

**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**

- 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.
- 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.
- 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.
- Check 'Connections' before wiring.**  
Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.**  
Failure to follow this instruction may result in electric shock or fire.

**⚠ Caution**

- Use the unit within the rated specifications.**  
Failure to follow this instruction may result in fire or product damage.
- 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.
- 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.
- Keep metal chip, dust, and wire residue from flowing into the unit.**  
Failure to follow this instruction may result in fire or product damage.
- 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 <sup>※1</sup>
Feedback control	F	Fuse
Option output	N	Normal control
	F	Normal/constant current/constant voltage/constant power control
Rated load current	N	Alarm output
	T	Alarm+RS485 comm. output
Rated load voltage	25	25A
	35	35A
	50	50A
	70	70A
	150	150A
Control phase	1	110VAC
	2	220VAC
	3	380VAC
	4	440VAC
Item	SPR	Solid State Power Regulator (slim type)

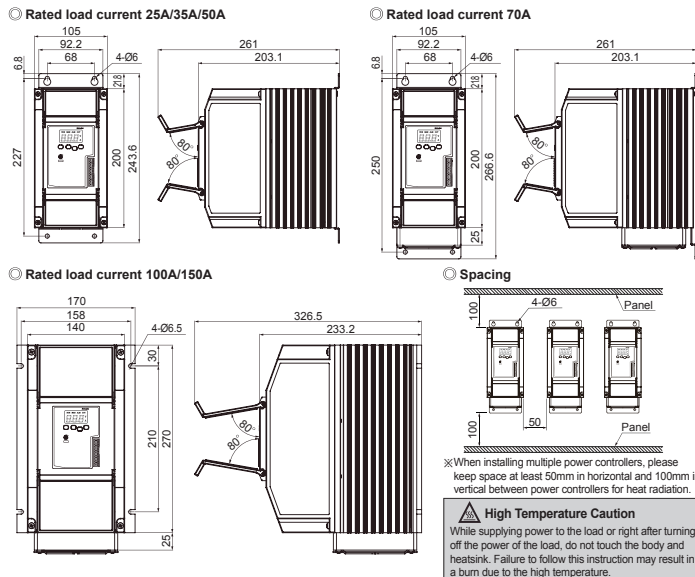
※1: Product is not equipped with a rapid fuse inside. Install the suitable fuse for rated load current of the model separately.  
(The performance of the product is guaranteed only when using the fuse provided by us.)  
※ The above specifications are subject to change and some models may be discontinued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

**■ Specifications**

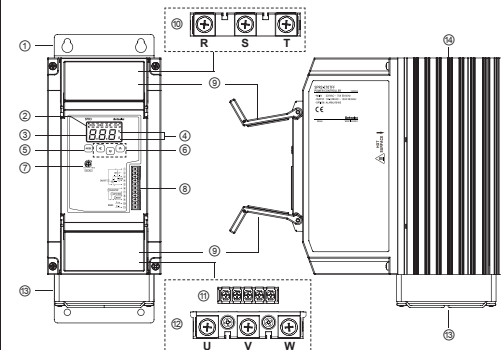
Model	SPR3-1 □ □ □ □	SPR3-2 □ □ □ □	SPR3-3 □ □ □ □	SPR3-4 □ □ □ □
Control phase	3-phase			
Rated load voltage (50/60Hz)	110VAC~	220VAC~	380VAC~	440VAC~
Power supply	100-240VAC~ 50/60Hz			
Min. load current	1A			
Permissible voltage range	90 to 110% of rated voltage			
Power consumption	<ul style="list-style-type: none"> <li>Rated load current 25A/35A/50A: max. 14VA</li> <li>Rated load current 70A: max. 22VA</li> <li>Rated load current 100A/150A: max. 32VA</li> </ul>			
Display method	3-digit 7-segment LED			
Indicator	<ul style="list-style-type: none"> <li>Operation indicator/Manual control indicator: green LED</li> <li>Alarm indicator/output indicator (V/A) indicator: red LED</li> <li>Phase control: normal control mode, constant current/constant voltage/constant power feedback control mode</li> <li>Cycle control: fixed cycle control mode</li> <li>ON/OFF control</li> </ul>			
Applied load	<ul style="list-style-type: none"> <li>Phase control, ON/OFF control: resistance load, inductive load</li> <li>Cycle control: resistance load</li> </ul>			
Control input	<ul style="list-style-type: none"> <li>Auto control: DC4-20mA, 1-5VDC=, ON/OFF contact (no-voltage input), pulse voltage (5-12VDC=)</li> <li>Manual control: outside adjuster (10kΩ), inside adjuster (output limit)</li> </ul>			
Digital input (DI)	RUN/STOP switching, AUTO/MAN switching, RESET			
Output	Alarm	250VAC~ 3A, 30VDC= 3A, 1c resistive load		
Output range	Communication	RS485 communication output (Modbus RTU method), max. connection: 31 units		
Output accuracy	<ul style="list-style-type: none"> <li>Phase control: 0 to 98% / Cycle control: 0 to 100% / ON/OFF control: 0%, 100%</li> <li>Normal control: within ±10% F.S. of rated load voltage</li> <li>Constant current feedback control: within ±3% F.S. of rated load current</li> <li>Constant voltage feedback control: within ±3% F.S. of rated load voltage</li> <li>Constant power feedback control: within ±3% F.S. of rated load power</li> </ul>			
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	<ul style="list-style-type: none"> <li>Rated load current 25A/35A/50A: natural cooling</li> <li>Rated load current 70A/100A/150A: forced air cooling (with the cooling fan)</li> </ul>			
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. 10mA rms			
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 hum.	35 to 85%RH, storage: 35 to 85%RH		
Accessory	11-pin connector, insulating barrier: 4			
Approval	CE			
Weight <sup>※1</sup>	<ul style="list-style-type: none"> <li>Rated load current 25A/35A/50A: approx. 4.9kg (approx. 4.1kg)</li> <li>Rated load current 70A: approx. 5kg (approx. 4.2kg)</li> <li>Rated load current 100A/150A: approx. 9.7kg (approx. 8.7kg)</li> </ul>			

