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WTD8XXX Series

IoT WiFi Communication
User's Manual of I/O Module

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Chapter 1

Basic Information

1.1 Overview

WTD8XXX series are a series of IoT I/O acquisition and control modules based on wireless Wi-Fi communication,that integrated with IoT data acquisition, processing, control and publishing functions.The series product can be connected to the host computer such as computer 、mobile phone、HMI(Human Machine Interface)、industrial computer and so on via wireless Wi-Fi router or wireless AP.Users can access the configuration interface and operate configuration and monitoring function via browser and WTDUtility.This series product can provide signal isolated input-output I/O port and the function of turning Modbus-RTU/TCP to wireless Wi-Fi.

The following figure shows a typical application case for the WTD8XXX series of networking modules:

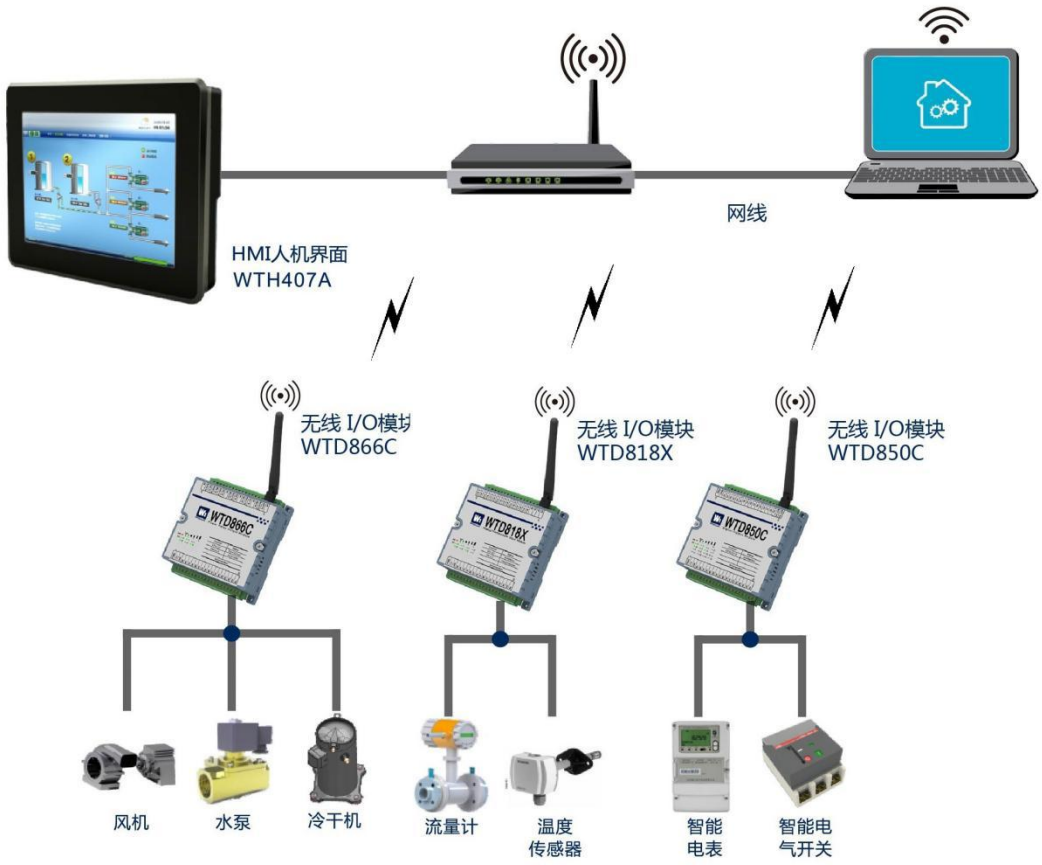


Figure 1-1 WTD8XXX IoT application case

1.1.1 Characteristics

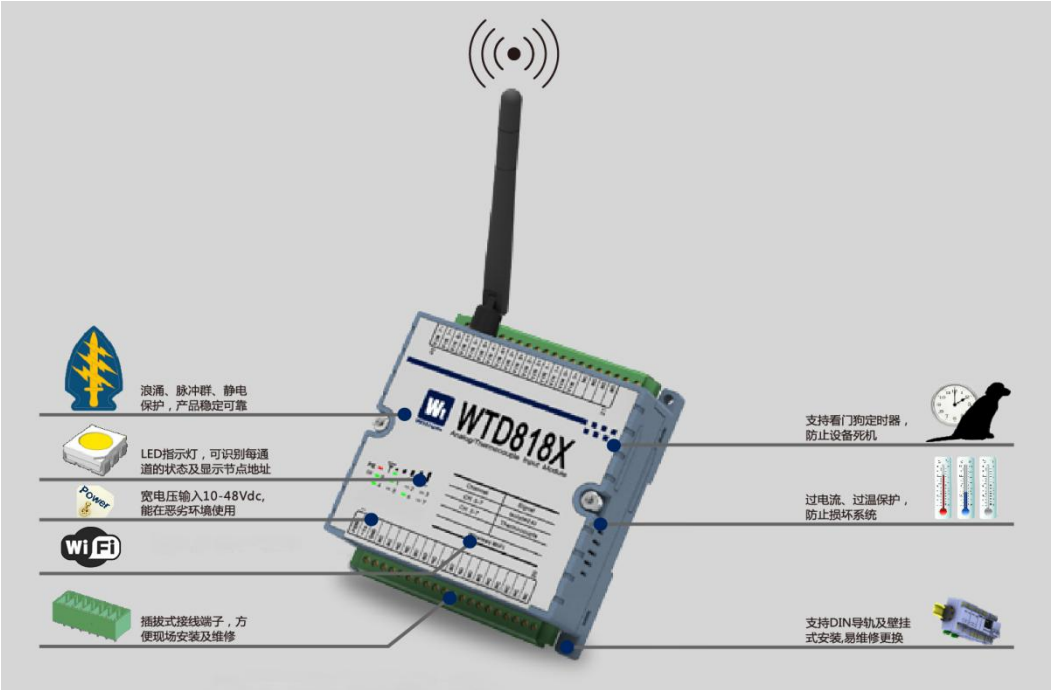


Figure 1-2 chractor of WTD8XXX IoT module

Multifunction I/O:

- Each DO channel can support open-drain TTL-level output. Moreover, you can set the security values, that is, if the Wi-Fi communication is lost, DO status can be set to a safe value. Meanwhile, DO channel can simultaneously control the PWM output waveform.
- Each DI channel can simultaneously support the input of dry and wet nodes.
- Every DO/DI has a corresponding LED indicator to display its status.

Built-in watchdog:

WTD8XXX series module includes a built-in hardware watchdog timer that can be reset automatically in case of module system failure, to ensure the normal operation of such module.

Wi-Fi communication:

WTD8XXX series module communicates with host computer via Wi-Fi communication and Modbus-TCP protocol what is a standard bus protocol for

industrial applications that can be used in a variety of data acquisition and process monitoring occasion.In this communication network is only one device host, the rest are slave controllers up to 247. WTD8XXX series module can be used as Modbus-TCP slave controller , where industrial HMI or industrial computer and other host computer are used as Modbus-TCP host computer.

Cascade mounting of modules:

WTD8XXX series modules can be mounted on any panels, brackets and DIN rails. They can be stacked together in order to saving space and mounting more modules.

Three-way isolation and protection:

It can protect the hardware as far as possible without external influences.WTD8XXX series module passed CE certification testing has such designed three-channel isolation and protection for communication interface, I/O interface and power interface.

IoT cloud platform application:

Users can not only locally collect or control to the WTD8XXX module, but users can use the IoT cloud platform to monitor the WTD8XXX module via the computer or mobile browser.As long as the module’s communication protocol is consistent with the cloud platform,the module can remotely upload monitoring data to cloud server and record、 analyse and dig data. Users can save data by public cloud platform or configuring private cloud platform.

From the field-side data monitoring to data communications of cloud platform, the WTD8XXX module provides a very flexible IoT solution.

1.2 Product Front View

Figure 1-3 WTD8XXX front view

1.3 Installation Dimensions

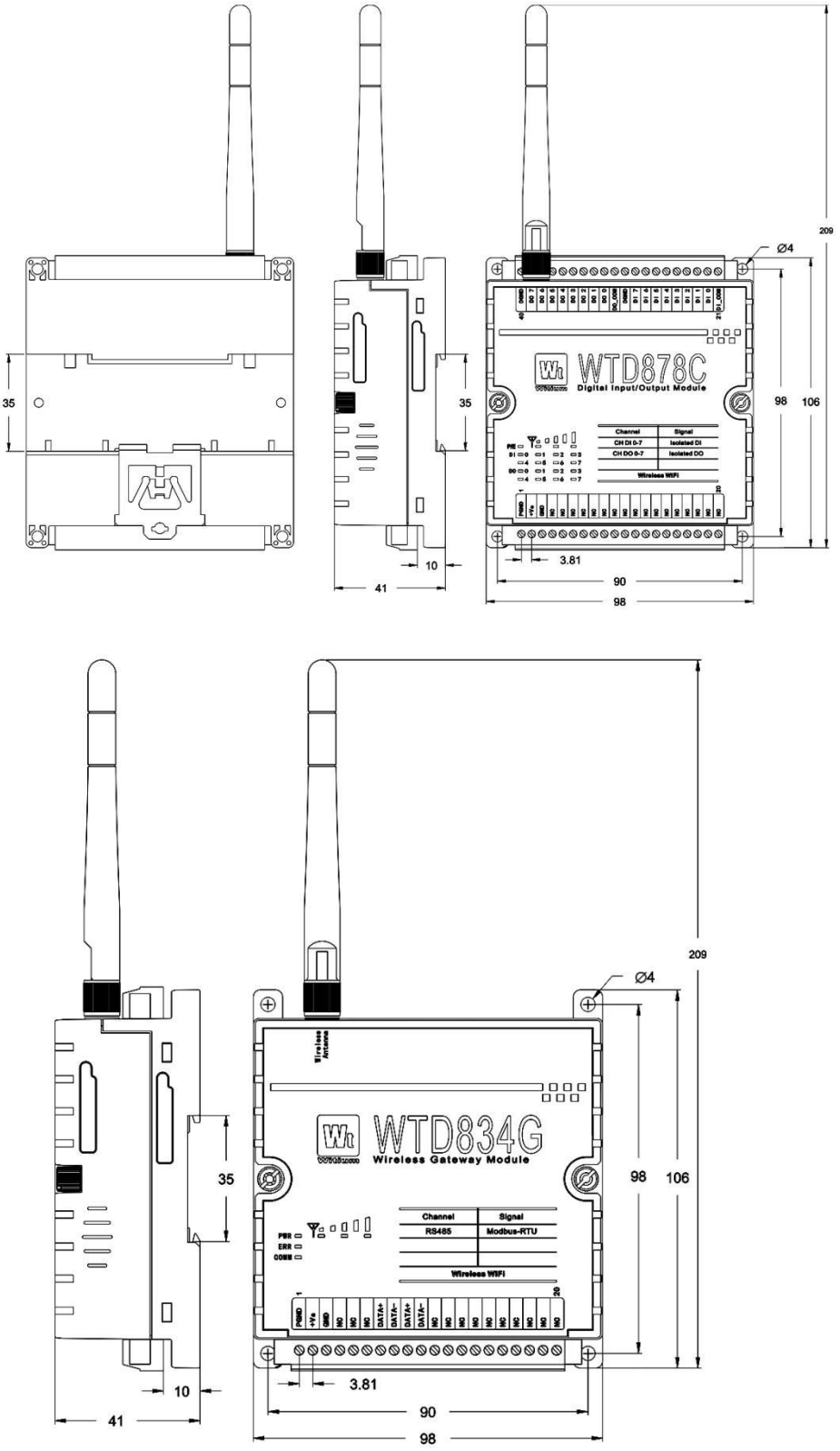


Figure 1-4 WTD8XXX module installation dimension

1.4 Switch description

There is a DIP switch on the left side of the WTD8XXX series module that can be used to configure Wi-Fi AP mode (Wireless Access Point) or station mode (Station).

DIP switch	dial up	ON	AP mode
DIP switch	dial down	OFF	AP mode

1.5 LED light instructions

WTD8XXX series modules have power status indicator, Wi-Fi signal strength light and channel work indicator，that,with different functions,have different numbers of input-output channel indicators.

LED	color	status	function description
power / status P / E	red	AP mode: blink station mode: blink station mode: bright	AP mode: normal operation station mode: The device is not connected to the network station mode: The device is connected to the network
antenna signal strength	green	AP mode: marquee blink station mode: off station mode: bright	AP mode: normal operation station mode: without no connection signal station mode: with the connection signal strength
digital input DI	green	off bright	digital input off digital input on
digital output DO	green	off bright	digital output off digital output on
analog input AI	green	off bright	analog input off analog input on

analog output AO	green	off bright	analog output off analog output on

1.6 Product Family

Serial number	module model	module brief
1	WTD814P	4-channel Rtd input 2-channel isolated output IoT Wi-Fi communication module
2	WTD818X	8-channel analog/thermocouple input IoT Wi-Fi communication module
3	WTD824X	4-channel analog output 4-channel isolated digital input IoT Wi-Fi communication module
4	WTD840X	16-channel isolated digital/counter input IoT Wi-Fi communication module
5	WTD850C	16-channel isolated digital/PWM output IoT Wi-Fi communication module
6	WTD866C	6-channel isolated relay output IoT Wi-Fi communication module
7	WTD878C	8-channel isolated digital/counter input 8-channel isolated digital/PWM output IoT Wi-Fi communication module
8	WTD834G	Modbus-RTU to Wi-Fi IoT gateway
9	WTD836G	Modbus-TCP to Wi-Fi IoT gateway

1.7 Application

The product can be used for

- Remote data acquisition

- Remote monitoring
- Industrial control
- Energy management
- Security system
- Production testing
- Automatic control
- Wisdom Water
- Wisdom street lights
- Intelligent parking
- Intelligent building
- Intelligent environmental protection

and so on.

Chapter 2

Installation and Software Configuration

This chapter is used for guidance on how to install and configure the WTD8XXX series module network. It provides a user rapid configuration method of each module prior to the installation of communication network, and the configuration examples of the modules' Wi-Fi Web interface and all the modules while using the WTDUtility software.

2.1 Device Setup Wizard

WTD8XXX series modules are mounted on the guide rail and the installation method is as follows:

1、 First, fix the guide rail.

2、 Pull the movable plate back of the module out, as shown in the following figure.

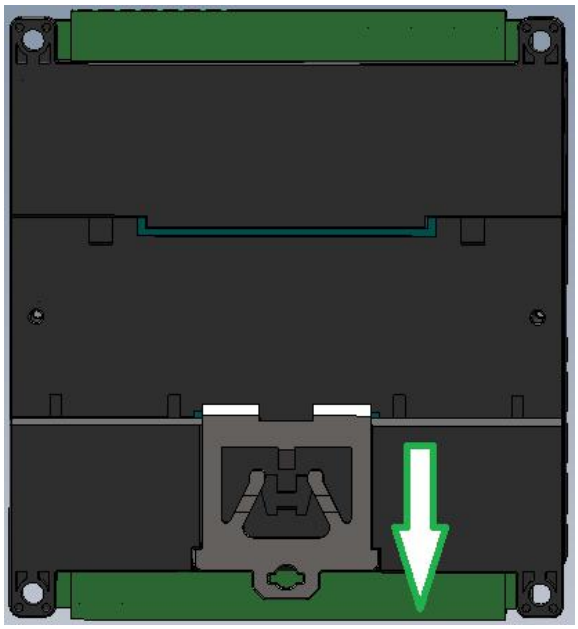


Figure 2-1 Schematic Diagram of WTD8XXX Module Back

3、 Install the buckle on the inactive side on the module back on the guide rail.

4、 Then press the other side on the rail.

5、 Finally, reject the movable plate pulled before.

WTD8XXX series module can be cascaded via screws, i.e. change the screws on both sides of module into long ones, and fix the module to the screw

on the lower module by long screws through the module housings on both sides. All WTD series modules can be cascaded, including WTD4XXX series, WTD6XXX series,WTD8XXX series,WTD9XXX series,etc. with the effect diagram as shown in the following figure:

Figure 2-2 WTD8XXX Module Cascade Effect Diagram

The explosion diagram of WTD8XXX series is shown in the following figure:

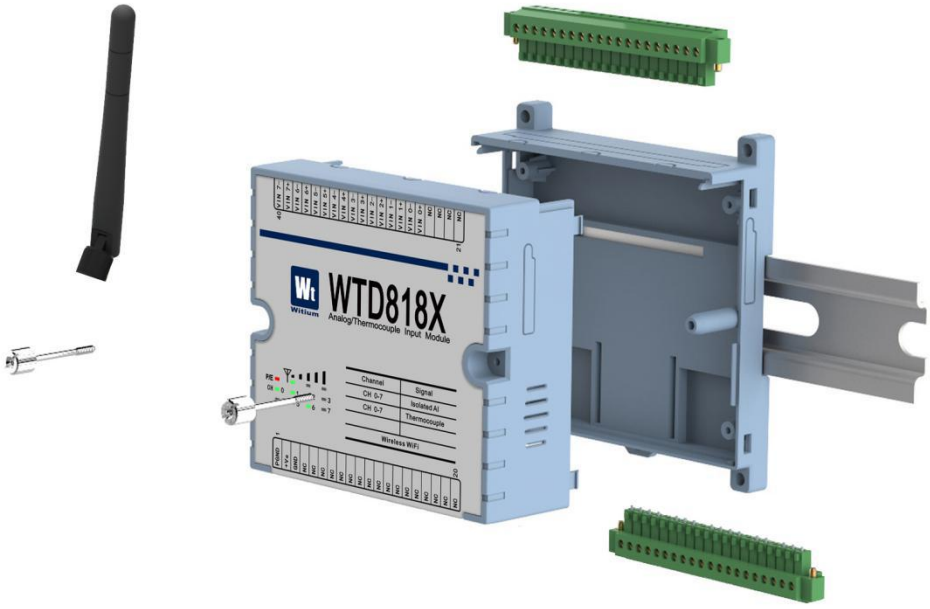


Figure 2-3 WTD8XXX Module Explosion Diagram

2.2 Module Web Side Configuration Wizard

Pre-prepare computers, mobile phones, or other devices with wireless network cards;12-24VDC power supply ;router and router's Wi-Fi account and password, network signal type, IP address.Recommend Google Chrome as the debugging device browser.

2.2.1 Introduction to module configuration

- Prepare 12-24VDC DC power supply;
- Connect power cable to module;
- Dial up the module product DIP switch to AP mode and power up;
- Open the wireless network-search function of computer or mobile and disconnect the other network connection,.Search for the wireless network with module number .And if there is no connection, disable the wired network port;
- Connect the computer or cell phone to the module Wi-Fi network;
- Enter IP: 192.168.1.1 in the browser address bar of computer or mobile,and click OK.Then the interface get into the module configuration mode;
- Click the "Configure Device" menu.Under the "Wireless" tab, set the working mode "WLAN Mode" of the module to the operating mode "Station", and then configure the router's Wi-Fi account "SSID of the Access Point" 、encryption type "Security Type", password "Security Key".In "Station Mode IP Settings" area, configure the module's work IP address (it's important and remember please), gateway, and click to submit;
- Power the module off and dial the DIP switch to the operating mode.And then re-power the module up;
- Connect the computer to router network as same as the module .In the

browser address bar, enter the working IP address in node mode of the WiFi module set in AP mode ,and then click to enter;

- Click on the menu "IO status" to view the module's input-output status and value and control the module's output status and value;
- The configuration ends.

2.2.2 detailed flow of the module configuration

WTD8XXX series modular products have DIP switch what can restore the Wi-Fi module to AP mode in one-touch, easily handle the situation of forgetting the IP in station mode.(Below to WTD878C module configuration process as an example)

2.2.2.1 Module environment configuration

Dial up the module's mode DIP switch to AP configuration mode.While powered up the module to AP configuration mode,the status of P / E indicator and the antenna signal lights on the module surface are marquee with left and right cycle.

Figure 2-4

The left shows the module DIP switch , the right shows the module's status on AP mode

1.Turn on the computer, mobile phone or tablet PC Wi-Fi network;

2.Disconnect the other network connections;

3.Disable the wired network;

4.Search wireless module Wi-Fi signal.

5.As shown below, click wireless network "Witium_878C_E0E5CFB45D07" to connect.

Figure 2-5 module's AP signal

1.Open the browser and enter module AP IP: 192.168.1.1 in the address bar.

2.As shown below [AP mode fixed IP: 192.168.1.1], click the Enter.

3.Go to the login page, and enter the account and password to the configuration interface.

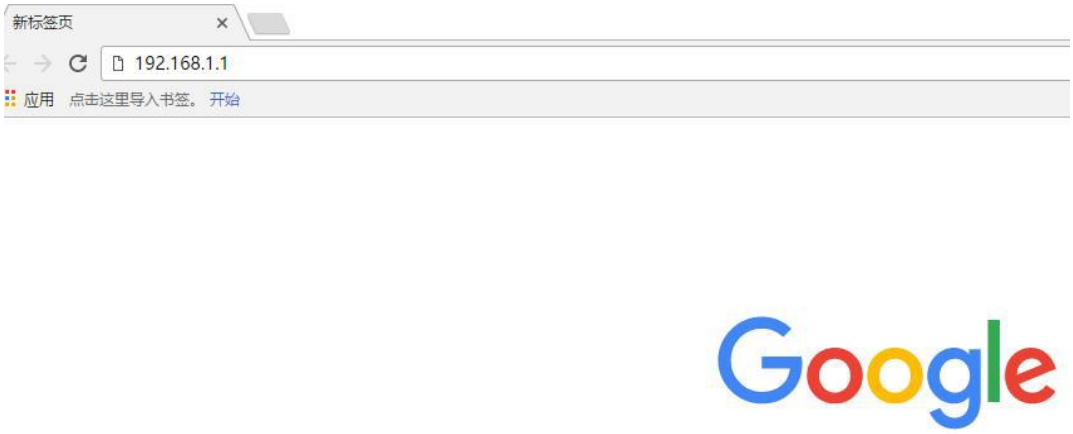


Figure 2-6 module configuration interface via the Web

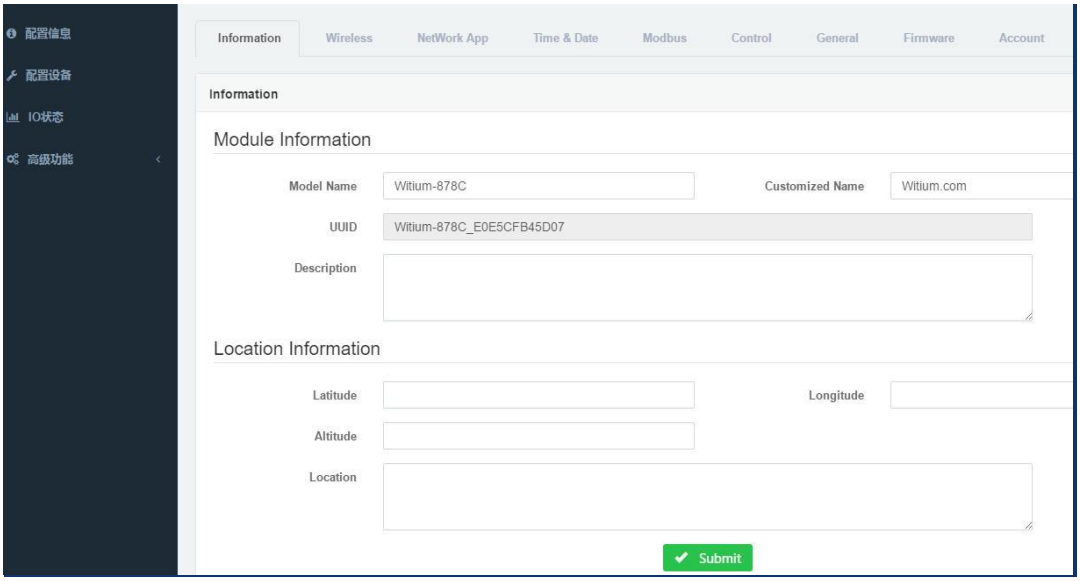


Figure 2-7 configuration-device interface on module's Web side

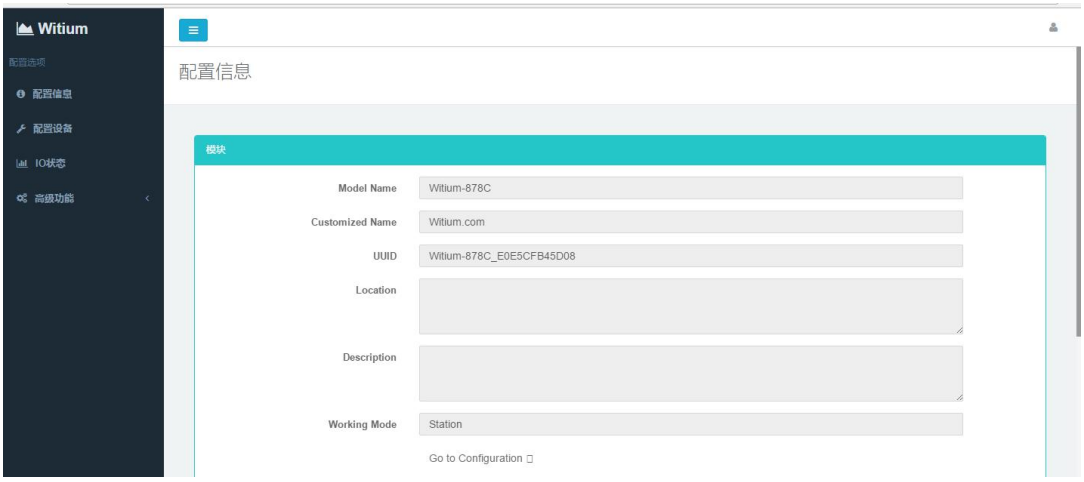


Figure 2-8 configuration information interface on module's Web side

2.2.2.2 Module "Wireless" wireless configuration

Click the menu "Configure Device" and enter the wireless configuration label "Wireless" to get the following figure:

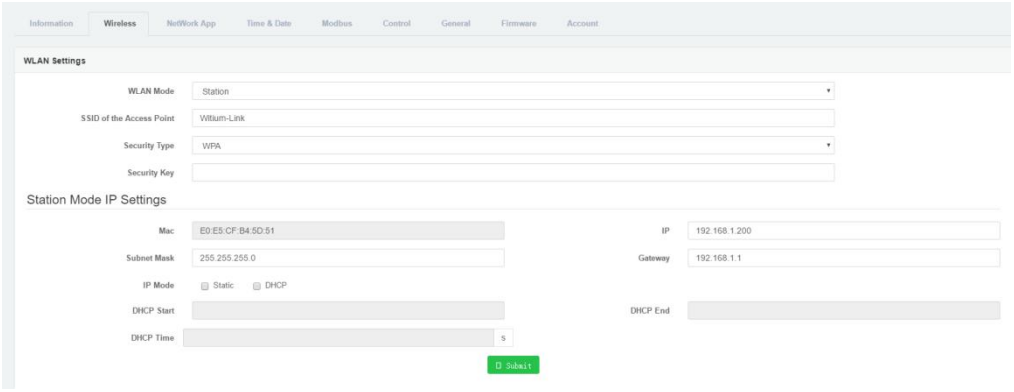


Figure 2-9 configuration interface on module's Web side

Step 1: Set the network account and password of the wireless router connected with Wi-Fi module product under "working mode" (as already mentioned in Section 2.2.1).

Step 2: Set the IP address of the Wi-Fi module under "Operating mode". IP address can be set by yourself and you can also set a fixed IP address or automatically assign IP address.Click on "IP Mode" and tick ✔ the Static item . (It is recommended to set a fixed IP address for subsequent settings). Click on the submit button to submit and save the settings.

– **WLAN Settings**：network settings

– **WLAN Mode** 网络模式：station(working mode) access point (AP mode)

– **SSID of the Access Point**：module's router network name in working mode

– **Security Type**：The type of network access point (typically WPA2)

– **Security Key**：module's router Wi-Fi password in working mode

– **Station Mode IP Settings**:working mode network settings

– **IP Mode Static**：fixed IP address

– **IP Mode DHCP**: Randomly assign IP addresses

– **Gateway**：Gateway default 192.168.1.1

– **Subnet Mask**:subnet mask default 255.255.255.0

– **IP:** module's network address in working mode（enter this address in browser address bar to connect to modules and the test

configuration IP address is 192.168.1.108）

2.2.2.3 Module input and output configuration and testing

Click on “IO status”and enter module’s input-output configuration interface .As shown below is DI and DO configuration interface of WTD878C module product,in which users can view and control module’s DI and DO status.

DI configuration and test:

(1)In the "Status", when users input switch contact signal or level signal to the module channels DI0 to DI7, users can see the module port status above the configuration page.

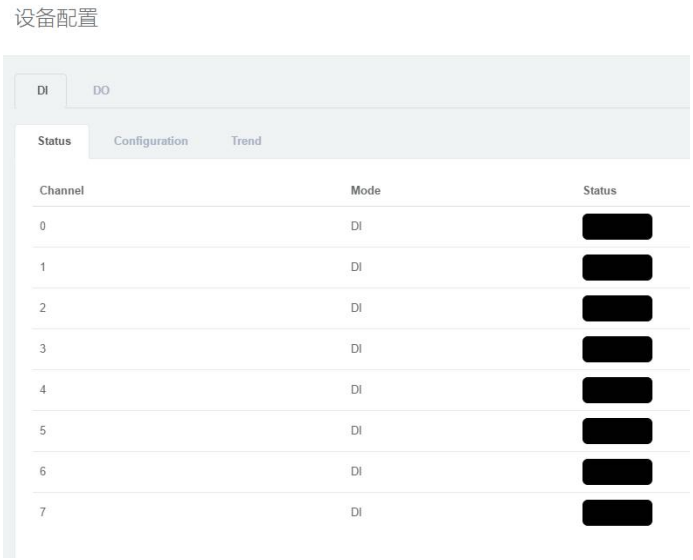


Figure 2-10 input status page of module DI-channel

(2)In “Config”,the interface is DI-channel configuration mode.Under the "Channel" option, select the channel to set and ,under the “Mode” option, select channel input type to configure.By default, all channels are "DI" digital input mode.

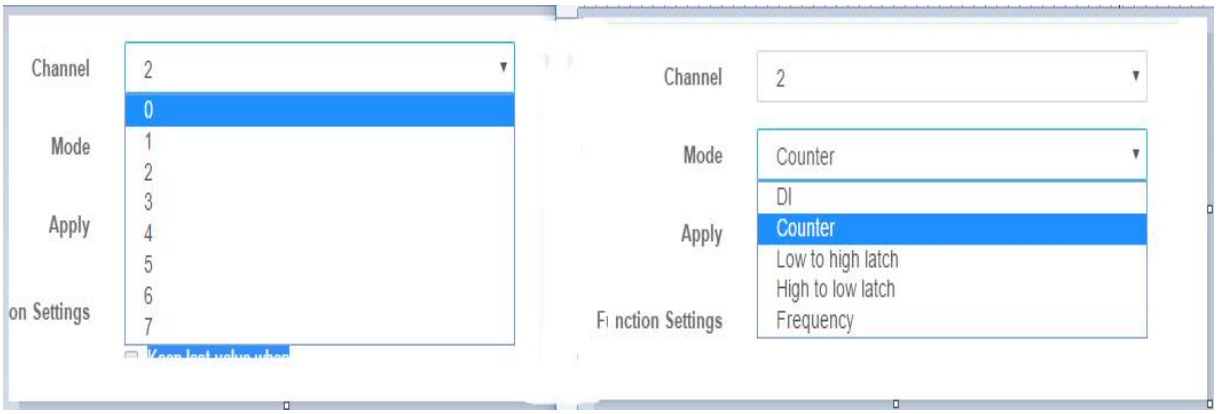


Figure 2-11 Module DI channel input mode setting

"Apply":"DIMode" means a single channel application; "ModeAll" means all channel applications. Click on any one of the two buttons and it will pop up a dialog box.Click "OK" to save the application successfully, as shown below:

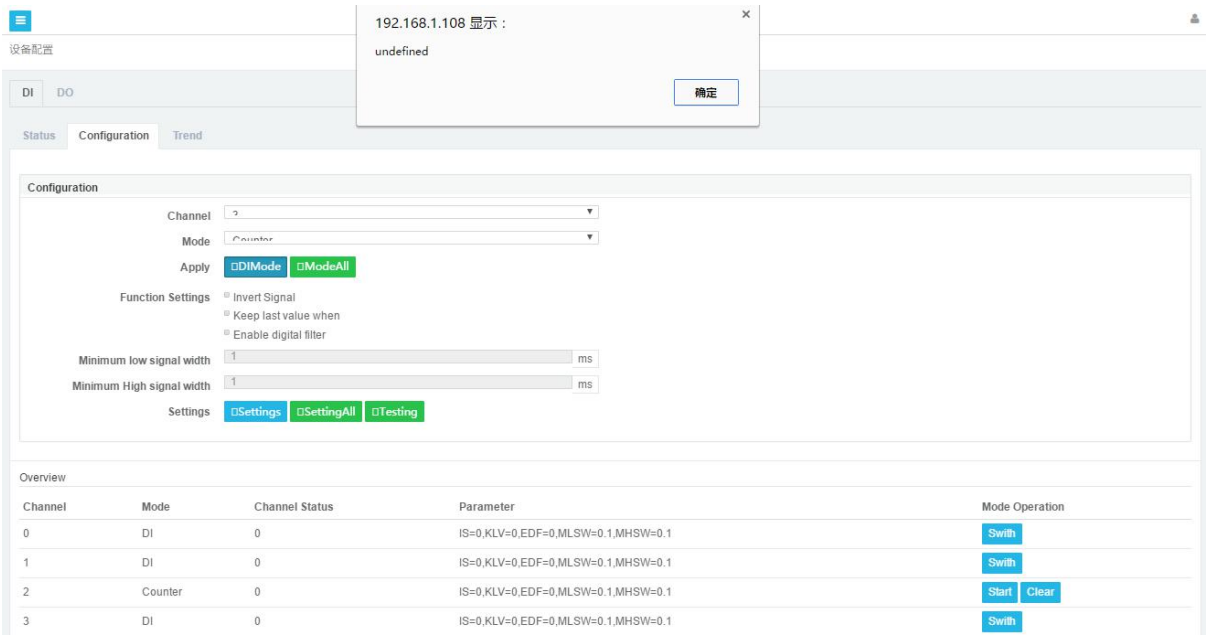


Figure 2-12 Module DI channel input function setting

After the input mode is configured, users can see the "Mode" status change in the "Overview" column.

