OMRON

Power Controller
G3PW

INSTRUCTION SHEET

Thank you for purchasing the G3PW Power Controller.
Make sure that a specialist with acknowledge of electrical systems operates the Power Controller.
Read and understand this Instruction Sheet, and be sure you understand the Power Controller sufficiently before attempting to use it.
Keep this Instruction Sheet close at hand and use it for reference during operation.
To ensure safe operation, please also read the following manual: G3PW Power Controller User's Manual (Cat. No. Z280).

OMRON Corporation

 1624643-8A

● **Definition of Precautionary Information**

⚠ **WARNING**	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.
⚠ **CAUTION**	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

● **Warnings**

⚠ WARNING
Do not attempt to disassemble the Power Controller while the power is being supplied. Doing so may occasionally result in strong electric shock.
Do not touch any of the terminals while the power is being supplied. Also, always attach the terminal block cover after completing wiring. Touching live terminals may occasionally result in serious injury due to electric shock.
Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes. Abnormal operation may result in serious accidents.
Do not use the Power Controller where subject to flammable or explosive gas. Otherwise, explosion may occur.
Use the wire sizes given in this document and use twisted copper wires or solid copper wire. Use crimp terminals with insulative sleeves. If the crimp terminals do not come with insulative sleeves, attach insulative sleeves. Use the size of crimp terminals specified in this document.
Make sure that the phases match for load terminal T1 and power supply terminal 4 (N), and for load terminal L1 and power supply terminal 5 (L). Insert suitable fuses in the power supply line and load output line to protect the circuits. The Power Controller will not operate normally if the wiring is not correct, and the load may be damaged.
Leave at least 100 mm of space above and below the Power Controller when installing it to allow heat to dissipate. Do not obstruct the area around the Power Controller and especially the area around the heat sink.
Install the Power Controller in the direction shown in this Instruction Sheet. The Power Controller generates a lot of heat and it uses natural heat convection for cooling. Installing the Power Controller in the wrong direction may cause in malfunctions or accidents.

● **Cautions**

⚠ CAUTION
The Power Controller and the heat sink become very hot. Do not touch anything but the setting keys while power is being supplied or just after the power supply is turned OFF. Doing so may cause burns.
Do not attempt to disassemble, modify, or repair the Power Controller or touch any of the internal parts. Minor electric shock, fire, or malfunction may occasionally occur.
Do not allow chips or filings from installation work, pieces of metal, or wire clippings to enter the Power Controller. Doing so may occasionally result in minor electric shock, fire, or malfunction.
Always connect the load to load terminal T1. Also, always connect power supply terminal 4 (N) directly to the power supply. Do not connect it through the load. If the wiring is not correct, the fault detection function of the Power Controller will stop the output operation.
When using the Power Controller to control the primary side of a transformer, do not open the circuit on the secondary side of the transformer while the Power Controller is operating.
Do not touch the connecting cables while power is being supplied. Static electricity from your body may cause malfunctioning.
If a malfunction in the Power Controller prevents control operations or if an alarm cannot be output, it may occasionally cause damage to the connected equipment and devices. To maintain safety in the event of a malfunction in the Power Controller, always take appropriate safety measures, such as installing a separate monitoring system.
Set the parameters of the Power Controller so that they are suitable for the system being controlled. If they are not suitable, unexpected operation may occasionally result in property damage or accidents.
Tighten the terminal screws to the torque specified in this Instruction Sheet. If the screws are loose, it may occasionally cause a fire.

Precautions for Safe Use

● **Installation Environment**
- Use the Power Controller within the rated ambient temperature and humidity ranges. If multiple Power Controllers are installed side-by-side or vertically, the heat that is generated will cause the internal temperatures of the Power Controllers to rise and will shorten their service life. In these kinds of installations, take suitable measures, such as installing fans for forced cooling.
- The Power Controller is designed for indoor use only. Also, do not use the Power Controller in the following environments.
  - Locations subject to water, oil, or chemicals
  - Locations subject to direct sunlight
  - Locations where dust or corrosive gases (in particular, sulfuric or ammonia gas) are present
  - Locations subject to extreme temperature changes
  - Locations where icing or condensation may occur
  - Locations subject to excessive shocks or vibration
  - Locations subject to direct heat radiated from heating devices

