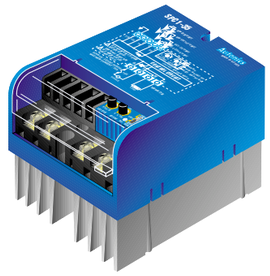
Autonics

POWER CONTROLLER
SPC SERIES
M A N U A L



Thank you very much for selecting Autonics products.
Please read this manual carefully before you use this unit.

▣ Caution

DANGER

F.G terminal must be grounded for avoiding electric shock and do not touch indirect heated panel.

WARNING

This unit is not designed for safety, therefore when this unit is applied at dangerous application such as serious human injury, serious property damage, be sure to install fail-safe device.

1. When you install it on panel, it should be installed vertically at the place where is well ventilation. If install it horizontally, under 70% of rated current should be applied.
2. The fuse for inner circuit must be installed between the terminal of R, T phase and the power.
3. If input current is over than absolute rated current of this product, it will cause damage of product.
4. The inductive load must not be use because this is for resistive load only.
5. The wire for the power and load connection should allow flowing absolute rated current. (35A:Min. 5.5mm² , 50A:Min. 8mm²)
6. The user should set proper mode and function for usage before using it.
   If OUT ADJ. has been set "0", it will not operate.
7. The mode cannot be changed during it is operating. Please be sure to set the proper mode after cut the power off then apply the power again.
8. Be sure to avoid the following places to install this unit
   ①Flammable, corrosive gas
   ②Water, oil
   ③Dust

※Above cautions must be kept because malfunction of unit can be occurred.

▣ Ordering information

SPC **1** – □

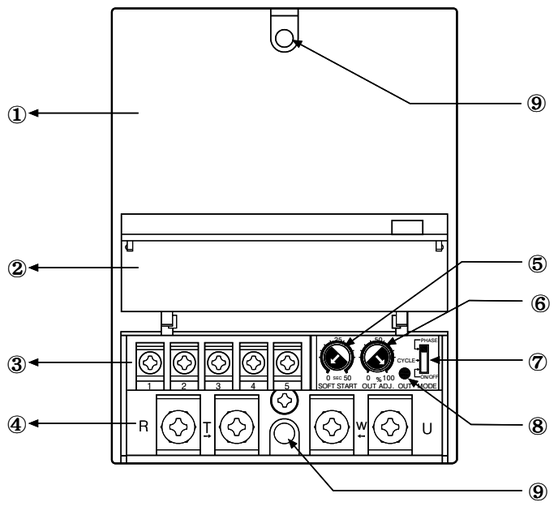
35	Rated current(A)
50	Rated current(A)
1	Single phase
3	Triple phase
SPC	Series name (Solid state Power Controller)

※The above specification are changeable without notice anytime.

▣ Specification

Model		SPC1-35	SPC1-50
Power supply		220VAC 50/60Hz	
Allowable operating voltage		90 to 110% of rated voltage	
Maximum rated current		35A(Single phase)	50A(Single phase)
Control power		220VAC	
Control range		0 to 100% of load power	
Applied load		Resistance load(Min. load:over 5% of rated current)	
Frozen type		In the air	
Control device		Micom control type	
Control input		1 to 5VDC	
		4 to 20mADC(250Ω)	
		ON/OFF(External contact point)	
		External VR(1KΩ)	
		Output limit input(Inner VR)	
Control type	By selection S/W	Phase control ┌ Equality division type of phase according as control input └ Equality division type of power according as control input	
		Cycle control(ZERO CROSS)-period(0.5, 2.0, 10sec)	
		ON/OFF control(ZERO CROSS)	
Starting type		SOFT START(0 to 50 sec variable)	
Display		Output indication(LED)	
Insulation resistance		100MΩ(at 500VDC Mega)	
Dielectric strength		2000VAC for 1minute	
Noise		±2KV the square wave noise(pulse width:1㎲) by the noise simulator	
Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 1hour	
	Malfunction	0.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 10min.	
Shock	Mechanical	300m/s² (30G) in X, Y, Z directions for 3 times	
	Malfunction	100m/s² (10G) in X, Y, Z directions for 3 times	
Ambient temperature		0 to 50℃(at non-freezing status)	
Ambient storage temperature		-25 to 65℃(at non-freezing status)	
Ambient humidity		35 to 85%RH	
Net weight		Approx. 1kg	

