TS4-Y 1 Segment Displays PID Control Temperature Controller An Instruction Manual

Thank you very much for purchasing Nietz products。

Please be sure to familiarize yourself with the contents of the user manual and product manual before use。

For your safety, please be sure to follow the precautions in the safety precautions。

Please be sure to follow the instructions, product manuals, Nietz website, and other precautions。

Please keep it safe for easy retrieval。

The specifications and external dimensions recorded in this manual may change or be discontinued due to product improvements without prior notice.

Please confirm the latest information on the Nietz website.

Safety Precautions

- **The safety precautions are for the safe and correct use of this product to prevent dangerous accidents. Please follow the following content.**
- **Accidents or dangers may occur in special circumstances.**

Warning: Violation of this item may result in serious injury or death

01. When using machines that have a significant impact on people and property (such as nuclear control, medical equipment, ships, vehicles, railways, aviation, flammable devices, disaster prevention/anti-theft devices, etc.), please be sure to install dual safety protection devices。
Otherwise, it may cause personal injury, property damage and fire.

02.Otherwise, it may cause personal injury, property damage, and fire.

Do not use in environments with flammable, explosive, corrosive gases, humidity, direct sunlight, thermal radiation, vibration, impact, or salt.
Otherwise, there is a risk of explosion or fire。

03. Please install and use it on the panel.
Otherwise, there is a risk of fire and electric shock.

04. Do not perform wiring or maintenance operations while powered on。
Otherwise, there is a risk of fire and electric shock.

05. When wiring, please confirm the wiring diagram before connecting.
Otherwise, there is a risk of fire.

06. Please do not modify the product arbitrarily.
Otherwise, there is a risk of fire and electric shock.

Please note that violating this rule may result in minor injury or product damage.

- 01. When connecting the power input terminal and the relay output terminal, use AWG 20 (0.50 mm2) or higher cables, and keep the torque of the screw at 0.74 ~ 0.90 N·m.
- For sensor input and communication connections, if there is no dedicated wire, the torque of the screw with AWG 28 ~ 16 or above is maintained at 0.74 ~ 0.90 N·m.
- Otherwise, fire or product misoperation may occur due to poor contact.
- 02. Please use within the rated specification range.
- Otherwise there is a risk of fire and product failure.
- 03. Do not use water or organic solvents when cleaning. Wipe with a dry towel.
- Otherwise, there is a risk of fire and electric shock.
- 04. Do not allow metal debris, dust, cable residue and other foreign objects into the product.

Precautions For Use

- Please follow the instructions in the precautions when using. Otherwise, unforeseen accidents may occur.
- When connecting the temperature sensor, please confirm the polarity of the terminal before connecting it correctly.
- Please connect the RTD temperature sensor in a 3-wire configuration and use wires of the same thickness and length. When extending the wires of the thermocouple (TC) temperature sensor, please use the specified compensating wire.
- To eliminate inductive interference, please separate the wiring of this product from the high-voltage and power lines. When installing power and input lines at close range, please install a filter at the power end and shield the signal line. Do not use near machines with strong magnetic fields and high-frequency interference.
- Switches or circuit breakers used for powering on and off products should be installed nearby for easy operation by operators.
- Do not use for purposes other than temperature controllers (voltmeter, ammeter, etc.)
- When changing the input sensor, please power off the product before making the change. Change the associated parameters after changing the input sensor.
  The power supply voltage of 24 VAC, 24-48 VDC models must be insulated and limited by voltage and current, or powered by Class 2, SELV power supply equipment.
- Please reserve a certain amount of space around the product to facilitate heat dissipation. To measure accurate temperature, preheat for 20 minutes after powering on before use.
- Within 2 seconds after turning on the power, make the voltage reach the rated voltage.
- Do not connect unused terminals.
- This product can be used in the following environments.

- Indoor (meeting the surrounding environmental conditions specified in the specifications)
- Below an altitude of 2000 meters
- Pollution Degree 2
- Installation Category II

Type composition

For reference only, the actual product does not support all combinations.
Please confirm the supported models on the Nietz official website.

