

Modular Multi Channel Power Controller


SPRS Series
INSTRUCTION MANUAL


TCD240017AC

Autonics

Thank you for choosing our Autonics product.
Read and understand the instruction manual and manual thoroughly before using the product.
For your safety, read and follow the below safety considerations before using.
For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
Keep this instruction manual in a place where you can find easily.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.
Follow Autonics website for the latest information.

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
-  symbol indicates caution due to special circumstances in which hazards may occur.

 **Warning**

Failure to follow instructions may result in serious injury or death.

01. 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 personal injury, economic loss or fire.

02. Do not use or store the unit in the place where flammable / explosive / corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.
Failure to follow this instruction may result in explosion or fire.

03. Install the device in panel, and ground to the bolt for grounding separately.
Failure to follow this instruction may result in fire or electric shock.

04. Be sure to install, set, and combine the product with a machanical control system by a qualified user operator.
When a non-user operator installs, sets, and combines the product with a mechanical control system, the product does not work as intended, resulting in personal injury, economic loss or fire.


05. When installing or moving the product and changing the position of the power module, hold the body to move it. Do not hold the input power terminal block or the transparent terminal block protection cover (transparent).
Separation of the terminal block or cover from the body may result in product damage or personal injury due to falling.

06. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire or electric shock.

07. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.

08. Inspect the product daily and regularly every 12 months.
Failure to follow this instruction may result in personal injury, economic loss or fire with product malfunction.

09. Do not disassemble or modify the unit.
Failure to follow this instruction may result in fire or electric shock.

 **Caution**

Failure to follow instructions may result in injury or product damage.

01. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage.

02. Use a dry cloth to clean the unit, and do not use water or organic solvent.
Failure to follow this instruction may result in fire or electric shock.

03. Keep the product away from metal chip, dust, and wire residue which flow into the unit.
Failure to follow this instruction may result in fire or product damage.

04. 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.


05. Be careful not to injure the edges of the heat sink.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- Power supply should be insulated and limited voltage / current or Class 2, SELV power supply device.
- Use the product, after 3 sec of supplying power.
- Before use, set the mode and function according to the specification. Since changing the mode / parameter during operation may result in malfunction, set the mode and function after disconnecting load output.
- Set the operating channel of the control setting mode parameters to match the actual wiring. It may result in malfunction. Refer to the product manual for wiring instructions.
- Re-supply the power to the unit after 3 sec of turning off the power. 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.

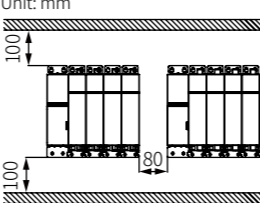
- When installing the power module, use the terminal block protection cover (transparent).
- When installing the front cover of the power module, fit it toward the rear of the product in accordance with installation groove the angle of 30°.
- Do not apply excessive force to open the front cover of the power module, the cover may be detached and fall off.
- 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 product body and heat sink. Failure to follow this instruction may result in a burn due to the high temperature.
- Use twisted pair wire for communication line.
- RS485 communication cannot be used at the same time as other communications.
- Since inter element can be damaged when using with coil load, inductive load, etc., the inrush current must be under the rated load current.
- To prevent product malfunction due to noise, wire power, control input, communication, and load cables separately.
- When installing close to the load line, use a line filter for the power line and use a shield wire.
- For stable operation, use shield wire for control, alarm, and communication wires. Use a ferrite core on the shield wire to cope with EMC.
- Do not use near the equipment which generates strong magnetic force or high frequency noise.
- If environments such as ambient temperature or installation specifications are not satisfied, lower the load rate for use.
- The ambient temperature is -10°C to 40°C. Install a cooling system to ensure that the internal panel temperature does not exceed 40°C. If the ambient temperature unavoidably exceeds 40°C, reduce the load current.
- The power modules with different rated currents can be combined and connected. Connect the power modules to the right of the control module in ascending order of current capacity. Failure to follow this instruction may result in malfunction.
- This unit may be used in the following environments.
 - Indoors (in the environment condition rated in 'Specifications')
 - Altitude max. 2,000 m
 - Pollution degree 2
 - Installation category III

Cautions during Installation

**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 heat sink. Failure to follow this instruction may result in a burn due to the high temperature.

