

DSS Series

Desktop-Type Temperature Control Device

Instruction Manual

Thank you for purchasing this Shimaden product.
Make sure that the product you are looking for is exactly what you want, and read this instruction manual carefully so that you fully understand it before use.

Request

Please make sure that this instruction manual is delivered to the end user.

Preface

This instruction manual is written for people involved in DSS Series wiring, installation, operation, and daily maintenance. This instruction manual describes precautions, mounting methods, wiring, function descriptions, and operating methods for handling the DSS Series, so always keep it in a convenient location when handling the DSS Series. Also, be sure to observe the contents described in this instruction manual. Safety precautions, precautions regarding equipment and facility damage, additional explanations, and provisos are listed under the following headings.

SHIMADEN CO., LTD.

DSSF-1CE
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1. Safety Precautions

Safety precautions, precautions regarding equipment and facility damage, additional explanations, and provisos are listed under the following headings.

- "⚠ WARNING" © Precaution that may lead to injury or death if not followed
"⚠ CAUTION" © Precaution that may lead to damage to equipment or facilities if not followed
"NOTE" © Additional explanations and provisos

⚠ WARNING

This product is a control device designed for industrial use. It is designed to control temperature, humidity, and other physical quantities. Therefore, avoid using it for applications that have a serious impact on human life, or use it after taking safety measures.

Shimaden is not liable for any accidents that occur due to use without safety measures.

- Do not remove the cover or put your hands or conductors inside the device while power is supplied. Doing so may cause a fatal accident or serious injury due to electric shock.
- Do not turn on the device when wiring. Doing so may cause electric shock.

⚠ CAUTION

If there is a risk of damage to peripheral devices, equipment, or products, etc. due to failure of this product, use it after taking safety measures such as installing a fuse or overheating prevention device.

Shimaden is not liable for any accidents that occur due to use without safety measures.

- Install a switch or circuit breaker in the external power supply circuit connected to the power supply terminal of the device as a means to disconnect the power supply. Install the switch or circuit breaker close to the device and fixed in a position where it can be easily operated by the operator. Use a switch or circuit breaker that complies with the relevant requirements of IEC 60947.
- Alert symbol mark ⚠ on the affixing plate
An alert symbol mark ⚠ is printed on the terminal nameplate affixed to the device cover. **Touching the live parts while the power is on may cause an electric shock.**
- Ensure that the voltage and current of the load connected to the output terminal and alarm terminal are within the ratings. If the ratings are exceeded, the temperature will rise, the product life may be shortened, and the device may be damaged. For the ratings, see "10. Specifications." Connect a device that conforms to the requirements of IEC 61010 to the output terminal.
- Do not apply voltage or current in excess of the input ratings to the input terminals. The product life may be shortened and the device may be damaged. For the ratings, see "10. Specifications." If the input type is voltage or current, connect a device that conforms to the requirements of IEC 61010 to the input terminal.
- The device has a vent for heat dissipation. Make sure that no foreign objects such as metal enter this vent. Failure to do so may cause damage to the device or fire.
- Do not block the vent or allow dust to become adhered. Doing so may cause temperature rise and insulation deterioration, which may shorten the product life and lead to failure. For the usage environment, see "3. Usage Location."
- Fuse
Since this device does not have a built-in fuse, be sure to attach a fuse to the power supply circuit connected to the power supply terminal. Install a fuse between the switch or circuit breaker and the device, and attach it to R or T of the power supply terminal.
Fuse rating/characteristic: 250 VAC or more/medium time-delay type or slow time-delay type
Use a fuse that conforms to the requirements of IEC 60127.
- Repeated withstand voltage tests such as withstand voltage, noise resistance, and surge resistance may lead to deterioration of the device.
- The user must not modify the product or use it irregularly under any circumstances.
- It takes 30 minutes to display the correct temperature after turning on the controller. (Turn on the power supply 30 minutes before starting actual control.)

- This instruction manual is common to the DSS Series. Refer to the instruction manual for each controller for details on how to handle the installed controllers.

2. Introduction

2-1. Check before use

This device has undergone a thorough quality inspection before shipment, but upon arrival, check the model code, the appearance, and the accessories to make sure there are no mistakes, damage, or missing parts.

- 1). Checking the model code: Check the model code affixed to the main unit case against the following code contents to make sure that it is as ordered.
- 2). Code selection table: Check the following four types depending on the installed model.

1). Installed model: SR83 code selection table

| Item | Code | Specification | |
|---|-------------------------|---|--|
| 1. Series | DSS83- | Desktop-Type Temperature Control Device with SR83 Series Digital Controller | |
| 2. Current capacity | 20 | 20 A | |
| | 30 | 30 A | |
| 3. Control method | P | Phase angle control method | |
| | C | Cycle calculation zero voltage switching control method | |
| 4. Protector output | 0 | None | |
| | 1 | With (ON between P1-P2 terminals when protector is shut down) | |
| 5. Power supply | 84- | 100-120V AC | For the phase control method, select with the frequency selector switch. (factory default: 50Hz) |
| | 85- | 200-240V AC | |
| 6. Input | 1 | Thermocouple | |
| | 2 | R.T.D. : Pt100 / JPt100 | |
| | 3 | Voltage mV | |
| | 4 | Current mA | |
| | 6 | Voltage V | |
| 7. Input type | B | Thermocouple B | |
| | R | Thermocouple R | |
| | S | Thermocouple S | |
| | K | Thermocouple K | |
| | E | Thermocouple E | |
| | J | Thermocouple J | |
| | T | Thermocouple T | |
| | N | Thermocouple N | |
| | P | R.T.D.: Pt100 / JPt100 | |
| L | Voltage / current input | | |
| 8. Event | 0 | None | |
| | 1 | With 3 contact outputs Contact details: 240V AC 1A Resistance load | |
| 9. Remote setting input | 00 | None | |
| | 14 | Current 4 to 20 mA DC Receiving impedance: 250Ω | Non-isolated input |
| | 15 | Voltage 1 to 5 V DC Input resistance: 500kΩ and over | |
| | 16 | Voltage 0 to 10 V DC Input resistance: 500kΩ and over | |
| 10. Analog output (Transmission output) | 0 | None | |
| | 3 | Voltage 0 to 10mV DC Output resistance: 10Ω | |
| | 4 | Current 4 to 20 mA DC Load resistance: 300Ω max | |
| | 6 | Voltage 0 to 10 V DC Load current:: 2mA max | |
| 11. Communication function | 0 | None | |
| | 5 | RS-485 | Shimaden standard protocol |
| | 7 | RS-232C | |
| 12. External input control signal | 0 | None | |
| | 1 | With control input 2 points Non-voltage contact open collector input | |
| 13. Remarks | 0 | None | |
| | 9 | With | |

