DRW180136AC

Autonics

LED Display Slim Power Controller
SPR3 Series
INSTRUCTION MANUAL

CE

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 heat sink or bracket 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)

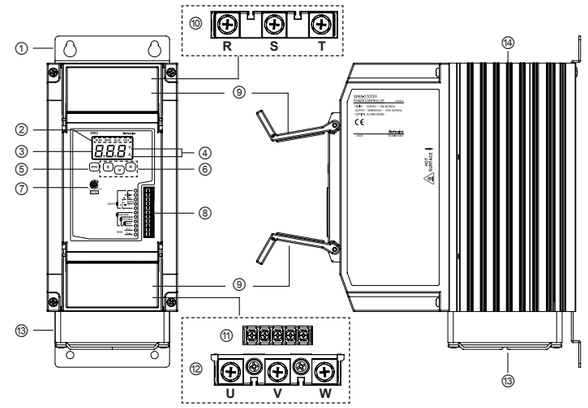
※1: Product is not equipped with a rapid fuse inside. Install the suitable fuse for rated load current of the model separately.
(The performance of the product is guaranteed only when using the fuse provided by us.)
※**The above specifications are subject to change and some models may be discontinued 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°C, storage: -20 to 80°C			
	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, load
☼	●	Voltage
●	☼	Current
☼	☼	Power

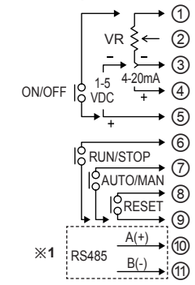
⑤ SET key: Enters parameter group, returns to RUN mode, moves parameters, and saves the setting value.
⑥ Setting value adjustment key
: Enters SV setting mode and move digits.
⑦ Output limit adjuster (OUT ADJ)
: Limits output from 0 to 100%.
⑧ 11-pin connector terminal
⑨ Terminal cover
⑩ R, S, T load 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.

▣ Wire Specification by Load Current

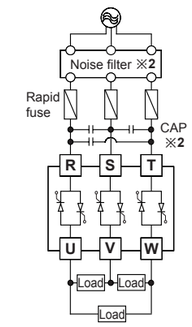
Rated load current	Wire specification	
	Alarm output/power input	Load input/output
25A/35A/50A/70A	AWG 18 to 14	AWG 13 to 4
100A/150A		AWG 4 to 2/0

▣ Connections

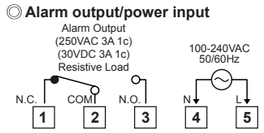
◎ **Control input/Comm. output**



◎ **Load input/output**



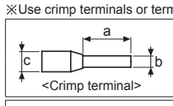
◎ **Alarm output/power input**



※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.

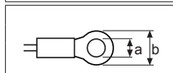
Rated load current	Specification	Alarm output/ power input	Load input/output
25A, 35A, 50A, 70A	Screw	M3	M6
	Tightening torque	0.5N·m	5.5 to 6.0N·m
100A, 150A	Screw	M3	M8
	Tightening torque	0.5N·m	6.5 to 7.0N·m

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



<Crimp terminal>

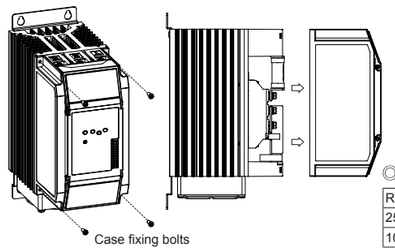
Terminal type	Terminal number	a	b	c
Input (11-pin)	1 to 11	6 to 7	Max. 1.5	Max. 3.5



<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

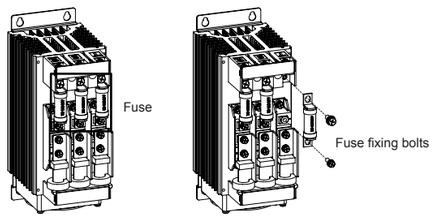
▣ Removing the Case



◎ **Spec. of case fixing bolts**

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

▣ Replacement of Fuse



◎ **Spec. 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)

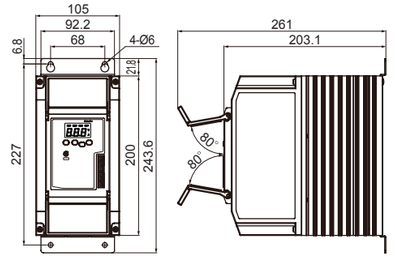
Rated load current	Model
100A	660GH-160
150A	660GH-200

