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Document Revision

Version	Date	Description of changes
Rev1.0	2019-05-17	First release for ALM-06-WF
Rev1.1	2019-08-29	Change Figure 1-1
Rev1.2	2020-02-13	Add Modbus connection idle timeout

Table of Contents

1. Introduction

The ALM-06-WF have WLAN connection complies with the IEEE802.11b/g/n standards. With the popularity of 802.11 network infrastructure, the ALM-06-WF make an easy way to incorporate wireless connectivity into monitoring and configuration. They also support Modbus TCP protocol and the network encryption configuration, which makes perfect integration to SCADA software and offer easy and safe access for users from anytime and anywhere.

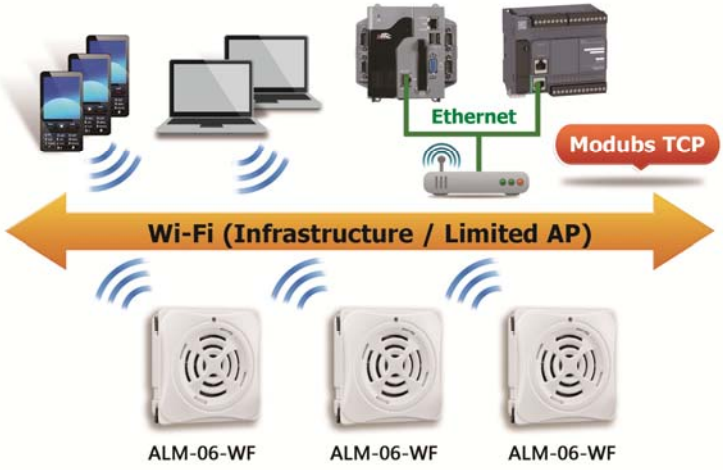


Figure 1-1: Application architecture for the ALM-06-WF

1.1 Wireless connection mode

ALM-06-WF support both Access Point(AP) & Station(STA) wireless connection modes of WLAN.

1.2 Features

- Wi-Fi communication monitoring and configuration
- Compatible with IEEE 802.11b/g/n standards
- Support Access Point(AP, 1 Client) & Station(STA) modes for wireless networks
- Support WEP, WPA and WPA2 wireless encryption
- Support Modbus TCP monitoring
- Support DHCP Server(AP), DHCP Client or Static IP(STA) network configuration
- Wide operating temperature range
- Wide power supply range
- Photo couple input, Relay output
- MP3 Audio Output, external Line out
- Digital Volume control
- 8 Alarm mode support

1.2.1 Features Description

The ALM-06-WF offers the most comprehensive configuration to meet specific application requirements. The following list shows the features designed to simplify installation, configuration and application.

Compatible with IEEE 802.11b/g/n standards

ALM-06-WF complied with IEEE 802.11b/g/n standard from 2.4~2.5 GHz, and it can be used to connect your wireless LAN.

Support Access Point(AP) & Station(STA) modes for wireless networks

AP mode lets you create a Limited AP(1 Client access allow) network with the specified SSID to communicate directly with each other without the need for a wireless access point.

STA mode is the more common network configuration where all wireless clients connect to the wireless network via a WAP (Wireless Access Point).

Support WEP, WPA and WPA2 wireless encryption

WEP and WPA are common types of security that are used to protect wireless networks. When WEP or WPA is turned on, ALM-06-WF uses a special security key combination to allow only devices that know this key to connect to its wireless network. This applies to laptops, smart device, or any other wireless device.

Support Modbus TCP protocols

The Modbus TCP server function on the ALM-06-WF can be used to provide data monitoring from HMI/SCADA software built with Modbus TCP driver.

Also there is some other HMI Modbus App in Android Google Play you can use.

Built-in MP3 Audio decoder & Output

The Alarm sound output using MP3(MPEG1-Audio Layer III) audio, it support most of MP3 format(Sample Rate 24/44.1(prefer)/48 KHz, Bit Rate 32 64 96 128(prefer) 160 192 Kbit/s), include an 3W audio power amplifier & 1KΩ Impedance Line Out can send the alarm sound to external PA(Power Amplifier) system.

Support 6 channel trigger input with 8 alarm mode

Include 6 channel Photo couple input & 8 kinds of mode for trigger alarm, it also can be trigger an extend device using external Relay Output. All modes & MP3 audio files can be monitoring, configuration & download from PC Utility, it also can monitor status form Android APP.

1.3 Specifications

Table 1-1: System Specifications

Wi-Fi Interface	
Antenna	Chip Antenna
Output Power	18.0 dBm @ 1 DSSS / 14.5 dBm @ 54 OFDM
Receive Sensitivity	–95.7 dBm @ 1 DSSS /–74.0 dBm @ 54 OFDM
Interface	Wi-Fi 2.4G
Standard Supported	IEEE 802.11b/g/n
Wireless Mode	Station & AP (1 Client)
Encryption	WEP, WPA and WPA2
Service	TCP, Modbus TCP
LED Indicators	
Power/Status	One 2 colors LED, Blue for System status, Purple(Blue+Red)for Connective status/Locator
Isolation	
Intra-module Isolation, Field-to-Logic	3000 VDC
Protection	
ESD (IEC 61000-4-2)	±8 kV Air for Random Point
EFT (IEC 61000-4-4)	±2 kV for Power
Waterproof(IEC 60529)	IP54 (Panel Mount Upright Position)
Power Requirements	
Input Voltage Range	9 ~ 28 VDC with Reverse Protection (Vin to GND)
Power Consumption	0.7 W Standby.
Mechanism	
Dimensions(WxLxH)	72 mm x 72mm x 22 mm
Installation	Panel Mount/Wall Mount/DIN-Rail Mounting
Environment	
Operating Temperature	-20℃ ~ +75℃
Storage Temperature	-30℃ ~ +85℃
Humidity	10% ~ 85% RH, Non-condensing

Table 1-2: I/O Specification

Digital Input	
Channels	6
Input Type	Dry Contact: Sink
Dry Contact Level	Off Voltage Level: Open On Voltage Level: Close to GND
Photo-Isolation	3750 VDC
Input Condition	Pulse Width must > 150mSec or more
Digital Output	
Channels	1
Output Type	Form A
Contact Rating (Resistive Load)	DC50V/100mA

Table 1-3: Audio Specification

Audio	
Sound Pressure Level	99dB@1KHz/1meter
Volume Control	Digital Volume Control
Number of Playback	64(Max)
Audio File Format	MPEG1-Audio Layer III (MP3)
Sample Rate	24/44.1(prefer)/48 KHz
Bit Rate	32 64 96 128(prefer) 160 192 kbit/s
Audio Startup Time	< 150ms
Audio Output	3W(Max)
Line out Impedance	1KΩ

Table 1-4: Storage Specification

Storage	
Audio Files Locate	Micro SD(T-Flash) up to 32GB, bundle 4GB
File System	Fat16/32
File Transfer	PC Utility through Wi-Fi

2. Hardware

2.1 Outward Appearance

ALM-06-WF contains I/O connectors, Micro SD, Reset to Default and LEDs.

