Autonics

3-Phase, LED Display Slim Power Controller
SPR3 Series
INSTRUCTION MANUAL

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

▣ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.
※⚠ 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.

⚠ Warning

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 fire, personal injury, or economic loss.
2. **Install on the device panel, and ground to the bolt for grounding separately.**
   Failure to follow this instruction may result in electric shock or fire.
3. **Do not connect, repair, or inspect the unit while connected to a power source.**
   Failure to follow this instruction may result in electric shock or fire.
4. **Check 'Connections' before wiring.**
   Failure to follow this instruction may result in fire.
5. **Do not disassemble or modify the unit.**
   Failure to follow this instruction may result in electric shock or fire.

⚠ Caution

1. **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 electric shock or fire.
3. **Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
   Failure to follow this instruction may result in fire or explosion.
4. **Keep metal chip, dust, and wire residue from flowing into the unit.**
   Failure to follow this instruction may result in fire or product damage.
5. **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.

▣ Ordering Information

SPR	3	–	2	70	T	F	F

Fuse	**N**	Non-fuse※1
	F	Fuse
Feedback control	**N**	Normal control
	F	Normal/constant current/constant voltage/constant power control
Option output	**N**	Alarm output
	T	Alarm+RS485 comm. output
Rated load current	**25**	25A
	35	35A
	50	50A
	70	70A
	100	100A
	150	150A
Rated load voltage	**1**	110VAC
	2	220VAC
	3	380VAC
	4	440VAC
Control phase	**3**	3-phase
Item	**SPR**	Solid State Power Regulator (slim type)

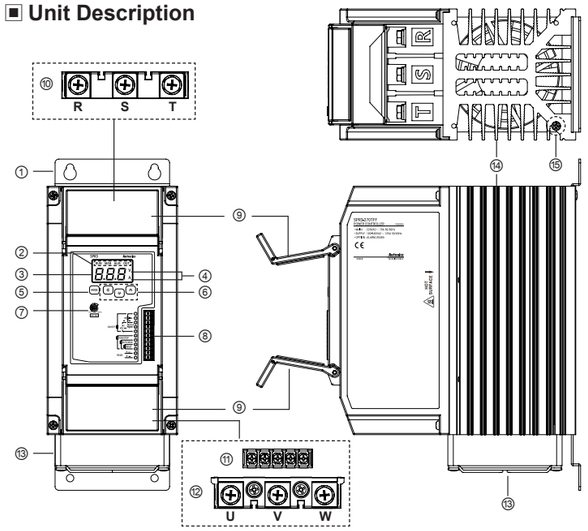
※1: Product is not equipped with a rapid fuse inside. Install the suitable fuse for rated load current of the model separately.
(The performance of the product is guaranteed only when using the fuse provided by us.)
※**The above specifications are subject to change and some models may be discontinued without notice.**
※**Be sure to follow cautions written in the instruction manual, user manual, and the technical descriptions (catalog, homepage).**