2). Installed model: FP93 code selection table

| Item | Code | Specification | |
|---|-----------------------|--|--|
| 1. Series | DSSP93- | Desktop-Type Temperature Control Device with FP93 Series Programmable Controller | |
| 2. Current capacity | 20 | 20A | |
| | 30 | 30 A | |
| 3. Control method | P | Phase angle control method | |
| | C | Cycle calculation zero voltage switching control method | |
| 4. Protector output | 0 | None | |
| | 1 | With | |
| 5. Power supply | 84- | 100-120V AC | For the phase control method, select with the frequency selector switch. (factory default: 50Hz) |
| | 85- | 200-240V AC | |
| 6. Input | 1 | Thermocouple | |
| | 2 | R.T.D. : Pt100 / JPt100 | |
| | 3 | Voltage mV | |
| | 4 | Current mA | |
| | 6 | Voltage V | |
| 7. Input type | B | Thermocouple B | |
| | R | Thermocouple R | |
| | S | Thermocouple S | |
| | K | Thermocouple K | |
| | E | Thermocouple E | |
| | J | Thermocouple J | |
| | T | Thermocouple T | |
| | N | Thermocouple N | |
| | P | R.T.D. : Pt100 / JPt100 | |
| L | Voltage/current input | | |
| 8. Status output (*Cannot be selected simultaneously with the communication function) | 0 | None | |
| | 1 | Four open collector Darlington outputs | |
| 9. Analog output (Transmission output) | 0 | None | |
| | 3 | Voltage 0 to 10mV DC Output resistance: 10Ω | |
| | 4 | Current 4 to 20 mA DC Load resistance: 300Ω max. | |
| | 6 | Voltage 0 to 10 V DC Load current: 2mA max. | |
| 10. Communication (* Cannot be selected simultaneously with the status output) | 0 | None | |
| | 5 | RS-485 | Shimaden standard protocol / MODBUS communication protocol |
| | 7 | RS-232C | |
| 11. Remarks | 0 | None | |
| | 9 | With | |

3). Installed model: SR23A code selection table

| Item | Code | Specification | |
|---|-----------------------|--|---|
| 1. Series | DSS23A- | Desktop-Type Temperature Control Device with SR23A Series Digital Controller | |
| 2. Current capacity | 20 | 20A | |
| | 30 | 30 A | |
| 3. Control method | P | Phase angle control method | |
| | C | Cycle calculation zero voltage switching control method | |
| 4. Protector output | 0 | None | |
| | 1 | With | |
| 5. Power supply | 84- | 100-120V AC | For the phase control method, select with the frequency selector switch. (factory default : 50Hz) |
| | 85- | 200-240V AC | |
| 6. Input | 1 | Thermocouple | |
| | 2 | R.T.D. : Pt100 / JPt100 | |
| | 3 | Voltage mV | |
| | 4 | Current mA | |
| | 6 | Voltage V | |
| 7. Input type | B | Thermocouple B | |
| | R | Thermocouple R | |
| | S | Thermocouple S | |
| | K | Thermocouple K | |
| | E | Thermocouple E | |
| | J | Thermocouple J | |
| | T | Thermocouple T | |
| | N | Thermocouple N | |
| | P | R.T.D. : Pt100 / JPt100 | |
| L | Voltage/current input | | |
| 8. Remote setting input | 04 | Current 4 to 20 mA DC Receiving impedance: 250Ω | Non-isolated input |
| | 05 | Voltage 1 to 5 V DC Input resistance: 500kΩ and over | |
| | 06 | Voltage 0 to 10 V DC Input resistance: 500kΩ and over | |
| | 14 | Current 4 to 20 mA DC Receiving impedance: 250Ω | Isolated input |
| | 15 | Voltage 1 to 5 V DC Input resistance: 500kΩ and over | |
| | 16 | Voltage 0 to 10 V DC Input resistance: 500kΩ and over | |
| 9. Analog output 1 | 0 | None | |
| | 3 | Voltage 0 to 10mV DC Output resistance: 10Ω | |
| | 4 | Current 4 to 20 mA DC Load resistance: 300Ω max. | |
| | 6 | Voltage 0 to 10 V DC Load current: 2mA max. | |
| 10. Analog output 2/Power supply for sensor | 0 | None | |
| | 3 | Voltage 0 to 10mV DC Output resistance: 10Ω | |
| | 4 | Current 4 to 20 mA DC Load resistance: 300Ω max. | |
| | 6 | Voltage 0 to 10 V DC Load current: 2mA max. | |
| | 8 | For sensor power supply 24 V DC 25 mA | |
| 11. Communication function | 0 | None | |
| | 5 | RS-485 | Shimaden standard protocol / |
| | 7 | RS-232C | MODBUS communication protocol |
| 12. Remarks | 0 | None | |
| | 9 | With | |