TS4-Y

❶ Display digits

4: 4 digit

❸ Supply Voltage

4: 100~240 VAC~50/60 Hz

❷ ALARM IN

N: not have
1: Alarm 1
2: Alarm 2

❹ Control Output

N: Display dedicated
R: Relay+SSR driver

Product composition

- Product (+ stand)
- Instruction manual

[TS4-Y] Product, bracket × 2

Specification

Series Name		TS4-Y
Supply Voltage		100 - 240 VAC 50/60 Hz
Allowable Voltage Variation Range		90~110% of the power supply voltage
Power Consumption		AC: ≤ 5 VA
Sampling Period		100 ms
Enter Specifications		Refer to "Input Specifications and Scope of Use"
Control Output	Relay	250 VAC~3 A, 30 VDC⎓3 A, 1a
	SSR	12 VDC⎓ ±2 V, ≤ 20 mA
ALARM IN		250 VAC~1 A 1a
Display Mode		7-segment (red, green, yellow), LED mode
Control Mode	Heating And Cooling	ON/OFF, P, PI, PD, PID
Lag		1 ~ 100 (0.1 ~ 50.0) ℃/℉
Proportional Bandwidth (P)		0.1 ~ 999.9 ℃/℉
Integral Time (I)		0 ~ 9,999 sec
Derivative Time (D)		0 ~ 9,999 sec
Control Cycle (T)		0.5 ~ 120.0 sec
Manual Reset Value		0.0 ~ 100.0%
Relay lifespan	Machinery	OUT1/2,AL1/2:≥5 million times
	Electrical	OUT1/2: ≥ 200000 times (resistive load: 250 VAC~3A) AL1/2: ≥ 300000 times (resistive load: 250 VAC~1A)
Withstanding Voltage		Between the charging unit and the casing: 1,000 VAC 50/60 Hz 1min
Vibration		5~55 Hz amplitude 0.75 mm X, Y, Z direction 2 hours

Insulation Impedance	≥100MΩ(500 VDC—megger)
Anti-interference	Square wave interference generated by interference simulator (pulse width 1 μ s) ± 2kV R-phase, S-phase
Power Outage Compensation	≈ 10 years (non-volatile semiconductor storage method)
Using Ambient Temperature	-10~50 ℃, during storage: -20~60 ℃ (not frozen, not condensed)
Utilize The Surrounding Humidity	35-85% RH, during storage: 35-85% RH (not frozen, not condensed)
Insulation Type	Symbol: Return, double insulation or reinforced insulation (measure the withstand voltage between the input terminal and the power terminal: 2kV)

Enter Specifications And Usage Scope

When setting with one decimal place, the range of some parameters will be limited.

Enter Specifications		**Decimal Point**	**Display**	**Temperature Range (℃)**	**Temperature Range (℉)**
Thermocouple	K(CA)	1	KCA	-50 ~ 1,200	-58 ~ 2,192
	J(IC)	1	JIC	-30 ~ 500	-22 ~ 932
	L(IC)	1	LIC	-40 ~ 800	-40 ~ 1,472
Thermal Resistance (RTD)	Cu50 Ω	1	CUs.H	-50~200	-58 ~ 392
		0.1	CUs.L	-50.0~200.0	-58.0 ~ 392.0
	DPT100 Ω	1	DPt.H	-100~400	-148 ~ 752
		0.1	DPt.L	-100.0~400.0	-148.0 ~ 752.0

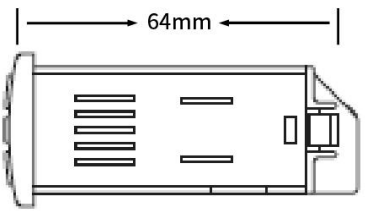
■ Display Accuracy

Enter Specifications	**Usage Temperature**	**Display Progress**
(Thermocouple) (RTD)	Normal temperature range (23℃ ±5 ℃)	(PV±0.5%or±1℃ whichever is larger) ±1-digit • Thermocouple L, Thermal Resistance Cu50 Ω: (PV±0.5%or±2℃, whichever is larger) ±1-digit
	Outside the normal temperature range	(PV±0.5%or±2℃ whichever is larger) ±1-digit • Thermocouple L, Thermal Resistance Cu50 Ω: (PV±0.5%or±3℃ whichever is larger) ±1-digit

• TC4SP ± 1 ℃ on accuracy benchmark

• When the input specification is set to 'decimal point 0.1' for display, the accuracy reference is ± 1 ℃

Name of each part



1. Temperature display unit (red)

Operation mode: Display PV (current value) • Setting mode: Display parameter name, set value