● **Installation and Wiring**
- When installing the Power Controller, always securely tighten the top mounting screws first. When removing the Power Controller, always remove the bottom mounting screws first.
- Take safety measures, such as wearing safety shoes, in case the Power Controller falls.
- Touch the Power Controller only after first touching a grounded metal object to discharge any static electricity from your body.
- Always ground the Power Controller to 100 Ω or less. There are no ground terminals provided, so use the heat sink mounting screws as ground terminals.
- Check the terminal number and polarity for each input before connecting it.
- Use copper twisted wire in the sizes specified in this Instruction Sheet.
- Use insulated crimp terminals with insulation sleeves. If using crimp terminals that are not insulated, cover them with insulation sleeves. Also, use terminals of the sizes specified in this Instruction Sheet.
- Insert connectors all the way.
- Do not connect anything to unused terminals.

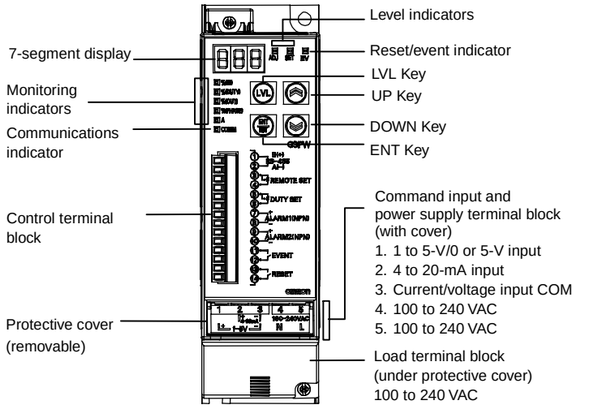
● **Safety Measures and Checking**
- Install a switch or circuit breaker so that the operator can immediately turn OFF the power, and provide a suitable display.
- Apply the power supply voltage through the contacts of a switch, relay, or similar device so it reaches the rated voltage within 2 s. If the power supply voltage is increased gradually, the power supply may not be reset or outputs may malfunction.
- Use a power supply voltage, input voltage, input current, and load within the specifications and rated ranges for the Power Controller. Use a load that draws a current at the maximum output that is within the rated current range of the Power Controller. If the current drawn by the load is not within the rated current range, malfunction or fire may occur.
- Make sure that the protective cover is attached to the load terminal block before using the Power Controller. Failure to do so may damage internal components due to mechanical stress.

● **Preventing Inductive Noise**
- Allow as much space as possible between the Power Controller and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.
- Keep the signal lines that connect to the Power Controller's terminal block away from power cables carrying high voltages or large currents. Also, do not wire power lines together with or parallel to Power Controller wiring. Using shielded cables and using separate conduits or ducts is recommended.
- Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular, motors, transformers, solenoids, magnetic coils or other equipment that have an inductance component).
- When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the Power Controller.

● **Cleaning**
- Do not use paint thinner or similar chemical to clean with. Use commercially available standard grade alcohol.

● **Storage**
- Store the Power Controller within the rated ambient temperature.

