

LED Display Slim Power Controller

SPR1 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

- Fall-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 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	1	-	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					
Rated load voltage	1	110VAC					
	2	220VAC					
Control phase	3	380VAC					
	4	440VAC					
	SPR	Solid State Power Regulator					

*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.

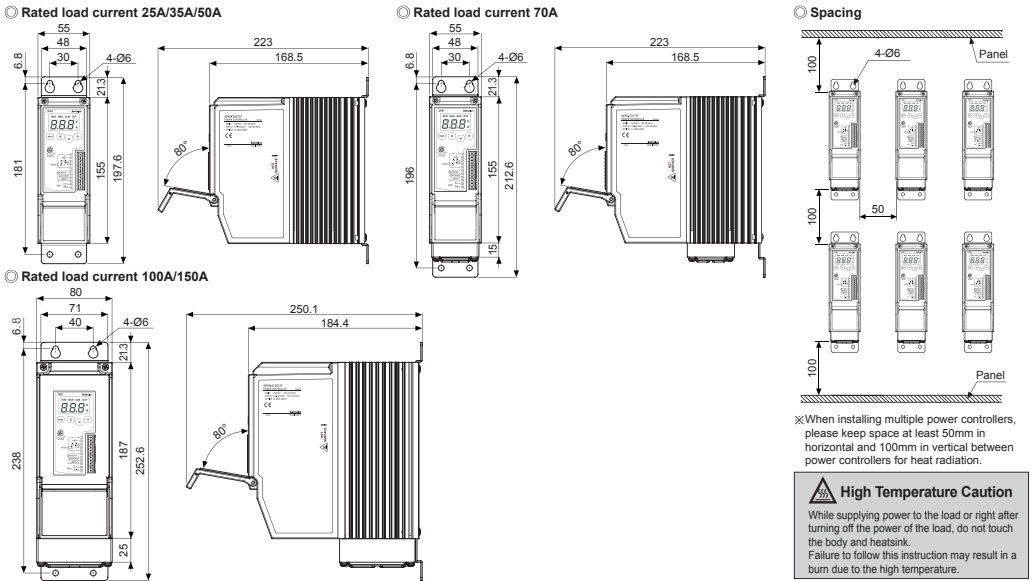
✗ Be sure to follow cautions written in the instruction manual, user manual, and the technical descriptions (catalog, homepage).

■ Specifications

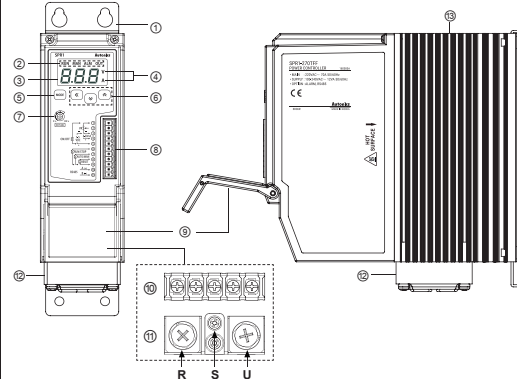
Model	SPR1-1	SPR1-2	SPR1-3	SPR1-4
Control phase	1-phase			
Rated load voltage (50/60Hz)	110VAC~	220VAC~	380VAC~	440VAC~
Power supply	100-240VAC~ 50/60Hz			
Min. load current	1A			
Permissible voltage range	90 to 110% of rated voltage			
Power consumption	• Rated load current 25A/35A/50A: max. 7VA • Rated load current 70A/100A/150A: max. 12VA			
Display method	3-digit 7-segment LED			
Indicator	• Operation indicator/Manual control indicator: green LED • Alarm indicator/output indicator/(V, A) indicator: red LED			
Control method	• Phase control: normal control mode, constant current/constant voltage/constant power feedback 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		
Output range	Communication	RS485 communication output (Modbus RTU method), max. connection: 31 units		
Output accuracy	• Phase control: 0 to 98% • Cycle control: 0 to 100% • ON/OFF control: 0%, 100% • 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	Alarm	Overcurrent alarm, overvoltage alarm, fuse break alarm, element 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. 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 humi.	35 to 85%RH, storage: 35 to 85%RH		
Accessory	11-pin connector			
Approval	CE			
Weight*1	• Rated load current 25A/35A/50A: approx. 1.6kg (approx. 1.3kg) • Rated load current 70A: approx. 1.65kg (approx. 1.35kg) • Rated load current 100A/150A: approx. 3.2kg (approx. 2.8kg)			