When the input mode is "DI", users can see the current status of the digital input channel.

When the input mode is "Counter", press "start" to see the count value what can be cleared.

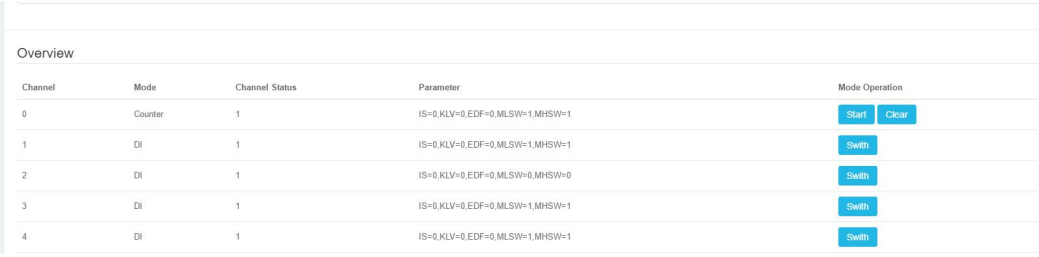


Figure 2-13 Module DI channel status display

(3)Under the "Threnda" curve, the current status curve for all DI channels is displayed. The curve is recorded every 1 s, showing only the status of the last 8 seconds. As shown below:

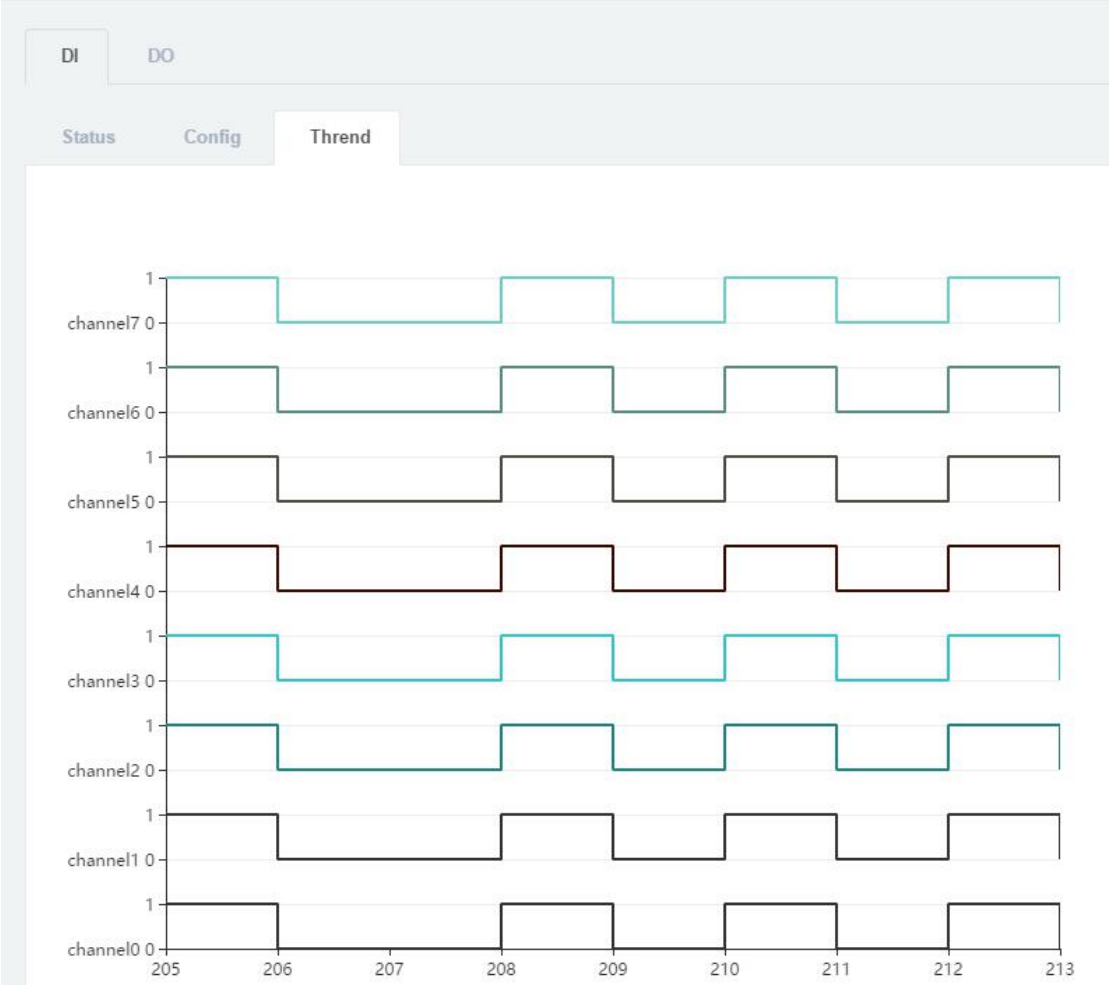


Figure 2-14 Module DI channel curve status display

DO configuration and testing:

(1) In "Status" , users can control the output status of the channels DO 0 to DO 7, and then users can see the current status of the module output port on

the configuration interface. If users can not control the product, please check the power supply and network of the product. The error shown below is that the module is not online:

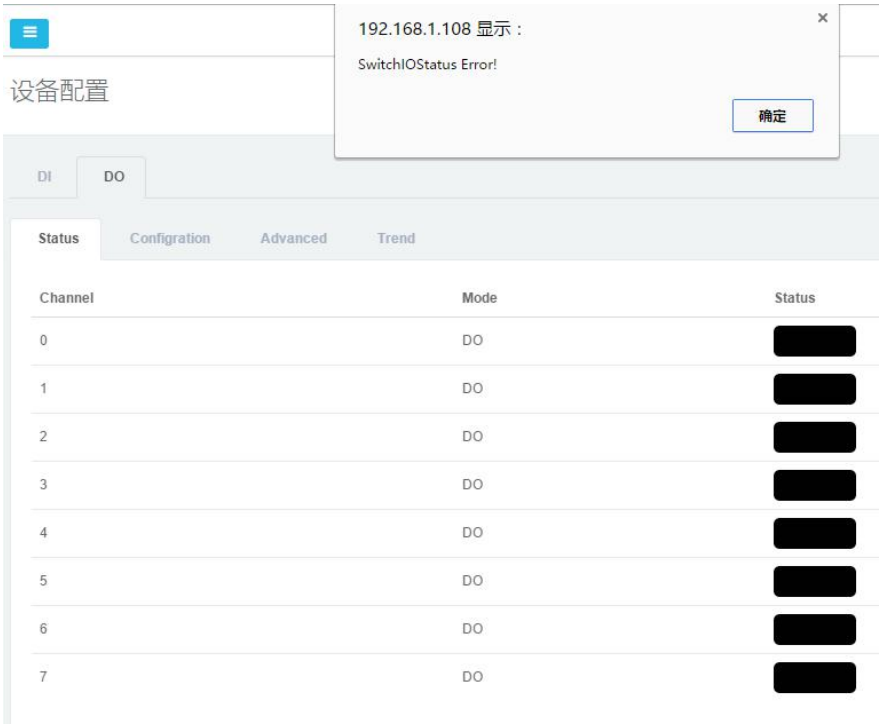


Figure 2-15 Module DO channel output status page

(2) "Configuration" shows the DO channel configuration mode. Select the channel to be set in "Channel". Select the channel need to configure the output type In "Mode", such as DO, PWM output. By default,all channels are "DO" digital output mode.

"Apply":"DIMode" means a single channel application; "ModeAll" means all channel applications. Click on any one of the two buttons and it will pop up a dialog box.Click "OK" to save the application successfully, as shown below:

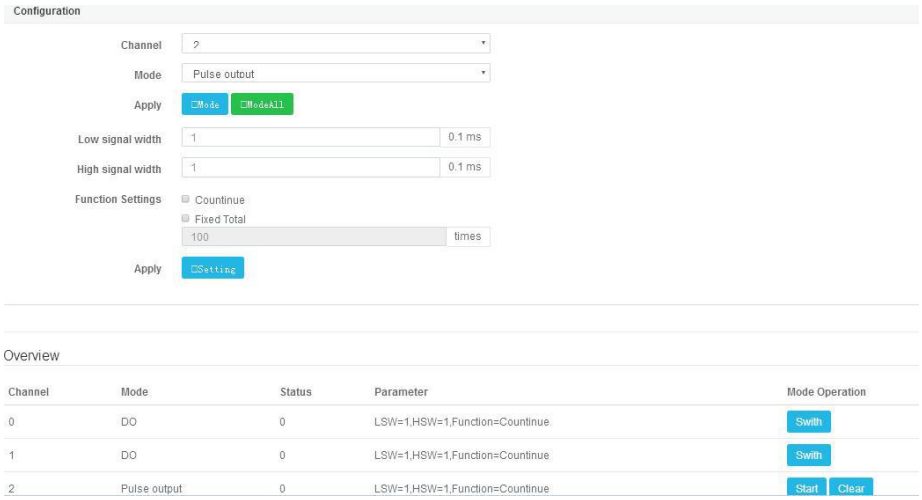


Figure 2-16 Module DO channel output function setting

After the output mode is configured, users can see the change of "Mode" in the "Overview" column.

When the output mode is "DO", users can see and control the status of the digital output channel.

When the output mode is "Pulse output", press "start" to start the PWM output.

(3) In "Advanced", you can configure the advanced settings of the module. The setting is used to set the module product in case of broken network whether to continue to maintain the output or to disconnect the output, what play a role in the protection of field devices.

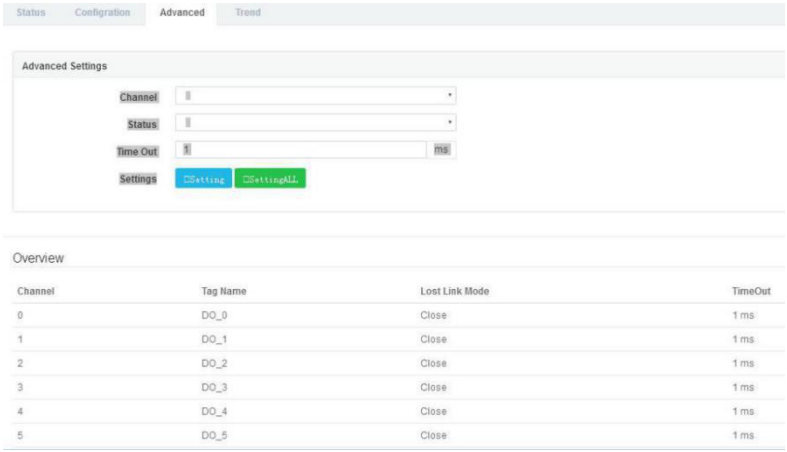


Figure 2-17 Module DO-channel's output status setting in broken network

(4) The "Threnl" curve will display the curve for all DO-channels' current

status what will be recorded every 1 s, showing only the status of the last 8 seconds.

2.3 Introduction to module "working mode"

This section describes how the WTD8XXX series modules work in the field after being configured the "working mode" via the Web side.

2.3.1 How to connect modules on site

When the WTD8XXX series module is configured to "operating mode", the computer, mobile phone, IPC / HMI and other host computer are disconnected from the Wi-Fi network of the WTD8XXX module and connected to the field via wireless Wi-Fi or wired Ethernet router.Dial down the DIP switch of WTD8XXX series product to "operating mode" and then re-power up the module again.Wait for the WTD8XXX module to connect to the wireless router. What the indicator means on the module product surface is as follows:

LED indicator	color	status	functional description
P/E	red	blink	no connection to the Wi-Fi router
		bright	connected to the Wi-Fi router
Antenna lights	green	bright	with Wi-Fi antenna signal
		off	No Wi-Fi antenna signal

If the WTD8XXX module is connected to a wireless network, the power indicator "P / E" and the signal strength light will be on. As shown below:

Figure 2-18 "work mode" indicator after module connect to WiFi

If the power indicator blinks and the signal indicator doesn't light, check whether the router's wireless account and password of the Web configuration or network type, fixed IP address are wrong or not.

2.3.2"Work mode" application scenario

Module are in "working mode" after connected to the Wi-Fi network. Here is a variety of connection applications in field.

2.3.2.1 Web side monitoring and control mode

Field operators can enter the IP address 192.168.1.108 (set in the detailed flow of the 2.2.2 module configuration) in the browser address bar via the host computer such as mobile phone, computer, IPC / HMI, etc. and enter the module configuration interface on the Web side.

In this way, the user can see the working status of the input-output channels of the module and control module as in the chapter "2.2.2 Module configuration detailed flow". The configuration is the same as the Web side in AP mode.As shown below:

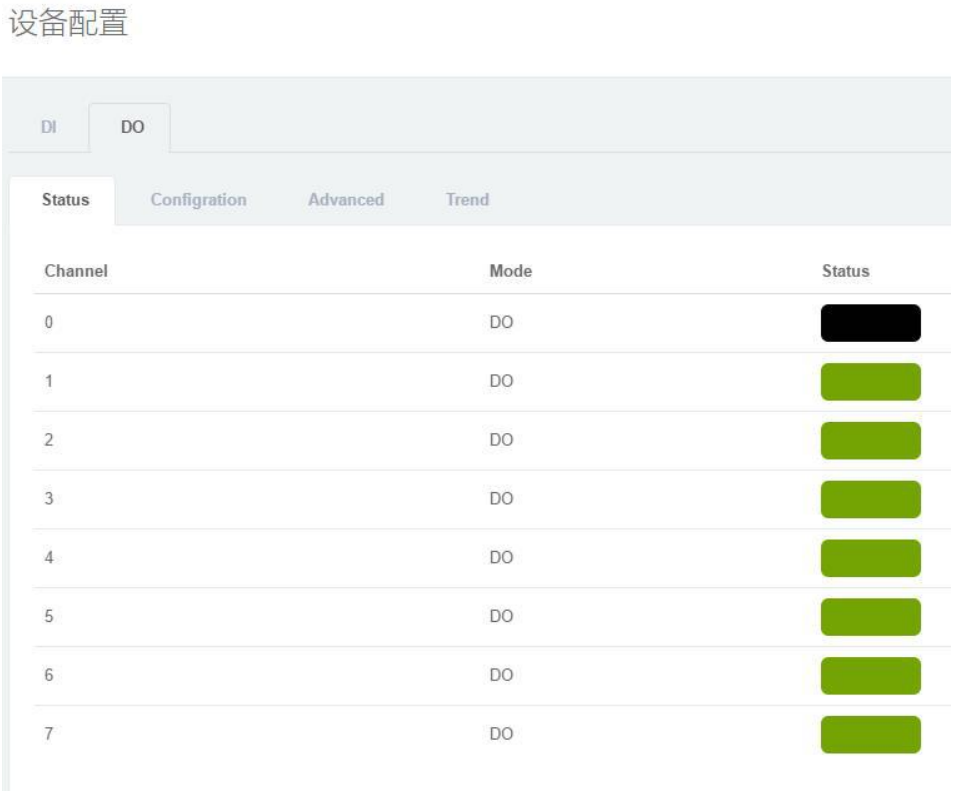


Figure 2-19 Web side monitoring mode of module "working mode"

This "working mode" is suitable for applying variety of WTD8XXX modules in the same network segment,as shown below:

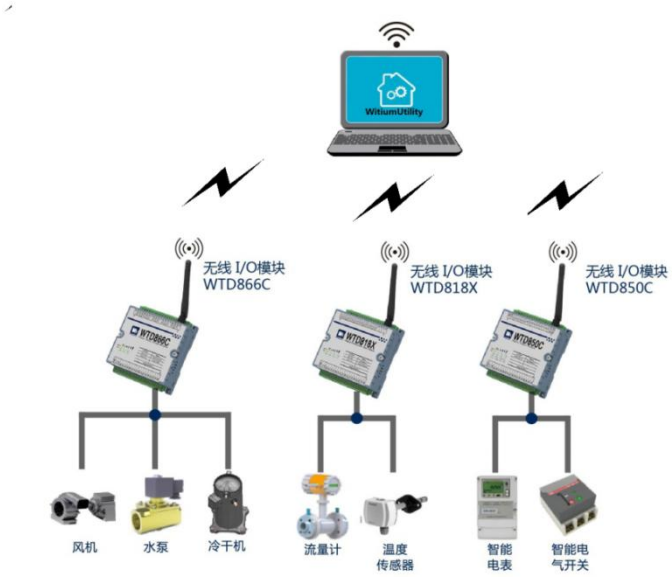


Figure 2-20 Apply a variety of modules

2.3.2.2 Host computer application monitoring mode

Field operator can collect 、 monitor and control module in real time via mobile phone application ,computer application ,IPC/HMI,etc..As shown below:

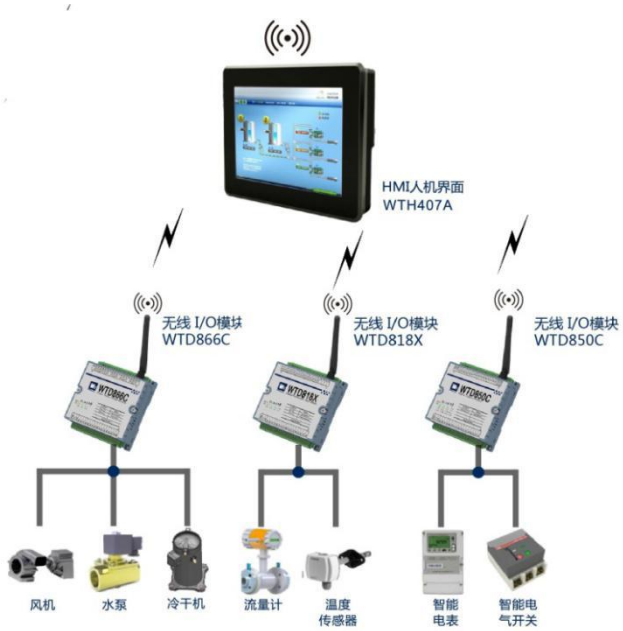


图2-21 connection and monitoring way of host computer application

2.3.2.3 PLC connection monitoring mode

Field operator can connect PLC to router via wired Ethernet.And then the PLC can collect and control the WTD8XXX-series'input-output channels in field via wireless Wi-Fi router.

As shown below:

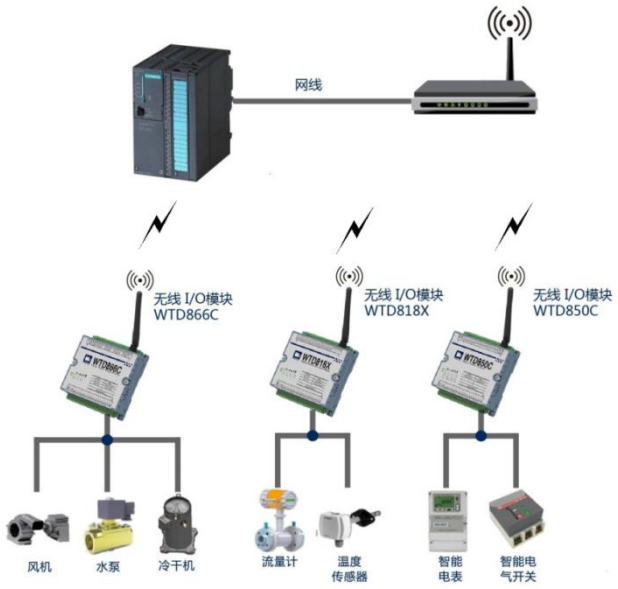


Figure 2-22 connection and monitoring way of PLC

2.3.2.4 HMI connection monitoring mode

Field operator can connect host computer like HMI to router via wired Ethernet or wireless Wi-Fi.And the HMI can collect and control the WTD8XXX-series'input-output channels via wireless Wi-Fi router.As shown below:

图2-23 connection and monitoring way of HMI

2.4 Module WTDUtility side configuration wizard

Besides the way of section " 2.2Module Web Side Configuration Wizard " ,users can configure and monitor the input-output channels of WTD8XXX module via WTDUtility configuration published by Witium.

After configuring the WTD8XXX series module to " working mode " via Web side of computer ,disconnect computer from the Wi-Fi network of WTD8XXX module. Then the computer must be connected to router via wired Ethernet. Dial down WTD8XXX module′ s DIP switch to " working mode " .Then re-power up the module and wait for connection between WTD8XXX module and wireless router.Then users can configure and monitor module by WTDUtility on computer side.

2.4.1 WTDUtility Software Installation and Use Wizard

WTD Utility uses Green installation way to direct run by extraction of software package without tedious installation process. WTD Utility software tool can be obtained from the disc that comes with your module and also from the official website:

Make sure the computer is connected to the router via wired Ethernet. Before turning on the WTDUtility software, turn off the computer Wi-Fi to prevent wireless network card conflict from causing the module failed to be searched.

The interface after running the software is shown in the following figure:

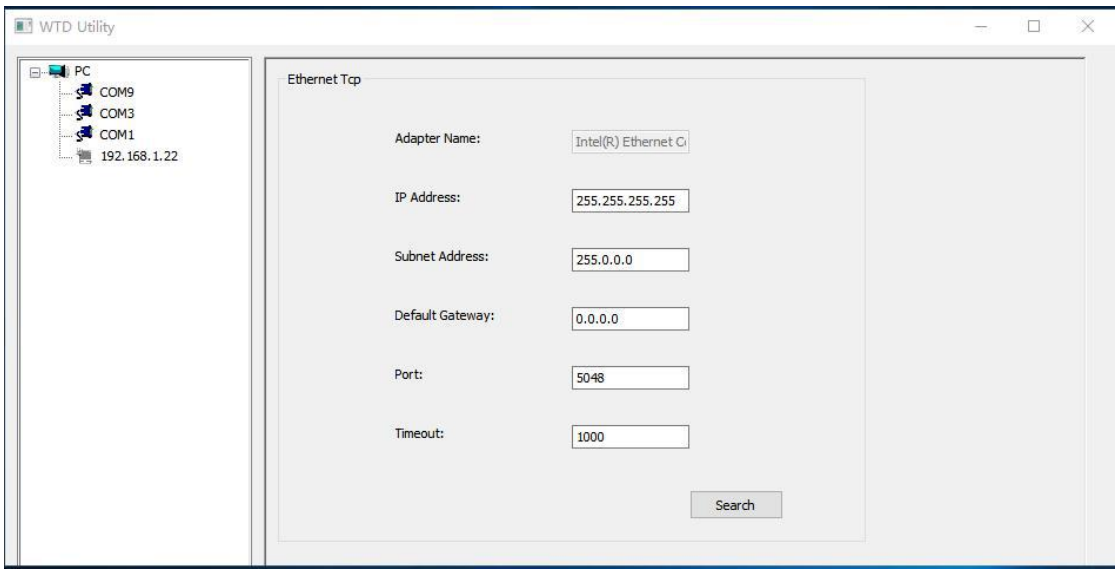


Figure 2-24 Main Interface of WTD Utility Software

The list box on the left lists relevant hardware resources of the device, including serial and Ethernet resources.Select the Ethernet IP:192.168.1.22 of the WTD8XXX module used in this device. In the right dialog box,the search interface will be displayed as shown below. Click on " search " to execute equipment search.The software will show the selected WTD8XXX module product in a list on the left, and click the corresponding module to configure and monitor the module.

WTD8XXX module is set for the whole network.

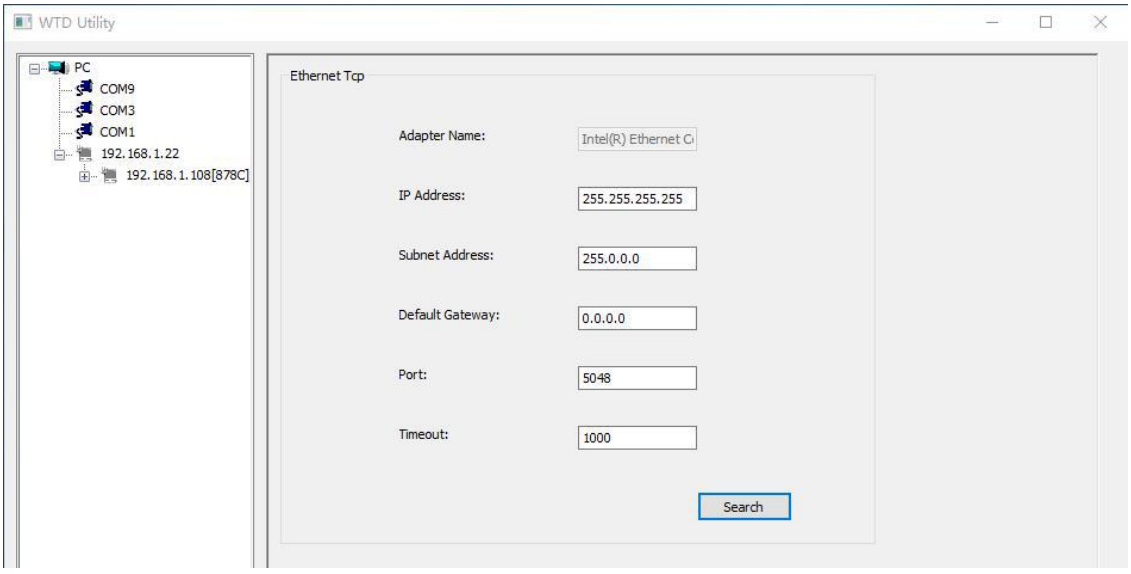


Figure 2-5 WTD Utility Serial software Search Interface

2.4.2 WTD814P 4-channel platinum resistance input module

After searching for a module device, the following interface can be seen:

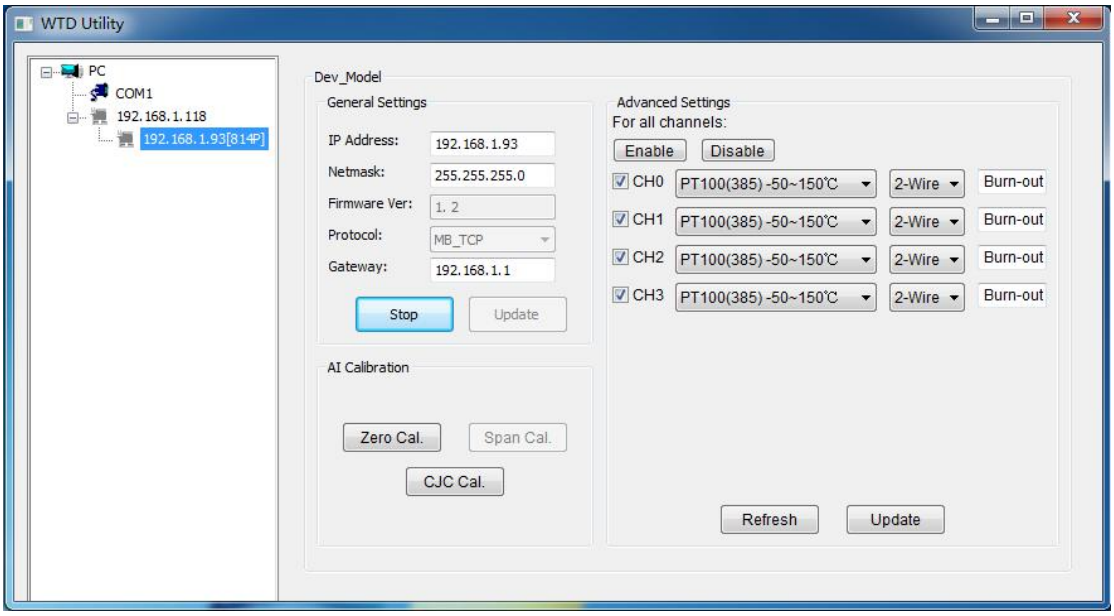


Figure 2-26 WTD814P Main Interface

Discovered devices will be displayed in the corresponding serial network node, whose name contains IP address of Modbus-TCP and module model.

General Communication Settings

Click on the module node and the correlated settings and test functions will be displayed in the right window, including general settings, advanced settings, and data display. In common settings, Modbus-TCP IP address, gateway, and sub-mask of the module can be set.When the parameter setting is completed, click on "Update" to complete the final device parameter settings. If setting successfully, it will pop up the button " Set Param Success " , as shown in Figure:

Figure 2-27 Successful Setting

If the setting is wrong, please check the module power supply and communication cables.

Advanced Settings

In the advanced settings, the mode setting of each channel is provided, that can select desired channels and platinum resistance sensors of different types and connection methods of different wiring systems.

Click the selection box in front of each channel to enable or disable the channel:

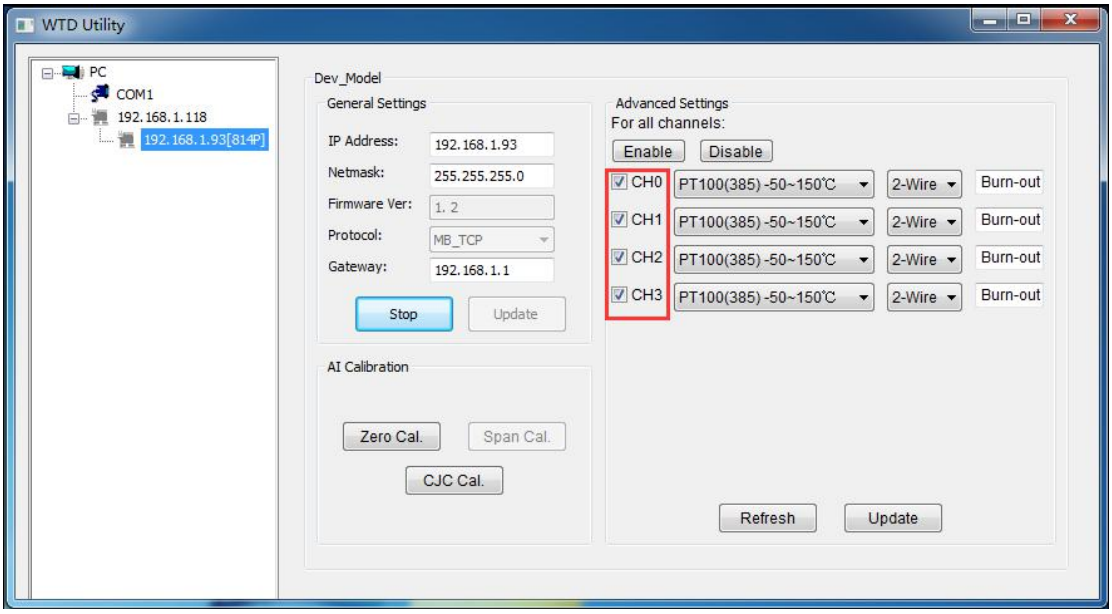


Figure 2-28 WTD814P configuration figure

In each drop-down option of each channel, select the corresponding platinum resistance type:

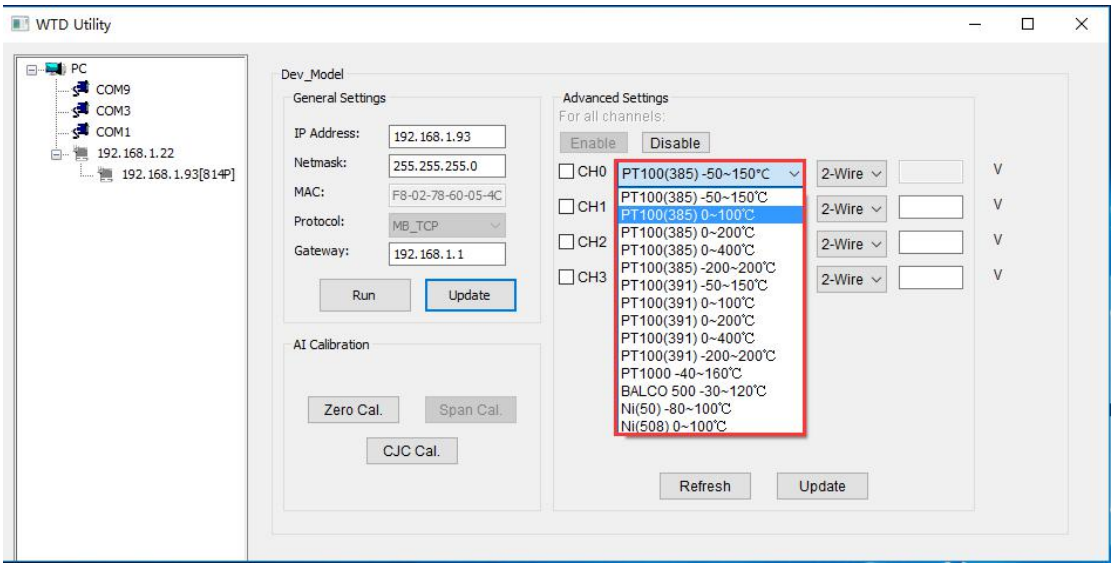


Figure 2-29 WTD814P selection of Pt type

Also, the corresponding wiring can be selected in each drop-down option of multiple-wire system:

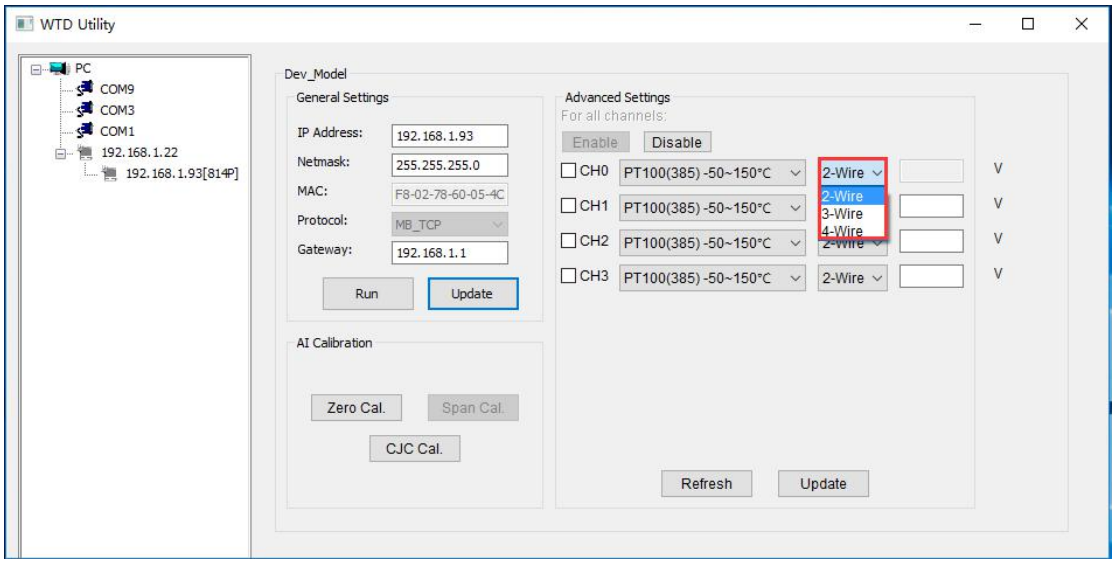
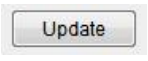
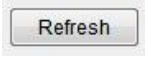


Figure 2-30 WTD814P selection of Pt wiring system

After the selection, in the advanced settings box, press 

button to save the settings,while 

button can be pressed to refresh the channel setting state of the module.

