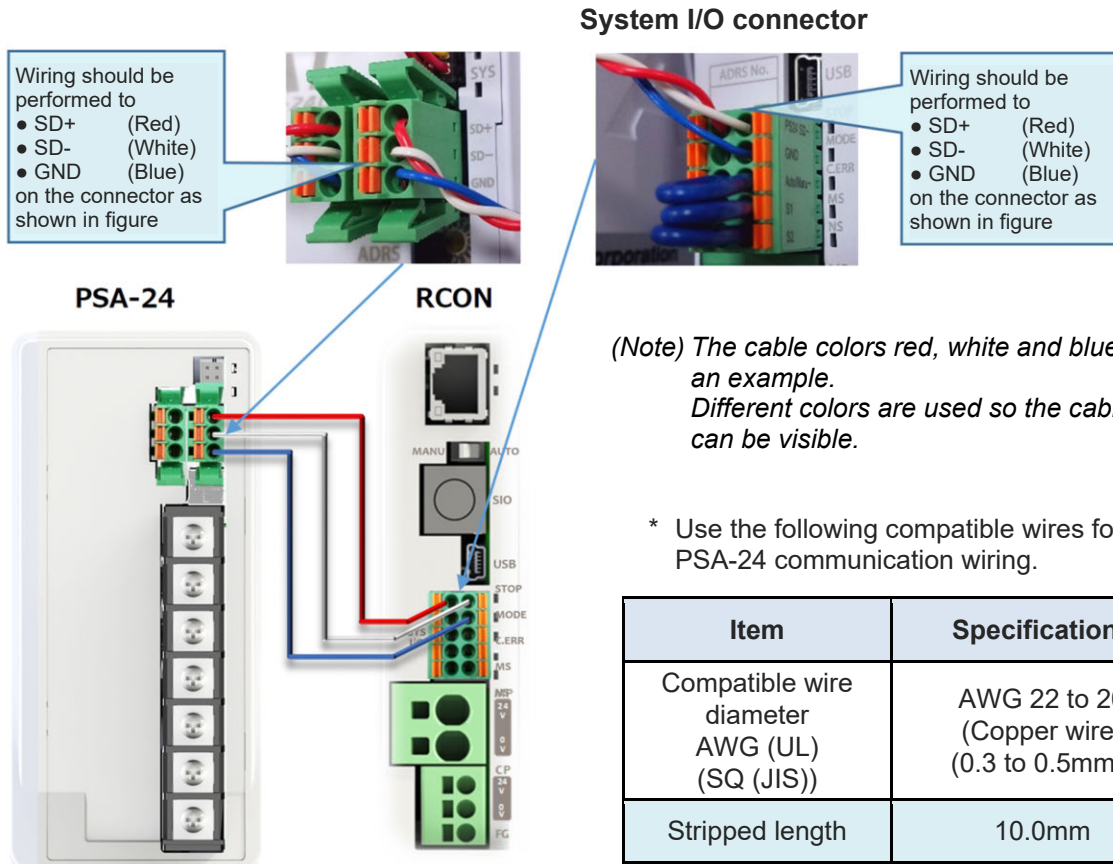
6.4.1 Connection method

- Monitoring via RCON system or RSEL system

This is how to monitor PSA-24 status data by having it connected to RCON gateway unit or SEL unit. To monitor status data using PC software (PSA-24 compatible version), connect to any of the RCON / RSEL USB, Ethernet, or teaching connectors. The status data of the power supply is also available on the fieldbus, so it is possible to monitor the status data from the host network via PLC.