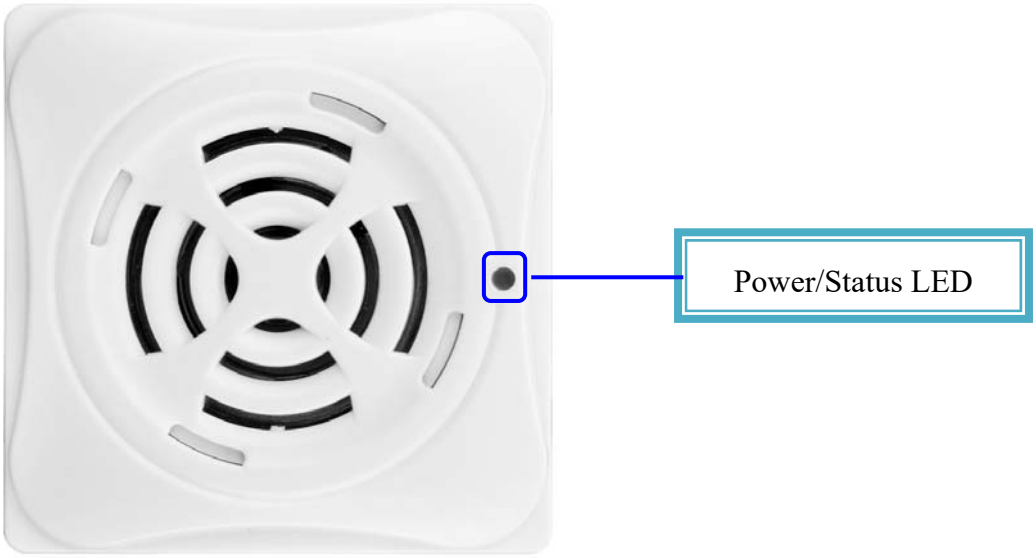


Figure 2-1: Front Panel

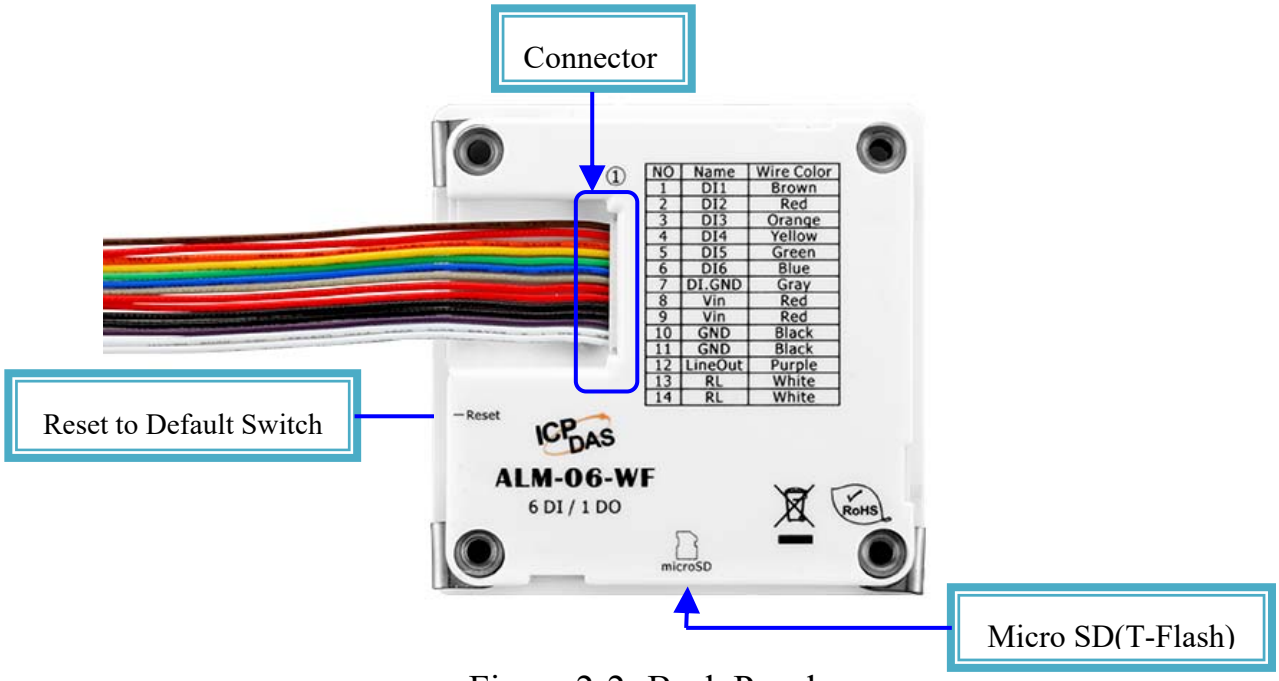


Figure 2-2: Back Panel

2.1.1 LED Indicator

Table 2-1: System Status Indicator

System Status Indicator		
LED	**Controller Status**	**LED Status**
PWR	Wi-Fi get Link	Purple(Blue + Red) LED ON
	Power On	Blue LED
	Locator	Red LED Blinking
	Process reset to default	Blue LED Blinking(Fast)
	Alarm Status	Red LED

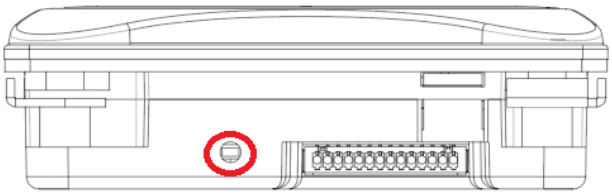
2.1.2 Connector Pin Define

Terminal NO	Pin Name	Wire Color
1	DI1	Brown
2	DI2	Red
3	DI3	Orange
4	DI4	Yellow
5	DI5	Green
6	DI6	Blue
7	DI.GND	Gray
8	Vin	Red
9	Vin	Red
10	GND	Black
11	GND	Black
12	Line Out	Purple
13	RL	White
14	RL	White

Figure 2-3: I/O Connector of ALM-06-WF

2.2 Reset to default

Press & hold the reset button on the bottom side over 6 Sec until the Red LED quick flash then release to restore ALM-06-WF default setting, default is set in AP mode.



Bottom View

Figure 2-4: Reset button locate in the bottom side of ALM-06-WF

2.3 Dimensions

The diagrams below provide the dimensions of the ALM-06-WF to use in defining your enclosure specifications. All dimensions are in millimeters.

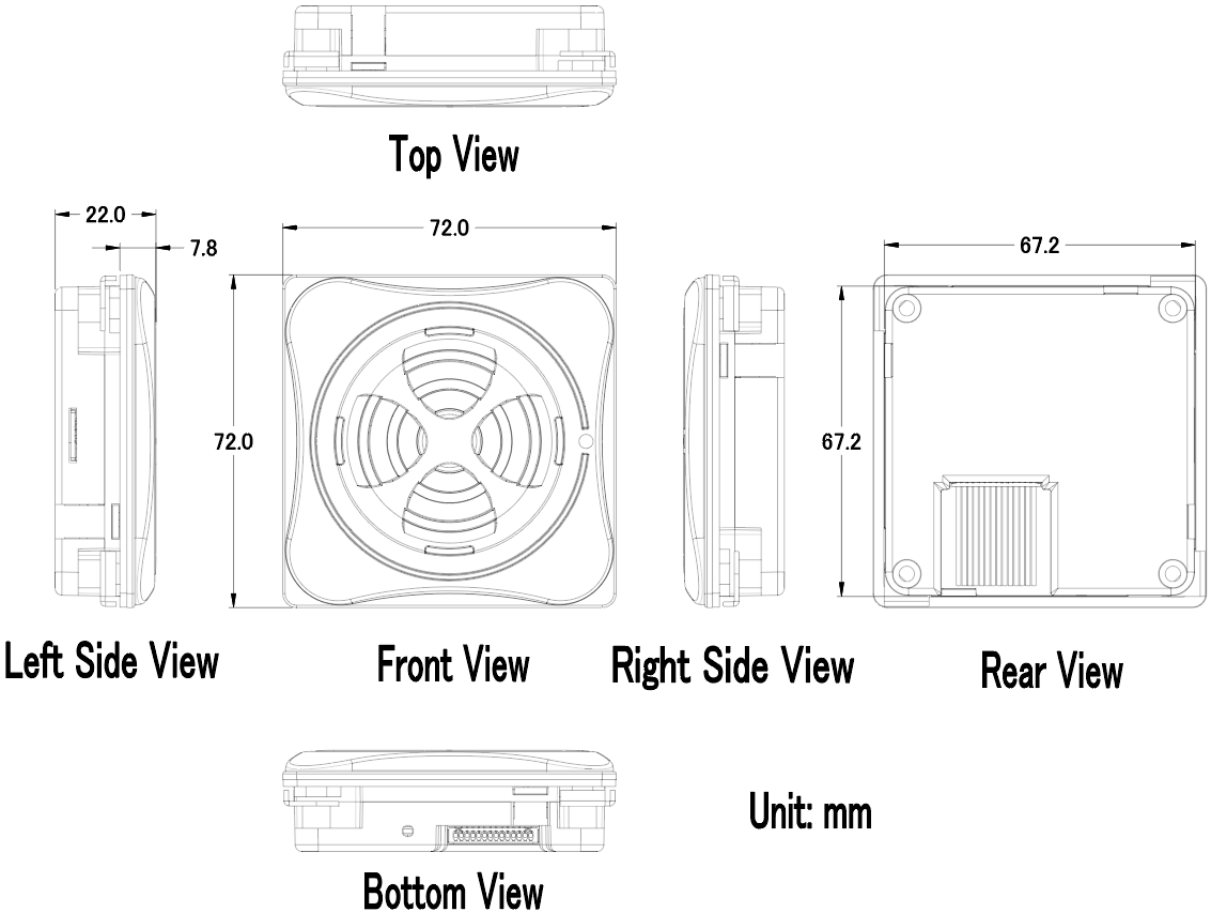


Figure 2-5: Dimension of the ALM-06-WF

2.4 Wire Connection

2.4.1 Wire connection define

The following describe the wire color & function

Figure 2-6: Wire color & function

2.4.2 I/O connection

2.4.2.1 Digital Input (DI) wiring

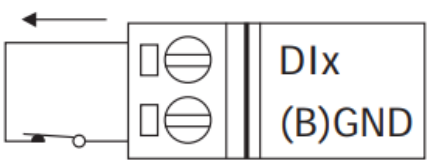
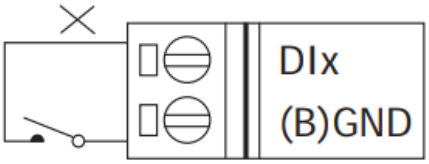
Digital Input wiring		
Digital Input/ Counter	ON State	OFF State
Dry Contact	Close to GND	OPEN
		

Figure 2-7: DI Dry contact wiring

2.4.2.2 Relay Output wiring

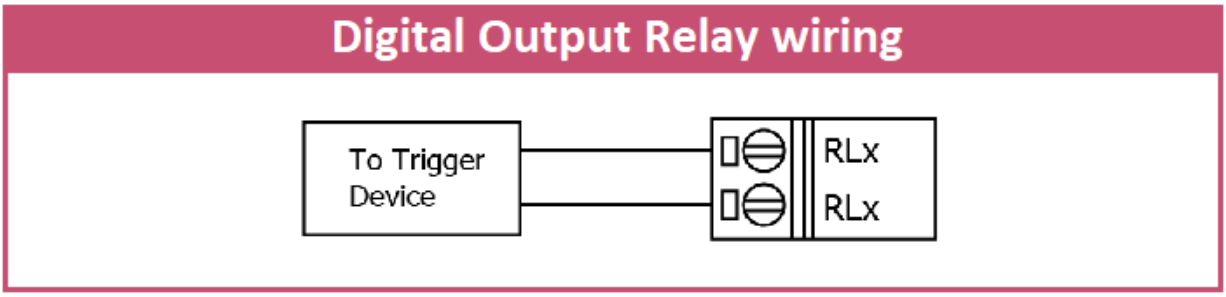


Figure 2-8: Relay Output wiring

2.4.2.3 Line Out wiring

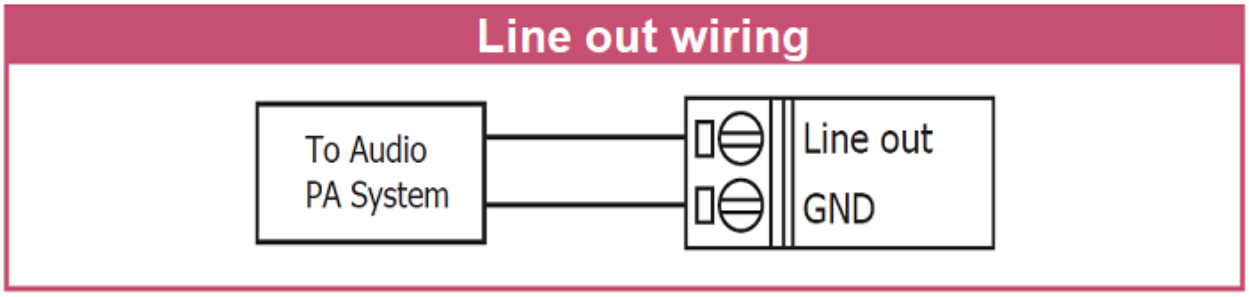


Figure 2-9: Line Out wiring

2.4.2.4 Power Input

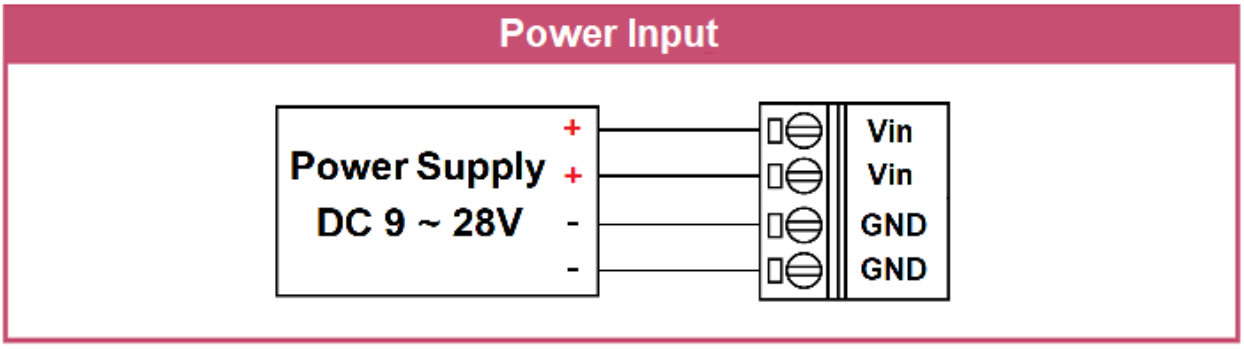


Figure 2-10: Power Input

3. Software

The ALM Utility provides the simple way to operating and acquire I/O status. ALM Utility can used the wireless network interface to configuration. Provide AP(Access Point) & STA(Station) mode to connect the ALM-06-WF.

