EM51 Series

Plug-in Type Servo Controller

Instruction Manual

Thank you for purchasing our product.
Check that the delivered product is the correct item you ordered.
Do not begin operating this product until you have read and thoroughly understood the contents of this Instruction Manual.

Notice: Make sure that this Instruction Manual is given to the final user of the device.

Preface: This Instruction Manual is meant for persons involved in wiring, installation, operation and routine maintenance of the EM51 Series. It describes matters to be attended to in handling the EM51 Series, how to install it and its wiring. It is requested that for ready reference, this manual is kept at the work site during operation of the EM51 Series. In operating it, please follow the instructions contained herein.
This Instruction Manual describes matters to be attended to concerning safety, potential damage to equipment and/or facilities, additional explanations and notes under the following headings.

⚠ WARNING: This heading indicates that failure to follow instructions could cause injury or even death.

⚠ CAUTION: This heading indicates that failure to follow instructions could cause damage to equipment and/or facilities.

⚠ WARNING

The EM51 Series Servo Controller is designed for controlling temperature, humidity and other physical values.
Therefore, it should not be used in any way that might result in injury or fatality, or must be used only after adequate safety measures are taken. No responsibility will be taken for any accident resulting from the usage of this device without appropriate safety measures being in place.

- This device must be housed, for example, in a control box to prevent the terminal board from coming into accidental physical contact with personnel.
- To prevent electric shock, always turn off and disconnect this device from the power supply before starting wiring.
- Do not touch wired terminals or charged parts with your hands while the power is supplied.

⚠ CAUTION

To avoid damage to connected peripheral devices, facilities or the product itself due to malfunction of this device, safety countermeasures such as proper installation of the fuse or installation of overheating protection must be taken before use. No responsibility will be taken for any accident resulting from the usage of this device without appropriate safety measures being in place.

- The Alert Symbol Mark ⚠ on the plate affixed to this device:
  The Alert Symbol Mark ⚠ indicated on the nameplate affixed on the casing of this device warns you not to touch charged parts while this device is powered ON. Doing so might cause an electric shock.
- A means for turning the power OFF such as a switch or a breaker must be installed on the external power circuit connected to the power supply terminal on this device.
  Fasten the switch or breaker at a position where it can be easily operated by the operator, and indicate that it is a means for powering this device OFF.
- Use this device by ensuring the wire connection part is firmly tightened.
- Fuse: This device has no built-in fuse. Ensure to install a fuse in the power circuit to be connected to the power supply terminal.
  Fuse rating/characteristic: 250V AC 0.5A
- Use the device with the power voltage, frequency, load current and voltage within their rated ranges.
- Use the device with the relay contact current only within its rated range. When using with any motor, use only within approx. 1/5 of the rated range since inrush current or surge voltage may occur.
- Users are prohibited from remodeling this device or using it in a prohibited or unauthorized manner.

EM51F2DE
Sep. 2018

1. Specification

Input .....See ordering information.
Feedback Resistance .....100Ω ~ 2kΩ randam/3-wire
Output .....Relay contact or Triac (SSR)
Output Rating/Contact Protection
Relay contact.....240V AC, 1A (inductive load)/ CR Absorber
Triac (SSR) .....20 ~ 120V AC, 1A (inductive load)/ (Exclusively used for AC load) CR Absorber + varistor
Hysteresis..... Approx. 0.5% fixed of input signal range
Deadband (DB) .....1 ~ 10% variable of input signal range
Dead Time.....Approx. 0.2 sec. (Chattering prevention)
Zero & Span Adjustment .....0% (ZERO): 0 ~ 20% variable 100% (SPAN): 70 ~ 100% variable
Output Action Display .....M2-M1/LED green lighting M2-M3/LED red lighting

