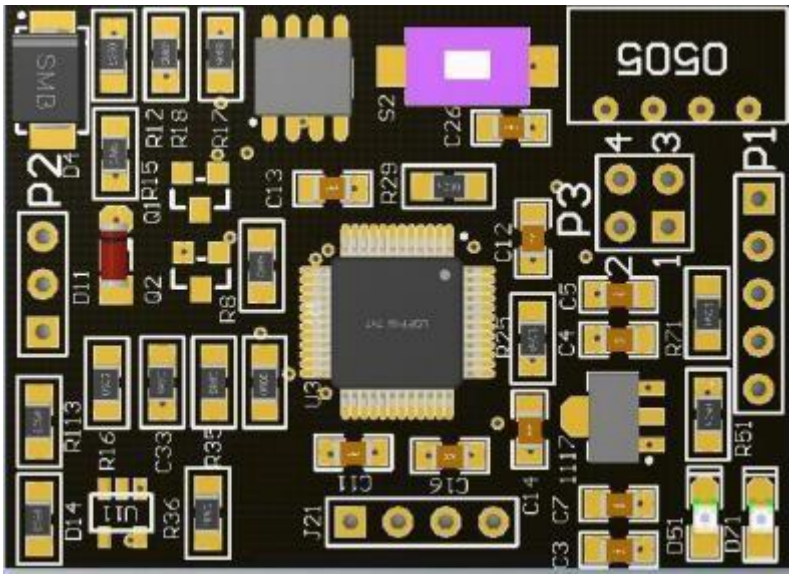
ZS-RTU-TTL Product Manual

Temperature and humidity at 200 points,
isolated power supply, MODBUS- RTU / custom protocol
temperature measurement distance of more than 1,500 meters.



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I. Product overview

ZS-RTU-TTL is a temperature and humidity data that integrates 200 single bus digital temperature sensors (DS18B20 and domestic imitation) single bus temperature and humidity sensors, converted and sorted to convenient TT L readable data. High-stability, industrial-grade design.

The module has built-in two sets of communication protocols, which can read the temperature data of 0-1500 m extension wire, and the data of 1-200 temperature and humidity points can be read together using the built-in MB-RTU protocol number sorting function of the module, and TH TL temperature and other data can be read together using custom ASCII protocol. At the same time has a number of internal parameter adjustment interface, to provide to modify the temperature and humidity built-in number function.

2. Product characteristics

- The 0-1500 m extended conductor temperature point is fully compatible to read;
- Up to 200 points of simultaneous reading is supported;
- Support for the MODBUS-RTU protocol return;
- Internal self-sorting function, the upper end analysis only needs to be read according to the fixed address;
- Built-in custom ASC II protocol to achieve more functions;
- Support 9600 / 115200 double wave rate;
- Built-in watchdog function, automatic restart after the crash;
- Support a variety of internal parameter customization;

