Temperature Adjuster

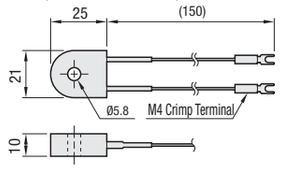
Instruction manual is available online:
http://fa.misumi.jp/ht/
Refer to a collection of FAQ which compiled frequently asked questions.

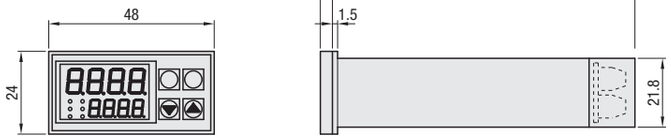
Be sure to refer to Temperature Adjuster Overview on **P.1667.**

Size	Output Type		Heater Wire Breakage Alarm Function	Accessory
	Relay Contact Output	SSR Drive Voltage Output		
24x48	MTMNR	MTMNS	Unavailable	-
	MTMNRD	MTMNSD	Available	CT (Current Transformer)

Accessory mounting attachment is included in the box.

• **CT** (Current Transformer)





Size	Output Type	Part Number	Heater Wire Breakage Alarm Function	Unit Price 1 ~ 10 pc(s).
24x48	Relay Contact Output	MTMNR	-	
		MTMNRD	Available	
	SSR Drive Voltage Output	MTMNS	-	
		MTMNSD	Available	

Ordering Example: **MTMNR**

For orders larger than indicated quantity, please check with WOS.

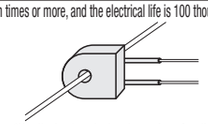
■ Specification

Size	24x48mm	
Part Number	MTMNR/MTMNRD	MTMNS/MTMNSD
O.D. Dimension	24x48x100	
Control Method	ON/OFF control, PID Control with Auto Turning, PID Control with Self-turning	
Input	Thermocouple (K, J, R, T, N, S, B), Temperature Measuring Resistor (Pt100 JPt100)	
Control Output (OUT1)	Relay Contact Output (Contact Capacity AC250V 3A Resistance Load)	SSR Drive Voltage Output (DC12V Max. 20mA)
Alarm Output (EV1)	Relay Contact Output (AC250V 2.4A Resistance Load) 1a Contact Point	
Control / Alarm Output2 (OUT2/EV2)	Relay Contact Output (AC250V 2.4A Resistance Load) 1a Contact Point	
Sampling Frequency	500mS	
Indication Accuracy (Thermocouple)	The bigger one of ±0.3% of specified value +1 digit or ±2°C ±3°C for -100 ~ 0°C, ±4°C for -200 ~ -100°C, no regulation for 400°C or less of B Thermocouple	
Indication Accuracy (Temperature Measuring Resistor)	The bigger one of ±0.3% of specified value +1 digit or ±0.9°C	
Indication Accuracy Maintenance Temperature Range	Ambient Temperature: 23±10°C	
Storage Element	EEPROM	
Power Supply Voltage	AC 100~240V (Allowable Voltage Change Range 85 ~ 264V)	
Power Consumption	10VA (max.)	
Mass	180g or Less	

* For relay contact of OUT1 EV1 - OUT2 EV2, the mechanical life is 5 million times or more, and the electrical life is 100 thousand times or more.

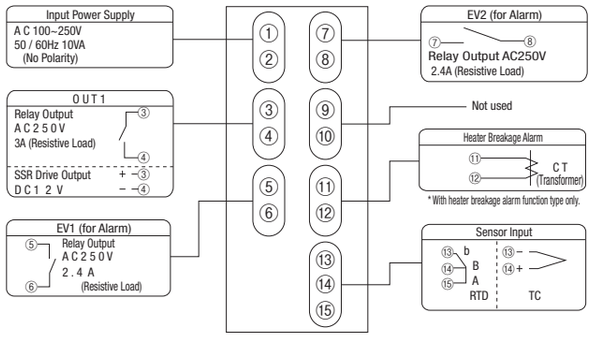
(With Heater Breakage Alarm Function Type only.)

CT Input (Current Transformer)		
	Setting Range	AC1~30A
	Precision	5% (Set Resolution 1A)
	Breakage Detection	ON Time of OUT1: 300mS or More
	Welding Detection	ON Time of OUT1: 300mS or More



*Use the heater wire breakage alarm function included CT (Current Transformer) by threading the heater lead wire through Ø5.8 hole.