ALM Utility available on both Windows & Android application to operating and configure the ALM-06-WF.

Utility Support Windows 7 (or later versions) and Android 5.0 (or later versions).

3.1 ALM Utility(AP Mode)

The following is the main screens provided by ALM Utility, these utility tools can be thought as a useful tool for configuration and monitoring on the ALM-06-WF. It supplies several functions, such as Monitoring, Configuration, Connection, Wi-Fi setting and F/W upgrade, etc.., **Only PC Utility support Audio & Alarm Configuration.**

3.1.1 Main Screen

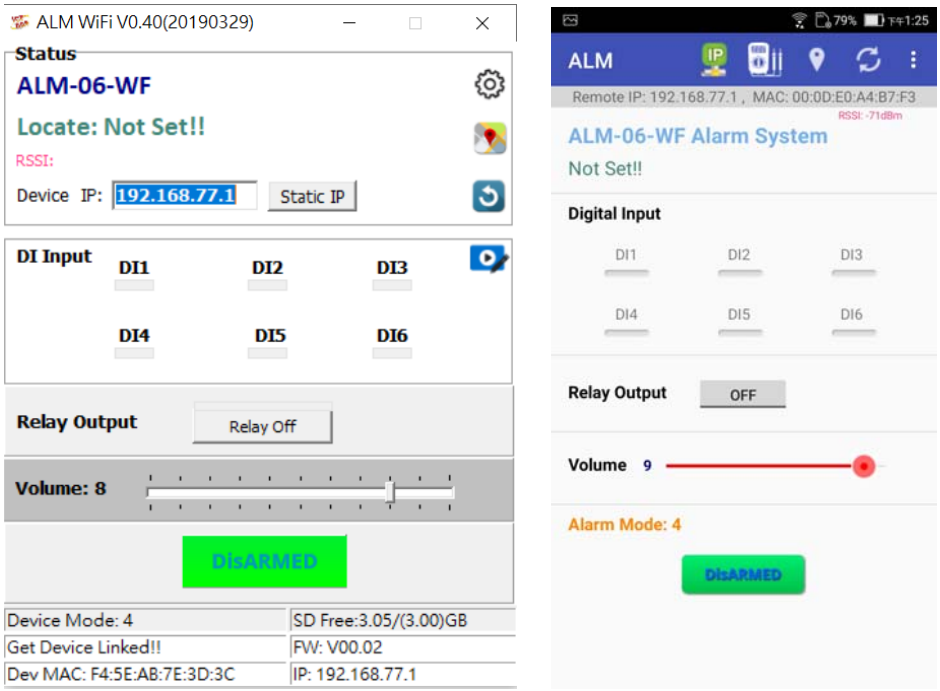
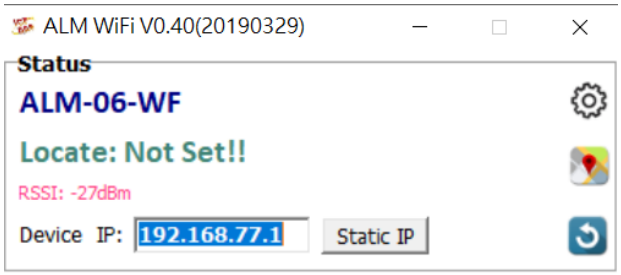
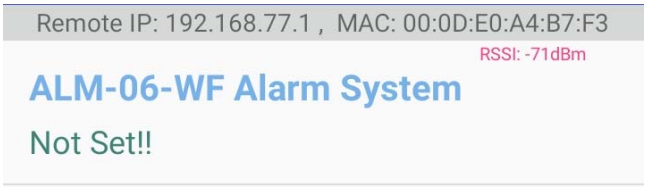


Figure 3-1: ALM Utility main screen
(From left to right is Windows Utility , Android App)

3.1.2 Controller Status

Show the connected controller information, user define Locate string, RSSI strength, Device IP & Static IP button for changing device IP in STA mode.





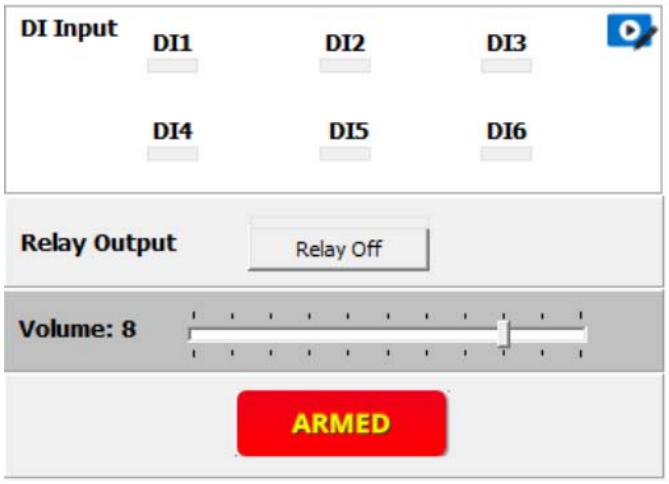
3.1.3 DI/DO Status & Control

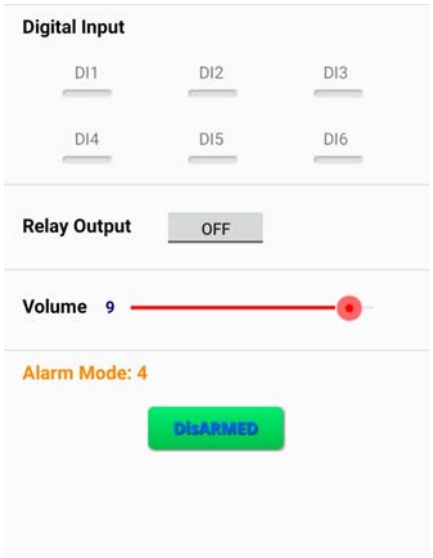
Show the DI/Relay Output status, The value can be read(DI) or set(Relay Output) in this area.

Volume Control trackbar, range from 0(Mute)~10(Max).

Armed/DisArmed button for global alarm Enable/Disable.

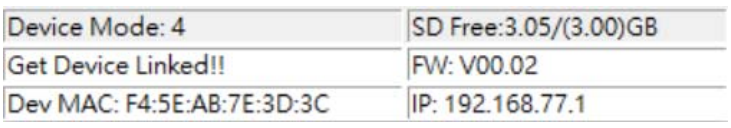
Audio Configuration icon enter the configuration page (Only in PC Utility).





3.1.4 Status Bar

Show the F/W Version, Device's Alarm mode, SD capacity, MAC address and Device's IP address.



3.1.5 Icon Button

ICON	function	
	**Setup**	Open the Setup Screen (Android versions Setup function under the  icon)
	**Find Controller**	Red Led blinking, use to find the connected Controller
	**Refresh**	Refresh status
	**Menu**	Only Android Device, Include setup, FW Version & About.
	**Audio Configuration**	Audio Configuration page.
	**Channel Test**	Simulation Channel Test. (Only in Android)

Table 3-1: icon Indicator

3.1.6 Configuration/Setup

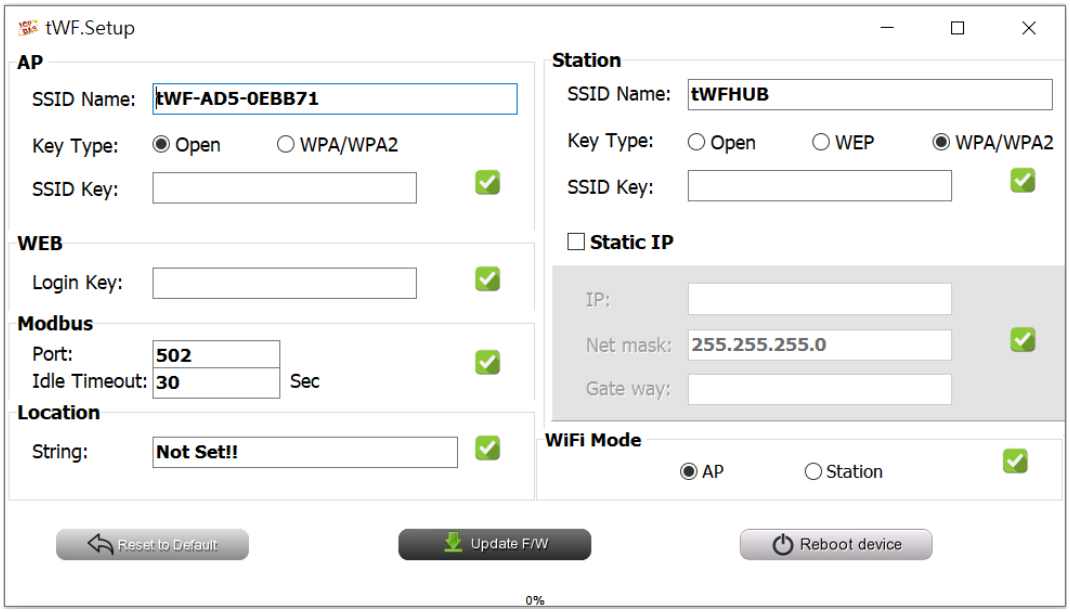


Figure 3-2: ALM Utility setup page

Click apply icon  to save each subject's setting, after finish all setting click 

to make device take effect on new setting

AP：

SSID Name

1. Default Controller's SSID in Wi-Fi AP mode, will be ALM-06-xxxxxx.
   Note: xxxxxx is the last 6 characters MAC address of your device.

