#### **Autonics**

# POWER CONTROLLER **SPC SERIES**

#### INSTRUCTION MANUAL



Thank you for choosing our Autonics product. Please read the following safety considerations before use.

#### Safety Considerations

XPlease observe all safety considerations for safe and proper product operation to avoid hazards.

st symbol represents caution due to special circumstances in which hazards may occur.

▲ Warning Failure to follow these instructions may result in serious injury or death.

▲ Caution Failure to follow these instructions may result in personal injury or product damage.

- 1. 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
- 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.

  3. Install on the device panel, and ground to the F.G. terminal separately.
- Failure to follow this instruction may result in fire or electric shock
- 4. 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.
- 5. Check 'Connections' before wiring.
  Failure to follow this instruction may result in fire.
- 6. Do not disassemble or modify the unit.

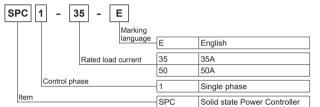
Failure to follow this instruction may result in fire or electric shock.

#### **⚠** Caution

- Use the unit within the rated specifications.
- Failure to follow this instruction may result in fire or product damage.

  2. Use 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. 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.
- 4. Since leakage current still flows right after turning off the power or in the output OFF
- Failure to follow this instruction may result in electric shock

### Ordering Information



## Specifications

Model		SPC1-35-E	SPC1-50-E	
Power supply		220VAC~ 50/60Hz		
Allowable voltage range		90 to 110% of rated voltage		
Operating frequency fluctuation		±1Hz		
Rated load current		35A (Single phase)	50A (Single phase)	
Control power		220VAC~		
Control range		Phase control: 0 to 98%, Cycle control: 0 to 100%		
Applied load		Resistance load (Min. load: over 5% of rated current)		
Cooling method		Natural air cooling		
Control circuit		Micom control type		
Control input		1-5VDC		
		DC4-20mA (250Ω)		
		ON/OFF (External contact or 24VDC)		
		External adjuster (1kΩ)		
		Output limit input (Front OUT ADJ. adjuster)		
Control method	By selection switch	Phase control <sup>×1</sup>		
		Cycle control (Zero Cross turn-on) - period 0.5, 2.0, 10sec <sup>⊗1</sup>		
		ON/OFF control (Zero Cross turn-on)		
Starting type		SOFT START (0 to 50 sec variable)		
Indicator		Output indicator (OUT): red LED		
Insulation resistance		Over 100MΩ (at 500VDC megger)		
Dielectric strength		2000VAC 50/60Hz for 1 minute		
Noise immunity		±2kV the square wave noise (pulse width:1μs) by the noise simulate		
Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 1 hour		
	Malfunction	0.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 10 min		
Shock	Mechanical	300m/s² (approx. 30G) in each X, Y, Z direction for 3 times		
	Malfunction	100m/s² (approx. 10G) in each X, Y, Z direction for 3 times		
Environ- ment	Ambient temperature	0 to 50°C, storage: -25 to 65°C		
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH		
Wire specification		AWG16 to 8	AWG8 to 6	
Unit weight		Approx. 1kg		

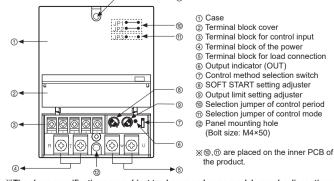
※1. Refer to '■ Operation and Function.

XEnvironment resistance is rated at no freezing or condensation.

## Factory Default

-		
Control method	Phase control	
Control mode	Phase equal division type according to control input	
Cycle control period	0.5 sec (JP1, JP2 short)	
SOFT START setting	0 sec	
OUT ADJ. setting	100%	

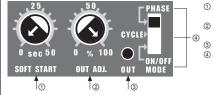
## Unit Description



XThe above specifications are subject to change and some models may be discontinued without notice.