- Unit: mm



Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

■ Control Module

SPRS	-	①	-	②
① Module		② Communication		
CM: Control module		R: RS485		CL: RS485 + CC-Link
		EC: RS485 + EtherCAT		PN: RS485 + PROFINET

■ Power Module

SPRS	-	①	-	②	③
① Module		② Rated load voltage		③ Rated load current	
No mark: Power module		F: Free voltage		Number: Rated load current (unit: A)	

- Product Components
- Product (+ bracket), Instruction manual
 - [Control module] Module connection ribbon cable (2 mm pitch, 24-pin) × 1, Power connector × 1, Control signal / communication connector × 1, Alarm output connector × 1 [CC-Link comm. model] CC-Link connector × 1
 - [Power module] Module connection ribbon cable (2 mm pitch, 24-pin) × 1, FAN power connector × 1, Feedback signal connector × 1, Terminal block protection cover × 2

Manual

For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.
Download the manuals from the Autonics website.

Software

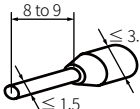
Download the installation file and the manuals from the Autonics website.

■ DAQMaster

It is the comprehensive device management program for Autonics' products, providing parameter setting, monitoring and data management.

Cautions during Wiring

■ Ferrule terminal



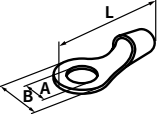
- Unit: mm, Cable specification: AWG 24 - 16
- Applicable connector terminal

Control module	Power connector Control signal / Comm. connector Alarm output connector [CC-Link Comm. model] CC-Link connector
Power module	Feedback signal connector FAN power connector, FAN connector terminal

■ Copper pipe terminal

- Unit: mm, Use copper tube terminal certificated by UL.
- Be sure to use a copper pipe terminal with an insulating sleeves (tubes) that meets a dielectric strength of 600 V or more.

- [Power module] Cable / tightening torque spec. is different depending on the model based on the rated load current. Be sure to check as below.



Rated load current (A)	Copper pipe terminal			Cable (mm²)	Tightening torque (N m)
	A	B	L		
25 / 40 / 55 / 70	M6	≤ 13	≥ 40	25	5.6 to 6.0
90 / 110 / 150 / 180	M8	≤ 25	≥ 64	95	13.6 to 14.5
200 / 250 / 350	M12	≤ 40	≥ 92	240	47.0 to 50.0
400 / 500 / 600	M12×2	≤ 35	≥ 78	185×2	47.0 to 50.0

Specifications	
Series	SPRS Series
Control phases	Single-phase control, single-phase dual control, 3-phase control (wiring and parameter setting)
Rated load voltage	Free voltage 220 - 490 VAC ~ 50 / 60 Hz
Permissible voltage range	± 10 % of rated load voltage
Load rated frequency	50 / 60 Hz ± 3 Hz (frequency auto identification)
Rated load current	25 / 40 / 55 / 70 / 90 / 110 / 150 / 180 / 200 / 250 / 350 / 400 / 500 / 600 A
Min. load current	1 A
Display method	5 digit 11 segment LCD (white) × 4, Output BAR
Auto control input	Current: DC 4 ~ 20 mA × 4 ch (input impedance: 100 Ω) Voltage: 0 - 5 / 1 - 5 / 0 - 10 VDC = × 1 ch External adjuster: 10 kΩ Communication: RS485 / EtherCAT / CC-Link / PROFINET
Manual control input	Parameter setting
Digital input (DI)	RUN (short) / STOP (open), MAN (short) / AUTO (open), Alarm reset (short) / Inactivate (open), Not used (4 ch)
Alarm output	8 relay contact output (parameter setting) 250 VAC ~ 2 A / 30 VDC = 3 A 1a resistance load
Comm. output	RS485 / EtherCAT / CC-Link / PROFINET model
Cooling method	Natural cooling ⁰¹⁾ : 25 / 40 A, Forced cooling (with cooling fan): 55 / 70 / 90 / 110 / 150 / 180 / 200 / 250 / 350 / 400 / 500 / 600 A
Certification	CE, UKCA, RoHS, REACH, UL
SCCR Rating	100 kA (UL certification)

01) Forced cooling is available by installing FAN separately.