Key Type

AP mode SSID Key type (default is **Open**)

SSID Key

AP mode SSID Key, (default is **None**)

STA：

SSID Name

Wi-Fi AP's SSID intent to connect (default is **tWFHUB**)

Key Type

Wi-Fi AP's SSID Key Type (default is **WPA/WPA2**)

SSID Key

Wi-Fi AP's SSID Key (default is **00000000**)

Static IP:

IP: Specific an IP that is not been used.

Mask: Default will be **255.255.255.0**.

Gateway: Basically define in the AP you are going to connect.

SSID	Service Set Identifier: Connected devices must be the same SSID, SSID length must not exceed 31 characters.
Key Type	Key of Encryption, connected devices must with the same Key. Open : No Key request. WEP(Shared) : Key length must be 15 characters. WPA/WPA2-PSK : Key length must between 8~15 characters.

Table 3-2: Station SSID & Key type configure

Wi-Fi Mode：

ALM Controller working mode (default is in **AP**)

AP (Access Point**)：**

PC or Android Device connect to ALM Controller directly through AP(Fixed IP:**192.168.77.1**), AP mode support only one connection, If Multiple devices connect at a same time, only first connected devices can access.

STA(Station**):**

ALM Controller will auto connect to specific Wi-Fi AP, PC or Android Device also need to connect to the same AP, then they can use those ALM Controller in same domain.

*. Please check specific Wi-Fi AP is active and SSID/key is same as the setting before use.

Location information:

Set the information for you to identify & locate those Controller easily, length must under 31 characters.

Modbus Port:

Modify Modbus TCP Port (default is **502**)

Modbus Idle Timeout:

Set Idle Timeout for Modbus TCP connection (default is **120 Sec**) in STA(Station) mode, recommend 30 Sec. when device in STA mode connect to an AP, Host device break connect with AP and lost connection, the device will hang in a dead connection. To prevent this happen, set a timeout, the device will close the connection and wait for next connect.

3.2 IP scanner

There are lot of free IP scanner tools in both Windows & Android OS, for example "Advanced IP Scanner" for Windows, "Network Analyzer" for Android, those are high performance scanner tools on each OS.

3.3 Alarm Mode & Audio Editor

ALM-06-WF contain 8 kinds of alarm mode, **Mode 0 ~ 3** are DI1~DI6 in single independence channel trigger, in DIx channel priority, the priority of DI channel is DI6 > DI5... > DI1.
Mode 4 ~ 7 are DI1~DI5 in Binary trigger & DI6 in single channel trigger, the priority of DI channel in this mode is DI6 > 11111b(0x1F)>…> 00001b(0x01).

Alarm Mode			
Mode	**Channel Trigger Function**	**Mode**	**Binary Trigger Function**
0	General Playback	4	General Playback
1	Trigger Input priority Playback	5	Trigger Input priority Playback
2	Hold Repeat Playback	6	Hold Repeat Playback
3	Memory Once Playback	7	Memory Once Playback

Max 4 MP3 files can be add for each Channel or Binary trigger alarm, it will playback from #1 to #4 for the trigger depend on the setting.
Relay output can set an extend alarm output to trigger other device.
All those setting can be done in PC Utility & can be monitor Armed/DisArmed on both PC Utility or Android APP, show as below.

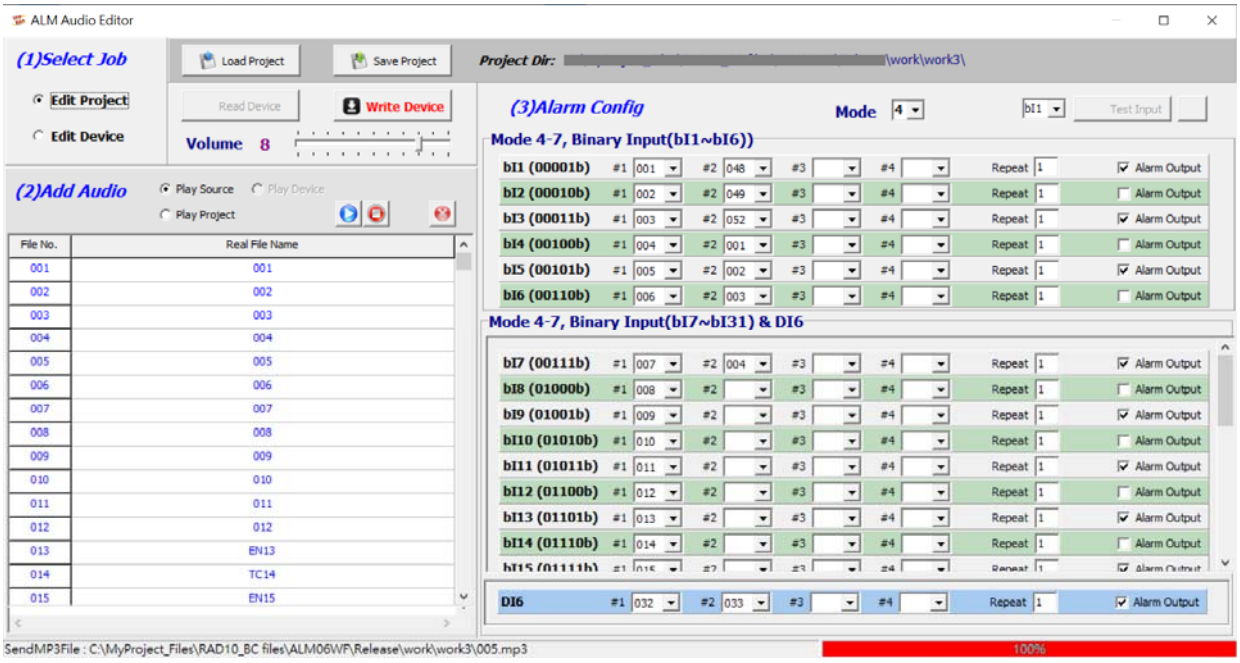


Figure 3-3: ALM-06-WF PC Utility Audio Editor page.

3.4 Start your Edit

Follow the step number,

(1) Select Job: Select Project or Device to Edit.

If **Project Edit** selected, you need to save project after finish edit.

In **Device Edit** selected, it will auto load the setting & audio file name from device, same as **Read Device** button, in Device Edit mode audio file cannot be read back, can only be modify or recover.

Write Device button will download all your setting & audio files into ALM-06-WF device through Wi-Fi. Also you can copy all the file inside your project directory to the Micro SD Card.

Volume Control trackbar, range from 0(Mute)~10(Max), same as main form.

To Create new project, use **Load Project** button, select the directory where you want to put and add the new directory name, show as below.

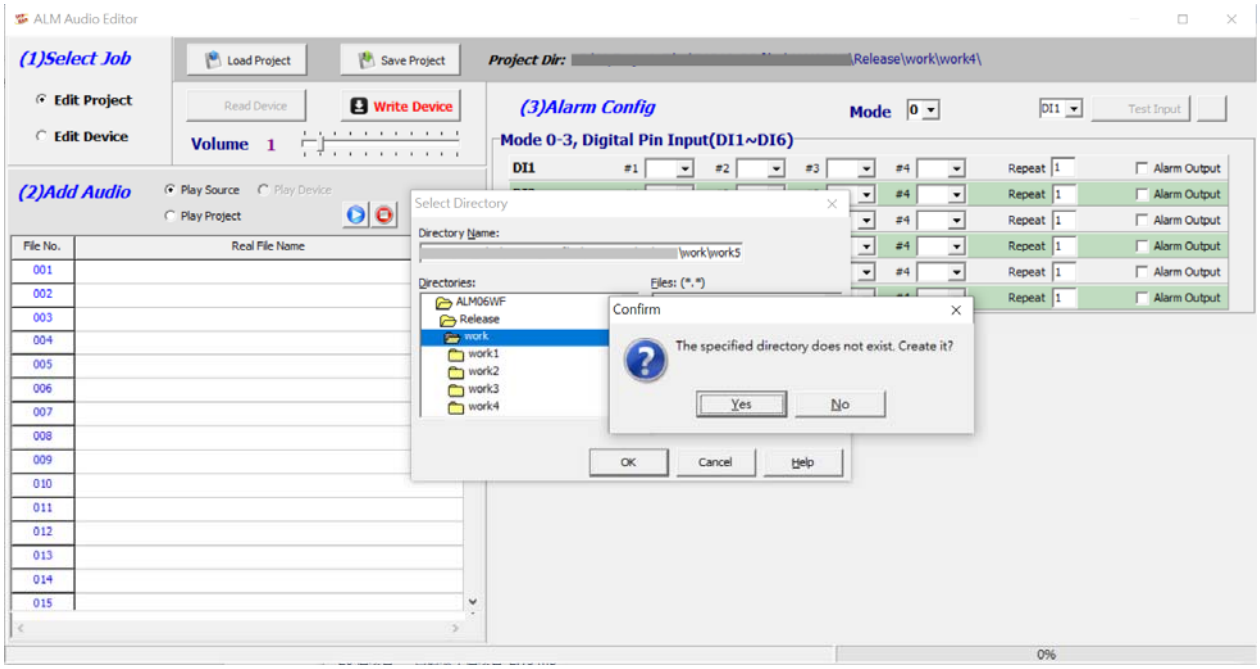


Figure 3-4**:** New Project in Audio Editor.

(2) Add Audio: Double Click on which File No. you are going to add the audio file, max 64 files can be assign.

File No. play back, select **Play Source** (Audio file original location) or **Play Project** (Audio file in project) or **Play Device** (Audio file in ALM-06-WF device's SD Card, only when Device Edit selected), click **File No.** and press **Play** button to play, and **Stop** button to break playback.
Click **File No.** and press the **Delete** button to remove file name in list, show as below.