4). Installed model: FP23A code selection table

| Item | Code | Specification | |
|--|-----------------------|---|--|
| 1. Series | DSS23P- | Desktop-Type Temperature Control Device with FP23A Series Programmable Controller | |
| 2. Current capacity | 20 | 20A | |
| | 30 | 30 A | |
| 3. Control method | P | Phase angle control method | |
| | C | Cycle calculation zero voltage switching control method | |
| 4. Protector output | 0 | None | |
| | 1 | With | |
| 5. Power supply | 84- | 100-120V AC | For the phase control method, select with the frequency selector switch. (factory default: 50Hz) |
| | 85- | 200-240V AC | |
| 6. Input | 1 | Thermocouple | |
| | 2 | R.T.D. : Pt100 / JPt100 | |
| | 3 | Voltage mV | |
| | 4 | Current mA | |
| | 6 | Voltage V | |
| 7. Input type | B | Thermocouple B | |
| | R | Thermocouple R | |
| | S | Thermocouple S | |
| | K | Thermocouple K | |
| | E | Thermocouple E | |
| | J | Thermocouple J | |
| | T | Thermocouple T | |
| | N | Thermocouple N | |
| | P | R.T.D. : Pt100 / JPt100 | |
| L | Voltage/current input | | |
| 8. Analog output 1 | 0 | None | |
| | 3 | Voltage 0 to 10 mV DC | Output resistance: 10Ω |
| | 4 | Current 4 to 20 mA DC | Load resistance: 300Ω max. |
| | 6 | Voltage 0 to 10 V DC | Load current: 2mA max. |
| 9. Analog output 2/Power supply for sensor | 0 | None | |
| | 3 | Voltage 0 to 10mV DC | Output resistance: 10Ω |
| | 4 | Current 4 to 20 mA DC | Load resistance: 300Ω max. |
| | 6 | Voltage 0 to 10 V DC | Load current: 2mA max. |
| | 8 | For sensor power supply 24 V DC 25 mA | |
| 10. Communication function | 0 | None | |
| | 5 | RS-485 | Shimaden standard protocol / |
| | 7 | RS-232C | MODBUS communication protocol |
| 11. Remarks | 0 | None | |
| | 9 | With | |

5). Accessories check

This device instruction manual 1 copy
 Installed controller instruction manual 1 copy

If there is any problem with the product, missing accessories, or if you have any other inquiry, please contact your distributor or the Shimaden sales office.

2-2. Precautions for use

- 1). Do not operate the front panel of the controller with a hard or pointed object. Be sure to operate the device gently with your fingertips.
- 2). When cleaning the device, do not use a solvent such as thinner, and wipe it gently with a dry cloth.

3. Usage Location (Environment)

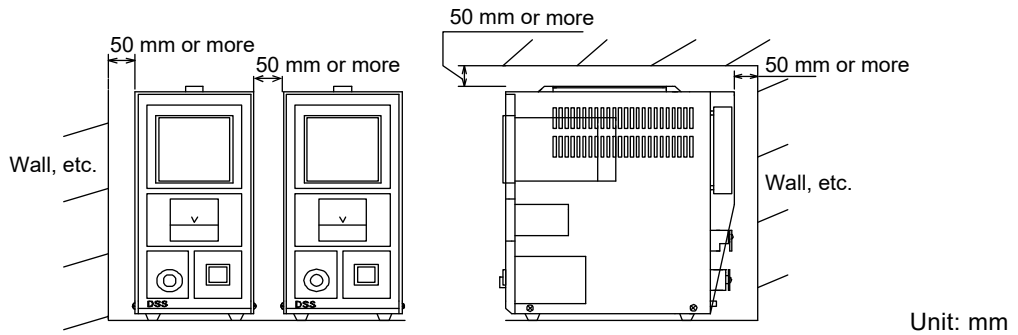
⚠ CAUTION

Do not use the product in the following locations. Doing so may cause failure or fire as a result of damage to the product.

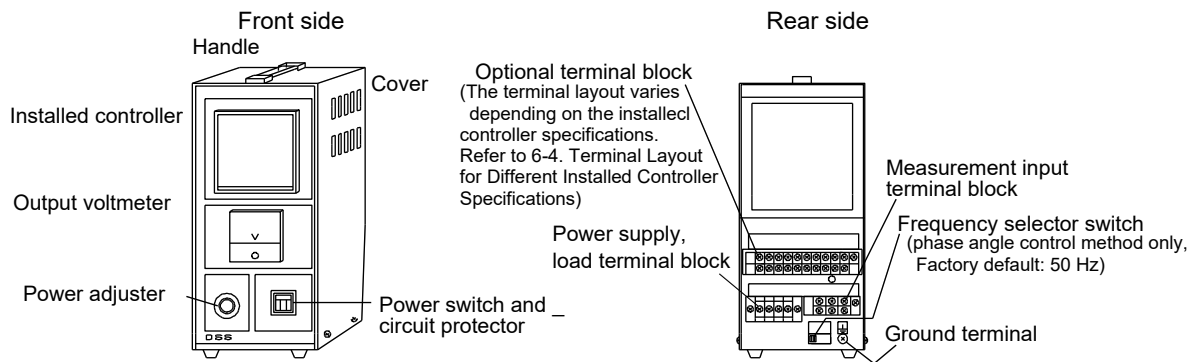
- 1). Locations where flammable gas, corrosive gas, oil smoke, or dust that damages insulation, etc. is generated or present in a large quantity.
- 2). Locations where the ambient temperature exceeds 0 to 40°C.
- 3). Locations where the ambient humidity exceeds 90% RH or where condensation occurs.
- 4). Locations subject to strong vibration or shock.
- 5). Locations near a high-voltage circuit or subject to inductive interference.
- 6). Locations exposed to water drops or direct sunlight.
- 7). Location with altitudes above 2000 m.
- 8). Outdoor.

Request: The product has a vent in the cover to dissipate internal heat. Do not block the periphery of the device so as not to block heat dissipation. Leave a space of 50 mm or more around the device on the left, right, top, and rear, and place it horizontally with the colored feet down.