2.4.3 WTD818X 8 analog / thermocouple input module

After searching for the module device, the following interface can be seen:

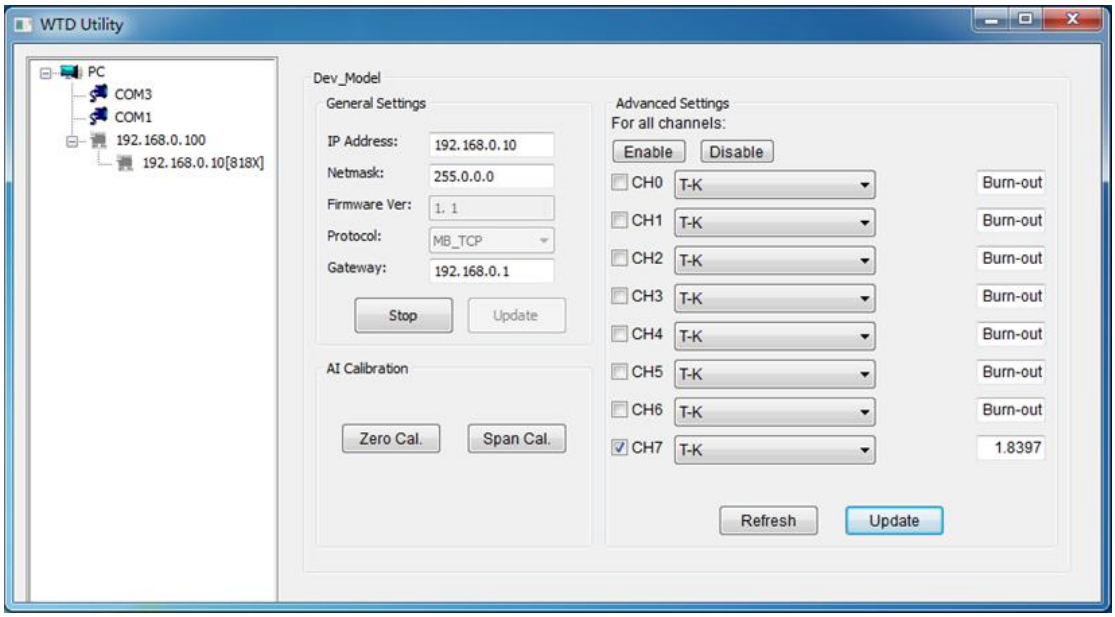


Figure 2-31 WTD818X main interface

Discovered devices will be displayed under the network node of the machine, whose name contains the Modbus address of Modbus-TCP and module model.

General Communication Settings

Click on the device node and the correlated settings and test functions will be displayed in the right window, including general settings, advanced settings, and data display. In common settings, Modbus-TCP IP address, gateway, and sub-mask can be set and, when the parameter setting is completed, click on "Update" button to complete the final device parameter settings.If successfully, it will pop up the button for successful parameter settings, as shown below:

Figure 2-32 Set up successfully

If the setting is wrong, please check the module power supply and

communication cables.

Advanced Settings

In the advanced settings, the mode setting of each channel is provided, that can select desired channels and analog input signal of different types and thermocouple type.

Click the selection box in front of each channel to enable or disable the channel:

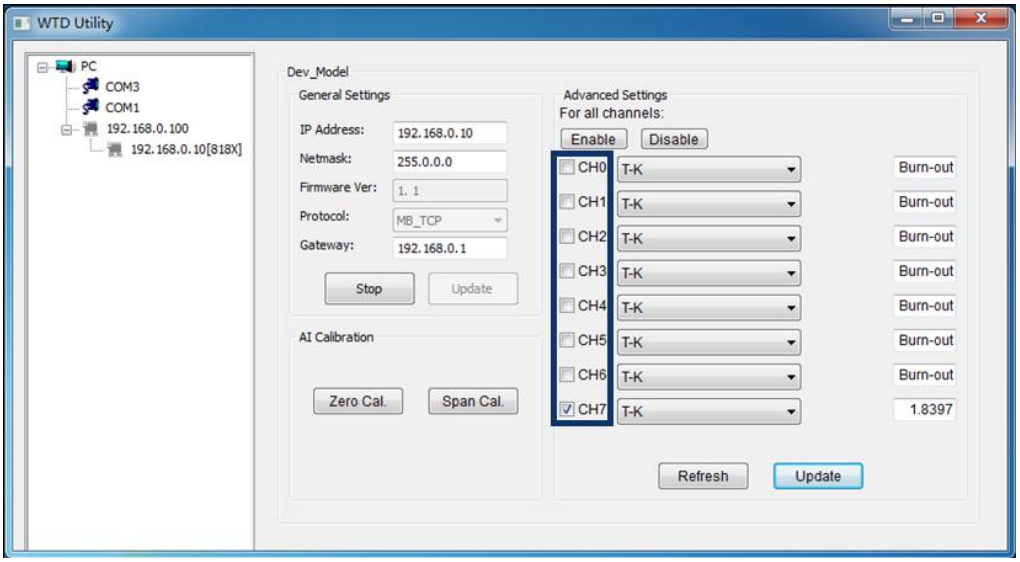


Figure 2-33 WTD818X configuration figure

In each drop-down option of each channel, select the corresponding type of analog input signal and thermocouple:

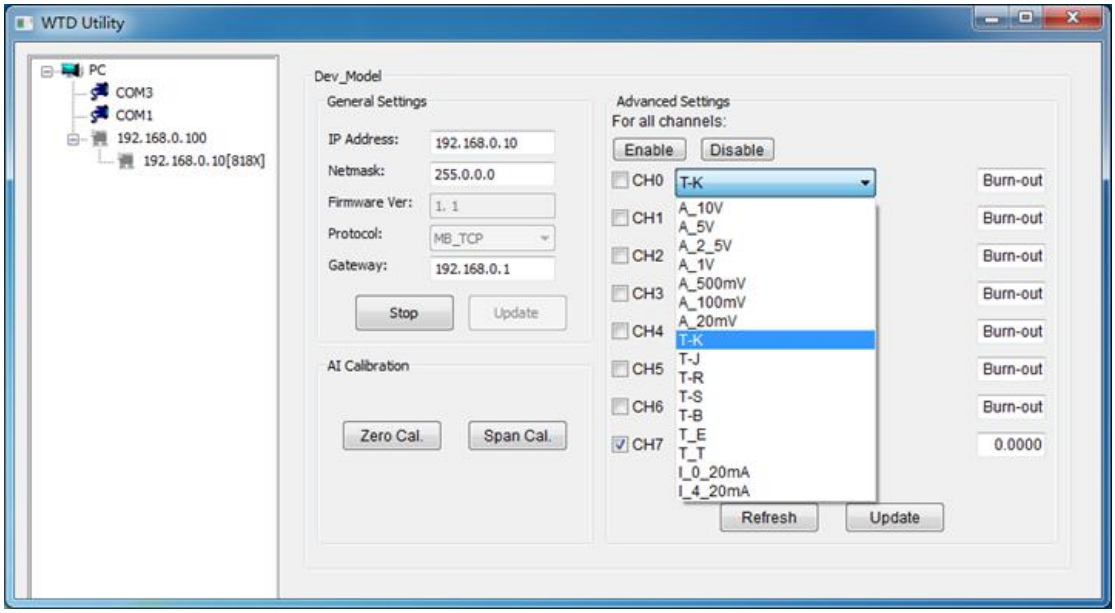


Figure 2-34 WTD818X selection of analog input type

After the selection, in the advanced settings box, press Update button to save the settings, while Refresh button can be pressed to refresh the channel setting state of the module.

2.4.4 WTD824X 4-channel analog output module

After searching for the device, the following interface can be seen:

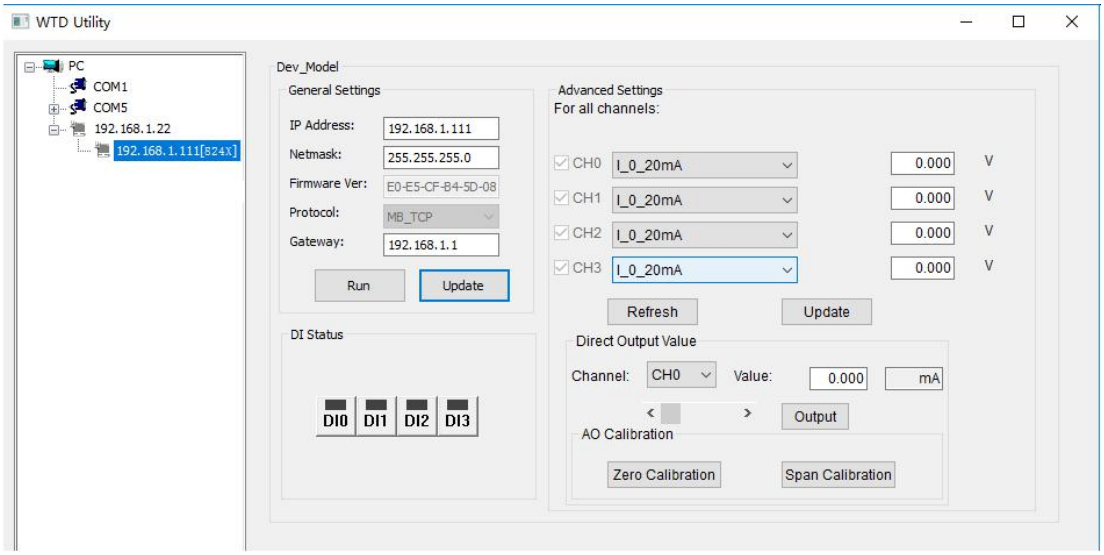


Figure 2-35 WTD824X main interface

Discovered devices will be displayed under the network node of the

machine,whose name contains the Modbus address of Modbus-TCP and module model.

General Communication Settings

Click on the device node and the correlated settings and test functions will be displayed in the right window, including general settings, advanced settings, and data display. In common settings, Modbus-TCP IP address, gateway, and sub-mask can be set and, when the parameter setting is completed, click on "Update" button to complete the final device parameter settings.If successfully, it will pop up the button for successful parameter settings.

If the setting is wrong, please check the module power supply and communication cables.

Advanced Settings

In the advanced settings, the mode setting of each channel is provided, that can select desired channels and analog output signal of different types and digital input type.

Click the selection box in front of each channel to enable or disable the channel:

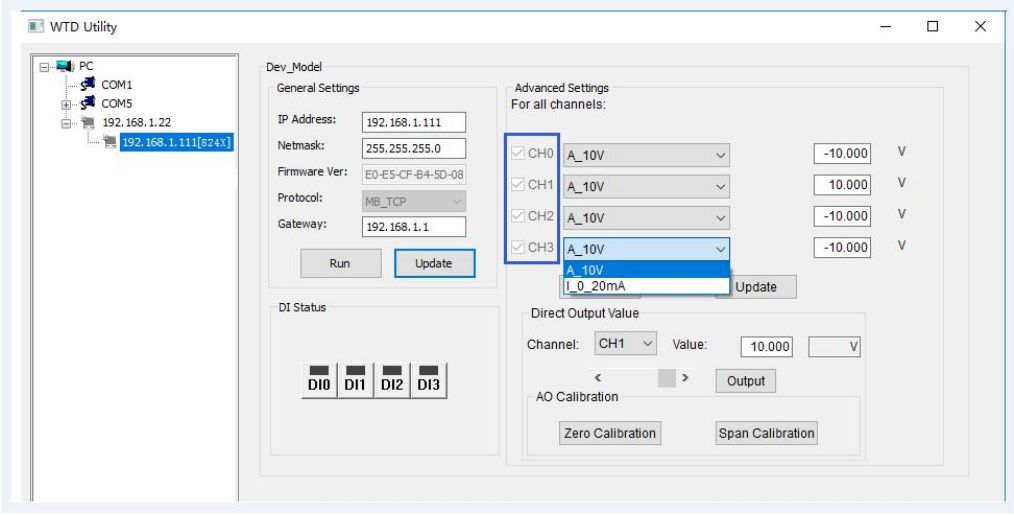


Figure 2-36 WTD824X configuration figure

In each drop-down option of each channel, select the corresponding type of analog output signal:

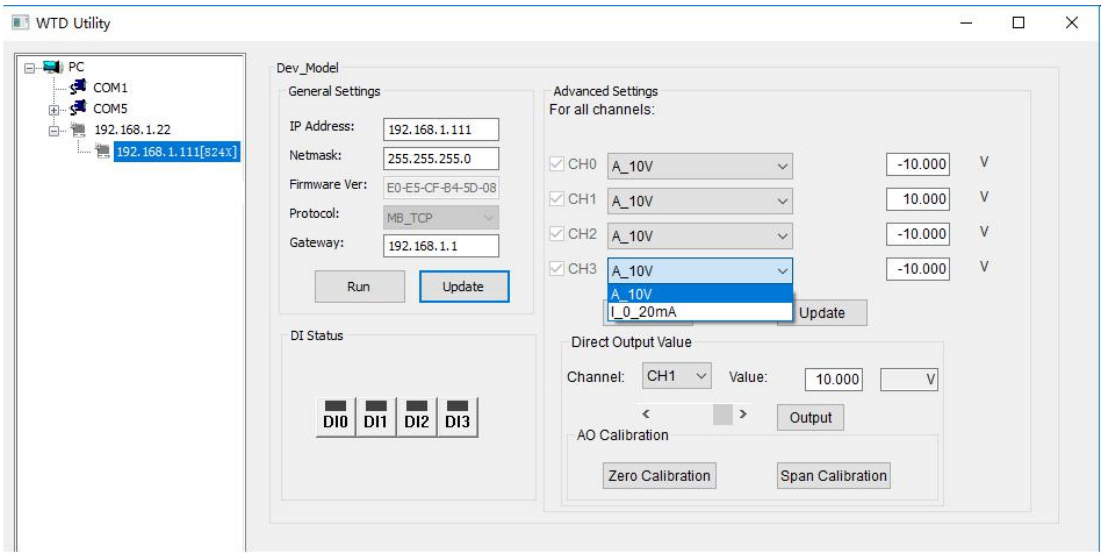
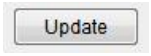
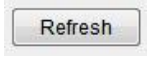


Figure 2-37 WTD824X selection of analog output type

After the selection, in the advanced settings box, press 

button to save the settings,while 

button can be pressed to refresh the channel setting state of the modul.

2.4.5 WTD840X 16-channel digital input module

After searching for the module device, the following interface can be seen:

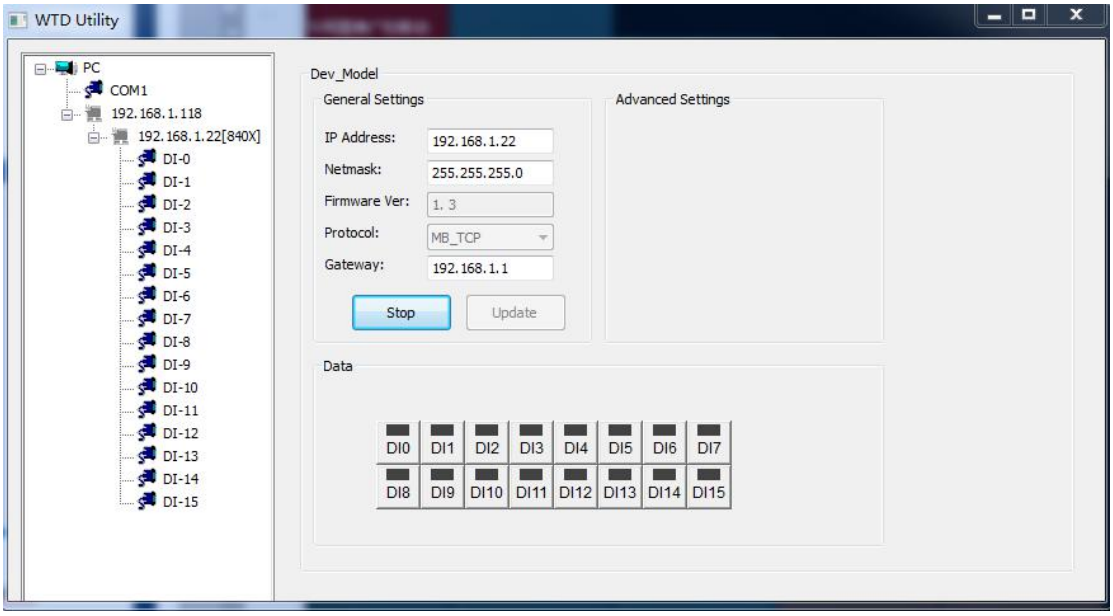


Figure 2-38 WTD840X main interface

Discovered devices will be displayed under the network node of the

machine, whose name contains the Modbus address of Modbus-TCP and module model.

General Communication Settings

Click on the device node and the correlated settings and test functions will be displayed in the right window, including general settings, advanced settings, and data display. In common settings, Modbus-TCP IP address, gateway, and sub-mask can be set, when the parameter setting is completed, click on "Update" button to complete the final device parameter settings.If successfully, it will pop up the button for successful parameter settings.

If the setting is wrong, please check the module power supply and communication cables.

Data Area

Figure 2-39 WTD840X indicator of DI data area

Input Port Status

In the data area, the status of all 16 input channels is displayed. if the input channel is 1, the corresponding channel`s button light will be turned on, otherwise it will be turned off.

2.4.6 WTD850C 16-channel digital output module

After searching for the module device, the following interface can be seen:

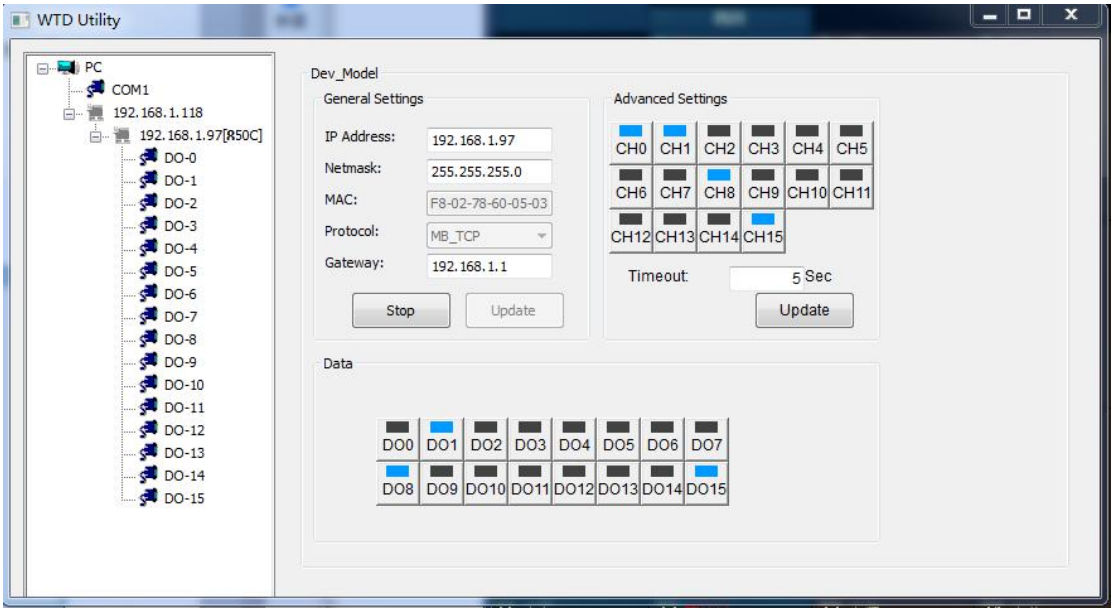


Figure 2-40 WTD850C main interface

Discovered devices will be displayed under the network node of the machine,whose name of new devices contains the Modbus address of Modbus-TCP and module model.

General Communication Settings

Click on the device node and the correlated settings and test functions will be displayed in the right window, including general settings, advanced settings, and data display. In common settings, Modbus-TCP IP address, gateway, and sub-mask can be set, when the parameter setting is completed, click on "Update" button to complete the final device parameter settings.If successfully, it will pop up the button for successful parameter settings.

If the setting is wrong, please check the module power supply and communication lines.

Advanced Settings

In advanced settings, some special setting functions are provided and there are corresponding output protection status setting buttons and the output protection time setting.

Output Protection Status

Output protection status refers to the port`s output status of automatic

update when there is no communication and lack of access to the corresponding control commands. When there`s a need to set up some output protection status for some output ports, simply press the corresponding port button to make the button light on and then press the "Update" button in advanced settings to complete the final confirmation of parameter settings.

Output Protection Time

Output protection time refers to the time set within which there is no communication or lack of access to the corresponding control commands and the port`s output protection status will be triggered. It’s the same for setting output protection time.

Data area

Figure 2-41 WTD850C indicator DO data area

Output Port Status

A row beneath the data area is mainly used for all 16 channels’ output channel status control test. Each time the button is pressed, it will control the corresponding output ports to opposite state, while the light on the buttons will show the status output in real time, i.e. originally the off state of the button light indicates the output of '0', and after the button is pressed, the output will turn to '1'.If the output control is successful, the light will be on.

Type configuration of output channel

In the tree list of devices on the left side of the WTDUtility software, click any channels under the WTD850C module, such as DO-0, and then configure the PWM output mode, as shown in the following figure:

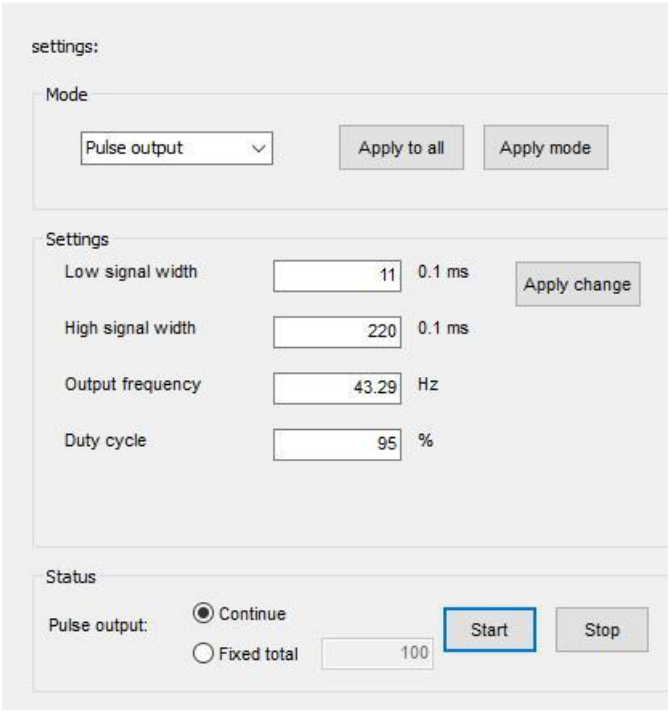


Figure 2-42 setting of WTD850C PWM output

2.4.7 WTD866C 6-channel relay output module

After searching for the module device, the following interface can be seen:

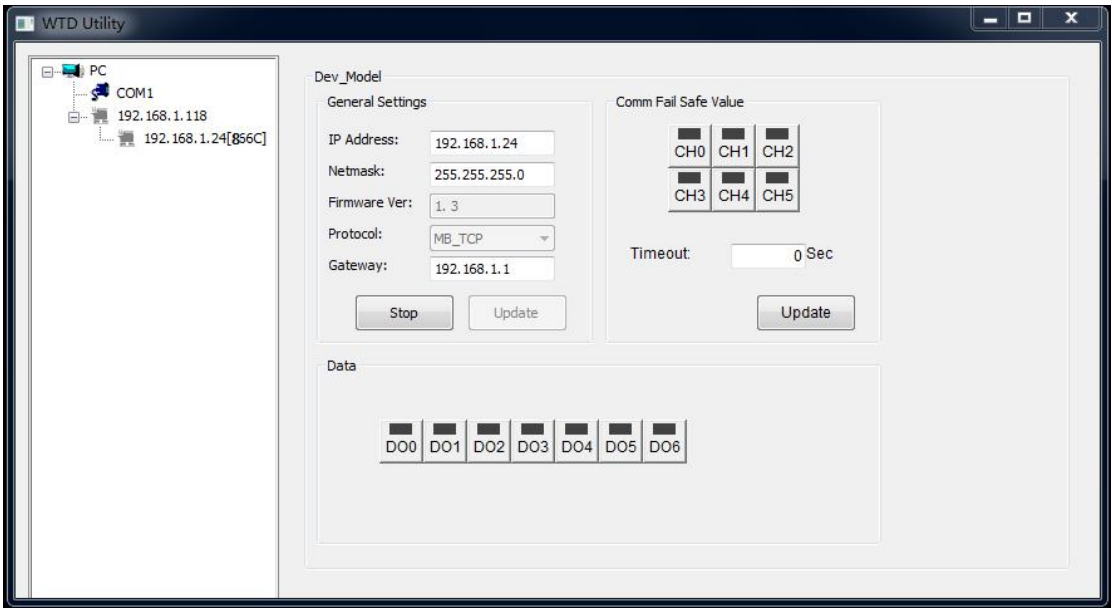


Figure 2-43 WTD866C main interface

Discovered devices will be displayed under the network node of the machine, whose name of new devices contains the Modbus address of

Modbus-TCP and module model.

General Communication Settings

Click on the device node and the correlated settings and test functions will be displayed in the right window, including general settings, advanced settings, and data display. In common settings, Modbus-TCP IP address, gateway, and sub-mask can be set, when the parameter setting is completed, click on "Update" button to complete the final device parameter settings.If successfully, it will pop up the button for successful parameter settings.

If the setting is wrong, please check the module power supply and communication lines.

Advanced Settings

In advanced settings, some special setting functions are provided, there are corresponding output protection status setting buttons and the output protection time setting.

Output Protection Status

Output protection status refers to the port`s output status of automatic update when there is no communication and lack of access to the corresponding control commands. When there`s a need to set up some output protection status for some output ports, simply press the corresponding port button to make the button light on, then press the "Update" button in advanced settings to complete the final confirmation of parameter settings.

Output Protection Time

Output protection time refers to the time set within which there is no communication or lack of access to the corresponding control commands, the port`s output protection status will be triggered. It’s the same for setting output protection time.

Data area

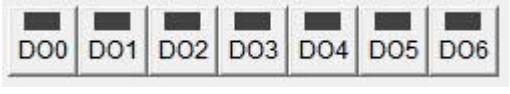


Figure 2-44 WTD866C output control buttons

Output Port Status

A row beneath the data area is mainly used for all 16 channels` output channel status control test. Each time the button is pressed, it will control the corresponding output ports to select the NOT state, while the light on the buttons will show the status output in real time, i.e. originally the off state of the button light indicates the output of '0', and after the button is pressed the output will turn to '1', if the output control is successful, the light will be on.

2.4.8 WTD878C 8-channel digital input, 8-channel digital output module

2.4.8.1 Ordinary digital signal input and output functions

After searching for the module device, the following interface can be seen:

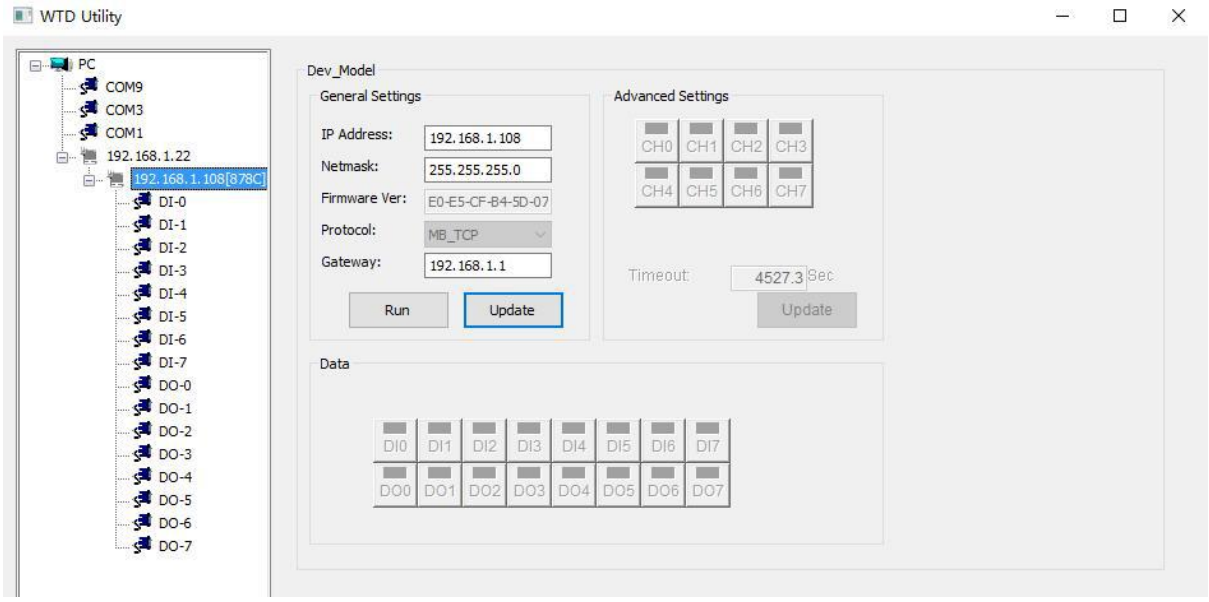


Figure 2-45 WTD878C main interface

Discovered devices will be displayed under the network node of the machine, whose name of new devices contains the Modbus address of Modbus-TCP and module model.

General Communication Settings

Click on the device node, the correlated settings and test functions will be

displayed in the right window, including general settings, advanced settings, and data display. In common settings, Modbus-TCP IP address, gateway, and sub-mask can be set and, when the parameter setting is completed, click on "Update" button to complete the final device parameter settings.If successfully, it will pop up the button for successful parameter settings.

If the setting is wrong, please check the module power supply and communication cables.

Advanced Settings

In advanced settings, some special setting functions are provided, there are corresponding output protection status setting buttons and the output protection time setting.

Output Protection Status

Output protection status refers to the port`s output status of automatic update when there is no communication and lack of access to the corresponding control commands. When there`s a need to set up some output protection status for some output ports, simply press the corresponding port button to make the button light on, then press the "Update" button in advanced settings to complete the final confirmation of parameter settings.

Output Protection Time

Output protection time refers to the time set within which there is no communication or lack of access to the corresponding control commands, the port`s output protection status will be triggered. It’s the same for setting output protection time.

Data area

Figure 2-46 WTD878Cinput and output control buttons

Input Port Status

In the data area, the upper row displays the status of all 8 input channels

is displayed, if the input channel is 1, the corresponding channel`s button light will be turned on, otherwise it will be turned off.

Output Port Status

A row beneath the data area is mainly used for all 8 channels` output channel status control test. Each time the button is pressed, it will control the corresponding output ports to select the NOT state, while the light on the buttons will show the status output in real time, i.e. originally the off state of the button light indicates the output of '0', and after the button is pressed the output will turn to '1', if the output control is successful, the light will be on.

2.4.8.2 Advanced count input

In the tree list on the left of the WTDUtility software ,all input channels list can be seen under the WTD878C module,as shown below:

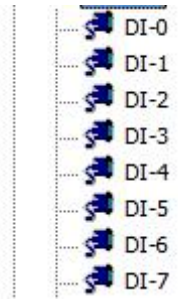


Figure 2-47 WTD878C input-channel list

DI 0 to DI 7 represent the port channels of 8-channel with counter functions, respectively. Click on any one channel (for example, DI-0 node), the dialog box will appear on the right window as shown below.

