ZHC0941_0951 Application Guidance

Version: ZHC0941_0951 Application Guide _V1.0

Date: 2021-2-10

content

Content

1 Overview

ZHC0941, ZHC0951 are two kinds of remote I based on LoRa communication I/O Control devices need to be used at the same time to achieve point-to-point, one-to-many and other application scenarios.

Data topology diagram:

peer to peer

relay, forward

1.1.ZHC0941

ENC0941Provides 4-way dry/wet junction detection, 4-way (4~20mA)Analog input detection, support Modbus RTU/TCP protocol for acquisition control. Through LoRa network, with ZHC0951Communication between devices and I/O follow.

main feature:

- peer-to-peer communication
- RS485collectionI/O
- I/O Threshold, condition reporting
- LoRa network relay forwarding
- Modbus support RTU /TCP
- Support serial port timing collection and reporting

1.1.1. Basic parameters

project		describe
LoRa	protocol	ENCprivate protocol
	frequency band	471.2MHz~501.8MHz, 32 channels in total
	transmit power	Maximum transmit power20dBm
	antenna	Suction Cup Antenna (470MHz ~ 540MHz)
DI*4	Wet and dry joints are supported	Isolated Power Short circuit DGND and COM to switch to wet node mode Short DC-IN, COM switches to dry node mode
AI*4	Analog input detection	Support 4~20mA analog input detection
RS485*1	serial port	Maximum baud rate 115200
DIP switch	8-bit DIP switch	Factory reset, firmware upgrade Reset: channel 5 6 7 8 to ON Upgrade mode: After all channels are turned ON and restarted
temperature	Operating temperature	-20℃~+70℃
	storage temperature	-40℃~+125℃
humidity	Working humidity	5%~95%RH (no condensation)
	Storage humidity	1%~95%RH (no condensation)
power supply	Yes	12~36VDC

1.1.2. Appearance description

1.2.ZHC0951

ENC0951 Provides 4 relay outputs, 4 (4~20mA)Analog output, support Modbus RTU/TCP protocol for acquisition control. Communication and I/O between devices can be performed through the LoRa network/Ofollow.

main feature:

- peer-to-peer communication
- equipment roomI/Ofollow
- RS485Acquisition controlI/O
- local I/OConditional control
- LoRa network relay forwarding
- Modbus support RTU /TCP
- Support serial port timing collection and reporting

1.2.1. Basic parameters

project		describe
LoRa	protocol	ENC private protocol
	frequency band	471.2MHz~501.8MHz, 32 channels in total
	transmit power	Maximum transmit power20dBm
	antenna	Suction Cup Antenna (470MHz ~ 540MHz)
DO*4	relay output	10A250VAC/30VDC
AO*4	Analog output	0~20mA analog output
RS485	serial port	Maximum baud rate 115200
DIP switch	8-bit DIP switch	Factory reset, firmware upgrade Reset: channel 5 6 7 8 to ON Upgrade mode: After all channels are turned ON and restarted
temperature	Operating temperature	-20℃~+70℃
	storage temperature	-40℃~+125℃
humidity	Working humidity	5%~95%RH (no condensation)
	Storage humidity	1%~95%RH (no condensation)
power supply	Yes	12~36VDC

1.2.2. Appearance description

2. Quick Start

2.1. Point-to-point I/O test follow-up test

- ZHC0941
- ZHC0951
- DC12V power supply
- LoRa suction cup antenna (470MHz ~ 540MHz)

- USB to RS48 tool
- PC software

	
ENC0941	ZHC0951

			
PC software	power supply	antenna	Serial tool

2.2.1. Setting ZHC0941

The necessary parameters are as follows:

- App ID: 1 (with ZHC0951consistent)
- Address: 0x56(Unique under the same application ID)
- Spread Spectrum: 10 (with ZHC0951consistent)
- Channel: 0 (with ZHC0951consistent)
- DI active reporting: enable
- AI Active Reporting: Enable

Note:

After confirming that the settings are completed, you need to restart the device for the configuration to take effect. If the communication is unsuccessful, please switch the spread spectrum or channel, butZHC0951be consistent.

