

THP sensor

Temperature Humidity Atmospheric Pressure

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1. Design

Name	MPL3115A2 Sensor	HWS version	Comment
THPX	YES	THP_x*	

2. Hardware

2.1 Hardware parameters			
Measurement	Value	Range	Comments
	Temperature	-30°C ÷ 60°C	In tenth of °C
	Relative Humidity	0 ÷ 99.9%	In tenth of %
	Atmospheric pressure	200.0 ÷ 1100.0 hPa	Resolution 0.1 hPa
Power	6 - 26V DC/ max 1.5 mA, 24 Volt -> 1.0 mA = 1 mW		
Interface	RS485 - MODBUS RTU		
Hardware	SHT35 TH sensor, MPL3115 pressure sensor		
Comm. speed	9600 or 115200 Bd		
Dimensions	Φ15 x 100 mm		
Design	Interior, Exterior		
Setup	Via software Bootloader or via ModBus directly		

2.2 Sending parameters to RS485 after RESET		
	Parameter	Comments
1.row	112:RESET=4<cr><lf>	112 – address (dec), 4 – com. Protocol
2.row	112:MPL=1<cr><lf>	112 – address (dec), MPL3115A2 – OK, 0 - NOOK
3.row	112:SHT=1<cr><lf>	112 – address (dec), SHT35 – OK, 0 – NOOK

3. Wiring, standard cable length: 3 m

3.0 Wire color	Comment
Green	Ground
White	12-24V DC
Yellow	RS485 +
Brown	RS485 -

4. ModBus RTU communication protocol

4.1 Command 0x03 Read Registers	
Register Number	Parameter
0	Temperature in tenth of degrees from SHT35
1	Relative humidity in tenth of % from SHT35
2	Dew point in tenth of degrees from SHT35
3	♦ Calculated atmospheric pressure in 10 Pa from MPL3115 from sea level

♦ if register 108 is set to 0 then value in register 3 is equal with absolute atmospheric pressure in 10 Pa

4.2 Command 0x03 Read Configuration Registers			
Register Number	Register name	Description	Units/Notes
100	Address	1 – 247	
101	Communication speed	0–115200, 1–9600	Bd
102	HWS version 0	Read Only	TH
103	HWS version 1	Read Only	P_
104	HWS version 2	Read Only	x*
105	HWS version 3	Read Only	:1
106	HWS version 4	Read Only	.0
107	Communication protocol		1 ÷ 5
108	Altitude above sea level in meters		0 – 4000

4.3 Command 0x06 Write Registers			
Register Number	Register name	Description	Units/Notes
100	Address	1 – 247	
101	Communication speed	0 – 115200, 1 - 9600	Bd
102-106	Read Only		
107	Comm. Protocol	1 - INGSIMON 2 - HTML 3 - MODBUS ASCII 4 – MODBUS RTU 5 – MODBUS TCP	Default: MODBUS RTU (4)
108	Altitude above sea level in meter	0 to 4000	Default 0. Can set to between 0 – 4000

4.4 Default parameters		
Parameter	Value	Comment
Address	0x70h (112d)	
Communication speed	115200, N, 8,1	
Communication Protocol	0x04	MODBUS RTU
Altitude above sea level in meter	0	m

4.5 Range of addresses	
Address [dec]	Comment
1 - 247	For sensors
248 - 254	Reserve
255	Universal address – used only to read registers Writing to registers does not work with this address

5. Examples for Modbus RTU

Example 5.1

Set the communication speed from 115200 Bd to 9600 Bd for Address 0x70 (112 dec)		
Poll	70 06 00 65 00 01 52 F4	The response is at 115200 Bd. In the next communication will use 9600 Bd
Response	70 06 00 65 00 01 52 F4	

Example 5.2

Set the communication speed from 9600 Bd to 115200 Bd for Address 0x70 (112 dec)		
Poll	70 06 00 65 00 00 93 34	The response is at 115200 Bd. In the next communication will use 9600 Bd
Response	70 06 00 65 00 00 93 34	