1. Nomenclature

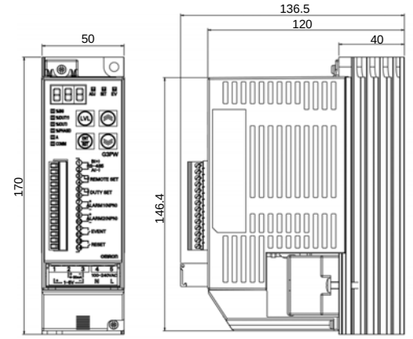


2. Specifications

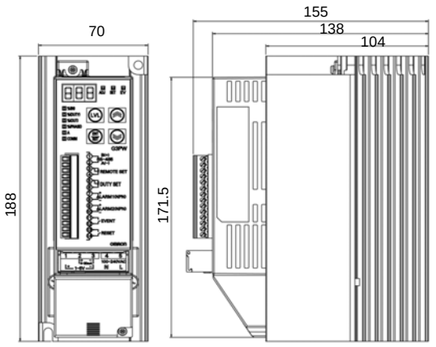
Models		Standard: G3PW-A2□□EU-□ Constant-current: G3PW-A2□□EC-□-FLK
Control method		Phase control, optimum cycle control, and ON/OFF control
Max. load capacity		G3PW-A220E□-□-□□□: 20 A G3PW-A245E□-□-□□□: 45 A G3PW-A260E□-□-□□□: 60 A
Input signal for control	DC current input	4 to 20 mA DC (Input impedance: 100 Ω)
	DC voltage input	1 to 5 V (Input impedance: 30.1 kΩ)
	Voltage ON/OFF input	0/5 VDC (Input impedance: 30.1 kΩ)
	External main setting	Specified Variable Resistor: G32X-V2K (2 kΩ, 2W)
	External duty setting	
Min. load current		1 A
Phase		Single
Rated voltage		100 to 240 VAC
Operating voltage range		–15% to +10%
Power supply frequency		50/60 Hz
Power supply frequency fluctuation		±3 Hz
Output voltage adjustable range		0% to 98%
Output mode		Proportional phase angle to output (same as G3PX) Proportional square voltage to output Proportional voltage to output Constant-current control (constant-current models only)
Constant-current		Current fluctuation: ±2% of FS (constant-current models only)
Alarm output	No. of outputs	2 points: Open-collector outputs
	Maximum operating voltage	30 VDC
	Maximum load current	50 mA
	Maximum residual voltage	1.5 V
	Maximum leakage current	0.4 mA
Overcurrent detection		Rated current × 120% min., within 250 cycles
SSR failure detection		An error is detected within 3 seconds after an SSR failure. Phase angle for SSR short-circuit failure detection: 0% to 72% Phase angle for open failure detection: 28% to 100%
Power supply frequency error		Not within 47 to 63 Hz
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		2,500 VAC at 50/60 Hz for 1 min. between charged parts and non-charged parts
Vibration resistance		10 to 55 to 10 Hz, 100 m/s^2
Shock resistance		300 m/s^2
Ambient operating humidity		5% to 95% (with no condensation)
Ambient operating temperature		–15°C to +55°C (with no icing or condensation)
Storage temperature		–25°C to +65°C (with no icing or condensation)
Weight		G3PW-A220E□-□-□□□: 1.0 kg max. G3PW-A245E□-□-□□□: 1.9 kg max. G3PW-A260E□-□-□□□: 1.9 kg max.
Standard functions		• Main setting automatic/manual selection • Output value limit (0.0% to 100%) • Output upper/lower limits (0.0% to 100%) • Base-up value (0.0% to 100%) • Duty setting (0.0% to 100%) • Soft-start up/down time (0.0 to 99.9 s) • Total run time exceeded detection (0.0 to 99.9 kh)
Functions of Constant-current Models		• Load current monitoring: Measurement accuracy ±10% of rated current • Heater burnout alarm: Measurement accuracy ±10% of rated current (for resistive load and rated output) • Load current limit: 0.0 to 66.0 A • Overcurrent detection time: 500 ms max. • CT failure
Fuses	Recommended fast-acting fuses	Super-rapid Fuse (Fuji Electric): For 20 A: CR6L-20/UL; For 45 A: CR6L-50/UL; For 60 A: CR6L-75/UL Fuse Holder (Fuji Electric): CMS-4; CMS-5
	Time-delay fuses	250 VAC, 2 A

■ External Dimensions and Mounting Hole Dimensions

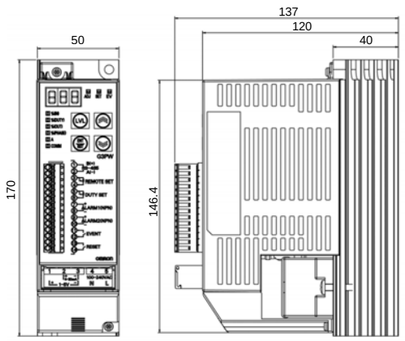
● G3PW-A220 (Small Slotted Terminals)



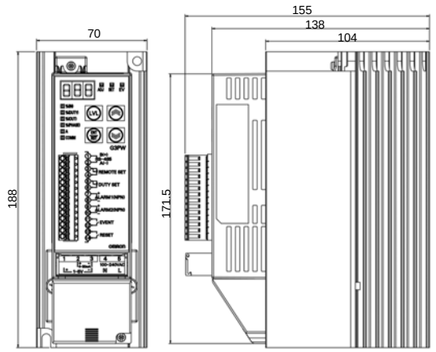
● G3PW-A245/A260 (Small Slotted Terminals)



● G3PW-A220 (Screwless Clamp Terminals)