2.2.2. Setting ZHC0951

The necessary parameters are as follows:

- App ID: 1 (with ZHC0941consistent)
- Address: 0x55(Unique under the same application ID)
- Spread Spectrum: 10 (with ZHC0941consistent)
- Channel: 0 (with ZHC0941consistent)
- Conditional judgment:As shown in the figure, it means

  When the address code is 0x56ZHC0941DI1If a closure is detected then ZHC0951DO1Output normally closed

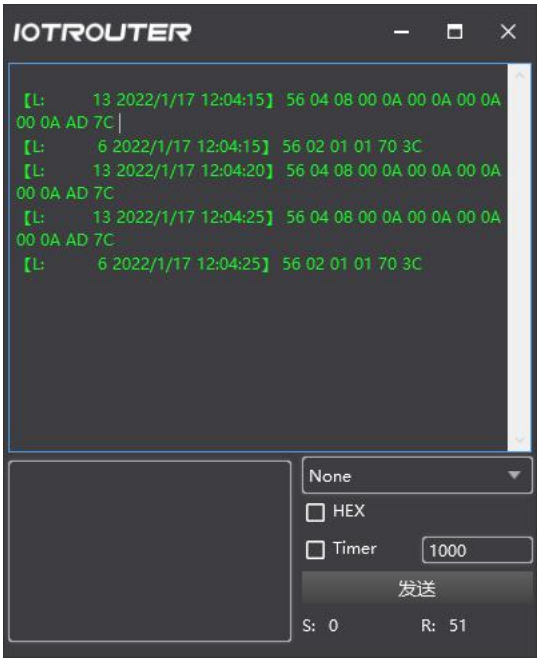
  When the address code is 0x56ZHC0941DI1If a disconnection is detected then ZHC0951DO1output normally open

***Notice:**

After confirming that the settings are completed, you need to restart the device for the configuration to take effect.

If the communication is unsuccessful, please switch the spread spectrum or channel but need to contactZHC0951be consistent.

2.2.3. Test cases



As shown in the figure above, ZHC0951 receives the DI report data from ZHC0941. After parsing, DO executes the conditional judgment and completes the follow-up.

3. Function description

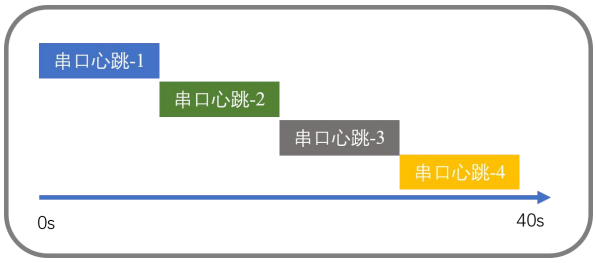
3.1. Basic information

project	Attributes	describe
serial number	read only	Appearance unique number
model	read only	According to I/ODivided into ZHC0941, ZHC0951
Version	read only	Device firmware version
address code	read and write	modbus address code. Unique under the same application ID
Data reporting direction	read and write	Data reporting direction. The device sends data in the specified direction
recovery time	read and write	Set time to restart, max 4294967296unit s/second

3.2.LoRa Network

project	Attributes	describe
App ID	read and write	Differentiate application scenarios
spread spectrum	read and write	Spreading factor. SF7~SF12, SF7fastest, closest
channel	read and write	will 470~510Mhz separated by 32channels
Signal	read only	The signal strength of the most recent data received
signal to noise ratio	read only	The signal-to-noise ratio of the most recent piece of data received
forwarding table	read and write	Supports up to 1 forwarding0address packets

3.3. Serial port

project	Attributes	describe
baud rate	read and write	1200~115200bps
data bits	read and write	optional5, 6, 7, 8 bits
stop bit	read and write	1 or 2 digits optional
Check Digit	read and write	Optional no parity, odd parity, even parity
Serial heartbeat	read and write	4 serial ports can be set to send data regularly The application is as follows: 

3.4.DI

project	Attributes	describe
Take the initiative to report	read and write	Enable/disable DI data reporting
Reporting cycle	read and write	DI status reporting period

After active reporting is enabled, when any change in the status of DI is detected, the status of all DIs will be reported immediately and refreshed Active reporting cycle.