Example 5.3

Read 9 registers from 100 from Address 0x70 (112 dec)		
Poll	70 03 00 64 00 09 CE F2	
Response	70 03 12 00 70 00 00 54 48 57 50 78 2A 3A 31 2E 30 00 04 00 00 FC 2A	
Meaning:		
Byte [hex]	Description	Comment
70	Address	
03	function code	Read holding register
12	count of bytes (18dec)	
00 70	Address	
00 00	communication speed	115200 Bd
54 48	TH	Temperature, Humidity
57 50	P_	Pressure
78 2A	x*	version, * - reserve
3A 31	:1	
2E 30	.0	
00 04	communication protocol	4 - MODBUS RTU
00 00	Altitude from sea level	
FC 2A	Checksum	

Example 5.4

Getting the current address from a sensor with the unknow address with universal address 0xff Be aware, that only 1 equipment is connected to the Modbus network.		
Poll	FF 03 00 64 00 01 D0 0B	Read register 100
Response	FF 03 02 00 70 90 74	70 – equipment's new address

Example 5.5

How to set the address. Changing the address from 70h to 1h. Be aware, that only 1 equipment is connected to the Modbus network.		
Poll	70 06 00 64 00 01 03 34	Write to register 100 value 1
Response	70 06 00 64 00 01 03 34	01 – equipment's new address
The next communication with the equipment will be at address 1		

Example 5.6		
How to set the address. Changing the address from 1h to 2h		
Be aware, that only 1 equipment is connected to the Modbus network.		
Poll	01 06 00 64 00 02 49 D4	Write to the register 100 value 2
Response	01 06 00 64 00 02 49 D4	02 – equipment’s address
The next communication with the equipment will be at address 2		

Example 5.7		
How to set the Altitude to the value 128 m. Address 70h. Register 108		
Poll	70 06 00 6C 00 80 42 96	Write to the register 108 value 128
Response	70 06 00 6C 00 80 42 96	80h (128d) altitude in m

Example 5.8		
How to set the Altitude to the value 128 m using universal CRC (XX). Address 70h. Reg.108		
Poll	70 06 00 6C 00 80 58 58	Write to the register 108 value 128
Response	70 06 00 6C 00 80 58 58	80h (128d) altitude in m

Example 5.9		
Reading measured values from 0. register, 4 registers. Address 70h.		
Poll	70 03 00 00 00 04 4E E8	Read 4 registers
Response	70 03 08 00 DA 01 3D 00 25 27 45 E7 FB	
Meaning: 70 – address 03 – function 08 – count of bytes 00 DA → $0*256 + 13*16 + 10 = 218 \rightarrow 21.8 \text{ }^\circ\text{C}$ 01 3D → $1*256 + 3*16 + 14 = 318 \rightarrow 31.8 \text{ \%Rh}$ 00 25 → $0*256 + 2*16 + 5 = 37 \rightarrow 3.7 \text{ }^\circ\text{C dew point}$ 27 45 → $2*4096 + 7*256 + 4*16 + 5 = 10053 \rightarrow 100530 \text{ Pa} \rightarrow 1005.3 \text{ hPa}$ E7 FB CRC		

6. Used sensors

6.1 Humidity and Temperature Sensor IC

- Accuracy tolerance ± 2 %RH
- Repeatability ± 0.1 %RH
- Hysteresis ± 1 %RH
- Nonlinearity < 0.1 %RH
- Operating Range extended 0 to 100 %RH
- Long Term Drift 5 Typ. < 0.25 %RH/year



6.2 MPL3115A2 precision pressure sensor

- Pressure absolute accuracy ± 0.4 kPa, 50 ÷ 110 kPa over -10 °C to 70 °C
- Temperature accuracy @ 25 °C ± 1 °C, over temperature range ± 3 °C



7. Dimensions - holders

Example:

