

# Single-Phase / 3-Phase Digital Power Controllers



## DPU1 / DPU3 Series PRODUCT MANUAL

**For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.**

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

### Features

- High speed and high accuracy by digital control using high speed CPU
- Various controls
  - Phase control, feedback control (constant voltage/constant current/constant power)
  - Zero crossing cycle control (fixed/variable cycles)
  - Zero crossing ON/OFF control
- Improved maintainability with built-in fast-acting fuse and easy fuse replacement
- Communication output model: RS485 (Modbus RTU)
- Various control inputs and DI inputs
  - Control input: analog (current, voltage), ON/OFF (voltage pulse, no voltage), communication (RS485), potentiometer
  - DI input: AUTO/MAN switching, RUN/STOP switching, Reset, output holding, SP designation (6 setting points can be customized)
- Various alarm output
  - Overcurrent, overvoltage, fuse break, heat sink overheat, device fault, heater break alarm (partial heater break detection)
- Improved convenience by separating operation part
- Applicable load
  - Supercantal, platinum, molybdenum, carbon, halogen lamps, chrome, nickel, etc.

### Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

**⚠ Warning** Failure to follow instructions may result in serious injury or death.

- 01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)  
Failure to follow this instruction may result in personal injury, economic loss or fire.
- 02. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.**  
Failure to follow this instruction may result in explosion or fire.
- 03. Install on a device panel, and ground separately.**  
Failure to follow this instruction may result in fire or electric shock.
- 04. Do not connect, repair, or inspect the unit while connected to a power source.**  
Failure to follow this instruction may result in fire or electric shock.
- 05. Do not disassemble or modify the unit.**  
Failure to follow this instruction may result in fire or electric shock.
- 06. Check 'Connections' before wiring.**  
Failure to follow this instruction may result in fire.

**⚠ Caution** Failure to follow instructions may result in injury or product damage.

- 01. Use the unit within the rated specifications.**  
Failure to follow this instruction may result in fire or product damage.
- 02. Use a dry cloth to clean the unit, and do not use water or organic solvent.**  
Failure to follow this instruction may result in fire or electric shock.
- 03. Keep the product away from metal chip, dust, and wire residue which flow into the unit.**  
Failure to follow this instruction may result in fire or product damage.
- 04. Since leakage current still flows right after turning off the power or in the output OFF status, do not touch the load terminal.**  
Failure to follow this instruction may result in electric shock.
- 05. Since leakage current still flows right after turning off the power or in the output OFF status, do not touch the load terminal.**  
Failure to follow this instruction may result in burn due to high temperature of the surface.

### Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- Keep away from high voltage lines or power lines to prevent inductive noise. Do not use near the equipment which generates strong magnetic force or high frequency noise.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Do not wire the unused terminals.
- Resupply the power after the product is completely discharged. Failure to follow this instruction may result in malfunction of the product.
- Wet product may cause the electric leakage or fire, the inspection must be required. Use safety equipment for installation. Do not raise leg or sit on the product.
- Prevent the product cover from automatically opening for transporting.
- In case of temporary storage, fix the product with transporting screw.
- Use twisted pair wire for communication line.

## Ordering Information

This is only for reference, the actual product does not support all combinations.  
For selecting the specified model, follow the Autonics website.

DPU ① ② ③ - ④ ⑤

### ① Control phase

- 1: Single-phase
- 3: 3-phase

### ② Power supply

- 1: 110 VAC~
- 2: 220 VAC~
- 3: 380 VAC~
- 4: 440 VAC~

### ③ Size (rated current capacity)

	Single-phase	3-phase
A	0 to 70 A	0 to 50 A
B	80 to 200 A	70 to 200 A
C	250 to 350 A	
D	400 to 600 A	
E	Option	

### ④ Rated current capacity

Number: Rated current capacity (unit: A)

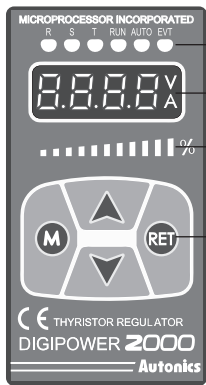
### ⑤ Option

- R: RS485 communication
- D: Remote display
- A: Remote display + RS485 communication
- N: None

## Product Components

- Product
- Instruction manual
- Bolt × 4
- Terminal × 1

## Unit Descriptions



### 01. Indicator

Indicator	Descriptions	Model
R/S/T	Turns ON by display value of display part E.g.) R, S ON → R-S line voltage display	DPU3
RUN	Turns ON for RUN, turns OFF of STOP	DPU1/3
AUTO	Turns ON for AUTO, turns OFF of MANUAL	
EVT	Turns ON for Digital input ON, flashes for alarm output ON	