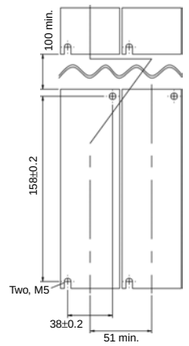


● G3PW-A245/A260 (Screwless Clamp Terminals)

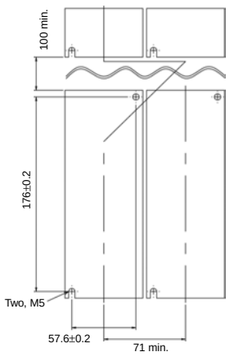


● **Mounting Hole Dimensions**

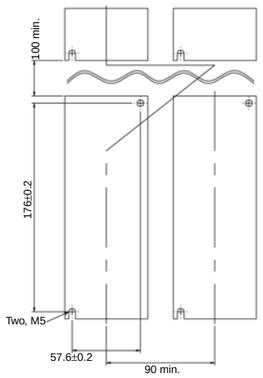
G3PW-A220



G3PW-A245

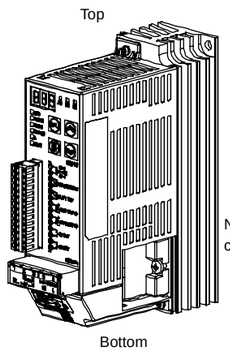


G3PW-A260



3. Installation

■ Installation Direction



- Install to a wall as shown in the diagram. If the Power Controller is installed in a direction other than that shown in the diagram, cooling efficiency will be reduced and the Power Controller may be damaged due to heat buildup.
- Leave a space of at least 100 mm above and below the Power Controller. To allow heat to dissipate, do not obstruct the area around the Power Controller.

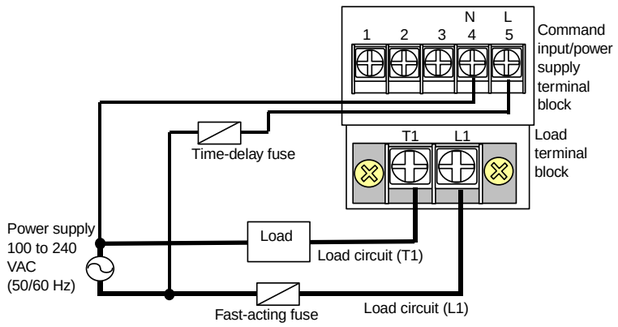
● **Mounting Screws**

Model	Tightening torque	Screw size
All models	2.3 to 2.5 N·m	M5, length: 10 mm min.

4. Wiring

■ Wiring the Power Supply and Load Circuits

- First, connect load terminal T1 through the load to the power supply, and connect load terminal L1 though a fast-acting fuse to the power supply.
- Then, connect power supply terminals 4 (N) and 5 (L) to the AC power supply.
- The AC power supply ground polarity and the G3PW terminal block polarity are not related, but connect the 4 (N) and 5 (L) terminals on the command input/power supply terminal block and the T1 and L1 terminals of the load terminal block to power supplies with the same phases.
- Always connect load terminal T1 to the load.



⚠ WARNING

Make sure that the phases match for load terminal T1 and power supply terminal 4 (N), and for load terminal L1 and power supply terminal 5 (L). Insert suitable fuses in the power supply line and load output line to protect the circuits.
The Power Controller will not operate normally if the wiring is not correct, and the load may be damaged.

⚠ Caution

- Always connect the load to load terminal T1. Also, always connect power supply terminal 4 (N) directly to the power supply. Do not connect it through the load. If the wiring is not correct, the fault detection function of the Power Controller will stop the output operation.
- When using the Power Controller to control the primary size of a transformer, do not open the circuit on the secondary side of the transformer while the Power Controller is operating.

● **Load Terminal Wire Sizes**

Select the load circuit wire size based on both the allowable current and the voltage drop. Use stranded wires.

Model	Recommended wire size	Tightening torque	Terminal screws
G3PW-A220	AWG18 to 10	1.8 N·m	M4
G3PW-A245	AWG6 (See note.)	2.8 N·m	M5
G3PW-A260			

Note: Crimp terminals that conform to UL and CSA specifications must be used.