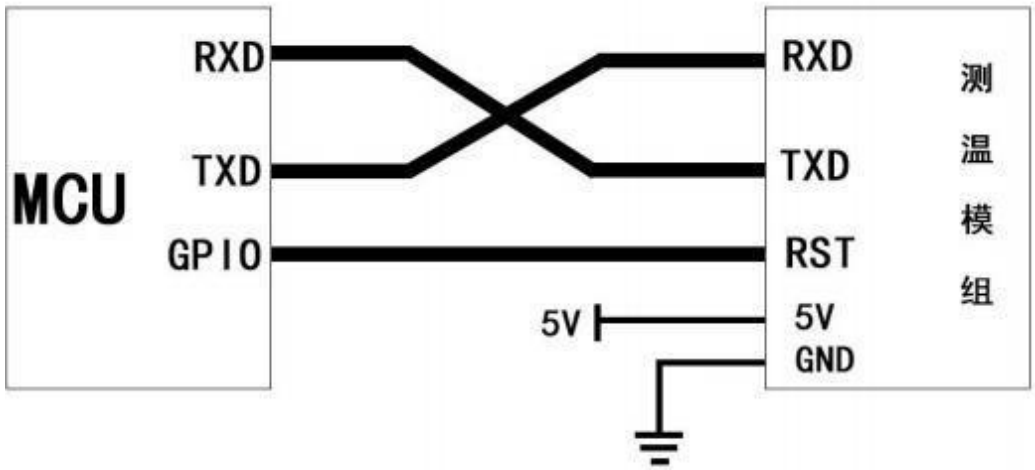
3. Product Parameters

product model	ZS - RTU-TTL	Isolation design	Power isolation Software-level isolation of the temperature measurement channel
Voltage input	5v (0.2A)	Communication parameters	9600bps, 8-bit data bit, 1-bit stop bit, no check, 115,200 b p s, 8-bit data bit, 1-bit stop bit, no check
Temperature measurement resolution	0.1℃	Support chip	DS 18B 20/CT 1820/QT 18B 20/GX 18B 20 MY 18B 20 / HK 1020 (MY 18B 20 needs to select a new version) (Support for two-line system or three-line system)
joggle	1. Power supply input 1. Route of temperature measurement input The 1-way ttl- output is available	protocol	MODBUS — RTU protocol Custom ASCII protocol
Capability	Single- channel channel 200≤point for measuring temperature single channel ≤1500m (Note: Strong In the interference environment, the need to To reduce the number of points and	Number of temperature measuring channels	1 channel

	distance)		
Temperature measurement and sampling polling time	4s	orking temperature	-30℃-80℃
M O DBUS Sampling waiting time	3S above	The M O DBUS polling interval	1S

IV. Hardware interface

4.1, Recommended and, MCU, connection diagram:



4.2 Pin definition diagram:

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name	act on	matters need attention
RST(the left side)	The measurement module is hard reset	
GND(the left side)	fishplate bar GND	
RX(the left side)	R XD	Backport MCU TXD
TX(the left side)	TX D	Backport MCU R XD
5v (left)	Connect with 5V power supply	
5V (right)	Connect the power terminal line at the temperature measuring end	This line is not required if you use a two-line parasitic mode

DQ(right)	Connect the signal end line of the temperature measuring end	If used below 800 m, recommend a 33 ohm resistance in series.
GND(right)	Ground line at the temperature measuring end	

V. Module drive ability test

Meters \ Point	1	4	8	12	20	40	60	80	100	120	160	180	200
0m	√	√	√	√	√	√	√	√	√	√	√	√	√
10m	√	√	√	√	√	√	√	√	√	√	√	√	√
30m	√	√	√	√	√	√	√	√	√	√	√	√	√
50m	√	√	√	√	√	√	√	√	√	√	√	√	√
100m	√	√	√	√	√	√	√	√	√	√	√	√	√
200m	√	√	√	√	√	√	√	√	√	√	√	√	√
400m	√	√	√	√	√	√	√	√	√	√	√	√	√
550m	√	√	√	√	√	√	√	√	√	√	√	√	√
600m	√	√	√	√	√	√	√	√	√	√	√	√	√
800m	√	√	√	√	√	√	√	√	√	√	√	√	√
950m	√	√	√	√	√	√	√	√	√	√	√	√	√
1050m	√	√	√	√	√	√	√	√	√	√	√	√	√
1300m	√	√	√	√	√	√	√	√	√	√	√	√	√
1500m	√	√	√	√	√	√	√	√	√	√	√	√	√
1700m	√	√	√	√	√	√	√	√	√	√	√	√	√
1860m	√	√	√	√	√	√	√	√	√	√	√	×	×
2200m	√	√	√	√	√	√	√	√	√	×	×	×	×

Note: This result includes both the terminal resistance and the no terminal resistance.
This result, obtained using a multisegment mix of 0.3mm ² or 0.5mm ² wires, applies only to uninterrupted laboratory environments. The above test results are only applicable to the three DS 18B 20 QT 18B 20 GX 18B 20 chips. The CT 1820 chip performs well below 1000 meters, but it is unstable above 1300 meters.

Drive 200 points is only an upper limit set to drive the allowance, the actual drive circuit can drive over 550 points.

The maximum number of drive points at 0-600m is 550 points, and the CT 1820 is 800 points
At 600 - 1200m, the maximum drive points were 460 points, and the CT 1820 number is 560 points.
At 1300 - 1600m, the maximum number of drive points was 270 points, and the CT 1820 was 180 points.

VI. Modulprotocol analysis1.MODBUS-RTU protocol:

The MODBUS address	Represents the meaning	data format
1.1 03 04 Functional Code Read Area		
30001-30200 (04 Function Code)	Temperature zone (this data * 0.1 yields a temperature) Default-1000	Read from 30001-30100 (01 04 00 00 00 64 F 1 E 1) Reads from 30101-30200 (01 04 00 64 00 64 B 0 3E) 01 [modbus Address] 04 [Function Code] 00 64 [Read Start Location] 00 64 [Read Length] B 0 3E [CRC 16-MODBUS Check]

40001-40200 (03, Function code)	humidity province Default-1000	Reads from 40001-40100 (01 03 00 00 00 64 44 21) Reads from 40101-40200 (01 03 00 64 00 64 05 FE) 01 [modbus Address] 03 [Function Code] 00 64 [Read Start Location] 00 64 [Read Length] 05 FE [CRC 16-MODBUS Check]

1.2 The MODBUS-RTU protocol collation description:

In order to read out the data more conveniently and reduce the difficulty of upper analysis logic analysis, the module uses 1 modbus address, corresponding to 1 temperature / humidity point data. Therefore, the collation needs to write inside the temperature measurement module in advance.

example 1: have 100 root 18B 20 Probes, cables are all 1 The layer number is 1-100.