▣ Specifications

Model		SPR3-1□□□□	SPR3-2□□□□	SPR3-3□□□□	SPR3-4□□□□
Control phase		3-phase			
Rated load voltage (50/60Hz)		110VAC~	220VAC~	380VAC~	440VAC~
Power supply		100-240VAC~ 50/60Hz			
Min. load current		1A			
Permissible voltage range		90 to 110% of rated voltage			
Power consumption		• Rated load current 25A/35A/50A: max. 14VA • Rated load current 70A: max. 22VA • Rated load current 100A/150A: max. 32VA			
Display method		3-digit 7-segment LED			
Indicator		• Operation indicator/Manual control indicator: green LED • Alarm indicator/output indicator/unit (V, A) indicator: red LED			
Control method		• Phase control: normal control mode, constant current/constant voltage/constant power feedback control mode • Cycle control: fixed cycle control mode • ON/OFF control			
Applied load		• Phase control, ON/OFF control: resistance load, inductive load • Cycle control: resistance load			
Control input		• Auto control: DC4-20mA, 1-5VDC⎓, ON/OFF contact (no-voltage input), pulse voltage (5-12VDC⎓) • Manual control: outside adjuster (10kΩ), inside adjuster (output limit)			
Digital input (DI)		RUN/STOP switching, AUTO/MAN switching, RESET			
Output	Alarm	250VAC~ 3A, 30VDC⎓ 3A, 1c resistive load			
	Communication	RS485 communication output (Modbus RTU method), max. connection: 31 units			
Output range		• Phase control: 0 to 98% • Cycle control: 0 to 100% • ON/OFF control: 0%, 100%			
Output accuracy		• Normal control: within ±10% F.S. of rated load voltage • Constant current feedback control: within ±3% F.S. of rated load current • Constant voltage feedback control: within ±3% F.S. of rated load voltage • Constant power feedback control: within ±3% F.S. of rated load power			
Set method		By front keys, by communication			
Functions		Output limit (OUT ADJ), AUTO/MAN selection, control method selection, RESET, SOFT START, SOFT UP/DOWN, output high/low limit, input correction, input slope correction, monitoring (control input, load voltage/current/power/resistance, power supply frequency, heatsink temperature)			
	Alarm	Overcurrent alarm, overvoltage alarm, fuse break alarm, SCR error alarm, heater break alarm, heatsink overheat alarm			
Cooling method		• Rated load current 25A/35A/50A: natural cooling • Rated load current 70A/100A/150A: forced air cooling (with the cooling fan)			
Insulation resistance		Over 200MΩ (at 500VDC megger)			
Dielectric strength		2,000VAC 50/60Hz for 1 min (between input terminals and power terminals)			
Output leakage current		Max. 10mArms			
Noise immunity		±2kV the square wave noise (pulse width: 1μs) by the noise simulator			
Memory retention		Approx. 10 years (when using non-volatile semiconductor memory type)			
Vibration	Mechanical	0.75mm amplitude at frequency of 5 to 55Hz in each X, Y, Z direction for 2 hours			
	Malfunction	0.5mm amplitude at frequency of 5 to 55Hz in each X, Y, Z direction for 10 min			
Environment	Ambient temp.	-10 to 55℃, storage: -20 to 80℃			
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH			
Accessory		11-pin connector, insulating barrier: 4			
Approval		CE			
Weight※1		• Rated load current 25A/35A/50A: approx. 4.9kg (approx. 4.1kg) • Rated load current 70A: approx. 5kg (approx. 4.2kg) • Rated load current 100A/150A: approx. 9.7kg (approx. 8.7kg)			

※1: The weight includes packaging. The weight in parenthesis is for unit only.
※Environment resistance is rated at no freezing or condensation.

▣ Unit Description



① Bracket (except rated load current 100A/150A models)
② Indicator

Indicator		Color	Function
RUN	Operation indicator	Green LED	Turns on in the RUN mode.
MAN	Manual control indicator	Green LED	Turns on when adjusting load output in the manual control mode.
ALM	Alarm indicator	Red LED	Flashes in alarming status.
OUT	Output indicator	Red LED	Turns on when load control outputs.

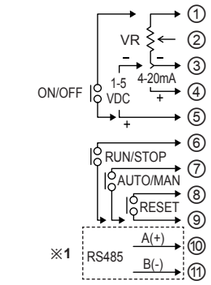
③ Display part: Displays settings of the front display [dI 5] parameter in RUN mode, and displays parameter and setting value in setting mode.
④ Unit indicator
(☼: Light ON/●: Light OFF)