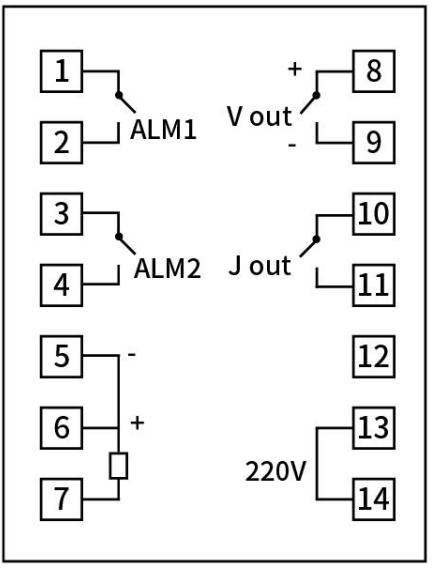
2. Pilot Lamp			3. Input Key	
Display	Name	Content	Display	NAME
▲ ■ ▼	Deviation	Based on SV (set value), display the deviation from PV (current value) ▲: Deviation Exceeding ±2℃, light on ■: Within a deviation of±2℃, light on ▼: Deviation less than 2℃, light on During self-tuning execution, all flashing occurs with a 1-second cycle	[SET]	function
			[＜], [V], [Λ]	Set value operation key
SV	Set Value	When SV is displayed in the temperature display section, the light is on		
℃, ℉	Temperature Unit	The set temperature unit light is on (parameter)		
AL1/2	Alarm Output	When the corresponding alarm output is ON, the light is on		
OUT	Control Output	When the control output is turned on, the light will turn on •Cycle/Phase Control: When the operating amount exceeds 3.0%,the light will turn on (only applicable to AC power type)		

Report Errors

Display	Content	Processing Method
OPEN	Flashing when the temperature sensor is disconnected or not connected	Confirm the status of the temperature sensor
HHHH	Flashing when PV is greater than input range 01)	Once PV returns to the input range, it can be restored
LLLL	Flashing when PV is less than the input range 01)	

01) When an HHHH/LLLL error occurs, the control output can be recognized as the maximum or minimum input based on the control method. Please note。.

Wiring diagram



Mode Setting

RUN	[SET],[＜],[V], [∧]	→	SV Setting	Number of moving digits：[＜] Change value：[V], [∧] save：[SET]	→	RUN
	[SET] 2 秒	→	Parameter group 1	[SET] More than 3 seconds	→	
	[SET] 4 秒	→	Parameter group 2	[SET] More than 3 seconds	→	
	[＜]+[V]+[＞] 5 秒以上	→	Parameter initialization	Automatic	→	
	[＜]，[V]，[＞]	→	Number input key	Automatic	→	

Parameter Setting

Some parameters may be activated or deactivated depending on the model or other parameter settings.

Please refer to the various instructions.

The range in parentheses is the setting range when the input specification setting value is set to one decimal place.

- When there is no key input for more than 30 seconds in each parameter, return to the running mode.
- Pressing the [MODE] key within 1 second after returning to run mode in the parameter group will enter the parameter group before returning.
- [SET] key: After saving the current parameter setting value, move to the next parameter.
- [<] key: Move column when changing setting value
- [V], [∧] key: Select parameter/set value change
- Recommended parameter setting sequence: Parameter group 2 → Parameter group 1 → SV setting mode

Restore factory Settings: press [＜]，[V]，[∧] three keys at the same time, hold down for 5 seconds, the display No, then press [∧] key, the display Yes, finally press the SET key to return.

■Parameter group 1

Only displayed in control output type.

Parameter	Display	Initial Value	Setting Range	Display Conditions
1-1 AL1 alarm temperature	AL1	1250	When setting the deviation alarm: - F.S.~F.S. ℃/℉ When setting the absolute value alarm: within the operating temperature range of the temperature sensor	
1-2 AL2 alarm temperature	AL2	1250	[2 alarm output types] Same as the alarm temperature of 1-1 AL1	2-12/14 AL1/2 Alarm action: AM1~AM6
1-3 Self-tune	AT	OFF	OFF: stop, ON: execute	2-8 Control mode: PID
1-4 Proportional bandwidth	P	0 1 0.0	0.1~999.9 ℃/℉	
1-5 Integral Time	I	0 0 0 0	0(OFF)~9999 sec	
1-6 Derivative Time	D	0 0 0 0	0(OFF)~9999 sec	
1-7 Manual Reset	REST	0 5 0.0	0.0~100.0%	2-8 Control mode: PID&1-5 Integration time: 0
1-8 Lag	HYS	0 0 2	1~100(0.1~50.0) ℃/℉	2-8 Control mode: ONOF

■Parameter group 2

Only parameters 2-1 to 4 and 2-19 are active in the dedicated display type.

