

K-Bus Tool

IR Configuration Function

User manual-Ver. 2.1

KNX/EIB Intelligent Installation Systems

Version to upgrade (Required)

Version	Upgrade Instructions	Date
User manual-Ver2	After upgrading the software on the user interface with a legacy of great changes, in order to better use the upgraded software, it is recommended for the first time using this software users read the manual.	2013/12/12
User manual-Ver2.1	The main changes are as follows: 1 Description of the type 4bit Function(See 3.3.6); 2 The demo of IR transmitter (See 4.4.2); 3 Description of the current detection(See 3.3.4), Note: Function not implemented.	2014/05/26

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1 General

K-BUS Tool is PC configuration software to configure some devices from video-star, this paper describes the overall framework of the software and the use of IR configuration function. The IR configuration function of this software are only available in conjunction with the IR Learner and IR Emitter, it can facilitate simple set-up of these devices. It is the upgraded version of the first edition of this function. Compared with the first version of the function, user interface more humane, have the very big enhancement on the data processing capacity .Users can avoid the complex and complicated operation in the first version .In addition, the software also provides configuration debugging capabilities, you can avoid ETS software configure device debugging steps , greatly improve the work efficiency.

The user who use it at first time, should read the software driver installation manual, it detailed introduces the essential condition of the software runs and the related driver installation method.

2 Software Introduction

2.1 Functional overview

2.1.1 IR Config Function

IR configuration function can be used to learn and test the key encoding of the IR Remoter through the IR learner, and save encoding to the configuration file. Every channel of IR Emitter can be configured in 64 different control commands and 16 group addresses configuration. After completing the configuration, through the EIB Bus and communicate with IR Emitter, then download the IR control command and each channel group configuration data to the IR Emitter, after downloaded successfully, through the other devices of the system with EIB/KNX bus can the IR Remote Control devices, such as the family of DVD, TV, air conditioning, Fan, etc.

The main functions are as follows:

- ◆ Supports the IR transmitter of BTIS-04/00.1 and BTIS-01/00.1 versions ;
- ◆ The device manager of IR can be configured with 20 IR Emitter devices at most ;
- ◆ The device manager of IR Learning code can be configured with 40 controlled appliances ;
- ◆ Each of the controlled appliance can learn 40 key encoding at most ;
- ◆ Each devices have 4 channels, and can configure 256 commands ; (maybe the BTIS-01/00.1 can support more devices, but max. number of commands still are 256)
- ◆ Each channel can be configured with 16 group addresses at most ;
- ◆ To learn more than 95% of remote controller in the market ;
- ◆ The IR control commands can be assigned to 3 types of object (1bit 4Bit 1byte), 1bit or 4Bit object can recall the IR control commands of the devices, but 1byte object only can recall the corresponding IR control commands of channel through the scene mode;
- ◆ Sending time and sending delay can be set for per IR commands ;
- ◆ Each command can include 5 slave functions, this way is suitable for controlling several functions via one command at a time ;

2.1.2 Debug function

Debug function can be used to send the message of group address and monitor the group address message on the bus.

The main functions are as follows:

- ◆ Only support to send a type of 1bit ,4Bit, 1byte message;
- ◆ Support group address message series [write] cycle transmission;
- ◆ Support group address message series [read] cycle transmission;
- ◆ Support the manual transmission of group address message;
- ◆ Can store 10 different message series;
- ◆ Each series can add 150 test data (including the delay and group address message).

2.2 Operating environment

Operating system: the operating system version of Windows XP(32bit)and Windows 7(32/64bit) ;

Operating environment: must install "KNX etcC Falcon Runtime V2.1" run time library on the PC(Note: the operating environment in the software installationis introduced in the specification).

2.3 Language

The software supports two language: Chinese and English,when under the English operating system want to normal use Chinese interface, you need to install Chinese language pack .

3 Software Interface

Double-click the shortcut on the desktop [K-BUS Tool.exe] or select [Start]/[All Programs]/[K-BUS Tool]/[K-BUS Tool.exe] to start the software, the initial interface shown as in fig. 3.1.