Indicator		Display
V	A	
●	●	Resistance, input
☼	●	Voltage
●	☼	Current
☼	☼	Power

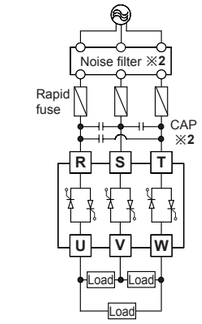
⑤ SET key: Enters parameter group, returns to RUN mode, moves parameters, and saves the setting value.
⑥ Setting value adjustment key
: Enters SV setting mode and move digits.
⑦ Output limit adjuster (OUT ADJ)
: Limits output from 0 to 100%.
⑧ 11-pin connector terminal
⑨ Terminal cover
⑩ R, S, T load input terminals
⑪ Alarm output and power input terminals
⑫ U, V, W load output terminals
⑬ Cooling fan: For models with the rated load current of 70A/100A/150A, a cooling fan is attached.
⑭ Heatsink: In case of rated load current 100A/150A models, there are mounting holes on the right/left.
⑮ Bolt for grounding (M4)

▣ Connections

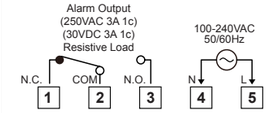
◎ Control input/Comm. output



◎ Load input/output



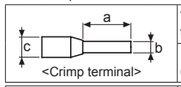
◎ Alarm output/power input



※1: This is only for models with RS485 communication output (SPR3-□□T□).
※2: When connecting noise filter and capacitor, it is appropriate for EMC.
CAP : Rated load voltage 110VAC-220VAC → 1uF/250VAC
: Rated load voltage 380VAC-440VAC → 0.47uF/500VAC
※Tighten the terminal screw with the below tightening torque.

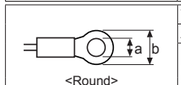
Rated load current	Specification	Alarm output/ power input	Load input/output
25A, 35A, 50A, 70A	Screw	M3	M6
	Tightening torque	0.5N·m	5.5 to 6.0N·m
100A, 150A	Screw	M3	M8
	Tightening torque	0.5N·m	6.5 to 7.0N·m

※Use crimp terminals or terminals of size specified below. (unit: mm)



<Crimp terminal>

	Terminal type	Terminal number	a	b	c
	Input (11-pin)	1 to 11	6 to 7	Max. 1.5	Max. 3.5



<Round>

	Terminal type		a	b
	Alarm output/power input		Min. 3.0	Max. 6.0
Load input/output		Rated load current 25A/35A/50A/70A	Min. 6.0	Max. 16.0
		Rated load current 100A/150A	Min. 8.0	Max. 26.0

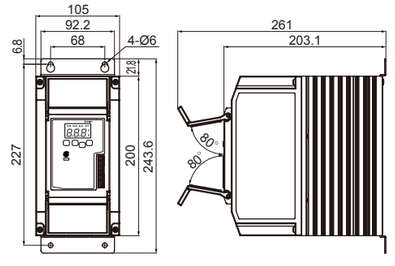
※Connect the specified wire as the rated load current.

Rated load current	Wire specification	
	Alarm output/power input	Load input/output
25A/35A/50A/70A	AWG 18 to 14	AWG 13 to 4
100A/150A		AWG 4 to 2/0

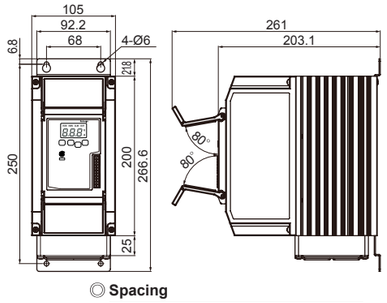
▣ Dimensions

(unit: mm)