■ Terminal Arrangement for Wire Connection

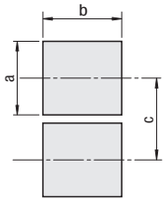


• **Sensor Input Types and Sensor Range**

	Sensor	Lower to Upper Limit	Setting the decimal point
00	K Thermocouple	-200~ 1372	-199.9~990.0
01	J Thermocouple	-200~ 850	-199.9~850.0
02	R Thermocouple	0~ 1700	
03	T Thermocouple	-200~ 400	-199.9~390.0
04	N Thermocouple	-200~ 1300	-199.9~990.0
05	S Thermocouple	0~ 1700	
06	B Thermocouple	0~ 1800	
10	Pt100Ω	-199~ 500	-199.9~500.0
11	JPt100Ω	-199~ 500	-199.9~500.0

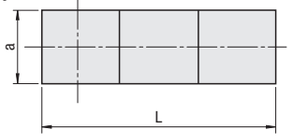
■ Panel Cut Dimension

• **Single Installation**



• **Solid Installation**

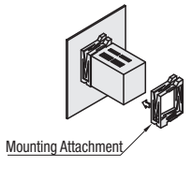
*To install, insert the body and gasket into the square hole of the panel, and insert the mounting attachment from the rear side until clearance is eliminated.



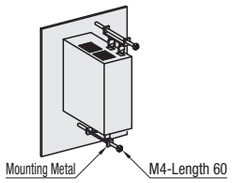
Size	a	b	c	L
24x48	$22.2^{+0.3}_{0}$	$45^{+0.6}_{0}$	60 or More	(48x Qty. of Controllers-3) $^{+0.6}_{0}$
48x48	$45^{+0.6}_{0}$			
96x96	$92^{+0.8}_{0}$	$92^{+0.6}_{0}$	120 or More	(96x Qty. of Controllers -3) $^{+1}_{0}$

■ How to Mount

■ Size: 24x48, 48x48



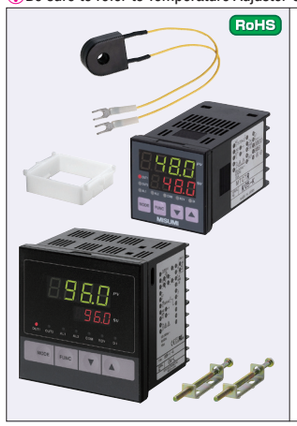
■ Size: 96x96



Temperature Adjuster

Instruction manual is available online:
http://fa.misumi.jp/ht/
Refer to a collection of FAQ which compiled frequently asked questions.

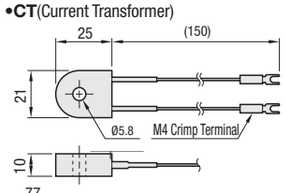
Be sure to refer to Temperature Adjuster Overview on **P.1667.**

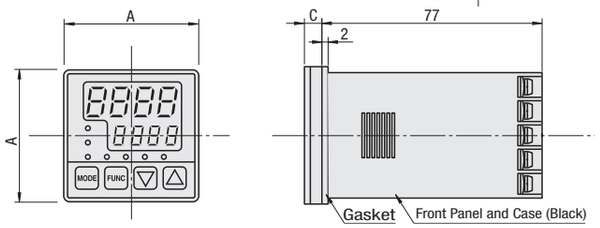


Size	Output Type		Heater Wire Breakage Alarm Function	Accessory
	Relay Contact Output	SSR Drive Voltage Output		
48x48	MTCTR	MTCTS	Unavailable	-
	MTCTRD	MTCTSD	Available	CT (Current Transformer)
96x96	MTBGR	MTBGS	Unavailable	-

Accessory mounting attachment is included in the box.

•**CT**(Current Transformer)





Size	Output Type	Part Number	Heater Wire Breakage Alarm Function	A	C	Unit Price 1 ~ 10 pc(s).
48x48	Relay Contact Output	MTCTR	-	48	6	
		MTCTRD	Available			
	SSR Drive Voltage Output	MTCTS	-			
		MTCTSD	Available			
96x96	Relay Contact Output	MTBGR	-	96	9	
	SSR Drive Voltage Output	MTBGS	-			

Ordering Example: **MTCTR**

For orders larger than indicated quantity, please check with WOS.

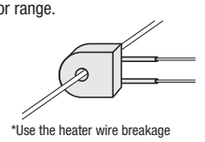
■ Specification

Size	48x48mm		96x96mm	
Part Number	MTCTR / MTCTRD	MTCTS / MTCTSD	MTBGR	MTBGS
O.D. Dimension	48x48x83		96x96x86	
Control Method	ON/OFF control, PID Control with Auto Turning, PID Control with Self-turning			
Input	Thermocouple (K, J, R, T, N, S, B), Temperature Measuring Resistor (Pt100 JPt100)			
Control Output (OUT1)	Relay Contact Output (Contact Capacity AC250V 3A Resistance Load)	SSR Drive Voltage Output (DC12V Max. 20mA)	Relay Contact Output (Contact Capacity AC250V 3A Resistance Load)	SSR Drive Voltage Output (DC12V Max. 20mA)
Alarm Output (EV1)	Relay Contact Output (AC250V 2.4A Resistance Load) 1a Contact Point			
Control / Alarm Output2 (OUT2/EV2)	Relay Contact Output (AC250V 2.4A Resistance Load) 1a Contact Point			
Sampling Frequency	500mS			
Indication Accuracy (Thermocouple)	The bigger one of ±0.3% of specified value +1 digit or ±2°C ±3°C for -100 ~ 0°C, ±4°C for -200 ~ -100°C, no regulation for 400°C or less of B Thermocouple			
Indication Accuracy (Temperature Measuring Resistor)	The bigger one of ±0.3% of specified value +1 digit or ±0.9°C			
Indication Accuracy Maintenance Temperature Range	Ambient Temperature: 23±10°C			
Storage Element	EEPROM			
Power Supply Voltage	AC 100~240V (Allowable Voltage Change Range 85 ~ 264V)			
Power Consumption	10VA (max.)			
Mass	180g or Less		380g or Less	