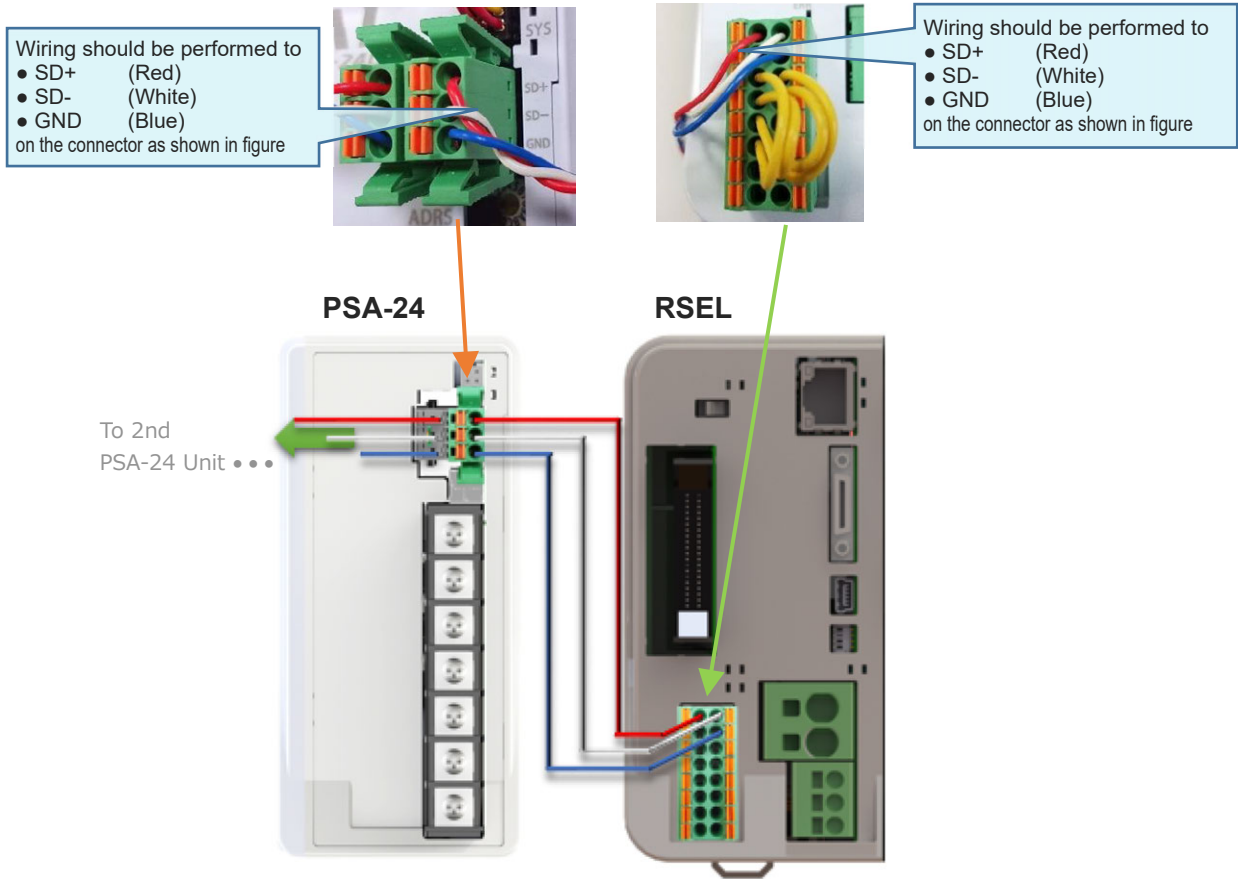
[1] RCON system How to Connect with Gateway Unit



Caution

- Use cables with cable diameter that has larger allowable current than the current volume to be used.
There could be a concern of communication failure if using thinner cables than the complied cable diameter. Also, make sure to use twisted pair cables for the differential lines.
- A communication line on one unit of PSA-24 is not available for connecting to multiple gateway units.
Connecting to multiple units should generate the alarm of "86D Power Supply Unit Communication Error" (Gateway Version V0009 or later) or "8FA CPU Error" (Gateway Version V0008 or earlier).

[2] RSEL system How to Connect with SEL Unit



* Use the following complied cables for PSA-24 communication wiring.

Item	Specifications
Compatible wire	AWG 22 to 20 (0.3 to 0.5mm ²) (Copper wire)
Stripped length	10.0mm

* Use cables with their rated temperature on the isolation sheath at 60°C or higher.



Caution

- Use cables with cable diameter that has larger allowable current than the current volume to be used.

There could be a concern of communication failure if using thinner cables than the complied cable diameter. Also, make sure to use twisted pair cables for the differential lines.

- A communication line on one unit of PSA-24 is not available for connecting to multiple SEL units.

Connecting to multiple units should generate the alarm of "22E Power Supply Unit Communication Error".

6.4.2 Status data

The status data that can be monitored is as follows.

Item	Content
Output voltage	AD conversion value of output voltage. This power supply fluctuates the output voltage according to the load, so the output voltage monitor value changes from time to time, but this is not abnormal.
Voltage of auxiliary winding	AD conversion value of the control power supply voltage inside the power supply unit. As with the output voltage, it changes according to the load on the output voltage side, but this is not abnormal.
Peak hold voltage	Constantly compares output voltage AD conversion value during AD conversion and saves the maximum current value.
Output current	AD conversion value of output current. Represents the instantaneous value.
Peak hold current	Peak value of output current. Constantly compares during AD conversion and saves the maximum current value.
Load factor	The value obtained by expressing the ratio of the integral value of the output current used internally for overload judgment and the rated output current in percentage. If this value exceeds 100%, the output voltage is cut off as an overload error.
Fan rotation speed	The value obtained by calculating the fan rotation speed based on the pulse signal input from the fan
PCB temperature	AD conversion value of the temperature sensor in the vicinity of the output capacitor on the secondary side.
Total power-on time	The power-on time is counted by the CPU and is accumulated periodically in the internal memory

6.4.3 Fan installation

- Connection recognition

The CPU automatically detects that the fan cable is connected to the power supply circuit board.

