

SanAce PWM Controller Instruction Manual

9PC8045D Series

M0011494C

Thank you for purchasing the San Ace *PWM Controller*.



Please read this instruction manual thoroughly before using the product to fully understand its functions. After thoroughly reading this manual, keep it handy for reference.



CAUTION

- To ensure that the product is used safely, be sure to read and fully understand the Safety Precautions and only use the product as directed.
- Read the Safety Precautions carefully before installing, connecting, operating, maintaining, or inspecting the product.
- The product has been designed and manufactured for use in general industrial machinery, and may not be used as a standalone product.
- The product of our company (hereafter referred to as "the product") falls into the category of the products specified in the Attached List 1, Item 16 (Class 85, Item 43) of the Export Trade Control Ordinance. To export the product as an individual part or to export a product into which the product is assembled, the "Information Requirements" and "Objective Requirements" that the Ministry of Economy, Trade and Industry established based on the "Catchall Controls" must be studied for applicability. Based on information on applicability and specified requirements, appropriate export formalities must be performed.
- When disposing of the product, treat it as industrial waste. For instructions on proper disposal methods, please contact local government authorities.
- When using the product in an environment with vibration, such as in a car or a ship, use it at your own discretion only after deploying sufficient safety measures and making prior evaluations. Fully understand the Safety Precautions described in this instruction manual before using the product.

In order to prevent any possible bodily injury or damage to property or equipment, the following precautions for ensuring safety are displayed according to the following two ranks of importance:

 DANGER	Handling or using the product improperly and in disregard of the instructions with this mark may result in serious bodily injury or death.
 CAUTION	Handling or using the product improperly and in disregard of the instructions with this mark may result in bodily injury or physical damage.

*Note: Items marked 'Caution' may also result in serious bodily injury or death in some circumstances. Always follow the instructions for items marked 'Danger.'

Safety Precautions

DANGER

- If the product is used in medical appliances or other types of equipment that affect people's lives, sufficient safety-related evaluations and preparations must be made in advance, and the product or the type of equipment into which the product is assembled must be used under the full responsibility of the user.
- If the product is used in types of equipment that have a strong social and public impact, sufficient prior evaluations and safety-related evaluations and preparations must be made, and the product or the type of equipment into which the product is assembled must be used under the full responsibility of the user.
- The product is not designed to be used in a car or a ship. When using the product in an environment with vibration, such as in a car or a ship, use it at your own discretion only after deploying sufficient safety measures and making prior evaluations.
- Connect all wires properly and securely. Failure to do so may result in fire, burns, or electrical shock.
- Do not use this product in a location where there is flammable gas. Otherwise, it may result in fire, burns, or bodily injury.
- Only use the product integrated with another device or system. Failure to do so may result in burns or electrical shock.
- Do not touch the product while it is operating. Otherwise, it may result in burns or electrical shock.
- Turn off the power and stop using the product immediately if you notice any sparks, smoke, odd odors, sounds, or anything unusual during operation. Failure to do so may result in fire, bodily injury, or electrical shock.

- Never allow the product to fall, topple over, or otherwise be subjected to excessive shocks when moving it. Otherwise, it may result in product failure.
- The product should be handled only by personnel with sufficient training and knowledge and under the full responsibility of the user.
- Never attempt to disassemble, repair, or alter the product in any way. Failure to do so may result in fire, bodily injury, or electrical shock.

Handling

- Discharge static electricity from your body before handling the product. In addition, avoid packaging or covering the product with materials which generate static electricity. Contact with static electricity may result in product failure.
- Do not touch solder joints or pins. Otherwise, it may result in bodily injury.
- Installation, placement, connections, wiring, or relocation of the product should be performed by knowledgeable or correctly licensed personnel. Never perform such work while the product is on. Failure to do so may result in bodily injury, fire, burns, or electrical shock.
- Never allow yourself to come into contact with the ends of wires or plugs when measuring insulation resistance or dielectric strength voltage. Otherwise, it may result in electrical shock.
- Never attempt to disassemble or alter the product in any way. Doing so may invalidate any warranties concerning the functions or performance of the product, and may also result in fire, burns, bodily injury, or electrical shock.