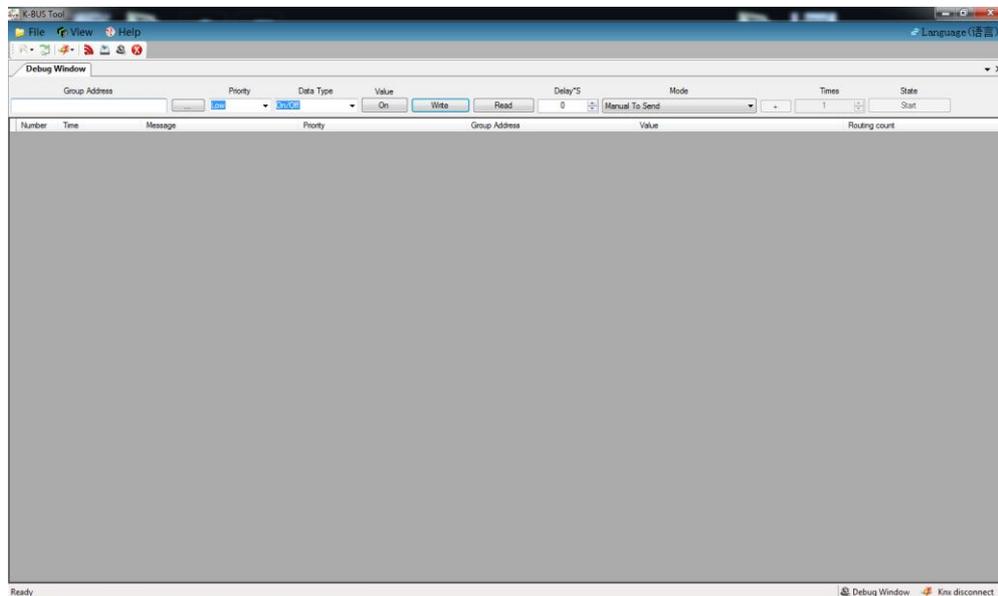


fig.3.1 The initial interface

3.1 Main menu

The main menu include three menu group: [file] [view] [help], these menu group content and method of use will introduce as follow section.

3.1.1 [File]

The drop-down menu shown as fig.3.2.

- ① [New]: Create a new configuration file;
- ② [Open]: Open the configuration file;
- ③ [Security settings]: Set password of current configuration file;
- ④ [Communication]: Software and KNX bus communication settings;
- ⑤ [Recent files]: Browse or open the 10 recent success opened files;
- ⑥ [Quit]: Exit the software.

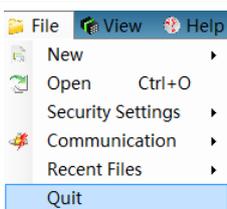


fig.3.2 [File] drop-down menu

3.1.2 [View]

The drop-down menu shown as fig.3.3.

- ① [IR Configuration]:Show IR Configuration window;
- ② [Download]:Show Download window;
- ③ [Error list]:Show Error list window;
- ④ [Debug]:Show Debug window;
- ⑤ [Toolbar]:Show Toolbar.

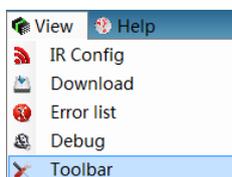


fig.3.3 [View] drop-down menu

3.1.3 [Help]

The drop-down menu shown as fig.3.4.

- ① [About]:Show the software version number information;
- ② [User manual]:Open the user manual.

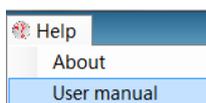


fig.3.4 [Help] drop-down menu

3.1.4 [语言(Language)]

The drop-down menu shown as fig.3.5.

- ① [Simplified Chinese]:Select simplified Chinese as the software display language next times;
- ② [English]:Select simplified English as the software display language next times.

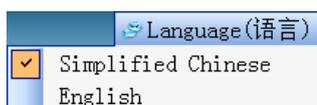


fig.3.5 [语言(Language)] drop-down menu

3.2 Debug Window

The debug window shown as fig.3.6, it is similar to ETS4's "Group Monitoring" window, but the functions of debug window would be far less than the functions of ETS's "Group Monitoring", therefore, to obtain more detailed information we need to use the ETS4 "Group Monitoring" window for the test. Debugging is mainly to write or read the device's group data by sending a group telegram, then the user according to the feedback information and the response of controlled appliances to judge the downloaded in the device configuration is in force or not.