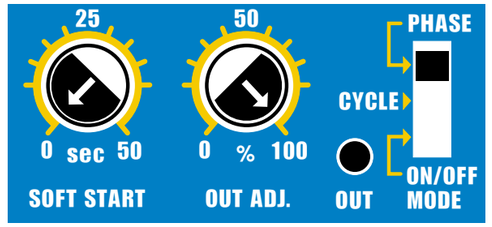
▣ Parts name



① Case
② Terminal block cover
③ Terminal block for control input
④ Terminal block of the power and load connection
⑤ Soft start adjusting volume
⑥ OUT ADJ. volume
⑦ Control mode
⑧ The LED display of output
⑨ The hole for fixing panel (Bolt size:M4×50)

▣ Operation and function

<Front part>



1. Function of selecting control mode

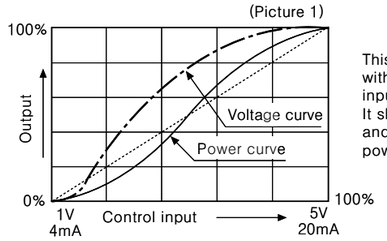
Control mode	Phase control mode	Cycle control mode (Zero Cross)	ON/OFF control mode (Zero Cross)
Mode switch	PHASE / CYCLE / ON/OFF	PHASE / CYCLE / ON/OFF	PHASE / CYCLE / ON/OFF

※When select cycle control mode, the cycle has been set as 0.5sec, it can be variable 2.0sec and 10sec by optional function.
※The mode cannot be changed during it is operating. Please be sure to set the proper mode after cut the power off then apply the power again.

1)Phase control type

It is output type to control phase of an alternating according as control input signal.
①Equality division type of phase according as control input

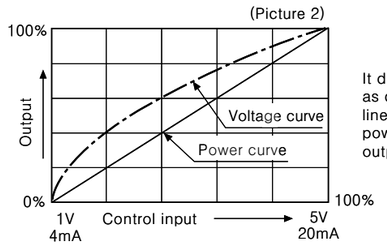
(Picture 1)



This is analogue type to output control angle with dividing equally according as control input signal.
It shows power characteristic as (Picture 1) and it might be occurred over power and lack power at point middle of control input.

②Equality division type of power according as control input

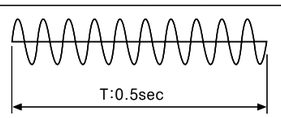
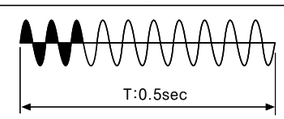
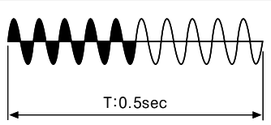
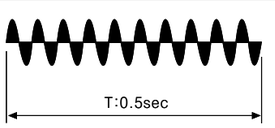
(Picture 2)



It divides control angle non-equally according as control input signal then make power curve linerize, so it becomes possible to output the power, which is proportioned control input as outputing(Picture 2).

2)Cycle control-Zero Cross

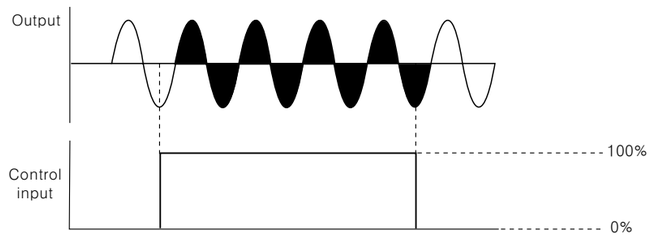
It controls the power, which is applied in to the load to repeat ON/OFF cycle like below picture with constant proportion according as control input signal. It is easy to control the load and there is no ON/OFF noise because it turns ON and OFF at the zero point of AC.
Usually it is used in a place or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

When control input signal is 0%(4mA, 1V)	When control input signal is 25%(8mA, 2V)
	
When control input signal is 50%(12mA, 3V)	When control input signal is 100%(20mA, 5V)
	

3)ON/OFF control-Zero Cross

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 is not able to use OUTPUT ADJ. and SOFT START function in ON/OFF control mode.