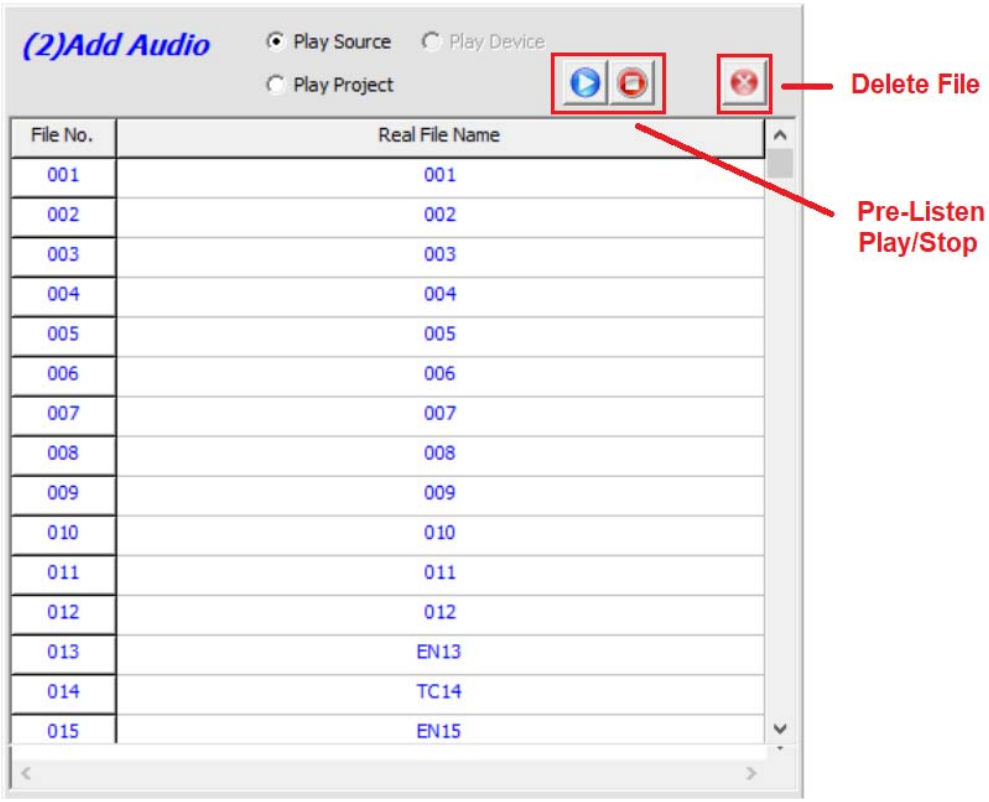


Figure 3-5**:** Play Back & Delete File.

(3) Alarm Config: Frist you need to select **Alarm Mode**, then you can assign audio File No. for each alarm channel from combo box, playback Repeat count & Alarm Output Relay.

To simulation the alarm channel audio playback, select the channel from combo box, press **Channel test** button to play, and **Stop** to break the playback, show as below.

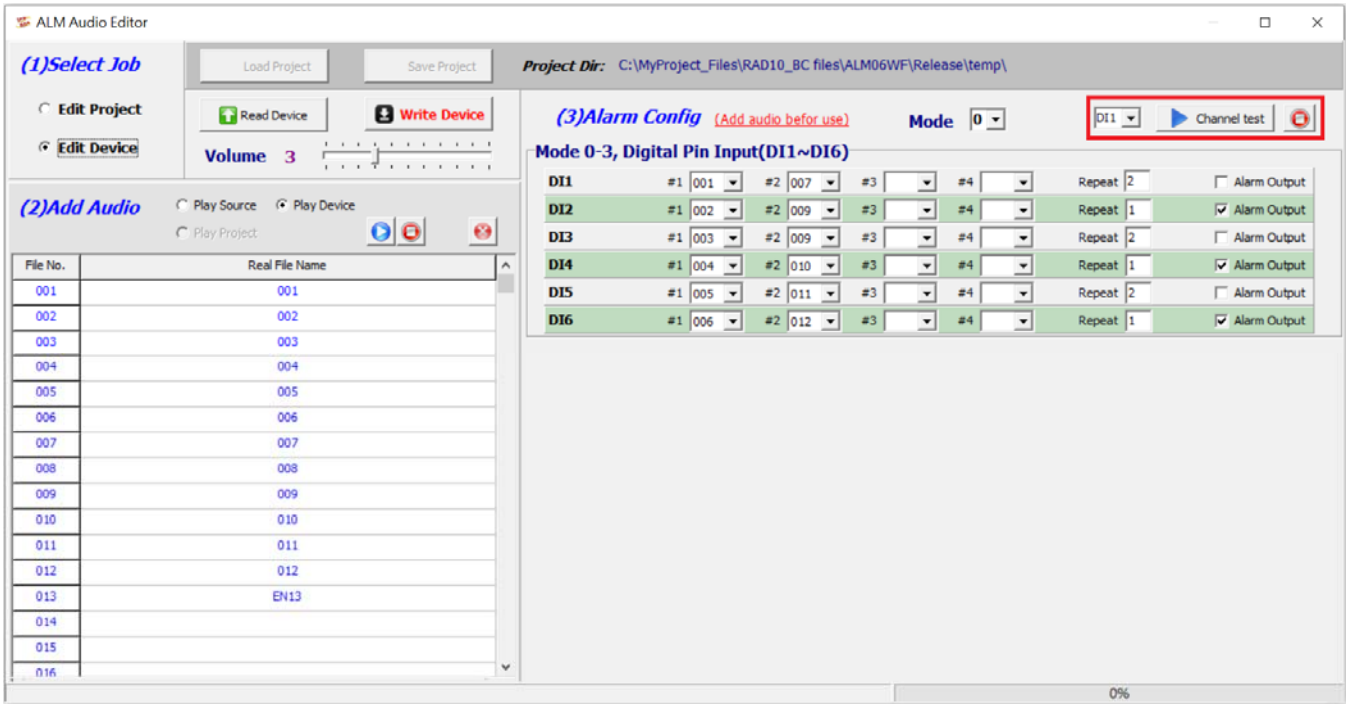


Figure 3-6: Alarm Config Mode0~3 & Test Input.

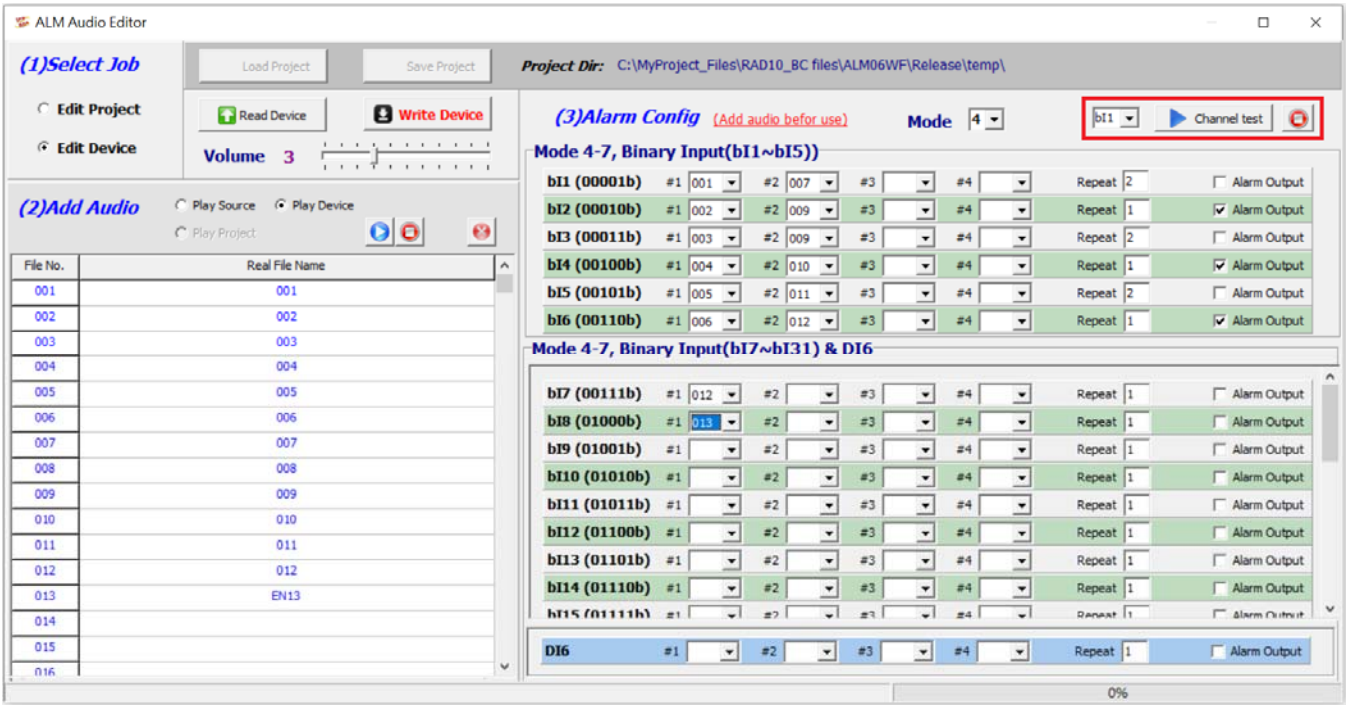


Figure 3-7: Alarm Config Mode4~7 & Test Input.

3.4.1 Make a Micro SD from project

Copy all the file to the MicroSD root directory where your project directory locate, this will be the same as **Write Device** from project.

3.4.2 Insert a New MicroSD

To start a new MicroSD, please insert to a PC before use it, this will make Microsoft OS fill the correct capacity into the MicroSD.

3.5 Alarm Mode Description

Mode 0: Channel Trigger-General Playback

- DI1 to DI6 playback in single independence trigger of 6 channels.
- A pulse input triggered the Playback. Playback repeat when the input is not release.
- When alarm in playback process, any input trigger will ignore.
- The highest DIx channel priority input will take place after the previous playback complete.

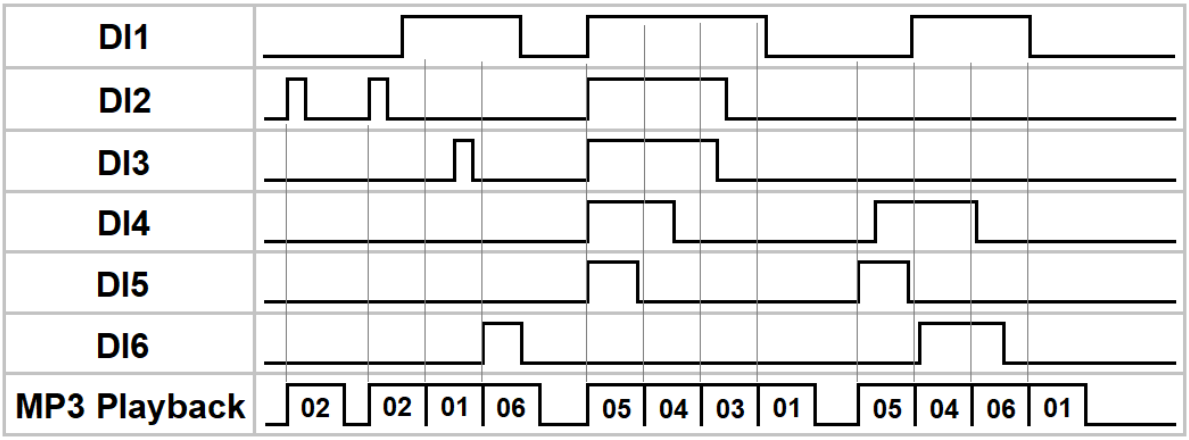


Figure 3-8: ALM-06-WF Mode 0

Mode 1: Channel Trigger-Trigger Input priority Playback

- DI1 to DI6 playback in single independence trigger of 6 channels.
- When alarm in playback process, any trigger input will break & take place the previous playback.
- In this mode, it only playback once, even the input is not release.
- Only when multi trigger in same time the highest DIx channel priority will take place

.

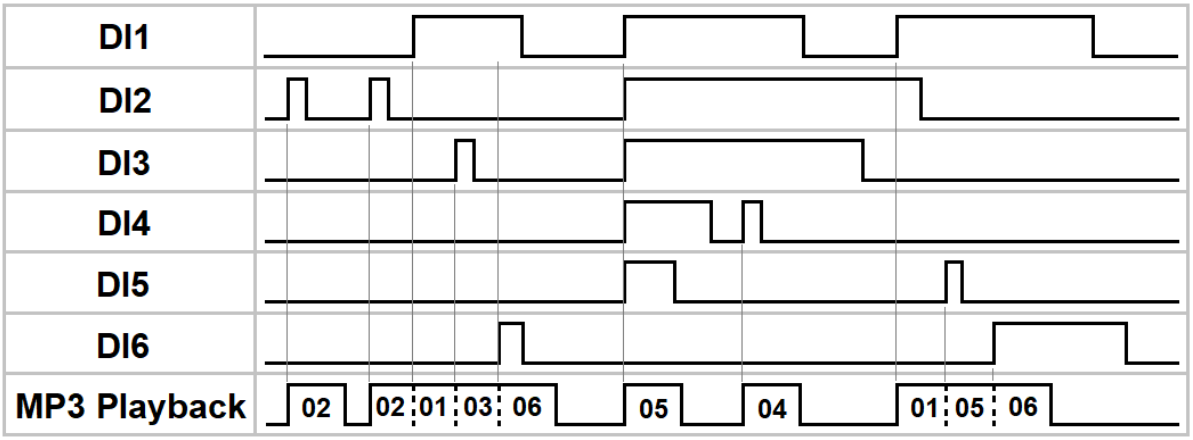


Figure 3-9: ALM-06-WF Mode 1

Mode 2: Channel Trigger- Hold Repeat Playback

- DI1 to DI6 playback in single independence trigger of 6 channels.
- When alarm in playback process, only higher DIx channel priority can break & take place the previous playback.
- Playback will repeat when input are not release & will stop immediately when input released.
- When multi trigger in same time the highest DIx channel priority will take place

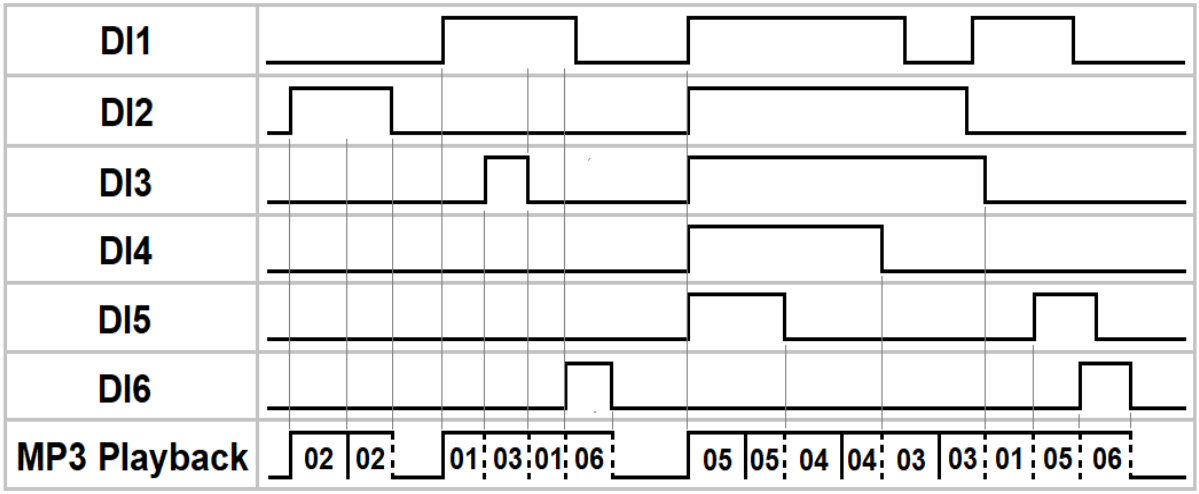


Figure 3-10: ALM-06-WF Mode 2

Mode 3: Channel Trigger- Memory Once Playback

- DI1 to DI6 playback in single independence trigger of 6 channels.
- When alarm in playback process, any trigger input will memory once for next playback.
- In this mode, it only playback once, even the input is not release.
- When multi trigger in same time the highest DIx channel priority will take place

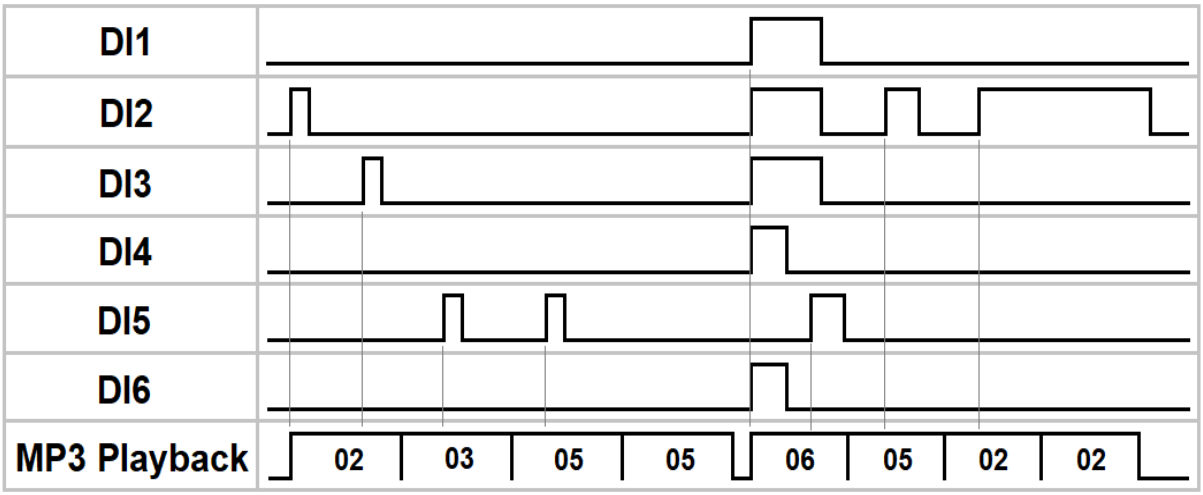


Figure 3-11: ALM-06-WF Mode 3

Mode 4: Binary Trigger-General Playback

- DI1 to DI5 are used as binary input, max 31 channels & DI6 in single channel.
- A pulse input triggered the Playback. Playback repeat when the input is not release.
- When alarm in playback process, any input trigger will ignore.
- The highest binary channel priority input will take place after the previous playback complete, DI6 is the most highest channel.

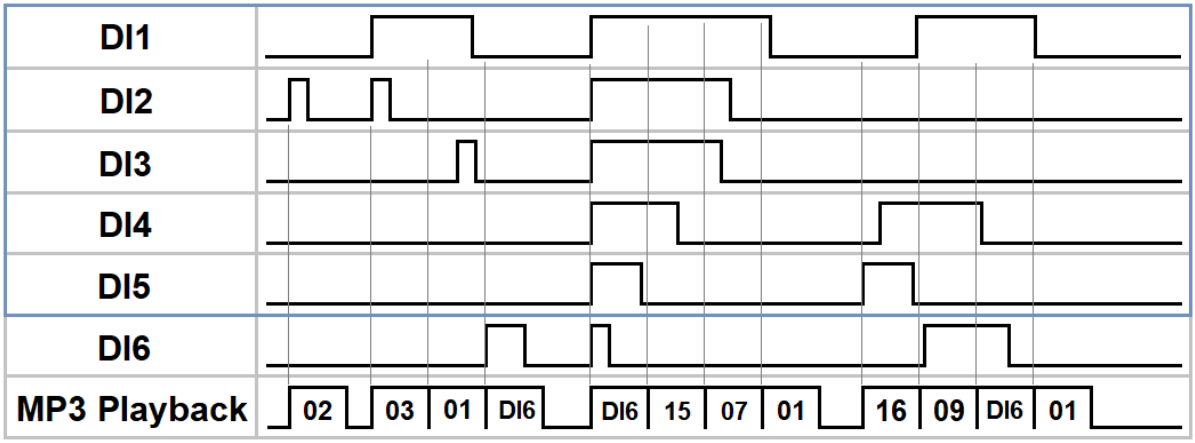


Figure 3-12: ALM-06-WF Mode 4

Mode 5: Binary Trigger-Trigger Input priority Playback

- DI1 to DI5 are used as binary input, max 31 channels & DI6 in single channel.
- When alarm in playback process, any trigger input will break & take place the previous playback.
- In this mode, it only playback once, even the input is not release.
- The priority depend on trigger input, only when multi trigger in same time the highest binary channel priority will take place, DI6 is the most highest channel.