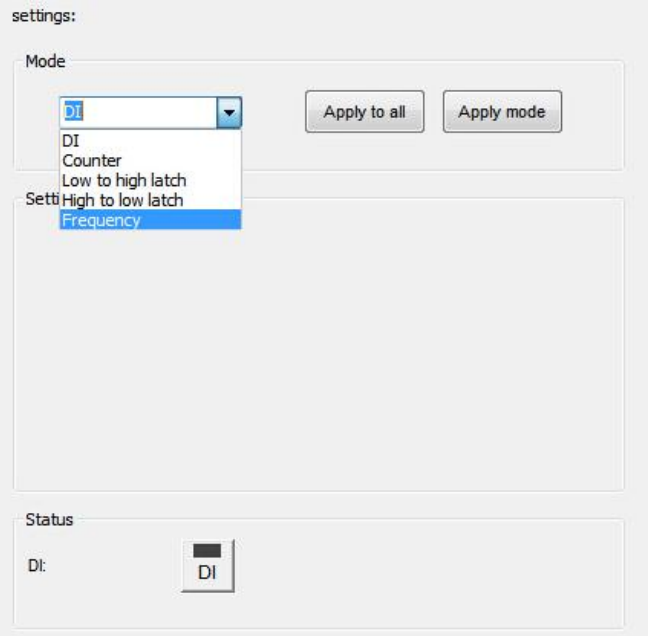


Figure 2-48 choice interface of WTD878C input-channel mode

Optional modes are DI (digital input), Counter (input count mode), Low to high latch (ascending lock mode), High to low latch (descending lock mode), and Frequency (frequency calculation mode). DI mode is the default mode.

- **advanced Input Counting Mode**

In the mode options, select "Counter", if you just set the single channel, press "Apply mode" button, and if you want to set all channels to the same mode, press the "Apply to all" button. After selection, enter the following dialog box:

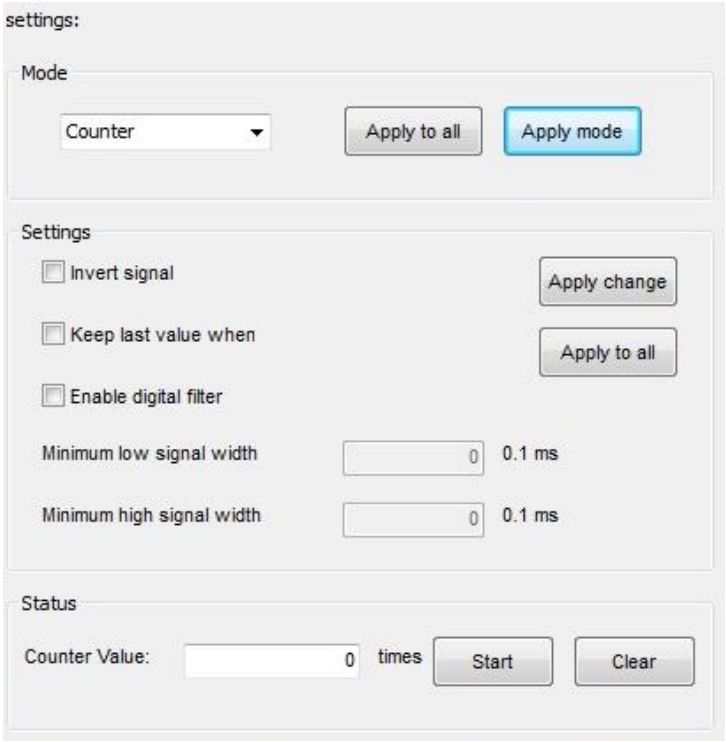


Figure 2-49 interface of WTD878Cinput counting mode

In " Settings " box, you can set the signal inversion function, count holding function and digital filtering function. In digital filtering capability, you can set filtering signals` maximum and minimum pulse width.

In " Satus " box below, it can display the counting value after starting. You can press "Start" to start counting, and press "Clear" to purge count value.

➢ Ascending Lock Mode

In " Mode " options, select "Low to high latch", if you just set the single channel, press "Apply mode" button, and if you want to set all channels to the same mode, press the "Apply to all" button. After selection, enter the following dialog box:

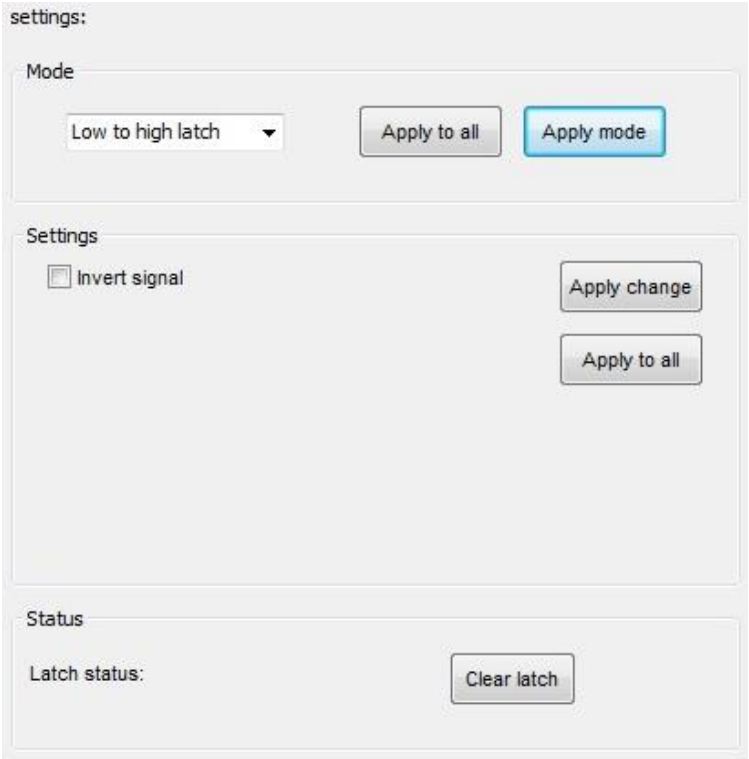


Figure 2-50 interface of WTD878C input ascending lock mode

In " Settings " box, you can check the signal inversion function, and in " Satus " bar you can view the lock status.

Descending Lock Mode

In " Mode " options, select "High to low latch".If you just set the single channel, press "Apply mode" button, and if you want to set all channels to the same mode, press the "Apply to all" button. After selection, enter the following dialog box:

图 2-51　main interface of WTD878C input descending lock mode

In ＂Settings＂ box, you can check the signal inversion function, and in ＂Status＂ bar you can view the lock status.

Frequency Calculation Mode

In ＂Mode＂options, select "Frequency".If you just set the single channel, press "Apply mode" button, and if you want to set all channels to the same mode, press the "Apply to all" button. After selection, enter the following dialog box:

Figure 2-51 main interface of WTD878C input frequency calculation mode

In the status box at the bottom you can see the frequency value read.

2.4.8.3 PWM output function

In the tree list on the left of the WTDUtility software ,all-input-channel list can be seen under the WTD878C module,as shown below:

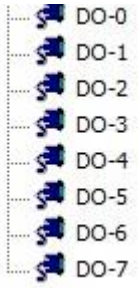


Figure 2-53 WTD878C output-channel list

DO-0 to DO-7 respectively represent the port channels with PWM output functions. Click on any one channel (for example, DO-0 node), the dialog box will appear on the right window as shown below.

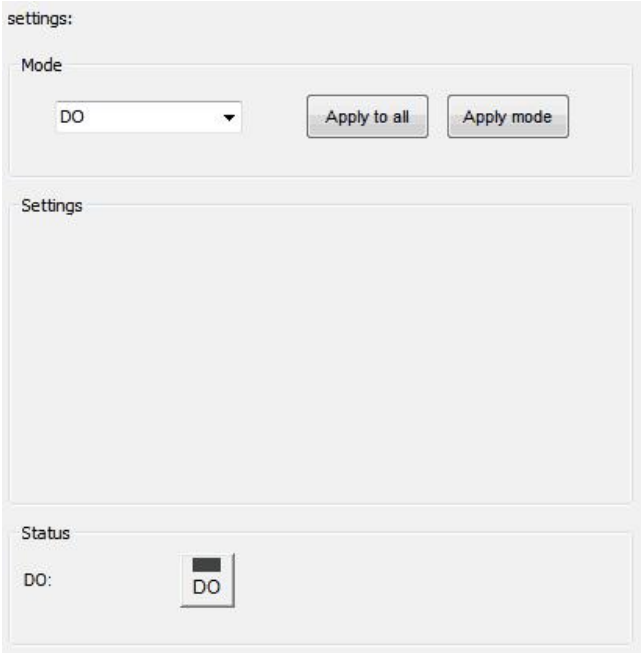


Figure2-54 WTD878C choice main interface of output-channel mode

Optional modes are DO (digital output mode), Pulse output (pulse width mode), Low to high latch (ascending lock mode), High to low latch (descending lock mode). DO mode is the default mode.

➢ Pulse Width Output Mode

In the mode options, select "Pulse output".If you just set the single channel, press "Apply mode" button, and if you want to set all channels to the same mode, press the "Apply to all" button. After selection, enter the following dialog box:

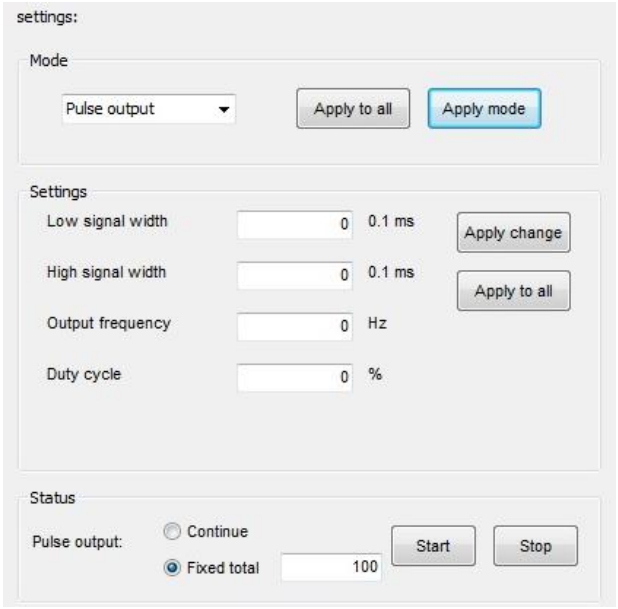


Figure 2-55 WTD878C main interface of pulse-width-output mode

In " Settings " box, you can set the pulse width time, output frequency and duty cycle of high and low signals, after the setting is complete, press the "Apply change" to save the settings.

In " Status " box, you can select the output pulse width mode, including constant and fixed pulse width outputs. After the selection is complete, press the "Start" button to open the output function.

➢ Ascending Lock Mode

In " Mode " options, select "Low to high latch".If you just set the single channel, press "Apply mode" button, and if you want to set all channels to the same mode, press the "Apply to all" button. After selection, enter the following dialog box:

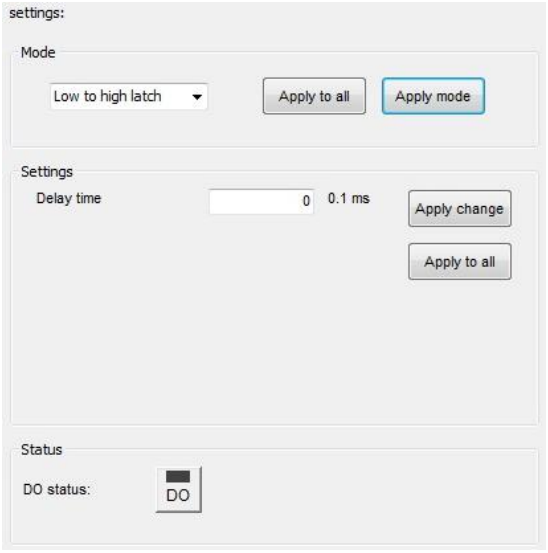


Figure 2-56 WTD878C main interface of output ascending lock mode

The lock delay time can be set in the settings box, and in the status bar, you can control DO port output.

Descending Lock Mode

In ＂Mode＂ options, select "High to low latch", if you just set the single channel, press "Apply mode" button, and if you want to set all channels to the same mode, press the "Apply to all" button. After selection, enter the following dialog box:

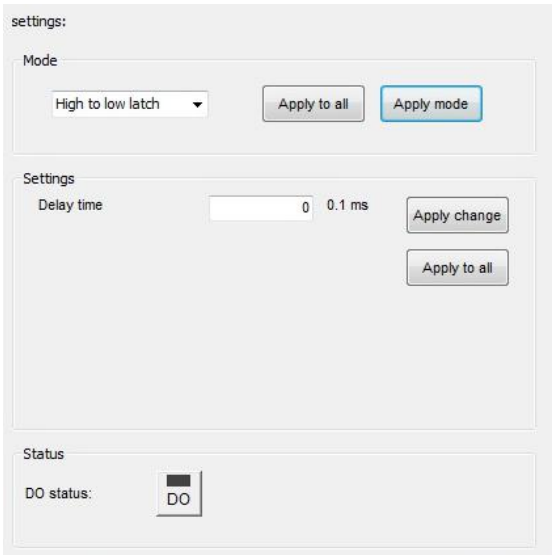


Figure 2-57　main interface of WTD878C output descending lock mode

The lock delay time can be set in the settings box, and in the status bar, you can control DO port output

Chapter 3

Product Specifications

3.1 Basic specifications

- **Wi-Fi specifications**

IEEE standard and transmit power:

– 802.11b 15.0dBm

– 802.11g 16.4dBm

– 802.11n 16.3dBm

topology structure:

– AP mode（wireless server side）

– station mode（wireless user side）

Communication distant:100m(linear distant)

Antenna character:

- standard SMA connector, connected different antennas

- **common parameter**

CPU: 32-bit Cortex-M3 processor ,72MHz

Operating system:real-time operating system FreeRTOS

Wiring terminal :3.81mm plug and socket wiring terminal, connected power lines, 485 lines, input-output lines

Shell material:inflaming retarding ABS

Mounting way:DIN35mm rails or screw fixing

Dimension(length*width*height):98×106×41mm

Power input range:10-48Vdc（24Vdc rated）

Operating temperature:-20～70°C

Operating humidity:10～90%RH (noncondensing)

Configuration software:Web server or WTDUtility

Offer of communication protocol:TCP/IP，UDP，HTTP

Offer of IoT protocol: JSON format in Web page API ,MQTT

Industrial communication interface:RS485（Modbus-RTU）、RJ45（Modbus-TCP）

Module protection function: over current,over voltage ,anti reverse

Certification: EMC(EN61000-6-2/4)，safety

3.2 WTD814P 4-channel platinum resistance input, 2-way digital output

WTD814P applying to temperature-acquisition in industrial field is isolated platinum resistance temperature-acquisition input module that can communicate with host computer via wireless Wi-Fi and simultaneously collect and monitor temperature of 4-channel platinum resistance.And the module processes the 2-channel isolated digital output function, that can cope with various emergency situations in industrial field.As shown below:

Figure 3-1 WTD814P impression figure

3.2.1 Technical indicators

3.2.1.1 Platinum resistance input

Number of input channel: 4 differential channels

Input type (independent configuration): Pt100(IEC)，Pt100(JLS)，Pt1000，Ni-RTD

Input resistance:10MΩ

Platinum resistance wiring:2-line system,3-line system, 4-line system

AD conversion resolution: 24 bit

Sampling accuracy: ±0.1％

Sampling rate: 60 point/s

Cross - temperature coefficient: ±25 ppm/°C

Independent control of the channel off / on: yes

Disconnection detection: Yes

Isolated voltage:3KVdc

3.2.1.2 Digital / PWM output

Number of output channel: 2 isolated-channels

Output type: open collector

Maximum load voltage: +40Vdc

Maximum load current: 2A(resistive load)

Inductive load: No need for external counter electromotive force protection diode

Maximum output pulse width : 1KHz

Support high - low, low - high delay output: Yes

Output security protection: Yes , with set the protection time for communication line break

Isolated voltage: 3KVdc

LED indicator : Yes

3.2.2 Functional block diagram

The functional block diagram of WTD814P module is shown in the following figure.

The module mainly consists of power supply circuit, isolation circuit, A / D conversion circuit, digital output circuit, Wi-Fi communication interface circuit and MCU circuit and so on. The module`s micro-controller uses 32-bit ARM chips and has extremely fast data processing capability. Inside the chip, there`s watch-dog circuit, which makes the system to restart in case of accident, allowing the system to be more stable and reliable.

WTD814P is designed for industrial applications, that use photoelectric isolation between the internal input-output unit and the control unit.And the module do filtering process with input signal and greatly reducing the industrial field interference on the normal operation of the module, so that the module has a high reliability.The module used the industrial Wi-Fi communication interface can deal with the various interference in the industrial scene and also pass the EMC, EMI and other anti-interference certification test.

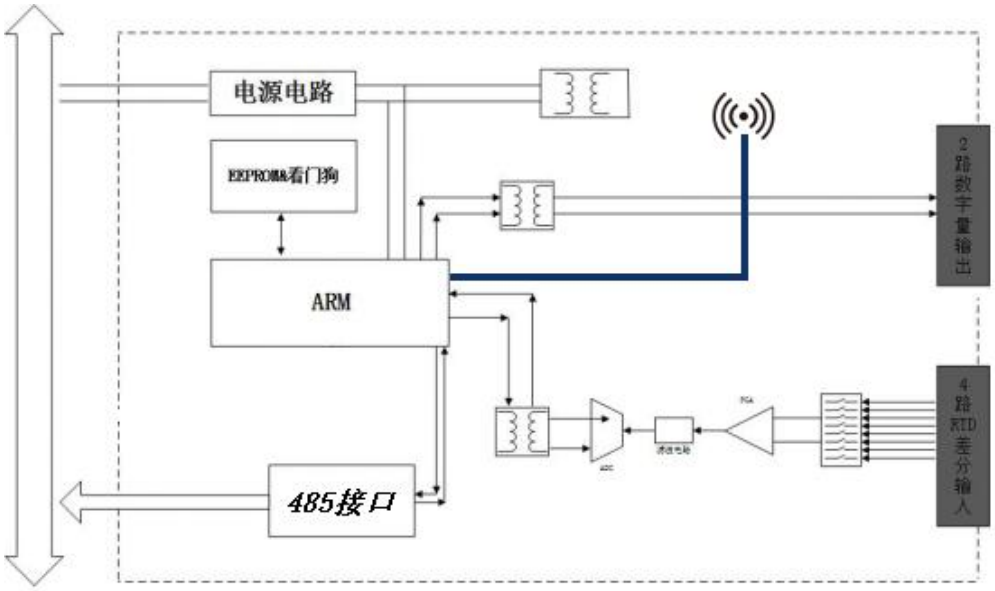


Figure 3-2 WTD814P functional block diagram

3.2.3 Terminal pin introduction

➢ Definition of terminal pin

WTD814P has a total of 40 pins on terminals and the pin function is defined as shown below:

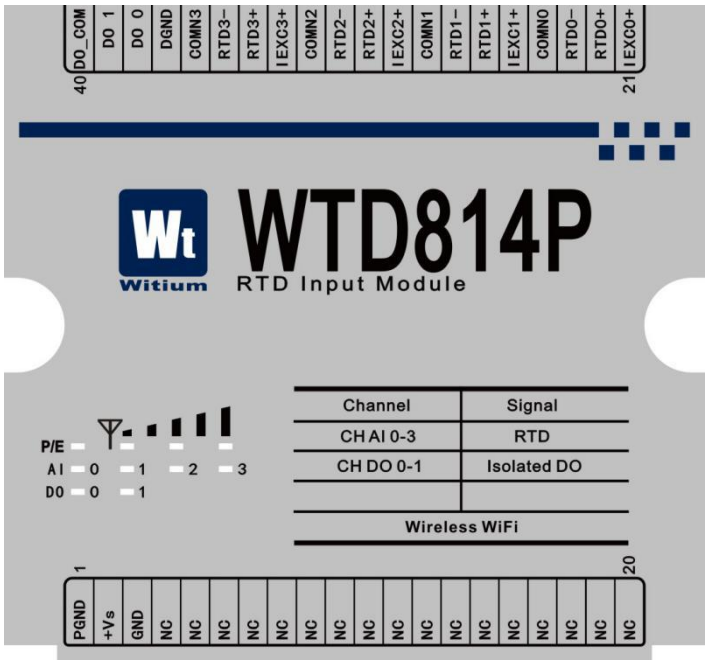


Figure 3-3 definition of WTD814P terminal pin

➢ Function description of terminal pin

-- PGND、VIN+ and VIN- are the input terminals of the module, PGND is the power ground, VIN+ connects to power positive terminal and VIN- connects to power negative terminal.

-- IEXC0 + ~ IEXC3 +, RTD0 ± ~ RTD3 ±, COMN0 ~ COMN3 are 4-channel platinum resistance interfaces of the module, please refer to the next section for wiring.

-- DO_COM is the common port of module's 2-channel isolated digital output interface,connected to the positive terminal of external load power, please refer to the next section for wiring.

--DGND is the referent ground of module's 2-channel isolated digital

output interface, connected to the negative terminal of external load power, please refer to the next section for wiring.

--DO 0、DO 1 are module's 2-channel isolated digital output interface, please refer to next section for wiring.

3.2.4 Wiring

WTD814P module has 4-channel platinum resistance input and also has 2 digital output channels.

- **Wiring of platinum resistance**

The WTD814P module has four platinum resistance input channels; each channel supports 2-wire, 3-wire and 4-wire platinum or nickel thermal resistance measurements.

wiring of 2-wire system:

As shown below is 2-wire thermal resistance wiring, connected two wires to RTD0+ and RTD0- .

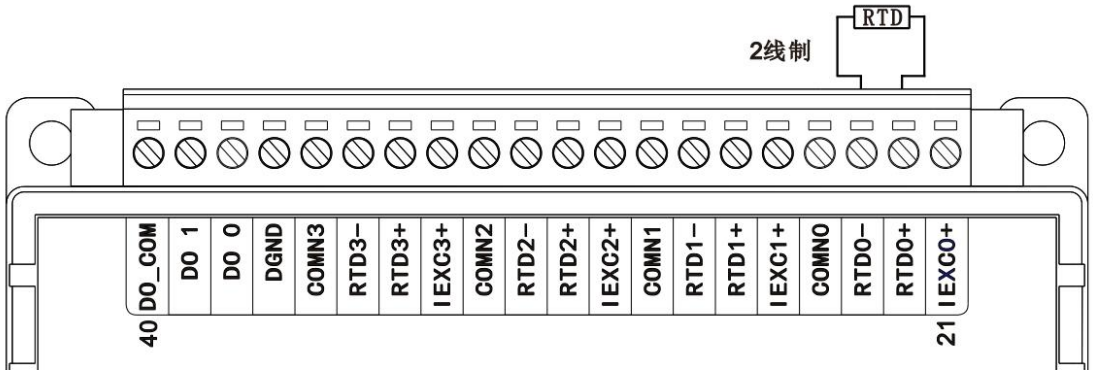


Figure 3-4 wiring for WTD814P 2-wire RTD

wiring of 3-wire system:

There are two connectors with the same color (usually blue) and one with color different (usually red) among three wires of 3-wire thermal resistance system. As shown below is the wiring ,that connect the red wire of thermal resistance to RTD0- and respectively connect the blue wires to RTD0+ and IEXC0+.

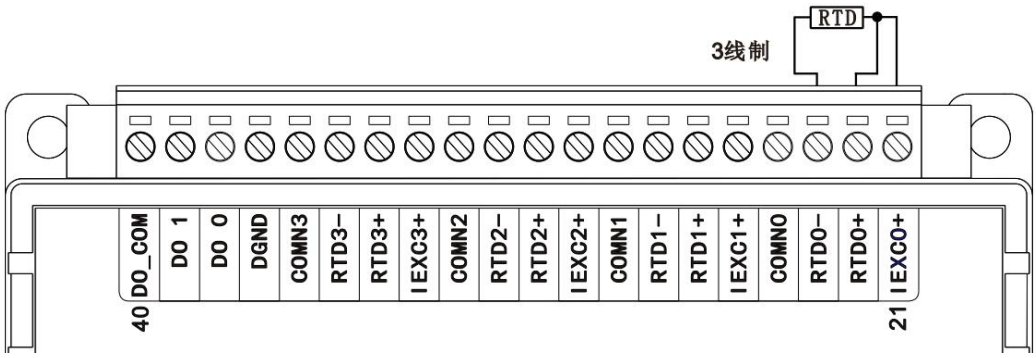


Figure 3-5 wiring of WTD814P 3-wire RTD

wiring of 4-wire system:

As shown below is the wiring of 4-wire thermal resistance system.

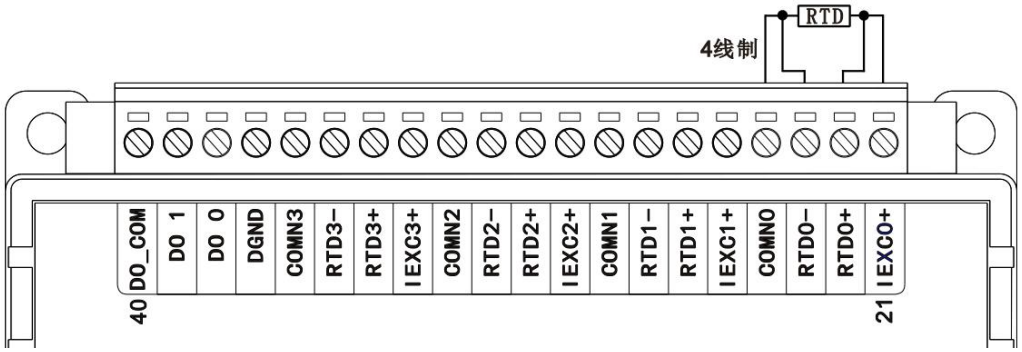


Figure 3-6 wiring of WTD814P 4-wire RTD

➢ Digital output wiring

The WTD814P module has 2 digital / PWM output channels, each supporting a resistive or inductive load that need an external DC power supply.

As shown below is digital output wiring ,that connect the positive side of the external DC power supply to one end of the load and connect it to the common terminal DO_COM. The other end of the load is connected to the output channel DO 2, and the negative of the external DC power supply is connected to the module's DGND.

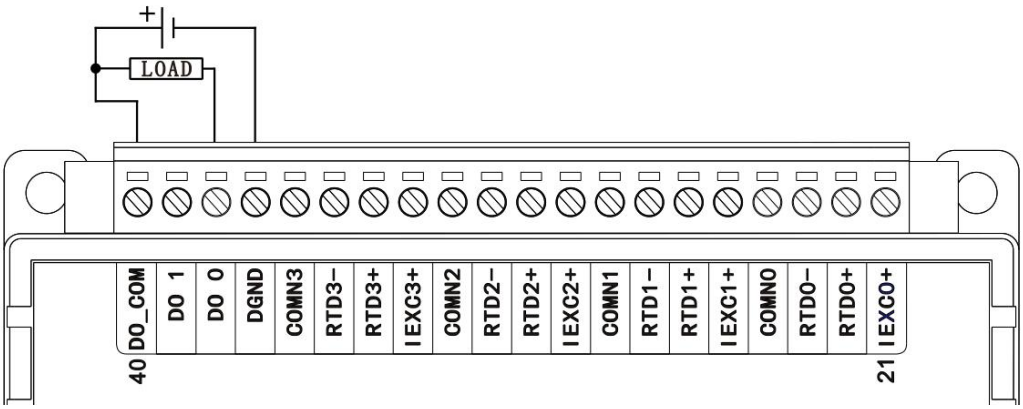


Figure 3-7 WTD814P digital output wiring

3.3 WTD818X 8-channel analog / thermocouple input

WTD818X is an isolated analog / thermocouple acquisition input module,that can communicate with the host computer via wireless Wi-Fi and simultaneously do acquisition to 8-channel analog differential signal or monitor 8-channel thermocouple temperature,applying to various voltage and current signal acquisition or temperature value acquisition in industrial field and sensor or transmitter signal acquisition.As shown below:

Figure 3-8 WTD818X impression figure

3.3.1 Technical indicators

3.3.1.1 Analog / thermocouple input

Number of input channel:8 differential channels

Input type(independent configuration):voltage、current(plus jumper cap internal module)、thermocouple

Range of input voltage:±10V、±5V、±2.5V、±1V、±0.5V、±0.1mV、±20mV

Range of input current: ±20mA、+4～20mA

Type of input thermocouple: J(0~760℃)、 K（0~1370℃）、T（-100~400℃）、
E（0~1000℃）、R（500~1750℃）、S（500~1750℃）、
B（500~1800℃）

Input impedance: 10MΩ

AD conversion resolution: 16bit

Sampling accuracy: ±0.1％

Sampling rate: 60 point/s

Cross - temperature coefficient: ±25 ppm/°C

Input low-pass filter and overvoltage protection: Yes

Overrun alarm function: Yes

Independently control open/close of channel: Yes

Disconnection detection: Yes

Isolated voltage: 3KVdc

3.3.2 Functional block diagram

The functional block diagram of WTD818X module is shown in the following figure.

The module mainly consists of power supply circuit, isolation circuit, A / D conversion circuit, Wi-Fi communication interface circuit and MCU circuit and so on. The module`s micro-controller uses 32-bit ARM chips and has extremely fast data processing capability. Inside the chip, there`s watch-dog circuit, which makes the system to restart in case of accident, allowing the system to be more stable and reliable.

WTD818X is designed for industrial applications, that use photoelectric isolation between the internal input-output unit and the control unit.And the module do filtering process with input signal and greatly reducing the industrial field interference on the normal operation of the module, so that the module has a high reliability.The module used the industrial WiFi communication interface can deal with the various interference in the industrial scene and also pass the EMC, EMI and other anti-interference certification test.

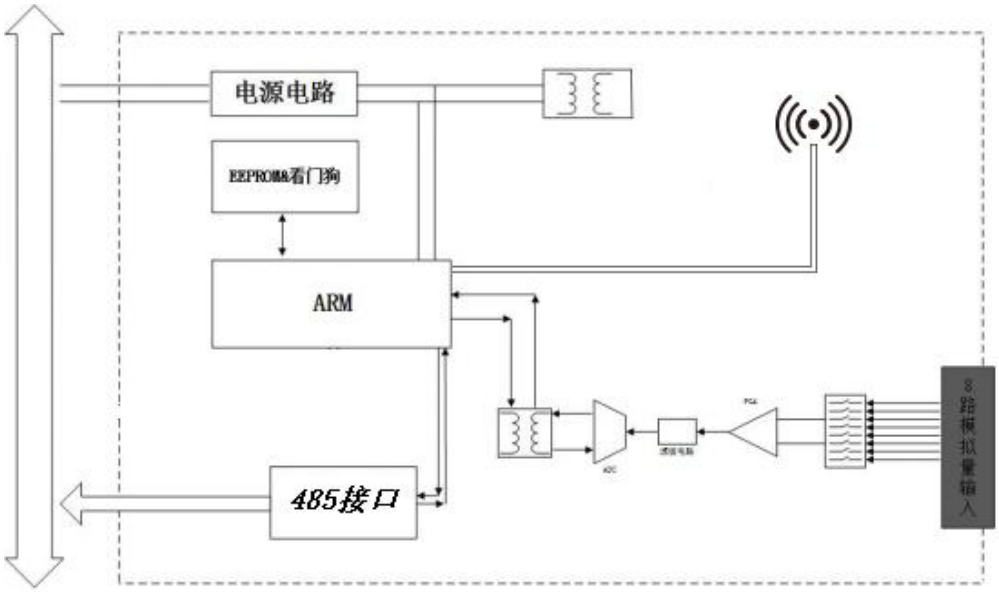


Figure 3-9 WTD818X functional block diagram

3.3.3 Terminal pin introduction

◆ Definition of terminal pin

WTD818X has a total of 40 pins on terminals and the pin function is

defined as shown below:

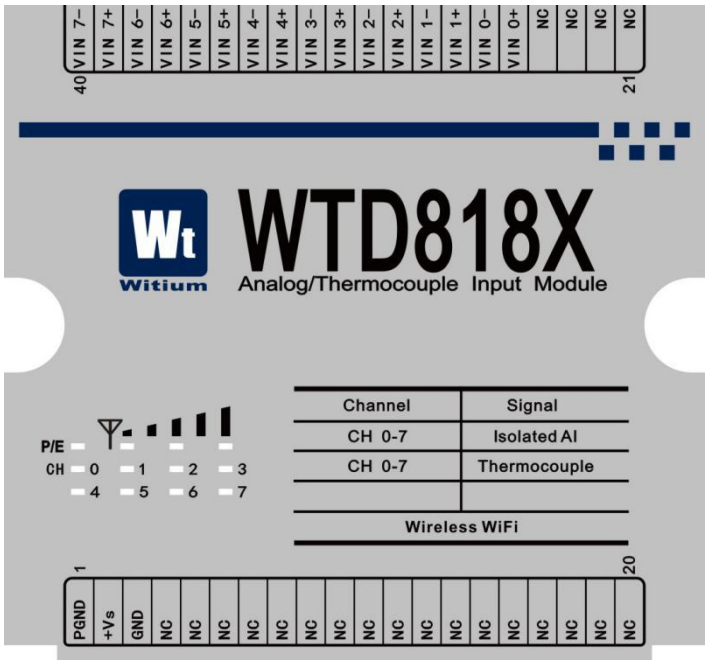


Figure 3-10 WTD818X definition of terminal pin

-- PGND、VIN+ and VIN- are the input terminal of the module, PGND is the power ground, VIN+ connects to power positive terminal and VIN- connects to power negative terminal.

-- VIN 0±~VIN 7± are 8-channel differential analog /thermocouple input interface of the module, please refer to the next section for wiring.

3.3.4 Wiring

WTD818X module has 8 differential analog/thermocouple input channels, each supporting acquisition of senor’s or transmitter’s output voltage signal and current signal and output temperature signal of thermocouple.