Instruction

- Do not touch the product for a period after the power has been turned off as it may still be hot. Otherwise, it may result in burns.
- Take measures to protect the device from potential damage caused by the product stopping during operation.
- Never use the product at voltages, temperatures, or any other settings which exceed those given in the product specifications. Otherwise, it may result in substandard operation, failure, fire, bodily injury, or electrical shock.
- Never remove the product nameplate or install the product so that the identification cannot be seen after installation. Otherwise, it may result in the product being improperly used, and subsequently result in fires.
- Do not turn the power supply ON/OFF on a ground wire. Otherwise, it may result in product failure.
- Do not apply excessive force to the product while it is operating. Otherwise, it may result in product failure.
- If you install and use the product in a car or a ship, we shall not be responsible for any faults caused by the environment of the car or ship in which the product is installed.

Installation

- When fixing the product into place, be sure to take into consideration the product's weight and all other relevant factors. Failure to do so may result in the product or its parts falling, resulting in bodily injury or device failure.
- Never install or remove the product while it is wired.
- When fixing the product with screws, ensure correct tightening torque. If the tightening torque is over the recommended values, the product structure may deform or break.
- Install the product carefully without touching conductors or other electrical components. Touching these components may result in device failure, product failure, or product malfunction.
- Take proper precautions against static electricity when making electrical connections. Failure to do so may result in device or product failure.
- Make electrical connections properly. Failure to do so may result in device failure, product failure, or product malfunction.
- Ensure that wires are not allowed to short-circuit. Failure to do so may result in device failure, product failure, or product malfunction.

Operating Environment

- Do not use or store the product where it is exposed to flammable or corrosive gas, water or oil splashes, dust or humidity, condensation, radioactive rays or direct sunlight, salty air or saltwater, or where the product may be contaminated by corrosive materials such as sulfurous water, sulfurous volcanic ash, organic solvents, acidic chemicals, alkali chemicals, nuclear fuel materials, or other hazardous substances. If it is used or stored in such places or environments, there is the possibility that a fire may occur, the product may malfunction or its performance may deteriorate.
- Do not use or store the product in locations and environments where it could be constantly exposed to vibrations, strong shocks, magnetic or electromagnetic noise, or in which electromagnetic noise overlaps into power voltage. Otherwise, it may result in product failure.
- Do not use or store the product in environments subject to sudden changes in temperature and humidity. Otherwise, it may result in product failure.

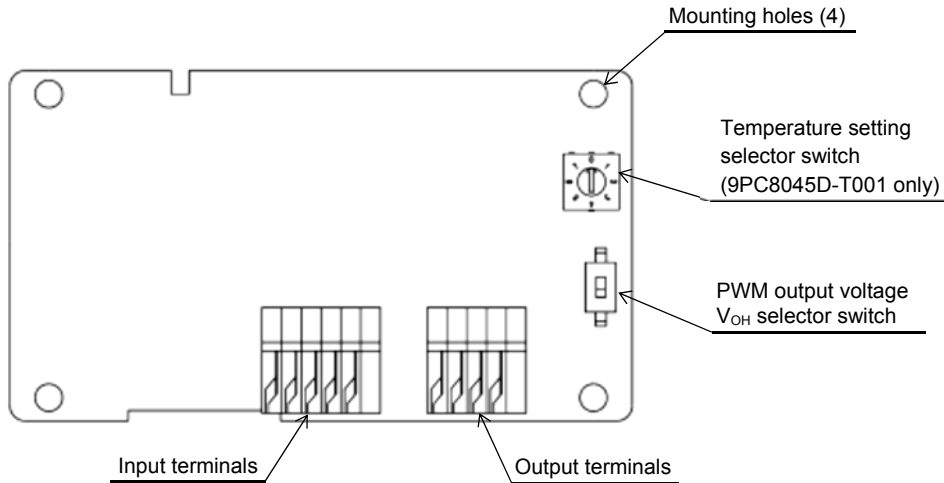
Maintenance

- Only certified personnel with sufficient training and knowledge should perform maintenance and inspections. Otherwise, it may result in fire, burns, bodily injury, or electrical shock.
- Perform maintenance or inspections while the product is off. Otherwise, it may result in fire, burns, bodily injury, or electrical shock.
- Never use gasoline, paint thinner, benzene, or any other organic solvents to clean the product. Otherwise, it may result in product deformation or substandard operation.

1. Outline

- (1) The San Ace *PWM Controller* is a PWM signal generator that can control the speed of PWM control fans.
- (2) There are three models in the 9PC8045D Series, each with separate methods of controlling the output duty cycle.
 - 1) 9PC8045D-V001/V101: Control via DC voltage input
 - 2) 9PC8045D-R001/R101: Control via variable resistor
 - 3) 9PC8045D-T001/T101: Control via thermistor and temperature set point
- (3) It can use the same or separated DC power supply (12/24/48) as the connected DC fan(s). When using separated DC power supply, the negative line must be common.
- (4) The product can be connected to up to four fans.