* For relay contact of OUT1 EV1 - OUT2 EV2, the mechanical life is 5 million times or more, and the electrical life is 100 thousand times or more.
* Refer to **P.1669** for sensor input type and sensor range.

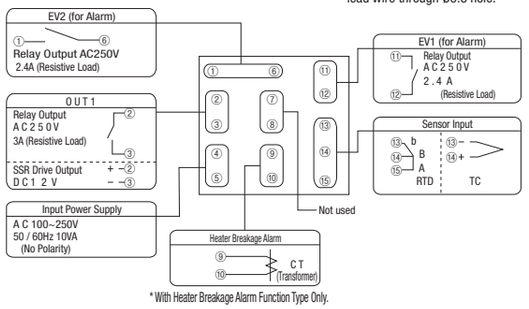
(With Heater Breakage Alarm Function Type only.)

CT Input (Current Transformer)		
	Setting Range	AC1~30A
	Precision	5% (Set Resolution 1A)
	Breakage Detection	ON Time of OUT1: 300mS or More
	Welding Detection	ON Time of OUT1: 300mS or More



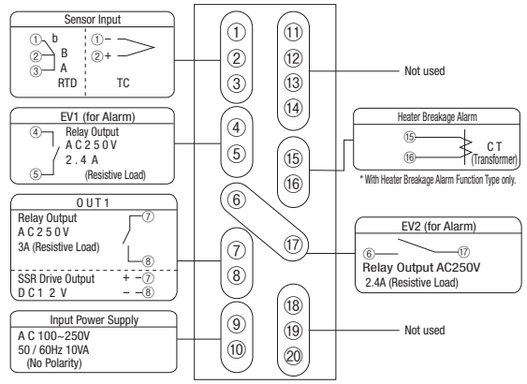
*Use the heater wire breakage alarm function included CT (Current Transformer) by threading the heater lead wire through Ø5.8 hole.

■ Terminal Arrangement for Wire Connection (Size: 48x48)



■ For panel cut dimensions and how to mount, refer to **P.1669**.

■ Terminal Arrangement for Wire Connection (Size: 96x96)

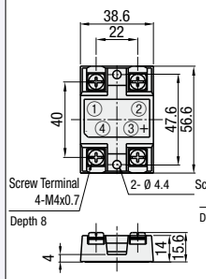


Note that, for some of the types shown here, order might be unable to be received by the MISUMI Indonesia offices.

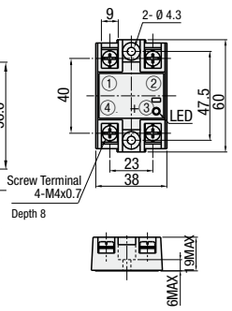
SSR (Solid State Relays)

MSSSR (SSR)

No.10, 20

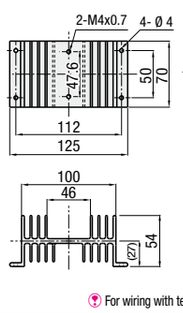


No.45

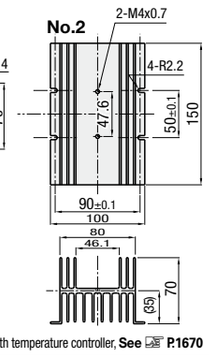


MHS (Heatsinks)

No.1



No.2



For wiring with temperature controller, See P.1670

SSR

Part Number Type	No.	Output Side Rated Load Current	Output Side Rated Voltage	Input Voltage Range (V)	* Max. load when 1 heater is used (reference)	Weight (g)	Applicable Heatsinks	Unit Price Qty. 1 ~ 9	Unit Price 10~20	Volume Discount Rate
MSSSR	10	10A acrms	120/240 V acrms	DC4~32	6A(①10A)	50	MHS1, 2			
	20	20A acrms			7A(①13A②16A)		MHS1, 2			
	45	45A acrms		DC3~30	7A(①24A②36A)	53	MHS1, 2			

*The values of the maximum load current (reference) are those measured when 1 heater is used without a heatsink. In ( ), ① when MHS1 is used; ② when MHS2 is used. No.10 and 20 are for ambient temperature 40°C or less, while No. 45 is for ambient temperature 30°C or less.
*Refer to the following load current characteristics.