◆ Wiring of voltage input

When the analog voltage is input, the WTD818X module does not need to place short-circuit jumper cap of "sampling resistor"(The module is shipped by default without placing a short jump cap).As shown below is analog voltage input wiring, connecting power positive electrode to VIN0+ and connecting power negative electrode to VIN0-:

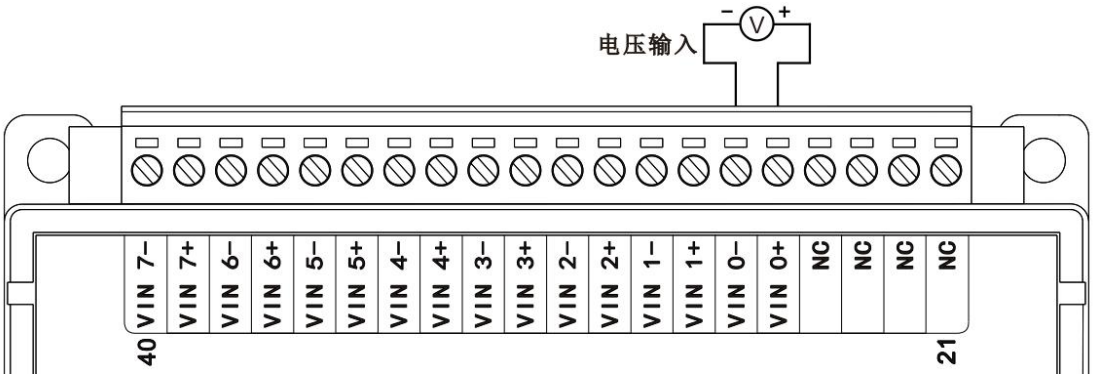


Figure 3-11 WTD818X voltage input wiring

◆ Wiring of current input

Wiring 1:

WTD818X module needs to be placed inside the short-circuit jumper cap of the "sampling resistor", that user can request placing the short-circuit jumper cap in advance while the module is shipped.

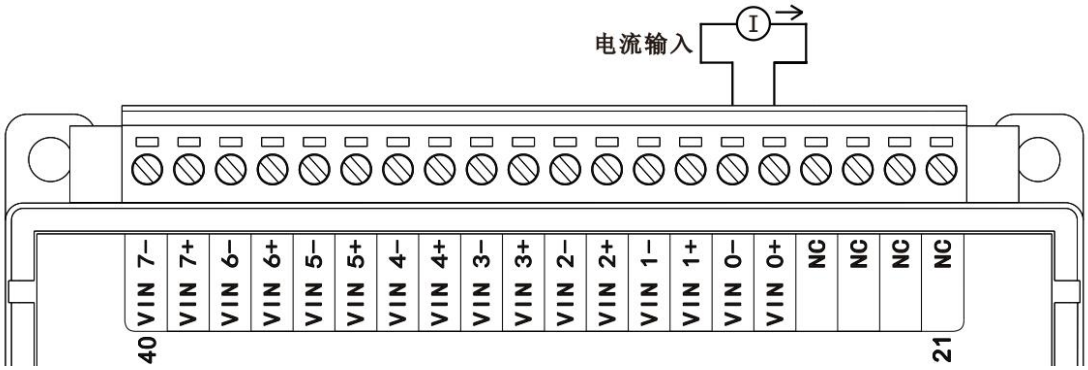


Figure 3-12 WTD818X current input wiring 1

Wiring 2:

WTD818X module does not need to be placed inside the short-circuit jumper cap of the "sampling resistor", only the need for external parallel 100% 0.1% high precision sampling resistor.As shown below is analog current input wiring, connecting power positive electrode to one end of acquisition resistor and VIN0+ and connecting power negative electrode to another end of acquisition resistor and VIN0-:

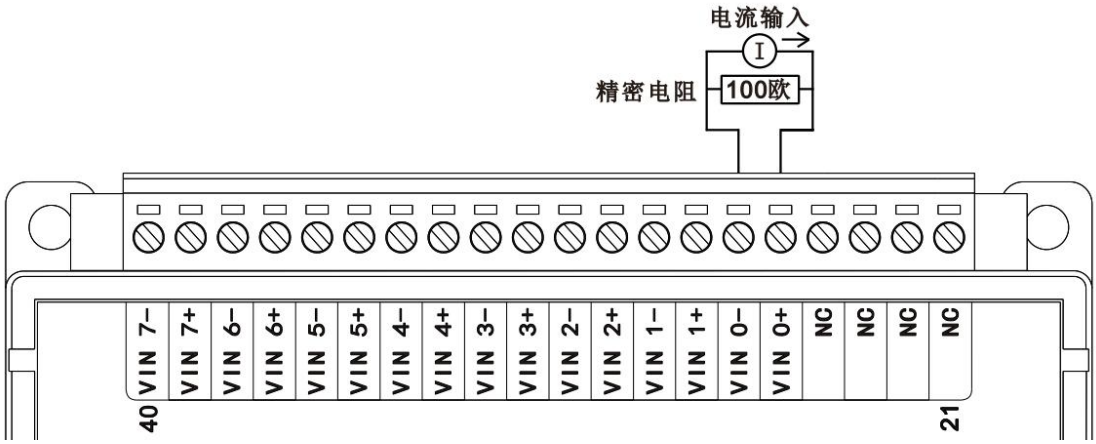


Figure 3-13 WTD818X current input wiring 2

◆ Wiring of thermocouple input

When thermocouple temperature is input, module does not need to be placed inside short-circuit jumper cap of the "sampling resistor"(The module is shipped by default without placing a short jump cap).As shown below is wiring of thermocouple temperature input, connecting thermocouple positive electrode to VIN0+ and connecting thermocouple negative electrode to VIN0-:

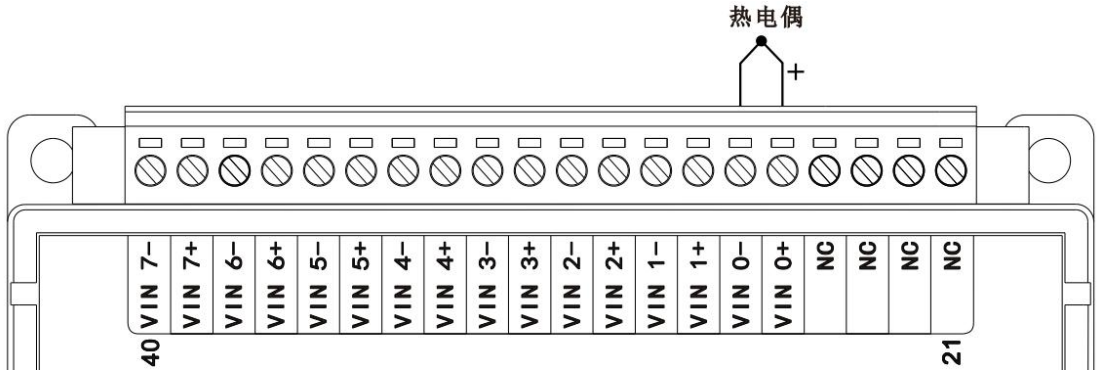


Figure 3-14 WTD818X thermocouple input wiring

3.4 WTD824X 4-channel analog output, 4 digital inputs

WTD824X is isolated analog control output module, that can communicate with host computer via wireless Wi-Fi and control controlled object with simultaneously output 4-channel analog differential signal,applying to control various actuators or analog drive objects in industrial field.The module also

processes 4-channel isolated digital input function ,that can cope with various emergencies in industrial field.As shown below :

Figure 3-15 WTD824X impression figure

3.4.1 Technical indicators

3.4.1.1 Analog output

Number of output channel:4 differential channels

Output type(independent configuration):voltage、current

Range of output voltage:±10V

Range of output current: ±20mA、+4～20mA

Output current load:0～700Ω

Output impedance: 1.0Ω

DA conversion resolution: 16bit

Output accuracy: ±0.1％

Zero drift:0.03 μV/°C

Cross - temperature coefficient: ±25 ppm/°C

Independently control open/close of channel: Yes

Isolated voltage: 3KVdc

3.4.1.2 Digital / counter input

Number of input channel:8 isolated channels

Input type(independent configuration):bilateral wet contact

Parameter of wet contact : high level:+10V～+50V/-50V～-10V low level :≤+3V

Response time: ≤50us

Frequency counting function: Yes

Maximum input frequency : 3KHz

Isolated voltage: 3KVdc

ESD static electricity rating: contact 4KVdc air 8KVdc

LED indication: Yes

3.4.2 Functional block diagram

The functional block diagram of WTD824X module is shown in the following figure.

The module mainly consists of power supply circuit, isolation circuit, D / A conversion circuit, digital input circuit, Wi-Fi communication interface circuit and MCU circuit and so on. The module`s micro-controller uses 32-bit ARM chips and has extremely fast data processing capability. Inside the chip, there`s watch-dog circuit, which makes the system to restart in case of

accident, allowing the system to be more stable and reliable.

WTD824X is designed for industrial applications, that use photoelectric isolation between the internal input-output unit and the control unit.And the module do filtering process with output signal and greatly reducing the industrial field interference on the normal operation of the module, so that the module has a high reliability.The module used the industrial Wi-Fi communication interface can deal with the various interference in the industrial scene and also pass the EMC, EMI and other anti-interference certification test.

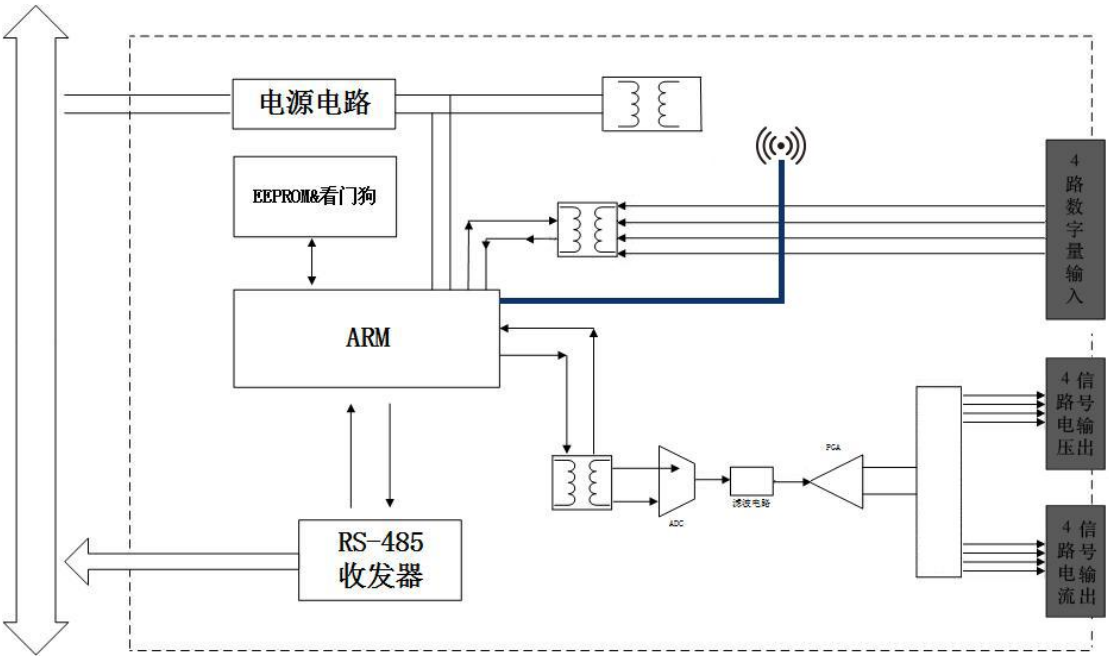


Figure 3-16 WTD824X functional block diagram

3.4.3 Terminal pin introduction

◆ Definition of terminal pin

WTD824X has a total of 40 pins on terminals and the pin function is defined as shown below:

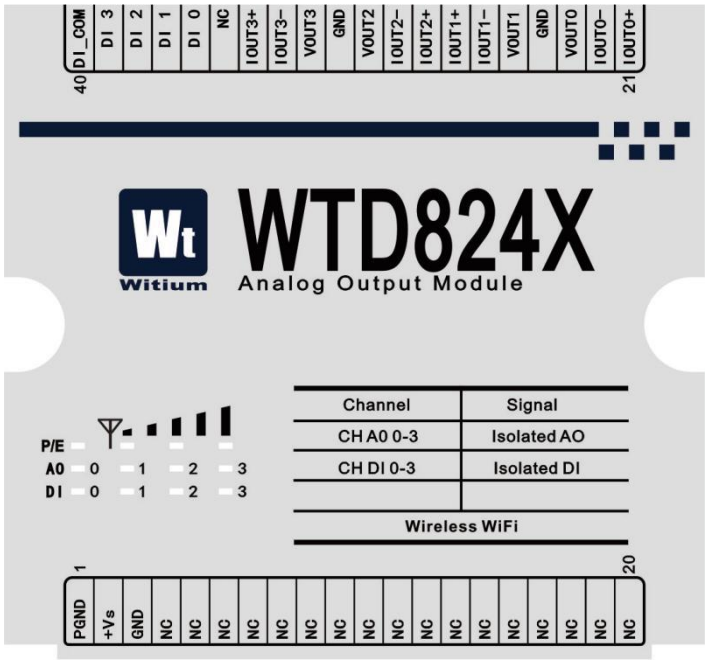


Figure 3-17 WTD824X definition of terminal pin

◆ Function description of terminal pin

--PGND、+Vs、GND are power input terminals of the module,PGND is the power ground, +Vs connects to power positive terminal and GND connects to power negative terminal.

--IOUT0±～IOUT3± are analog current output channel interfaces, VOUT0～VOUT3、GND are analog voltage output channel interfaces, please refer to the next section for wiring.

-- DO_COM is the wet input common port of module's 4-channel isolated digital input interfaces,that PNP type connect to the external power negative electrode and NPN type connect to external power positive electrode,please refer to the next section for wiring.

--DO 0～DO 3 are module's 4-channel isolated digital output interfaces, please refer to next section for wiring.

3.4.4 Wiring

WTD824X module processes 4 analog output channels and 4 digital input channels.

◆ Wiring of analog output

WTD824X module processes 4 analog output channels, each supporting output voltage signal and current signal.

Wiring of voltage output:

Wiring of analog voltage output is shown in the following figure, connecting VOUT0 to positive electrode of load and connecting negative electrode of load:

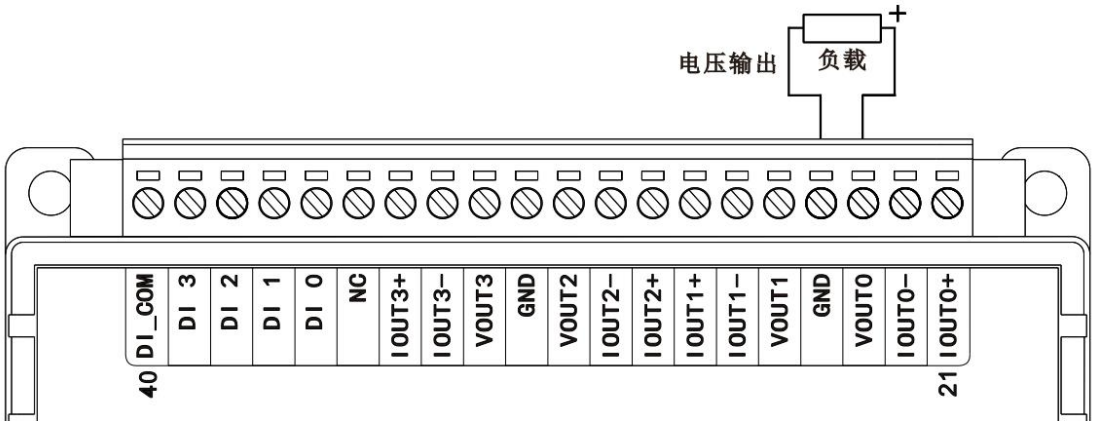


Figure 3-18 wiring of WTD824X voltage output

Wiring of current output:

Wiring of analog current output is shown in the following figure, connecting IOUT0+ to positive electrode of load and connecting IOUT0- to negative electrode of load:

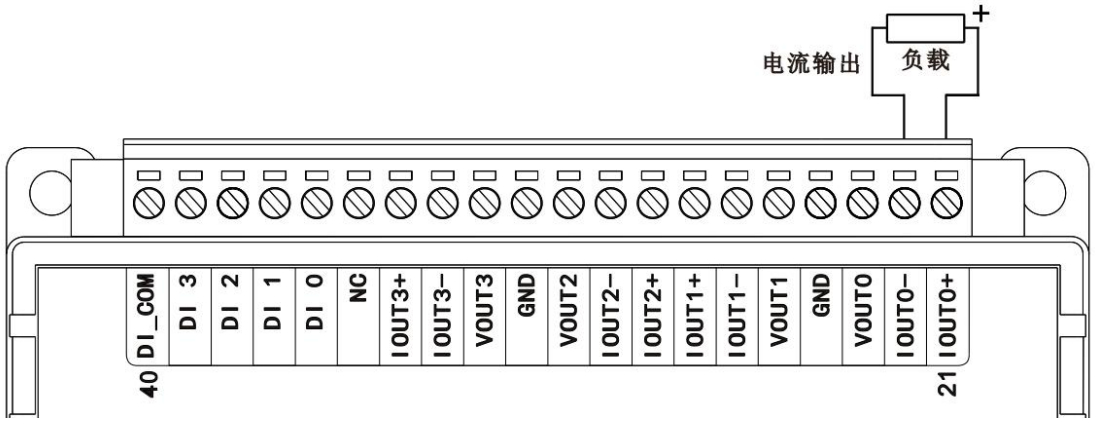


Figure 3-19 wiring of WTD824X current output

◆ Wiring of digital input

WTD824X module processes 4 digital input channels, each supporting bilateral wet input, such as NPN type or PNP type photoelectric switch input.

Ordinary wet input wiring:

The ordinary wet input wiring is shown in the following figure, connecting input positive electrode (negative electrode) to common port DI_COM and connecting input negative electrode(positive electrode) to input channel DI 0:

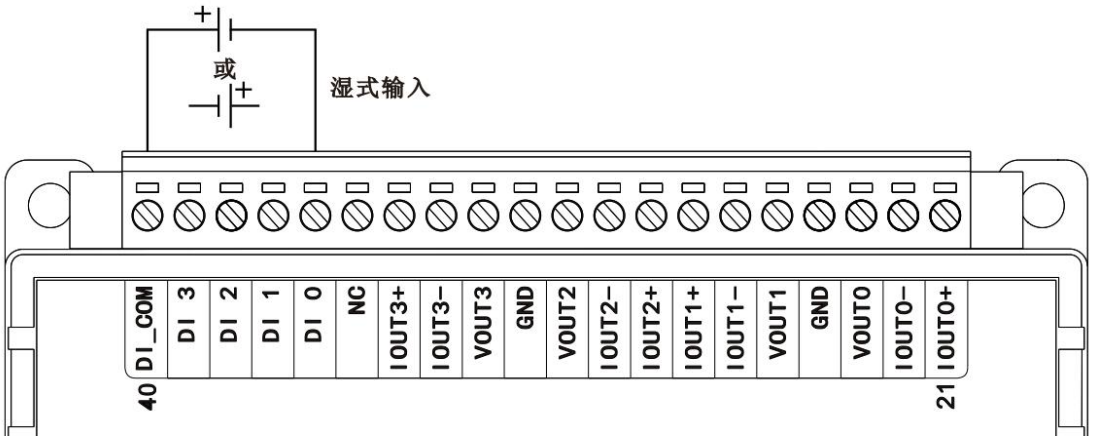


Figure 3-20 WTD824X ordinary wet input wiring

Wiring of NPN type wet input:

Wiring of NPN type wet digital input is shown in the following figure, connecting positive electrode of the external power to the common port DI_COM and connecting output pin of senor or photoelectric switch to input channel DI 0:

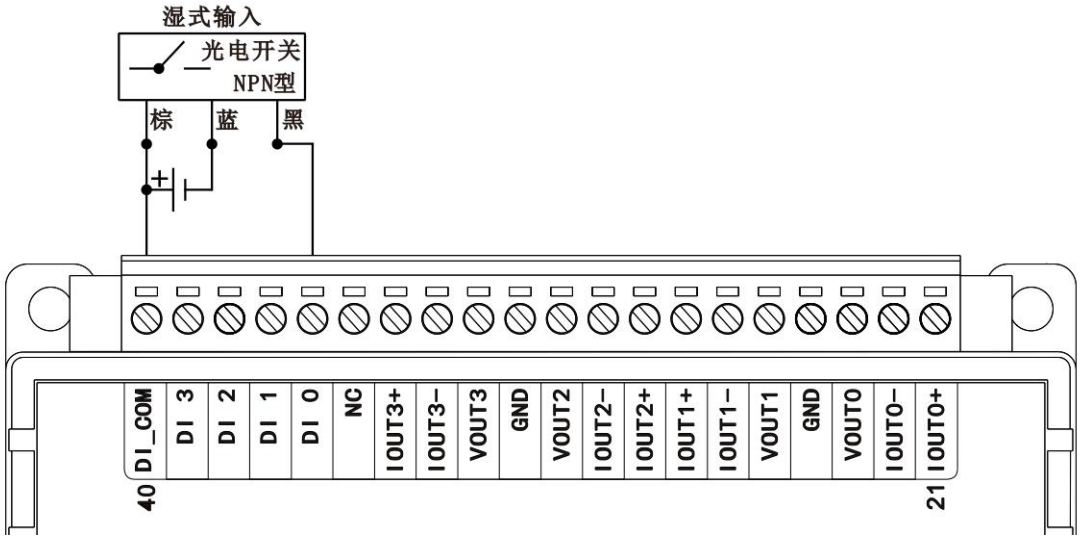


Figure 3-21 WTD824X NPN wet input wiring

Wiring of PNP type wet input :

Wiring of PNP type wet input is shown in the following figure, connecting negative electrode of the external power to common port DI_COM and connecting output pin of senor or photoelectric switch to input channel DI 0:

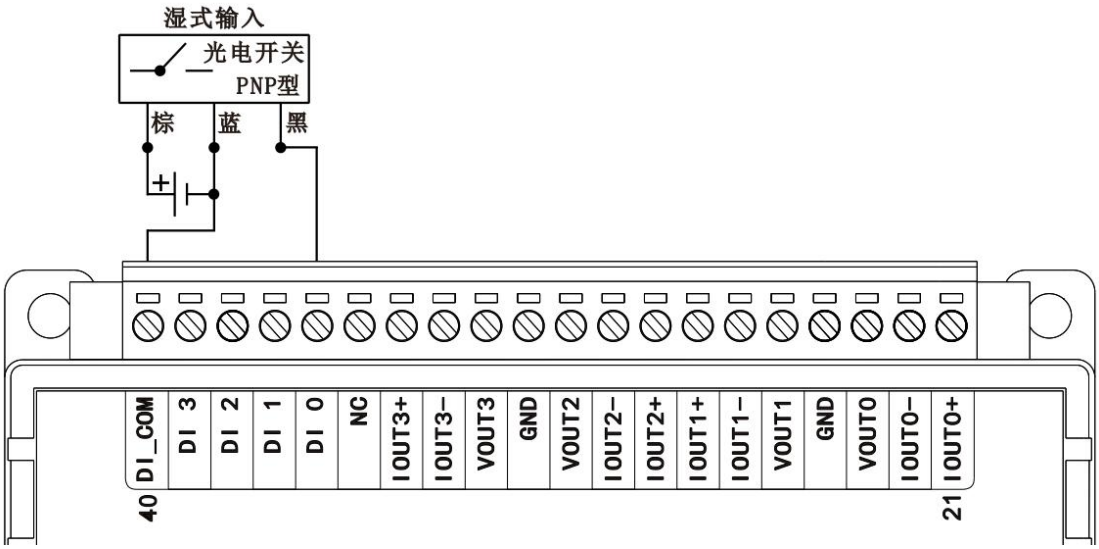


Figure 3-22 WTD824X PNP type wet input wiring

3.5 WTD840X 16-channel isolated digital / count input

WTD840X applying to acquisition of various passive switch、photoelectric switch、electromagnetic switch in industrial field is isolated digital/counting input module, that can communicate with host computer via wireless Wi-Fi and simultaneously collect 16-channel digital input or 16-channel counter input, supporting dry and wet input.As shown below:

Figure 3-23 WTD840X impression figure

3.5.1 Technical indicators

3.5.1.1 Digital / counter input

Number of input channel: 16 isolated channels

Input type: dry contact 、bilateral wet contact

Parameter of wet contact: high level :+10V～+50V or -50V～-10V low level :≤+3V

Response time : ≤50us

Frequency counting function : Yes

Maximum input frequency : 3KHz

Isolated voltage : 3KVdc

ESD static electricity rating : contact 4KVdc air 8KVdc

LED indication : Yes

3.5.2 Functional block diagram

The functional block diagram of WTD840X module is shown in the following figure.

The module mainly consists of power supply circuit, isolation circuit, digital input circuit, Wi-Fi communication interface circuit and MCU circuit and so on. The module`s micro-controller uses 32-bit ARM chips and has extremely fast data processing capability. Inside the chip, there`s watch-dog circuit, which makes the system to restart in case of accident, allowing the system to be more stable and reliable.

WTD840X is designed for industrial applications, that use photoelectric isolation between the internal input-output unit and the control unit.And the module do filtering process with input signal and greatly reducing the industrial field interference on the normal operation of the module, so that the module has a high reliability.The module used the industrial Wi-Fi communication interface can deal with the various interference in the industrial scene and also pass the EMC, EMI and other anti-interference certification test.

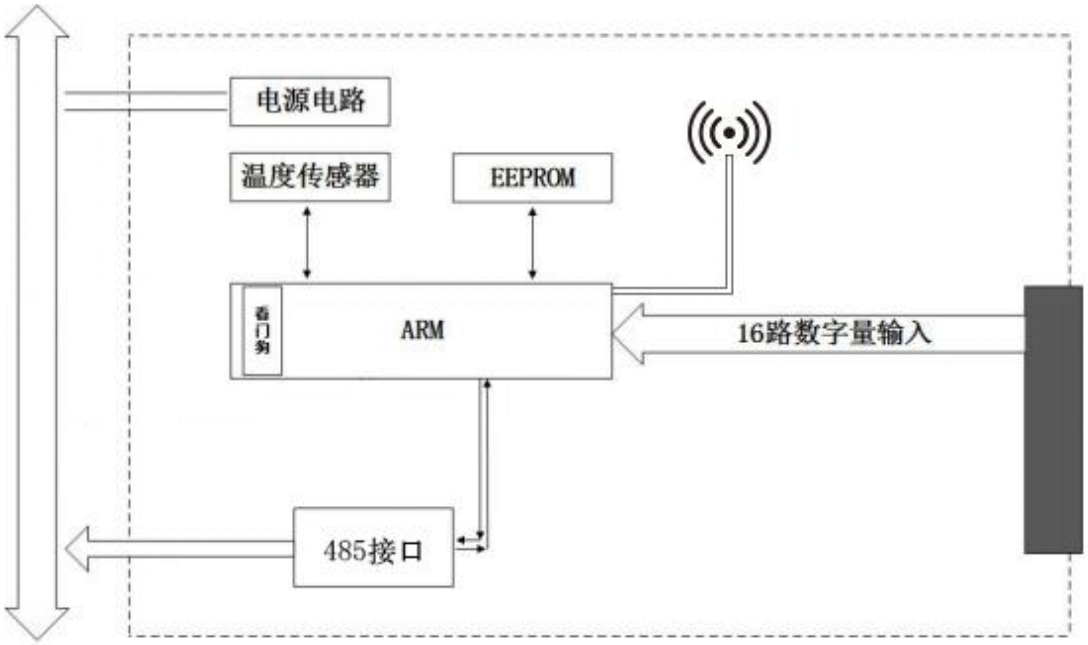


Figure 3-24 WTD840X functional block diagram

3.5.3 Terminal pin introduction

◆ Definition of terminal pin

WTD840X has a total of 40 pins on terminals and the pin function is defined as shown below:

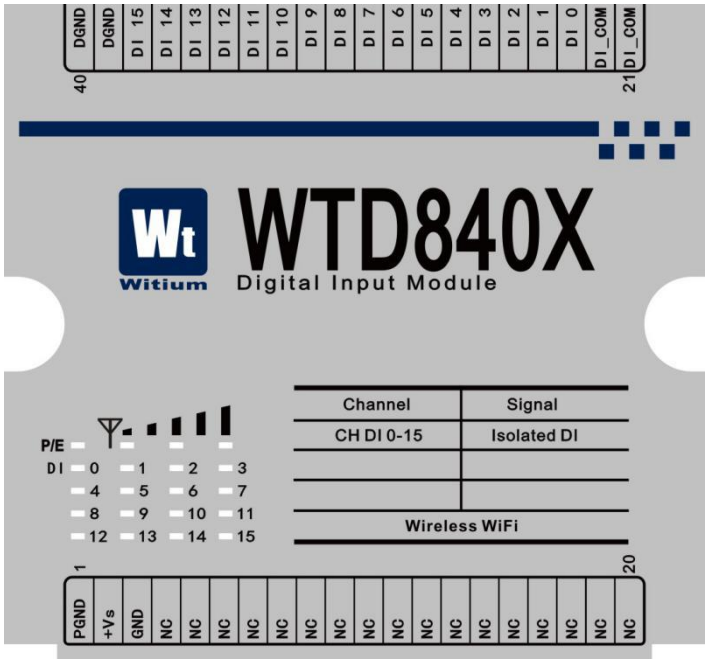


Figure 3-25 WTD840X definition of terminal pin

◆ Function description of terminal pin

--PGND、+Vs、GND are power input terminals of the module,PGND is the power ground, +Vs connects to power positive terminal and GND connects to power negative terminal.

-- DO_COM is the wet input common port of module's 16-channel isolated digital input interface,that PNP type connect to the external power negative electrode and NPN type connect to external power positive electrode,please refer to the next section for wiring.

--DGND is the dry input common port of module's 16 isolated digital input-channel-interfaces, please refer to the next section for wiring.

--DI 0～DI 15 are module's 16-channel isolated digital output interfaces, please refer to next section for wiring.

3.5.4 Wiring

WTD840X module processes 16 digital/counter input channels, each supporting dry contact input and bilateral wet contact input such as NPN type or PNP type photoelectric switch input.