The collation rule is:

Start cable: 1 —— maximum number of layers: 100

At this point, the 30001-30100 then arranges down the temperature order of the 18B 20 probe down.

30001	Tempera ture of probe # 1	30006	Tempera ture of probe # 6	30011	Tempera ture of probe # 11	30016	The tempera ture of probe # 16
30002	Tempera ture of probe # 2	30007	Tempera ture of probe # 7	30012	The tempera ture of probe # 12	30017	The tempera ture of probe # 17
30003	The tempera ture of probe #3	30008	The tempera ture of probe # 8	30013	The tempera ture of probe # 13	30018	The tempera ture of probe # 18
30004	Tempera ture of probe # 4	30009	Tempera ture of probe # 9	30014	Tempera ture of probe # 14	.....	
30005	Tempera ture of probe # 5	30010	Tempera ture of probe # 10	30015	The tempera ture of probe # 15	30100	Tempera ture of probe # 100

example 2: There are three temperature measuring cables, and they all are 4 Layer point, cable number 1,2,3

The collation rule is:

Start cable: 1 —— maximum number of layers: 4

30001	1 Tempera ture of the cable and 1 layer	30006	Tempera ture of	30011	Temperature oflayers 2 cables
30002	1 Tempera ture of the cable and 2 layers	30007	Tempera ture of 2 cables and 3 layers	30012	Tempera ture of cable 4
30003	1 Tempera ture of the cable and 3 layers	30008	Tempera ture of 2 cables and 4 layers	30013	-100
30004	1 Tempera ture of the cable and 4 layers	30009	3 Tempera ture of cable-1 layer	30014	-100
30005	Tempera ture of 2 cable and 1 layer	300010	Tempera ture of cable 2	30015	-100

1.3 Write zone in MODBUS mode

01 (MODBUS address) 06 (Write function code) 00 00 (write location) 00 01 (Write data) 48 0A (CRC16-modbus)

address	function	Protocol examples
40001	Write a modbus address	01 06 00 00 00 01 48 0A Write address 1
40002	Write the starting cable number	01 06 00 01 00 01 19 CA Write the starting cable
40003	Maximum number of layers	01 06 00 02 00 03 68 0B layer 3
40004	Write the 1 switch mode	01 06 00 03 00 01 B 8 0A Switch to custom ASCII mode
40015	Write something about the 1 restart module	01 06 00 0F 00 01 78 09 Reboot module

1.4 Configuring the Parameter Read Area

The read protocol is as follows: 01 (Modbus ADDRESS) 16 (22 function code) 00 00 (Read location) 00 64 (Read length data) 49 E2 (CRC16-modbus) Note: This protocol reads the first 100 MODBUS addresses in block 22

address	function	Protocol examples
District 22, District 1	The modbus address	
District 22 District 2	Start cable number	
District 22, District 3	Maximum number of layers	
District 22, District 14	Read the channel status	Channel is normal with value =1 Channel is short with value =0

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1.5 You can use debugging software to debug the temperature measuring module that is converted from TTL to USB

The debugging software can read the value of 03 04 22 function code area under MODBUS protocol. One key configuration address, start cable number, layer number and other information. You can switch to ASCII mode with one click. The temperature address table corresponding to MODBUS can be generated by one key and exported to EXCEL for the upper end to understand and parse. You can easily write the configuration data in area 22. MODBUS addresses of 03 and 04 codes can be conveniently numbered.

You are advised to use debugging software when you are familiar with protocols. For details about how to use the debugging software, see the Debugging Software Instructions.