### 02. Display part

RUN mode: Displays depending the front display setting  
Setting mode: Displays parameter and setting value

Indicator	Descriptions
V	Turns ON for voltage display
A	Turns ON for current display
V + A	Turns ON for power display, turns OFF for resistance and input value display

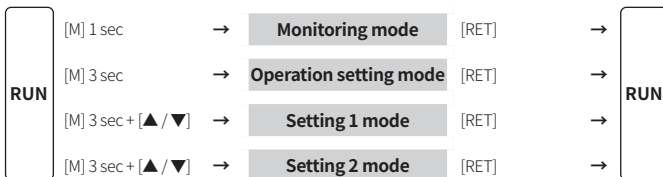
### 03. Bar graph indicator

Turns ON as 0 to 100 % ratio for selected display value.

### 04. Operation keys

Keys	Descriptions
[M]	To enter parameter mode, monitoring mode and to move between parameters
[▲/▼]	To move setting modes and to set parameters.
[RET]	To return to RUN mode from SET mode

## Mode Setting



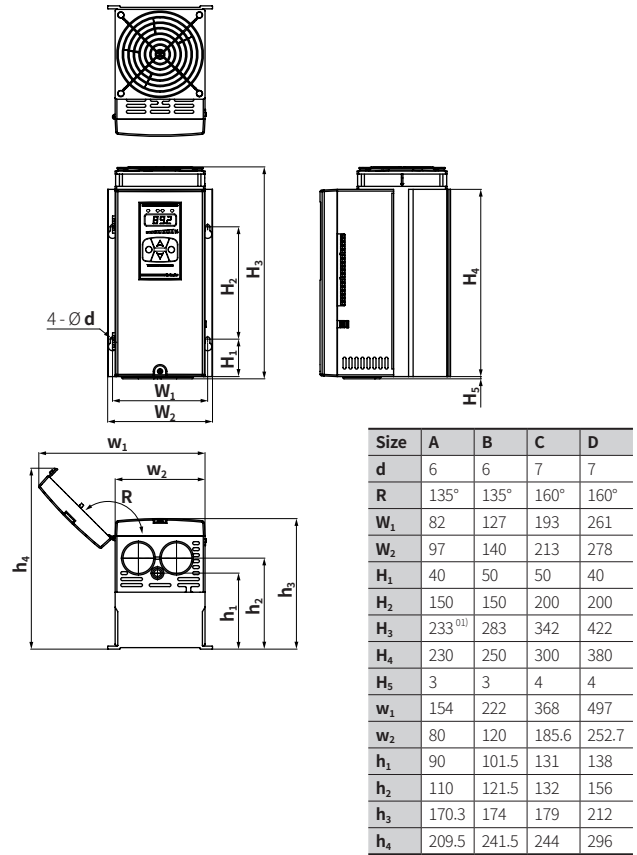
Mode	Descriptions
Monitoring	Monitors input value, load voltage / current / power / resistance, power frequency.
Operation setting	Sets parameters for DPU operation.
Setting 1	Sets parameters for details set.
Setting 2	Sets parameters for alarm.

## Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.
- The figure is based on the B size of DPU1.
- The A size 25 / 40 / 50 A model of DPU1 does not have the fan.

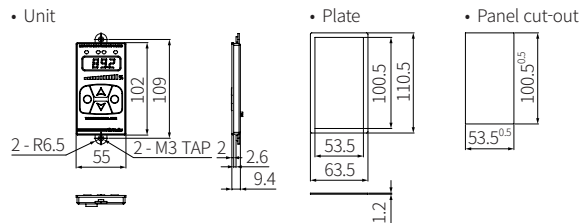
Size	A	B	C	D
Allowable cable thickness	≥ AWG4	≥ AWG4/0	≥ AWG300MCM	≥ AWG500MCM