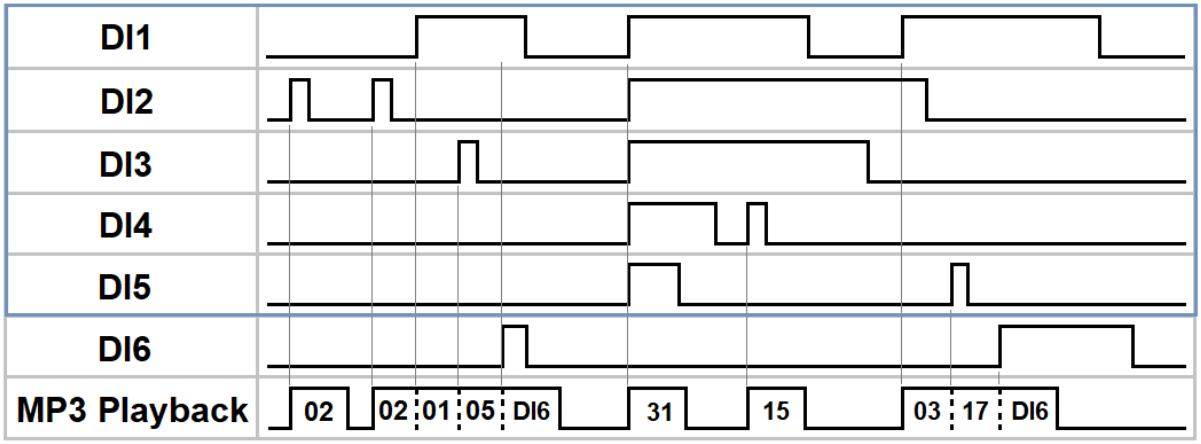


Figure 3-13: ALM-06-WF Mode 5

Mode 6: Binary Trigger- Hold Repeat Playback

- DI1 to DI5 are used as binary input, max 31 channels & DI6 in single channel.
- When alarm in playback process, only highest binary channel priority can break & take place the previous playback.
- Playback will repeat when input are not release & will stop immediately when input released.
- When multi trigger in same time the highest binary channel priority will take place, DI6 is the most highest channel.

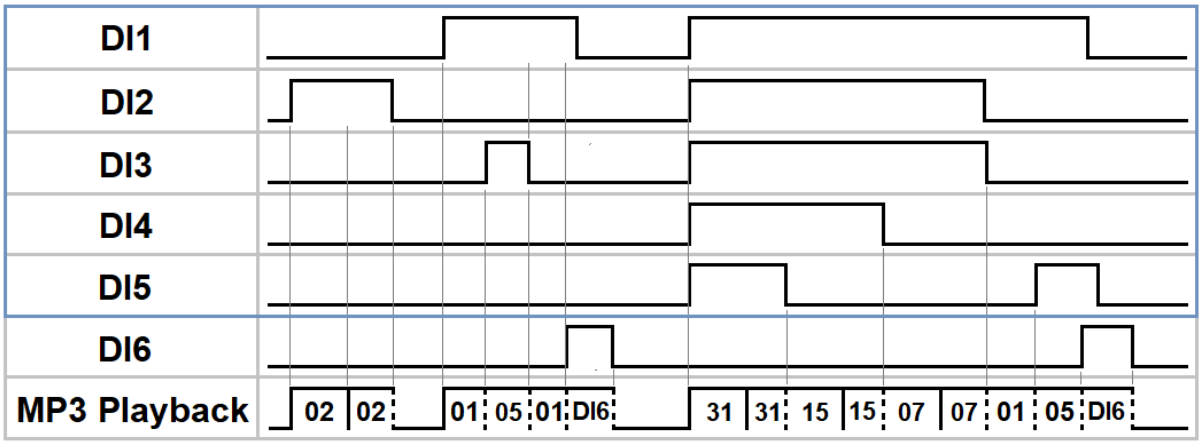


Figure 3-14: ALM-06-WF Mode 6

Mode 7: Binary Trigger- Memory Once Playback

- DI1 to DI5 are used as binary input, max 31 channels & DI6 in single channel.
- When alarm in playback process, any trigger input will memory once for next playback.
- In this mode, it only playback once, even the input is not release.
- The highest binary channel priority input will take place after the previous playback complete, DI6 is the most highest channel.

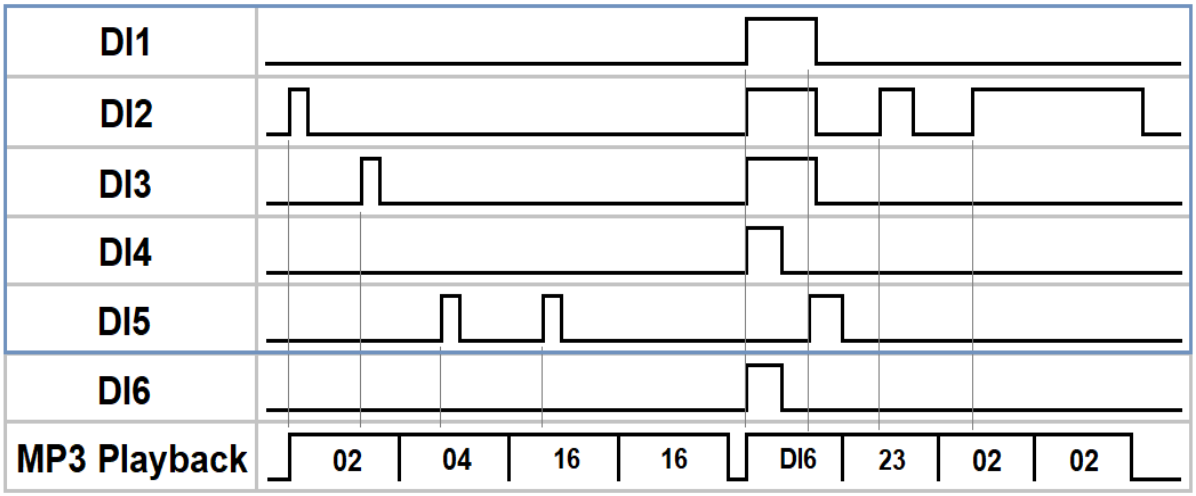


Figure 3-15: ALM-06-WF Mode 7

4. Application

Users can use a Computer or Smart Device to communicate with the ALM devices in the application. It can complete the purpose of control to wireless network by this way.

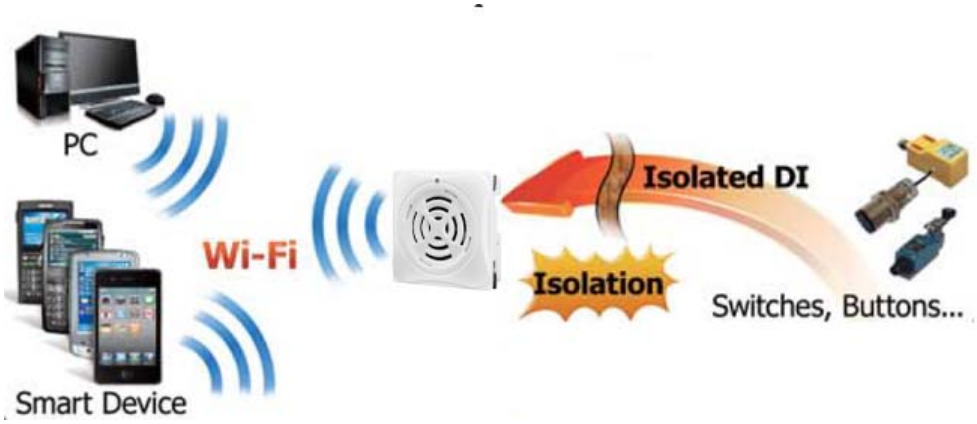


Figure 4-1: ALM + PC/Laptop/Smart Device application architecture

4.1 Connection with Modbus TCP utility

a. Open Modbus TCP utility and key in the IP address , Port as "502". Finally, click the "Connect" button.
b. If the network settings are correct, this will immediately establish a connection.
c. Use the function code "0x02", and set the Reference Number as "0x00", Bit Count as "0x06" to get the 6 CHs DI value.
d.

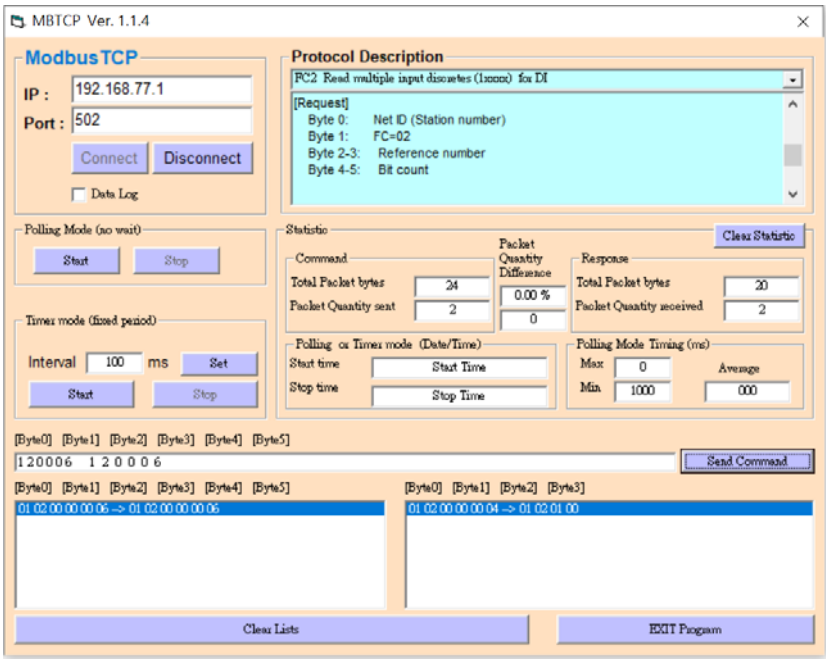


Figure 4-2:Input Channels reading screen

e. Use the function code "0x01", and set the Reference Number as "0x00", Bit Count as "0x01" to get the Relay Output value.

f.

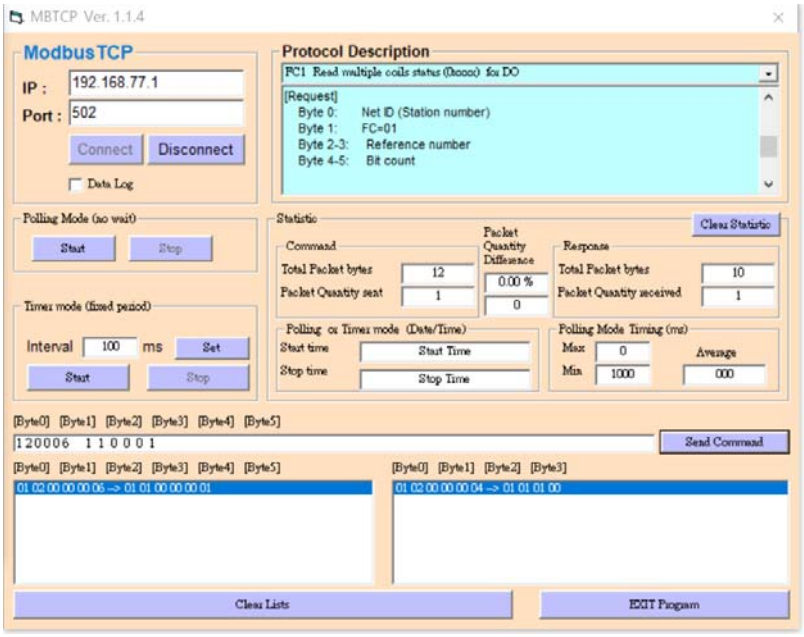


Figure 4-3: Relay Status reading screen

g. Use the function code "0x05", and set the Reference Number as "0x00", value as "0xFF" to turn on the Relay Output, & 0x00 to turn off.

h.