2. Custom ASCII protocol:

Note: In this format, the protocol is sent and received in the ASCII format
.12 Send the format

function	Send format	Returns the data and the parsing	tailed
Restart the module	reset (0) + line break	reset (Modulpreset parameters ├─ API debug mode working mode ├─ centralized conversion mode ├─ conversion of 850ms pull-up delay ├─ 1 device address ├─ 1 start cable number ├─ 4 point number ├─ normal port status	Judge the "Port Status"
Search for temperature and humidity points (in common use)	romsearch (0,0) + line break	romsearch (0X 0) chn =0 idNums = 16 =0X 18; Analysis: Search for 16 temperature points	judge ";"

Conversion of temperature and humidity concentration (in common use)	cvttempallwithoutid (0) + line break	cvttempallwithoutid (0X 0) ├─0 72 01 02 25 ff 0e ├─1 78 01 02 02 f f 08 ├─2 78 01 02 03 f f 08 ├─3 7d 01 02 04 f f 03 ├─4 70 01 02 05 f f 10 ├─5 7f 01 02 06 ff 01 ├─6 71 01 02 07 ff 0f ├─7 79 01 02 08 f f 07 ├─8 7c 01 02 09 ff 04 ├─9 74 01 02 0a ff 0c ├─10 7d 01 02 0b ff 03 ├─11 77 01 02 0c ff 09 ├─12 70 01 02 0d ff 10 ├─13 77 01 02 0e ff 09 ├─14 77 01 02 0f ff 09 ├─ 15 78 01 02 10 ff 08 =0X10; Resolution See Note 1 *	judge ″;″

Show the module parameters	showinfo (0) + line break	showinfo () Modulpreset parameters ├─ API debug mode working mode ├─ centralized conversion mode ├─ conversion of 850ms pull-up delay ├─ 1 device address ├─ 1 start cable number ├─ 4 point number ├─ port status normal =0X 17;	judge ";"
Switch the Porter rate (115200)	setarg (0X 08007004,01) + line break	setarg (0X 8007004,0X 1) =0X 0; Note: The restart takes effect	judge ";"
Switch the Porter rate (9600)	setarg (0X 08007004,02) + line break	setarg (0X 8007004,0X 2) =0X 0; Note: The restart takes effect	judge ";"
Switch to the MODBUS mode	setarg (0X 08007002,02) + line break	setarg (0X 8007002,0X 2) =0X 0; Note: The restart takes effect	judge ";"
The MODBUS mode switches to a centralized conversion	setarg (0X 08007016,00) + line break	setarg (0X 8007016,0X 0) =0X 0; Note: restart after switching MODBUS	judge ";"
The MODBUS mode switches to a single-point conversion	setarg (0X 08007016,01) + line break	setarg (0X 8007016,0X 1) =0X 0; Note: restart after switching MODBUS	judge ";"
Convert Temperature Mode-Common Chip	setarg (0X 08007018,85) + line break	setarg (0X 8007018,0X 55) =0X 0; Note: The restart takes effect	judge ";"
Convert Temperature	setarg (0X 08007018,4) + line break	setarg (0X 8007018,0X 4) =0X 0; Note: The restart takes effect	judge ";"

Mode-High Speed Chip

Change the single-point chip number	setromid (0,1,1,1) + line break Send-out format resolution: Change the chip TH of internal number 1 to 1 and TL to 1. setromid (0, internal number, TH, TL)	setromid (0X 0,0X 1,0X 1,0X 1) Write to complete =0XC;	judge ";"
Change the chip TH number only	setromid (2,1,2,1) + line break Send-out format resolution: Change all chips TH to 2, leaving TL unchanged setromid (2,1,TH ,1)	setromid (0X 2,0X 1,0X 2,0X 1) Write to complete =0XC;	judge ";"
Change all chips TH, TL to the same number	setromid (1,1,3,3) + line break Send-out format resolution: Change all chips TH to 3 and TL to 3 setromid (1,1,TH ,TL)	setromid (0X 1,0X 1,0X 3,0X 3) Write to complete =0XC;	judge ";"

All the above functions can be tested using the debugging software. It is suggested that the analysis protocol be used with the debugging software. The debugging software use method is described in the use instructions for the debugging software.

Note: Generally speaking, using ASCII mode, you only need to use two commands.

After turning on, use romsearch (0,0) to search out the temperature point, and use cvttempallwithoutid (0) to read the TH TL TEMP HUM data repeatedly.

