

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 "Caution for your safety" to avoid accidents or damages as using it correctly.
- ※The meaning of 'Warning' and 'Caution' is as follows:
 - Warning** In case a serious injury or dead may be occurred.
 - Caution** In case a little injury or a damage of this unit may be occurred.
- ※The meaning of the mark on the product and manual is as follows:
 - ▲ is a caution mark for danger in special condition.

Warning

- Please use it with double safety devices when it is used at the equipments which may cause damages to human life or assets(Ex:Nuclear power control, Medical equipment, Vehicle, Train, Air plane, Combustion apparatus, Entertainment or Safety device etc.)**
It may cause a fire, human injury and damage.
- Do not connect, check or repair the product when power is ON.**
It may give an electric shock.
- Do not disassemble and modify this unit. When it requires, please contact us.**
It may cause an electric shock or fire.
- Please check the polarity before connecting wires.**
It may cause a fire.

Caution

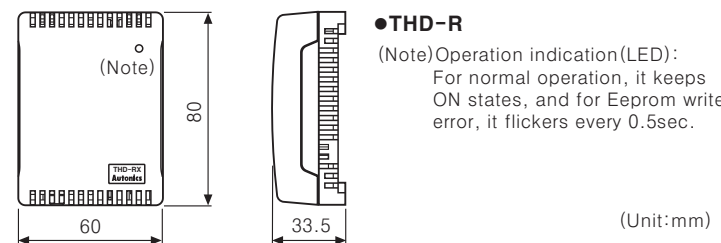
- This unit shall not be used outdoors.**
It may shorten the life cycle of the product.
- Do not touch the temperature/humidity sensor by hands.**
- This unit must be mounted on panel.**
It may cause a malfunction.
- For cleaning the unit, do not use water or an oil-based detergent but a dry towel.**
It may cause an electric shock or fire.
- Do not use this unit at place where there are flammable or explosive gas, humidity, direct ray the sun, radiant heat, vibration, impact etc.**
It may cause explosion or fire.
- Do not inflow dust or wire dregs into inside of this unit.**
It may cause fire or mechanical problem.

Ordering information

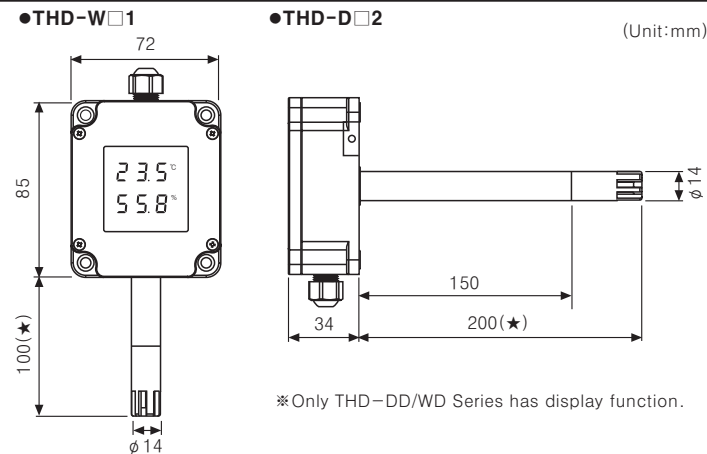
THD	-	R	-	C	C Current output(DC4~20mA)
				V	V Voltage output(1~5VDC)
				T	RS485(MODBUS RTU)
		R			Indoor type
		D1			Duct mounting(※100mm)
		D2			Duct mounting(※200mm)
		DD1			Duct mounting(※100mm)+Display
		DD2			Duct mounting(※200mm)+Display
		W1			Wall mounting(※100mm)
		W2			Wall mounting(※200mm)
		WD1			Wall mounting(※100mm)+Display
		WD2			Wall mounting(※200mm)+Display
		THD			Temperature/Humidity

※ See the "Dimensions" (★)

Dimensions



※The above specifications are changeable without notice anytime.



Specifications

Model	THD-R-C	THD-R-V	THD-R-T	THD-D□-C	THD-D□-V	THD-D□-T	
Power supply	24VDC ±10%						
Power consumption	Max. 2.4W						
Input	Temperature/Humidity sensor(built-in)						
Output	DC4~20mA	1~5VDC	RS485 (MODBUS RTU)	DC4~20mA	1~5VDC	RS485 (MODBUS RTU)	
Display type	—			7Segment LED Display (Temperature:3Digit, Humidity:3Digit)			
Measuring range	Temp. 0.0 ~ 50.0°C	Humidity 0.0 ~ 90.0%RH	Temp. 0.0 ~ 50.0°C	Humidity 0.0 ~ 90.0%RH	Temp. 0.0 ~ 60.0°C	Humidity 0.0 ~ 99.9%RH	
Output accuracy	Temp. Max. ±0.8°C (5~40°C)	Humidity Max. ±3%RH (10~90%RH)	Temp. Max. ±0.5°C (5~40°C)	Humidity Max. ±3%RH (10~90%RH)	Temp. Max. ±0.8°C (5~40°C)	Humidity Max. ±0.5°C (5~40°C)	
Sampling period	Fixed 0.5sec						
Insulation resistance	Min. 100MΩ (500VDC)						
Dielectric strength	500VAC 50/60Hz for 1 minute						
Noise strength	±0.3kV the square wave noise(pulse width:1μs) by the noise simulator						
Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 1hour				Malfunction	0.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 10minutes
Shock	Mechanical	300m/s ² (30G) in X, Y, Z directions for 3 times				Malfunction	100m/s ² (10G) in X, Y, Z directions for 3 times
Ambient temperature	0~50°C(at non-freezing status)		0~60°C(at non-freezing status)				
Storage temperature	-10~60°C(at non-freezing status)		-10~60°C(at non-freezing status)				
Weight	Approx. 55g□			Approx. 160g□			