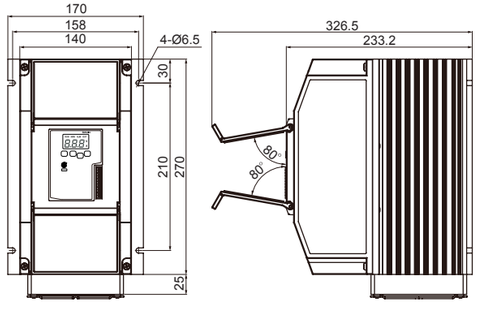
◎ Rated load current 25A/35A/50A



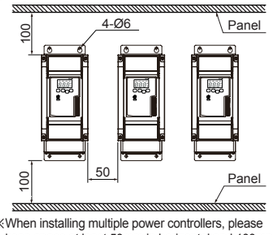
◎ Rated load current 70A



◎ Rated load current 100A/150A



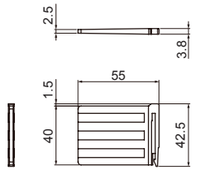
◎ Spacing



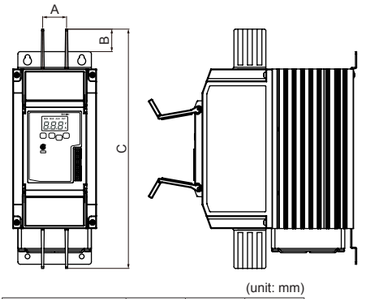
※When installing multiple power controllers, please keep space at least 50mm in horizontal and 100mm in vertical between power controllers for heat radiation.

⚠ High Temperature Caution
While supplying power to the load or right after turning off the power of the load, do not touch the body and heatsink. Failure to follow this instruction may result in a burn due to the high temperature.

◎ Insulating barrier



● With the insulating barrier

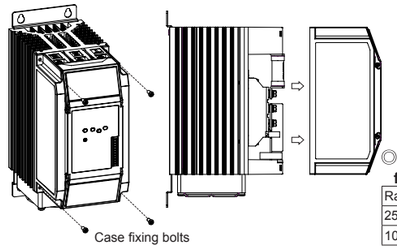


(unit: mm)

Rated load current	A	B	C
25A, 35A, 50A	30	28.2	300
70A	30	28.2	300
100A, 150A	40.5	50	370

※It is recommended to use the included interphase barriers for insulation between phases and reduce influence from conductive material.

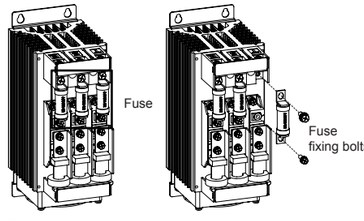
▣ Removing the Case



◎ Specification of case fixing bolts

Rated load current	Spec. of bolts
25A, 35A, 50A, 70A	M3
100A, 150A	M4

▣ Replacement of Fuse



◎ Specification of fuse fixing bolts

Rated load current	Spec. of bolts
25A, 35A, 50A, 70A	M6
100A	Top: M8 Bottom: M6
150A	M8

◎ Recommended fuse specifications

For replacing the fuse, please use the recommended fuse which has the below specifications.

(manufacture: BUSSMANN)

Rated load current	Model	Rated load current	Model
25A	50FE	50A	80ET
35A	63ET	70A	100FE

(manufacture: HINODE)

Rated load current	Model
100A	660GH-160
150A	660GH-200

※The performance of the product is guaranteed only when using the fuse provided by us.

■ Parameter Group

※Hold the MODE key in RUN mode to enter into parameter group.
※In parameter setting group, press the MODE key to move to other parameter in the group.
※Press the MODE key once after changing the setting value, to save the setting value and move to the next parameter.
※When entering to the parameter, press the ≪ key to move digit, ≫, ≪ keys to change the setting value.
※If there is no key input for 30 sec while setting SV or the parameters, the new settings are ignored, and the unit will return to RUN mode with previous settings.
※Hold the MODE key for 3 sec to save the setting value and return to RUN mode after changing the setting value.