*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

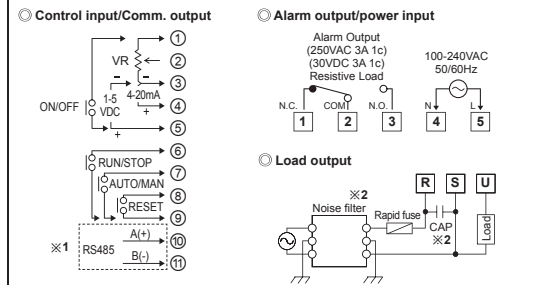


① Bracket	Indicator	Color	Function
② RUN	Operation indicator	Green LED	Turns on in the RUN mode.
③ MAN	Manual control indicator	Green LED	Turns on when adjusting load output in the manual control mode.
④ ALM	Alarm indicator	Red LED	Flashes in alarming status.
⑤ OUT	Output indicator	Red LED	Turns on when load control outputs.
⑥ Display part	Displays settings of the front display [di 5] parameter in RUN mode, and displays parameter and setting value in setting mode.		
⑦ Unit indicator	Ⓞ = key: Enters parameter group, returns to RUN mode, moves parameter and saving value in setting mode. Ⓢ = key: Enters parameter group, returns to RUN mode, moves parameter, and saves the setting.		
⑧ Indicator	Display	• Resistance load • Voltage • Current • Power	
⑨	V	Voltage	
⑩	A	Current	
⑪	P	Power	
⑫	Ⓢ	Setting value adjustment key: Enters SV setting mode and move digits.	
⑬	Ⓞ	Output limit adjuster (OUT ADJ.): Limits output from 0 to 100%.	
⑭	Ⓢ	Terminal cover	
⑮	Ⓢ	Alarm output and power input terminals	
⑯	R, S, U	Load output terminals	
⑰	Ⓢ	Cooling fan: For models with the rated load current of 70A/100A/150A, a cooling fan is attached.	
⑱	Ⓢ	Heatsink	

■ Wire Specification by Load Current

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

■ Connections



✗1: This is only for models with RS485 communication output (SPR1-□□□□).
 ✗2: When connecting noise filter and capacitor, it is appropriate for EMC.
 CAP: Rated load voltage 110VAC-220VAC → 1μF/250VAC
 Rated load voltage 380VAC-440VAC → 0.47μF/500VAC

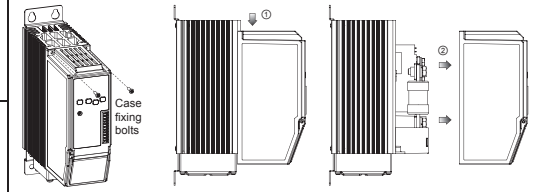
✗ Tighten the terminal screw with the below tightening torque.

Rated load current	Specification	Alarm output/power input	Load output
25A, 35A, 50A, 70A	Screw	M3	M3
	Tightening torque	0.5N·m	0.5N·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)

Terminal type	Terminal number	a	b	c
Input (11-pin)	1 to 11	6 to 7	Max. 1.5	Max. 3.5
Terminal type		a	b	
Alarm output/power input	S	Min. 3.0	Max. 6.0	
Load output	R, U	Min. 3.0	Max. 8.0	
		Min. 6.0	Max. 16.0	
		Min. 8.0	Max. 26.0	

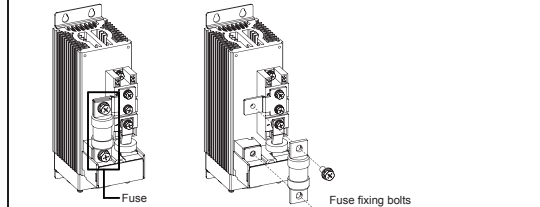
■ Removing the Case



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, 150A	M8

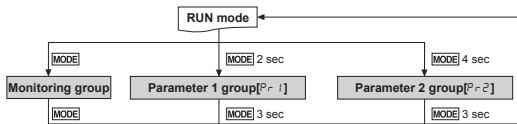
Recommended fuse specifications

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

Rated load current	Model	Rated load current	Model
25A	50FE	50A	80ET
35A	63ET	70A	100FE
		150A	150A