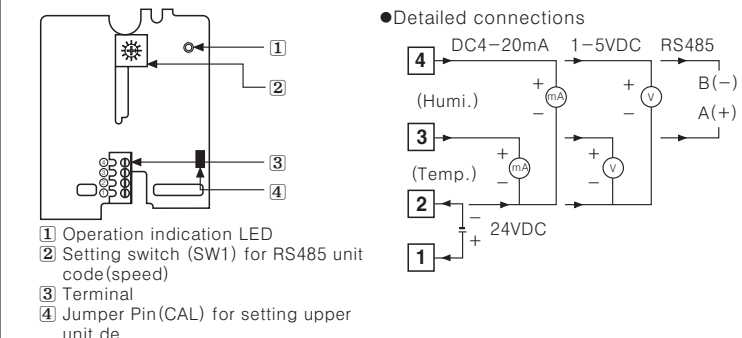
※THD-W series has the same specification with THD-D.

Case detachment

Turn the screw in CCW direction and delete the case smoothly in upper direction.



Terminal connection



Current output (The temperature range for THD-D/W is 0~60°C.)

It transmits current temperature/humidity to other equipments, PC and recorder, and outputs 4~20mADC. It outputs 4mADC at 0°C of temperature and 0% RH of humidity, 20mADC on the 50°C of temperature and 100% RH of humidity.
 ※Separate output for temperature and humidity with 4,000 divisions.

Voltage output (The temperature range for THD-D/W is 0~60°C.)

It transmits current temperature/humidity to other equipments, PC and recorder, and outputs 1~5V DC. It outputs 1VDC on the 0°C of temperature and 0% RH of humidity. And it outputs 5VDC on the 50°C of temperature and 100% RH of humidity. Temperature output and humidity output are divided, and the resolution is 4000 division.

RS485 Communication output

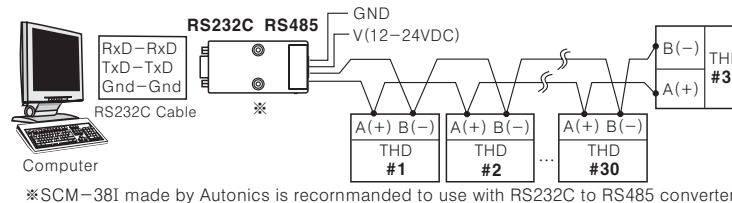
It is used to transmit current temperature and humidity to other equipment.

Interface

Standard	EIA RS485
Maximum connections	31(Address setting : 01~31)
Communication method	2-wire half duplex
Communication type	Asynchronous
Effective communication distance	Max. 800m
Communication speed	1200~115200bps(Setting)
Start bit	1(Fixed)
Stop bit	1(Fixed)
Parity bit	None(Fixed)
Data bit	8bit(Fixed)
Protocol	MODBUS RTU

- ※It is not possible to change parameter related to communication of THD on line with upper systems. During the communication operation between THD and upper system, editing the parameter is unavailable.
- ※Correct the parameter of THD communication to be same as upper system.
- ※It is not allowed to set overlapping communication address at the same communication line.
- ※Please use a proper twist pair for RS485 communication.

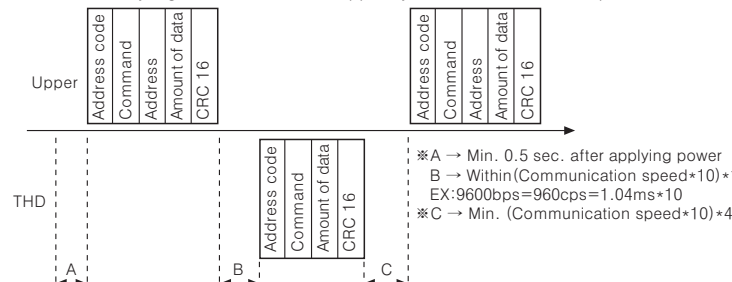
Application of system organization



※SCM-38I made by Autonics is recommended to use with RS232C to RS485 converter.

Communication control ordering

- The communication method is MODBUS TRU(PI-MBUS-300 REV.J).
- After 0.5sec. being supplied the power in to upper system, then able to start communicating.
- Initial communication will be started by upper system.
 When Query signal come out from upper system then THD will response.