◆ Wiring of dry input

Wiring of dry digital input is shown in the following figure, connecting one end of passive switch to common port DGND and connecting another end of passive switch to input channel DI 15:

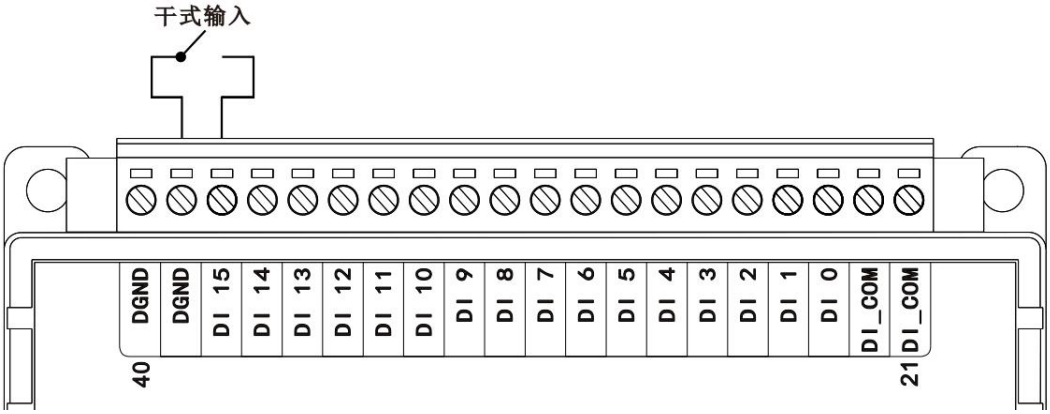


Figure 3-26 wiring of WTD840X dry input

◆ Wiring of wet input

Wiring of ordinary wet input :

Wiring of ordinary wet digital input is shown in the following figure, connecting input positive electrode (negative electrode) to common port DI_COM and connecting negative electrode (positive electrode) to input channel DI 2:

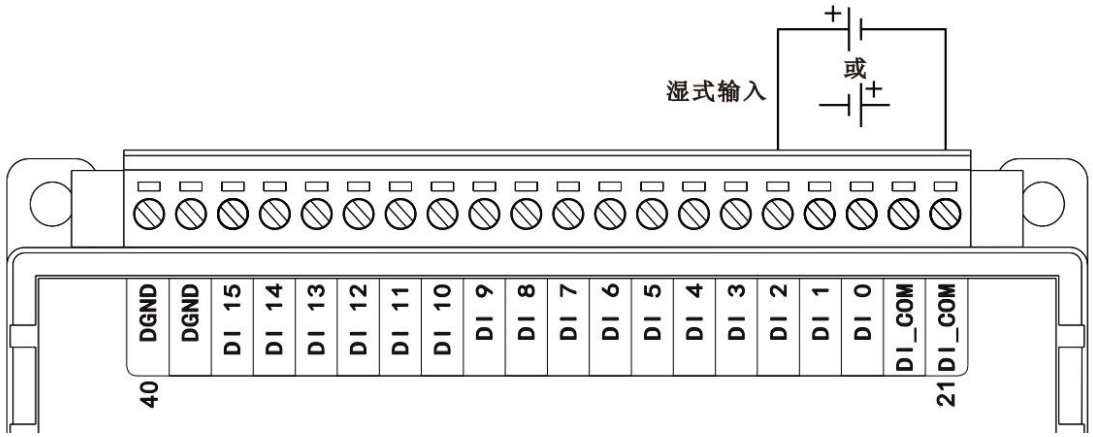


Figure 3-27 wiring of WTD840X ordinary wet input

Wiring of NPN type wet input:

Wiring of NPN type wet digital input is shown in the following figure, connecting positive electrode of external power to common port DI_COM and connecting output pin of senor or photoelectric switch to input channel DI_2:

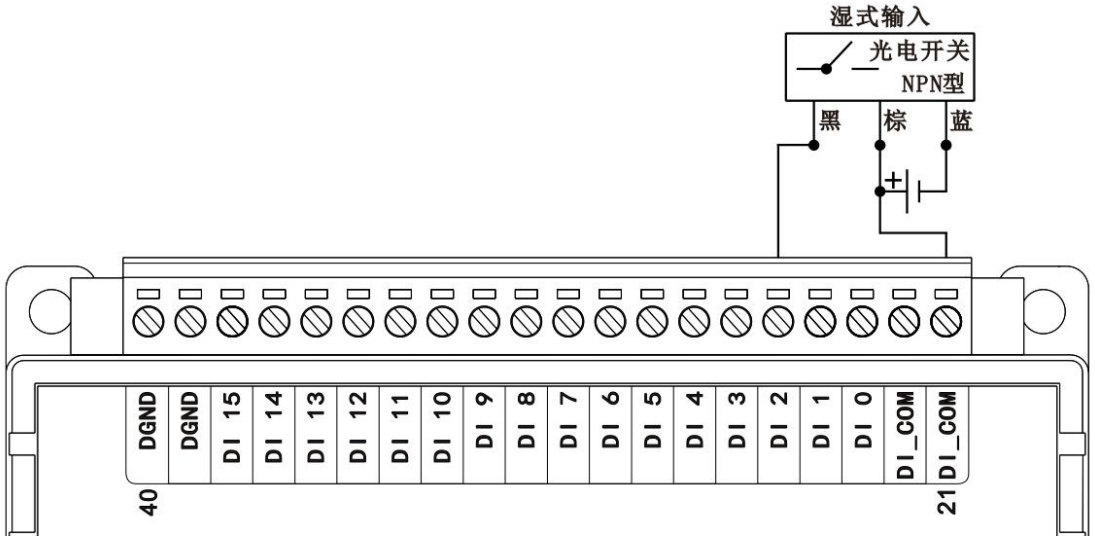


Figure 3-28 wiring of WTD840X NPN type wet input

Wiring of PNP type wet input:

Wiring of PNP type wet digital input is shown in the following figure, connecting negative electrode of external power to common port DI_COM and connecting output pin of senor or photoelectric switch to input channel DI 2:

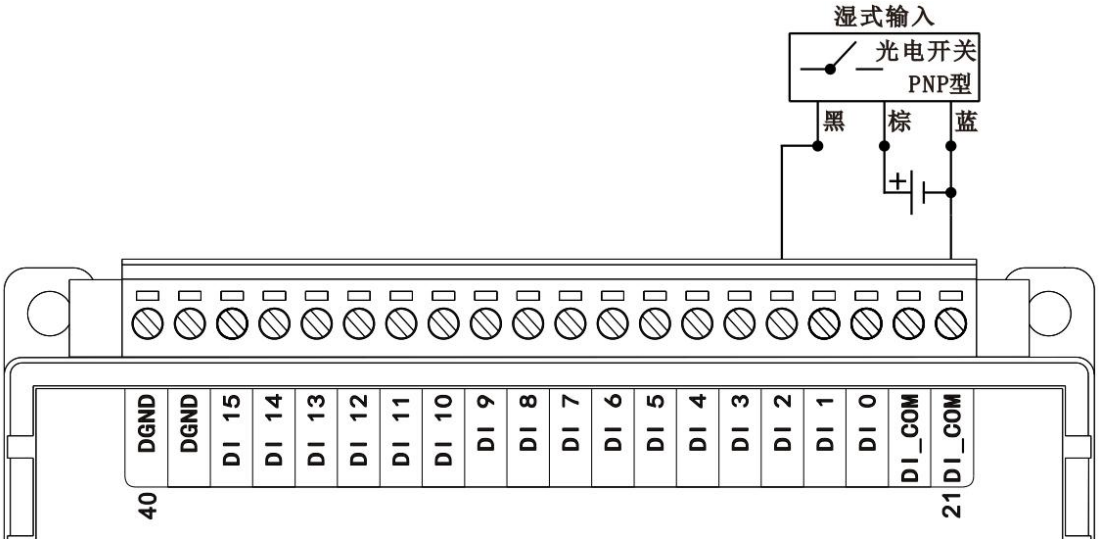


Figure 3-29 wiring of WTD840X PNP type wet input

3.6 WTD850C 16-channel isolated digital / PWM output

WTD850C is isolated digital/PWM output module, that can communicate with host computer via wireless Wi-Fi and control object with simultaneously output 16-channel switch or PWM signal,applying to control various switch actuator or PWM drive object in industrial field such as power relay.As shown below:

Figure 3-30 WTD850C impression figure

3.6.1 Technical indicators

3.6.1.1 Digital / PWM output

Number of output channel:16 isolated channels

Output type: open collector

Maximum load voltage:+50Vdc

Maximum load current:500mA(resistive load)

Inductive load: No need for external back electromotive force protection diodes

Maximum output pulse width frequency: 1KHz

High-low、low-high delay output : Yes

Output safety protection : Yes ,with set the protection time for communication disconnection

Isolated voltage :3KVdc

LED indication : Yes

3.6.2 Functional block diagram

The functional block diagram of WTD850C module is shown in the following figure.

The module mainly consists of power supply circuit, isolation circuit, digital output circuit, Wi-Fi communication interface circuit and MCU circuit and so on. The module`s micro-controller uses 32-bit ARM chips and has extremely fast data processing capability. Inside the chip, there`s watch-dog circuit, which makes the system to restart in case of accident, allowing the system to be more stable and reliable.

WTD850C is designed for industrial applications, that use photoelectric isolation between the internal input-output unit and the control unit.And the module do filtering process with input signal and greatly reducing the industrial field interference on the normal operation of the module, so that the module has a high reliability.The module used the industrial Wi-Fi communication interface can deal with the various interference in the industrial scene and also pass the EMC, EMI and other anti-interference certification test.

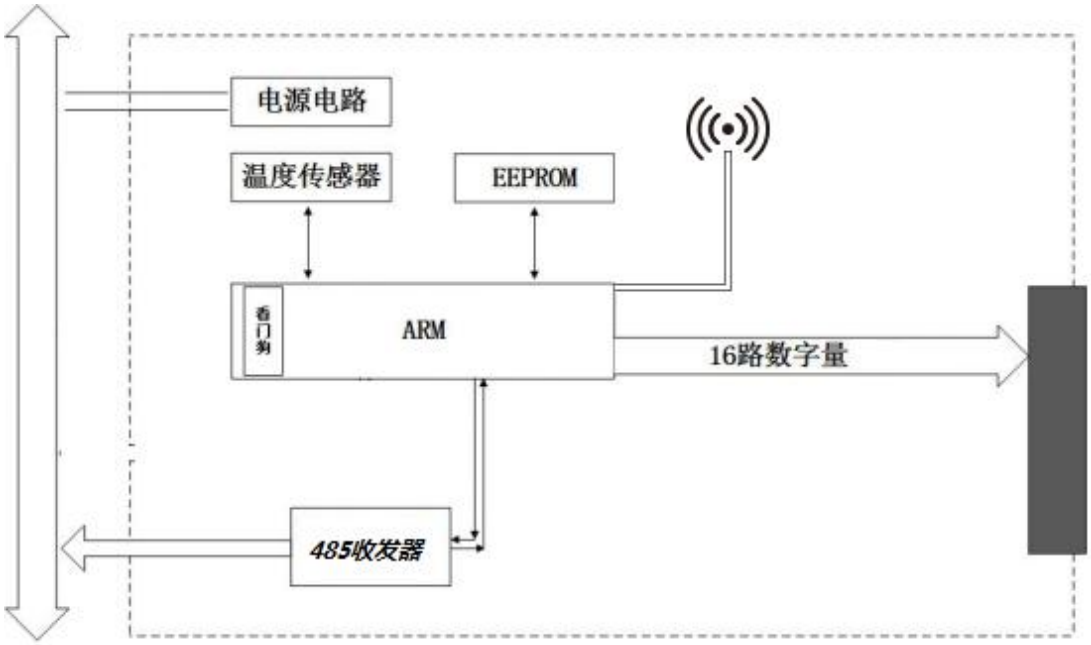


Figure 3-31 WTD850C functional block diagram

3.6.3 Terminal pin introduction

◆ Definition of terminal pin

WTD850C has a total of 40 pins on terminals and the pin function is defined as shown below:

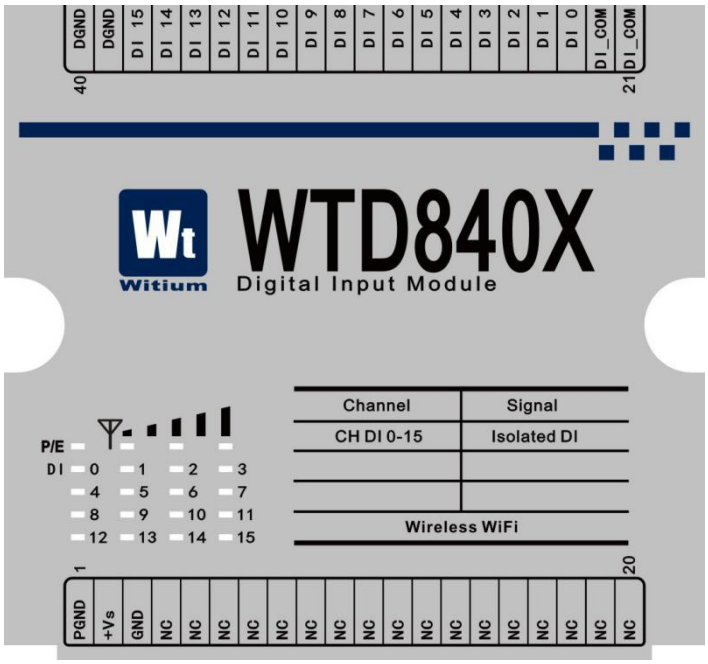


Figure 3-32 WTD850C definition of terminal pin

Function description of terminal pin

--PGND、+Vs、GND are power input terminals of the module,PGND is the power ground, +Vs connects to power positive terminal and GND connects to power negative terminal.

-- DO_COM is the common port of module's 16-channel isolated digital output interfaces,connecting to the external power positive electrode,please refer to the next section for wiring.

--DGND is the referential ground terminal of module's 16-channel isolated digital output interface, please refer to the next section for wiring.

--DI 0～DI 15 are module's 16-channel isolated digital output interfaces, please refer to next section for wiring.

3.6.4 Wiring

WTD850C module processes 16 digital/PWM output channels, each supporting contacting resistive load and inductive load ,that requires an external DC power supply.

◆ **Wiring of digital output**

Wiring of digital output is shown in the following figure,connecting positive electrode of the external DC power to one end of load and module's common port DO_COM and connecting another end of load to output channel DO 2 and connecting negative electrode of the external DC power to module's DGND, as shown below:

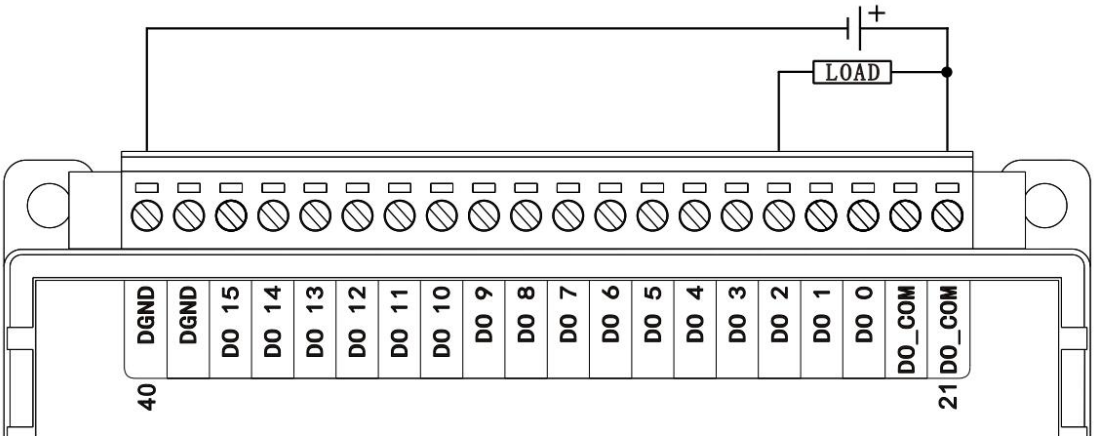


Figure 3-33 WTD850C wiring of digital output

3.7 WTD866C 6-channel isolated relay output

WTD866C is isolated relay-output module that can communicate with host computer via wireless Wi-Fi and control object with simultaneously output relay signal, applying to control various low power devices、strong electricity devices、heating devices in industrial field, as shown below:

Figure 3-34 WTD866C impression figure

3.7.1 Technical indicators

3.7.1.1 Relay output

Number of output channel:6 channels

Output type: 3 channels C type, 3channels A type

Output load: A-relay:5A@250Vac/30Vdc

C-relay:10A@250Vac/30Vdc

Breakdown voltage: 750Vac(50/60Hz 1min)

Contact resistance: A-relay:≤100mΩ

C-relay:≤100mΩ

Insolation resistance: 100MΩ.Min@500Vdc

Service life: 100,000 times

On-off time： ≤10ms

Operating speed: 60 times/min

3.7.2 Functional block diagram

The functional block diagram of WTD866C module is shown in the following figure.

The module mainly consists of power supply circuit, isolation circuit, digital output circuit, Wi-Fi communication interface circuit and MCU circuit and so on. The module`s micro-controller uses 32-bit ARM chips and has extremely fast data processing capability. Inside the chip, there`s watch-dog circuit, which makes the system to restart in case of accident, allowing the system to be more stable and reliable.

WTD866C is designed for industrial applications, that use photoelectric isolation between the internal input-output unit and the control unit.And the module do filtering process with input signal and greatly reducing the industrial field interference on the normal operation of the module, so that the module

has a high reliability.The module used the industrial Wi-Fi communication interface can deal with the various interference in the industrial scene and also pass the EMC, EMI and other anti-interference certification test.

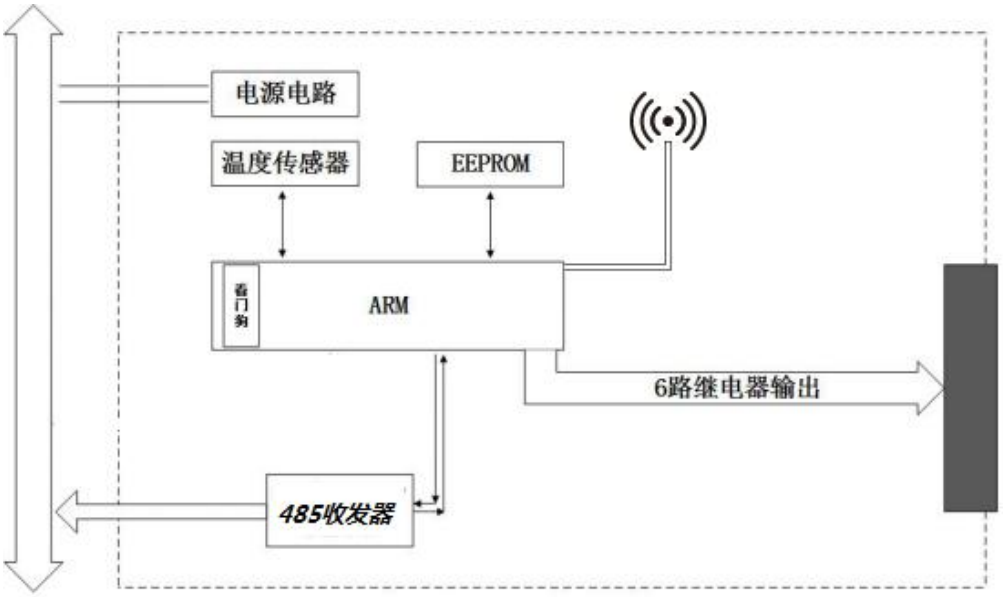


Figure 3-35 WTD866C functional block diagram

3.7.3 Terminal pin introduction

◆ Definition of terminal pin

WTD866C has a total of 40 pins on terminals and the pin function is defined as shown below :

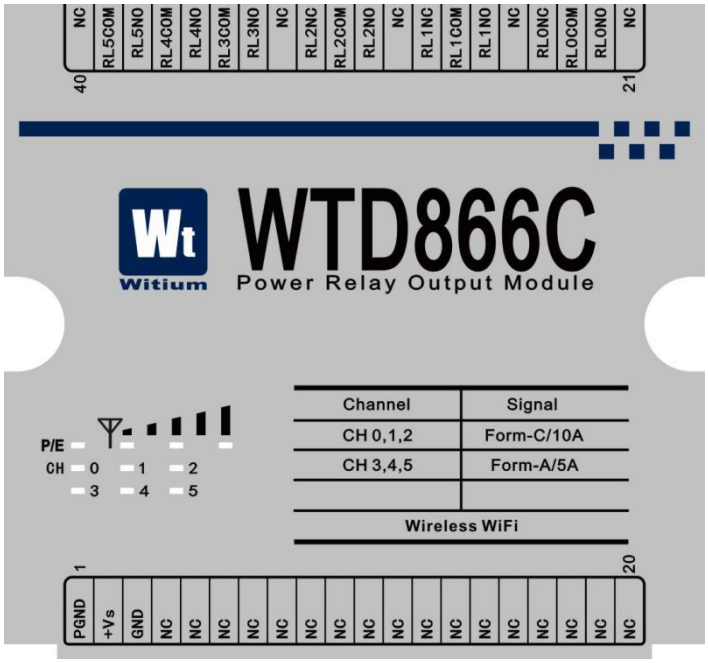


Figure 3-36 definiton of WTD866C terminal pin

◆ Function description of terminal pin

--PGND、+Vs、GND are module's power input terminals ,that PGND connects to power ground 、+Vs connects to power positive electrode and GND connects to power negative electrode.

--RL0COM～RL5COM are the common terminals of 6-channel relay output terminals, please refer to next section for wiring.

--RL0NO～RL5NO are normally open contact output terminal of 6-channel relay output interfaces,please refer to next section for wiring.

--RL0NC～RL2NC are normally close contact output terminal of 3-channel relay output interfaces, please refer to next section for wiring.

3.7.4 Wiring

WTD866C has 6 relay output channels, each supporting connecting resistive load or inductive load that requires an external power supply.

◆ Relay-output wiring

As shown below is the wiring of A-relay output and C-relay output.

While A-relay is connecting, connect one end of external power supply to

relay output common terminal RL5COM and connect another end of power supply to one end of load that another end of load connects to normally open contact RL5NO of relay output channel interface.

While C-relay is connecting, connect one end of external power supply to relay output common terminal RL0COM and connect another end of power supply to one end of load that another end of load respectively connects to normally open contact RL0NO and normally close contact RL0NC.

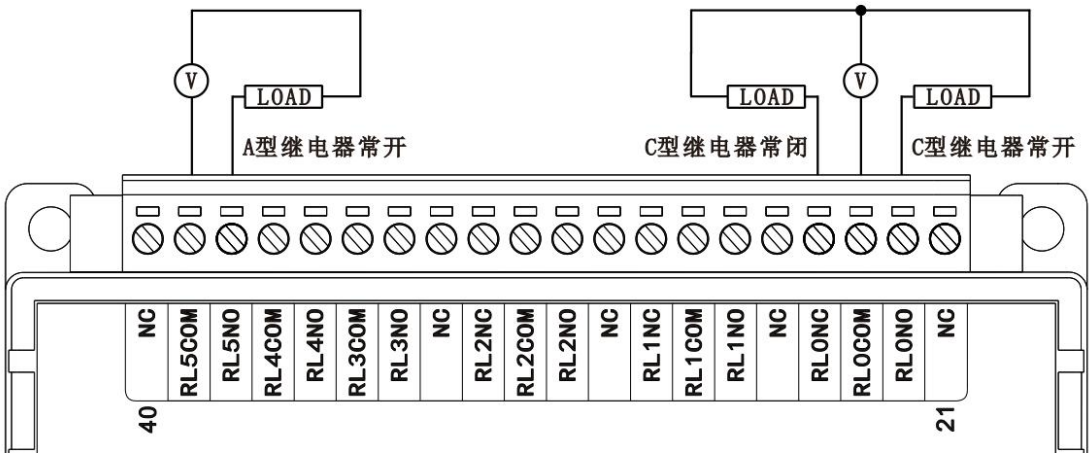


Figure 3-37 WTD866C relay-output wiring

3.8 WTD878C 8-channel digital input, 8-channel digital output

WTD878C is isolated digital/counting input and isolated digital/PWM output module that can communicate with host computer via wireless Wi-Fi,that can simultaneously collect 8-channel digital signal or 8-channel counter-input signal, supporting dry and wet input.And the module can simultaneously output 8-channel switch signal or control object with PWM signal,applying to various signal acquisition of passive switch、photoelectric switch、electromagnetic switch in industrial field and control various switch actuator or PWM drive object in industrial field such as power relay.As shown below:

Figure 3-38 WTD878C impression figure

3.8.1 Technical indicators

3.8.1.1 Digital / counter input

Number of input channel: 16 isolated channels

Input type: dry contact、bilateral wet contact

Parameter of wet contact:high level:+10V～+50V or -50～-10V　low level :≤+3V

Response time :≤50us

Frequency counting function: Yes

Maximum input frequency:3KHz

Isolated voltage:3KVdc

ESD static rating:contact 4KVdc　air 8KVdc

LED indication : Yes

3.8.1.2 Digital / PWM output

Number of output channel: 16 isolated channels

Output type :open collector

Maximum load voltage :+50Vdc

Maximum load current:500mA(passive load)

Inductive load: no need for external back electromotive force protection diode

Maximum output pulse width frequency: 1KHz

High-low and low-high relay output: Yes

Output safety protection: Yes,set protection time of communication disconnection

Isolated voltage: 3KVdc

LED indication : Yes

3.8.2 Functional block diagram

The functional block diagram of WTD878C module is shown in the following figure.

The module mainly consists of power supply circuit, isolation circuit, digital output circuit, Wi-Fi communication interface circuit and MCU circuit and so on. The module`s micro-controller uses 32-bit ARM chips and has extremely fast data processing capability. Inside the chip, there`s watch-dog circuit, which makes the system to restart in case of accident, allowing the system to be more stable and reliable.

WTD878C is designed for industrial applications, that use photoelectric isolation between the internal input-output unit and the control unit.And the module do filtering process with input signal and greatly reducing the industrial field interference on the normal operation of the module, so that the module has a high reliability.The module used the industrial Wi-Fi communication

interface can deal with the various interference in the industrial scene and also pass the EMC, EMI and other anti-interference certification test.

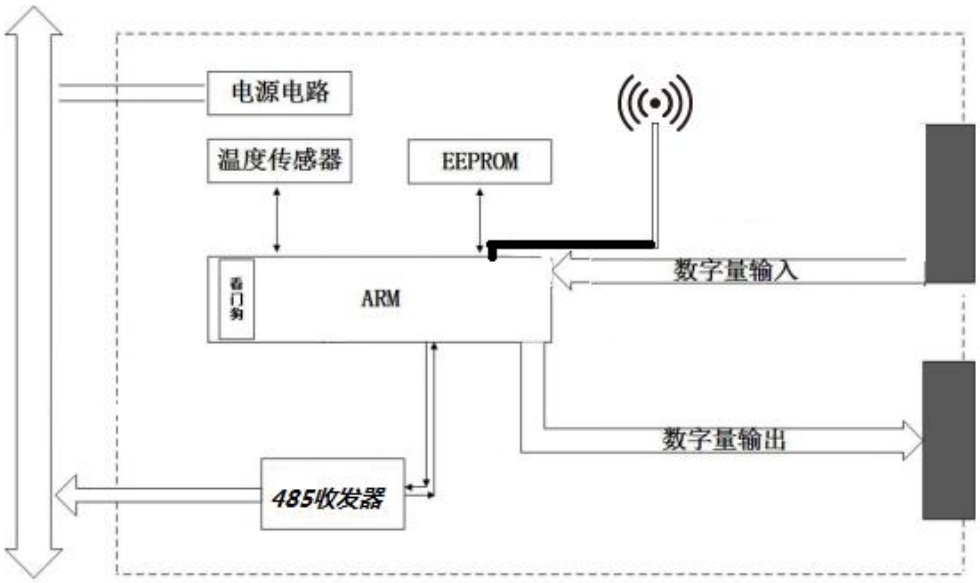


Figure 3-39 WTD878C functional block diagram

3.8.3 Terminal pin introduction

◆ Definition of terminal pin

WTD878C has a total of 40 pins on terminal and the pin function is defined as shown below:

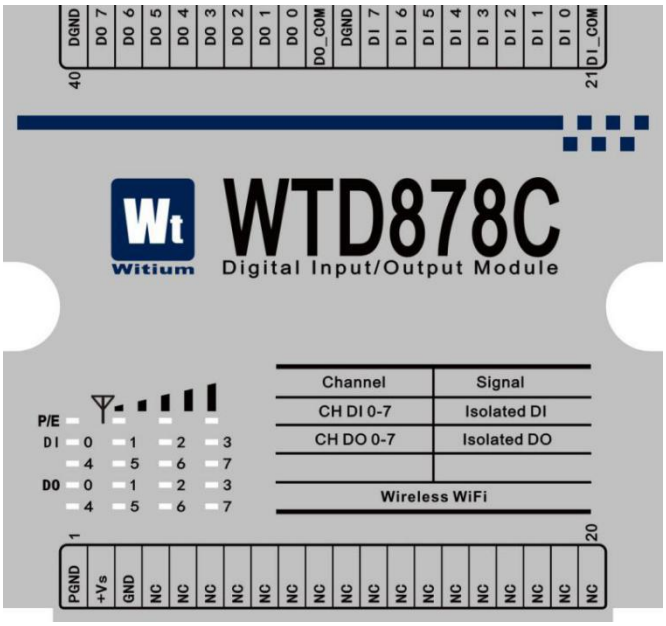


Figure 3-40 definition of WTD840X terminal pin

◆ Function description of terminal pin

--PGND、+Vs and GND are module's power input terminals, connecting PGND to power ground 、connecting +Vs to power positive electrode and connecting GND to power negative electrode.

--DI_COM is module's wet input common terminal of 8-channel isolated digital input interfaces,connecting to negative electrode of external power for PNP and connecting to positive electrode of external power for NPN.

--DGND is module's dry input common terminal of 8 isolated digital input channel interfaces.

--DI 0～DI 7 are module's 8-channel digital input interfaces.

--DO_COM is module's common terminal of 8-channel isolated digital output interface,connected to positive electrode of external load power.

--DO 0～DO 7 are module's 8-channel isolated digital output interface.

3.8.4 Wiring

WTD878C has 8 digital/counter input channels,each supporting dry contact input and bilateral wet contact input such as NPN or PNP photoelectric switch input.And the module has 8 digital/PWM output channels, each supporting connecting resistive or inductive load that requires external DC power supply.

◆ Wiring of dry input

Wiring of dry input is shown in the following figure ,connecting one end of passive switch to digital input common terminal and connecting another end of passive switch to input channel DI 7:

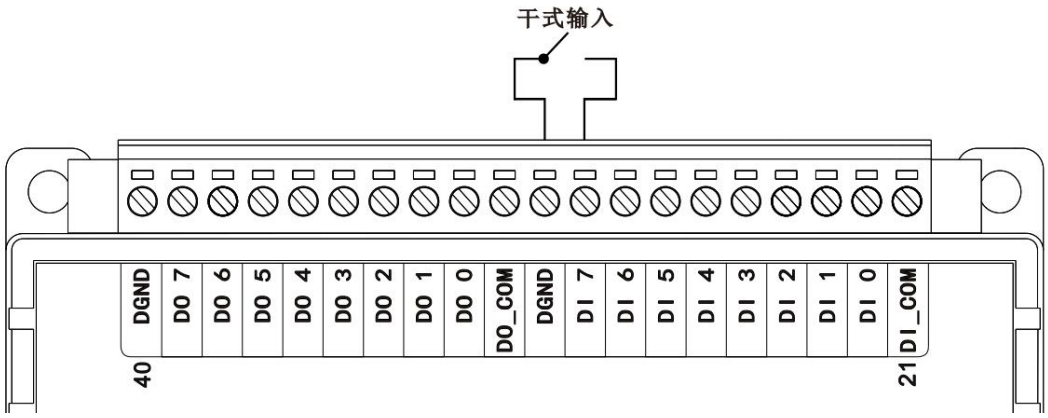


Figure 3-41 wiring of WTD878C dry input

◆ Wiring of wet input

wiring of ordinary wet input:

Wiring of ordinary wet digital input is shown in the following figure,connecting input positive electrode (negative electrode) to digital common DI_COM and connecting input negative electrode (positive electrode) to input channel DI 3:

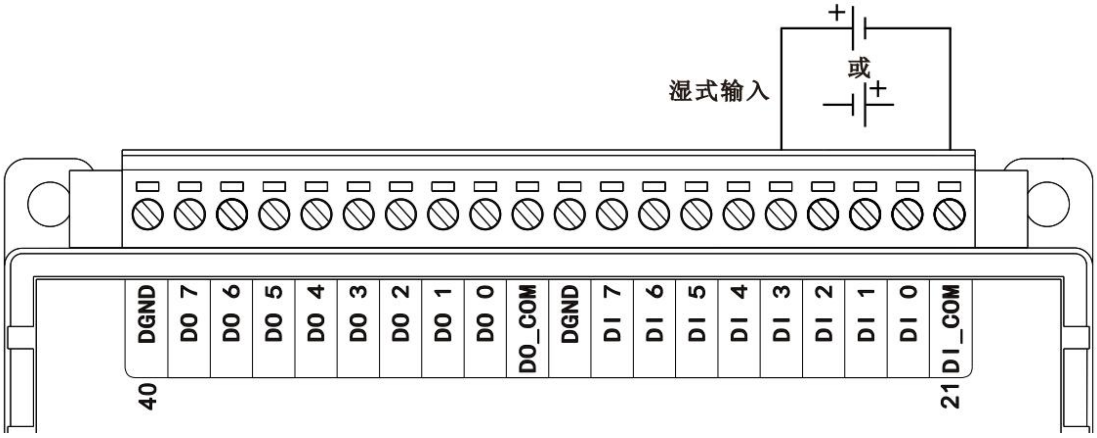


Figure 3-42 wiring of WTD878C ordinary wet input

wiring of NPN wet input:

Wiring of NPN wet digital input is shown in the following figure, connecting positive electrode of external power to digital input common terminal DI_COM and connecting output pin of senor or photoelectric switch to input channel DI 2:

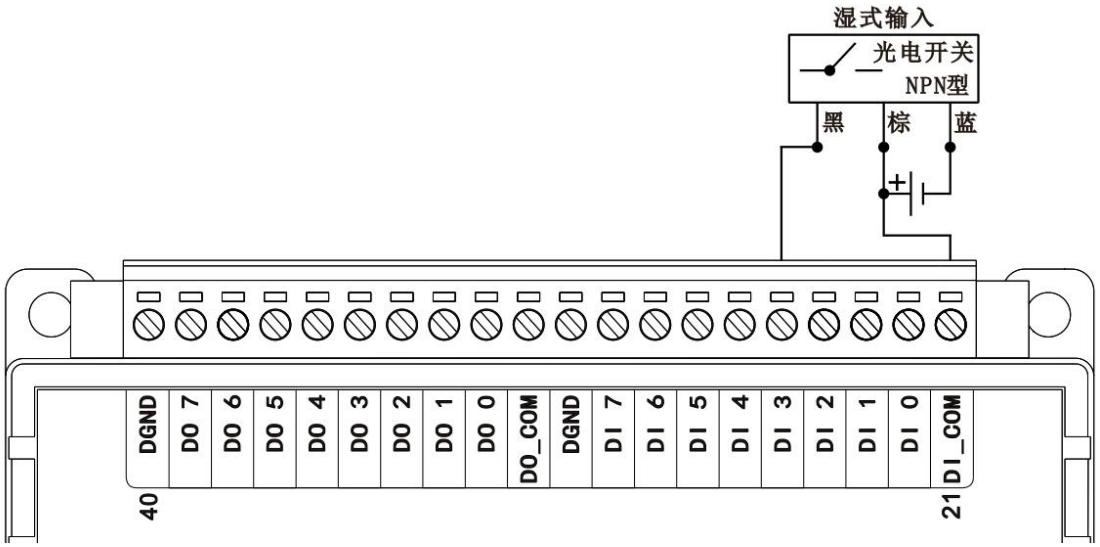


Figure 3-43 wiring of WTD878C NPN wet input

wiring of PNP wet input :

Wiring of PNP wet digital input is shown in the following figure ,connecting negative electrode of external power to digital input common terminal DI_COM and connecting output pin of senor or photoelectric switch to input channel DI 3:

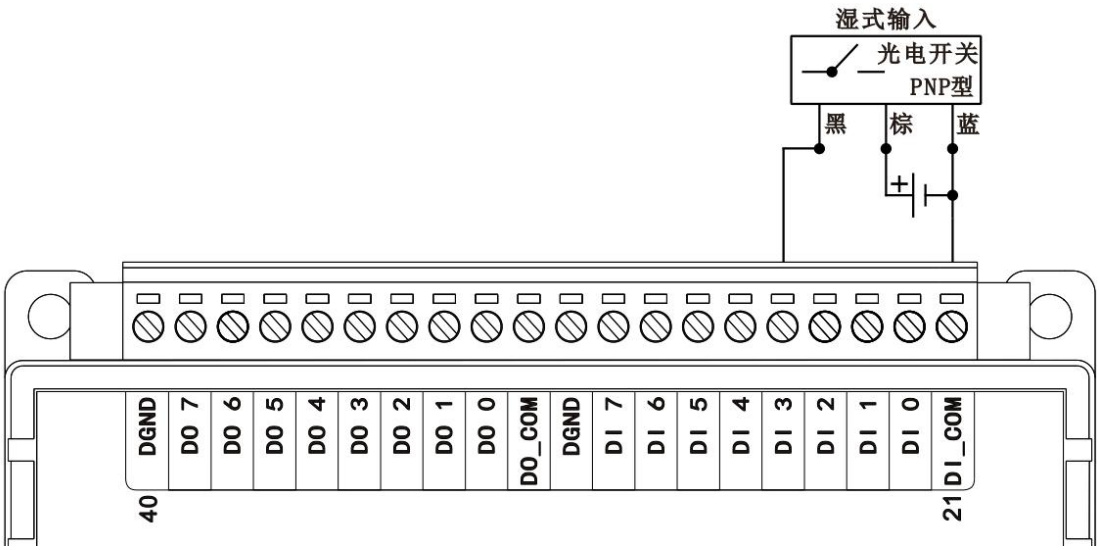


Figure 3-44 wiring of WTD878C PNP wet input

◆ Wiring of digital output

Wiring of digital output is shown in the following figure ,connecting positive electrode of external DC power to one end of load and module’s digital output

common terminal DO_COM .Another end of load connects to digital output channel DO 3 and the negative electrode of external power connects module's digital output DGND.As shown below:

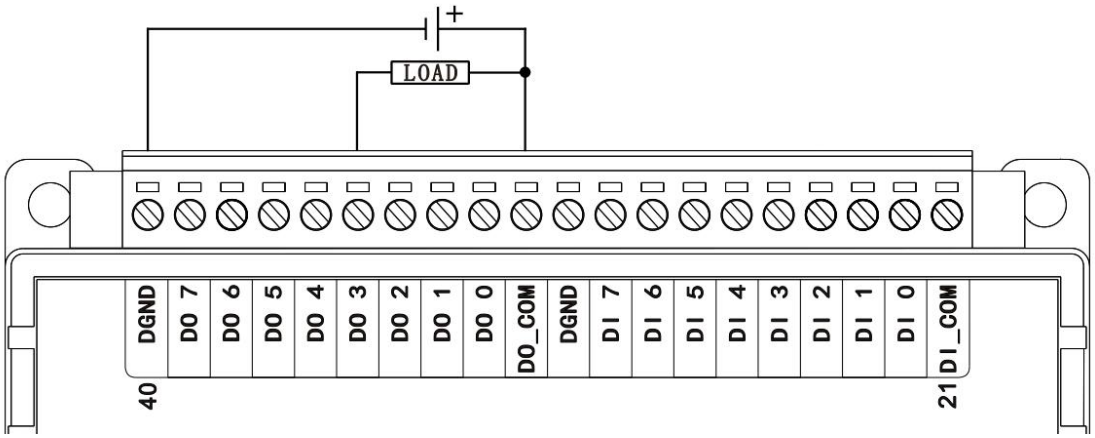


Figure 3-45 wiring of WTD878C digital output

3.9 WTD834G Modbus-RTU to wireless WiFi gateway

WTD834G is gateway module shifting wireless Wi-Fi from Modbus-RTU bus of industrial field based on the serial RS485 that can communicate with host computer via wireless Wi-Fi and remotely collect or control devices based on Modbus-RTU industrial field bus,applying to various unattended or remote monitoring industrial field such as industrial device monitoring 、environmental monitoring 、wisdom city and so on.As shown below:

Figure 3-46 WTD834G impression figure

3.9.1 Technical indicators

3.9.1.1 Modbus-RTU fieldbus

Number of input channel: 1 channel

Interface type: RS485 terminal

Baud rate: 1200-115200 bps

Number of sites: support up to 127 sites

Isolated voltage: 3KVdc

3.9.1.2 Gateway metrics

- **Communication mode:**

  --Modbus-RTU master station: gateway module as Modbus master station

communicates with server via WiFi

--Modbus-RTU slave station: gateway module as Modbus slave station communicates with PLC、HMI、IPC and so on.