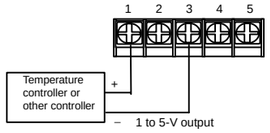
● **Crimp Terminals**

- Either use insulated crimp terminals or cover the crimp terminals with insulating sleeves.
- Always use the following crimp terminals to wire the load terminals.
- Do not connect more than two crimp terminals to one terminal screw.

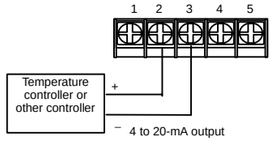
Model	A
G3PW-A220	9.5 mm max.
G3PW-A245/A260	12 mm max.

■ Command Input and Power Supply Terminal Wiring

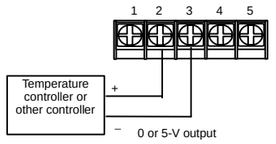
● Voltage Input (1 to 5 VDC)
When using a voltage input, connect the positive and negative signal wires to terminals 1 and 3, respectively.



● Current Input (4 to 20 mA DC)
When using current input, connect the positive and negative signal wires to terminals 2 and 3, respectively.



● ON/OFF Voltage Input (0 or 5 VDC)
When using an ON/OFF voltage input, connect the positive and negative signal wires to terminals 1 and 3, respectively.



● **Command Input and Power Supply Wire Sizes**

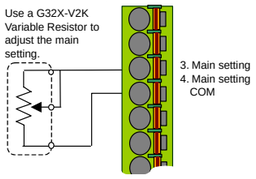
Model	Recommended wire diameter	Tightening torque	Terminal screws
All models	AWG 18 to 14	0.8 to 1.0 N·m	M3.5

● **Recommended Crimp Terminals**

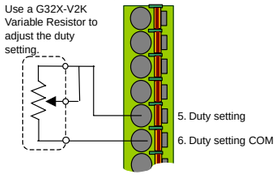
- Either use insulated crimp terminals or cover the crimp terminals with insulating sleeves.
- Always use the following crimp terminals (for M3.5) to wire to the command input and power supply terminals.

■ Control Terminal Wiring

● **Wiring to Adjust the Main Setting**



● **Wiring to Adjust the Duty Setting**



● **Control Terminal Wire Sizes**

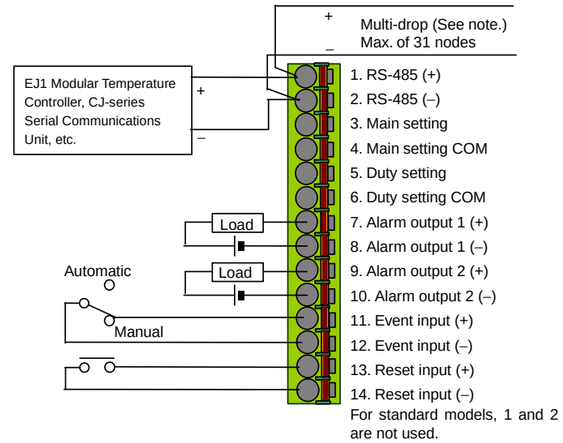
Model	Recommended wire diameter	Tightening torque	Terminal screws
All models	AWG 26 to 16	0.22 N·m	M2

- Strip the wire sheathing for the following lengths.

Model	Stripping length
G3PW-A2□□E□-S (Small slotted terminals)	7 mm
G3PW-A2□□E□-C (Screwless clamp terminals)	9 mm

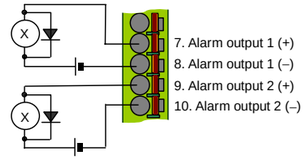
- When using stranded wires, attach a ferrule with an insulative cover that conforms to DIN 46228-4 and connect the ferrule to the terminal.
- Use shielded twisted-pair wires for RS-485 communications wires. A maximum of 500 m total of wiring can be used.

■ Alarm Output, Event Input, and RS-485 Connections



Note: A terminator must be connected at each end of the RS-485 transmission path. The terminators must be at least 54 Ω combined.

· If you connect a contact relay or other device containing contacts to the alarm output, wire a diode in parallel with the relay coil, as shown in the figure.



Conforming to Safety Standards

- The Power Controller is a Class A product (products for industrial environments). In residential environment areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.
- For the power supply for the alarm output, always use an EN/ IEC-approved power supply with reinforced or double insulation.

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.
Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.
Please know and observe all prohibitions of use applicable to the products. NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
See also product catalogs for Warranty and Limitations of Liability.

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