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

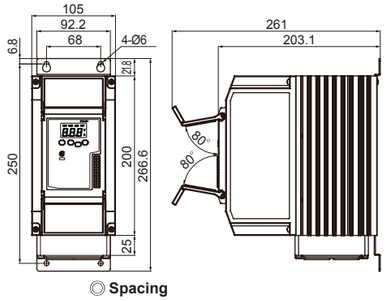
▣ Dimensions

(unit: mm)

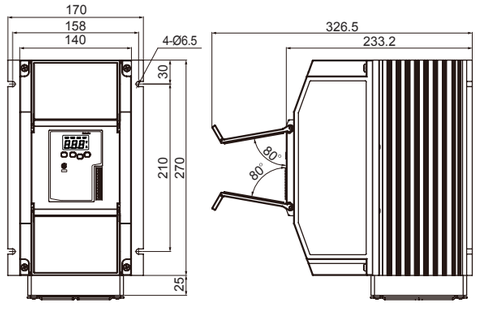
◎ **Rated load current 25A/35A/50A**



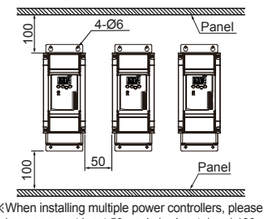
◎ **Rated load current 70A**



◎ **Rated load current 100A/150A**



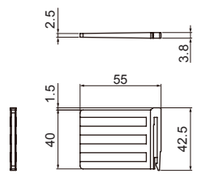
◎ **Spacing**



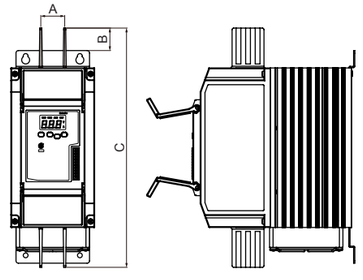
※When installing multiple power controllers, please keep space at least 50mm in horizontal and 100mm in vertical between power controllers for heat radiation.

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**

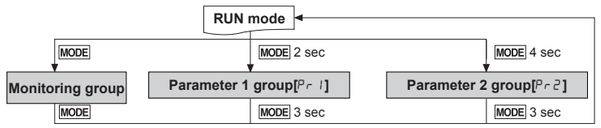


(unit: mm)

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.