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

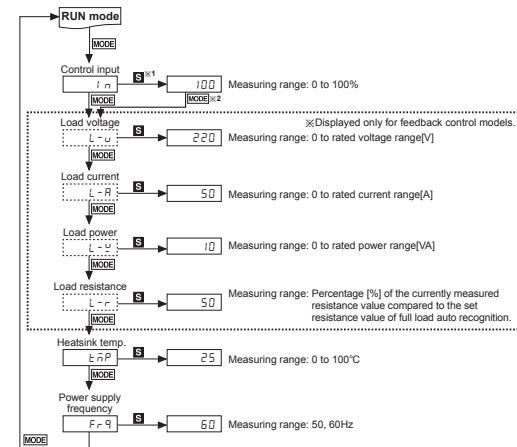
Parameter Group



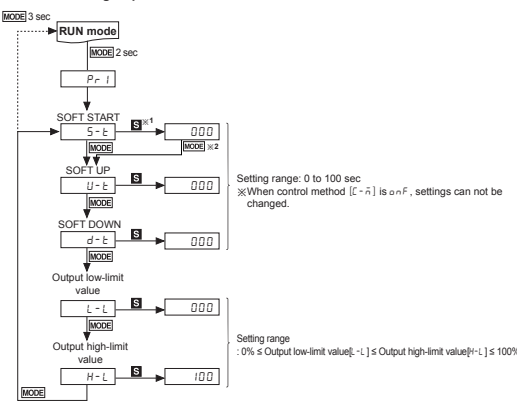
※ If there is no key input for 30 sec while setting SV or the parameters, the new settings are ignored, and the unit will return to RUN mode with previous settings.
 ※ Hold the [MODE] key for 3 sec while in setting mode to return to RUN mode.

Monitoring group

※ 1: Press any key among [OK], [F1], [F2].
 ※ 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

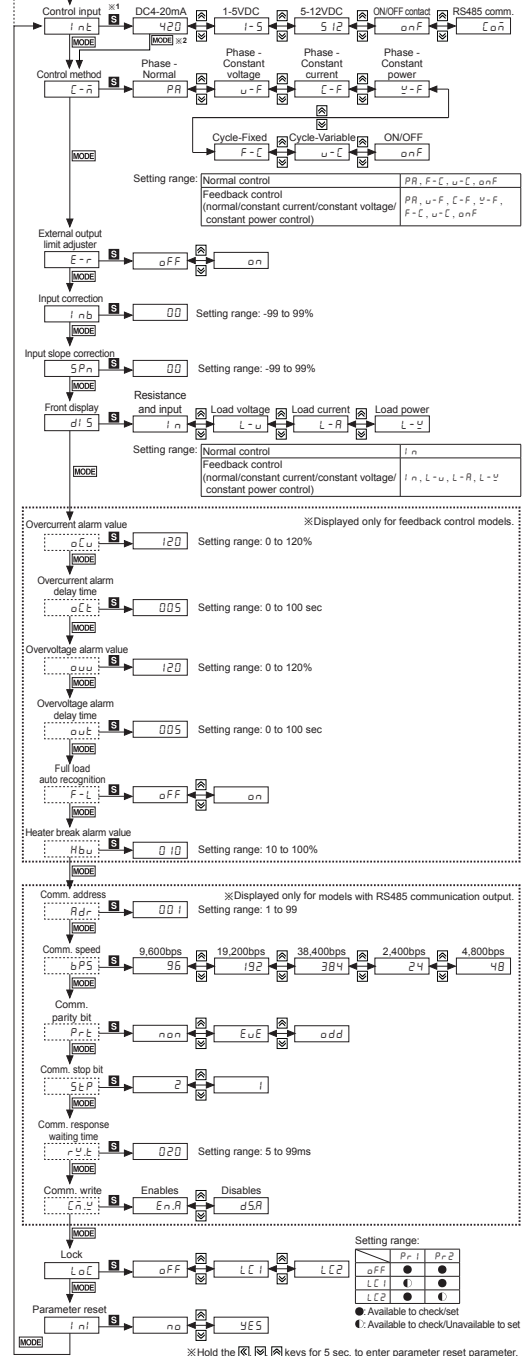


Setting range: 0 to 100 sec
 ※ When control method [C-n] is o-n-F, settings can not be changed.