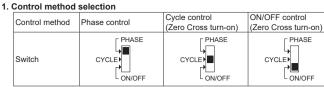
\*Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

## Operation and Function



① SOFT START setting adjuster (0 to 50 sec) ② Output limit setting adjuster

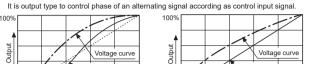
③ Output indicator Control method selection switch
 PHASE: Phase control method CYCLE: Cycle control method ON/OFF: ON/OFF control metho



When selecting cycle control method, the cycle has been set as 0.5 sec. It can be changed to 2 sec, 10 sec by selection.

\*The control method setting cannot be changed while it is operating.
Turn OFF the power at first then change the setting and supply the power again.

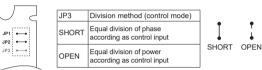
#### 1) Phase control



1VDC DC4mA Control input 1VDC DC4mA Control input (Fig. 1) Equal division type of phase according as control input (Fig. 2) Equal division type of power

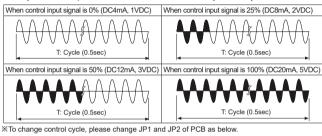
according as control input This is analog type to output control angle It divides control angle non-equally according with dividing equally according as control as control input signal then make power input signal. It shows power characteristic curve linearization, so it becomes possible as (Fig. 1) and it might occur over power or lack power at point middle of control input. to output the power, which is proportioned

※To change control mode, please change the JP3 of the PCB as below



#### 2) Cycle control (fixed cycle) - Zero cross turn on

It controls the power, which is applied into the load to repeat ON/OFF cycle like below picture with constant proportion according to control input signal. It is easy to control the load and there is no ON/OFF noise because it turns ON and OFF at the zero point of AC. Usually it is used in a place or electric furnace which is not easily effected by external noise.



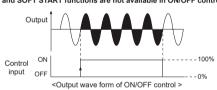






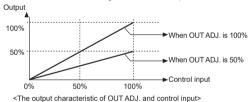
## 3) ON/OFF control - Zero cross turn on

This function is when control input is ON, output is 100%. When it is OFF, output is 0%. It is the same function as SSR (Solid State Relay). (It always turns ON/OFF at zero point of AC.) **XOUT ADJ.** and SOFT START functions are not available in ON/OFF control method



## 2. OUT ADJ. (Output limit) (0 to 100%)

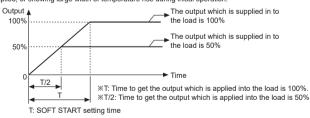
This function will be [Control input(%) × output limit set(%) = Output] and it controls the power supplied into the load. Although control input is 100% (5V or 20mA), the output is the 50% which is proportioned with OUT ADJ. When not using OUT ADJ. function, please make set value 100%



\*This function must not be used in ON/OFF control method.

## 3. SOFT START (0 to 50sec)

This function protects the load in cases that the set temperature is high, such as controlling the load (platinum. molybdenum, tungsten, infrared lamp, etc.) in which inrush current flows when power is supplied, or showing large width of temperature rise during initial operation.



SOFT START set time (T) is the required time that output reaches to 100%, and it is differentiated by OUT ADJ, set value. For example, SOFT START is set as 10sec and OUT ADJ, is set as 70%, it takes 7 sec to reach goal output.

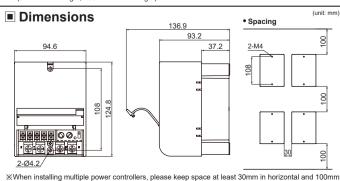
[Set time (T) × OUT ADJ, set value (%)=10sec × 0.7 = 7sec]

If increasing the OUT ADJ. before output reaches to goal output, it delays as much as the value, multiply of increased value (%) and SOFT START set time.

