Autonics

TEMPERATURE/HUMIDITY CONTROLLER

THD SERIES

M A N U A L

Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

▣ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;
⚠Warning Serious injury may result if instructions are not followed.
⚠Caution Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠ Caution: Injury or danger may occur under special conditions.

⚠Warning

1. In case of using this unit with machinery(Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.
It may cause fire, human injury or damage to property.
2. Do not connect, check or repair the product when power is ON.
It may cause an electric shock.
3. Do not disassemble and modify this unit. Please contact us if it is required.
It may cause an electric shock or fire.
4. Check input power specification and check power terminal polarity when wiring power cable.
It may cause fire.

⚠Caution

1. This unit shall not be used outdoors.
It may shorten the life cycle of the product or cause electric an shock.
2. Do not touch the temperature/humidity sensor by hands.
3. This unit must be mounted on the wall.(THD-R)
It may cause malfunction.
4. In cleaning the unit, do not use water or organic solvent. And use dry cloth.
It may cause an electric shock or fire.
5. Do not use this unit where there are flammable or explosive gas, humidity, direct ray the sun, radiant heat, vibration, impact etc.
It may cause an explosion or fire.
6. Do not inflow dust or wire dregs into the unit.
It may cause fire or mechanical problem.
7. Do not unfasten the sensor pole except for Autonics engineers.
It may cause a breakdown of sensor.

▣ Ordering information

THD — **D** **D** **1** — **C**

Output	※ **PT**	DPt100Ω resistance value(Temp.)
	※ **PT/C**	DPt100Ω resistance value(Temp.) / DC4-20mA current output (Humidity)
	C	DC4-20mA current output (Temp./Humidity)
	V	1-5VDC voltage output (Temp./Humidity)
	T	RS485 com. output Modbus RTU (Temp./Humidity)
Length of sensor pole	※ **No-mark**	Built in type
	1	100mm
	2	200mm
Display	**No-mark**	Non-display type
	D	Display type
Mounting	**R**	Room type(for indoor)
	D	Duct mounting type
	W	Wall mounting type
Item	**THD**	Temperaure Humidity Double

※It is only for THD-R.

▣ Specifications

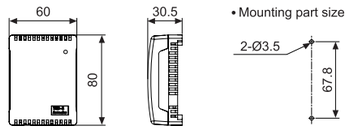
Model		THD-R-PT	THD-R-PT/C	THD-R-C THD-R-V THD-R-T	THD-D□-□ THD-W□-□	THD-DD□-□ THD-WD□-□
Power supply		—	24VDC			
Allowable voltage range		—	90 to 110% of rated voltage			
Power consumption		—	Max. 2.4W			
Input type		Temperature (built-in sensor)	Temperature, Humidity sensor(built-in sensor)			
Display type		Non-display				7Segment LED Display
Display digit		—				Each 3digits for temp./humi.
Character size		—				W6.2×H10.0mm
Measuring range	Temp.	-19.9 to 60.0℃				
	Humidity	—	0.0 to 99.9%RH(THD-R is required to attend for using over 90%RH)			
Accuracy ※1	Temp.	Max. ±0.8℃	±1℃(at room temp.)			
	Humidity	—	±3%RH (30 to 70%RH, at room temp.), ±4%RH (10 to 90%RH)		±2%RH (10 to 90%RH, at room temp.)	
Output※2	Temp.	DPt100Ω resistance value		DC4-20mA,1-5VDC,		
	Humidity	—	DC4-20mA	RS485 communication output(Modbus RTU)		
Sampling period			0.5sec.			
Insulation resistance			Min. 100MΩ(at 500VDC megger)			
Dielectric strength			500VAC 50/60Hz for 1 minute			
Noise resistance			±0.3kV the square wave noise(pulse width: 1μs) by the noise simulator			
Vibration	Mechanical	—	0.75mm amplitude at frequency of 10 to 55Hz(for 1 min.) in each of X, Y, Z directions for 1 hour			
	Malfunction		0.5mm amplitude at frequency of 10 to 55Hz(for 1 min.) in each of X, Y, Z directions for 10 minutes			
Shock	Mechanical		300m/s²(approx. 30G) in X, Y, Z directions for 3 times			
	Malfunction		100m/s²(approx. 10G) in X, Y, Z directions for 3 times			
Protection		IP10			IP65(except sensor part)	
Environment	Ambient temperature	-20 to 60℃, storage: -20 to 60℃				
Cable		Terminal type			Ø4mm, 4-wire, length: 2m	
Approval		CE				
Weight※3		Approx. 98g (approx. 55g)			Approx. 415g (approx. 160g)	

