ZHC493C Application Guide

LTE Cat 1 Modbus RTU

Version: ZHC493C_Application Guide_V1.1

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Contents

1 Overview

1.1 Product introduction

ZHC493C support 2 Road dry (wet) node detection, 1Relay (COM, NO) output,1Analog quantity (current 4~20mA) detection, 2 Network IO products with transparent transmission through serial port, compatible with Modbus RTU/TCP protocol. With "remote control" as the core function, it is highly easy to use, and users can easily and quickly integrate into their own systems to realize LTE, RS485 remote and local control.

1.2 Appearance description

DC power supply: 5.5*2.5mm, 9~36V
Reset: Reset button
Terminal power supply:3.81mm, 9~36V

SIM:SIM card interface
MAIN: Main antenna

Serial port:RS485/RS232, 5.08mm terminal block plug-in
RELAY:RELAY is 1 relay output
DI:DI1, DI2 is 2 way dry/wet node input detection
AI:AI is 1 current input detection

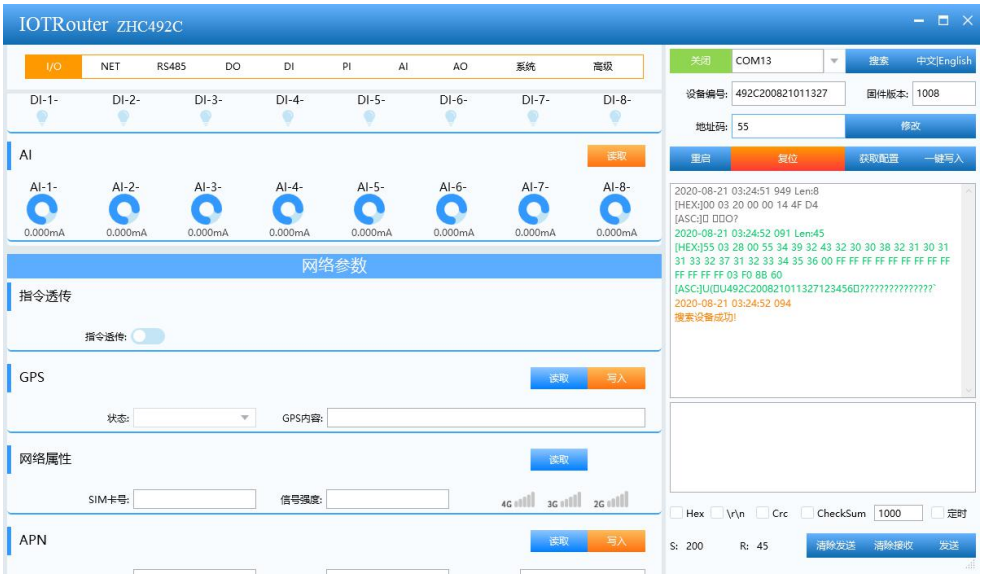
2. Quick start

This chapter is a quick introduction to the ZHC493C product. It is recommended that users read this chapter systematically and follow the instructions once again, so that they will have a systematic understanding of the product. For specific details and instructions, please refer to the subsequent chapters.

Wiring: The computer connects to ZHC493C through USB to RS485.
Networking: Insert the SIM card when the power is off.
Power supply: ZHC493C working voltage is DC9~36V.

2.1. RS485 Bus Control

Select the corresponding port and click "Search" to search for the device.



IO control

For detailed functions of the host computer, please refer to "ZHC493C_Host Computer_Application Guide".

2.2. Across Cloud Control

Refer to "ZHC493C_Zongheng Cloud Platform_Application Guide"

3. Product features

3.1. Serial RS485

3.1.1. Basic parameters

project	Attributes	parameter
Baud rate	Serial port rate	1200~921600bit/s
Stop bit	Stop bit	1/1.5/2
Data bit	Data bit	8/7
Check Digit	Check Digit	None/even parity/odd parity