- Rotation speed monitoring

Rotation speed is monitored by counting the pulse signal from the fan. Judgment is as follows.

Item		Specifications
Warning	Operation	Continues at less than 70% of rated speed for 15 seconds or more
	Protection method	<ul style="list-style-type: none"> · Alert notification by LED blinking at 1Hz (0.5 seconds ON ⇔ 0.5 seconds OFF) · Alert notification by warning bit during communication
	Recovery	Automatic recovery
Error	Operation	Continues at less than 50% of rated speed for 15 seconds or more
	Protection method	<ul style="list-style-type: none"> · LED ON · Switch overload level to 204W (switching operation does not stop) · Alert notification by error bit during communication
	Recovery	AC reboot (latch)

- Switch overload error threshold

The rated current changes depending on whether a fan is connected or not, so the internal overload error threshold is also switched after detecting the fan connection. If fan abnormal rotation speed is detected, there is a possibility of significant decrease in life or failure of continuous operation, so the threshold value for overload error will be forcibly switched to the threshold for continuous rated output 204W (without fan).

- Fan ON/OFF control by internal temperature

When the ambient temperature is low or when the environment has capacity for more load, the internal temperature sensor may turn the fan ON/OFF in order to extend its life. The ON/OFF control specifications of the fan using an internal temperature sensor are as follows.

Item	Specifications
ON	Continues for 10 seconds at 60°C or higher
OFF	Continues for 10 seconds at 50°C or below

Power supply unit

Chapter 7

Warranty

7.1 Warranty Period	7-1
7.2 Scope of the Warranty	7-1
7.3 Honoring the Warranty	7-1
7.4 Limited Liability.....	7-2
7.5 Conformance with applicable standards/regulations, etc., and application conditions	7-2
7.6 Other items excluded from warranty.....	7-2

7.1 Warranty Period

Whichever of the following periods is shorter:

- 18 months after shipment from IAI
- 12 months after delivery to a specified location
- 2,500 operational hours

7.2 Scope of the Warranty

Our products are covered by warranty when all of the following conditions are met.

Faulty products covered by warranty will be replaced or repaired free of charge:

- (1) The breakdown or malfunction in question pertains to our product as delivered by IAI or our authorized dealer.
- (2) The breakdown or malfunction in question occurred during the warranty period.
- (3) The breakdown or malfunction in question occurred while the product was in use for an appropriate purpose under the operating conditions and operating environment specified in the instruction manual and catalog.
- (4) The breakdown or malfunction in question was caused by a specification defect, malfunction, or poor product quality.

Note that breakdowns due to any of the following reasons are excluded from the scope of warranty:

- (1) Anything other than our product
- (2) Modification or repair performed by a party other than IAI (unless approved by IAI)
- (3) Anything that could not be easily predicted with the level of science and technology available at the time of shipment from IAI
- (4) Natural disaster, unnatural disaster, incident or accident for which we are not liable
- (5) Natural fading of paint or other symptoms of aging
- (6) Wear, depletion or other expected results of use
- (7) Operation noise, vibration or other subjective sensations not affecting function or maintenance

Note that the warranty only covers our product as delivered and that any secondary loss arising from a breakdown of our product is excluded from the scope of warranty.

7.3 Honoring the Warranty

As a rule, the product must be consigned to IAI for repair under warranty.

7.4 Limited Liability

- (1) We assume no liability for any special damage, consequential loss or passive loss such as a loss of expected profit arising from or in connection with our product.
- (2) We assume no liability for any program or control method created by the customer to operate our product or for the results of any such program or control method.

7.5 Conformance with applicable standards/regulations, etc., and application conditions

- (1) If our product is combined with another product or any system, equipment, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc.
In such a case we assume no liability for the conformance of our product with the applicable standards, etc.
- (2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications.

Contact IAI if you must use our product for any of these applications:

- (1) Medical equipment used to maintain, control or otherwise affect human life or physical health
 - (2) Mechanisms and machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.)
 - (3) Machinery components essential for safety (safety devices etc.)
 - (4) Equipment used to handle cultural assets, art or other irreplaceable items
- (3) Contact IAI in advance if our product is to be used in any condition or environment that differs from that specified in the catalog or instruction manual.