2. Part Names



3. Mounting

The product can be mounted with screws.

Insert an M3 screw in each of the four mounting holes and tighten. (Tightening torque: 0.5 N·m max.)

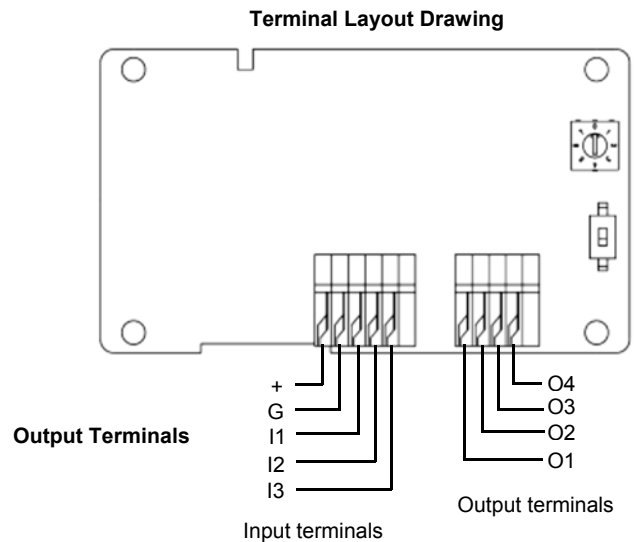
4. I/O Terminals

4-1. Arrangement and Functions

Input Terminals

Terminal	Function		
	9PC8045D-V001 9PC8045D-V101	9PC8045D-R001 9PC8045D-R101	9PC8045D-T001 9PC8045D-T101
+	Power supply input	Power supply input	Power supply input
G	Ground	Ground	Ground
I1	Control voltage input	Variable resistor	Thermistor connection
I2	Control voltage ground	Variable resistor	Unassigned
I3	Unassigned	Variable resistor	Thermistor connection

Terminal	Function
O1-O4	PWM signal output



4-2. Wiring

- (1) Connect the wiring to the terminals.
- (2) Confirm the wiring and turn the power on.
- (3) The PWM signal output may be subject to noise and impedance due to the wiring conditions. Use wires as thick and short as possible.

Applicable wire

Size	0.14–0.5 mm ² (AWG26–20)
Recommended strip length	11 mm

4-2-1. Connecting the Wiring

- (1) While pressing the push-button on the terminal block using a slotted screwdriver, insert the wiring.
- (2) Completely insert the wiring, release the push-button, and confirm the connection.
(Press the push-button when removing the wiring)

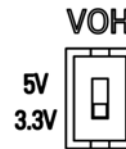


5. Using the PWM Controller

5-1. Selecting V_{OH}

PWM output voltage V_{OH} can be set to 3.3 V or 5 V using the switch. Select the V_{OH} matching the specifications of the connected fan(s).

V_{OH} Selector Switch

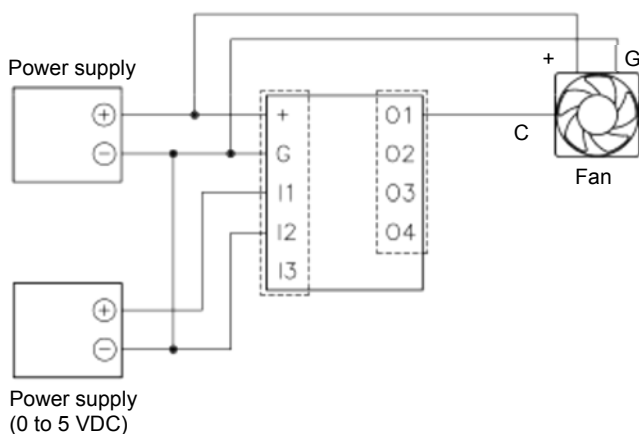


5-2. Description of Control Functions for Each Model

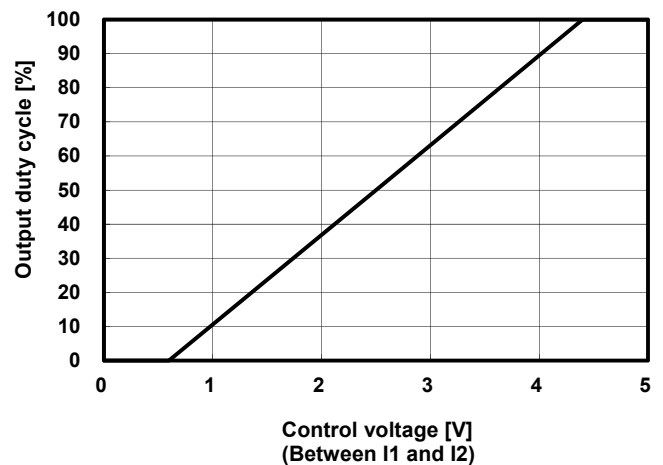
5-2-1. 9PC8045D-V001/V101 (Voltage Control Type)

- (1) The 9PC8045D-V001/V101 model controls the output duty cycle by externally applying voltage from 0 to 5 V.
- (2) Do not apply more than 5.5 V to the voltage input terminals.
- (3) Do not apply control voltage when the power is off.