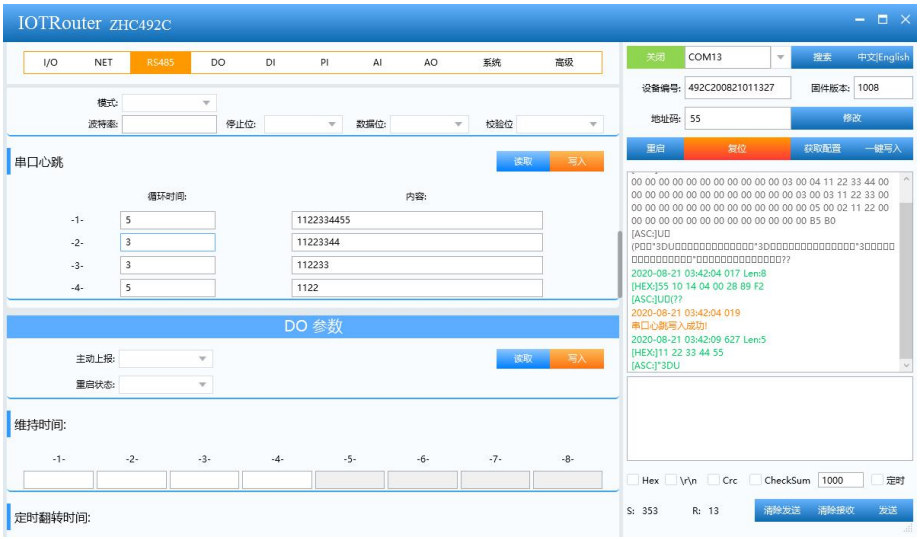
3.1.2. Features

ZHC493C supports serial port timing to send heartbeat.

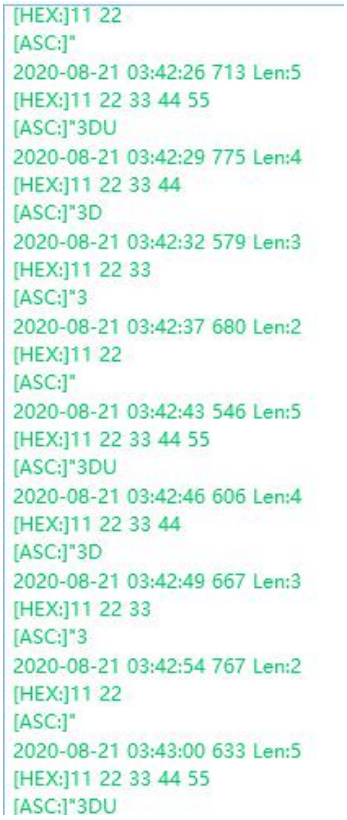
project	Attributes	parameter
cycle	Time interval from the last serial port heartbeat	0~65535 s
length	Serial port heartbeat packet length	0~16
content	Hex format data	Example: Read the address code as 0x551 analog input 55 04 00 00 00 01 FC 1D

Serial port heartbeat application example:

Write the serial port heartbeat.



effect


[HEX:]11 22
[ASC:]"
2020-08-21 03:42:26 713 Len:5
[HEX:]11 22 33 44 55
[ASC:]"3DU
2020-08-21 03:42:29 775 Len:4
[HEX:]11 22 33 44
[ASC:]"3D
2020-08-21 03:42:32 579 Len:3
[HEX:]11 22 33
[ASC:]"3
2020-08-21 03:42:37 680 Len:2
[HEX:]11 22
[ASC:]"
2020-08-21 03:42:43 546 Len:5
[HEX:]11 22 33 44 55
[ASC:]"3DU
2020-08-21 03:42:46 606 Len:4
[HEX:]11 22 33 44
[ASC:]"3D
2020-08-21 03:42:49 667 Len:3
[HEX:]11 22 33
[ASC:]"3
2020-08-21 03:42:54 767 Len:2
[HEX:]11 22
[ASC:]"
2020-08-21 03:43:00 633 Len:5
[HEX:]11 22 33 44 55
[ASC:]"3DU

3.2.DO

3.2.1. Read and write status

Send Modbus commands to ZHC493C through the network and serial port to read and write DO status.

project	parameter
Register address range	00001 (0x0000)
Support function code	01, 05, 0F

To read1Take the relay output status as an example:

check Inquiry:55 01 00 00 00 01 F0 1E

Query response:55 01 01 01 80 78

The first relay control 05 function code:

Control closure:55 05 00 00 FF 00 8D EB

ring should:55 05 00 00 FF 00 8D EB

Control disconnect:55 05 00 00 00 00 CC 1B

response:55 05 00 00 00 00 CC 1B

3.2.2. Features

ZHC493C DO supports active reporting, restarting the state of the holding relay, output holding time, timing flip, etc.

project	Attributes	parameter
Proactively report	Report all DO status values immediately after DO status changes	Enable/disable
Restart state	Whether to maintain the latest DO output state after the device is powered on	Enable/disable
Output hold time	The new state of DO is maintained for a specified period of time and then reverse	0~65535 s
Timed rollover	Every "set time", DO status is reversed	0~65535 s

3.3.DI

3.3.1. Read status

Send Modbus commands to ZHC493C through the network and serial port to read DI status.

project	parameter
Register address range	10001~10002(0x0000~0x0001)
function code	02

Detection level: The default state is0, After the input signal, the state is1, The detection method is Modbus Agreement of 02 function code.

Take the first detection as an example:

Inquire:55 02 00 00 00 01 B4 1E

Query response: (detected 0):55 02 01 00 B1 B8

Query response: (detected 1):55 02 01 01 70 78

3.3.2. Features

ZHC493C DI supports active reporting, periodic reporting, etc.

project	Attributes	parameter
Proactively report	Whether to enable DI status reporting	Enable/disable
circulation time	When the DI status does not change, the cycle of reporting status	0~65535 s

DI Proactive report description:

After power-on, if there is no DI status change, it will be reported circularly according to the "cycle time". If there is a DI status change, all statuses will be reported immediately and the cycle time will be reset.

3.4.AI

3.4.1. Read status

Calculation formula:

Current value = return value / 1000 Unit: mA

Send Modbus commands to ZHC493C through the network and serial port to read the AI value.

project	parameter
Register address range	30001 (0x0000)
function code	04

Take the first current detection as an example:

check Inquiry:55 04 00 00 00 01 3C 1E

Query response:55 04 02 10 00 82 0C

The return data is 0x1000, which means 4096uA,I.e. 4.096mA

3.4.2. Features

project	Attributes	parameter
Proactively report	Whether to enable AI status reporting	Enable/disable
circulation time	A Period of reporting status when there is no change in I status	0~65535 s
Escalation mode	Trigger mode for reporting AI status changes	Inside/Outside/Prohibited
Lower limit of interval	The lower limit of the interval that triggers the report	4000~20000 uA
Upper bound	The lower limit of the interval that triggers the report	4000~20000 uA

AI Proactive report description:

Disable reporting mode: Report all AI values cyclically according to the set cycle.

Report within the interval: When the set AI channel value enters the interval from outside the interval, all AI channel values are reported immediately and the cycle time is reset.

Report outside the interval: When the set AI channel value enters the interval from inside the interval, all AI channel values are reported immediately and the cycle time is reset.

3.5. Logic

ZHC493C supports setting 8 logics.

project	Attributes	parameter
Triggering conditions	Logic trigger condition	**Forward follow:**DI closed, DO closed **Follow in reverse:**When DI is closed, DO is disconnected, when DI is disconnected, DO is closed **greater or equal to:**DO output is triggered when AI input is greater than or equal to the set value **Less than or equal to:**Trigger DO output when AI input is less than or equal to the set value **AO follows AI:**AO output value = AI input value Disable: Turn off local logic
Remote address	This logic will be triggered when a data packet with the specified address code is received	01~FE;00**Local logic**
enter	Trigger logic input conditions	Can be specified by DI X, AI X trigger
AI threshold	Trigger logic after AI reaches a certain value **(Greater than or equal, less than or equal to mode takes effect)**	0~20000
Output type	Output type after logic trigger	Optional DO
Output	Output channel after logic trigger	Can specify DO X , AO X output
DO value	Specify the value of the DO channel output	Normally open, normally closed, flip