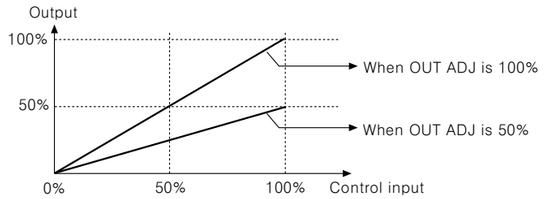
〈 Output waveform of ON/OFF control〉



2. OUT ADJ. function(0 to 100%)

This function will be[Control input(%) X OUT ADJ.(%) = Output] and it controls the power applied into the load. Although the control input is 100%(5V or 20mA), if OUT ADJ. is 50%, the output will be 50% which is proportioned OUT ADJ.
When this function is not used, OUT ADJ. should be 100%.

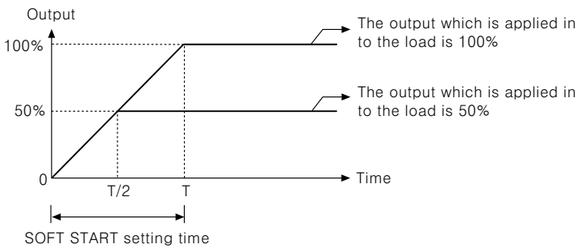
〈 The output characteristic of OUT ADJ. and control input〉



※This function must not be used in ON/OFF control mode.

3. SOFT START function(0 to 50sec)

When the power is applied or the load is converted, this function is able to protect the load when it controls load(Molybdnum, White gold, Lamp) with sudden current.



SOFT START setting time(T) is the time of applied output in the load reaches until 100%.
If applied output in load is 50%, the time of the goal output value reaches until 50% will be T/2.
In this time, if incrase the OUT ADJ before it becomes T/2, it will slowly increase and then reaches at the output as much as the value of multiply the value of increment of OUT ADJ to T.
When this function is not used, T should be 0.

※This function must not be used in ON/OFF control mode.

4. OUT display function

This is LED ramp to display the status of output and will be getting brighter according as output (0%:Minimum, 100%:Maximum)

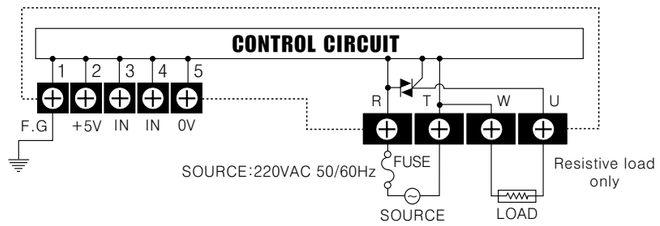
▣ Control input specification and function for each mode

●Please see〈 Connection of control input terminals〉 and above function

Mode / Input and function	Phase control mode	Cycle control mode	ON/OFF control mode
Control input specification	4 to 20mADC		External relay contact
	1 to 5VDC		
	External relay contact		
	External volume		
Function	OUT ADJ.		OUT display
	SOFT START		
	OUT display		

▣ Connection

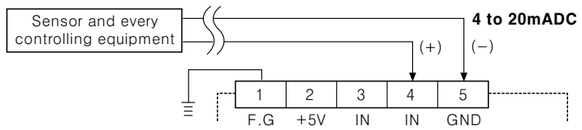
1. External connection



2. Connection of control input terminals

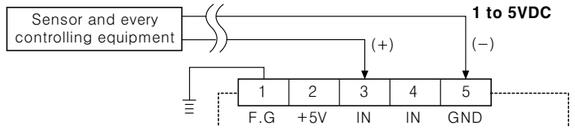
1)4 to 20mADC control input

It controls 0 to 100% to apply 4 to 20mADC on ④, ⑤ terminals in state of the power applied.



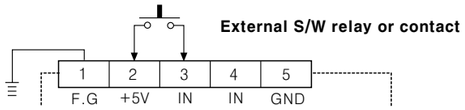
2)1 to 5VDC control input

It controls 0 to 100% to apply 1 to 5VDC on ③, ⑤ terminals in state of the power applied.



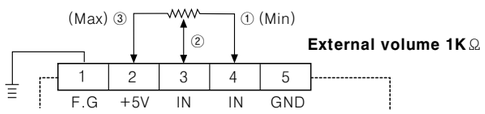
3)ON/OFF External contact control input

It controls 100% to connect External S/W or relay contact to ②, ③ terminal when it is ON, it controls 0% when it is OFF.