Connection Diagram for 9PC0845D-V001



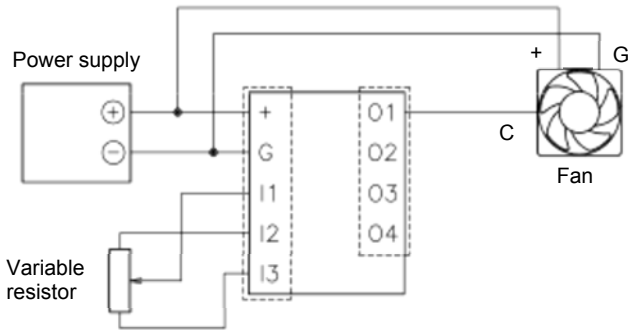
Control Voltage - Output Duty Cycle Characteristics



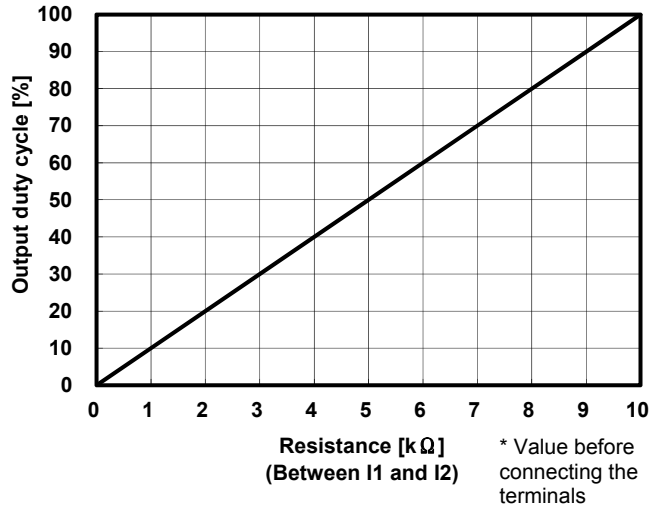
5-2-2. 9PC8045D-R001/R101 (Variable Resistor Control Type)

- (1) The 9PC8045D-R001/R101 model controls the output duty cycle using a variable resistor.
- (2) A variable resistor is not included, so you will need to supply your own.
Variable resistor specifications: Total resistance = 10 kΩ, resistance taper = B

Connection Diagram for 9PC8045D-R001



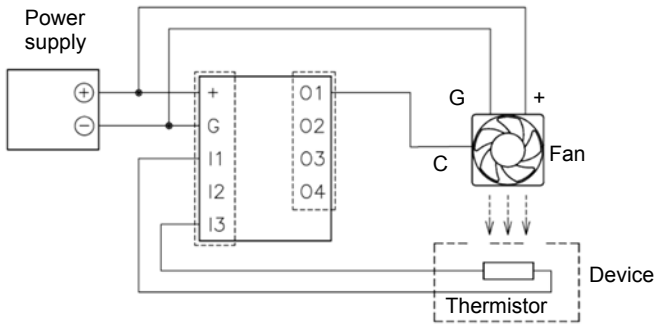
Resistance - Output Duty Cycle Characteristics



5-2-3. 9PC8045D-T001/T101 (Thermistor Control Type)

- (1) The 9PC8045D-T001/T101 model automatically controls the output duty cycle by using the controller's temperature set point (30 to 50°C) and an external thermistor to detect the temperature. As the temperature detected by the thermistor nears the temperature set point, the fan automatically increases, decreases, or maintains rotational speed.
- (2) Confirm the cooling performance of the fan before connecting it.
- (3) A thermistor is not included so you will need to supply your own.
Thermistor specifications: NTC thermistor with cable, $R_{25} = 10 \text{ k}\Omega$, $B_{25/85} = 3435\text{K}$