※1: •Room temperature is 23℃±5℃.
•It may cause degree of degradation when this unit is exposed to organic chemicals such as alcohol gas or sulfuric acid.
•It may cause degree of degradation for humidity when using this unit at high temperature/humidity environment for a long time.
•It may cause error of humidity value when this unit is exposed to high humidity environment (over 80%RH) for a long time.
※2: The allowable impedance of current output is max. 600Ω.
※3: The weight is with packaging and the weight in parentheses is only unit weight.
※Environment resistance is rated at no freezing or condensation.

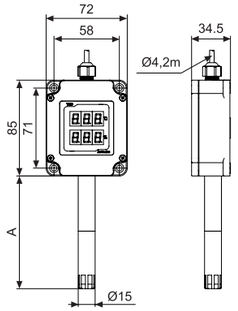
▣ Dimensions

(Unit: mm)

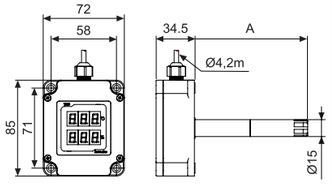
◎ **THD-R**



◎ **THD-W**

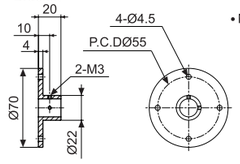


◎ **THD-D**

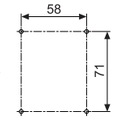


Model	Length of sensor pole(A)
THD-□1-□	100mm
THD-□2-□	200mm

• **Bracket**

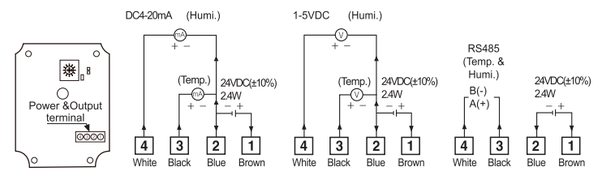


• Mounting part size

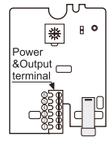


▣ Terminal connection

◎ **THD-D/THD-W**

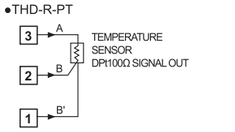


◎ **THD-R**

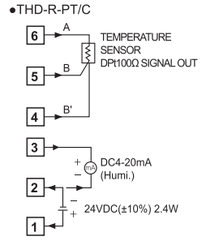


※Check the terminal connection diagram and be sure that when connecting the power.

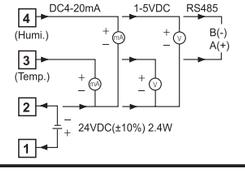
•THD-R-PT



•THD-R-PT/C



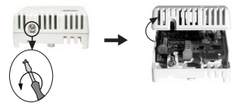
•THD-R-C, V, T



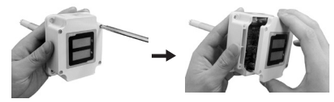
※**The above specifications are subject to change and some models may be discontinued without notice.**

▣ Case detachment

◎ **THD-R**
Unfasten the bolt on the bottom of the product, separate the case from it.



◎ **THD-D/THD-W**
Unfasten 4 bolts on the top of the product, separate the case cover from it.



▣ Current output

It transmits current temperature/humidity to other devices (PC, recorder, etc.) and outputs DC4-20mA. It outputs DC4mA at -19.9℃ of temperature and 0%RH of humidity, DC20mA at 60℃ of temperature and 99.9%RH of humidity. The temperature and humidity output are separated and the resolution is divisible by 1,000.

▣ Voltage output

It transmits current temperature/humidity to other devices (PC, recorder, etc.) and outputs 1-5VDC. It outputs 1VDC at -19.9℃ of temperature and 0%RH of humidity, 5VDC at 60℃ of temperature and 99.9%RH of humidity. The temperature and humidity output are separated and the resolution is divisible by 1,000.