7.6 Other items excluded from warranty

The price of the product delivered to you does not include expenses associated with programming, the dispatch of engineers, etc. Accordingly, a separate fee will be charged in the following cases even during the warranty period:

- (1) Guidance for mounting/adjustment and witnessing of test operation
- (2) Maintenance and inspection
- (3) Technical guidance and education on operating/wiring methods, etc.
- (4) Technical guidance and education on programming and other items related to programs

Power supply unit

Chapter 8

Appendix

8.1 Connected Unit Count Determination Method	8-1
8.2 Relation of Actuator and Power Supply Current	8-3
8.3 Index	8-13

8.1 Connected Unit Count Determination Method

Refer to the power capacity calculation method below in [Method of Calculating Rated Current and Peak Current] and [Required Number of Power Supply Units], and determine the number so that the load rated current and the peak current fall within the allowable range of the power supply.

- To calculate the MCON power supply current, refer to [1.3 Power Supply Capacity Calculation in the MCON instruction manual].
- To calculate the MSEP power supply current, refer to [1.3 Power Supply Capacity Calculation in the MSEP instruction manual].
- To calculate the RCP6S gateway system power capacity, refer to [1.3 Calculation of Number of Connectable Axes and Power Capacity in the RCP6S fieldbus communication instruction manual].

If the following phenomenon occurs after actual operation, operation can be performed by connecting the power supplies in parallel and increasing the number of units.

- Overcurrent protection circuit engages Refer to [2.2.3 Protective Function Specifications]

Power capacity calculation method

[Method of Calculating Rated Current and Peak Current]

Refer to [Appendix Tables 8.2 [1] to [8]] for the rated current and maximum current for each actuator.

1. Models without rated current notation

Total rated current (A) = Maximum current per actuator (A) x Number of actuators
+ Control power supply current of each controller (A) x Number of controllers

2. Models with rated current notation

Total rated current (A) = Rated current per actuator (A) x Number of actuators
+ Control power supply current of each controller (A) x Number of controllers

Total peak current (A) = Maximum current per actuator (A) x Number of actuators simultaneously activated
+ Control power supply current of each controller (A) x Number of controllers

(Note) The controllers that include control power supply current in "Power Supply Current" of [8.2 [1] to [8]] do not require separately adding the control power supply current of the controller.

(Note) If the controller is fieldbus specification, add 0.3A multiplied by the number of controllers.

[Required Number of Power Supply Units]

1. Calculate the required number based on the total rated current obtained on the previous page and the rated output current of the used power supply. --- (A)
2. Calculate the required number from the total peak current obtained on the previous page and the peak output current of the used power supply. --- (B)
3. The required number of units is the number obtained in (A) or (B), whichever is larger.

Selection example for PSA-24/PSA-24L

Number of connected units		1	2	3	4	5
Rated output current [A]	PSA-24	8.5	15.3	22.95	30.6	38.25
	PSA-24L	13.8	24.8	37.3	49.7	62.1
Peak output [A]	PSA-24/24L	17.0	30.6	45.9	61.2	76.5

(Example 1) Model without rated current notation

- Number of necessary units of PSA-24 when five sets of PCON-CB (PIO spec.) and RCP5-RA7R (56P: high-output setting disabled) are connected and servo is turned ON at the same time

<Rated current>

$$\begin{aligned} \cancel{2.2A} \times 5 = 11.0A > 8.5A &\Rightarrow \text{Insufficient capacity} \\ \text{(1)Power supply current} < 15.3A &\Rightarrow \text{PSA-24: 2 units required} \end{aligned}$$

- * The controllers that include control power supply current (1) in "Power Supply Current" of the PCON-CB table do not require separately adding the control power supply current of the controller.

<Peak current>

Calculation is not required.

(Example 2) Model with rated current notation

- Number of necessary units of PSA-24 when four sets of ACON-C (fieldbus specification) and RCA2-SA3C (10W) combinations are connected and servo is turned ON at the same time

<Rated current>

$$\begin{aligned} \cancel{1.3A} \times 4 \text{ units} + \cancel{0.3A} \times 4 \text{ units} + \cancel{0.3A} \times 4 \text{ units} = 7.6A < 8.5A &\Rightarrow \text{PSA-24: 1 unit required} \\ \text{(1)Power supply current} \quad \text{(2)Control power supply current} \quad \text{(3)Fieldbus} \end{aligned}$$

<Peak current>

$$\begin{aligned} \cancel{4.4A} \times 4 \text{ units} + \cancel{0.3A} \times 4 \text{ units} + \cancel{0.3A} \times 4 \text{ units} = 20.0A > 17.0A &\Rightarrow \text{Insufficient capacity} \\ \text{(1)Power supply current} \quad \text{(2)Control power supply current} \quad \text{(3)Fieldbus} &< 30.6A \Rightarrow \text{PSA-24: 2 units required}^* \end{aligned}$$

The controllers that include control power supply current (1) in "Power Supply Current" of the ACON-C table require separately adding the control power supply current of the controller (2). If the controller is fieldbus specification, another 0.3A (3) is added.