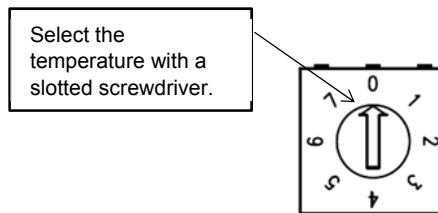
Connection Diagram for 9PC8045D-T001



Control Conditions

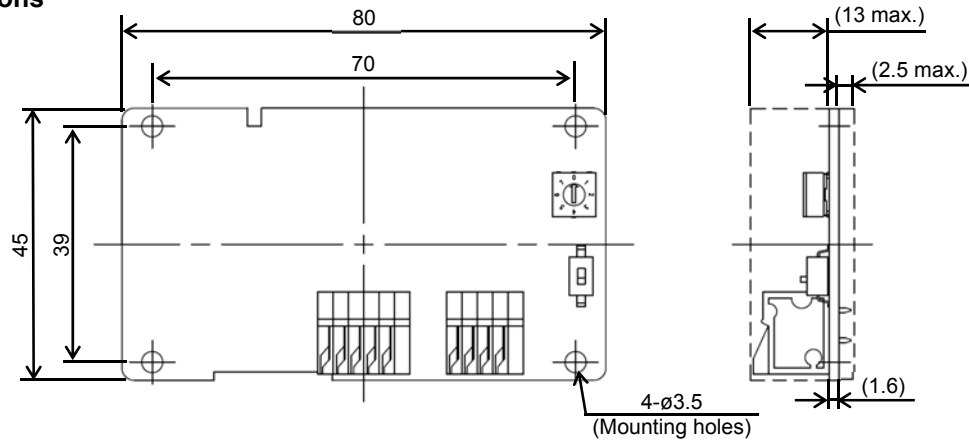
Temperature conditions	Output duty cycle	Fan rotational speed (For reference)
Temperature set point < Detected temperature	Increases	Increases
Temperature set point > Detected temperature	Decreases	Decreases
Temperature set point \approx Detected temperature	Maintains	Maintains

Temperature Setting Selector Switch



No.	Temperature set point
0	30°C
1	35°C
2	40°C
3	45°C
4	50°C
5-7	Unassigned

6. Dimensions



7. Specifications

Item	Specifications		Remarks
	The end of model : 001 *	The end of model : 101 *	
Rated Voltage	12/24/48 VDC		
Power Consumption	0.2 W		Output terminals not connected
Operating Voltage Range	7 to 60 VDC		
Output terminals	Number of output terminals	4	Same PWM signal sent from 4 terminals
	Input/output current	20 mA or lower	Total from 4 terminals
	Output withstand voltage	6.5 V	
PWM signal output	High-level voltage (V_{OH})	3.3 V or 5 V	
	Low-level voltage (V_{OL})	0.4 V or lower	
	PWM frequency	25 kHz	1 kHz
Insulation resistance	10 M Ω or higher using a 500 VDC insulation resistance tester		Between the power supply input terminal and enclosure of the host device
Dielectric strength	500 VAC (50/60 Hz) for 1 minute		Between the power supply input terminal and enclosure of the host device
Mass	Approx. 27 g		
Mounting	M3 screws		
Material	PCB: FR-4		
Operating temperature range	-20 to 70°C		Non-condensing
Storage temperature range	-30 to 70°C		Non-condensing
Humidity (operating and storage)	20 to 85% RH		Non-condensing

* The other last two digits shall be applied to the customized models.

8. CE marking, Safety Standards



(1) CE marking

- This product conforms EMC directive and applies CE marking.
Applicable Standards : EN 61000-6-4、 EN 61000-6-2
- The length of cables connected to this product should be less than 3m to conform EMC directive.
- The standards are for industrial environment. It does not conform EMC directive in residential areas.

(2) Safety standards

This product is compliant with ;
cUL_{US} : UL 508、 CSA C22.2 No.14
TUV : EN 60950-1、 EN62368-1

9. Product Warranty

- (1) The warranty period is one year from the date of shipment.
- (2) If the product fails within the warranty period under normal and proper use based on the contents of this instruction manual, the product will be repaired at no cost or be replaced with a new or equivalent product.
- (3) The warranty does not cover repairs in the following cases:
 - Failure or defects caused by improper handling such as dropping or applying an excessive force.
 - Failure or defects caused by disassembling, altering, or repairing the product by the user.
 - Failure or defects caused by external factors such as fires, natural disasters, pollution, salt damage, corrosive gas, and abnormal voltages.
 - Failure or defects found not to be the responsibility of SANYO DENKI.

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*Specifications are subject to change without notice.

Translated version of the original instructions