Operating Ambient Temperature .....-10 ~ 50°C
Operating Ambient Humidity .....90% RH max. (no dew condensation)
Storage Temperature.....-20 ~ 65°C
Power Supply.....See ordering information.
Power Consumption.....Approx. 4 VA
Insulation Resistance
Between the input and power supply terminals: 500V DC, 100MΩ min.
Between the output and power supply terminals: 500V DC, 100MΩ min.
Dielectric Strength
Between the output and power supply terminals: 1 min. at 1000V AC
Material.....ABS resin molding
External Dimensions.....80 (H) x 50 (W) x 130 (D) mm
Installation .....11P Plug-in
Weight.....Approx. 350g

2. Ordering Information

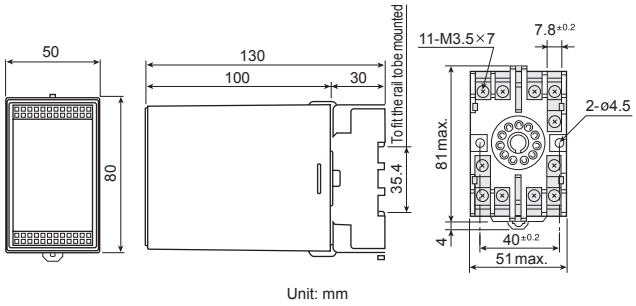
ITEMS	CODE	SPECIFICATIONS	
1. SERIES	EM51-	Plug-in type servo controller	
2. INPUT		1	1 ~ 5mA DC, Receiving Impedance: 250Ω
		2	4 ~ 20mA DC, Receiving Impedance: 62Ω
		3	0 ~ 10V DC, Input Resistance : 200kΩ
		5	Potentiometer 100Ω ~ 2kΩ, 3-wire type
		9	Others (Please consult before ordering.)
3. OUTPUT		Y	Contact 240V AC, 1A (inductive load)/ with CR Absorber
		R	Contact 240V AC, 1A (inductive load)/ without CR Absorber
		S	Triac 20 ~ 120V AC, 1A (inductive load) (Motor Supply Voltage: 20 ~ 120V AC)
4. POWER SUPPLY		13-	100 ~ 110V AC ±10%, 50/60Hz
		14-	110 ~ 120V AC ±10%, 50/60Hz
		15-	200 ~ 220V AC ±10%, 50/60Hz
		16-	220 ~ 240V AC ±10%, 50/60Hz
		99-	Others (Please consult before ordering.)
5. REMARKS		0	Without
		9	With (Please consult before ordering.)

3. Installations

Do not use this device in the following sites to avoid any trouble since use in such circumstances may generate severe harmful influence on its performance or its useful life, or lead to other shortcomings:

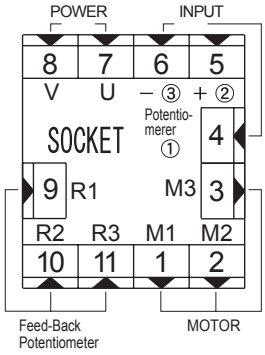
1. Locations that are filled with or generate corrosive gas or inflammable gas
2. Locations where high temperature/humidity is present
3. Locations where direct sunlight or radiant heat such as that from an electric furnace is present
4. Locations where any vibration or shock may be experienced

4. External Dimensions & Panel Cutout



Unit: mm

5. Terminal Arrangement

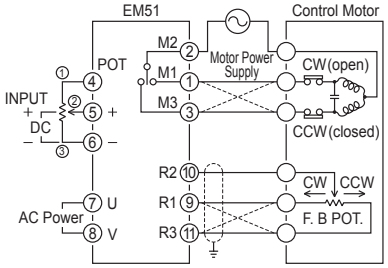


6. Wiring

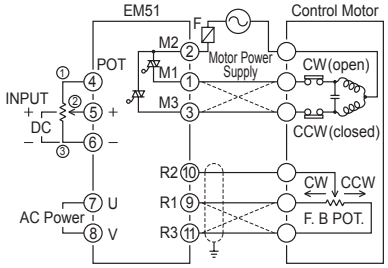
1. Wiring should be routed according to the indications located on the terminal face plates.
   Do not apply too much force when tightening the terminal screw.
2. Keep wiring away from strong electrolyte circuits, or use shielding wire to protect the feedback resistance wire from the input signal/control motor.
3. If you inadvertently connect the motor power supply to the feedback resistance circuit of the control motor, the potentiometer will burn.
4. Connection terminal symbols found on control motors may vary depending on their manufacturer. Refer to the instruction manual supplied by the manufacturer in question for clarification.