Communication command and block

The format of query and response

Unit number	Command	Start address	Amount of data	CRC16
Calculation range of CRC16				

①Unit number :

- This code is upper system can discern THD and able to set within range of 01 to 1F.
- ②Command : Read command for input register
- ③16 Bit data in the address 0000 indicates temperature value : 16 Bit data in the address 0000 indicates humidity value. (See MODBUS Mapping Table)
- ④Amount of data : The number of 16bit data from start address (No. of points)
 Reading one of 16bit data is available when start address is 0000 : reading two of 16 bit data is available when start address is 0001.
- ⑤CRC16 : CRC16 is for more reliable transmit/receive to check the error between transmitter and receiver.

Response

Unit number	Command	Amount of data	Temperature data	Humidity data	CRC16
Calculation range of CRC16					

- Unit number : Distinguish THD and the number is available from 01 to 1F.
- Response command:
 A response for read command of input register(See Modbus Mapping Table)
- Amount of data : The number of 16 bit data on start code. (No. of Points)
 Reading four of 8bit data is available when start address is 0000: reading two of 8 bit data is available when start address is 0001. (See MODBUS Mapping Table)
- Temperature data : To get a current temperature value, divide read value by 100
 Ex)When read data is 0x09B6, decimal value 2486, the current value is 2486/100=24.86°C.
- Humidity data : To get a current humidity value, divide read value by 100
 Ex)When read data is 0x12FE, decimal value 4862, the current value is 2486/100=48.62%Rh.
- CRC16:Checking a whole frame.

Application for communication command

(Query) : Unit number(01), Start code(0000), The number of read data, 16bit(2)
 Check sum(0x71CB)

Unit number	Command	Start code	Amount of data	CRC16
01	04	00 00	00 02	71 CB
		High Low	High Low	High Low

(Response) : Unit number(01), The number of read data, 8bit(4), Temperature(0x09B6) Humidity(0x12FE), CRC Check sum(0x94DE)

Unit number	Reponse command	Amount of data	Temperature data	Humidity data	CRC16
01	04	04 09	B6 12	FE 94	DE
		High Low	High Low	High Low	High Low

Error handling(Slave → Master)

- Non support command

Unit number	Response command	Exception code	CRC16
01	81	01	81 90

 - ※Set a received highest bit and send it to response command and exception code 01.
- A start code of queried data is inconsistent with the transmittable code.

Unit number	Response command	Exception code	CRC16
01	81	02	81 90

 - ※Set a received highest bit and send it to response command and exception code 02.
- Amount of queried data is inconsistent with a transmittable one.

Unit number	Response command	Exception code	X	X
01	84	03	X	X

 - ※Set a received highest bit and send it to response command and exception code 04.
- Abnormal operation for command

Unit number	Response command	Exception code	X	X
01	84	04	X	X

 - ※Set a received highest bit and send it to response command and exception code 04.

MODBUS Mapping Table

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

Setting a communication speed

- Set SW1 to 0 and apply power.
 - Operation indicator LED is flickering.
 - Set a communication speed after choosing SW1 within the range 1~8, and hold it for 3sec.
 - After setting a communication speed, LED will be ON. At the moment turn OFF the power.
 - Factory default is 9600bps.
- ※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 |

Set a 485 communication unit no. (01~31)

- Set SW1 within 1~F and apply power.
 - Unit number is set automatically and it operates with 485 communication mode.
 - Factory default is 01.
- ※Setting table for unit number

CAL contact	SW1	Unit no.	CAL contact	SW1	Unit no.	CAL contact	SW1	Unit no.
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			

Caution for using

- Read below cautions before using the product.
 - Do not touch the sensor module.
 - Fix the product THD-R Series on the wall for using.
 - Cautions for cleaning
 - Use dry towel
 - Do not use acid, chrome acid, solvent but alcohol.
 - Clean after turning off the power. Turn on the power after passing 30 min.
 - Be sure that metal dust and wire-dregs are not flowed in the unit.
 - Connect the wires after checking polarity
 - Please use separated line from high voltage line or power line in order to avoid inductive noise.
 - Keep away from the high frequency instruments. (High frequency welding machine & sewing machine, big capacitive SCR controller)
 - The switch or circuit-breaker should be installed near by users.
 - It shall be used indoor
 - Pollution Degree 2
 - Altitude Max. 2000m
 - Installation Category I
- ※It may cause malfunction if above instructions are not followed.

Main products

- COUNTER
- TIMER
- TEMPERATURE CONTROLLER
- PANEL METER
- TACHO/LINE SPEED/PULSE METER
- DISPLAY UNIT
- PROXIMITY SENSOR
- PHOTOELECTRIC SENSOR
- FIBER OPTIC SENSOR
- PRESSURE SENSOR
- ROTARY ENCODER
- SENSOR CONTROLLER
- POWER CONTROLLER
- STEPPING MOTOR & DRIVER & CONTROLLER
- LASER MARKING SYSTEM(CO₂, Nd:YAG)

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Satisfiable Partner For Factory Automation

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