3.5.AI

project	Attributes	describe
Take the initiative to report	read and write	Enable/disable AI data reporting
Reporting cycle	read and write	AI state reporting period
Reporting rules	read and write	Can be set to report when the AI value enters/exits a certain range
Low pass parameters	read and write	Adjust the AI acquisition filter range. The larger the low-pass parameter, the faster the AI value changes

After active reporting is enabled, when the reporting rules are met, all reports are immediately AI status,and refresh Active last cycle.

3.6.DO

project	Attributes	describe
Take the initiative to report	read and write	enable/disable DO data reporting
restart state	read and write	Whether the DO maintains the last output state after restarting
Output hold time	read and write	DO Output the duration of a state. Output the last state after reaching the time
default output	read and write	After this item is enabled, the set value will be output after reaching the default output time, and will not return to the previous state

3.7.AO

project	Attributes	describe
Take the initiative to report	read and write	enable/disable AO data reporting

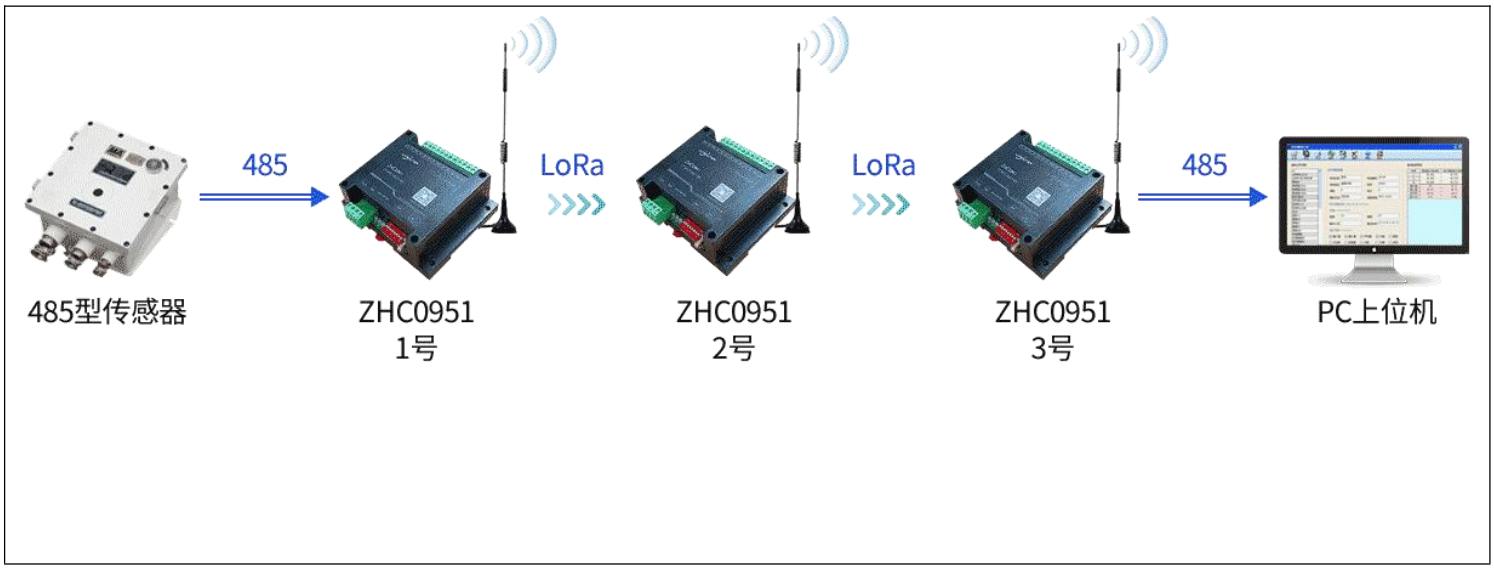
restart state	read and write	after reboot Whether AO maintains the last output value
Output hold time	read and write	AO Output the duration of a state. Output the last value after reaching the time
default output	read and write	After this item is enabled, the set value will be output after the default output time is reached, and the previous value will not be returned.