--transparent transmission mode :the data received by the RS485 interface is forwarded directly to the server via Wi-Fi

- **Disconnection function:**online forever 、automatic reconnection
- Periodic sending mechanism,set the transmission cycle time
- Field monitoring point overrun warning/alarm instant messaging mechanism
- cloud server application function

3.9.2 Functional block diagram

The functional block diagram of WTD834G gateway module is shown in the following figure.

The module mainly consists of power supply circuit, isolation circuit, RS485 communication interface circuit, Wi-Fi communication interface circuit and MCU circuit and so on. The module`s micro-controller uses 32-bit ARM chips and has extremely fast data processing capability. Inside the chip, there`s watch-dog circuit, which makes the system to restart in case of accident, allowing the system to be more stable and reliable.

WTD834G is designed for industrial applications, that use photoelectric isolation between the internal RS485 communication interface unit and the control unit.And the module do protection process with input-output signal and greatly reducing the industrial field interference on the normal operation of the module, so that the module has a high reliability.The module used the industrial Wi-Fi communication interface can deal with the various interference in the industrial scene and also pass the EMC, EMI and other anti-interference certification test.

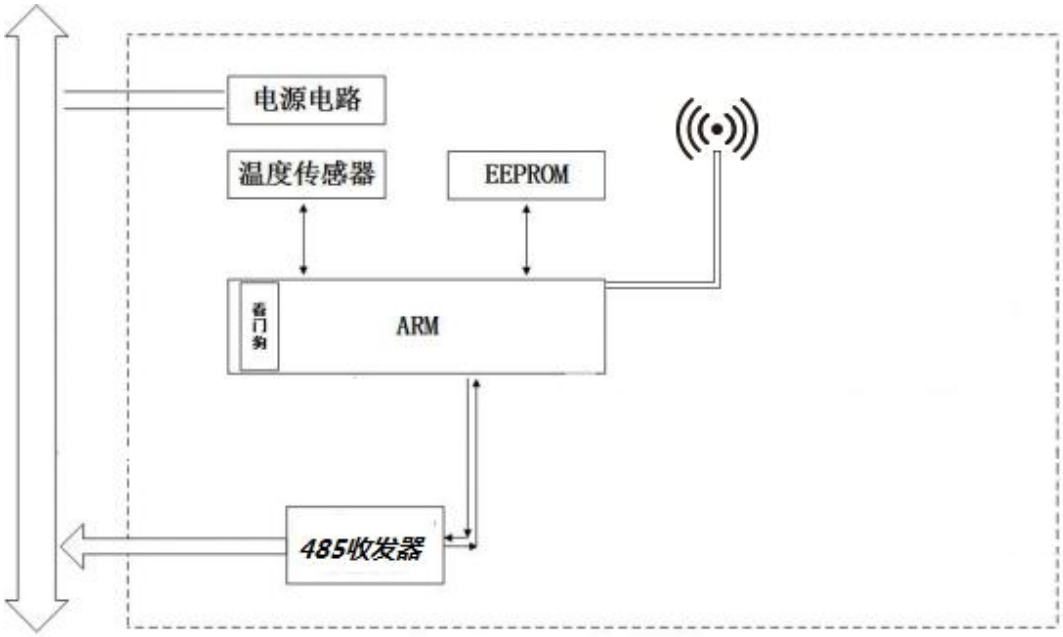


Figure 3-47 WTD834G functional block diagram

3.9.3 Terminal pin introduction

◆ Definition of terminal pin

WTD834G gateway module has a total of 20 pins on terminal and the pins function is defined as shown below:

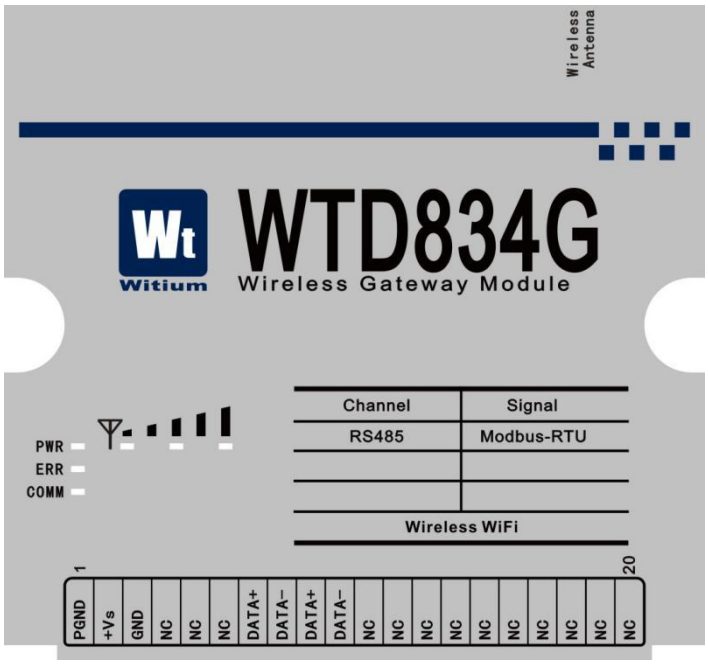


Figure 3-48 definition of WTD834G terminal pin

◆ Function description of terminal pin

--PGND、+Vs、GND are gateway-module's power input terminals ,connecting PGND to power ground,connecting +Vs to power positive electrode and connecting GND to power negative terminal.

--Two groups parallel connected in internal of DATA + and DATA - are RS485 communication interfaces for multi-device communication.

3.9.4 Wiring

WTD834G gateway module has 1 channel based on shifting Wi-Fi communication from RS485 Modbus-RTU communication protocol, that the RS485 interface can be connected to master device or slave device.

◆ **Wiring of shifting Wi-Fi gateway from RS485**

Gateway module wiring is shown in the following figure.

Connect master-slave devices' RS485 communication interface based on Modbus-RTU communication protocol to WTD834G gateway module's DATA+ and DATA- pins.In order to prevent the reflection and interference of the signal,connect the most remote RS485 communication wire 120 / 0.5W terminal resistance.

Note: no termination resistor in WTD834G RS485 internal.

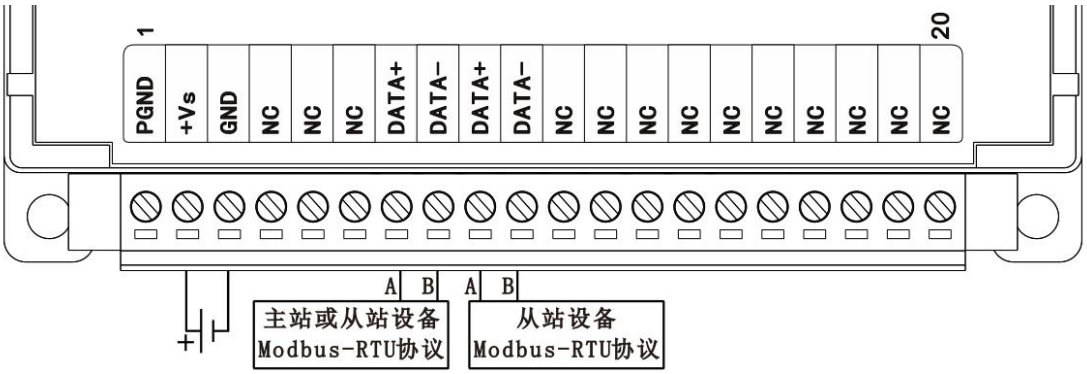


Figure 3-49 WTD834G gateway wiring

3.10 WTD836G Modbus-RTU to wireless WiFi gateway

WTD836G is gateway module shifting wireless Wi-Fi from Modbus-TCP bus of industrial field based on the serial RS485 that can communicate with host computer via wireless Wi-Fi and remotely collect or control devices based on Modbus-TCP industrial field bus,applying to various unattended or remote monitoring industrial field such as industrial device monitoring 、environmental monitoring 、wisdom city and so on.As shown below:

Figure 3-50 WTD836G impression figure

3.10.1 Technical indicators

3.10.1.1 Modbus-TCP field bus

Number of input channel: 1 channel

Interface type: 2-port 10/100 Base-TX (for daisy chain)

Isolation voltage: 1.5KVdc

3.10.1.2 Gateway metrics

- **Communication mode:**

--Modbus-TCP master station: gateway module as Modbus master station communicates with server via Wi-Fi

--Modbus-TCP slave station: gateway module as Modbus slave station communicates with PLC、HMI、IPC and so on.

--transparent transmission mode :the data received by the RS485 interface is forwarded directly to the server via Wi-Fi

- **Disconnection function:** online forever 、automatic reconnection
- Periodic sending mechanism,set the transmission cycle time
- Field monitoring point overrun warning/alarm instant messaging mechanism
- cloud server application function

3.10.2 Functional block diagram

The functional block diagram of WTD836G gateway module is shown in the following figure.

The module mainly consists of power supply circuit, isolation circuit, RJ45 Ethernet communication interface circuit, Wi-Fi communication interface circuit and MCU circuit and so on. The module`s micro-controller uses 32-bit ARM chips and has extremely fast data processing capability. Inside the chip, there`s watch-dog circuit, which makes the system to restart in case of accident, allowing the system to be more stable and reliable.

WTD836G is designed for industrial applications, that use photoelectric isolation between the internal RJ45 Ethernet communication interface unit and

the control unit.And the module do protection process with input-output signal and greatly reducing the industrial field interference on the normal operation of the module, so that the module has a high reliability.The module used the industrial Wi-Fi communication interface can deal with the various interference in the industrial scene and also pass the EMC, EMI and other anti-interference certification test.

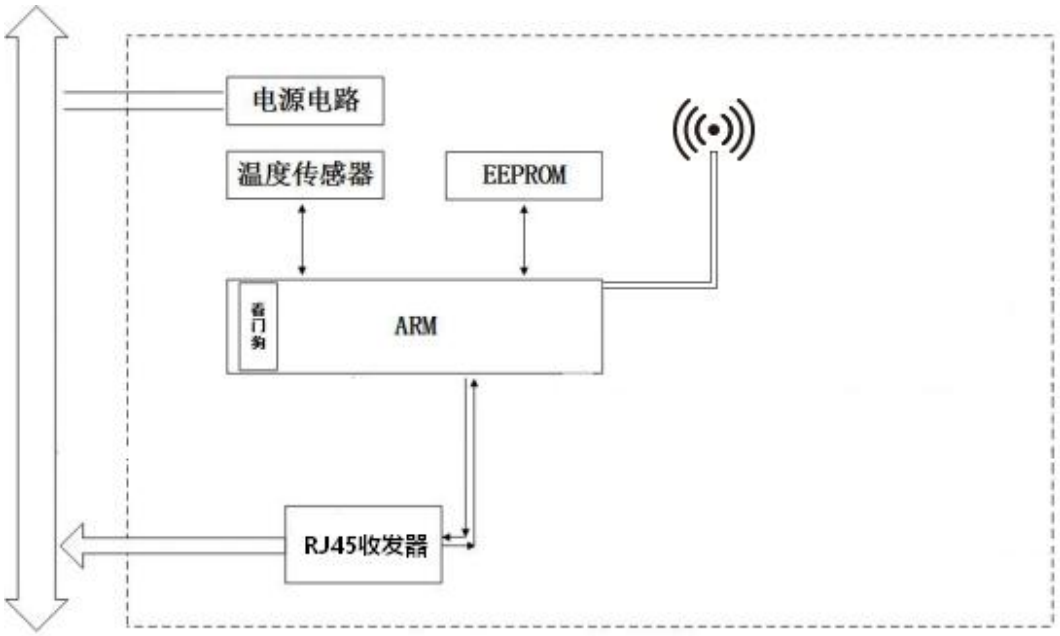


Figure 3-51 WTD836G functional block diagram

3.10.3 Terminal pin introduction

◆ Definition of terminal pin

WTD836G gateway module has a total of 8 pins on terminal and pin function is defined as shown in the following figure:

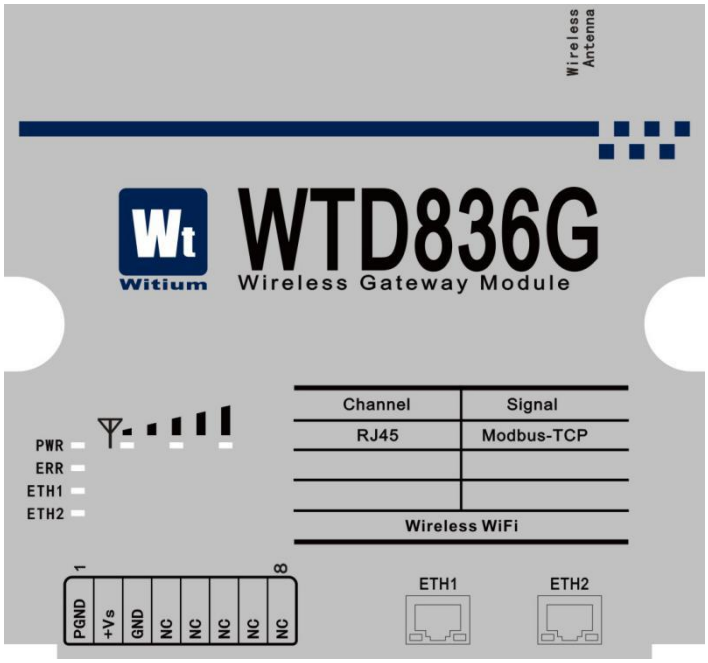


Figure 3-52 definition WTD836G terminal pin

◆ **Function description of terminal pin**

--PGND、+Vs、GND are gateway module's power input terminals , connecting PGND to power ground, connecting +Vs to power positive electrode and connecting GND to power negative electrode.

3.10.4 Wiring

WTD834G gateway module has 1 channel based on shifting Wi-Fi communication from RJ45 Modbus-TCP communication protocol, that the RJ45 interface can be connected to master device or slave device.

◆ **Wiring of shifting Wi-Fi gateway from RJ45 Ethernet**

Gateway module wiring is shown in the following figure.

Connect master or slave devices' terminal based on Modbus-TCP communication protocol to WTD834G gateway module's RJ45 communication interface.

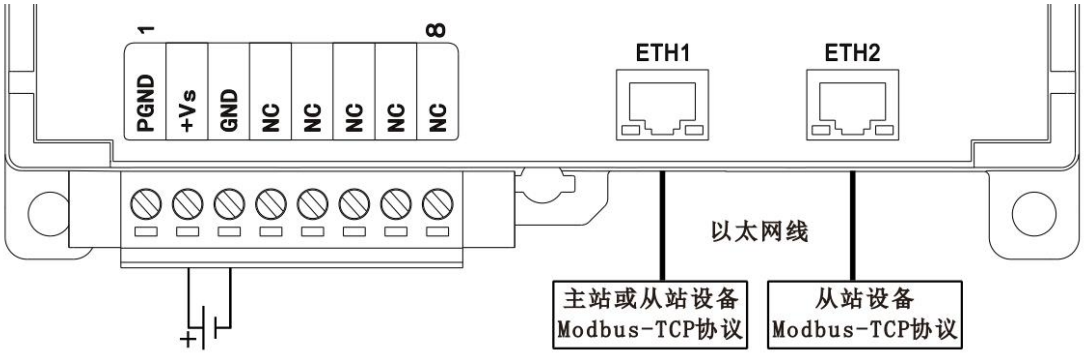


Figure 3-53 WTD836G gateway wiring

Chapter 4

Modbus Communication Protocol

4.1 Modbus protocol description

Modbus protocol defines a simple data unit (PDU) independent of the underlying communication layer. Modbus protocol mapping on a particular bus or network can introduce some additional fields on application data unit (AUD).

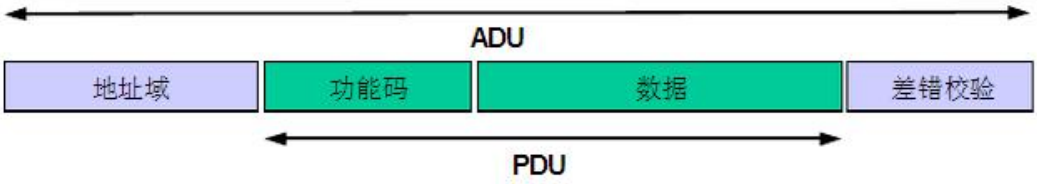


Figure 4-1 Modbus protocol frame

Start the client for MODBUS transaction processing to create the Modbus application data unit:

--The address code indicates which server needs to respond.

--The function code indicates which operation to be executed to the server.

--The data domain is used for providing relevant parameters required by the server.

--The final check code is used to verify the protocol`s validity.

4.1.1 Protocol address code

Use a byte to encode the address code domain of Modbus protocol. The effective size range is decimal 0-255 (0 as broadcast address). When the message is sent from the client to the server, the server will compare the address code received and its own address code to identify whether it needs to implement responses.

4.1.2 Protocol function code

Use a byte to encode the function code domain of Modbus data unit. The range of valid code is the decimal 1-255 (1-127 for the corresponding codes of

normal function and 128-255 reserved for exception responses). When sending a message from the client device to the server, a function code domain notifies the server to perform which operations. Function code can also be added with a function code to define multiple operations.

4.1.3 Data Bits

The message data field sent from the client device to the server device includes additional information, and the server uses this information to perform the operations defined by the function code. The field also includes discrete items and register address, the number of items processed, and the actual number of data byte in the field.

In some request, the data field does not exist (that is, the length can be 0), in which case the server does not require any additional information. The function code is only for instructions.

4.1.4 Check Code

Under Mobus RTU mode, the message sent from the client device to the server finally include two bytes of error checking field, which are implemented based on the cyclic redundancy check (CRC) method for all message content.

Under Modbus ASCII mode, the error checking field is based on the implementation for all message content based on longitudinal redundancy check (LRC) method.

Modbus TCP mode has no additional stipulated check, because TCP is a connection-oriented reliable protocol. TCP is a protocol that Modbus RTU/ASCII protocol is encapsulated into a TCP packet, there is not much difference in essence, but one is running on 232 or 485 serial communication platforms, the other is running on Ethernet platforms.

4.1.5 Response

If in a correctly received Modbus ADU, errors related with Mobus function request does not appear, the response data field from the server to the client includes the requested data. If there are errors related with Modbus function request, the field includes an exception code, which a server application can use to identify the next operations. For example, a client can read the on/off status of a set of discrete output or input, or read/write the data content of a set of registers.

When the server responds to the client, it uses the function code field to indicate the normal (no error) response or some kind of error (referred to as exception response). For a normal response, the server only respond to the original function code.

4.2 Data Encoding

Modbus uses a 'big-Endian' to represent address and data item. This means that while launching multiple bytes, the most significant bit is sent first. For example: The register size is 16 bit and the register value is 0x1234, then it sends the first byte 0x12, and the second byte 0x34.

4.3 Data Model

Modbus is based on the data model on a series of tables with different characteristics. Four basic forms are:

Basic Table	Object Type	Access Type	Content
Discrete Input	Single Bit	Read-only	I/O systems to provide this type of data
Coil	Single Bit	Read and Write	Change this type of data

			through the application
Input Register	16-bit Words	Read-only	I/O systems to provide this type of data
Holding Register	16-bit Words	Read and Write	Change this type of data through the application

For any item in the basic table, the agreement allows a single choice of65,536 data items, and the read and write operations designing those items can go across multiple consecutive data items until limited by data size, which is associated with the transaction processing function code.

It is clear that all data through Modbus process must be placed in the device application storage. However, the physical address of the memory should not be confused with reference data. The only requirement is the link between data reference and physical address.

The Modbus logic reference number used in MODBUS function code is the index of the unsigned integers starting with 0.

4.4 Modbus protocol functions and registers

Function Code	Description
01 (0x01)	Read Coil State
02 (0x02)	Read Discrete Input State
03 (0x03)	Read Holding Register State
04 (0x04)	Read Input Register State
05 (0x05)	Control Single Coil Output State
06 (0x06)	Preset Single Register State
15 (0x0F)	Control Output State of Multiple Coils
16 (0x10)	Preset Multiple-Register State

4.4.1 Read coil status 01 (0x01)

This function code is used to read the coil state of Modbus module equipment, ranging 1~2000. Request PDU details the start address, i.e. the first coil address and coil number specified. The coil address in request PDU makes addressing of the coil from zero, thus the address of the addressing coil 1-16 corresponds to 0-15.

The coil status of responded message indicates that each bit in the data field corresponds to a coil state. It indicates the state of1= ON and 0 = OFF. The first data byte`s LSB (least significant bit) represents the output of initial coil state in the query. Other coils repeat until the high-order end of this byte, and follow an order from low- to high-order end in the subsequent bytes.

If the returned output quantity is not a multiple of eight, a zero is used to fill in the remaining bits of the data byte (until the high-order end of the byte). The number domain of bit illustrates the number of full bytes of data.

Request PDU		Response PDU		Errors	
Function Code	0x01	Function Code	0x01	Function Code	0x81
Start Address High Bytes	0x00	Number of Bytes	0x01	Error Code	0x01或0x02或0x03或0x04
Starting Address Lower Bytes	0x00	Coil State	0x01		
Coil Number High Byte	0x00				
Coil Number Low Byte	0x02				

The above example indicates it requires to acquire the coil state with register address 0x0000 and register number of 0x0002. Seen from the normal response returned, the coil state is 0b00000001, i.e. the DO0 (Coil 1) is

expressed in LSB, with the state ON, DO1 (Coil 2) is expressed in the left bit of LSB, with the state OFF, and the remaining 6 bits are zero-filled. For error returns, the returned function code is the normal function code plus 0x80, and the error code is the actual error state value.

4.4.2 02 (0x02) Read Discrete Input

This function code is used to read the discrete input state of Modbus module equipment, ranging 1~2000. Request PDU details the start address, i.e. the first discrete input address and discrete input number specified. The coil address in request PDU makes addressing of the discrete input address from zero, thus the address of the addressing coil 1-16 corresponds to 0-15.

The discrete input state in the responded message indicates that each bit in the data field corresponds to an input state. It indicates the state of1= ON and 0 = OFF. The first data byte`s LSB (least significant bit) represents the output of initial discrete input state in the query. Other discrete inputs repeat until the high-order end of this byte, and follow an order from low- to high-order end in the subsequent bytes.

If the returned output quantity is not a multiple of eight, a zero is used to fill in the remaining bits of the data byte (until the high-order end of the byte). The number domain of bit illustrates the number of full bytes of data.

Request PDU		Response PDU		Errors	
Function Code	0x02	Function Code	0x02	Function Code	0x82
Start Address High Bytes	0x00	Number of Bytes	0x01	Error Code	0x01 or 0x02or 0x03or 0x04
Starting Address Lower Bytes	0x00	Input State	0x02		

Output Number High Bytes	0x00				
Output Number Low Bytes	0x02				

The above example indicates it requires to acquire the input state with discrete input address of 0x0000 and discrete input number of 0x0002. Seen from the normal response returned, the input state is 0b00000010, i.e. the DI0 (discrete input 1) is expressed in LSB, with the state OFF, DI1 (discrete input 2) is expressed in the left bit of LSB, with the state ON, and the remaining 6 bits are zero-filled. For error returns, the returned function code is the normal function code plus 0x80, and the error code is the actual error state value.

4.4.3 03 (0x03) Read Holding Registers

The function code is used to read the content of holding register`s continuous block in Modbus module device. Request PDU describes the starting register address and register number. Because the register address is addressing from zero, the address of address register 1-16 corresponds to 0-15.

In the response message, the register data are packed into two bytes in each register. For each register, the first byte represents high bit and the second byte represents low bit.

Request PDU		Response PDU		Errors	
Function Code	0x03	Function Code	0x03	Function Code	0x83
Start Address High Bytes	0x00	Number of Bytes	0x04	Error Code	0x01 or 0x02 or 0x03 or 0x04
Starting Address Lower Bytes	0x00	Register Data High Byte	0x01		

Register Number High Byte	0x00	Register Data Low Byte	0x02		
Register Count Low Byte	0x02	Register Data High Byte	0x01		
		Register Data Low Byte	0x03		

The above example indicates it requires to acquire input register data with register address 0x0000 and register number of 0x0002. Seen from the normal responses returned, the REGO (i.e. Holding Register 1) data is 0x0102, that is, the data of the first two bytes, and the data of REG1 (i.e. Holding Register 2) is 0x0103, i.e. the data of the second two bytes. For error returns, the returned function code is the normal function code plus 0x80, and the error code is the actual error state value.

4.4.4 04 (0x04) Read Input Registers

The function code is used to read the content of Modbus module device continuous input registers (1~125). Request PDU describes the starting register address and register number. Because the register address is addressing from zero, the address of address register 1-16 corresponds to 0-15.

In the response message, the register data are packed into two bytes in each register. For each register, the first byte represents high bit and the second byte represents low bit.

Request PDU		Response PDU		Errors	
Function Code	0x04	Function Code	0x04	Function Code	0x84
Start Address High Bytes	0x00	Number of Bytes	0x04	Error Code	0x01 or 0x02 or

					0x03 or 0x04
Starting Address Lower Bytes	0x00	Register Data High Byte	0x01		
Input Register Number High Byte	0x00	Register Data Low Byte	0x01		
Input Register Number Low Byte	0x02	Register Data High Byte	0x01		
		Register Data Low Byte	0x04		

The above example indicates it requires to acquire input register data with register address 0x0000 and register number of 0x0002. Seen from the normal responses returned, the REGO (i.e. Input Register 1) data is 0x0101, that is, the data of the first two bytes, and the data of REG1 (i.e. Input Register 2) is 0x0104, i.e. the data of the second two bytes. For error returns, the returned function code is the normal function code plus 0x80, and the error code is the actual error state value.

4.4.5 05 (0x05) Control Single Coil Output

The function code is used to control the state ON or OFF of single coil of Modbus module.

In the request PDU address field, the address of controlled coil is described. Since the coil address starts the addressing from zero, the address of addressing coil 1 corresponds to 0. The constants in the request data field also describes the ON/OFF state of the requested coil. The request

output of hexadecimal value of FF 00 is ON. The request output of hexadecimal value 00 00 is OFF. All other values are illegal, and have no effect on output.

Normally the appropriate PDU should be identical to the request one, and return after the end of the coil control.

Request PDU		Response PDU		Errors	
Function Code	0x05	Function Code	0x05	Function Code	0x85
Coil Address High Bytes	0x00	Coil Address High Bytes	0x00	Error Code	0x01 or 0x02 or 0x03 or 0x04
Low Coil Address Bytes	0x00	Low Coil Address Bytes	0x00		
High Coil State Bytes	0xFF	High Coil State Bytes	0xFF		
Low Coil State Bytes	0x00	Low Coil State Bytes	0x00		

The above example indicates it requires to acquire the coil state ON of register address 0x0000. For error returns, the returned function code is the normal function code plus 0x80, and the error code is the actual error state value.

4.4.6 06 (0x06) Preset Single Register

The function code is used to preset the content of single holding register in Modbus module device.

The requested PDU describes the register address, because the register address is addressing from zero, the address of address register 1 corresponds to 0. The constants in the request data field also describes the

data value of the requested preset register, with high data bit in the former, and low data bit in the post.

Normally the appropriate PDU should be identical to the request one, and return after the completion of the register data preset.

Request PDU		Response PDU		Errors	
Function Code	0x06	Function Code	0x06	Function Code	0x86
Register address high byte	0x00	Register address high byte	0x00	Error Code	0x01 or 0x02 or 0x03 or 0x04
Register address low byte	0x00	Register address low byte	0x00		
Register Data High Byte	0x01	Register Data High Byte	0x01		
Register Data Low Byte	0x23	Register Data Low Byte	0x23		

The above example indicates it requires to acquire register data 0x0123 with preset register address 0x0000. For error returns, the returned function code is the normal function code plus 0x80, and the error code is the actual error state value.

4.4.7 15 (0x0F) Control Multiple Coils Output

The function code is used to force the state ON or OFF of multiple continuous coils of Modbus module.

Request PDU details the start address of the coil, i.e. the first coil address and coil number specified. The coil address in request PDU makes

addressing of the coil from zero, thus the address of the addressing coil 1-16 corresponds to 0-15.

The constant in the request data field also describes the ON/OFF state of the requested coil. In the field bit logic position, "1" requests the appropriate output ON. In the field bit logic position, "0" requests the appropriate output OFF. The first data byte`s LSB (least significant bit) represents the state of the initial coil controlled. Other coils repeat until the high-order end of this byte, and follow an order from low- to high-order end in the subsequent bytes.

Normally it responses to PDU return function code, the starting address and the mandatory number of coils.

Request PDU		Response PDU		Errors	
Function Code	0x0F	Function Code	0x0F	Function Code	0x8F
Start Address High Bytes	0x00	Start Address High Bytes	0x00	Error Code	0x01 or 0x02 or 0x03 or 0x04
Starting Address Lower Bytes	0x00	Starting Address Lower Bytes	0x00		
Output Number High Bytes	0x00	Output Number High Bytes	0x00		
Output Number Low Bytes	0x09	Output Number Low Bytes	0x09		
Number of Bytes	0x02				
High Coil Output Bytes	0x01				
Low Coil Output	0x23				

Bytes					

The above example indicates it requires to control the coil state with the starting address of 0x0000 and coil number of 0x0009. And 9 coils` output state is 0x0123, representing the ON state of DO0 (Coil 1), DO1 (Coil 2), DO5 (Coil 6), DO8 (Coil 9) status and the OFF state of the remaining 5 coils (DO2~DO4 and DO6~DO7) . For error returns, the returned function code is the normal function code plus 0x80, and the error code is the actual error state value.

4.4.8 16 (0x10) Preset Multiple Registers

The function code is used to preset the content of holding register`s continuous block in Modbus module device.

Request PDU describes the starting register address and register number. Because the register address is addressing from zero, the address of address register 1-16 corresponds to 0-15. In the requesting data field, it also illustrates the value of write requests. The data in each register is divided into two bytes, with high bit in the former, low bit in the post.

Normal response returns the function code, starting address and the number written to the registers.

