LCD Temperature/Humidity Controllers

TH4M Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
The specifications, dimensions, etc are subject to change without notice for product improvement Some models may be discontinued without notice.

Features

- Simultaneous control of temperature and humidity
- LCD display with easy-to-read white and blue characters
- Input correction of temperature and humidity
- Output delay time setting
- Deviation high/low-limit alarm output
- Dedicated temperature/humidity sensor THD-RM (accessory)

Safety Considerations

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

⚠ Warning Failure to follow instructions may result in serious injury or death

01. **Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.(e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
    Failure to follow this instruction may result in personal injury, economic loss or fire.
02. **Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.**
    Failure to follow this instruction may result in explosion or fire.
03. **Install on a device panel to use.**
    Failure to follow this instruction may result in fire or electric shock.
04. **Do not connect, repair, or inspect the unit while connected to a power source.**
    Failure to follow this instruction may result in fire or electric shock.
05. **Check 'Connections' before wiring.**
    Failure to follow this instruction may result in fire.
06. **Do not disassemble or modify the unit.**
    Failure to follow this instruction may result in fire or electric shock.

⚠ Caution Failure to follow instructions may result in injury or product damage

01. **When connecting the power input and relay output, use AWG 20 (0.50 mm^2) cable or over, and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m.**
    When connecting the sensor input and communication cable without dedicated cable, use AWG 28 to 16 cable and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m.
    Failure to follow this instruction may result in fire or malfunction due to contact failure.
02. **Use the unit within the rated specifications.**
    Failure to follow this instruction may result in fire or product damage
03. **Use a dry cloth to clean the unit, and do not use water or organic solvent.**
    Failure to follow this instruction may result in fire or electric shock.
04. **Keep the product away from metal chip, dust, and wire residue which flow into the unit.**
    Failure to follow this instruction may result in fire or product damage.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- Check the polarity of the terminals before wiring the temperature/humidity sensor. Use the cables in same thickness and length. Use the designated compensation wire for extending wire.
- Keep away from high voltage lines or power lines to prevent inductive noise. In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line. Do not use near the equipment which generates strong magnetic force or high frequency noise.
- Do not apply excessive power when connecting or disconnecting the connectors of the product.

CE

- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature/humidity controller.
- When changing the input sensor, turn off the power first before changing. After changing the input sensor, modify the value of the corresponding parameter.
- Make a required space around the unit for radiation of heat. For accurate temperature measurement, warm up the unit over 20 min after turning on the power.
- Make sure that power supply voltage reaches to the rated voltage within 2 sec after supplying power.
- Do not wire to terminals which are not used.
- This unit may be used in the following environments.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude Max. 2,000 m
  - Pollution degree 2
  - Installation category II

Ordering Information

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

TH 4 ❶ - ❷ ❸ ❹

❶ Size
M: DIN W 72 × H 72 mm

❷ Option I/O
2: Alarm 1/2 output

❸ Power supply
4: 100 - 240 VAC

❹ Control output
R: Relay 2-stage

Product Components

- Product
- Bracket
- Instruction manual
- Temperature/Humidity sensor THD-RM

Sold Separately

- Terminal protection cover: RMA Cover

Unit Descriptions

1. Temperature display part (White)
- Run mode: displays temperature PV (Present value)
- Setting mode: displays parameter name

2. Humidity display part (Blue)
- Run mode: displays humidity SV (Setting value)
- Setting mode: displays parameter setting value

3. Input key

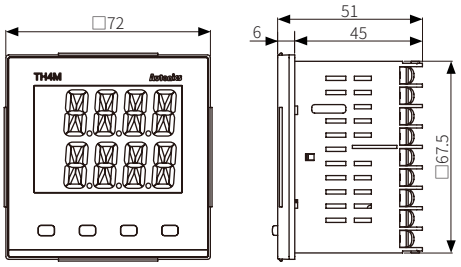
Display	Name
[MODE]	Mode key
[◀], [▼], [▲]	Setting value control key