For orders larger than indicated quantity, please check with WOS.

Ordering Example: Part Number MSSSR 10

Heatsinks

Part Number Type	No.	Thermal Resistance (°C/W)	Unit Price Qty. 1 ~ 9	Unit Price 10~20	Volume Discount Rate
MHS	1	1.52			
	2	0.85			

For orders larger than indicated quantity, please check with WOS.

Rating

	Item	Unit	MSSSR10	MSSSR20	MSSSR45
Output	Rated Load Voltage	V acrms	120/240		
	Rated Load Current (Resistance Load)	A acrms	10	20	45
	Rated Frequency	Hz	50/60		
	Peak Repeatability Off Voltage	V	AC600		
ON	Maximum Input Voltage	V	DC32		DC30
	Input Current	mA	11 or less (Built-in fixed current circuit)		7.0mA or Less*
Common	Withstand Voltage	V acrms	3k 1 minute interval or more (Input - Output - Grounding)		
	Insulation Resistance	MΩ	DC500 V100 or more (Input - Output - Grounding)		
	Operating Temperature Range	°C	-20~+80		
	Storage Temperature Range	°C	-30~+100		

* Built-in fixed current circuit

Properties

	Item	Unit	MSSSR10	MSSSR20	MSSSR45
Output	Operating Load Voltage Range	V acrms	50~264		85~264
	Leakage Current at Open Circuit	mA acrms	3 or less**		12 or Less***
	Contact Voltage Drop	V acrms	1.5 or Less (Operating Temperature Range=25°C)		
	Minimum Load Current	mA acrms	50		400
ON	Input Voltage Range	V	DC4~32		DC3.0~30
	Pick Up Voltage	V	DC4.0 or less		DC3.0 or Less
	Drop Out Voltage	V	DC1.0 or less		DC1.0 or More
Common	Response Speed	-	1/2 cycle +1ms or less		
	Capacitance	pF	150 or less (Input - Output)		

V_O=240V *V_O=200V

DC Input Signal of SSR

1) Connect it correctly without altering the polarity (+, - or terminal number).
2) For input voltage, apply the normal starting voltage.
3) The input power supply (signal) should be direct current. When commutating from AC power, put the smoothing circuit without fail, and reduce the ripple so that each voltage of the ripple may be within the operating voltage range.
4) Note that the noise near the input terminal may cause the malfunction.
5) When input line receives the inducement easily, use shielded wire.

Operating Environment

Because the SSR molding is not completely airtight, long term use in high humidity environment incurs the deterioration of SSR interior or malfunctioning. That will cause troubles from leakage between the charge parts, etc.
Examine the damp-proof measures as the system.

Notes on Heat Sink Use

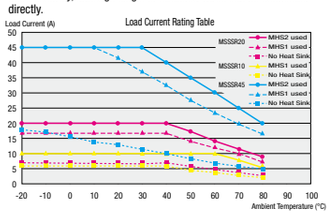
To enhance the heat radiation effect of SSR, deburr and smooth the surface of SSR, then lightly apply silicon compound.
If not applied, the heat will accumulate and SSR may break.
Ex.) Shinetsu Chemicals Ind. Corp. KS609, etc.

Cautions on Installation

When the ambient temperature is high, it is necessary to decrease the load current. Please pay attention to the relation of the mounting place and the load current.
Tighten the mounting screws firmly, so that they should not be loosened from vibration, impact and etc.

Notes on Wiring

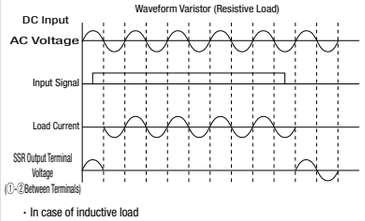
It is recommended to use ring or spade terminals (for M4) to wire more securely, although single or stranded wires can be connected directly.



Cautions on Operation Wave and Use for SSR

• Operation Wave

・In case of resistance load
Although the input voltage is applied near the AC power voltage, the current doesn't flow to the output side load of SSR at once, due to the effect of zero cross circuit.
When the AC power voltage decreases gradually till about zero voltage, the output side enters ON state.
And even when the input signal disappears, SSR is not turned off immediately thereafter. When the output current decreases and comes closer to zero, SSR is turned off through the effect of SSR internal element.
When the load current reaches zero, power supply voltage appears between the terminals ①-② of TRIAC.

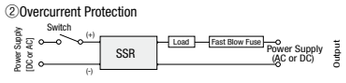


・In case of inductive load
The voltage starts quickly (Magnetic field off voltage increase rate dv/dt is large at the commutation), and it is likely to cause malfunction, when the inductive load of reactance is especially large.