4)External volume control input

It controls 0 to 100% with turning VR to connect 1KΩ to ②, ③, ④ terminals in state of the power applied, or after connect ② terminal to ③ terminal, it is possible to control 0 to 100% with turning OUT ADJ.
OUT ADJ will be operated in state of above 1), 2), 3). If it is not used, it should be 100%.



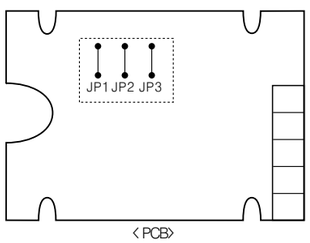
▣ Factory specification and How to change additional function

1. Factory specification

Control mode	Phase control mode
Control type	Phase equality division type according as control input
Control cycle	0.5sec
SOFT START setting	0sec
OUT ADJ. setting	100%

2. How to change additional function

When it needs to change control cycle or characteristic control type of phase control mode from factory specification, use JP1, JP2, JP3 on PCB as below.



〈 Select cycle control mode〉

JP1	JP2	Period(sec)
SHORT	SHORT	0.5sec
SHORT	OPEN	2.0sec
OPEN	SHORT	10sec
OPEN	OPEN	X(Do not use)

〈 Select phase control mode〉

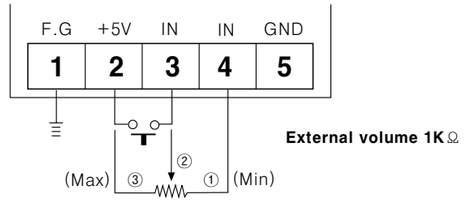
JP3	Control type
SHORT	Phase equality division type according as control input
OPEN	Power equality division type according as control input

※ SHORT OPEN

▣ Application

EX1)When it needs to control accurately with adjusting the power in phase control and cycle control mode. For example, if need to control 80% output when it is ON, 24% output when it is OFF, please keep below.

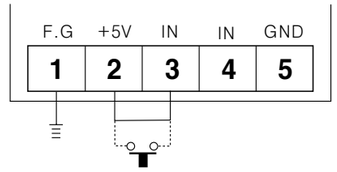
〈 Control input terminal connection of control input terminals〉



Firstly set OUT ADJ. as 80% and connect external volume and external relay contact S/W as above picture then set external volume as 30%.
●When the External contact signal is ON :
100%(External contact input)×80%(OUT ADJ.)=80%
●When the External contact signal is OFF:30%(Volume input)×80%(OUT ADJ.)=24%

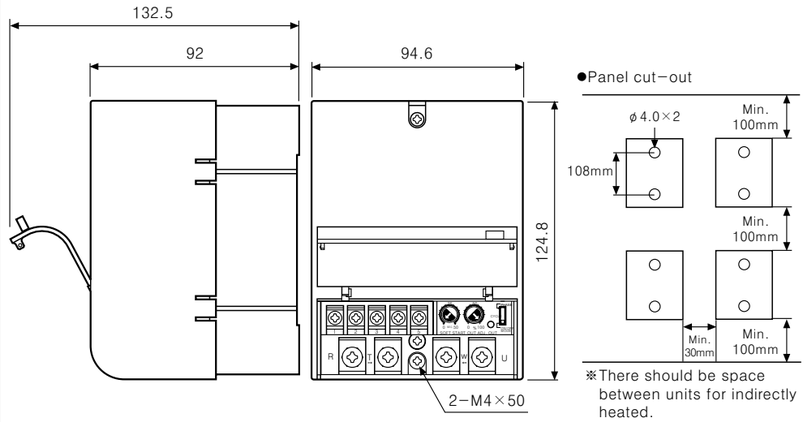
EX2)This is how to control 0 to 100% without external volume in phase conrol mode and cycle control mode.

〈 Control input terminal connection of control input terminals〉



It is possible to control 0 to 100% with turning OUT ADJ. in state of connecting terminal 2 and terminal 3.

▣ Dimension



▣ Main products

■COUNTER ■TIMER ■TEMPERATURE CONTROLLER ■PANEL METER ■TACHOMETER
■LINE SPEED METER ■DISPLAY UNIT ■PROXIMITY SWITCH ■PHOTOELECTRIC SENSOR
■OPTICAL FIBER SENSOR ■ROTARY ENCODER ■SENSOR CONTROLLER
■POWER CONTROLLER ■STEPPING MOTOR & DRIVER & CONTROLLER

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