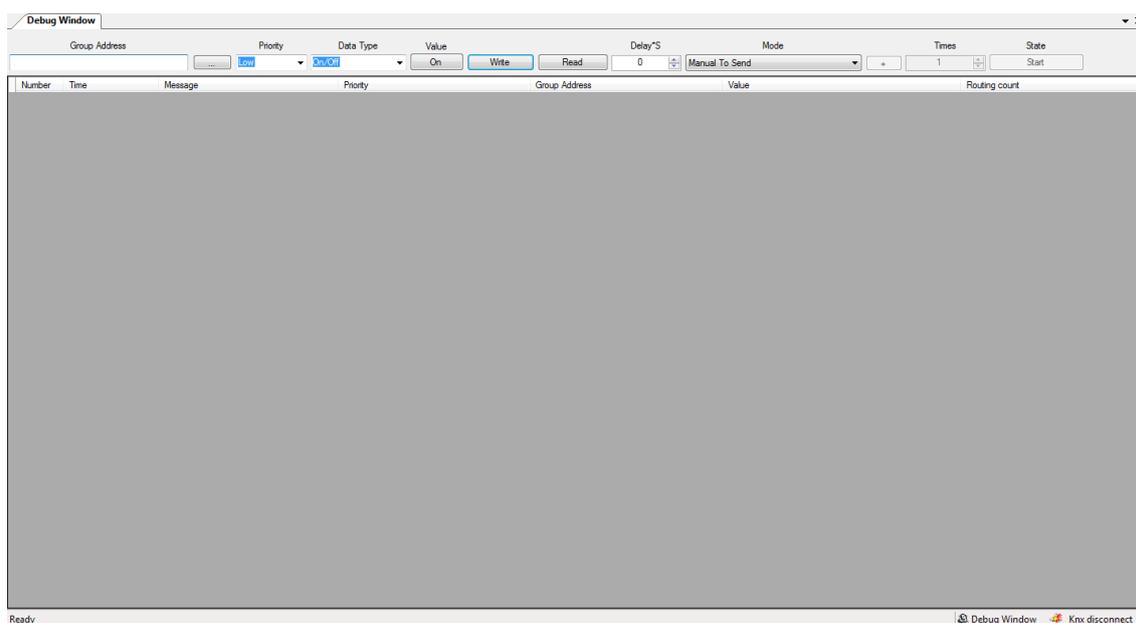


fig.3.6 Debug Window

The debug window includes information input box (fig.3.6 the gray background area) and information feedback box (fig.3.6 the dark background area). These informations are described in the following subsections.

3.2.1 Information input

There are two kinds of group telegram sending mode [manually send, circular sent (write / read)] in the information input box:

① Manual to send:

Group address: The group address of mailing telegram ;

Priority: The priority of sending Group telegram on the bus;

Button "...": Browse all input record of the group address;

Data type: The data type of group telegram ;

Value: The value of group telegram ;

Button "Write": To send the telegram which write group information;

Button "Read": To send the telegram which read group information;

Delay: Delay time of telegram sending after click the button "write/read".

②Circular sent (write / read)

(1) Loop to write

Times: The sending times of group address telegram series;

Button "+": Pop up a dialog box of adding group address series(Shown as fig.3.7).

fig.3.7 Group list dialog box-write

Through the dialog can add and save 10 cycling test series,each series can add 150 group telegram.When the cycling send start, the debug window will according to the telegram which was stored by the current test sequence, and according to the serial number in turn send the telegram.

(2) Loop to read

Times: The sending times of group address telegram series;

Button "+": Pop up a dialog box of adding group address series(Shown as fig.3.8,details please see page [Loop to write](#)).