①Overvoltage Protection

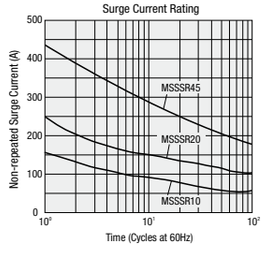
It is likely to malfunction if the noise environment on the power supply side is bad and the big surge voltage is applied to SSR. In such a case, connect varistor as figure shown above.
For varistor voltage, it is recommended to use 200 to 300V for power supply voltage 110V, and 350 to 450V for power supply voltage 220V.

②Overcurrent Protection



For SSR, there is a provided over-current rating. If current over the rated current flows, this may cause permanent breakage of SSR .
Therefore, use of fast fuse is recommended to protect SSR from surge current, when there is a possibility that a load may be short-circuited or abnormal current may flow for some causes.

Surge Current Rating



③Parallel Connection
SSR cannot be used by connected in parallel to increase the current. However, it can be connected in parallel to compensate the trouble of open mode.

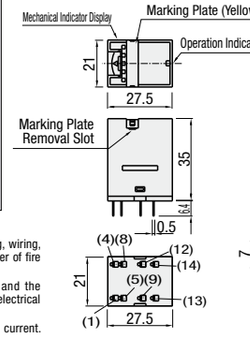
[Important] Malfunction
It is usually in the short mode in many cases when the element of SSR is destroyed by over-voltage or over-current, although two failure modes of the open mode and the short mode may occur.
Do not use it exceeding the maximum rating even just for a moment.
Avoid SSR malfunction by taking the measure such as circuit protection.
It is recommended to use in combination of SSR protection and fail safe (safety measures for malfunction).

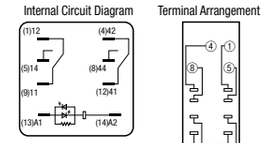
Universal Relays, Terminal Blocks

Soldered Terminals

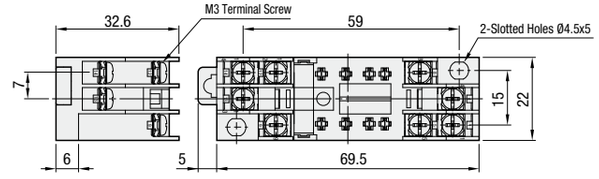
Universal Relays - Soldered Terminals

MURH





Accessory
Socket for Relay 1 pc.
Spring Fitting 2 pcs.



Cautions for Safety

- Shut off the power before attaching, detaching, wiring, maintaining and examining. There may be danger of fire or electrical shock.
- Comply with the rated specification range and the specification. There may be danger of fire or electrical shock.
- Use wires suitable for the applied voltage and current. Tighten the terminal screws using appropriate torque.

Part Number Type	No.	Rated Coil *1 Rated Current (mA)±15% 50Hz	60Hz	Rated Voltage AC (V)	Coil Resistance (Ω) ±10% (at 20°C)	Number of Poles	Contact Rating Allowable Contact Current	Contact Rating Voltage (V)	Allowable Contact Power (Resistance Load)	Load Current with Resistive Load	Unit Price Qty. 1 ~ 9	Volume Discount Rate 10~20
MURH	10	9.2~11.0	7.8~9.0	100~110	3,460	2 Poles	10A	AC250 DC30	AC2500VA DC300W	10A		
	20	4.6~5.5	4.0~4.6	200~220	14,080			AC250 DC30				

* Operating Properties of One Rated Coil (rated values at 20°C): Maximum Applied Voltage: 110%; Minimum Rated Operation: 80% or less; Return Voltage: 30% or more. For orders larger than indicated quantity, please check with WOS.
Note) The rated current value includes the current of operation indicator LED.

Properties

Contact Material	Ag Alloy	Maximum ON/OFF Frequency	Electrical: 1,800 times/h, Mechanical: 18,000 times/h
Contact Resistance *1	50mΩ or Less	Vibration Resistance	Endurance: Frequency 10 ~ 55Hz, Half Wave 0.5mm Malfunction: Frequency 10~55Hz, Half Wave 0.5mm
Minimum Operation Load *2	DC24V, 5mA (Reference Value)	Impact Resistance	Endurance: 1,000m/s², Malfunction: 150m/s²
Response Time *3	20ms or Less	Mechanical Durability	AC: 50 million times or more, DC: 100 million times or more.
Recovery Time *3	20ms or Less	Electrical Durability *3	AC250V: Resistive Load 10A=100,000, 5A=500,000 times.
Power Consumption	0.9-1.2VA(60Hz) 1.1-1.4VA(50Hz)	Operating Ambient Temp. *4	-55 ~ +60°C (No Freezing)
Insulation Resistance	100MΩ or more DC500V mega	Operating Ambient Humidity	5 ~ 85%RH (No Condensation)
Withstand Voltage	AC2500V, 1 min (between the same pole contact circuit, AC1000V, 1 min.)	Mass (approx.)	35g

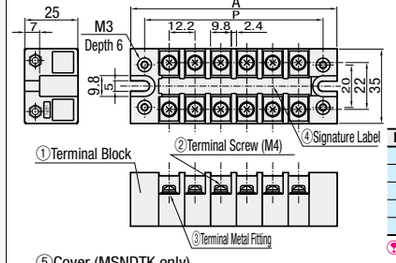
*1. Measurement Condition: DC5V, 1A, depending on the voltage descent method.
*2. M measurement Condition: The value at ON/OFF frequency 120 times/min. Failure modulus P level (Reference)
*3. Measurement Condition: When rated voltage is applied (at 20°C), Bounce is excluded.
*4. When 100% of rated voltage is applied.