Setting range: 0% ≤ Output low-limit value [L-L] ≤ Output high-limit value [H-L] ≤ 100%

Parameter 2 group

※ 1: Press any key among [OK], [F1], [F2].
 ※ 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.



Functions

Output limit (OUT ADJ.)

This function will set 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 (molybden, 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/L-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-nb]

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-nb to -5 calibrates the input monitoring value to 0%.

Input slope correction [S-Pn]

It compensates the gain of the measured 100% input for actual 100% input value.
 Calibrated monitoring value = Monitoring value × S-Pn
 E.g.) When the input monitoring value is 99% at 4mA in DC4-20mA control input, setting S-Pn 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 [F1] [F2] keys for 2 sec, to operates RESET.

Alarm

This table lists the alarm types, error messages, operations, clear methods, and display priorities.

Type	Error	Operation	Clear alarm	Display priority
Element (SCR) error alarm ^{*1}	Sc-r			1
Overcurrent alarm ^{*1}	o-C	Output stops.	- Re-supply the power.	2
Fuse break alarm	F-U5		- RESET	3
Heatsink overheat alarm	E-EN		- Switch to STOP mode	4
Overvoltage alarm ^{*1}	o-V			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) **Element (SCR) error alarm**
 Even though output is 0%, if the current of 0% or more of the rated load current flows for over 3 sec continuously, element error alarm occurs and output stops.

2) **Overcurrent alarm**
 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°C, heatsink overheat alarm occurs and output stops.

4) **Overvoltage alarm**
 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.

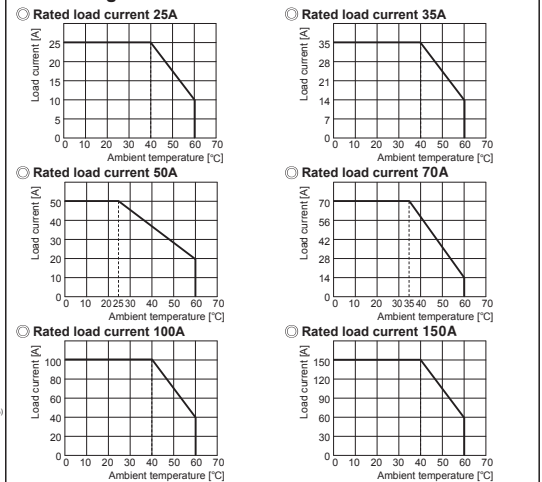
5) **Heater break alarm**
 Comparing the full load resistance value and the current load resistance value, if the current load resistivity is maintained under the setting value for over 3 sec continuously, heater break alarm occurs. Output does not stop and operates normally.

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

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 inter 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")
 ① Pollution degree 2
 ② Altitude max. 2,000m
 ③ 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

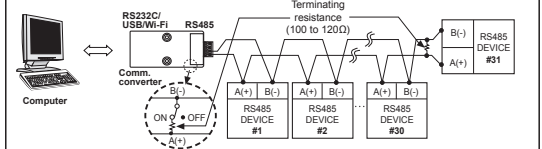
For the detail information and instructions, please refer to user manual for communication, and be sure to follow cautions written in the technical descriptions (catalog, homepage).
 Visit our homepage (www.autonics.com) to download manuals.

RS485 Communication Output

※ Applicable for models with RS485 communication output through option output (SPR1-□□□□).
 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



※ 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
 - Gas Sensors
 - Proximity Sensors
 - Pressure Sensors
 - Rotary Encoders
 - Connector/Sockets
 - Switching Mode Power Supplies
 - Control Switches/Lamps/Buzzers
 - Terminal Blocks & Cables
 - Stepper Motors/Drivers/Motion Controllers
 - Temperature Controllers
 - Temperature/Humidity Transducers
 - SSRs/Power Controllers
 - Counters
 - Timers
 - Panel Meters
 - Tachometer/Pulse (Rate) Meters
 - Display Units
 - Sensor Controllers
- ООО "РусАвтоматизация"
 454010 г. Челябинск, ул. Гагарина 5, оф. 507
 тел. 8-800-775-09-57 (звонок бесплатный),
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