Parameter	Display	Initial Value	Setting Range	Display Conditions
2-1 Input specification 01)	IN-T	KCA	Refer to 'Input Specifications and Scope of Use'	-
2-2 Temperature unit 01)	UNIT	℃	℃/℉	-
2-3 Input correction	IN-B	0 0 0 0	-999~999(-199.9~999.9) ℃/℉	-
2-4 Input digital filtering	MAvF	0 0 0. 1	0.1~120.0 sec	-
2-5 SV lower limit value 02)	L-SV	-0 5 0	2-1 Input specifications: within the scope of use, L-SV≤H-SV - 1 -digit H-SV≥L-SV +1 -digit	-
2-6 SV upper limit value 02)	H-SV	1 2 0 0		-

2-7 Control output mode	O-FT	HEAT	HEAT,COOL	-
2-8 Control method 03)	C-MD	PID	PID,ONOF:ON/OFF	-
2-9 Control output	OUT	RLY	RLY: Relay,SSR	-
2-10 Control cycle	T	0 2 0.0	0.5~120.0 sec	2-9 Control output: RLY
		0 2 0.0		2-9 Control output: SSR
2-11 AL1 alarm action 04)	AL-1	AM1.A □□□.■	□□□ AM:0 Not used AM:1 Deviation upper limit alarm AM:2 Deviation lower limit alarm AM:3 Deviation upper/lower limit alarm AM:4 Deviation upper/lower limit reverse alarm AM:5 Absolute value upper limit alarm AM:6 Absolute value lower limit alarm SBA: Sensor disconnection alarm LBA: Circuit disconnection alarm	-
2-12 AL1 alarm option			■ A: General alarm B: Alarm hold C: Waiting for alarm 1 D: Waiting for alarm to hold 1 E: Waiting for alarm 2 F: Waiting for alarm to hold 2 •Enter option setting mode: When 2-1AL1 alarm action is triggered, press the [<] key	-
2-13 AL2 alarm action 04)	AL-2	AM2.A	[2 alarm output types] Same as 2-12/13AL1 alarm action/option	-
2-14 AL2 alarm option				
2-15 Alarm output lag	AHYS	0 0 0 1	1~100(0.1~50.0)℃/℉	2-11/13 AL1/2 alarm action:AM1~6
2-16 LBA monitoring time	LBA.T	0 0 0 0	0 (OFF)~9999 seconds or automatic setting (self-tuning)	2-11/13 alarm action：LBA
2-17 Number input key	DI-K	STOP	STOP: Control output to stop,AL.RE: Alarm output release,AT*: Self tuning execution,OFF	*2-8 Control mode:PID
2-18 Sensor error operation quantity	ErMV	0 0 0.0	0.0：OFF,100.0:ON	2-8 Control mode：ONOF
			0.0~100.0%	2-8 Control mode：PID
2-19 Lock key setting	LOC	OFF	OFF: Unlock key release LOC1: Lock parameter group 2 LOC2: Lock parameter group 1/2 LOC3: Lock parameter group 1/2, SV setting	-
			[Display specific type] OF`F: Unlock key release LOC1: Lock parameter group 2	

01) When changing the set value, the following parameters will be initialized.
- Parameter group 1: AL1/2 alarm temperature
- Parameter group 2: Input correction, SV upper/lower limit values, alarm output lag, LBA monitoring time, LBA detection width
- SV setting mode: SV

02) When changing the set value, if SV is less than the lower limit or greater than the upper limit of the set temperature, SV will automatically change to its upper and lower limit set values。
When changing the input specification of 2-1, the previous set values will be initialized.

03) When changing from PID to ONOF, the relevant parameter settings will be changed. The 2-17 numeric input key is OFF, and the 2-20 sensor will report an error
Operation amount: 0.0 (when the set value is less than 100.0)

04) When changing the set value, the alarm temperature set values of 1-1/2 AL1 and AL2 will be initialized.