Part Number MURH 10

Terminal Blocks

RoHS

MSNDTD MSNDTK (Cover Type)



⑤Cover (MSNDTK only)

Features

- The terminal block is made of special resin (unsaturated polyester resin), which can be used at high temperature.
- Use it when several heater lead wires are connected with the temperature controller.
Although the use in atmosphere with temperature over 80°C causes product label to discolor and the terminal block to be loosened, there is no mechanical problem. Also, use heat resistant wires (more than 200°C) for wiring.
Tighten the terminal screw regularly (approx. once a year).

No.	Name of Parts	Material	Surface Treatment	Standards
①	Terminal Block	Unsaturated Polyester Resin	-	UL94V-0
②	Terminal Screw	Carbon Steel	Zinc Plating (Trivalent Chromate)	-
③	Terminal Metal Fitting	Brass	Nickel Plating	-
④	Signature Label	Fiber (White)	-	-
⑤	Cover	Phenol Plate (Black)	-	-

MSNDTK (Cover Type) is included with 4 pcs. of M3 screws.

Part Number Type	No.	A	P	Terminal Screws	Mass (g) MSNDTD	Mass (g) MSNDTK	MSNDTD Unit Price Qty. 1 ~ 9	MSNDTD Volume Discount Rate 10~20	MSNDTK Unit Price Qty. 1 ~ 9	MSNDTK Volume Discount Rate 10~20
MSNDTD	2	48.5	35.5	4	72	79				
	3	60.5	47.5	6	91	99				
MSNDTK	4	73	60	8	110	119				
	6	97	84	12	148	159				
	8	121.5	108.5	16	187	201				
	10	146	133	20	225	241				

No. indicates number of poles.
For orders larger than indicated quantity, please check with WOS.

Rating and Performance

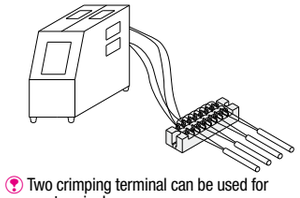
Rated Insulation Voltage	250V	Rated Current	20A	Applicable Wire	5.5mm²
Terminal Screw	M4 (Recommended Tightening Torque: 1.4 ~ 1.8N・m)				
Insulation Resistance	DC500V mega 100MΩ or more			Withstand Voltage	AC2000V, Normal for 1 minute
Operating Temp., Humidity Range	-10~150°C, 45~85%RH (No Freezing or Condensation)				
Conforming Standard	JIS C 2811 Industrial Terminal Block				

Use under atmospheric pressure (at an altitude 2,000m or less).

Ordering Example: Part Number MSNDTD8

Example

One temperature controller can be connected to several heaters.



Two crimping terminal can be used for one terminal.

Temperature Controllers

Instruction manual is available online:
http://fa.misumi.jp/ht/
Refer to a collection of FAQ which compiled frequently asked questions.

Please refer to FAQ on **P.1668**.

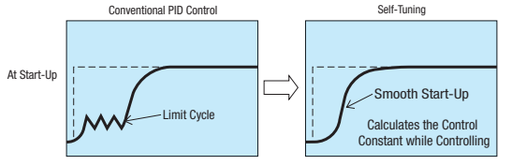
Temperature Controllers - Overview

MISUMI's Temperature Controllers can operate up to 20A in 100/240V on single-phase or up to 30A in 200V on three-phase.
Universal Type, Temperature sensor selectable, is available for a simple and compact line up of three kinds, such as Compact, Dual and High Current type. And a new product "Universal - Compact with Alarming Function" have alarm output terminals.
Specification of alarm output is same as the temperature adjuster (**P.1669**).

■Features

Various types of temperature sensors and various types of input ranges can be set, therefore precise temperature control is possible. Also when the control value fluctuates due to interference, the regulator can tune automatically and converge (stabilize) the fluctuation of control value because it has specific self-tuning function.
Moreover, when thermocouple or temperature measurement resistance burns out, protection circuit may work and prevent over-heating.