### ■ DPU1 Series





01) Rated current capacity 70 A model: 263

### ■ Remote display



## Specifications

Series	DPU1	DPU3
Control phase	Single-phase	3-phase
Rated frequency	50 / 60 Hz (auto recognition), allowable frequency range: $\pm 2$ Hz	
Min. load current	1 A	
Output range	Phase control: 0 to 98 %, Z.C. control: 0 to 100 %	
Control method	<ul style="list-style-type: none"> <li>Phase control: normal / constant current feedback / constant voltage feedback / constant power feedback</li> <li>Cycle control (Z.C.): fixed cycle / variable cycle<sup>01)</sup></li> <li>ON / OFF control (Z.C.)</li> </ul>	
Load	<ul style="list-style-type: none"> <li>Phase control: resistance load, inductive load</li> <li>ON / OFF, cycle control : resistance load</li> </ul>	
Phase control output accuracy	<ul style="list-style-type: none"> <li>Normal: within <math>\pm 10</math> % F.S. of rated load voltage</li> <li>Constant voltage feedback: within <math>\pm 3</math> % F.S. of rated load voltage (within variable <math>\pm 10</math> % F.S. of rated voltage)</li> <li>Constant current feedback: within <math>\pm 3</math> % F.S. of rated load current (within variable 1 to 10 times of rated resistance)</li> <li>Constant power feedback: within <math>\pm 3</math> % F.S. of rated load power (within variable <math>\pm 10</math> % F.S. of rated power, within variable 1 to 10 times of rated resistance)</li> </ul>	
Control input	<ul style="list-style-type: none"> <li>Auto : 4 - 20 mA / 0 - 20 mA / 0 - 5 VDC<math>\rightleftharpoons</math> / 1 - 5 VDC<math>\rightleftharpoons</math> / 0 - 10 VDC<math>\rightleftharpoons</math> / voltage pulse (0 / 12 VDC<math>\rightleftharpoons</math> (24 VDC<math>\rightleftharpoons</math>)) / non-voltage input (ON / OFF) / communication input (RS485)</li> <li>Manual : internal 10 k<math>\Omega</math> adjuster, external 3 to 10 k<math>\Omega</math> adjuster (<math>\geq 2</math> W)</li> </ul>	
Digital input (DI)	AUTO / MAN selectable, RUN / STOP selectable, RESET, output holding, SP set (SP 1 to 6)	
Display type	Control input, load voltage, load current, load power, load resistance, power supply frequency	
Min. display output	Over 2.5 % of rated voltage / current	
RS485 comm.	Modbus RTU method	
Approval	CE  	

01) Only for single-phase

Power supply	110 / 220 / 380 / 440 VAC $\sim$ model (fan and control power 220 VACs $\sim$ 50 / 60 Hz separately)
Allowable voltage range	Single-phase: 90 to 110 % of power supply 3-phase: 85 to 115 % of power supply
Power consumption	Single-phase: $\leq 7$ W (except fan power) 3-phase: $\leq 10$ W (except fan power)
Display method	<ul style="list-style-type: none"> <li>Display value and setting value display: 7 segment 4-digit</li> <li>State display: Single-phase LED <math>\times 4</math>, 3-phase LED <math>\times 6</math></li> <li>Display value percentage display: 11 LED bar</li> </ul>
Dielectric strength	Between input terminal and power terminal: 2000 VAC $\sim$ 50 / 60 Hz for 1 min
Vibration	0.75 mm double amplitude at frequency of 5 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours
Insulation resistance	$\geq 200$ M $\Omega$ (500 VDC $\rightleftharpoons$ megger)
Noise immunity	$\pm 2$ kV square wave noise (pulse width: 1 $\mu$ s) by the noise simulator
Ambient temp.	-10 to 50 $^{\circ}$ C, storage: -20 to 80 $^{\circ}$ C (no freezing or condensation)
Ambient humidity	5 to 90 %RH, storage: 5 to 90 %RH (no freezing or condensation)

Unit weight (packaged)	Single-phase	3-phase
A	$\approx 3.0$ kg ( $\approx 3.2$ kg)	$\approx 6.5$ kg ( $\approx 7.6$ kg)
B	$\approx 3.0$ kg ( $\approx 5.6$ kg)	$\approx 11.5$ kg ( $\approx 13.0$ kg)
C	$\approx 11.0$ kg ( $\approx 12.1$ kg)	$\approx 20.0$ kg ( $\approx 21.1$ kg)
D	$\approx 11.0$ kg ( $\approx 19.3$ kg)	$\approx 30.8$ kg ( $\approx 35.7$ kg)

## Input

### ■ AUTO input

Input	Spec.	Input impedance
Analog	Current	4 - 20 mA 0 - 20 mA
	Voltage	1 - 5 VDC $\rightleftharpoons$ 0 - 5 VDC $\rightleftharpoons$ 0 - 10 VDC $\rightleftharpoons$
		25 $\Omega$
ON / OFF	Voltage pulse Non-voltage	0 / 12 VDC $\rightleftharpoons$ ON / OFF
Comm.	RS485	-

### ■ MANUAL input

Internal adjuster	10 k $\Omega$
External adjuster	3 to 10 k $\Omega$

## Communication Interface

### ■ RS485

Comm. protocol	Modbus RTU
Application standard	Compliance with EIA RS485
Max. connection	31-unit (address: 01 to 64)
Comm. synchronous method	Asynchronous
Comm. method	2-wire half duplex
Comm. distance	$\leq 800$ m
Comm. speed	4,800 / 9,600 / 19,200 / 38,400 bps
Comm. response time	5 to 99 ms
Data bit	8-bit (fixed)
Parity bit	Even (fixed)
Stop bit	1-bit (fixed)