When not using SOFT START function, set value 0. **XThis function must not be used in ON/OFF control method.** 

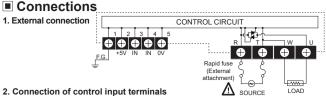
# 4. OUT display

This is LED lamp to display the status of output and will be getting brighter according as output. (0%: Min. LED light, 100%: Max. LED light)

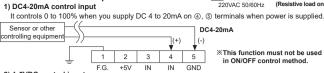


When installing multiple power controllers, please keep space at least 30mm in horizontal and 100m in vertical between power controllers for heat radiation

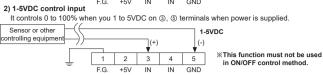
Connections



2. Connection of control input terminals



It controls 0 to 100% when you 1 to 5VDC on ③, ⑤ terminals when power is supplied.



3) ON/OFF external contact control input

It controls 100% if you connect external contact or switch to ②, ③ terminal when it is ON, it controls 0% when it is OFF.



methods.
OUT ADJ and SOFT START functions are not available in ON/OFF control method.

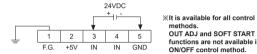
4) External adjuster control input

After power is applied, connecting the external adjuster  $1k\Omega$  to ②, ③ and ④ terminals and turning adjuster control from 0% to 100%. In another way, connecting to the @ and @ terminals and turning OUT ADJ control from 0% to 100%. <Refer to 'E.g. 2)' of 'Applications'.> It is available to control as OUT ADJ, adjuster for the above 1), 2), 3) and set at 100% when it is



#### 5) External 24VDC control input

It can be used with external 24VDC voltage as below. It is available to control of ON/OFF, outputs 100% for applying 24VDC and 0% for applying 0VDC.



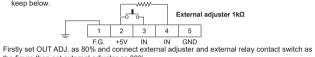
Max. 7.0mm

Max. 12mr

XTighten the terminal screw with the below tightening torque nals of size specified below Signal input Output and power terminal type control input) Tightening torque 0.6 to 1.2N·m Output and pow Min. 5mm Min. 3.5mm

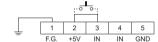
## Applications

E.g. 1) When controlling by limiting the power at ON/OFF in phase control and cycle control method. For example, if it needs to control 80% output when it is ON, 24% output when it is OFF, please keep below.



• When the External contact signal is OFF: 30% (adjuster input) ×80%(OUT ADJ.) = 80%
• When the External contact signal is OFF: 30% (adjuster input) ×80%(OUT ADJ.) = 24%

E.g. 2) This is how to control 0 to 100% without external adjuster in phase control and cycle control It is possible to control 0 to 100% with turning OUT ADJ. in state of connecting terminal 2 and



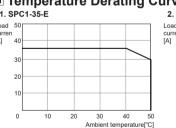
## Control Input Specification and Function

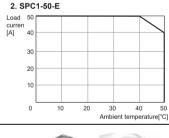
• Please see <Connection of control input terminals> and above function Control method ON/OFF control Phase control Cycle control Input and function DC4-20mA 1-5VDC External contact Control input specification External contact, 24VDC or 24VDC External adjuster OUT ADJ

## Temperature Derating Curve

SOFT START

OUT display





OUT display

## Remove of Case

Function

After disconnecting all power sources supplied to the product, remove the case, Push the Joint part (4 points) on the right and left side of the case with the flat head screwdriver, and disassemble the case.

∧When using the tool, be careful not to injure yourself.



# Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.

Use the product, after 3 sec of supplying power.
 Before use, set the mode and function according to the specification.

Especially, be cautious that the product does not operate when OUT ADJ. is set to 0%. Since mode/parameter can not be changed during operation, set the mode and function after turning off the power.

4. To ensure the reliability of the product, install the product on the panel or metal surface

vertically to the ground.

5. Install the unit in the well ventilated place. 6. While supplying power to the load or right after turning off the power of the load, do not while supplying power or the load of right after utiling on the power or the load, touch the body and heat sink.

Failure to follow this instruction may result in a burn due to the high temperature.

7. Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.

8. Do not wire to terminals which are not used.

9. The rapid fuse must be connected between R terminal and the power source. 10. Do not use near the equipment which generates strong magnetic force or high frequency

11. This unit may be used in the following environments ①Indoors (in the environment condition rated in 'Specifications') ②Altitude max. 2,000m ③Pollution degree 2 (4) Installation category III

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