• Difference between Conventional PID Control and Self-tuning



■Specification

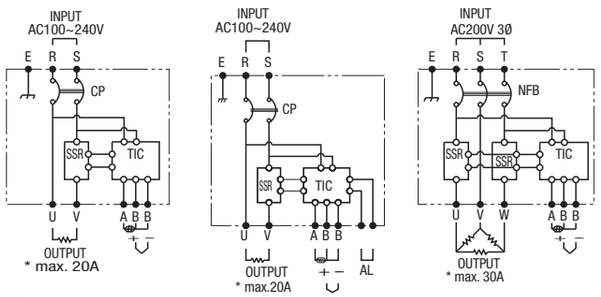
Control Rating: PID Control (with Self-turning Function)

MTCS, MTCRM	AC100V~240V 1Ø	*20A
MTCD	AC100V~240V 1Ø	*20A x 2 Circuits
MTCH	AC200V 3Ø	*30A

* Resistance load without inrush current (Max. Value)

Input Type: Thermocouple (K, J, R, T, N, S, B)
Temperature Measuring Resistor (Pt100Ω, JPt100Ω)
* Switchable depending on the panel setting
* Thermocouple at the time of shipment (K)
Conditions of Operating Temperature: 0 ~ 30°C (No Freezing)
Over Current Cut-off: Breaker Switch

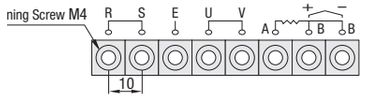
■Circuit (MTCD has two identical circuits)



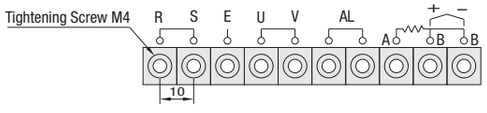
* Maximum current is heat resistance load.

■Connection

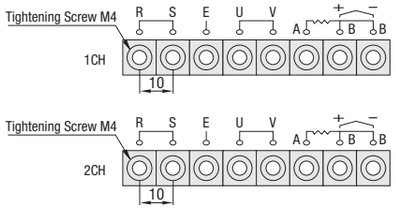
•MTCS (Universal - Compact)



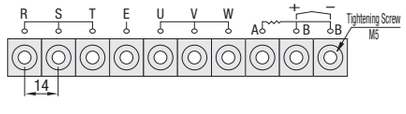
•MTCRM (Universal - Compact with Alarming Function)



•MTCD (Universal - Dual Outputs)

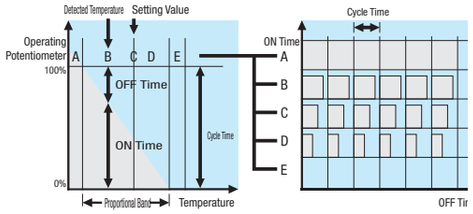


•MTCH (Universal - High Electrical Current)



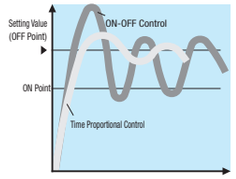
■Control by Solid State Relay (SSR)

This is a control method which is based on the proportional control (time proportional control) in the form of ON-OFF control in order to change the length of ON and OFF times in proportion to the variation against the setting value in the proportional band with central focus on the setting value.



Summary for Proportional Control

This one set of ON and OFF cycle is constant, and is called a Cycle Time. Suppose one cycle time is 10 seconds. If the present value is lower than the Proportional Band, the controller output will remain ON. On the other hand if the present value is higher than the Proportional Band, the controller output will remain OFF.



Comparison of Time Proportional Control and ON-OFF Control

Within the proportional range, the time proportion between ON and OFF changes according to the temperature and in proportion to the variation against the setting value. For example, when the current value is lower than the setting value and ON time is 7 seconds, OFF time can be 3 seconds and ON time can be longer than OFF time.

■Warranty

Warranty Period: One year from the shipping date.
Warranty Condition: Please present the guarantee card included at the time of delivery.
Coverage of Warranty:Problems or damages arising through the normal usage in compliance with the instruction manual included at the time of delivery.

If trouble occurs during the warranty period even though the unit has been used in the proper manner, we will collect and repair/replace the unit.
In the following cases, repairs are fare-paying services. We will collect the product and make an quotation.
①When the damage is caused by a factor other than covered by the warranty and the product is repairable.
②When the damage has occurred beyond the warranty period and the product is repairable.

• Contact for Repairs

Temperature Controllers/Related Products, MISUMI Corporation
TEL:03-5805-7470 FAX:03-5805-7318

• Connection with Sensor

Thermocouple
+ –Red
- –White or Black
Temperature Measuring Resistor
A –Red
B –Black or White
b –White or Black
(For B and b, black or white is selectable.)

• Connection with Alarm Operation

(MTCRM only)
AL–For Alarm

• Connection with Power Supply

Single-phase 100~240V
R, S–Power Connection
E –Grounding Connection
U, V–Heater Connection
Three-phase 200V
R, S, T–Power Connection
E –Grounding Connection
U, V, W–Heater Connection

Precautions for Safety

Although this product is designed and manufactured with safety in mind, safety cannot be guaranteed for everything about it.
For example, when the SSR (load switch) incorporated in the product is damaged, the incidents, i.e. temperature increase, can be caused in spite of being controlled by TIC (temperature controller). In such a case, measure should be taken to provide a safety circuit to cut off primary power of this product when the temperature exceeds a preset level.
The closer the current of the product approaches to the maximum rating level, the higher its temperature becomes. This can affect other equipment or shorten the service life, etc. (Expected service life can be doubled by a temperature drop of 10°C according to Arrhenius' Law.)
Be sure to keep sufficient allowance, considering each rating and safety in mind. Wire connection should be conducted by someone with expertise.
Electrical power plug and cord are not included. Select them according to the capacity of the heater you use.