3.8. Conditional judgment

project	Attributes	describe
condition	read and write	Trigger the rule. follow forward (DI closed, DO is closed) Reverse follow (DI is disconnected, DO is closed) AO follow (AO output value follows AI detection value) greater or equal to(AI Perform an action when the detected value is greater than or equal to the threshold) less than or equal to (AI Perform an action when the detected value is less than or equal to the threshold)
address	read and write	Device address code to follow
input register	read and write	4input (DI/AI)
output type	read and write	DO/AO
output register	read and write	4 outputs (DO/AO)
DO action	read and write	DO is normally open and normally closed. Only valid when "condition" is "greater than or equal to" or "less than or equal to"
threshold	read and write	AI comparison value. Only valid when "condition" is "greater than or equal to" or "less than or equal to"
AO output	read and write	AO output value. Only valid when "condition" is "greater than or equal to" or "less than or equal to"

4. Advanced function (relay forwarding function)

4.1 Case Application Scenario



Scenario description: PC computer/host computer collects sensor data. Due to the distance, device 1 and device 2 can communicate, device 2 and device 3 can communicate, and device 1 and device 3 need to be transferred. Continue forwarding.

4.2 Configure No. 1 device

The necessary parameters are as follows:

- Application ID: 1 (No. 1, No. 2, No. 3 devices are all the same)
- Address: 0x01 (unique under the same application ID)
- Spread spectrum: 10 (No. 1, No. 2, No. 3 devices are all the same)
- Channel: 0 (No. 1, No. 2, No. 3 devices are all the same)