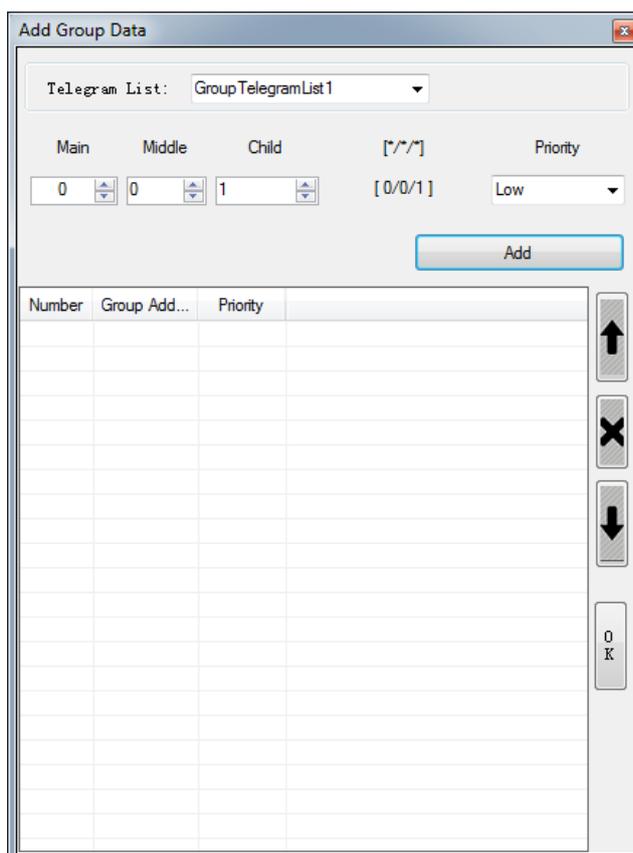


fig.3.8 Group list dialog box-Read

3.2.2 Information display

Number:The sequence number of Feedback message ;

Time:The time of detecting message ;

Message: The information of feedback message;

Priority: The Priority of telegram ;

Group address: The group address of telegram ;

Value: the value of telegram ;

Rount count:The routing count of telegram .

3.3 IR configuration

IR configuration window is used to configure the function of IR Emitter, the contents of the window as shown in fig.3.9. Through IR Learning Code Manager, we can learn and record each IR encoding of the appliance remote controller's function ,and can config the key function encoding into the commands library by the commands configuration box, according to a certain format configured to the command which IR Emitter can call, then through the group configuration box you can config the group address of channel function, the command to call and so on. Finally downloaded the

configuration to the IR Emitter via the KNX Bus.

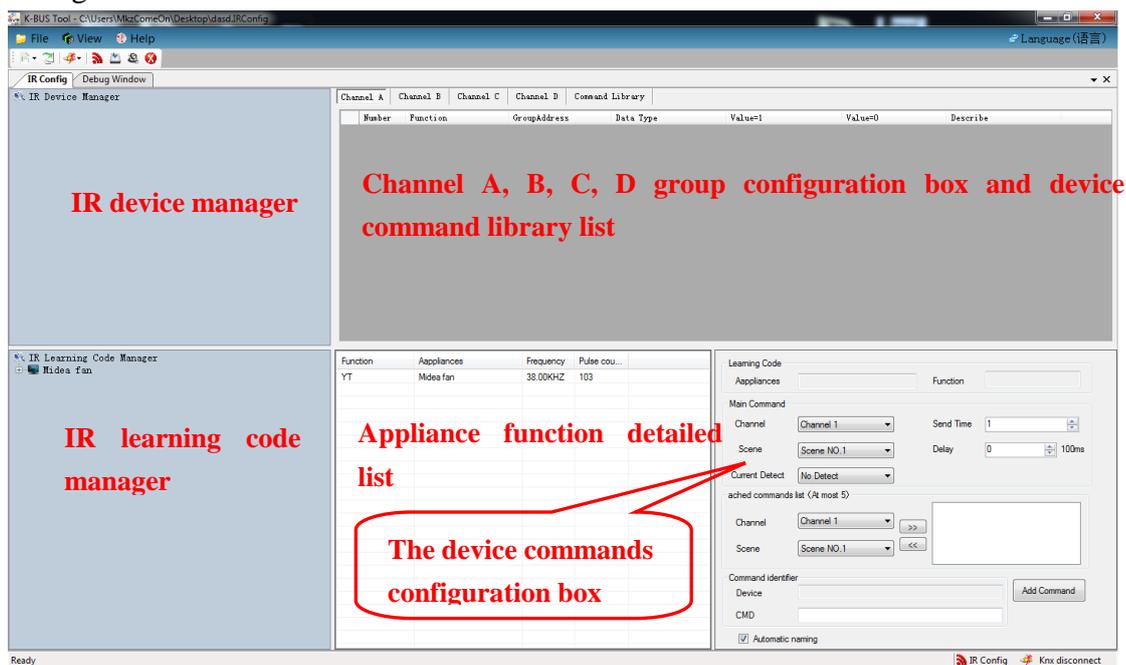


fig. 3.9 IR Configuration

3.3.1 Device manager

The device manager is a mechanism to manage the configured information of IR Emitter, it is mainly used for device of new, delete, modify the properties, channel selection, download of the configured information.