3.6. System Information

project	Attributes	parameter
Modbus address code	Modbus address code	01~FE
DEVID	Factory unique number	Read only
password	The password used to access the ZH-Cloud platform	Support 16byte
Escalation mode	Format and channel of actively reported data	Network modbus RTU report Network modbus TCP report Network JSON report Serial modbus RTU report Serial modbus TCP report Serial JSON report Serial + network modbus RTU report Serial + network modbus TCP report Serial port + network JSON report
Networking mode	Use the networking mode when accessing to the crossbar cloud transparent transmission	Enable/Disable
Group ID Group password	Group ID Devices with the same group password can establish a networking mode	Support 16byte
Group type	In the same group, different types of equipment can exchange data	A/B

3.7. Timing trigger

ZHC493C supports "arrival at the set time point (Beijing time), trigger an action".

project	Attributes	parameter
mode	Whether to turn on this timing trigger	Enable/disable
Timing	Time point when the action is triggered	Hour: 00~twenty three; Minutes: 00~59; Seconds: 00~60
Action type	Type of action performed	Restart/DO
Execution channel	When the action type is DO, the output channel of DO	DO1~4
Execution status	When the action type is DO, DO channel output value	switch

3.8. Network subsidiary information

ZHC493C supports obtaining SIM card number, signal strength, setting APN, reading and writing positioning information, etc.

project	Attributes	parameter
CCID	SIM unique identification number	A combination of 20 numbers and letters. Read only
Signal strength	The signal strength of the environment where the device is located	See appendix QCSQ for details
APN address	Access point settings, dedicated network card need to set this	Provided by the operator
APN username	The username required to access the specified network	Provided by the operator
APN password	The password required to access the specified network	Provided by the operator
Positioning mode	Whether to enable the positioning function of the device itself	Enable/disable
Location data	Device's own positioning data/user settings	When the device's own positioning function is enabled, it conforms to the NMEA1803 protocol

3.9. Status indicator

name	Features	status	State description
POW	Power Indicator	Always on	System start
		Always off	The system does not start
WORK	System working status indicator	Always on	The network module does not start
		1000ms off 1000ms on	Network module is starting
		1500ms off 100ms on 100ms off 100ms on	SIM card error
		200ms off 200ms on	Get IP
		500ms off, 500ms on	The network is normal
SEND	Network data sending indicator	Always off	SOCKET is not established
		Always on	SOCKET has been established
		Flashing	Send network data
RECV	Network data receiving indicator	Always off	default
		Always on	Module not started
		Flashing	Receive network data

3.10. Restore factory settings

A) The device can be restored to factory settings by operating the RESET button.
Steps:
Step 1: Power on the device.
Step 2: Press and hold the RESET button until the indicator lights of the device are all off, and immediately release the reset button, the device is restored to factory settings successfully.

If it is found that the serial port of the device starts to actively send JSON packets after reset, it indicates that the reset button has been pressed for too long and the device enters the local firmware upgrade mode. At this time, power off the device and perform the reset operation again.

B) Restore factory settings by issuing Modbus/JSON commands.

Modbus instructions:55 06 20 14 00 02 4E 1B

JSON command:{"msgType":"setDeviceConfig","data": {" sysCmd ": "2"}}

3.11. Firmware upgrade

For the firmware upgrade process, please refer to "ZHC493C_PC_Application Guide"