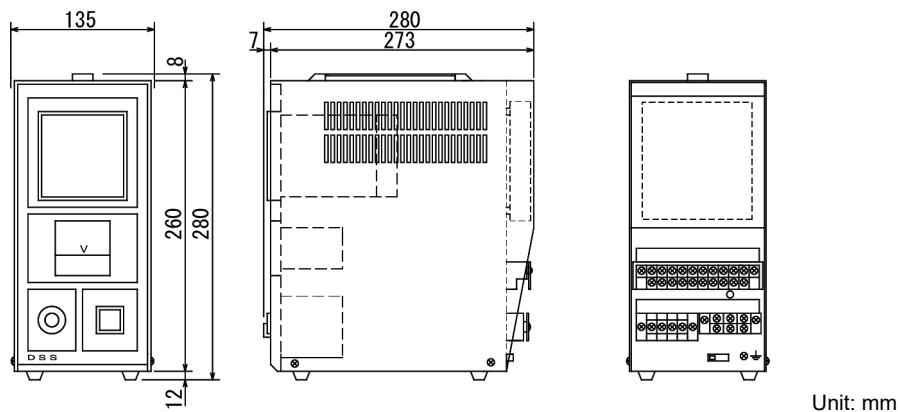
- Usage interval



4. Name of each part



5. External dimensions



6. Wiring

⚠ WARNING

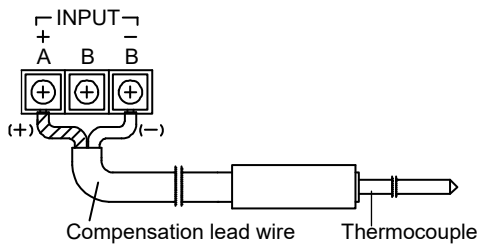
- Do not turn on the device when wiring.
- Be sure to wire the ground terminal (⚡). If you turn on the device without grounding, you may receive an electric shock.
- Do not touch the terminals after wiring or other charged parts while the power is on.

6-1. Measurement input wiring

(Screw diameter M3.5, terminal width 8 mm, manufacturer recommended tightening torque 0.8 N·m)
To avoid the effects of noise, route the input signal line away from high-power circuit wiring such as power circuits and do not pass it through the same wire piping or duct. Be sure to use shielded wires when wiring together is unavoidable.

1). Thermocouple input

For the thermocouple input, use the specified compensation lead wire and connect the positive (+) of the thermocouple to the positive (+) of the terminal at the bottom of the device and the negative (-) to the negative (-) of the terminal.



The outer color of the compensation lead wire is differentiated as follows according to the thermocouple.

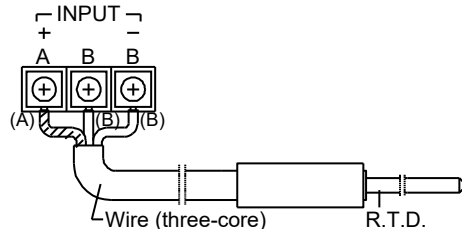
| Thermocouple | T | J | E | K | S | R | B | |
|----------------|-------|--------|--------|------|-------|-------|------|--|
| Exterior color | Brown | Yellow | Purple | Blue | Black | Black | Grey | |

Color is JISC1610 1995 standard before revision

[CAUTION] The DSS main unit uses the compensation lead wire specified at the time of ordering. When changing the input type in a series with multiple inputs, it is necessary to change the main unit internal compensation lead wire.

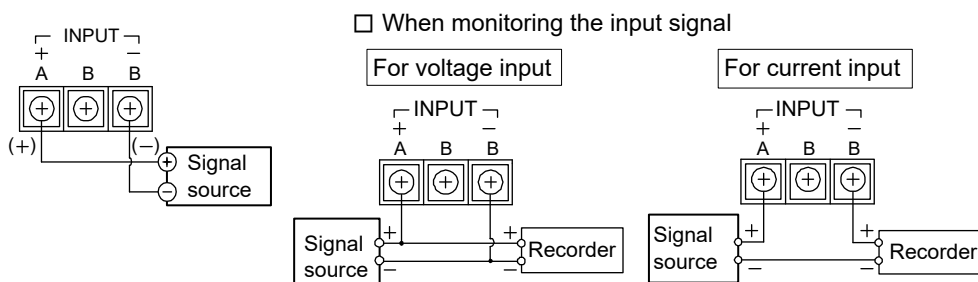
2). R.T.D. : Pt100 / JPt100 Input

For R.T.D input, use wires with low lead wire resistance and no difference in resistance between the three wires. Connect R.T.D. (A) to A on the bottom terminal of the device and (B) to B respectively.



3). Voltage/current input

For voltage/current input, connect the positive (+) of the signal source to the (+) of the terminal at the bottom of the device and the negative (-) to the negative (-) terminal as shown below.

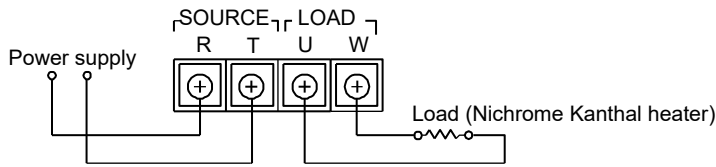


[CAUTION] When monitoring the current signal with a dot-type recorder, note that some recorders become open circuit when the input is switched.

6-2. Power supply and load wiring

(Screw diameter M4, terminal width 10mm, manufacturer recommended tightening torque 1.2 N·m)

This is a high-power circuit that supplies power to a load (such as a heater). Use a wire that has sufficient rated current capacity to withstand the load current.



[CAUTION]

- 1). Since output control with no load is not possible, be sure to connect a load when there is no large inrush current.
- 2). An infrared lamp load (about 300 W) can only be controlled in the phase angle control method.