Note 1 *: Analysis of the temperature and humidity data algorithm

cvttempallwithoutid (0X 0)

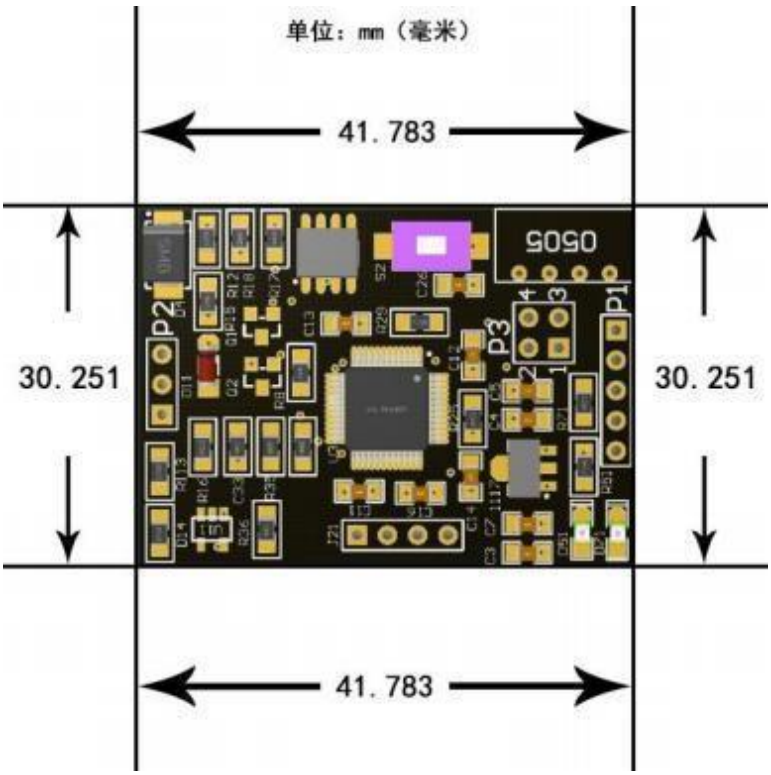
├─0 72 01 02 25 ff 0e
├─1 78 01 02 02 ff 08
├─2 78 01 02 03 ff 08
├─3 7d 01 02 04 ff 03
├─4 70 01 02 05 ff 10
├─5 7f 01 02 06 f f 01
├─6 71 01 02 07 ff 0f
├─7 79 01 02 08 ff 07
├─8 7c 01 02 09 ff 04
├─9 74 01 02 0a ff 0c
├─10 7d 01 02 0b ff 03
├─11 77 01 02 0c ff 09
├─12 70 01 02 0d ff 10
├─13 77 01 02 0e ff 09
├─14 77 01 02 0f ff 09
├─15 78 01 02 10 ff 08 =0X10;

First remove cvttempallwithoutid (0X 0) and =0X 10; start characters and end symbols

Take ├─ 15 78 01 02 10 ff 08 as an example

Split area	function	Analytical algorithm
├─	useless	
15	Internal number	10 Mimal, no parsing
78 01	Temperature data	Turn 7801 to 10 cx * 0.0625 If greater than required, the negative temperature is subtracted
02	TH number	Sixteen decimal system to decimal system
10	TL number	Sixteen decimal system to decimal system
ff 08	Humidity data	If this first digit is FF, this is the temperature data and is not resolved. Humidity resolution algorithm: LSB =08 MSB =ff hum =(float)((MSB <<8)+LSB)/0xffff

VII. Dimensions of modules



For the welding pad design, please refer to the welding pad design circuit diagram.

Modulresponse time

pattern	function	Typical Value (MS)	Maximum value (MS)	remarks
M ODBUS	03 District read	2000	3500	Recommended for 3,000 ms
M ODBUS	04 District read	2000	3500	Recommended for 3,000 ms
M ODBUS	Area 22 read	2000	3500	Recommended for 3,000 ms
M ODBUS	District 22 is written	1500	3000	Recommended for 3,000 ms
ASCI I	Restart the reset (0)	1000	2000	Recommended for 2,000 ms
ASCI I	Search for temperature points rom search (0,0)	500	1500	Protocol header can be quick Answer, but at the end of the time Between and chip points Related, suggest to judge tailed
ASCI I	Convert temperature and humidity concentration, cvttempallwithoutid (0)	500	1500	Protocol header can be quick Answer, but at the end of the time Between and chip points Related, suggest to judge tailed
ASCI I	Setarg Start setting parameter command	1000	3000	Recommended for 2,000 ms tally

ASCI I	The setromid begins with the modification numbering command	500	1500	Protocol header can be quick Answer, but at the end of the time Between and chip points Related, suggest to judge tailed
ASCI I	Show the module parameters showinfo (0)	1000	3000	Recommended for 2,000 ms Recommended judgment to end tally

Disclaimer: This specification is subject to change as product hardware and software continue to improve. The pictures and charts used in this specification are for reference only to illustrate the function of this product. The measurement data in this specification is measured at room temperature without interference in our company. It is for reference only, and the actual measurement shall prevail.

Langfang Zhaosui Temperature Measurement Cable Co., Ltd. reserves the right of final interpretation and modification of all contents in this specification.