▣ Temperature sensor output(DPt 100Ω output)

It transmits current temperature to other devices (recorder, thermometer, etc.). It outputs 100Ω at 0℃ and 119.40Ω at 50℃. (TCR=3850ppm/℃)

▣ Communication output

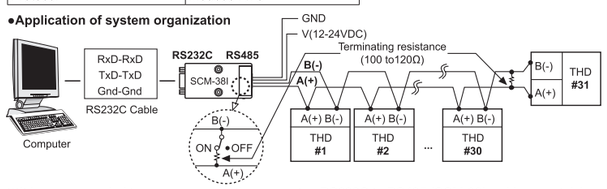
It is output transmit current temperature and humidity to other devices by communication.

●**Interface**

Standard	EIA RS485
Maximum connections	31(address setting: 01 to 31)
Communication method	2-wire half duplex
Synchronous method	Asynchronous
Effective com. distance	Max. 800m
Communication speed	1200 to 115200bps(setting)
Start bit	1bit(fixed)
Stop bit	1bit(fixed)
Parity bit	None(fixed)
Data bit	8bit(fixed)
Protocol	Modbus RTU

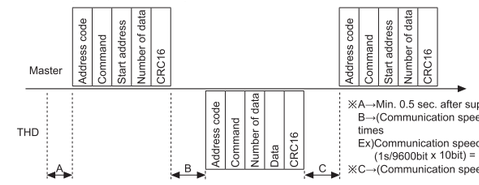
※It is not possible to change parameter related to communication of THD under the communication wth high order system.
※Match the parameter of THD communication to be same as the high order system.
※It is not allowed to set overlapping communication address at the same communication line.
※Please use a proper twist pair for RS485 communication.

●**Application of system organization**



※It is recommended to use communication converter, RS232C to RS485 (SCM-38I, sold separately).

●**Ordering of communication control**
1. The communication method is Modbus RTU.
2. After 0.5sec. being supplied the power into master system, it is able to start communication.
3. The initial communication is started by master system. When a command comes out from the master system, THD will respond.



●**Communication command and block**
The format of query and response.
Query

Address code	Command	Start address	Number of data	CRC16

Calculation range of CRC16

①Address code: This address code is for identifying THD by master system and able to set within range of 01 to 31.
②Command: Read command for input register
③Start address: The start address of input register to read (start address). It is available to select 0000 and 0001 for start address. 16bit data in the address 0000 indicates temperature value, 16bit data in the address 0001 indicates humidity value. (refer to Modbus Mapping table.)
④Number of data: The number of 16bit data from start address (no. of Points). When start address is 0000, it is available to read 2 of 16 bit data, or when start address is 0001, it is available to read 1 of 16 bit data.
⑤CRC16: Checksum for checking the whole frame and it is used for more reliable transmit/receive to check the error between transmitter and receiver.

Response

Address code	Command	Number of data	Temperature data	Humidity data	CRC16

Calculation range of CRC16

①Address code: This address code is for identifying THD by master system and able to set within range of 01 to 31.
②Command: A response for read command of input register
③Number of data: The number of 8 bit data to send from start address (no. of bytes). When start address is 0000, it is available to read 4 of 8 bit data, or when start address is 0001, it is available to read 2 of 8 bit data.
④Temperature data: This is the value of 16bit. To get a current temperature value, divide read value by 100.
Ex)When read data is 0×09B0, decimal value is 2480, the current value is 2480/100=24.80℃.
⑤Humidity data: This is the value of 16bit. To get a current humidity value, divide read value by 100.
Ex)When read data is 0×0B68, decimal value is 2920, the current value is 2920/100=29.20%RH.
⑥CRC16: Checksum for checking the whole frame.

●**Application for communication command**
(Query): Address code(01), Start address(0000), The number of 16bit data to read(2), CRC16(0×71CB)

01	04	00	00	00	02	71	CB
Address code	Command	Start address		Amount of data		CRC16	
		High	Low	High	Low	High	Low

(Response): Address code(01), The number of 8bit data to read(4), Temperature(0×09B0), Humidity(0×0B68), CRC16(0×94DE)

01	04	04	09	B0	0B	68	94	DE
Address code	Reponse command	Number of data	Temperature data		Humidity data		CRC16	
			High	Low	High	Low	High	Low

●**Error processing(Slave → Master)**
1. Not supported command

01	8X	01	XX	XX
Address code	Response command	Exception code	CRC16	

※Set a received the highest bit and send it to response command and exception code 01.
2. The start address of queried data is inconsistent with the transmittable address or the requested number of data is bigger than the transmittable address.

01	84	02	C2	C1
Address code	Response command	Exception code	CRC16	

※Set a received the highest bit and send it to response command and exception code 02.

●**Modbus Mapping Table**

Address	Item	Remark
30001(0000)	Temperature value	Temperature value×0.01
30002(0001)	Humidity value	Humidity value×0.01

●**Setting communication speed**
1. Set SW1 to 0 and supply the power.
2. Operation indicator LED is flashing.
3. Set a communication speed after choosing SW1 within the range 1 to 8, and hold it for 3sec.
4. After setting a communication speed, the LED will be ON. At the moment turn OFF the power.
※Factory default communication speed is 9600bps.
※In order to change the communication speed, please turn off the power and repeat step 1 to 4.

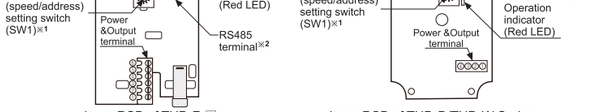
<Setting table for communication speed>

SW1	Communication speed(bps)
1	1200
2	2400
3	4800
4	9600
5	19200
6	38400
7	57600
8	115200

●**Setting communication address**
1. Set RS485 terminal and setting switch(SW1) to the desired address and supply the power.
2. The communication address is changed automatically.
※Factory default communication address is 01. (SW1: 1, RS485 terminal: OPEN)
※In order to change the communication address, please turn off the power and repeat step 1 to 2.

<Setting table for address>

RS485 terminal	SW1	Address	RS485 terminal	SW1	Address	RS485 terminal	SW1	Address
OPEN	1	01	OPEN	D	13	SHORT	9	25
OPEN	2	02	OPEN	E	14	SHORT	A	26
OPEN	3	03	OPEN	F	15	SHORT	B	27
OPEN	4	04	SHORT	0	16	SHORT	C	28
OPEN	5	05	SHORT	1	17	SHORT	D	29
OPEN	6	06	SHORT	2	18	SHORT	E	30
OPEN	7	07	SHORT	3	19	SHORT	F	31
OPEN	8	08	SHORT	4	20			
OPEN	9	09	SHORT	5	21			
OPEN	A	10	SHORT	6	22			
OPEN	B	11	SHORT	7	23			
OPEN	C	12	SHORT	8	24			



<Inner PCB of THD-R-□> <Inner PCB of THD-D/THD-W Series>

※**1:** Only when communication setting, remove the case cover and adjust communication setting switch to set address and communication speed.
※**2:** Short terminal as upper address setting terminal, the lower address setting is available.

▣ Integrated device management program [DAQMaster]

DAQMaster is an integrated device management program for convenient management of parameters and multiple device data monitoring. Visit our website (www.autonics.com) to download user manual and integrated device management program.

▣ Caution for using

1. Read below cautions before using the product.
2. Do not touch the temperature/humidity sensor by hands.
3. When removing a packing box, do not store this unit at the high temperature/humidity environment.
4. Do not use or storage this unit at over the 90%RH for a long time.
If not, it may cause error of humidity value.
5. This unit must be mounted on the wall. (THD-R)
6. Cautions for cleaning
①Use dry towel.
②Do not use acid, chrome acid, solvent but alcohol.
③Turn off the power before cleaning the unit. After 30min. of cleaning, supply the power to the unit.
7. Do not inflow dust or wire dregs into the unit.
8. Check power terminal polarity when wiring power cable.
9. Separate this unit cable from high voltage line, power line to avoid inductive noise.
10. Avoid installing controllers adjacent to high frequency noise generating units including high frequency soldering machine, high frequency sewing machine, and high capacity SCR controllers.
11. The switch or circuit-breaker should be installed near by users.
12. Installation environment
①It shall be used indoor ②Altitude Max. 2,000m
③Pollution Degree 2 ④Installation Category II

※**It may cause malfunction if above instructions are not followed.**

▣ Major products

- Photoelectric sensors
- Fiber optic sensors
- Door sensors
- Door side sensors
- Area sensors
- Proximity sensors
- Pressure sensors
- Rotary encoders
- Connectors/Sockets
- Switching mode power supplies
- Control switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper motors/drivers/motion controllers
- Graphic/Logic panels
- Field network devices
- Laser marking system(Fiber, CO_2, Nd:YAG)
- Laser welding/soldering system
- Temperature controllers
- Temperature/Humidity transducers
- SSR/Power controllers
- Counters
- Timers
- Panel meters
- Tachometer/Pulse(Rate)meters
- Display units
- Sensor controllers

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