RUN mode

MODE → **Monitoring group**
MODE 2 sec → **Parameter 1 group [PA1]**
MODE 4 sec → **Parameter 2 group [PA2]**

◎ Monitoring group

Display	Measuring range	Description	Unit	Factory default
in	0 to 100	Displays the present control input as percentage.	%	—
U-u ※1	0 to rated voltage range	Displays the present load voltage between U-V line.	V	—
u-v ※1		Displays the present load voltage between V-W line.		
v-U ※1		Displays the present load voltage between W-U line.		
U-A ※1	0 to rated current range	Displays the present load current of U-phase.	A	—
u-A ※1		Displays the present load current of V-phase.		
v-A ※1		Displays the present load current of W-phase.		
L-P ※1	0 to rated power range	Displays the present load power.	kW	—
L-r ※1	0 to 100	Displays the present resistance as percentage compared to the set resistance of full load auto recognition.	%	—
tAP	0 to 100	Displays the present temperature of heatsink.	℃	—
Frq	50, 60	Displays the present frequency of power supply.	Hz	—

■ Load Output Formula

Type	Input		Display		Formula
Auto control (AUTO)	Current	DC4-20mA	Int	420	Load output [%]
	Voltage	1-5VDC		1-5	= Control input [%] × Output slope (SLP) [%]
	RS485 communication			Coñ	Load output [%] = RS485 [%]
Manual control (MAN)	Output limit	Inside adjuster	oAn	I_r	Load output [%] = Inside adjuster [%]
		Outside adjuster		E_r	Load output [%] = Outside adjuster [%]
		Inside/outside adjuster		E_I	Load output [%] = Inside adjuster [%] × Outside adjuster [%]

■ Comprehensive Device Management Program [DAQMaster]

DAQMaster is a comprehensive device management software for setting parameters and monitoring processes. DAQMaster can be downloaded from our website at www.autonics.com.

Item	Minimum specifications
System	IBM PC compatible computer with Pentium III or above
Operations	Windows 98/NT/XP/Vista/7/8/10
Memory	256MB+
Hard disk	1GB+ of available hard disk space
VGA	Resolution: 1024×768 or higher
Others	RS232C serial port (9-pin), USB port

■ User Manual for Communication

For the detail information and instructions, please refer to user manual for communication, and be sure to follow cautions written in the technical descriptions (catalog, homepage).
Visit our homepage (www.autonics.com) to download manuals.

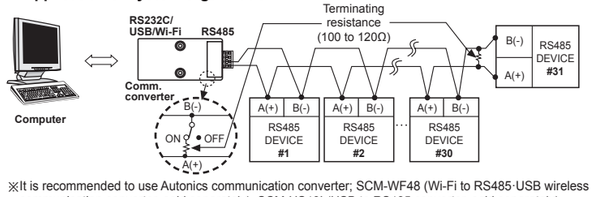
■ RS485 Communication Output

※Applicable for models with RS485 communication output through option output (SPR3-□□T□□). Please refer to '■ Ordering Information'.

1. Communication Specifications

Comm. protocol	Modbus RTU	Comm. speed	2400, 4800, 9600, 19200, 38400 bps
Connection method	RS485		
Application standard	Compliance with EIA RS485	Comm. response time	5 to 99ms (default: 20ms)
Max. connections	31 units (address: 1 to 99)	Start bit	1-bit (fixed)
Synchronization method	Asynchronous	Data bit	8-bit (fixed)
Comm. method	Two-wire half duplex	Parity bit	None, Even, Odd
Comm. distance	Max. 800m	Stop bit	1-bit, 2-bit

2. Application of system organization



※It is recommended to use Autonics communication converter; SCM-WF48 (Wi-Fi to RS485·USB wireless communication converter, sold separately), SCM-US48I (USB to RS485 converter, sold separately), SCM-38I (RS232C to RS485 converter, sold separately). Please use twisted pair wire, which is suitable for RS485 communication, for SCM-WF48, SCM-US48I and SCM-38I.