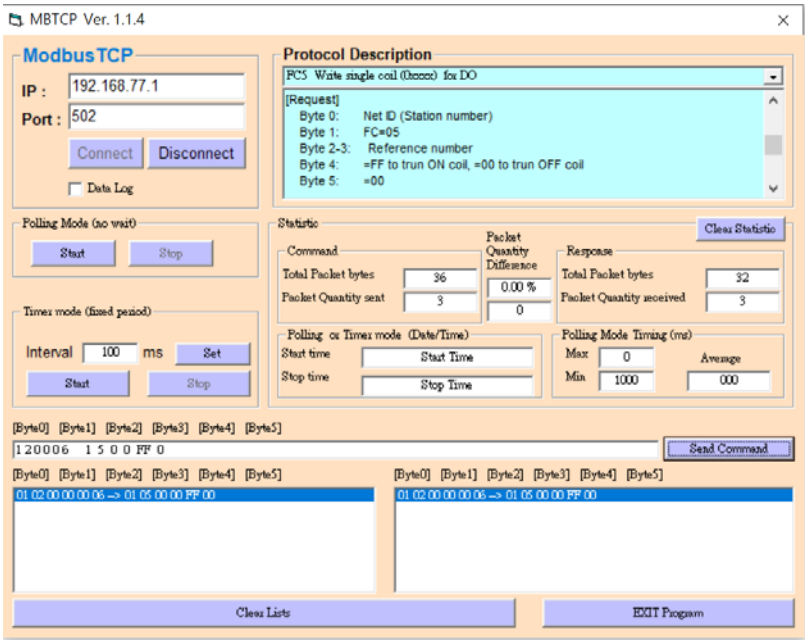


Figure 4-4: Relay output turn On/Off

5. Modbus Applications

The ALM-06-WF include a Modbus port that allows you to access terminals data via Wi-Fi and communicates using a master-slave technique in which only one device (the master) can initiate transactions (called queries). The other devices (slaves) respond by supplying the requested data to the master, or by taking the action requested in the query.

Most SCADA (Supervisor Control And Data Acquisition) and HMI software can easily integrate serial devices via the Modbus protocol, such as Citect, ICONICS, iFIX, InduSoft, Intouch, Entivity Studio, Entivity Live, Entivity VLC, Trace Mode, Wizcon, Wonderware, etc.

For Android Device, a freeware HMI Modbus is easy to use.

5.1 What is Modbus TCP/IP?

Modbus is a communication protocol developed by Modicon in 1979.

Different versions of Modbus used today include Modbus RTU (based on serial communication like RS485 and RS232), Modbus ASCII and Modbus TCP, which is the Modbus RTU protocol embedded into TCP packets.

Modbus TCP is an internet protocol. The protocol embeds a Modbus frame into a TCP frame so that a connection oriented approach is obtained thereby making it reliable. The master query's the slave and the slave responds with the reply. The protocol is open and hence highly scalable.

5.2 Protocol Description

The Modbus protocol defines a simple protocol data unit independent of the underlying communication layers. The mapping of Modbus protocol on network can introduce some additional fields on the application data unit.

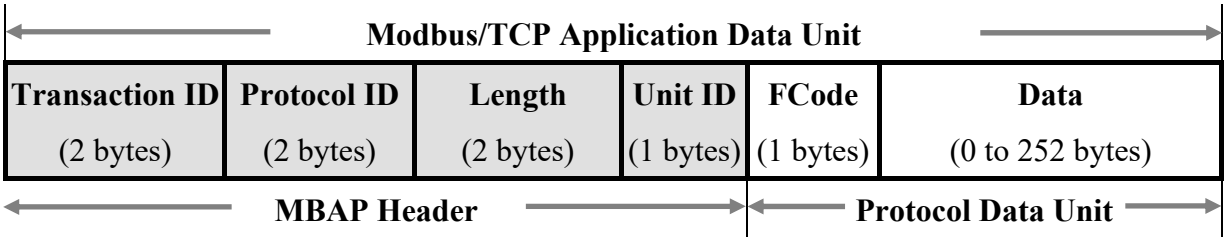


Figure 5-1: Modbus/TCP Application Data Unit

5.2.1 MBAP

The Modbus/TCP extension includes 7 additional bytes to the original Modbus protocol, which allows for transport over the TCP/IP layers.

A dedicated header is used on TCP/IP to identify the Modbus Application Data Unit. It is called the MBAP Header (MODBUS Application Protocol Header). The MBAP Header consists of 7 bytes of information:

Fields	Length	Description
Transaction Identifier	2 bytes	Identification of Request/Response transaction – Copied from request to response
Protocol Identifier	2 bytes	0 = Modbus protocol
Length	2 bytes	Number of following bytes - Includes the Unit Identifier
Unit Identifier	1 byte	Identification of remote slave

Table 5-1: MODBUS Application Protocol Header

5.2.2 Function Code

The function code field of a Modbus data unit is coded in one byte. Valid codes are in the range of 1 ... 255 decimal (the range 128 - 255 is reserved and used or exception responses). When a Modbus request is sent from a Modbus Client to a Server device the function code field tells the Server what kind of action to perform.

The Modbus/TCP feature of ALM series controller supports 6 function codes, which allows the reading and writing of data contents of registers.

Function Code	Descriptions
01 (0x01)	Read Coil Status
02 (0x02)	Read Input Status
03 (0x03)	Read multiple Analog Output registers
05 (0x05)	Force Single Coil
06 (0x06)	Write single Analog Output registers register
16 (0x10)	Write multiple Analog Output registers register

Table 5-2: Supports Function Codes of ALM series

Any other function code request will be returned with an error response indicating the function code is not supported, as well as a request for too much data or data at a register address that not present.

5.2.3 Data

The data field of Modbus request sent from a client to server devices contains additional information that the server uses to take the action defined by the function code. This can include items like discrete and register addresses, the quantity of items to be handled, and the count of actual data bytes in the field.

The data field may be nonexistent (of zero length) in certain kinds of requests, in this case the server does not require any additional information. The function code alone specifies the action.

5.2.4 Response

If no error occurs related to the Modbus function requested in a properly received Modbus PDU (Protocol Data Unit) the data field of a Modbus response from a server to a client contains the data requested. If an error related to the Modbus function requested occurs, the field contains an exception code that the server application can use to determine the next action to be taken.

For example a client can read the ON/OFF states of a group of digital input or output or it can read/write the data contents of a group of registers.

When the server responds to the client, it uses the function code field to indicate either a normal response or that some kind of error occurred (called an exception response). For a normal response, the server simply echoes to the request the original function code.

For an exception response, the server returns a code that is equivalent to the original function code from the request PDU with its most significant bit set to logic 1.

5.2.5 Data Encoding

Modbus uses a "big-endian" representation for address and data items. This means that when a numerical quantity larger than single byte is transmitted, the most significant byte (MSB, also called the high-order byte) is send first. The following sub-topics describe the different byte of encoding and show how the data is encoded as it is within the Modbus/TCP packet.

5.2.5.1 Binary

A binary item is represented as a single bit within a data word. All binary is packed into 16-bits data words, which are accessed using function code 01 and 02. Therefore, a single register contains 16 bits of binary data, each having a specific meaning.

Value	1st	2nd
0xAA55 (1010101001010101)	0xAA (10101010)	0x55 (01010101)

Table 5-3: A single register contains 16 bits of binary data

5.2.5.2 16-bits Word

A 16-bits word item is transmitted with the most significant byte first. Function code 03 and 04 read 16-bits items at a time; therefore, each of these data items will fit within one register that is read.

Value	1st	2nd
0x1234	0x12	0x34

Table 5-4: A 16-bits word item

5.2.5.3 32-bits Double Word

A 32-bits word item is transmitted with the most significant byte first. Function 04 read 32-bits items at a time; therefore, each of these data items will fit within 2 register that is read.

Value	1st Word	2nd Word
0x12345678	0x5678	0x1234

Table 5-5: A 32-bits double word item

5.3 ALM-06-WF Address Mapping

Address	CH	Descriptions	Range	Access Type
00001	1	Digital Output	0=OFF, 1=ON	R
00002	2	ARMED Status	0=OFF, 1=ON	R

Table 5-6: FC01 Read DO address (0xxxx)

Address	CH	Descriptions	Range	Access Type
10001~10006	1~6	Digital Input	0=OFF, 1=ON	R

Table 5-7: FC02 Read DI address (1xxxx)

Address	CH/Length	Descriptions	Range/Value	Access Type
40001	1	Volume Level (0~10)	INT16	R
40011	Always 1	Read Idle Timeout value	16bit Word	R

Table 5-8: FC03 Read multiple AO address (4xxxx)

Address	CH	Descriptions	Range	Access Type
00001	1	Relay Output	0x00=OFF, 0xFF=ON	W
00002	2	ARMED	0x00=OFF, 0xFF=ON	W
00003	3	Stop Playback	0xFF=Stop Playback	W
00009~00014	1~6	Simulation Channel Test	0xFF=Run Test	W

Table 5-8: FC05 Write DO address (0xxxx)

Address	CH	Descriptions	Range/Value	Access Type
40001	1	Volume Level (0~10)	16bit Word	W
40011	-	Write Idle Timeout value	16bit Word(1~65000)	W

Table 5-9: FC06 Write single AO address (4xxxx)

Address	CH	Descriptions	Range	Access Type
40001	1	Volume Level (0~10)	16bit Word	W

Table 5-10: FC16 Write multiple AO address (4xxxx)

Technical Support

If you have problems about using the ALM-06-WF controller, please contact ICP DAS Product Support.
Email: service@icpdas.com