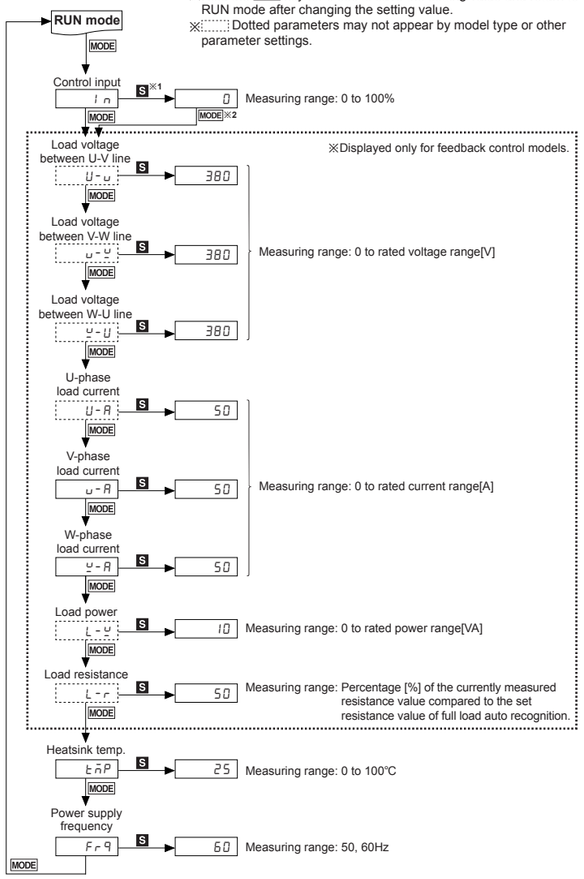
■ Parameter Group



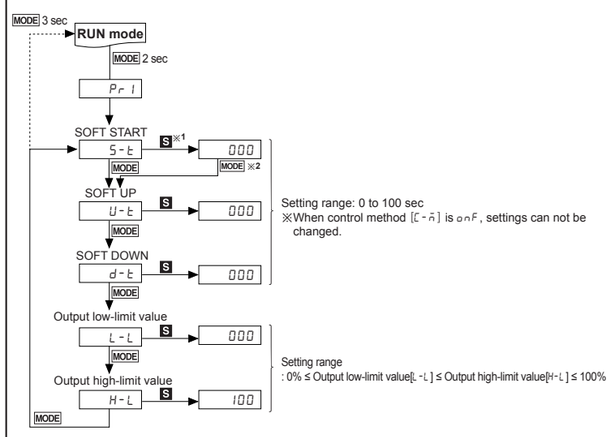
※If there is no key input for 30 sec while setting SV or the parameters, the new settings are ignored, and the unit will return to RUN mode with previous settings.
※Hold the MODE key for 3 sec while in setting mode to return to RUN mode.

◎ Monitoring group

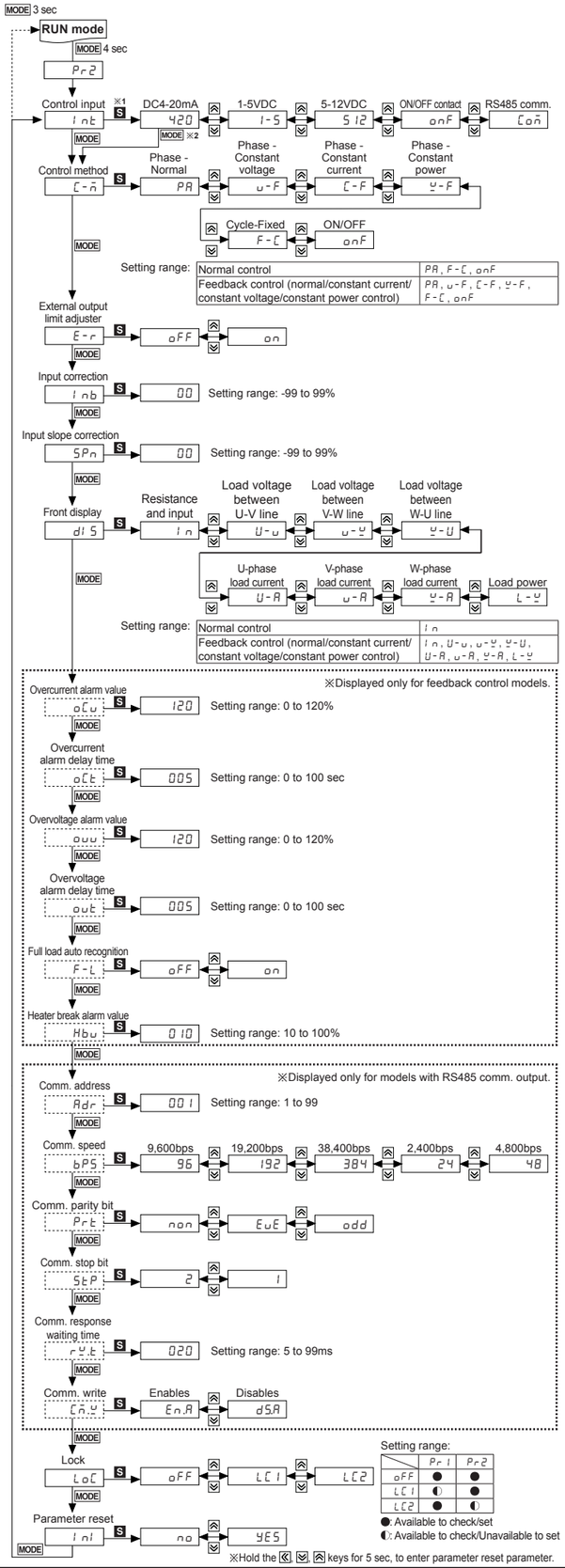
※1: S: Press any key among ◁, ▽, △.
※2: Press the MODE key once after changing the setting value, to save the setting value and move to the next parameter
※Hold the MODE key for 3 sec to save the setting value and return to RUN mode after changing the setting value.
※: Dotted parameters may not appear by model type or other parameter settings.



◎ Parameter 1 group



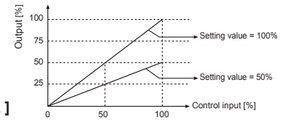
◎ Parameter 2 group



■ 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.

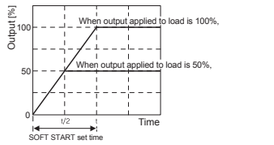


◎ Output high limit/low limit value [H-L/L-L]

This function is to limit output range to protect load.