◎ Parameter 1 group [PA1]

Display	Setting range	Description	Unit	Factory default
S-t	0 to 100	Set SOFT START time.	sec	3
U-t	0 to 100	Set SOFT UP time.	sec	3
d-t	0 to 100	Set SOFT DOWN time.	sec	3
L-L	0 ≤ L-L ≤ H-L ≤ 100	Set the output low-limit value.	%	0
H-L		Set the output high-limit value.	%	100
SLP	0 to 100	In case of auto control (AUTO), set the output slop limit proportional to control input for limit load power.	%	100

◎ Parameter 2 group [PA2]

Display	Setting range		Description	Unit	Factory default
Int ※1	420	DC4-20mA	Set the control input specification.	—	420
	1-5	1-5VDC			
	5 12	5-12VDC			
	onF	ON/OFF contact			
	Coñ	RS485 comm.			
C-ñ	PA	Phase control - Normal	Set the control method.	—	PA
	u-F ※2	Phase control - Constant voltage feedback			
	C-F ※2	Phase control - Constant current feedback			
	v-F ※2	Phase control - Constant power feedback			
	F-C	Cycle control - Fixed cycle			
	onF	ON/OFF control			
oAn ※1	I_r	Inside adjuster	In case of manual control (MAN), set the output limit method.	—	I_r
	E_r	Outside adjuster			
	E_I	Inside/outside adjuster			
inb ※1	-99 to 99		Set the compensated input value for the offset between the actual input value and the measured input value.	%	00
SPn ※1	-99 to 99		Set the compensated input slope value between the actual input value 100% and the measured input value 100%.	%	00
dIS	in	Resistance and input	Set the desired value to be displayed at the front display part.	—	in
	U-u ※3	Load voltage between U-V line			
	u-v ※3	Load voltage between V-W line			
	v-U ※3	Load voltage between W-U line			
	U-A ※3	U-phase load current			
	u-A ※3	V-phase load current			
	v-A ※3	W-phase load current			
	L-P ※3	Load power			
oCu ※2	0 to 120		Set the overcurrent alarm value.	%	120
oCt ※2	0 to 100		Set the overcurrent alarm delay time.	sec	5
ouu ※2	0 to 120		Set the overvoltage alarm value.	%	120
out ※2	0 to 100		Set the overvoltage alarm delay time.	sec	5
F-L ※2	oFF / on		It executes 100% control output for 3 sec and the load resistance value recognized automatically as the initial set when the function is ON.	—	oFF
Hbu ※2	oFF / 10 to 100		Set the heater break alarm value.	%	10
Adr ※3	01 to 99		Assign the unique address when communicating.	—	01
bPS ※3	24, 48, 96, 192, 384		Set the speed of data transmission. Multiply by 100 to read the set value. (e.g.: 96=9600bps)	bps	96
Prt ※3	non / EuE / odd		A parity bit is a data communication method that adds an additional bit to each character in transmitted data as an indicator used to verify data loss and corruption.	—	non
StP ※3	1, 2		Set the number of bits to mark the end of a transmitted data string.	bit	2
rSt ※3	5 to 99		Set standby time to prevent communication errors when communicating with a slow master device (PC, PLC, etc.).	ms	20
CAU ※3	EnA	Comm. write enables	Enable or disable the setting of parameters stored in memory via communication from the master system (PC, PLC, etc.). Reading the set value in parameter is always possible.	—	EnA
	dSA	Comm. write disables			
LoC	oFF	Unlock	The parameter group settings can not be changed when the function is ON.	—	oFF
	LC1	PA1 lock			
	LC2	PA2 lock			
ini	no / YES		If set the parameter to YES, reset all parameters to default. Hold the ≪, ≫, ≪ keys for 5 sec, to enter parameter reset parameter.	—	no

※1: Set the below parameters available depends on the control input.