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

**■ Dimensions**



**■ Unit Description**



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

② Indicator

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

③ Display part: Displays settings of the front display [d] 5] parameter in RUN mode, and displays parameter and setting value in setting mode.

④ Unit indicator (☑: Light ON ●: Light OFF)

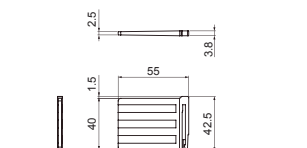
Indicator	Display
●	Resistance, load
●	Voltage
●	Current
●	Power

⑤ Alarm output and power input terminals  
⑥ U, V, W load output terminals  
⑦ Cooling fan: For models with the rated load current of 70A/100A/150A, a cooling fan is attached.  
⑧ Heatsink: In case of rated load current 100A/150A models, there are mounting holes on the right/left.

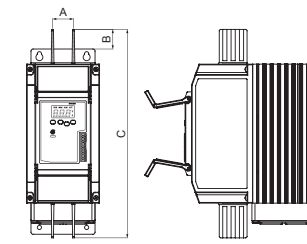
**■ Wire Specification by Load Current**

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

**○ Insulating barrier**



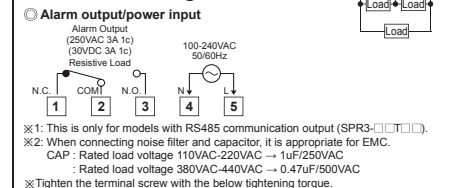
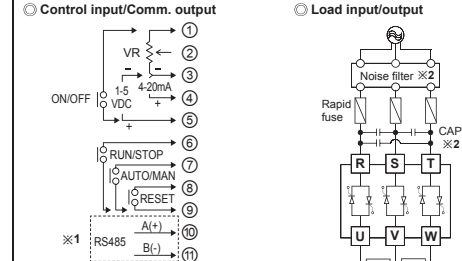
**● With the insulating barrier**



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

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

**■ Connections**



※ 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	M8	M8
	Tightening torque	0.5N·m	6.5 to 7.0N·m

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

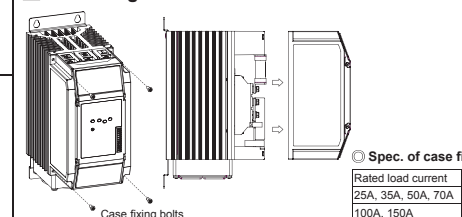
Terminal type	Terminal number	a	b	c
Input (11-pin)	1 to 11	6 to 7	Max. 1.5	Max. 3.5

<Crimp terminal>

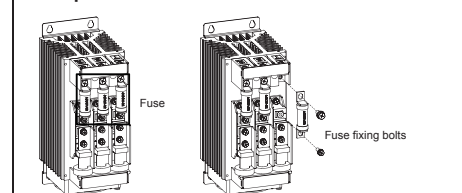
Terminal type	a	b
Alarm output/power input	Min. 3.0	Max. 6.0
Rated load current 25A/35A/50A/70A	Min. 6.0	Max. 16.0
Rated load current 100A/150A	Min. 8.0	Max. 26.0