When the same operation is performed with multiple actuators at the maximum load and the maximum acceleration simultaneously

Although the rated current is within 8.5 A, the peak current exceeds 17 A, making the capacity of one unit insufficient and requiring two units connected in parallel.

However, by satisfying the following two conditions, it is also possible to operate with one unit connected.

- Shift servo ON timing.
- Do not perform the same operation with multiple actuators at maximum load and maximum acceleration simultaneously.

8.2 Relation of Actuator and Power Supply Current

[1] □ CON-C/CG/CY/PL/PO/SE, PCON-CF, □ SEL, □ SEP

Controller type	Actuator type	Motor type	Power supply current [A] (Note 1)	
ACON (Note 2) ASEL (Note 3) ASEP (Note 4)	RCL	2W	Rated	0.8
			Maximum	4.6
		5W	Rated	1.0
			Maximum	6.4
		10W	Rated	1.3
			Maximum	6.4
	RCA RCA2	10W	Rated	1.3
			Power saving maximum	2.5
			Maximum	4.4
		20W	Rated	1.3
			Power saving maximum	2.5
			Maximum	4.4
		20W (Model notation 20S)	Rated	1.7
			Power saving maximum	3.4
			Maximum	5.1
30W	Rated	1.3		
	Power saving maximum	2.2		
	Maximum	4.0		
PCON PSEL (Note 3) PSEP (Note 4)	RCP2 RCP3	20P, 28P, 35P, 42P, 56P	Maximum	2.0
PCON-CF		86P	Maximum	6.0
DSEP (Note 4)	RCD	3W	Rated	0.7
			Maximum	1.5

Note 1 PCON power supply current includes control supply current.

Power supply current other than PCON does not include control power supply current.

Note 2 ACON control power supply current is 0.3A.

Note 3 ASEL/PSEL control power supply current is 1.2A.

ASEL/PSEL power supply current is single-axis specification. It is doubled for 2-axis specifications.

Note 4 The control power supply current of ASEP/PSEP/DSEP is 0.5A (0.8A for simple absolute compatibility).

(Note) 0.3A higher for the "fieldbus specification".

[2] □ CON-CA/CB/CGB, PCON-CFA/CFB

Controller type	Actuator type	Motor type	Power supply current [A] (Note 1)		
ACON-CA ACON-CB	RCL	2W	/	Rated	0.8
				Maximum	4.6
		5W	/	Rated	1.0
				Maximum	6.4
		10W	/	Rated	1.3
				Maximum	6.4
	RCA RCA2	10W	/	Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W	/	Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W (Model notation 20S)	/	Rated	1.7
				Maximum	5.1
30W	/	Rated	1.3		
		Power saving maximum	2.2		
		Maximum	4.0		
DCON-CA DCON-CB	RCD	3W	/	Rated	0.7
				Maximum	1.5
PCON-CA PCON-CB	RCP2 PCP3	20P, 20SP, 28P	/	Maximum	1.0
		28SP, 35P, 42P, 56P		Maximum	2.2
	RCP4 RCP5 RCP6	28P, 35P, 42P, 42SP, 56P	High-output setting disabled	Maximum	2.2
				Rated	3.5
			High-output setting enabled	Maximum	4.2
	PCON-CFA PCON-CFB	RCP2 PCP3	60P, 86P	/	Maximum
RCP4 PCP5 RCP6		56SP, 60P, 86P	Maximum		6.0

Note 1 Power supply current includes control power supply current.

(Note) 0.3A higher for the “fieldbus specification”.

[3] □ CON-CYB/PLB/POB

Controller type	Actuator type	Motor type	Power supply current [A] (Note 1)		
ACON-CYB ACON-PLB ACON-POB	RCL	2W		Rated	0.8
				Maximum	4.6
		5W		Rated	1.0
				Maximum	6.4
		10W		Rated	1.3
				Maximum	6.4
	RCA RCA2	10W		Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W		Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W (Model notation 20S)		Rated	1.7
				Power saving maximum	3.4
				Maximum	5.1
30W		Rated	1.3		
		Power saving maximum	2.2		
		Maximum	4.0		
DCON-CYB DCON-PLB DCON-POB	RCD	3W		Rated	0.7
				Maximum	1.5
PCON-CYB PCON-PLB PCON-POB	RCP2 PCP3	20P, 20SP, 28P		Maximum	1.0
		28SP, 35P, 42P, 56P		Maximum	2.2
	RCP4 RCP5 RCP6	28P, 35P, 42P, 42SP, 56P	High-output setting disabled	Maximum	2.2
				Rated	3.5
			High-output setting enabled	Maximum	4.2

Note 1 Power supply current includes control power supply current.