Safety precautions are particularly required in the following cases.
- **Use under operating conditions not specified in the instruction manual.**
- **Use in nuclear power systems, trains, motor vehicles, combustion and medical equipment.**
- **Use that may seriously affect human life or property and that particularly requires safety considerations.**

■Universal - Compact

Universal - Compact with Alarming Function

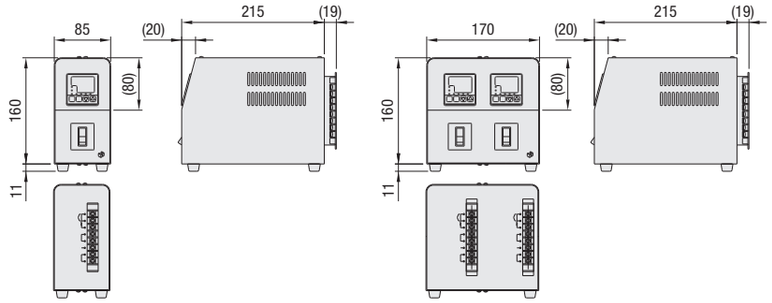
■Universal - Dual Outputs

RoHS

Universal - Compact
MTCS [Single-phase, AC100V~240V, 20A Max.]

Universal - Compact with Alarming Function
MTCRM [Single-phase, AC100V~240V, 20A Max.]

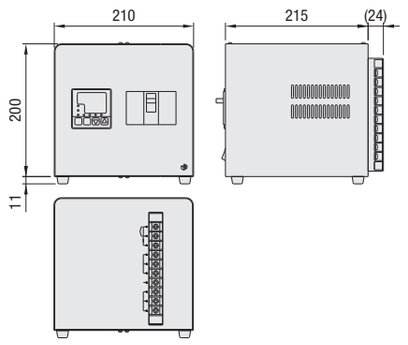
Universal - Dual Outputs
MTCD [Single-phase, AC100V~240V, 20A x2 Max.]



■Universal - High Electrical Current

RoHS

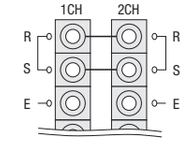
Universal - High Electrical Current
MTCH [Three-phase, AC200V, 30A Max.]



Part Number	Input Type	Unit Price Qty. 1 ~ 4
MTCS	Swivel	
MTCRM		
MTCD		
MTCH		

For orders larger than indicated quantity, please check with WOS.

• Cautions on MTCD (Double Output Type)



For power source of 1CH and 2CH, be sure to wire separately. Avoid using by shorting the terminals of 1CH and 2CH as shown. Otherwise, the power capacity of 1CH and 2CH will be added to the power source and the allowable power source value will be exceeded. As a result, heat generation and ignition may occur.

Be sure to avoid the wiring shown above.

Ordering Example: Part Number **MTCH**

■Type of Sensor

The Universal Type can be used as the sensor for Thermocouples (K, J, R, T, N, S, B) and Pt100Ω / JPt100Ω. * Set for thermocouple K at the time of shipping.

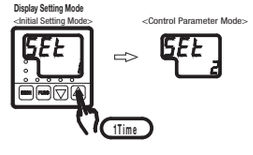
How to Set the Controls

1 Switching of Display

Press "MODE" key for 2 seconds to change displays.

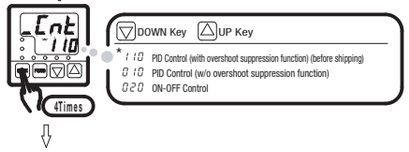
2 Change of Display Setting Mode

When display Setting Mode is shown, press UP key and change from "Initial Setting Mode" **1** to "Control Parameter Mode" **2**.



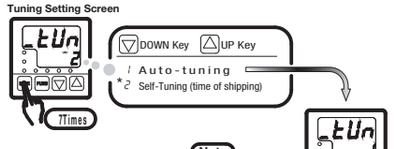
3 PID (Time of Shipping) and ON / OFFSettings

Set to Control Parameter Mode,
press MODE key four times and the control setting screen will be on display.
Use UP/DOWN keys.



4 Setting of Self-tuning (Time of Shipping) and Auto-tuning

Set to Control Parameter Mode,
press MODE key seven times and the tuning setting screen will be on display.
Use UP/DOWN keys.



Note
After setting to "auto-tuning mode", execute the auto tuning to be reflected.
Set at "**1**" and press "FUNC" key once to start.
* Self-tuning is not necessary.

■Other Display