Request PDU		Response PDU		Errors	
Function Code	0x10	Function Code	0x10	Function Code	0x90
Start Address High Bytes	0x00	Start Address High Bytes	0x00	Error Code	0x01 or 0x02 or 0x03 or 0x04
Starting Address Lower Bytes	0x00	Starting Address Lower Bytes	0x00		
Register Number	0x00	Register	0x00		

High Byte		Number High Byte			
Register Count Low Byte	0x02	Register Count Low Byte	0x02		
Number of Bytes	0x04				
Register value high byte	0x12				
Register value low byte	0x34				
Register value high byte	0x56				
Register value low byte	0x78				

The above example indicates it presets the register data with register address 0x0000 and register number of 0x0002. Moreover, the value of REG0 (register 1) is 0x1234 and that of REG1 (register 2) is 0x5678. For error returns, the returned function code is the normal function code plus 0x80, and the error code is the actual error state value.

4.5 Modbus simulator

The details of the Modbus communication protocol are described earlier. The following describes how to test the Modbus protocol via the PC-side Modbus simulator.

4.5.1 Master device Modbus simulator

ModScan Green software is a master device simulator for Modbus communication protocol running under windows, supporting RTU or ASCII protocol, that can read and write data from one or more Modbus slave devices

on the master device.

The interface diagram after ModScan started up is shown in the following figure:

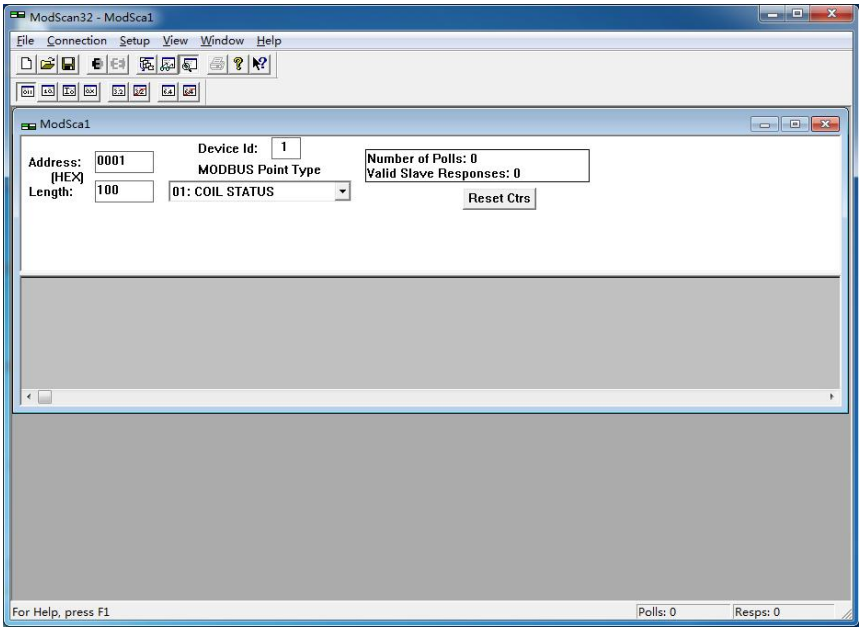


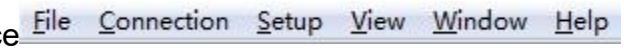
Figure 4-2 ModScan software startup interface

◆ Communication address setting

Slave device Modbus communication address setting 

,enter the slave address of the device in the box to the right of Device Id.

◆ Communication port and baud rate setting

Click the "Connection" item in the main menu of the ModScan software interface 

, select Connect in the drop-down menu and the settings window will pop up as shown below :

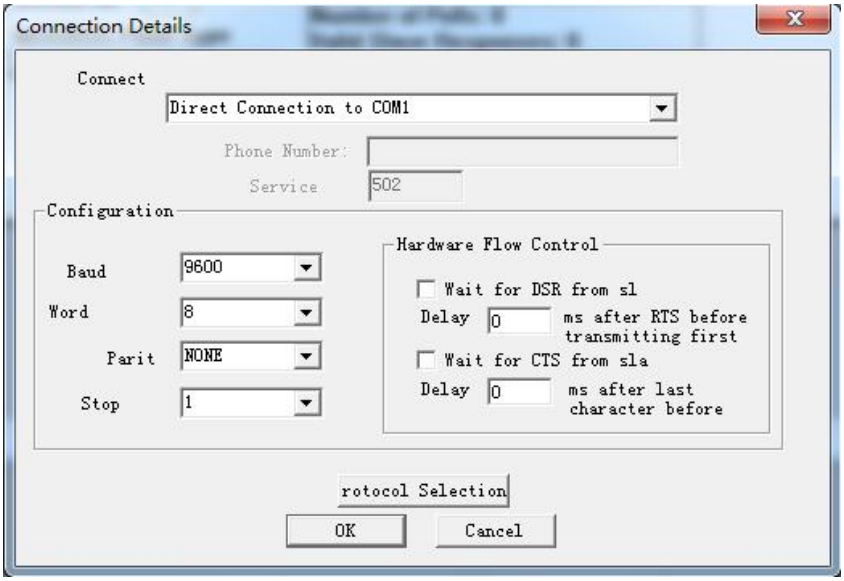


Figure 4-3 ModScan port connection setting

Select the serial port number of the communication in the drop-down menu 

and select the desired baud rate in the drop-down menu 

.

◆ Communication protocol setting

In the above baud rate settings interface, click the button 

and enter the following menu:

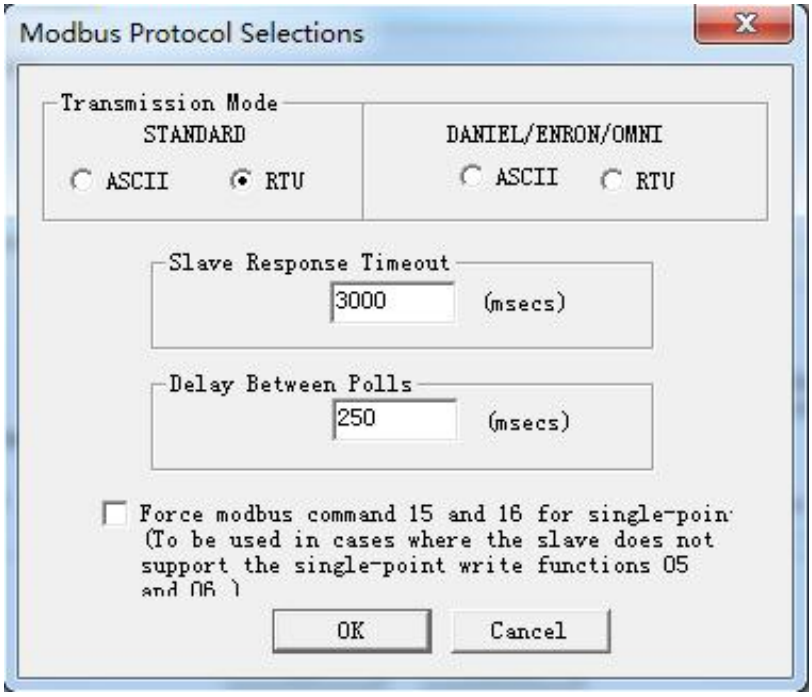
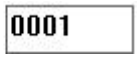


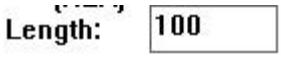
Figure 4-4 ModScan communication protocol setting

Select Modbus-ASCII or Modbus-RTU protocol and the other parameters are set by default.

◆ **Communication test setting**

In the main interface of the box 

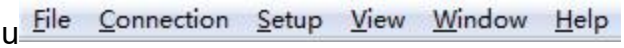
enter the coil or register start address (decimal count) that need to be read and search the address from 1.



Enter the number of coils or registers to be read (decimal count).

In the drop-down menu 

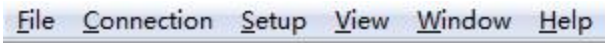
, select the desired Modbus protocol function, including read coil status function, read discrete input status function, read hold register function and read input register functions.

And then click the Connection item of the ModScan software main menu 

. In the drop-down menu, select Connect option and click the OK button to start the test.

4.5.2 Slave device Modbus simulator

◆ **Build a slave simulation device**

Click "File" in the main menu of the ModScan software interface 

and select New from the drop-down menu to create a new slave simulation device, as shown in the following figure:

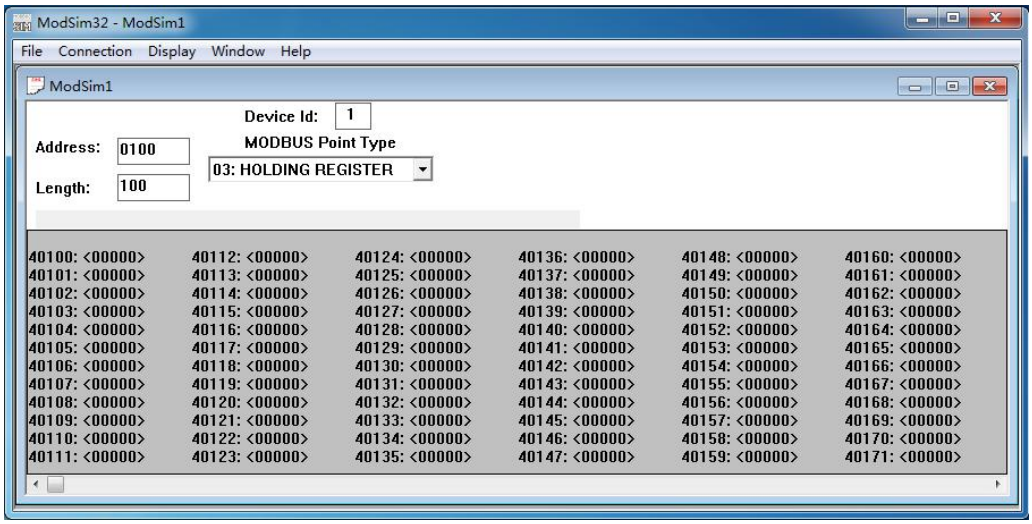


Figure 4-5 ModScan newly create slave simulation device

◆ Communication address setting

Device Id: 1 In the box, enter the Modbus address where you want to simulate the slave device.

◆ Communication port and baud setting

File Connection View Help Click Connection and select the corresponding serial port in the drop-down menu. As shown below:

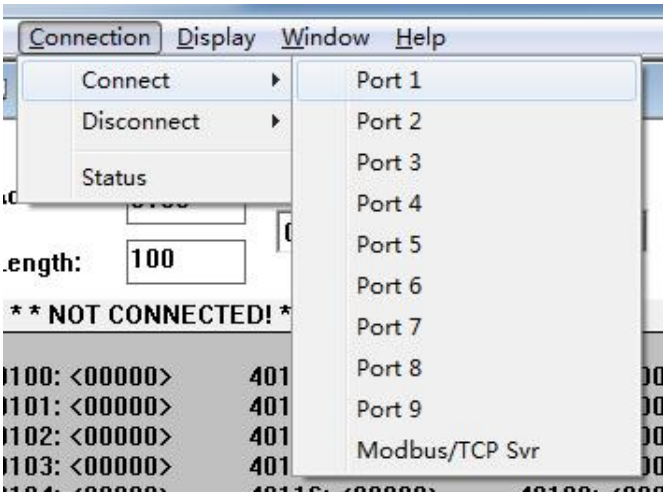


Figure 4-6 ModScan slave station port setting

After selecting, enter the following setup menu:

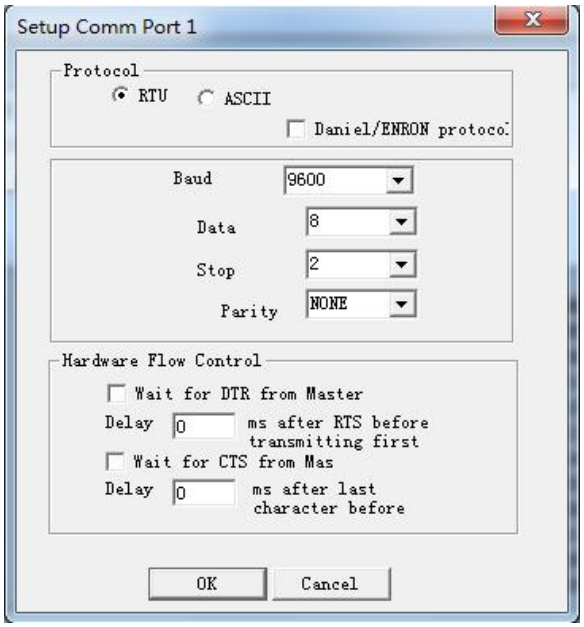


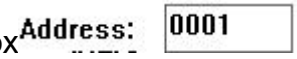
Figure 4-7 ModScan slave station baud setting

In the drop-down menu select the baud rate and the other can be the default. Click OK when the setting is complete.

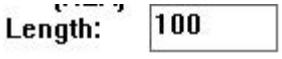
◆ Communication protocol setting

Select the Modbus communication protocol in the previous port setup menu.

◆ Communication test setting

In the box 

of ModScan software main interface ,enter the coil or register start address (decimal count) that need to be read and search the address from 1.



Enter the number of coils or registers to be read (decimal count).

In the drop-down menu 

, select the desired Modbus protocol function, including read coil status function, read discrete input status function, read hold register function and read input register functions.

Then click the OK button to complete the setup and start the simulation test.

Chapter 5

I/O Modbus Address Mapping Table

5.1 Modbus communication protocol function code

WTD8XXX wireless Wi-Fi series IoT module communicates with the host computer or server supporting Modbus protocol and each module product has a corresponding Modbus address mapping table.

The following table is the function description corresponding to the Modbus communication protocol function code:

Function code	Description
01 (0x01)	read coil status
02 (0x02)	read discrete status
03 (0x03)	read holding register status
04 (0x04)	read input register status
05 (0x05)	control single coil output status
06 (0x06)	preset single register status
15 (0x0F)	control multi-coil output status
16 (0x10)	preset multi-register status

WTD8XXX wireless Wi-Fi series has the following 9 things networking module products:

Serial number	module model	module brief
1	WTD814P	4-channel Rtd input 2-channel isolated output IoT Wi-Fi communication module
2	WTD818X	8-channel analog/thermocouple input IoT Wi-Fi communication module
3	WTD824X	4-channel analog output 4-channel isolated digital input IoT Wi-Fi communication module

4	WTD840X	16-channel isolated digital/counter input IoT Wi-Fi communication module
5	WTD850C	16-channel isolated digital/PWM output IoT Wi-Fi communication module
6	WTD866C	6-channel isolated relay output IoT Wi-Fi communication module
7	WTD878C	8-channel isolated digital/counter input 8-channel isolated digital/PWM output IoT Wi-Fi communication module
8	WTD834G	IoT gateway of turning Modbus-RTU to Wi-Fi
9	WTD836G	IoT gateway of turning Modbus-TCP to Wi-Fi

5.2 WTD814P module Modbus address table

address 0X	channel number	corresponding content	attribute	remarks
00201	0	channel anomaly signal	read-only	
00202	1	channel anomaly signal	read-only	
00203	2	channel anomaly signal	read-only	
00204	3	channel anomaly signal	read-only	

address 4X	channel number	corresponding content	attribute	remarks
40000	0	current range reading	read and write	
40001	1	current range reading	read and write	
40002	2	current range reading	read and write	
40003	3	current range reading	read and write	

40011	0	input type	read and write	
40012	1	input type	read and write	
40013	2	input type	read and write	
40014	3	input type	read and write	
40021	0	platinum resistance wire system number	read and write	
40022	1	platinum resistance wire system number	read and write	
40023	2	platinum resistance wire system number	read and write	
40024	3	platinum resistance wire system number	read and write	

5.3 WTD818X module Modbus address table

address 0X	channel number	corresponding content	attribute	remarks
00201	0	channel anomaly signal	read-only	
00202	1	channel anomaly signal	read-only	
00203	2	channel anomaly signal	read-only	
00204	3	channel anomaly signal	read-only	
00205	4	channel anomaly signal	read-only	
00206	5	channel anomaly signal	read-only	
00207	6	channel anomaly signal	read-only	
00208	7	channel anomaly signal	read-only	

address 4X	channel number	corresponding content	attribute	remarks
40001	0	current range reading	read and write	
40002	1	current range reading	read and write	
40003	2	current range reading	read and write	
40004	3	current range reading	read and write	
40005	4	current range reading	read and write	
40006	5	current range reading	read and write	
40007	6	current range reading	read and write	
40008	7	current range reading	read and write	
40011	0	input type	read and write	
40012	1	input type	read and write	
40013	2	input type	read and write	
40014	3	input type	read and write	
40015	4	input type	read and write	
40016	5	input type	read and write	
40017	6	input type	read and write	
40018	7	input type	read and write	

5.4 WTD824X module Modbus address table

address 0X	channel number	corresponding content	attribute	remarks
00001	0	DI signal	read-only	
00002	1	DI signal	read-only	
00003	2	DI signal	read-only	
00004	3	DI signal	read-only	

address 4X	channel number	corresponding content	attribute	remarks
40001	0	current range output value	read and write	
40002	1	current range output value	read and write	
40003	2	current range output value	read and write	
40004	3	current range output value	read and write	
40011	0	output type	read and write	
40012	1	output type	read and write	
40013	2	output type	read and write	
40014	3	output type	read and write	
40215		Communication Failure Enabling	read and write	
40216		Communication Failure Signs	read-only	

5.5 WTD840X module Modbus address table

address 0X	channel number	corresponding content	attribute	remarks
00000	0	DI Signal	Read-only	
00001	1	DI Signal	Read-only	
00002	2	DI Signal	Read-only	
00003	3	DI Signal	Read-only	
00004	4	DI Signal	Read-only	
00005	5	DI Signal	Read-only	
00006	6	DI Signal	Read-only	
00007	7	DI Signal	Read-only	
00008	8	DI Signal	Read-only	
00009	9	DI Signal	Read-only	
00010	10	DI Signal	Read-only	

00011	11	DI Signal	Read-only	
00012	12	DI Signal	Read-only	
00013	13	DI Signal	Read-only	
00014	14	DI Signal	Read-only	
00015	15	DI Signal	Read-only	
00033	0	Input Counting Mode: On (1)/Off (0)	Read and Write	
00034	0	Input Counting Mode: Count Reset (0)	Read and Write	
00035	0	Input Counting Mode: Overflow Reset (0)	Read and Write	
00036	0	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00037	1	Input Counting Mode: On (1)/Off (0)	Read and Write	
00038	1	Input Counting Mode: Count Reset (0)	Read and Write	
00039	1	Input Counting Mode: Overflow Reset (0)	Read and Write	
00040	1	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00041	2	Input Counting Mode: On (1)/Off (0)	Read and Write	
00042	2	Input Counting Mode:	Read and	

		Count Reset (0)	Write	
00043	2	Input Counting Mode: Overflow Reset (0)	Read and Write	
00044	2	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00045	3	Input Counting Mode: On (1)/Off (0)	Read and Write	
00046	3	Input Counting Mode: Count Reset (0)	Read and Write	
00047	3	Input Counting Mode: Overflow Reset (0)	Read and Write	
00048	3	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00049	4	Input Counting Mode: On (1)/Off (0)	Read and Write	
00050	4	Input Counting Mode: Count Reset (0)	Read and Write	
00051	4	Input Counting Mode: Overflow Reset (0)	Read and Write	
00052	4	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00053	5	Input Counting Mode: On (1)/Off (0)	Read and Write	

00054	5	Input Counting Mode: Count Reset (0)	Read and Write	
00055	5	Input Counting Mode: Overflow Reset (0)	Read and Write	
00056	5	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00057	6	Input Counting Mode: On (1)/Off (0)	Read and Write	
00058	6	Input Counting Mode: Count Reset (0)	Read and Write	
00059	6	Input Counting Mode: Overflow Reset (0)	Read and Write	
00060	6	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00061	7	Input Counting Mode: On (1)/Off (0)	Read and Write	
00062	7	Input Counting Mode: Count Reset (0)	Read and Write	
00063	7	Input Counting Mode: Overflow Reset (0)	Read and Write	
00064	7	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00065	8	Input Counting Mode:	Read and	

		On (1)/Off (0)	Write	
00066	8	Input Counting Mode: Count Reset (0)	Read and Write	
00067	8	Input Counting Mode: Overflow Reset (0)	Read and Write	
00068	8	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00069	9	Input Counting Mode: On (1)/Off (0)	Read and Write	
00070	9	Input Counting Mode: Count Reset (0)	Read and Write	
00071	9	Input Counting Mode: Overflow Reset (0)	Read and Write	
00072	9	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00073	10	Input Counting Mode: On (1)/Off (0)	Read and Write	
00074	10	Input Counting Mode: Count Reset (0)	Read and Write	
00075	10	Input Counting Mode: Overflow Reset (0)	Read and Write	
00076	10	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	

00077	11	Input Counting Mode: On (1)/Off (0)	Read and Write	
00078	11	Input Counting Mode: Count Reset (0)	Read and Write	
00079	11	Input Counting Mode: Overflow Reset (0)	Read and Write	
00080	11	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00081	12	Input Counting Mode: On (1)/Off (0)	Read and Write	
00082	12	Input Counting Mode: Count Reset (0)	Read and Write	
00083	12	Input Counting Mode: Overflow Reset (0)	Read and Write	
00084	12	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00085	13	Input Counting Mode: On (1)/Off (0)	Read and Write	
00086	13	Input Counting Mode: Count Reset (0)	Read and Write	
00087	13	Input Counting Mode: Overflow Reset (0)	Read and Write	
00088	13	Input Counting Mode: Locking State (read)/Reset State	Read and Write	

		(written)		
00089	14	Input Counting Mode: On (1)/Off (0)	Read and Write	
00090	14	Input Counting Mode: Count Reset (0)	Read and Write	
00091	14	Input Counting Mode: Overflow Reset (0)	Read and Write	
00092	14	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00093	15	Input Counting Mode: On (1)/Off (0)	Read and Write	
00094	15	Input Counting Mode: Count Reset (0)	Read and Write	
00095	15	Input Counting Mode: Overflow Reset (0)	Read and Write	
00096	15	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	

address 4X	channel number	corresponding content	attribute	remarks
40001 ～ 40032	0 ～ 15	Use for Counting (16-channel) [32Bits]	Read-only	
40081 ～	0 ～ 15	Input Mode Settings	Read and Write	

40096				
40097 ～ 40128	0 ～ 15	Input Filter Low Level Width	Read and Write	
40129 ～ 40160	0 ～ 15	Enter Filter High Level Width	Read and Write	

5.6 WTD850C module Modbus address table

address 0X	channel number	corresponding content	attribute	remarks
00016	0	DO Signal	Read and Write	
00017	1	DO Signal	Read and Write	
00018	2	DO Signal	Read and Write	
00019	3	DO Signal	Read and Write	
00020	4	DO Signal	Read and Write	
00021	5	DO Signal	Read and Write	
00022	6	DO Signal	Read and Write	
00023	7	DO Signal	Read and Write	

00024	8	DO Signal	Read and Write	
00025	9	DO Signal	Read and Write	
00026	10	DO Signal	Read and Write	
00027	11	DO Signal	Read and Write	
00028	12	DO Signal	Read and Write	
00029	13	DO Signal	Read and Write	
00030	14	DO Signal	Read and Write	
00031	15	DO Signal	Read and Write	

address 4X	channel number	corresponding content	attribute	remarks
40001～40032	0 ～ 15	Output Low Level Pulse Time Time Unit: 0.1ms (16-channel) [32Bits]	Read and Write	
40033～40064	0 ～ 15	Output High Level Pulse Time Time Unit: 0.1ms (16-channel) [32Bits]	Read and Write	
40064～40096	0 ～ 15	Set single pulse count (Set to 0=Continue	Read and Write	

		mode) (16-channel) [32Bits]		
40097～ 40112	0 ～ 15	Output Mode Settings	Read and Write	

5.7 WTD866C module Modbus address table

address 0X	channel number	corresponding content	attribute	remarks
00016	0	DO Signal	Read and Write	
00017	1	DO Signal	Read and Write	
00018	2	DO Signal	Read and Write	
00019	3	DO Signal	Read and Write	
00020	4	DO Signal	Read and Write	
00021	5	DO Signal	Read and Write	

address 4X	channel number	corresponding content	attribute	remarks
40211		Module Name 1	Read-only	
40212		Module Name 2	Read-only	
40213		Software Version 1	Read-only	
40214		Software Version 2	Read-only	
40215		Communication Failure Enabling	Read and Write	
40216		Communication Failure Signs	Read-only	

5.8 WTD878C module Modbus address table

address 0X	channel number	corresponding content	attribute	remarks
00001	0	DI Signal	Read and Write	
00002	1	DI Signal	Read and Write	
00003	2	DI Signal	Read and Write	
00004	3	DI Signal	Read and Write	
00005	4	DI Signal	Read and Write	
00006	5	DI Signal	Read and Write	
00007	6	DI Signal	Read and Write	
00008	7	DI Signal	Read and Write	
00017	0	DO Signal	Read and Write	
00018	1	DO Signal	Read and Write	
00019	2	DO Signal	Read and Write	
00020	3	DO Signal	Read and Write	
00021	4	DO Signal	Read and Write	
00022	5	DO Signal	Read and Write	
00023	6	DO Signal	Read and Write	
00024	7	DO Signal	Read and Write	
00033	0	Input Counting Mode: On (1)/Off (0)	Read and Write	
00034	0	Input Counting Mode: Count Reset (0)	Read and Write	
00035	0	Input Counting Mode: Overflow Reset (0)	Read and Write	
00036	0	Input Counting Mode:	Read and Write	

		Locking State (read)/Reset State (written)		
00037	1	Input Counting Mode: On (1)/Off (0)	Read and Write	
00038	1	Input Counting Mode: Counting Reset (0)	Read and Write	
00039	1	Input Counting Mode: Overflow Reset (0)	Read and Write	
00040	1	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00041`	2	Input Counting Mode: On (1)/Off (0)	Read and Write	
00042	2	Input Counting Mode: Count Reset (0)	Read and Write	
00043	2	Input Counting Mode: Overflow Reset (0)	Read and Write	
00044	2	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00045	3	Input Counting Mode: On (1)/Off (0)	Read and Write	
00046	3	Input Counting Mode: Count Reset (0)	Read and Write	
00047	3	Input Counting Mode: Overflow Reset (0)	Read and Write	

00048	3	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00049	4	Input Counting Mode: On (1)/Off (0)	Read and Write	
00050	4	Input Counting Mode: Count Reset (0)	Read and Write	
00051	4	Input Counting Mode: Overflow Reset (0)	Read and Write	
00052	4	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00053	5	Input Counting Mode: On (1)/Off (0)	Read and Write	
00054	5	Input Counting Mode: Count Reset (0)	Read and Write	
00055	5	Input Counting Mode: Overflow Reset (0)	Read and Write	
00056	5	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00057	6	Input Counting Mode: On (1)/Off (0)	Read and Write	
00058	6	Input Counting Mode: Count Reset (0)	Read and Write	
00059	6	Input Counting Mode:	Read and Write	

		Overflow Reset (0)		
00060	6	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	
00061	7	Input Counting Mode: On (1)/Off (0)	Read and Write	
00062	7	Input Counting Mode: Count Reset (0)	Read and Write	
00063	7	Input Counting Mode: Overflow Reset (0)	Read and Write	
00064	7	Input Counting Mode: Locking State (read)/Reset State (written)	Read and Write	

address 4X	channel number	corresponding content	attribute	remarks
40001～40016	0 ～ 15	Use for Counting (8-channel) [32Bits]	Read-only	
40017～40032	0 ～ 15	Output Low Level Pulse Time Time Unit: 0.1ms (8-channel) [32Bits]	Read and write	
40033～40048	0 ～ 15	Output High Level Pulse Time Time Unit: 0.1ms	Read and Write	

		(8-channel) [32Bits]		
40049～ 40064	0 ～ 15	Set single pulse count (Set to 0=Continue mode) (8-channel) [32Bits]	Read and Write	
40081～ 40088	0 ～ 15	Input Mode Settings	Read and Write	
40089～ 40096	0 ～ 15	Output Mode Settings	Read and Write	
40097～ 40112	0 ～ 15	Input Filter Low Level Width	Read and Write	
40113～ 40128		Enter Filter High Level Width	Read and Write	

Annex I:Data format and I / O field values

♦ WTD814P module analog input

threshold code(hex)	input range description	data format	signal maximum	signal minimum	display resolution
00	100.00Ω Platinum RTD α=.00385 -50°C to 150°C	Engineering Units	+150.00	-50.00	0.01 °C
		%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	D556	1 LSB*
01	100.00Ω Platinum RTD α=.00385 0°C to 100°C	Engineering Units	+100.00	+000.00	0.01 °C
		%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	0000	1 LSB*
02	100.00Ω Platinum RTD α=.00385 0°C to 200°C	Engineering Units	+200.00	+000.00	0.01 °C
		%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	0000	1 LSB*
03	100.00Ω Platinum RTD α=.00385 0°C to 400°C	Engineering Units	+400.00	+000.00	0.01 °C
		%of FSR	+100.00	+028.57	0.01%
		Twos Complement	7FFF	2492	1 LSB*
04	100.00Ω Platinum RTD	Engineering Units	+200.0	-200.00	0.01 °C

	α=.00385 -200°C to 200°C	%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	8000	1 LSB*
05	100.00Ω Platinum RTD α=.00392 -50°C to 150°C	Engineering Units	+150.0	-50.00	0.01 °C
		%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	D556	1 LSB*
06	100.00Ω Platinum RTD α=.00392 0°C to 100°C	Engineering Units	+100.0	+000.00	0.01 °C
		%of FSR	+100.00	+027.77	0.01%
		Twos Complement	7FFF	0000	1 LSB*
07	100.00Ω Platinum RTD α=.00392 0°C to 200°C	Engineering Units	+200.0	+000.00	0.01 °C
		%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	0000	1 LSB*
08	100.00Ω Platinum RTD α=.00392 0°C to 400°C	Engineering Units	+400.0	+000.00	0.01 °C
		%of FSR	+100.00	+027.77	0.01%
		Twos Complement	7FFF	0000	1 LSB*
09	100.00Ω Platinum RTD α=.00392 -200°C to 200°C	Engineering Units	+200.0	-200.00	0.01 °C
		%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	8000	1 LSB*
0A	1000.00Ω	Engineering	+160.0	-40.00	0.01 °C

	Platinum RTD α=.00385 -40°C to 160°C	Units			
		%of FSR	+100.00	000.00	0.01%
		Twos Complement	7FFF	E000	1 LSB*

♦ WTD818X module analog input

threshold code(hex)	input range description	data format	+F.S.	0	-F.S.	display resolution
00	± 10 V	Engineering Units	+10.000	±00.000	-10.000	1 mV
		% of FSR	+100.00	±00.000	-100.00	0.01%
		Twos Complement	7FFF	0000	8000	1 LSB*
01	± 5 V	Engineering Units	+5.0000	±0.0000	-5.0000	100 µV
		%of FSR	+100.00	±000.00	-100.00	0.01%
		Twos Complement	7FFF	0000	8000	1 LSB*
02	±2.5 V	Engineering Units	+2.5000	±0.0000	-2.5000	100 µV
		%of FSR	+100.00	±000.00	-100.00	0.01%
		Twos Complement	7FFF	0000	8000	1 LSB*
03	±1 V	Engineering Units	+1.0000	±0.0000	-1.0000	100 µV
		%of FSR	+100.00	±000.	-100.00	0.01%

				00		
		Twos Complement	7FFF	0000	8000	1 LSB*
04	± 500mV	Engineering Units	+500.00	±000.00	-500.00	10 μV
		%of FSR	+100.00	±000.00	-100.00	0.01%
		Twos Complement	7FFF	0000	8000	1 LSB*
05	± 100mV	Engineering Units	+100.00	±00.000	-100.00	10 μV
		%of FSR	+100.00	±000.00	-100.00	0.01%
		Twos Complement	7FFF	0000	8000	1 LSB*
06	± 20 mV	Engineering Units	+20.000	±00.000	-20.00	1 μV
		%of FSR	+100.00	±000.00	-100.00	0.01%
		Twos Complement	7FFF	0000	8000	1 LSB*
0F	± 20 mA	Engineering Units	+20.000	±00.000	-20.000	1 μA
		%of FSR	+100.00	±000.00	-100.00	0.01%
		Twos Complement	7FFF	0000	8000	1 LSB*
10	±4~20mA	Engineering Units	+20.000	±00.000	-20.000	1 μA

		%of FSR	+100.00	±000.00	-100.00	0.01%
		Twos Complement	7FFF	0000	8000	1 LSB*

♦ WTD818X module thermocouple input

threshold code(hex)	input range description	data format	signal maximum	signal minimum	display resolution
07	Type K Thermocouple 0°C to 1370°C	Engineering Units	+1370.0	+0000.0	0.1 °C
		%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	0000	1 LSB*
08	Type J Thermocouple 0°C to 760°C	Engineering Units	+760.000	+00.000	0.01 °C
		%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	0000	1 LSB*
09	Type R Thermocouple 500°C to 1750°C	Engineering Units	+1750.00	+500	0.1 °C
		%of FSR	+100.00	+028.57	0.01%
		Twos Complement	7FFF	2492	1 LSB*
0A	Type S Thermocouple 500°C to 1750°C	Engineering Units	+1750.00	+500	0.1 °C
		%of FSR	+100.00	+028.57	0.01%
		Twos Complement	7FFF	2492	1 LSB*
0B	Type B Thermocouple	Engineering Units	+1800.0	+500.00	0.1 °C

	500°C to 1800°C	%of FSR	+100.00	+027.77	0.01%
		Twos Complement	7FFF	2381	1 LSB*
0C	Type E Thermocouple 0°C to 1000°C	Engineering Units	+1000.0	+000.00	0.1 °C
		%of FSR	+100.00	+000.00	0.01%
		Twos Complement	7FFF	0000	1 LSB*
0D	Type T Thermocouple -100°C to 400°C	Engineering Units	+400.000	-100.00	0.01 °C
		%of FSR	+100.00	-0.25.00	0.01%
		Twos Complement	7FFF	E000	1 LSB*

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