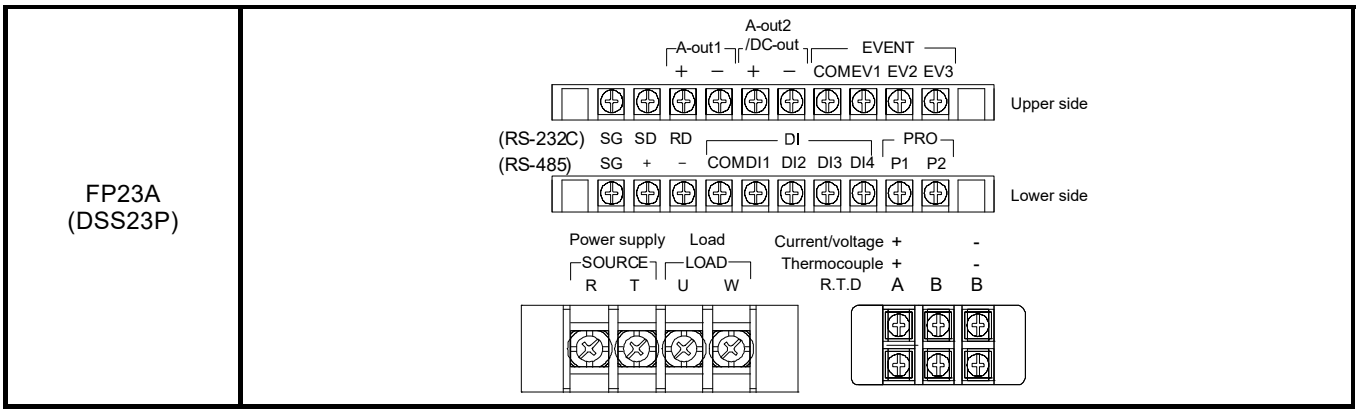
6-3. Wiring of optional and grounding terminals etc.

- 1). Optional terminals, etc. (screw diameter M4, terminal width 8.3 mm, manufacturer recommended tightening torque 1.2 N·m)
To avoid the effects of noise, route the input/output signal lines of the control input/output terminals away from high-power circuit wiring such as power circuits.
- 2). Grounding terminal (screw diameter M4, tightening torque 1.2 N·m)
Ground the grounding terminal with a thick wire of 2 mm² or more with a grounding resistance of 100 Ω or less.

6-4. Terminal Layout for Different Installed Controller Specifications

[NOTE] Optional terminal layout varies depending on the installed controller specifications.

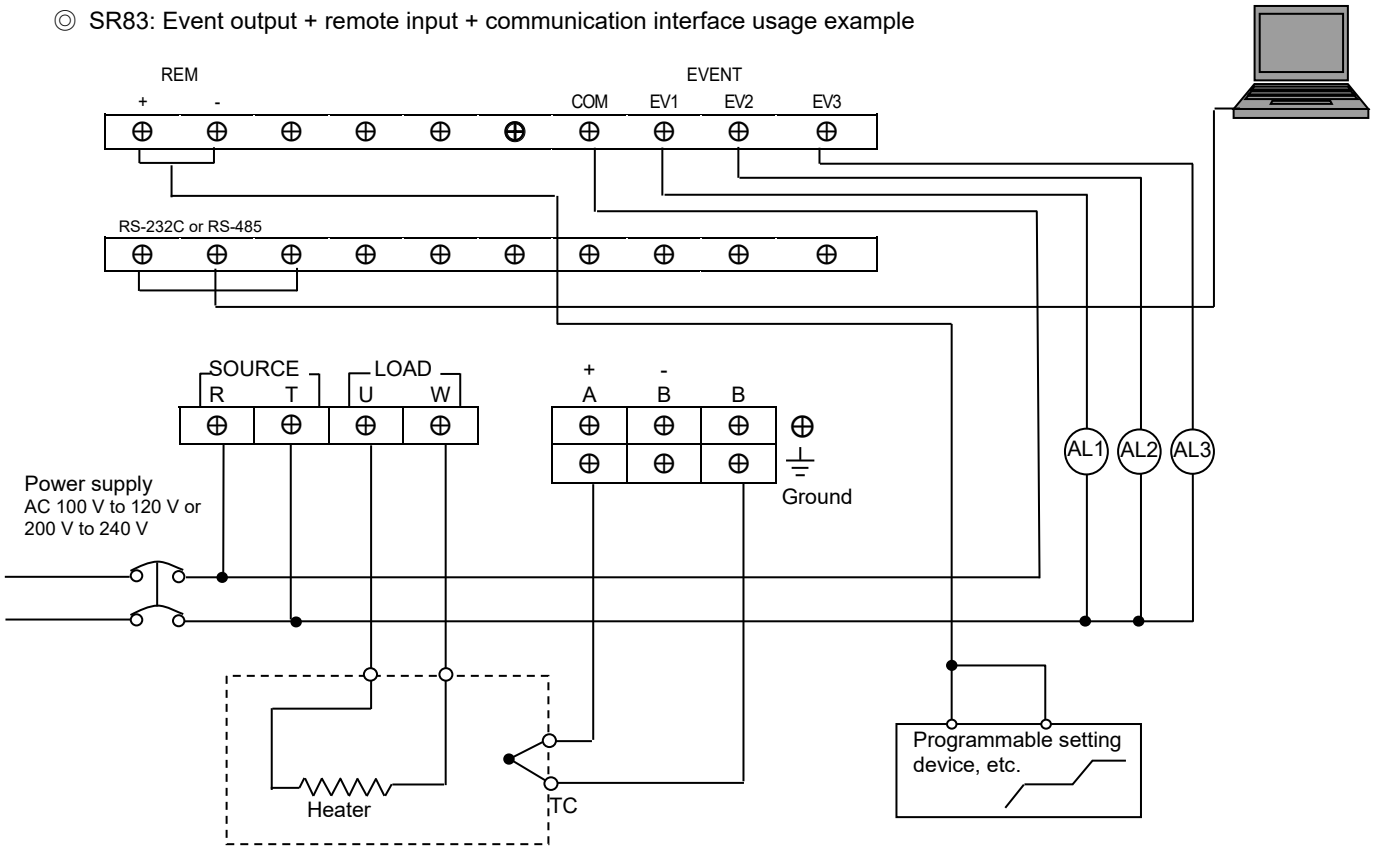
| | |
|----------------------------------|--|
| <p>SR83 (DSS83)</p> | |
| <p>FP93 (DSSP93)</p> | |
| <p>SR23A (DSS23A)</p> | |