Control method	Phase control	Cycle control
Control mode	Normal / Constant current / Constant voltage / Constant power feedback	Fixed cycle / Variable cycle / Power distribution control
Applied load	Resistance load, inductive load	Resistance load
Output range	2 to 98 %	0 to 100 %
Output accruacy	Varies by control mode	
Normal	Within ± 10 % F.S. of rated load voltage	-
Constant current / voltage / power feedback	Within ± 3 % F.S. of rated load current / voltage / power	-

Control module power supply	24 VDC =
Permissible voltage range	90 to 110 % of power voltage
Fan power supply	24 VDC =
Power consumption	Control module: ≤ 7 W, power module: each ≤ 2 W (FAN power separately)
Insulation resistance	≥ 200 MΩ (500 VDC = megger)
Dielectric strength	Between the charging part and the case: 3,000 VAC ~ 50 / 60 Hz for 1 min
Output leakage current	≤ 10 mArms
Noise immunity	± 500 V square wave noise (pulse width: 1 μs) by the noise simulator
Memory retention	≈ 10 years (when using non-volatile semiconductor memory type)
Vibration	0.5 mm double amplitude at frequency of 5 to 55 Hz in each X, Y, Z direction for 2 hours
Vibration (malfunction)	0.5 mm double amplitude at frequency of 5 to 55 Hz in each X, Y, Z direction for 10 min
Ambient temperature	-10 to 40 °C, storage: -20 to 70 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)


Module	Control module	Power module			
		25 / 40 / 55 / 70 A	90 / 110 / 150 / 180 A	200 / 250 / 350 A	400 / 500 / 600 A
unit weight (packaged)	0.76 kg (1.26 kg)	2.04 kg (2.62kg)	3.96 kg (4.72kg)	6.10 kg (7.14kg)	13.26 kg (14.82kg)


Derating Curve

Communication Interface	
■ Modbus RTU	
Comm. protocol	Modbus RTU (16 bit CRC), Modbus ASCII
Application standard	Compliance with EIA RS485
Max. connection	31-unit (address: 1 to 99)
Comm. synchronous method	Asynchronous
Comm. method	2-wire half duplex
Comm. distance	≤ 800 m
Comm. speed	2,400 / 4,800 / 9,600 (default) / 14,400 / 19,200 / 38,400 / 57,600 / 115,200 bps
Comm. response time	0 to 9999 ms (default: 0 ms)
Start bit	-
Data bit	8 bit (fixed)
Parity bit	None (default), Even, Odd
Stop bit	1 bit (default), 2 bit
EEPROM life cycle	≈ 100,000 operations (Erase / Write)

■ EtherCAT	
Comm. specifications	EtherCAT
Association approval ⁰¹⁾	
Connection cable	CAT5e class or over (Shield type: SF/FTP, S/FTP, SF/UTP)
Max. comm. distance	Within 100 m distance between nodes
Max. buad rate	10 / 100 Mbps
Topology	Star, Line, Tree

01) EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany

■ CC-Link	
Comm. specifications	CC-Link Ver.2.0
Association approval	
Station type	Remote Device station
Connection cable	CC-Link Exclusive Cable
Baud rate	156 k, 625 k, 2.5 M, 5 M, 10 M bps
Station number	01 to 64
No. of occupied station	1 station occupied, 2 station occupied
Max. Comm. distance	Depending on baud rate

■ PROFINET	
Ethernet standard	100BASE-TX
Association approval	
Cable speccifications	Cat 5 over STP (Shield Twisted Pair) Ethernet cable
Transmission rate	100 Mbps
Cable length	≤ 100 m
GSDML file	Download the GSDML file from the Autonics website

Module Connection

- Up to 4 power modules can be connected and controlled based on 1 control module. Power modules with different rated load current capacities can be used.
- The control module must be installed on the leftmost side.
- When installing multiple modules, connect the concave (凹) of the lower right bracket / the convex (凸) of the lower left bracket.
- For more information about the control module + power modules connectivity, follow the Autonics website.
- Use the module connection ribbon cable to connect between modules.
On power modules, connect the above module connector to the left module and the below module connector to the right module.
- After connecting the module connection ribbon cable, it is possible to close the front cover by organizing the cable according to the inner groove.
- An error in the module connection may result in a module connection error alarm.

Dimensions

For the detailed drawings, follow the product manual or Autonics website.

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