[4] R-unit

(1) Control power supply

Unit		Control power supply current [A]	
Gateway unit (includes terminal unit)	RCON-GW(G)	Without Ethernet	0.8
		With Ethernet	1.0
	RSEL-G		1.2
	REC-GW		0.8
24V driver unit (Common to all types)	RCON-PC RCON-PCF RCON-AC RCON-DC	Without brake	0.2
		Brake 1-axis specifications	0.4
		Brake 2-axis specifications	0.6
200V driver unit	RCON-SC	Without brake	0.2
		With brake	0.5
Expansion unit	SCON expansion unit	RCON-EXT	0.1
	PIO/SIO/SCON expansion unit	RCON-EXT-NP/PN	0.1
	PIO unit	RCON-NP/PN	0.1
Simple absolute unit	RCON-ABU-A		0.2
	RCON-ABU-P		0.2
EC connection unit	RCON-EC-4		0.1

Note: As the control supply current consumed in the 200V power supply unit is very little, it is not necessary to consider in the calculation.

- * The power supply for the fan unit (RCON-FU/RCON-FUH) should be included in the control power amperage for each connected unit (approx. 50mA/unit).

(2) ELECYLINDER Control power supply / Motor power supply

Item	ELECYLINDER specifications	Power supply current [A] ^(Note 1)		
Control power supply	24V specification ELECYLINDER	Without brake		0.3
		With brake		0.5
	200V specification ELECYLINDER	Without brake		0.32
		With brake	EC-S10□/S10X□	0.54
			EC-S13□/S13X□ EC-S15□/S15X□	1.2
Motor power supply	ELECYLINDER Motor Type		Power supply current [A] ^(Note 1)	
	35P, 42P, 56P	Power saving setting invalid	Rated	2.3
			Maximum	3.9
		Power saving setting valid	Maximum	1.9
	28P	S3□/RR3□ type	Maximum	1.9
		Slim and small type	Maximum	1.7

Note 1 The supply current represents the supply current for 1 unit / 1 axis.

To calculate the power supply current, refer to [Specifications Section 2.3.3 Power supply capacity in the RCON Instruction Manual] or [2.3 Power supply specifications in the REC Instruction Manual].

(3) 24V driver unit motor power

Controller type	Actuator type	Motor type	Power supply current [A] (Note 1)		
			Setting	Rated	Maximum
RCON-PC	RCP2 RCP3	20P, 20SP, 28P 28P (Note 2), 35P, 42P, 56P	Without High-output setting	Maximum	0.8
				Maximum	1.9
	RCP4 RCP5 RCP6	28P, 35P, 42P, 42SP, 56P	High-output setting disabled	Maximum	1.9
				High-output setting enabled	Rated
	WU (Note 3)	28P (WU-S) 35P (WU-M)	High-output setting enabled only		Rated
				Maximum	3.9
RCON-PCF	RCP2~RCP6	56SP, 60P, 86P	Without High-output setting	Maximum	5.7
RCON-AC	RCA RCA2	5W	Standard/ Hi-accel./decel.	Rated	1.0
				Maximum	3.3
		10W	Standard/ Hi-accel./decel. /Power saving	Rated	1.3
				Max. in Power Saving	2.5
		20W	Standard/ Hi-accel./decel. /Power saving	Maximum	4.4
				Rated	1.3
		20W(20S)	Standard/ Hi-accel./decel. /Power saving	Max. in Power Saving	2.5
				Maximum	4.4
		30W	Standard/ Hi-accel./decel. /Power saving	Rated	1.7
				Max. in Power Saving	3.4
	RCL	2W	Standard/ Hi-accel./decel.	Maximum	5.1
				Rated	1.3
				Max. in Power Saving	2.2
				Maximum	4.0
				Rated	0.8
				Maximum	4.6
RCD	3W	Standard	Rated	1.0	
			Maximum	6.4	
			Rated	1.3	
RCON-DC	RCD	3W	Standard	Maximum	6.4
				Rated	0.7
				Maximum	1.5

Note 1 The power supply current is for 1-axis and does not include the control power supply current.

Note 2 Applicable models : RCP2-RA3, RCP2-RGD3

Note 3 It is applicable only for RSEL. Each unit of WU (wrist unit) is equipped with two axes of motors. The values in the table show those for one axis of motor.

To calculate the power supply current, refer to [Specifications Section 2.3.3 Power supply capacity in the RCON Instruction Manual] or [2.2 Power supply specifications in the RSEL Instruction Manual].