4. Indicator

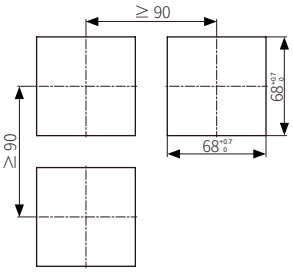
Display	Name	Description
LOCK	Lock	Turns ON when lock function is activated (parameter)
TEMP	Temperature control	Turns ON when temperature control is ON
HUMI	Humidity control	Turns ON when humidity control is ON
OUT1/2	Control output	Turns ON when the control output is ON
AL1/2	Alarm output	Turns ON when the alarm output is ON

Dimensions

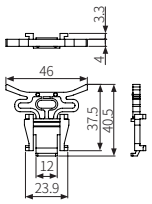
- Unit: mm, For the detailed drawings, follow the Autonics website.



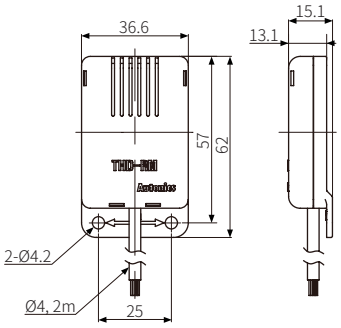
■ Panel cut-out



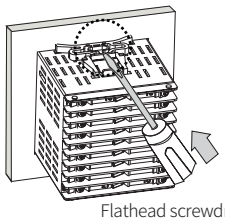
■ Bracket



■ Temperature/Humidity sensor



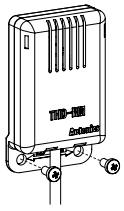
Installation Method



Flathead screwdriver

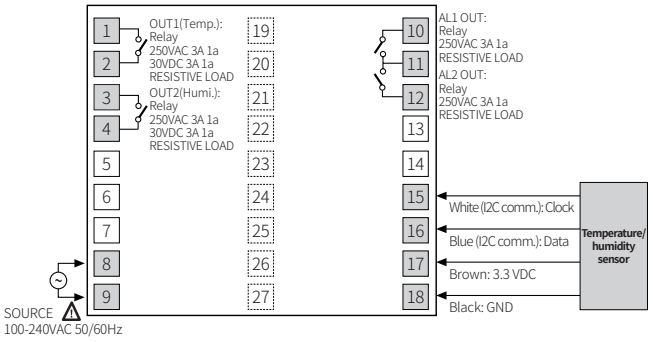
Insert the unit into a panel, fasten the bracket by pushing with tools with a flathead screwdriver.

■ Temperature/Humidity sensor



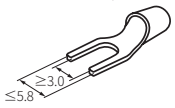
- Mounts sensor with M2 bolt and tighten screws by torque from 0.5 to 0.9 N.m.
- Do not impact on the unit with hard objects and do not bend the cable part too much. It may cause damage.

Connections

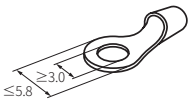


Crimp Terminal Specifications

• Unit: mm, Use the crimp terminal of follow shape.



Fork crimp terminal



Round crimp terminal

Specifications

Model		TH4M-24R
Power supply		100 - 240 VAC⁓ 50/60 Hz ±10%
Power consumption		≤ 8 VA
Sampling period		1 sec
Display accuracy	Temperature	• At room temperature (25 °C ±5 °C): ≤ ±1.0 °C • Out of room temperature range: ≤ ±2.0 °C
	Humidity	• At room temperature (25 °C ±5 °C): ≤ ±3.0%RH (20 to 90%RH), ≤ ±5.0%RH (below 20%RH, over 90%RH) • Out of room temperature: ≤ ±5.0%RH (all range)
Display range	Temperature	-20.0 to 60.0 °C
	Humidity	10.0 to 100.0%RH
Using range	Temperature	-20.0 to 60.0 °C
	Humidity	10.0 to 100.0%RH
Control output 01)	Temperature (OUT1)	Relay: 250 VAC⁓ 3 A, 30 VDC⎓ 3 A, 1a
	Humidity (OUT2)	Relay: 250 VAC⁓ 3 A, 30 VDC⎓ 3 A, 1a
Alarm output	Relay	AL1/2: 250 VAC⁓ 3 A, 1a
Display type 02)		11-Segment (temperature: white, humidity: blue), other display (yellow) LCD type
Control type		ON/OFF control
Relay life cycle	Mechanical	≥ 5,000,000 operations
	Electrical	≥ 200,000 operations (resistance load: 250 VAC⁓ 3 A)
Dielectric strength		Between the charging part and the case : 3,000 VAC⁓ 50/60 Hz for 1 min
Vibration		0.75 mm amplitude at frequency 5 to 55Hz in each X, Y, Z direction for 2 hours
Insulation resistance		≥ 100 MΩ (500 VDC⎓ megger)
Noise immunity		±2 kV square shaped noise (pulse width 1 μs) by noise simulator R-phase, S-phase
Memory retention		≈ 10 years (non-volatile semiconductor memory type)
Ambient temperature		-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)
Ambient humidity		35 to 85%RH, storage: 35 to 85%RH (no freezing or condensation)
Insulation type		Double or reinforced insulation (mark: ⧈, dielectric strength between primary circuit and secondary circuit: 3 kV)
Approval		CE
Unit weight		≈ 144 g