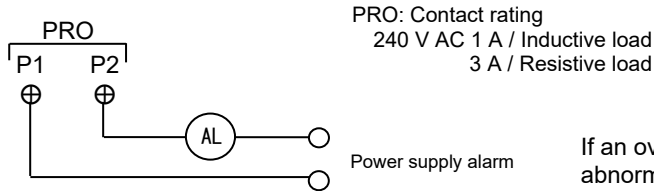
6-5. Terminal layout explanation

□ Wiring example

◎ SR83: Event output + remote input + communication interface usage example



◎ Protector trip output usage example



If an overcurrent flows due to an abnormality on the load side, the circuit protector is turned off and the P1-P2 terminals are turned on.

7. Operation / Adjustment

After completing all wiring, check the operation according to the following procedure.

7-1. Operation confirmation

- 1). Set the power adjuster to the MIN position.
- 2). Turn on the power switch of the DSS main unit.
- 3). Set the setting value of the installed controller to the maximum value. (Set the control output to 100%. For the handling of the installed controller, see its instruction manual.)
- 4). Slowly turn the power adjuster from the MIN position to the MAX position to check the output status. Check that the output voltmeter changes according to the output voltage.
- 5). If you want to use the device immediately, set the necessary settings for the installed controller and use it as it is. If you do not want to use it immediately, return the power adjuster from the MAX position to the MIN position and turn off the main unit.
 - If a problem occurs in the confirmation items so far, refer to "9. Troubleshooting."

7-2. PID Adjustment

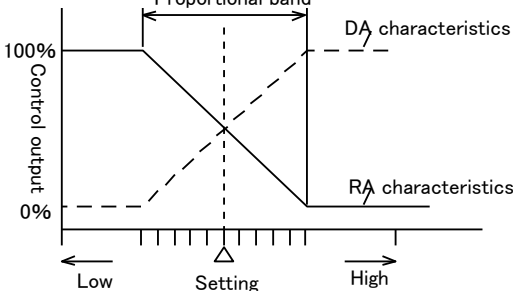
PID operation

In the case of the PID type, proportional (PB), integral (IT), and derivative (DT) control is possible.

Please refer to the basic operation of PID before control.

• Proportional band

The proportional band is above and below the set point as shown below, and is the range where the control output changes from 100% to 0%.



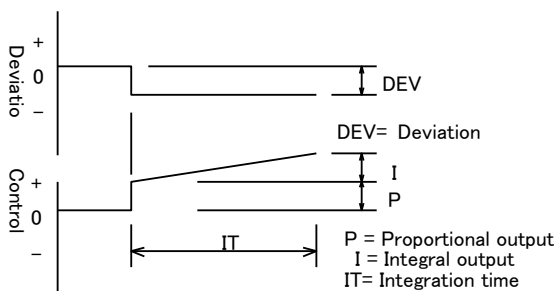
The proportional band is expressed in % and is calculated by the following formula.

$$\text{Proportional band} = \frac{\text{Input width to change output from 0 to 100\%}}{\text{Measurement range}}$$

In other words, when PB = 100%, the entire measurement range is in the proportional band. 10% PB is 10°C width when the measurement range is 0 to 100°C.

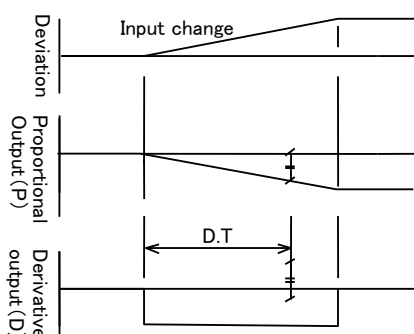
• Integral time

The integral time represents the speed of the integration operation (the function that automatically corrects the offset by proportional control).



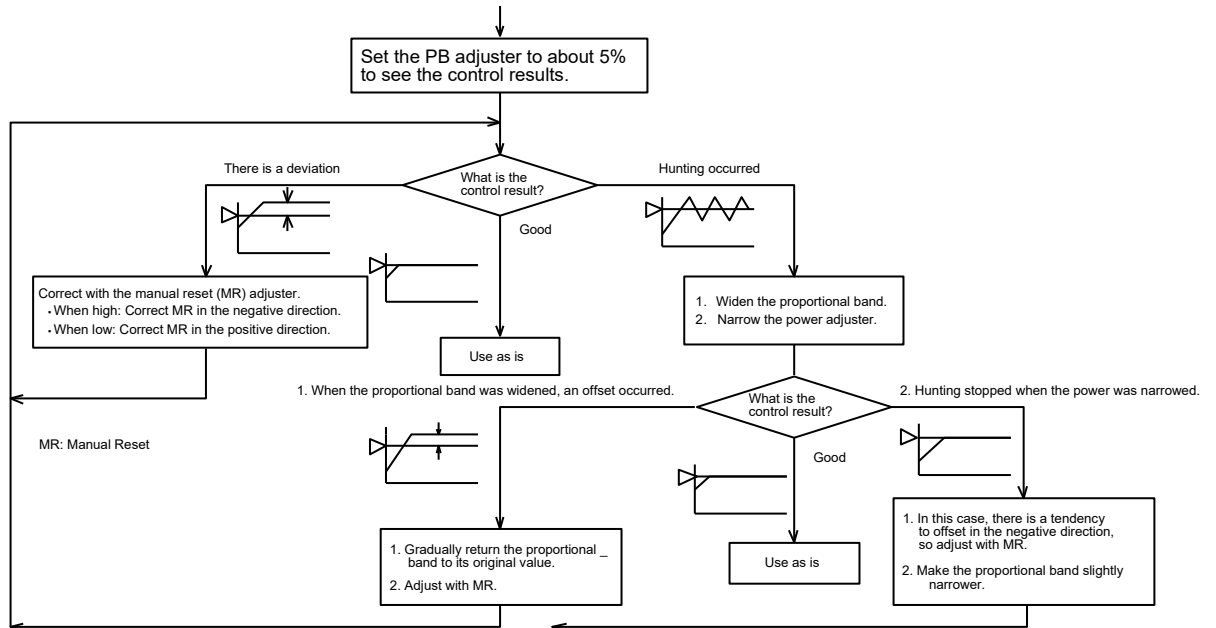
If a deviation (DEV) occurs on the negative side of the set value, the proportional control output increases by (P) and the integration time (I) increases gradually with time. At this time, the time required for I to become equal to P is the integration time (IT).