<Round>

**■ Removing the Case**



**■ 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

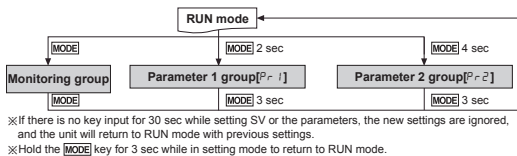
○ Recommended fuse specifications

For replacing the fuse, please use the recommended fuse which has the below specifications. (manufacturer: BUSSMANN) (manufacturer: HINODE)

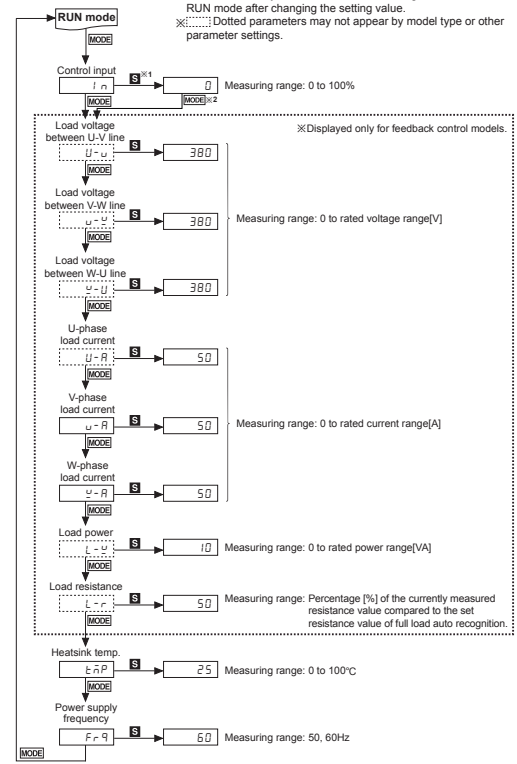
Rated load current	Model	Rated load current	Model	Rated load current	Model
25A	50FE	50A	80ET	100A	660GH-160
35A	63ET	70A	100FE	150A	660GH-200

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

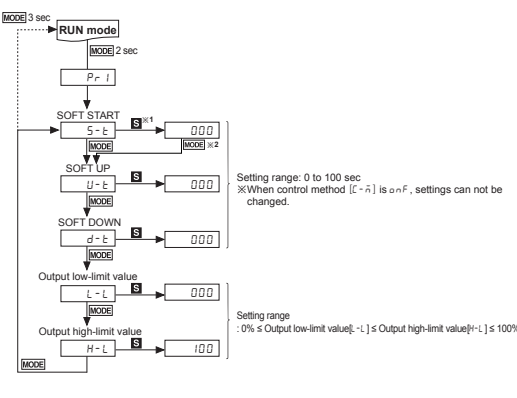
## Parameter Group



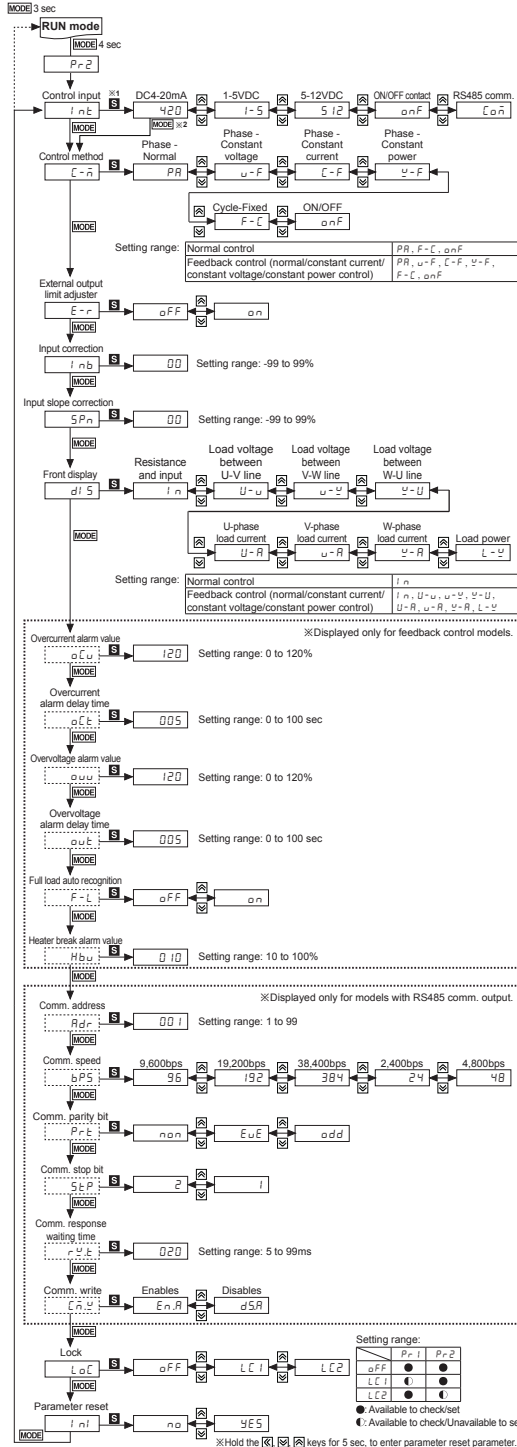
## Monitoring group



## 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 (molybdenum, 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.