No. 1 equipment configuration diagram

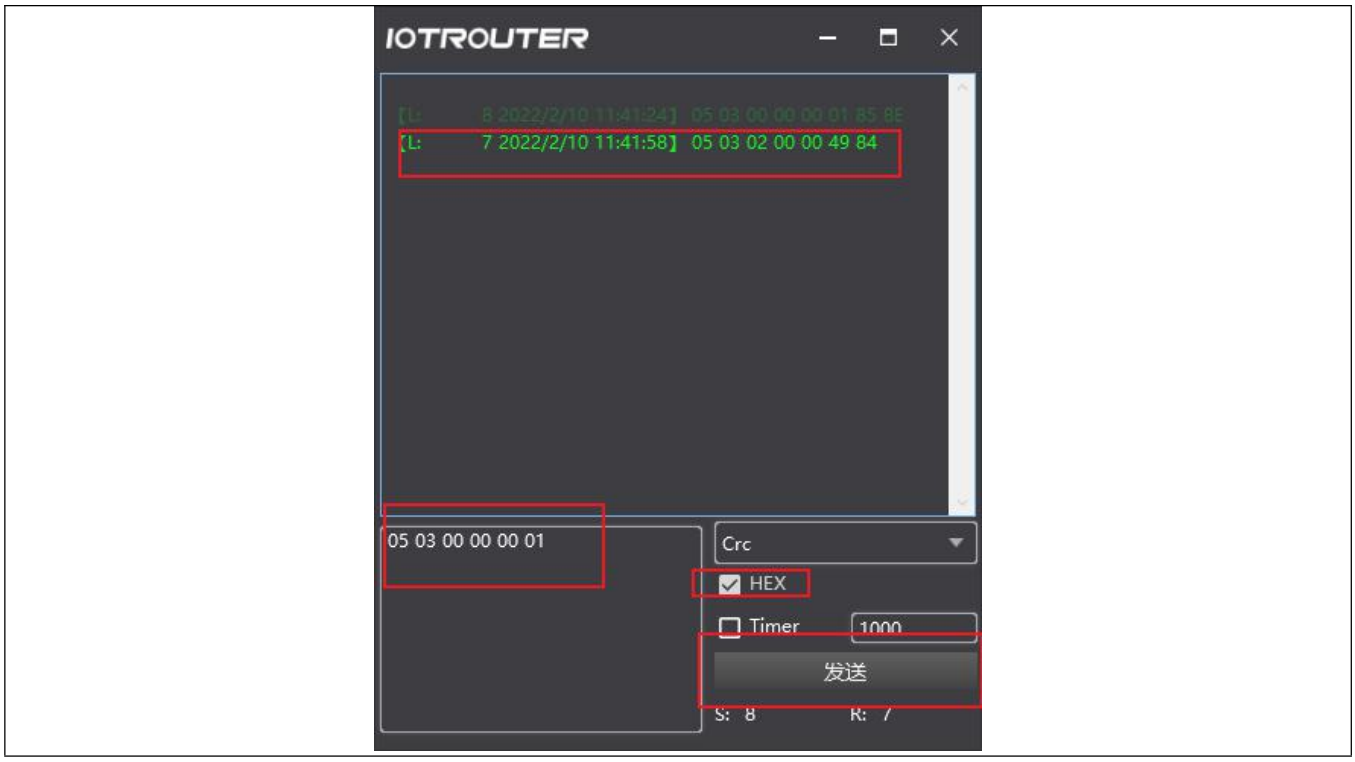
4.3 Configure No. 2 device

The necessary parameters are as follows:

- Application ID: 1 (No. 1, No. 2, No. 3 devices are all the same)
- Address: 0x02 (unique under the same application ID)
- Spread spectrum: 10 (No. 1, No. 2, No. 3 devices are all the same)
- Channel: 0 (No. 1, No. 2, No. 3 devices are all the same)
- Forwarding table: 0x03 (No. 2 device is the relay that needs to forward the command sent by the PC of No. 3 device, and the forwarding table is configured with 0x03)
- Forwarding table: 0x01 (No. 2 device is a relay that needs to forward the sensor reply data under No. 1 device, and the forwarding table is configured with 0x01)

No. 2 equipment configuration diagram

4.4 Testing



Device No. 3 does not need to be configured. Send the sensor command from 485 of Device No. 3, and the sensor responds with data.

(**Notice:**Ensure that the modbus address of the sensor and ZHC0951 is unique, the sensor address here is 0x05)

5. Wiring diagram

5.1. DI dry contact input detection wiring method

ZHC0941It is divided into dry node input circuit and wet node input circuit. Users need to determine the wiring method according to the input type of the product. Dry node wiring method:Short DC-IN and COM,A passive switch is connected in series between the DI input terminals DIX and COM, and the state of the input quantity is controlled by closing and disconnecting the control switch. The specific wiring method is as follows:

5.2. DI wet node input detection wiring method

Wet node wiring method:Short DGDNG and COM,The power supply needs to be provided externally, and the voltage range is 0~50VDC. The on-off of the power circuit is controlled by a serial switch between COM and DIX. COM is connected to the negative pole of the power supply, and DIX is connected to the positive pole of the power supply.

湿节点接线方式


+
-
DC-IN COM DGND DI4 DI3 DI2 DI1 DGND GND AI4 AI3 AI2 AI1
IOTROUTER
ZHC0941
1RS485+4DI+4AI
www.iotrouter.com
DC9~36V
A B
RS485
WORK SEND RECV
ADDR
ANT
1 2 3 4 5 6 7 8

5.3.DO output wiring mode

ENC0951The DO output adopts a single-way normally open relay, and the user can control the on-off of the peripheral circuit by controlling the opening/closing of the relay.

Notice:

When connecting a high-power inductive load, it should be noted that the maximum start-stop current of the load should be within the carrying range of the device.

It is recommended to use the device as a controller to control the intermediate relay to avoid damage to the output interface of the device due to excessive current.

5.4 AI analog detection/AO analog output wiring method