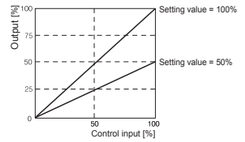
Type	Input		Display		Input correction [inb]	Input slope correction [SPn]	Output slope [SLP]	Monitoring value [in]
Auto control (AUTO)	Current	DC4-20mA	Int	420	○	○	○	The last control input value 0 to 100%
	Voltage	1-5VDC		1-5	○	○	○	
	pulse voltage	5-12VDC		5 12	×	×	○	
	No-voltage	ON/OFF contact		onF	×	×	○	
	RS485 communication			Coñ	×	×	×	
Manual control (MAN)	Output limit	Inside adjuster	oAn	I_r	×	×	×	
		Outside adjuster		E_r				
		Inside/outside adjuster		E_I				

※2: Displayed only for feedback control models.
※3: Displayed only for models with RS485 comm. output.

■ Functions

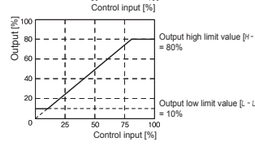
◎ Output limit (OUT ADJ)

This function will be [Control input (%) × OUT ADJ (%) = 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.
※This function can not be used for ON/OFF control method.



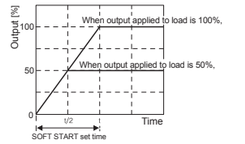
◎ Output high limit/low limit value [H-L/L-L]

This function is to limit output range to protect load.



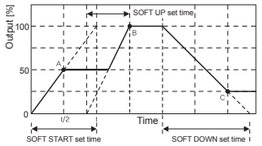
◎ SOFT START [S-t]

When the power is supplied, this function is able to protect the load when it controls load (molybdan, white gold, infrared lamp) with inrush current or the width of rising temperature in big (SV is big).
SOFT START set time (T) is the required time that output reaches to 100%, and it is differentiated by OUT ADJ set value.
※This function can not be used for ON/OFF control method.



◎ SOFT UP/DOWN [U-t/d-t]

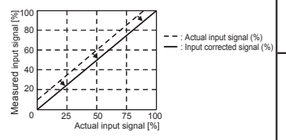
Unlike SOFT START which operates only once at supplying power, this function protects load from the inrush current in the RUN mode. When reached to the target output value, operation stops.
※This function can not be used for ON/OFF control method.
A: SOFT START function finished.
B: SOFT UP function finished.
C: SOFT DOWN function finished.



◎ Input correction [inb]

It compensates the offset between actual input value and measured input value.

E.g.) When input monitoring value is 5% at 4mA in DC4-20mA control input, setting inb to -5 calibrates the input monitoring value to 0%.

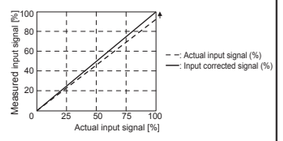


◎ Input slope correction [SPn]

It compensates the gain of the measured 100% input for actual 100% input value.

Calibrated monitoring value=Monitoring value+ $\frac{\text{Monitoring value}}{100-SPn} \times SPn$

E.g.) When the input monitoring value is 99% at 4mA in DC4-20mA control input, setting SPn to 1 calibrates the input monitoring value to 100%.



◎ RUN/STOP switching

RUN/STOP status of the power controller can be switched with the external RUN/STOP contact.
In the RUN mode, the operation indicator on the front turns on.

◎ AUTO/MANUAL selection

Operation mode (auto control/manual control) of the power controller can be selected with the external AUTO/MAN contact.
In the manual control mode, the manual control indicator on the front turns on.

◎ RESET

In the event of system anomalies and alarms, RESET input restarts the power controller.(Parameters are not initialized.)
Or, hold the ≫, ≪ keys for 2 sec, to operates RESET.

◎ Alarm

Type	Display		Operation		Clear alarm
	Error	Priority	Alarm	Output	
SCR error alarm ※1	SCr	1	• Error messege flashes. • Alarm indicator (ALM) flashes. • Alarm output turns ON	• Output stops. (SCR OFF)	• Re-supply the power • RESET • Switch to STOP mode
Overcurrent alarm ※1	o-C	2			
Heatsink overheat alarm	tEñ	4			
Overvoltage alarm ※1	o-u	5			• Automatically cleared when returning within the setting range
Fuse break alarm	FUS	3			
Heater break alarm ※1	H-b	6		• Continues operation	

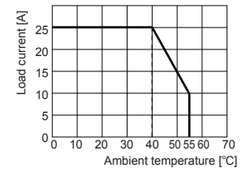
※1: This is only for feedback control models.
※When multiple alarms occur at the same time, the highest priority error message will be displayed based on priority.