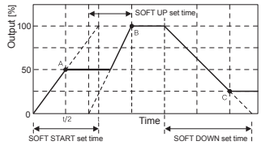
◎ SOFT START [S-t]

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.

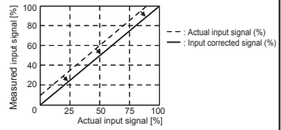


A: SOFT START function finished.
B: SOFT UP function finished.
C: SOFT DOWN function finished.

◎ Input correction [In b]

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 In b to -5 calibrates the input monitoring value to 0%.

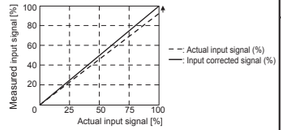


◎ Input slope correction [SPn]

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

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

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

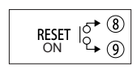
RUN/STOP status of the power controller can be switched with the external RUN/STOP contact.
In the RUN mode, the operation indicator on the front turns on.

◎ 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	Error	Operation	Clear alarm	Display priority
SCR error alarm※1	SCr	Output stops. (SCR OFF)	- Re-supply the power. - RESET - Switch to STOP mode	1
Overcurrent alarm※1	o-C			2
Fuse break alarm	FUS			3
Heatsink overheat alarm	tEr			4
Overvoltage alarm※1	o-u			5
Heater break alarm※1	H-b	Continues operation	Automatically cleared when returning within the setting range.	6

※1: This is only for feedback control models.
※For models with alarm output, the error message and alarm indicator flash at the same time, and alarm output turns on.
※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 and output stops.

2) Overcurrent alarm [oCu/oCt]
This function protects the load from overcurrent.
If the current flows over the overcurrent alarm setting value and setting delay time, overcurrent alarm occurs and output stops.

3) Heatsink overheat alarm
When the temperature of a heatsink is over 85℃, heatsink overheat alarm occurs and output stops.

4) Overvoltage alarm [ouu/out]
This function protects the load from overvoltage.
If the current flows over the overvoltage alarm setting value and setting delay time, overvoltage alarm occurs and output stops.

5) Heater break alarm [Hbu]
Comparing the full load resistance value and the current load resistance value, if the current load resistivity is maintained under the setting value for over 3 sec continuously, heater break alarm occurs. Output does not stop and operates normally.

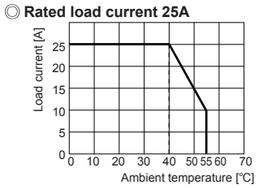
$$\text{Current load resistivity(\%)} = \frac{\text{Full load resistance value}}{\text{Current load resistance value}} \times 100$$

■ Cautions during Use

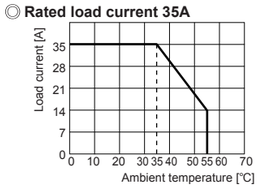
1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
2. Use the product, after 3 sec of supplying power.
3. Before use, set the mode and function according to the specification. Especially, be cautious that the product does not operate when OUT ADJ. is set to 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

■ Derating Curve

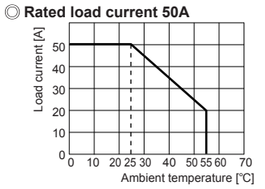
◎ Rated load current 25A



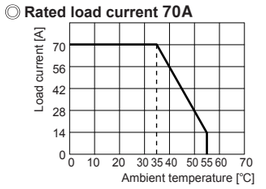
◎ Rated load current 35A



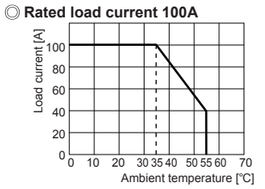
◎ Rated load current 50A



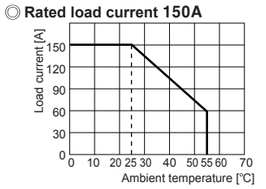
◎ Rated load current 70A



◎ Rated load current 100A



◎ Rated load current 150A



■ 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.

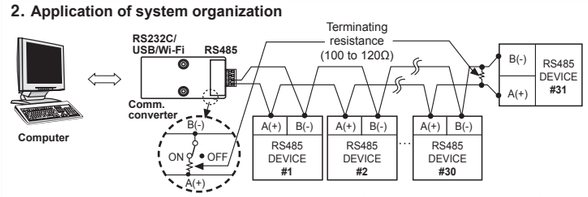
■ RS485 Communication Output

※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.

■ 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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