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Dust sensor

Exterior

Interior

Contents:

OEM sensor

1. Design

Name	HWS version	Comment
DUSTI	**DUSTI***	Interior
DUSTE	**DUSTE***	Exterior

2. Hardware

2.1 Hardware parameters			
Measurement	**Value**	**Range**	**Comments**
	PM 1.0 concentration	0 ÷ 1000	ug/m3
	PM 2.5 concentration	0 ÷ 1000	ug/m3
	PM 10.0 concentration	0 ÷ 1000	ug/m3
Power	6 - 26V DC/ max 40mA, 0.6 W		
Interface	RS485 - MODBUS RTU or other		
Hardware	OEM dust sensor		
Comm. Speed	9600 or 115200 Bd		
Dimensions	Interior: 76 x 76 mm x 30 mm, Exterior: in radiation cover		
Design	Interior, Exterior		
Setup	Via software Bootloader or via ModBus directly		

2.2 Sent parameters after RESET to RS485		
	Parameter	Comments
1.row	112:RESET=4<cr><lf>	112 – address (dec), 4 – com. Protocol
2.row	112:DUST=1<cr><lf>	112 – address (dec), 1 - DustSensor – OK, 0 - NOOK

2.3 Measured values are disponible 60 sec after the RESET**.** In this time the DUST sensor will response 0xff00 (65280 dec).

3. Connection, 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	PM 1.0 ug/m3
1	PM 2.5 ug/m3
2	PM 10.0 ug/m3

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	DU
103	HWS version 1	Read Only	ST
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

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)

4.4 Default parameters		
Parameter	**Value**	**Comment**
Address	0x70h (112d)	
Communication speed	115200, N, 8,1	
Communication Protocol	0x04	MODBUS RTU

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	Response with 115200 Bd. In 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	Response with 9600 Bd. In next communication will use 115200 Bd
Response	70 06 00 65 00 00 93 34	

Example 5.3

Read 8 registers from 100 from Address 0x70 (112 dec)	
Poll	70 03 00 64 00 08 0F 32

Response	70 03 10 00 70 00 00 44 55 53 54 45 2A 3A 31 2E 30 00 04 11 4D	
Meaning:		
Byte [hex]	**Description**	**Comment**
70	Address	
03	function code	Read holding register
10	count of bytes (16 dec)	
00 70	Address	
00 00	communication speed	115200 Bd
44 55	DU	DU
53 54	ST	ST
45 2A	E*	E, * - reserve
3A 31	:1	
2E 30	.0	
00 04	communication protocol	4 - MODBUS RTU
11 4D	CheckSum	

Example 5.4

Getting the 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 address**

Example 5.5

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 equipment will be with address 1		

Example 5.6

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 new address**
The next communication with equipment will be with address 2		

Example 5.7

Reading measured values from 0. register, 3 registers. Address 70h.		
Poll	**70 03 00 00 00 03 0F 2A**	**Read 3 registers**
Response	**70 03 06 00 0F 00 16 00 25 3D 39**	

Meaning:
70 – address
03 – function
06 – count of bytes
00 0F → 15(dec) → PM 1.0 15 ug/m3
00 16→ 21(dec) → PM 2.5 21 ug/m3
00 25 → 37(dec) → PM 10.0 37 ug/m3
3D 39 CRC

Used sensors

6.1 Dust sensor OEM

- Accuracy tolerance ±2 %
- Repeatability ±0.5 %
- Hysteresis ±1 %
- Nonlinearity <0.5 %RH
- Operating Range extended 0 to 99 %RH

6. Mechanical dimensions - holders

Example:

Exterior : Ø140 x 160 mm

Interior: 76 x 76 x 30 mm