Modbus Protocol
For THS17-MD

V1.0

Modbus Protocol of THS17-MD

Introduction

This document describes the protocol detail of Modbus for THS17-MD

1.獨立 COM PORT 的 RS485 連接,僅用於連接 THS17-MD 設備，確保線路上的設備都是同一型號。

2.每批最多連接 16 台設備

3.通訊協定以 Baud rate=9600; Parity=None; Data Bits=8; Stop Bits=1

4.在最後一台設備（末端）安裝 120Ω 的終端電阻。確保終端電阻安裝在 A、B 信號線之間，避免信號反射造成的通訊問題

安裝注意事項

供電： 確認每台設備的供電電壓和電流是否符合規格，避免因供電不足導致設備工作異常。

接地： RS485 通訊建議設置公共地線 (GND)，提高抗干擾能力。

測試： 安裝完成後，逐步測試通訊是否正常，特別是在增加新設備時。

Hardware interface

- The interface on the sensor is RS-485.
- Hardware named D+, D-
- Meet the standards TIA/EIA-232-F and TIA/EIA-485-A

RS-485 Address, Baud rate, Data format

- Address: 1~247
- Baud rate: 9600, 19200, 38400, 57600, 115200
- Parity: None, Even, Odd
- Data length: 8 bit
- Stop bit: 1 or 2 bit
- Default Address = 1, Data format= 9600, N81

About Modbus (ref PI–MBUS–300)

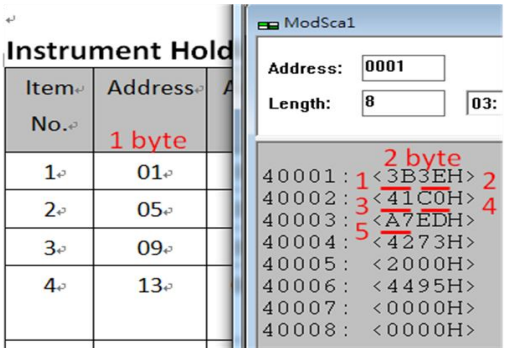
- Support RTU mode
- Broadcast support (Address 0)
- Bit addressable items (i.e. Coils and Discrete inputs) will not be implemented
- Measurement Values are represented in IEEE 754 single-precision 32-bit floating point type http://en.wikipedia.org/wiki/IEEE_754
- Modbus protocol structure:
  - 1st byte: Address (1~247)
  - 2nd byte: Function code (1 byte)
  - 3~Nth bytes: Data bytes
  - N+1th~N+2th byte: CRC (16 bits), LSB first

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Instrument Holding Registers for application engineering (ex: ModScan)

Item No.	Address	Address HEX	Parameter	Point Type	Data Type	Value
1	1	0001H	Temperature	HOLDING REGISTER	Floating Pt.	˚C
2	5	0005H	Relative Humidity	HOLDING REGISTER	Floating Pt.	%
3	33	0021H	Temperature	HOLDING REGISTER	Integer	˚C x10
4	35	0023H	Relative Humidity	HOLDING REGISTER	Integer	% x10
5	1025	0401H	Temperature	HOLDING REGISTER	Floating Pt.	˚C
6	1029	0405H	Relative Humidity	HOLDING REGISTER	Floating Pt.	%
7	1033	0409H	Dew Point Temperature	HOLDING REGISTER	Floating Pt.	˚C
8	1037	040DH	Forst Point Temperature	HOLDING REGISTER	Floating Pt.	˚C
9	1041	0411H	Wet Bulb Temperature	HOLDING REGISTER	Floating Pt.	˚C
10	1045	0415H	Saturation Vapour Pressure	HOLDING REGISTER	Floating Pt.	mbar
11	1049	0419H	Vapour Pressure	HOLDING REGISTER	Floating Pt.	mbar
12	1053	041DH	Mixture Ratio	HOLDING REGISTER	Floating Pt.	g/kg
13	1057	0421H	Absolute Humidity	HOLDING REGISTER	Floating Pt.	g/m^3
14	1061	0425H	Specific Enthalpy	HOLDING REGISTER	Floating Pt.	kJ/kg

- The base address is 1 rather than 0 in ModScan application.
- The register shown on the table is 1 byte whereas the Modscan 2 bytes.
- So the corresponding value against address 5 of the "table" would be address 40003 of the Modscan



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Instrument Holding Registers

Item No.	Address	Address HEX	Parameter	Data Bytes	Data Type	Value
Information						
1	65-80	0041H-0050H	Model Name	16 bytes	ASCII	
2	81-96	0051H-0060H	Serial Number	16 bytes	ASCII	
3	97-112	0061H-0070H	Firmware version	16 bytes	ASCII	
RS-485 Slave Address, Baud rate, Data format						
4	129	0081H	Slave Address	1 bytes	unsigned Integer	1-247
5	131	0083H	Baud rate	1 bytes	unsigned Integer	0: 9600 1: 19200 2: 38400 3: 57600 4: 115200
6	133	0085H	Data type	1 bytes	unsigned Integer	0: N81 1: N82 2: E81 3: E82 4: O81 5: O82

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ASCII format, Item No. 1-3

1st Word		2nd Word		3rd Word		4th Word		5th Word		6th Word		7th Word		8th Word	
Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte	Hi byte	Lo byte

"ABCDEF0123456789" is represented in byte of hexadecimal as

<41><42><43><44><45><46><30><31><32><33><34><35><36><37><38><39>

IEEE754 format, Item No. 7-12

Data Hi Word, Hi Byte	Data Hi Word, Lo Byte	Data Lo Word, Hi Byte	Data Lo Word, Lo Byte
SEEE EEEE	**EMMM MMMM**	**MMMM MMMM**	**MMMM MMMM**

Where

S represents the sign bit where 1 is negative and 0 is positive

E is the two's complement exponent with an offset of 127 i.e. an exponent of zero is represented by 127, an exponent of 1 by 128 etc.

M is the 23-bit normal mantissa. The highest bit is always 1 and, therefore, is not stored.

Using the above format the floating point number 23.83 is represented in byte of hexadecimal as <41><BE><A3><D7>:

Data Hi Word, Hi Byte	Data Hi Word, Lo Byte	Data Lo Word, Hi Byte	Data Lo Word, Lo Byte
0x41	**0xBE**	**0xA3**	**0xD7**

Modbus Protocol of THS17-MD

Communication Examples

Read Temperature Measurement Value

Request the host (PC or PLC) to polling the data of GTH53			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Starting Address Hi	0x00	Byte	1
Starting Address Lo	0x00	Byte	1
No. of registers Hi	0x00	Byte	1
No. of registers Lo	0x02	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*Registers of Temperature are 0x00 ~ 0x03

Response GTH53 response data to the host (PC or PLC)			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Byte Count	04	Byte	1
IEEE 754 **Data Lo Word, Hi Byte**	0xA3	Byte	1
IEEE 754 **Data Lo Word, Lo Byte**	0xD7	Byte	1
IEEE 754 **Data Hi Word, Hi Byte**	0x41	Byte	1
IEEE 754 **Data Hi Word, Lo Byte**	0xBE	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

* the floating point number 23.83 is represented in byte of hexadecimal as <41><BE><A3><D7>

Modbus Protocol of THS17-MD

Read Relativity Humidity Measurement Value

Request the host (PC or PLC) to polling the data of THS17-MD			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Starting Address Hi	0x00	Byte	1
Starting Address Lo	0x04	Byte	1
No. of registers Hi	0x00	Byte	1
No. of registers Lo	0x02	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*Registers of Relativity Humidity are 0x04 ~ 0x07

Response THS17-MD response data to the host (PC or PLC)			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Byte Count	04	Byte	1
IEEE 754 **Data Lo Word, Hi Byte**	0x77	Byte	1
IEEE 754 **Data Lo Word, Lo Byte**	0xCF	Byte	1
IEEE 754 **Data Hi Word, Hi Byte**	0x42	Byte	1
IEEE 754 **Data Hi Word, Lo Byte**	0x13	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

* the floating point number 36.87 is represented in byte of hexadecimal as <42><13><77><CF>:

Modbus Protocol of THS17-MD

Read Temperature Measurement Value In Integer

Request the host (PC or PLC) to polling the data of THS17-MD			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Starting Address Hi	0x00	Byte	1
Starting Address Lo	0x20	Byte	1
No. of registers Hi	0x00	Byte	1
No. of registers Lo	0x01	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*Register of Temperature is 0x0020

Response THS17-MD response data to the host (PC or PLC)			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Byte Count	02	Byte	1
Integer Data , Hi Byte	0x00	Byte	1
Integer Data, Lo Byte	0xEE	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

* the integer number 238 is represented in byte of hexadecimal as <00><EE> and the temperature reading is 23.8

Modbus Protocol of THS17-MD

Read Relativity Humidity Measurement Value In Integer

Request the host (PC or PLC) to polling the data of THS17-MD			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Starting Address Hi	00	Byte	1
Starting Address Lo	22	Byte	1
No. of registers Hi	00	Byte	1
No. of registers Lo	01	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*Register of Relative Humidity is 0x022

Response THS17-MD response data to the host (PC or PLC)			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Byte Count	02	Byte	1
Integer Data , Hi Byte	0x02	Byte	1
Integer Data, Lo Byte	0x8E	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

* the integer number 654 is represented in byte of hexadecimal as <02><8E> and the humidity reading is 65.4

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Read Serial No.

Request the host (PC or PLC) to polling the data of THS17-MD			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Starting Address Hi	0x00	Byte	1
Starting Address Lo	0x50	Byte	1
No. of registers Hi	0x00	Byte	1
No. of registers Lo	0x08	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*Registers of Serial No. are 0x50 ~ 0x5F

Response THS17-MD response data to the host (PC or PLC)			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Byte Count	10	Byte	1
1st Word, Lo byte	0x4E	Byte	1
1st Word, Hi byte	0x53	Byte	1
2nd Word, Lo byte	0x31	Byte	1
2nd Word, Hi byte	0x30	Byte	1
3rd Word, Lo byte	0x33	Byte	1
3rd Word, Hi byte	0x32	Byte	1
4th Word, Lo byte	0x35	Byte	1
4th Word, Hi byte	0x34	Byte	1
5th Word, Lo byte	0x37	Byte	1
5th Word, Hi byte	0x36	Byte	1
6th Word, Lo byte	0x39	Byte	1
6th Word, Hi byte	0x38	Byte	1
7th Word, Lo byte	0x42	Byte	1
7th Word, Hi byte	0x41	Byte	1
8th Word, Lo byte	0x44	Byte	1
8th Word, Hi byte	0x43	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*example of Serial No. is “SN0123456789ABCD”

Modbus Protocol of THS17-MD

Read Firmware Version

Request the host (PC or PLC) to polling the data of THS17-MD			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Starting Address Hi	0x00	Byte	1
Starting Address Lo	0x60	Byte	1
No. of registers Hi	0x00	Byte	1
No. of registers Lo	0x08	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*Registers of Firmware Version are 0x60 ~ 0x6F

Response THG17-MD response data to the host (PC or PLC)			
Field Name	Value	Type	Byte
Address of Transmit	1~247	Byte	1
Read Holding registers	03	Byte	1
Byte Count	10	Byte	1
1st Word, Lo byte	0x2E	Byte	1
1st Word, Hi byte	0x32	Byte	1
2nd Word, Lo byte	0x31	Byte	1
2nd Word, Hi byte	0x31	Byte	1
3rd Word, Lo byte	0x31	Byte	1
3rd Word, Hi byte	0x2E	Byte	1
4th Word, Lo byte	0x30	Byte	1
4th Word, Hi byte	0x2E	Byte	1
5th Word, Lo byte	0x00	Byte	1
5th Word, Hi byte	0x00	Byte	1
6th Word, Lo byte	0x00	Byte	1
6th Word, Hi byte	0x00	Byte	1
7th Word, Lo byte	0x00	Byte	1
7th Word, Hi byte	0x00	Byte	1
8th Word, Lo byte	0x00	Byte	1
8th Word, Hi byte	0x00	Byte	1
CRC Lo	CRC Lo	Byte	1
CRC Hi	CRC Hi	Byte	1

*example of Firmware Version is “2.11.1.0”

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Revise history

- V1 2025_12_26 Initial