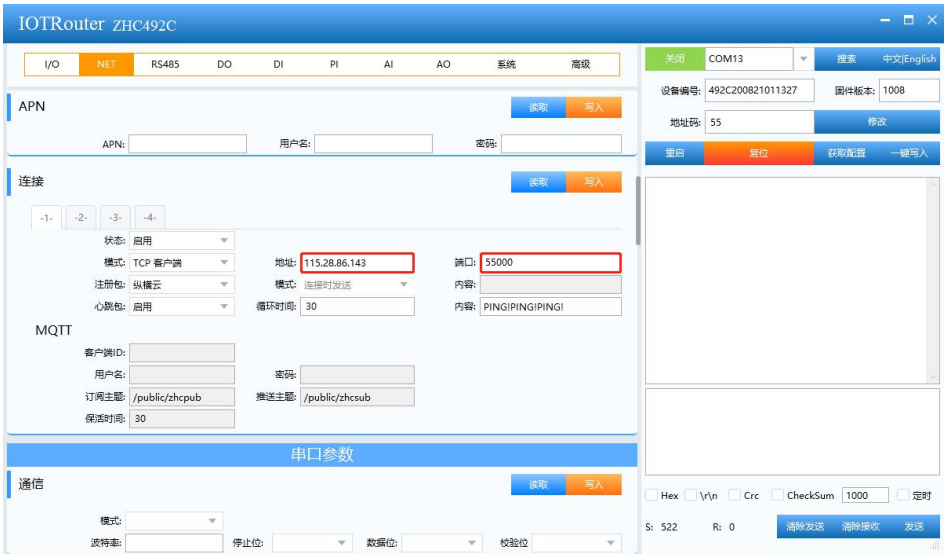
4. Product application

4.1. Transparent Cloud

Operation process (take socket1 as an example):

1. Set the socket1 parameters

Please confirm the IP address and port of the server to be connected; the registration package and the heartbeat package are recommended to be enabled, and can be customized if necessary, and the settings are complete and restarted.



2. Server operation

After the device is connected to the user server, a custom registration package will be sent to facilitate the customer to identify the device, and then the customer can Modbus , JSON protocol(Please refer to ZHC493C_JSON_Application guidance)To operate the device, the device adapts to Modbus RTU/TCP , JSON protocol.

4.2.MQTT

ZHC493C supports one MQTT application (connection 1). When the device actively pushes data, it will select the mode according to the "Data Active Reporting" option.

In the MQTT application, the picture above means that "application data is encapsulated in JSON format" and reported through the network in the MQTT protocol. The server can parse the application data of MQTT according to "ZHC493C_JSON_Application Guide".

4.3. Transparent transmission of vertical and horizontal clouds

Refer to "ZHC493C_ZH-Cloud Transparent Transmission_Application Guide"

4.4. Zongheng Cloud Platform

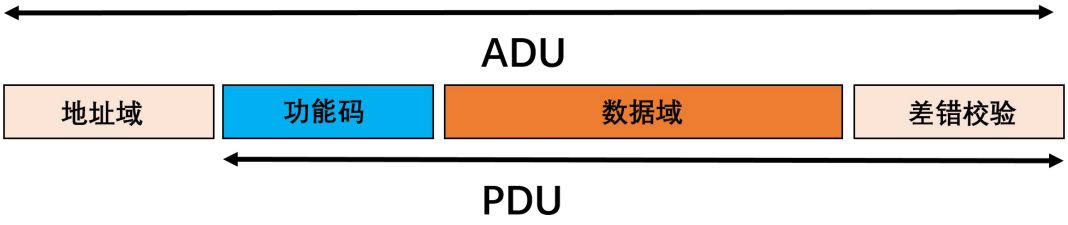
Refer to "ZHC493C_Zongheng Cloud Platform_Application Guide"

5. Modbus command frame

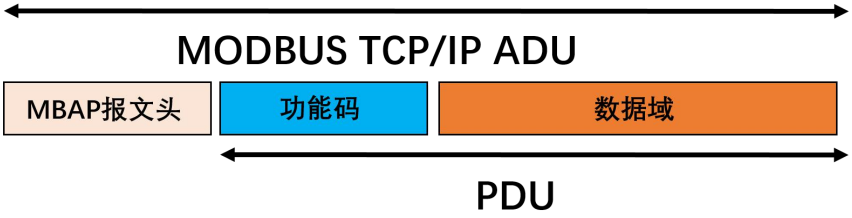
5.1 Modbus command frame

The ZHC493C data format follows the general Modbus frame format, and the device can parse the Modbus RTU/TCP protocol and perform related operations.

Modbus RTU:



Modbus TCP:



5.2 Register allocation

For register address allocation, please refer to "ZHC493C_Register Address Table"

6.JSON protocol

ZHC493C supports JSON protocol, please refer to "ZHC493C_JSON_Application Guide"

7. Update history

8. Contact

Company: Chengdu Zongheng Intelligent Control Technology Co., Ltd.

Address: 19th Floor, Zhidi Gotan, No. 888 Yizhou Avenue, High-tech Zone, Chengdu, Sichuan Province

Website: www.iotrouter.com

Phone: 028-83268936