01) Connect to a load using the same power supply. Connecting to a load from a different power supply may cause safety issues.

02) When using the unit at low temperature (below 0°C), display cycle is slow.

■ Temperature/Humidity sensor

Model		THD-RM
Power supply		3.3 VDC⎓ ±2%
Power consumption		≤ 1.3mA
Response time		15 sec
Sensing accuracy	Temperature	• At room temperature (25 °C ±5 °C): ≤ ±1.0 °C • Out of room temperature: ≤ ±2.0 °C
	Humidity	• At room temperature (25 °C ±5 °C): ≤ ±3.0%RH (20 to 90%RH), ≤ ±5.0%RH (below 20%RH, over 90%RH) • Out of room temperature: ≤ ±5.0%RH (all range)
Sensing range	Temperature	-20.0 to 60.0 °C
	Humidity	10.0 to 100.0%RH
Communication type		I2C communication output
Dielectric strength		Between the charging part and the case : 500 VAC⁓ 50/60 Hz for 1 min
Vibration		0.75 mm amplitude at frequency 5 to 55Hz in each X, Y, Z direction for 2 hours
Ambient temperature		-20 to 60 °C, storage: -20 to 60 °C (no freezing or condensation)
Ambient humidity		0 to 100%RH, storage: 35 to 85%RH (no freezing or condensation)
Cable		Ø4 mm, 4-core , 2 m (tensile strength: 1kgf/s)
Approval		CE
Unit weight		≈ 56 g

Initial Display When Power is ON

When power is supplied, after all display will flash for 1 sec, model name is displayed sequentially. After input sensor type will flash twice, enter into RUN mode.

Display	1. All	2. Model	3. RUN mode
Temperature	8.8.8.8.	tH4M	55.0
Humidity	8.8.8.8.	24R	42.8

Errors

Indicator	Display	Description	Trouble shooting
Temperature	Flashes oPEn	Flashes when input sensor is disconnected or sensor is not connected.	Check input sensor status.
Humidity			
Temperature	Flashes HHHH	Flashes when measured value is higher than input range.	When input is within the rated input range, this display disappears.
Humidity	Fixes maximum value		
Temperature	Flashes LLLL	Flashes when measured value is lower than input range.	
Humidity	Fixes minimum value		

Mode Setting

RUN → [MODE] → **SV setting** 01) (Move digit: [◀] key; Change value: [▲], [▼] key; Save: [MODE] key; Without save: [◀] key over 2 sec or no key input over 30 sec) → RUN

RUN → [MODE] 2 sec → **Parameter group** (Save: [MODE] key over 2 sec; Without save: [◀] key over 2 sec) → RUN

01) When entering SV setting mode, temperature SV setting mode appears. After that, when saving or not saving SV, it enters the sequence of humidity SV setting and RUN mode. In temperature SV setting mode, TEMP indicator lights up, and in humidity SV setting mode, HUMI indicator lights up.