[5] MCON

Controller type	Actuator type	Motor type	Power supply current [A] ^(Note 1)		
MCON ^(Note 2)	RCL	2W		Rated	0.8
				Maximum	4.6
		5W		Rated	1.0
				Maximum	6.4
		10W		Rated	1.3
				Maximum	6.4
	RCA RCA2	10W		Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W		Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W (Model notation 20S)		Rated	1.7
				Power saving maximum	3.4
				Maximum	5.1
		30W		Rated	1.3
	Power saving maximum			2.2	
	Maximum			4.0	
	RCD	3W		Rated	0.7
				Maximum	1.5
RCP2 RCP3	20P, 28P, 28SP, 35P, 42P, 56P		Maximum	2.0	
RCP4 RCP5 RCP6	28P, 35P, 42P, 42SP, 56P		High-output setting disabled	Maximum	2.0
			High-output setting enabled	Rated	3.5
				Maximum	4.2

Note 1 The power supply current is for 1-axis and does not include the control power supply current.

Note 2 MCON control power supply current is 1.0A. (Brake release current consumption is not included)

To calculate the power supply current, refer to [1.3 Power Supply Capacity Calculation in the MCON Instruction Manual].

[6] MSEP

Controller type	Actuator type	Motor type	Power supply current [A] ^(Note 1)		
MSEP ^(Note 2)	RCL	2W		Rated	0.8
				Maximum	4.6
		5W		Rated	1.0
				Maximum	6.4
		10W		Rated	1.3
				Maximum	6.4
	RCA RCA2	10W		Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W		Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W (Model notation 20S)		Rated	1.7
				Power saving maximum	3.4
				Maximum	5.1
		30W		Rated	1.3
				Power saving maximum	2.2
				Maximum	4.0
	RCD	3W		Rated	0.7
				Maximum	1.5
	RCP2 RCP3	20P, 28P, 28SP, 35P, 42P, 56P		Maximum	2.0
RCP4 RCP5	28P, 35P, 42P, 42SP, 56P		High-output setting disabled	Maximum	2.0
			High-output setting enabled	Rated	3.5
				Maximum	4.2

Note 1 The power supply current is for 1-axis and does not include the control power supply current.

Note 2 MSEP control power supply current is 1.0A. (Brake release current consumption is not included)

To calculate the power supply current, refer to [1.3 Power Supply Capacity Calculation in the MSEP Instruction Manual].

[7] Controller integrated actuator

Actuator type	Model/ Motor type	Power supply current [A] ^(Note 1)		
ELECYLINDER	EC-PR4, EC-GS4, EC-GD4, EC-TC4, EC-TW4		Maximum	2.0
	Other than the above	Energy-saving setting enabled	Maximum	2.2
		Energy-saving setting disabled	Rated	3.5
			Maximum	4.2
ERC3 ^(Note 2)		High-output setting disabled	Maximum	2.2
		High-output setting enabled	Rated	3.5
			Maximum	4.2
RCP6S	35P, 42P, 56P	High-output setting disabled	Maximum	2.0
		High-output setting enabled	Rated	3.5
			Maximum	4.5
	56SP, 60P		Maximum	6.0

Note 1 Power supply current includes control power supply current.

Note 2 For the calculation of the power capacity when controlled connecting to the ERC3 gateway, refer to [1.3 Power Amperage Calculation in ERC3 Gateway Unit Instruction Manual].

The calculation method for RCP6S gateway system power capacity, refer to [1.3 Calculation of Number of Connectable Axes and Power Capacity in the RCP6S fieldbus communication instruction manual].

[8] Controller for RCP6S gateway unit

Controller type	Actuator type	Motor type	Power supply current [A] (Note 1)		
RCM-P6PC	RCP2 RCP3	20P, 20SP, 28P		Maximum	1.0
		28SP, 35P, 42P, 42SP, 56P		Maximum	1.7
	RCP4 RCP5 RCP6	28P, 35P, 42P, 42SP, 56P	High-output setting disabled	Maximum	1.7
			High-output setting enabled	Rated	3.2
				Maximum	4.2
	RCM-P6AC	RCL	2W		Rated
				Maximum	4.6
5W				Rated	1.0
				Maximum	6.4
10W				Rated	1.3
				Maximum	6.4
RCA RCA2		10W		Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W		Rated	1.3
				Power saving maximum	2.5
				Maximum	4.4
		20W (Model notation 20S)		Rated	1.7
				Power saving maximum	3.4
				Maximum	5.1
30W		Rated	1.3		
		Power saving maximum	2.2		
		Maximum	4.0		
RCM-P6DC	RCD	3W		Rated	0.7
				Maximum	1.5

Note 1 Power supply current does not include control power supply current. Control power supply current is 0.3A.

The calculation method for RCP6S gateway system power capacity, refer to [1.3 Calculation of Number of Connectable Axes and Power Capacity in the RCP6S fieldbus communication instruction manual].