7. Connection Diagram

CONTACT



TRIAC



F: Fuse

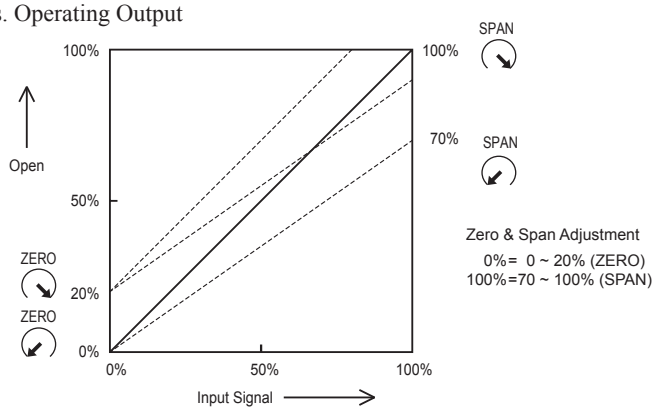
* For model with Triac (SSR), motor power supply voltage range must be 20 to 120V AC.
It is recommended that the fuse between terminal ② and the power supply terminal be used to protect motor upon malfunction.
(Current rating for fuse must be approximately twice the size which is appropriate for the motor for which it is being used.)

- Make sure the motor power supply matches the rating of the motor to be used.
- For inverting the operating direction of motor (to open with input at 0% and close with input at 100%), permute the wires for terminals ① and ③ as well as those for terminals ⑨ and ⑪ respectively.

CW : Clockwise rotation (open)
CCW : Counterclockwise rotation (closed)

8. Adjustment

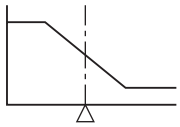
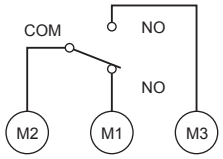
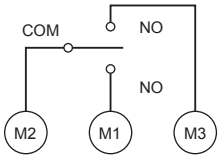
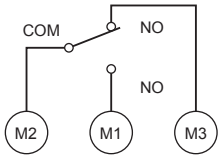
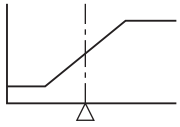
8-1. Characteristic of Input Signal vs. Operating Output



8-2. Adjustment of Operating Output
Confirm that the final control element is at 100% or the open position when 100% input signal is applied and at 0% or the closed position when 0% input signal is applied.
If there is any dislocation at the 0% position, adjust the Zero trimmer. In the case of dislocation at the 100% position, adjust the Span trimmer.
Note: Since the reaction of the final control element is normally slow, adjust the Zero and Span trimmers slowly.

8-3. Adjustment of Deadband (DB)
The deadband refers to the sensitivity between the clockwise (open) and counterclockwise (close) actions of the control motor.
If the control motor repeats quick hunting, turn the deadband from the narrow band gradually to the wide band until hunting stops.
If the deadband is set unnecessarily wide, the control motor may be dull in response.
(The deadband may be variable within 1 to 10% of the input signal range.)

9. Relay Application Diagram

Characteristic		Run	Increased	Balanced	Decreased
RA		Heat	M2 - M1: ON (Open)  LED Green lights.	M2 - M1, M3: OFF (Stop)  LED goes out.	M2 - M3: ON (Close)  LED Red lights.
DA		Cool			

The contents of this manual are subject to change without notice.

Temperature and Humidity Control Specialists

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