• Derivative time



The derivative action (output) has the characteristics shown in the figure below, and the response that is output when a change occurs is very fast, minimizing disturbance caused by noise. It also works as a brake against overshoot. When the input width increases as shown in the figure on the left, the proportional band output (P) changes in proportion to the input, the derivative output (D) is output at the time of the change, the output during the change continues, and the derivative output becomes zero when the change ends.

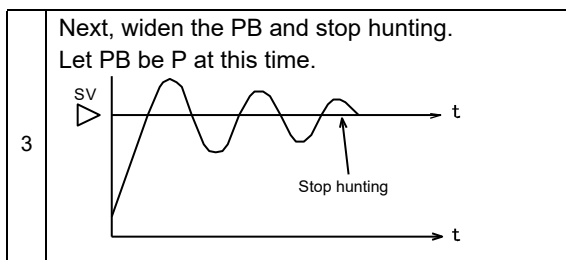
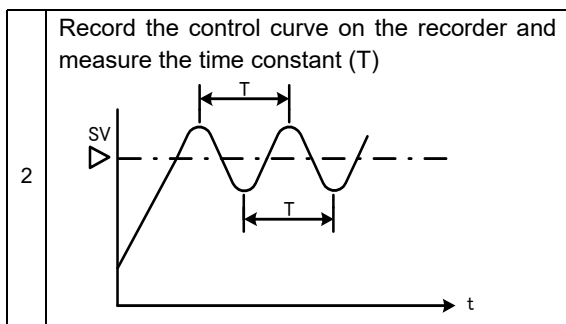
- How to find the P value



- How to find the PID value

This is explained using the limit sensitivity method that is generally used to obtain the PID ternary.

1 Operation with
PB=1 (%)
IT=10 (seconds)
DT=OFF



4 Calculate the PID value using the following formula.
PB=1.7×P (%)
IT=0.5×T (seconds)
DT=0.1×T (seconds)

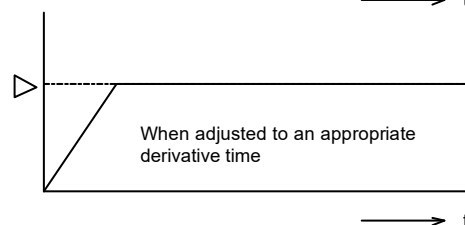
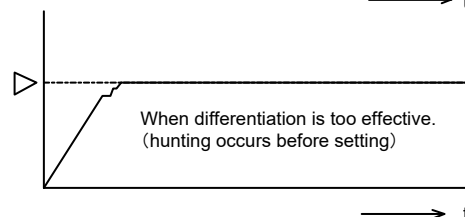
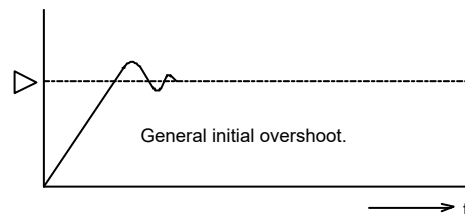
5 Set each calculated value

6 PID setting is complete
There is almost no problem with this value, but please refer to the prevention methods section for a description of initial overshoot prevention.

How to prevent initial overshoot

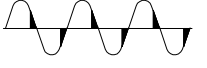



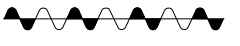

PI and PID type controls have the characteristics that they are delayed by the integral action and therefore overshoot occurs.

This device has a built-in circuit to reduce overshoot. Although the overshoot is very small, it can be improved by adjusting the derivative time.