1) SCR error alarm
Even though output is 0%, if the current of 10% or more of the rated load current flows for over 3 sec continuously, SCR error alarm occurs.
2) Overcurrent alarm
This function protects the load from overcurrent.
If the current flows over the overcurrent alarm setting value [oCu] and setting delay time [oCt], overcurrent alarm occurs.
3) Heatsink overheat alarm
When the temperature of a heatsink is over 85℃, heatsink overheat alarm occurs.
4) Overvoltage alarm
This function protects the load from overvoltage.
If the current flows over the overvoltage alarm setting value [ouu] and setting delay time [out], overvoltage alarm occurs.
5) Heater break alarm
Comparing the full load resistance value and the current load resistance value, if the current load resistivity is maintained under the setting value [Hbu] for over 3 sec continuously, heater break alarm occurs. This alarm operates when control output is over 10% and load current is over 10% of the rated current. Output does not stop and operates normally.

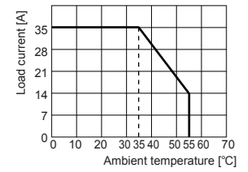
Current load resistivity(%) = $\frac{\text{Full load resistance value}}{\text{Current load resistance value}} \times 100$

■ Derating Curve

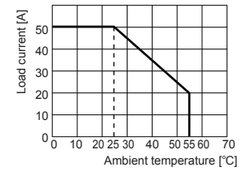
◎ Rated load current 25A



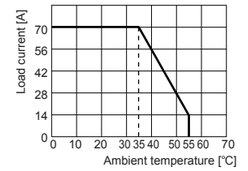
◎ Rated load current 35A



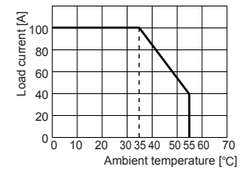
◎ Rated load current 50A



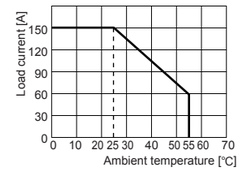
◎ Rated load current 70A



◎ Rated load current 100A



◎ Rated load current 150A



■ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
2. Use the product, after 3 sec of supplying power.
3. 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 changing the mode/parameter during operation may result in malfunction, set the mode and function after disconnecting load output.
4. Re-supply the power to the unit after the unit is discharged completely.
   Failure to follow this instruction may result in malfunction.
5. To ensure the reliability of the product, install the product on the panel or metal surface vertically to the ground.
6. Install the unit in the well ventilated place.
7. While supplying power to the load or right after turning off the power of the load, do not touch the body and heat sink. Failure to follow this instruction may result in a burn due to the high temperature.
8. Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
9. Do not wire to terminals which are not used.
10. Since inter element can be damaged when using with coil load, inductive load, etc., the inrush current must be under the rated load current.
11. Do not use near the equipment which generates strong magnetic force or high frequency noise.
12. This unit may be used in the following environments.
    ①Indoors (in the environment condition rated in 'Specifications')
    ②Altitude max. 2,000m
    ③Pollution degree 2
    ④Installation category III

■ Major Products

■ Photoelectric Sensors
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connector/Sockets
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, CO_2, Nd: YAG)
■ Laser Welding/Cutting System
■ Temperature Controllers
■ Temperature/Humidity Transducers
■ SSRs/Power Controllers
■ Counters
■ Timers
■ Panel Meters
■ Tachometer/Pulse (Rate) Meters
■ Display Units
■ Sensor Controllers

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