8.3 Index**A**

Actuator and power supply current	8-3
Altitude	3-1
Ambient operating humidity	3-1
Ambient operating temperature	3-1
Ambient storage temperature	3-1
Atmosphere	3-1

C

Communication address switch	1-5
Communication cable	3-6
Communication connector	1-7
Components	2-1
Continuous rated output 204 W	2-4
Continuous rated output 330 W	2-4
Cooling method	3-1

D

Default initial voltage	2-5
Degree of protection	3-1
Dielectric withstand voltage	2-8
DIN tab	1-3

E

Efficiency	2-4
Electric shock protection mechanism	2-4
Environmental conditions	3-1
External Dimensions	
PSA-24	2-13
PSA-24L	2-14

F

Fan alarm notification LED	1-5
Fan connection connector	1-3~8
Fan installation	6-9
Fan rotation detection	2-6
Fan unit	1-3

G

Generated heat	3-1
Grounding	3-3

H

Honoring the warranty	7-1
-----------------------	-----

I

Input specifications	2-4
----------------------	-----

Input undervoltage protection	2-6
Inrush current	2-4
Inrush current prevention circuit	4-2
Installation	3-3
Installation site	3-1
Insulation resistance	2-8
Insulation specifications	2-8

L

Leakage current	2-8
Life	6-2
Limited liability	7-2

M

Model nameplate	2-2
Momentary power failure resistance	2-4

N

Connected unit count	8-1
Normal operation notification LED	1-5

O

Output derating	3-2
Output retention time	2-5
Output specifications	2-5
Output voltage	2-9~10
Output voltage range	2-5
Overall Electrical Wiring Diagram	3-5
Overcurrent protection	2-6
Overheat protection	2-6
Overload detection	4-3
Overload protection	2-6
Overvoltage category	3-1
Overvoltage protection	2-6

P

Package drop	3-1
Parallel operation	3-9
Peak output	8-2
Pollution degree	3-1
Power capacity calculation method	8-1
Power factor	2-4
Power frequency range	2-4
Power input voltage range	2-4
Power ON/OFF sequence	4-1
Power supply cable	3-7
Power supply current	2-4

Power terminal block 1-3~6
Preventive maintenance function6-5
Protective function specifications2-6

R

Rated output voltage2-5
Restrictions in ambient environment3-3
Ripple noise voltage2-5
Ripple voltage2-5

S

Scope of the warranty7-1
Screw mounting hole1-3
Startup time2-5
Status data6-8

V

Vibration resistance3-1

W

Warranty period7-1

Revision History

Revision date	Revised content
2018.04	First Edition
2018.08	Edition 1B <ul style="list-style-type: none"> • Added precautions for parallel operation (Intro-8, 3-1, 4-3) • Added description of the rated current for PSA-24L parallel connection (4-5) • Added description of the control power supply current for RCON and revised power supply current (11-4)
2019.05	Second Edition <ul style="list-style-type: none"> • Model nameplate changed (1-1) • Environmental Conditions : Correction made to amount of generated heat (2-1) • Heat Dissipation and Mounting : Correction made to minimum distance to wall for installation of control panel (2-4) • Connected Unit Count Determination Method : Added description of the rated output current for PSA-24L (11-10)
2019.09	Edition 2B <ul style="list-style-type: none"> • Repair image deficiencies in previous version (Intro-13, Intro-15, Intro-16, 2-3, 2-4, 4-4, 5-1) • Revised the terminologies (11-1 to 11-8)
2020.04	Third Edition <ul style="list-style-type: none"> • Description deleted regarding communication lines (4-9) • Change made to description regarding preventive maintenance function (5-1, 5-2) • Description added regarding R-unit control / motor power supply current (11-4, 11-5)
2020.07	Edition 3B <ul style="list-style-type: none"> • Change made to specifications and conditions of ambient humidity for use (2-1)
2021.01	Edition 3C <ul style="list-style-type: none"> • Correction made in image of Specification Details (4-2, 4-6, 4-8 ,4-9) • Revised description regarding preventive maintenance function (5-1 to 5-3) • Order swapped between Appendix 11.1 and 11.2 (11-1 to 11-11) • Correction made and terms integrated over all

Revision history

Revision date	Revised content
2021.02	Edition 3D • 11.2 Relation of Actuator and Power Supply Current Table 11.2-4 Supply current of R Unit added and corrected
2021.11	Fourth Edition • Revised overall (change and integration in chapters) • 3.1 Heat radiation at 330W continuous rating described in environmental conditions • 3.5.3 Description regarding wiring in parallel operation and example of wiring revised • 8.2 [4] EC 200V control power amperage and power amperage for WU added • 8.2 [3], [5] to [8] Caution related to power amperage when using field network deleted
2025.10	Edition 4B • Changes due to discontinuation of including the First Step Guide
2026.03	Edition 4C • Information about the caution mark and high hot surface mark added



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