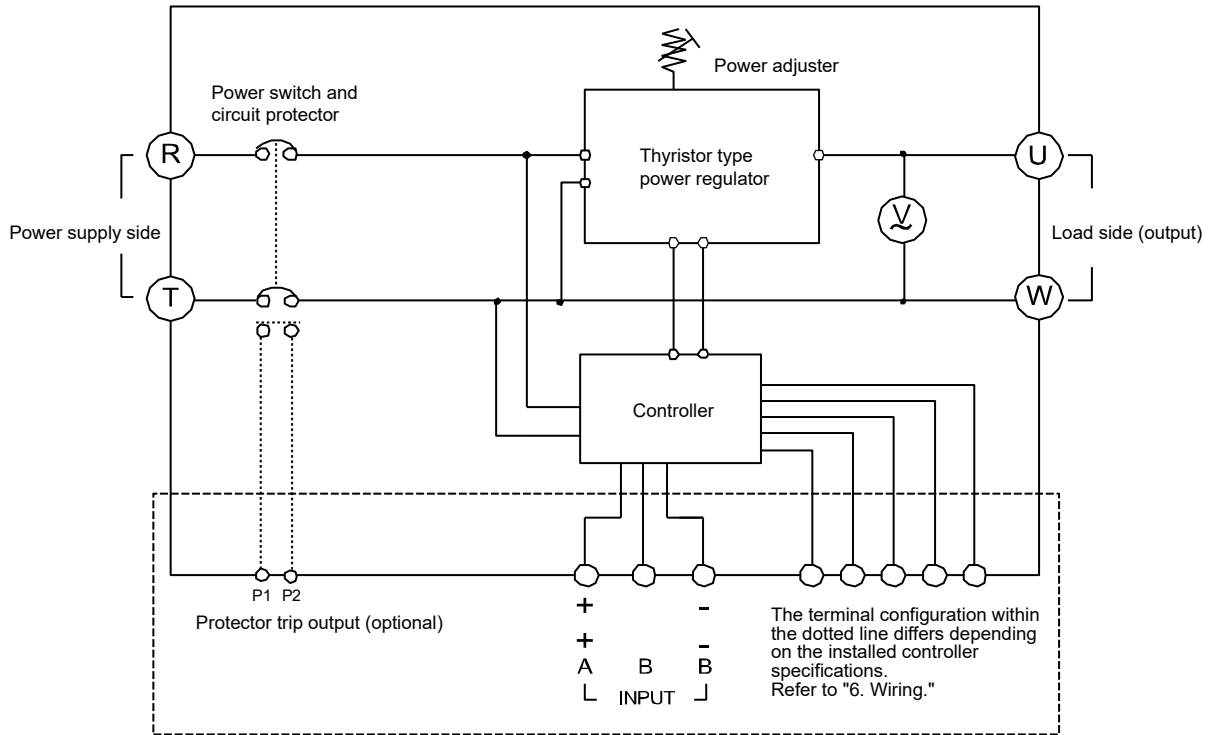


8. Control Method and Circuit Configuration

8-1. Thyristor control system output characteristics

| Item | Noise generation | Deflection of moving coil meter | Output waveform (reference diagram) | | |
|--|------------------|--|--|--|--|
| | | | 10% output | 50% output | 90% output |
| Phase angle control method (P) | Large | Continuous |  |  |  |
| Cycle calculation type zero voltage switching control method (C) | Small | <ul style="list-style-type: none"> · Large fluctuation at low output · Roughly continuous at medium to high output |  1 cycle ON, 9 cycles OFF in 10 cycles |  1 cycle ON and 1 cycle OFF |  9 cycles ON, 1 cycle OFF in 10 cycles |

8-2. Internal circuit configuration diagram



9. Troubleshooting

If a problem occurs, turn off the power, check the input/output sides, check for incorrect wiring or loose terminals, etc., and inspect the relevant parts.

| Fault condition | Inspection location |
|--|---|
| <ul style="list-style-type: none"> There is an error in the measured value (PV). | <ul style="list-style-type: none"> Check the input type and input standard |
| <ul style="list-style-type: none"> Increasing the output trips the circuit protector. | <ul style="list-style-type: none"> Check that the load does not exceed the rating Check for load short circuit Check the load characteristics Check the load insulation |
| <ul style="list-style-type: none"> The output voltmeter does not move. | <ul style="list-style-type: none"> Checking the setting value of the installed controller Check the output characteristics (RA/DA) of the installed controller Check the power controller setting position |
| <ul style="list-style-type: none"> The device does not operate at all. | <ul style="list-style-type: none"> Check if the power supply is normal |

* If the fault condition is not clear, or if you think that repair is necessary, confirm the model code, serial number, and fault details, and contact your local distributor or sales office.

10. Specifications

- Common specifications
 - Power control method : Thyristor (semiconductor) power control method
 - Thyristor control method/Applicable load : Phase angle control method/Resistive load (Nichrome / Kanthal)
Cycle calculation zero voltage switching control method/constant resistance load (Nichrome / Kanthal)
 - Power supply voltage : Specify either 100 to 120 V AC $\pm 10\%$ or 200 to 240 V AC $\pm 10\%$
 - Frequency : 50/60 Hz (For phase angle control method, frequency is selected by the selector switch) (factory default: 50 Hz)
 - Current capacity : Specify 20 A or 30 A
 - Output control range : Phase angle control method/0 to 95% or more of input voltage
Cycle calculation type zero voltage switching control method/0 to 95% or more of load power
 - Overcurrent shut off method : Semiconductor circuit protector (breaker) method
 - Minimum load : 0.5 A or more (Does not operate when there is no load.)
 - Power (gradient) adjuster : 0 to 100% of output control range
 - Protector trip output : Possible as an option, ON between P1 and P2 terminals when the protector is shut off (conduction)
 - Ambient temperature / humidity range : 0 to 40°C/90% RH or less
 - Storage temperature : -20 to 65°C
 - Insulation resistance : Between input terminal and power supply terminal: 500 V DC 20 M Ω or more
Between power supply terminal and grounding terminal: 500 V DC 20 M Ω or more
 - Dielectric strength : Between input terminal and power supply terminal: 1000 V AC for 1 minute
Between power supply terminal and grounding terminal: 1500 V AC for 1 minute
 - Main unit material : Normal copper plate/paint finish
 - Color :
 - Front part : Munsell value N-9 equivalent
 - Cover : Munsell value 10B7/6 equivalent (Hammerstone)
 - External dimensions : H 280 × W 135 × D 280 mm
 - Mass :
 - Installed controller SR83: Approximately 4.2 kg for both 20 A and 30 A
 - Installed controller FP93: Approximately 4.2 kg for both 20 A and 30 A
 - Installed controller SR23A: Approximately 4.4 kg for both 20 A and 30 A
 - Installed controller FP23A: Approximately 4.4 kg for both 20 A and 30 A

* With regard to the technical details of products, please contact your nearest Shimaden dealer.

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

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