Parameter Setting

- [MODE] key: Move to next item after saving / Return to RUN mode after saving (≥ 2 sec)
  [◀] key: Move digits / Return to RUN mode without saving (≥ 2 sec)
  [▲], [▼] key: Select parameter group / Change setting value
- TEMP indicator is ON in temperature related parameter, and HUMI indicator is ON in humidity related parameter.
- The control is operated during parameter setting.

■ Temperature parameter setting group [TEMP]

Parameter		Display	Default	Setting range
T-1	Control output mode	o-Ft	HEAt	HEAT: Heating, COOL: Cooling
T-2	Hysteresis	HYS	1.0	0.1 to 19.9 °C
T-3	Delay time	dLY.t	0	0 to 600 sec
T-4	Input correction	IN-b	0.0	-10.0 to 10.0 °C
T-5	Sensor error, MV	ER.MV	oFF	OFF, ON
T-6	Temperature SV low limit	L-SV	-20.0	-20.0 to [H-SV] - 0.1 °C
T-7	Temperature SV high limit	H-SV	60.0	[L-SV] + 0.1 to 60.0 °C

■ Humidity parameter setting group [HUMI]

Parameter		Display	Default	Setting range
H-1	Control output mode	o-Ft	HEAt	HEAT: Heating, COOL: Cooling
H-2	Hysteresis	HYS	1.0	0.1 to 19.9 %RH
H-3	Delay time	dLY.t	0	0 to 600 sec
H-4	Input correction	IN-b	0.0	-10.0 to 10.0 %
H-5	Sensor error, MV	ER.MV	oFF	OFF, ON
H-6	Humidity SV low limit	L-SV	10.0	10.0 to [H-SV] - 0.1 %RH
H-7	Humidity SV high limit	H-SV	100.0	[L-SV] + 0.1 to 100.0 %RH

■ Additional parameter setting group [ADD]

Parameter		Display	Default	Setting range
A-1	Input digital filter	MAV.F	1.0	0.1 to 100.0
A-2	Temperature alarm operation 01)	ALMt	ALM0	AM0: Off AM1: Deviation high limit alarm AM2: Deviation low limit alarm AM3: Deviation high, low limit alarm
A-3	Temperature alarm value	ALt	155.0	-155.0 to 155.0 °C
A-4	Humidity alarm operation 01)	ALMH	ALM0	AM0: Off AM1: Deviation high limit alarm AM2: Deviation low limit alarm AM3: Deviation high, low limit alarm
A-5	Humidity alarm value	ALH	90.0	-90.0 to 90.0 %RH
A-6	Lock	LoC	oFF	OFF ON: Lock temperature/humidity parameter setting group 02)
A-7	Parameter reset	INIt	No	NO: No reset YES: Reset all parameters

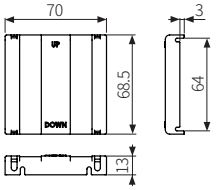
01) Alarm hysteresis = 1.0 °C/%RH (fixed)

02) When entering the parameter group, 'LOCK' indicator is ON.

Sold Separately: Terminal Protection Cover

• Unit: mm, For the detailed drawings, follow the Autonics website.

RMA COVER: DIN W72 × H72



Function: Alarm

■ Operation

• **H**: Alarm output hysteresis

Name	Alarm operation		Description
-	-		No alarm output
Deviation high limit	OFF H ON SV 100°C PV 110°C	OFF H ON PV 90°C SV 100°C	If deviation between PV and SV as high-limit is higher than set value of deviation temperature, the alarm output will be ON.
	High deviation: Set as 10°C	High deviation: Set as -10°C	
Deviation low limit	ON H OFF PV 90°C SV 100°C	ON H OFF SV 100°C PV 110°C	If deviation between PV and SV as low limit is higher than set value of deviation temperature, the alarm output will be ON.
	Low deviation: Set as 10°C	Low deviation: Set as -10°C	
Deviation high, low limit	ON H OFF H ON PV 90°C SV 100°C PV 110°C		If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be ON.
	High, Low deviation: Set as 10°C		

Segment Table

The segments displayed on the product indicate the following meanings. It may differ depending on the product.

7 Segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z

11 Segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z

12 Segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z

16 Segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z