### Input correction [I n 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 I n b to -5 calibrates the input monitoring value to 0%.

### Input slope correction [S-P n]

It compensates the gain of the measured 100% input for actual 100% input value.  
 Calibrated monitoring value = Monitoring value × S-P n  
 E.g.) When the input monitoring value is 99% at 4mA in DC4-20mA control input, setting S-P n 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 MODE keys for 2 sec, to operates RESET.

### Alarm

Type	Error	Operation	Clear alarm	Display priority
SCR error alarm <sup>K1</sup>	S-C r			1
Overcurrent alarm <sup>K1</sup>	o-C			2
Fuse break alarm	F-U S	Output stops. (SCR OFF)	- Re-supply the power. - RESET	3
Heatsink overheat alarm	T-E n		- Switch to STOP mode	4
Overvoltage alarm <sup>K1</sup>	o-v			5
Heater break alarm <sup>K1</sup>	H-b	Continues operation	Automatically cleared when returning within the setting range.	6

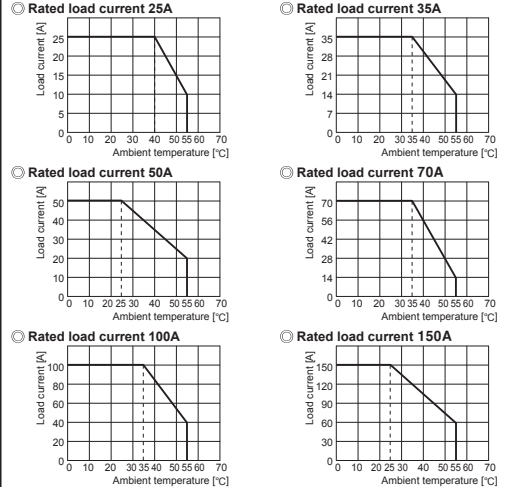
※1: This is only for feedback control models.  
 ※For models with alarm output, the error message and alarm indicator flash at the same time, and alarm output turns on.  
 ※When multiple alarms occur at the same time, the highest priority error message will be displayed based on priority.

- 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.
- Overcurrent alarm [o-C u/o-C t]**  
 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.
- Heatsink overheat alarm**  
 When the temperature of a heatsink is over 85°C, heatsink overheat alarm occurs and output stops.
- Overvoltage alarm [o-v u/o-v t]**  
 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.
- Heater break alarm [H-b u]**  
 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.  
 Current load resistivity (%) =  $\frac{\text{Full load resistance value}}{\text{Current load resistance value}} \times 100$

### Cautions during Use

- 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 changing the mode/parameter during operation may result in malfunction, set the mode and function after disconnecting load/output.
- Re-supply the power to the unit after the unit is discharged completely.  
 Failure to follow this instruction may result in malfunction.
- To ensure the reliability of the product, install the product on the panel or metal surface vertically to the ground.
- Install the unit in the well ventilated place.
- 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.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Do not wire to terminals which are not used.
- Since inner element can be damaged when using with coil load, inductive load, etc., the inrush current must be under the rated load current.
- Do not use near the equipment which generates strong magnetic force or high frequency noise.
- This unit may be used in the following environments.  
 ○Indoors (in the environment condition rated in "Specifications")      ○Altitude max. 2,000m  
 ○Pollution degree 2      ○Installation category III

## Derating Curve



## 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-□□□□□). Please refer to "Ordering Information".

### 1. Communication Specifications

Comm. protocol	Modbus RTU	Comm. speed	2400, 4800, 9600, 19200, 38400 bps
Connection method	RS485	Comm. response time	5 to 99ms (default: 20ms)
Application standard	Compliance with EIA RS485	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

Computer → RS232C/USB/Wi-Fi → RS485 Converter → RS485 Device #1, #2, #3

※It is recommended to use Autonics communication converter; SCM-WF48 (Wi-Fi) to RS485-USB wireless communication converter; sold separately, SCM-US48 (USB to RS485 converter; sold separately), SCM-38 (RS232C to RS485 converter; sold separately). Please use twisted pair wire, which is suitable for RS485 communication, for SCM-WF48, SCM-US48 and SCM-38.

### Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graph/Logic Panels
- Field Network Devices
- User Marking System (Fiber, CO, Nd:YAG)
- Laser Welding/Cutting System

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