3.3.2 IR learning Code manager

IR learning Code Manager is a mechanism to manage the information of the controlled appliances which have IR remote controlled function, it is mainly used for the controlled electrical new, delete, rename, import or export IR learning code, and the remote controlled function of appliance's new and learning, test.

3.3.3 Appliance function detailed list

The appliance function detailed list is used to display the item sub information which are selected by the learning code manager. we can check the appliance name of selected items, electrical function, the frequency and pulse counting of the electrical function remote controller, also can pass the test to verify the effectiveness of learning code.

3.3.4 The device command configuration box

Device command box is divided into four parts: learning code, the main command, the list of Attached commands and command marks.

① Learning Code (Choice in the appliance function detailed list)

Appliance: The electrical which the main command calls the electrical function;

Appliance function: the main command calls the electrical function;

② Main command

Channel: Part of a command;

Scene: Part of a command;

Send time: The number of send command, for example, the wind speed function of a fan is set to 2 times for transmitting, then when the transmitter receives a corresponding telegram, the transmitter will send the wind speed signal to the fan and continuous send 2 times, then the wind speed of the fan will jump 2 steps.

Send delay: To set the send delay for the command. For example, you turn on a fan, and attach a pivot and time function. If they are executed at the same time, this may influence the life of the fan motor, so you can delay a period of time for transmitting of the pivot and time function. Then when the transmitter receives a 14 corresponding telegram, the transmitter will first send the open function signal to the fan, after a while send the pivot function signal to the fan, and then after a time send the time function signal to the fan, in order to protect the motor of the fan.

Current Detect: (**Function not implemented**) The action of IR Transmitter before sending the command. [No Detect] indicate that transmitter will not detect the current of the controlled appliances before sending the command, and it will send the command directly. [No Current to send] indicate that transmitter will detect the current of the controlled appliances before sending the command, if there is not current, it will send the command, else do not send. [Have Current to send] indicate that transmitter will detect the current of the controlled appliances before sending the command. if there is current, it will send the command, else do not send.

③ the list of from commands

Channel: Part of a command;

The scene: Part of a command;

Button">>": Add a from command;

Button"<<": Delete the from command of selected.

④ Command marks.

Device: The device of the current configuration command;

Command: The mark of current command;

Button"Add command"or"Modify command": Add new command or modify the old command;

"Automatic naming": Selected whether or not automate name for the device command.

3.3.5 Device command library

Select the tab [Command Library] in the red box of group configuration shown in Figure 3.10 the detailed list of device command Library. The detailed list of device command library shows all the commands' parameters which are configured for the device by the user. Its main parameters had detail introduced in the previous subsection, so this section do not introduce anymore.

Number	CMD	Main Command Parameters			Attached CMD	Send Times	Delay(100ms)	Current Detect
		CMD Number	Appliances	Function				

fig.3.10 The detailed list of device command Library

3.3.6 Group configuration

In the group configuration, users can configure every channel's the group address allocation, command calling details, scene configuration and other data of the devices.

Number: Each function's serial number (automatic sorting)

Function: Assigned the only non empty marking to the function;

Data Type: Functional data type including 1Bit, 4Bit, 1Byte, when choose 1Bit or 4Bit, the parameters of [Value=1] and [Value=0] effective, When choose 1Byte, calling all command of the channel by using scene recall.

Value=1: Setting the data type is 1Bit case, device receives the command which was called by the specified message value 1; Setting the data type is 4Bit case, device receives the command which was called by the specified message value 8~15;

Value=0: Setting the data format is 1Bit case, device receives the command which was called by the specified message value 0; Setting the data type is 4Bit case, device receives the command which was called by the specified message value 1~7;

Description: The described information of the function;

The Save button: The function of save the current editor

3.4 The download window

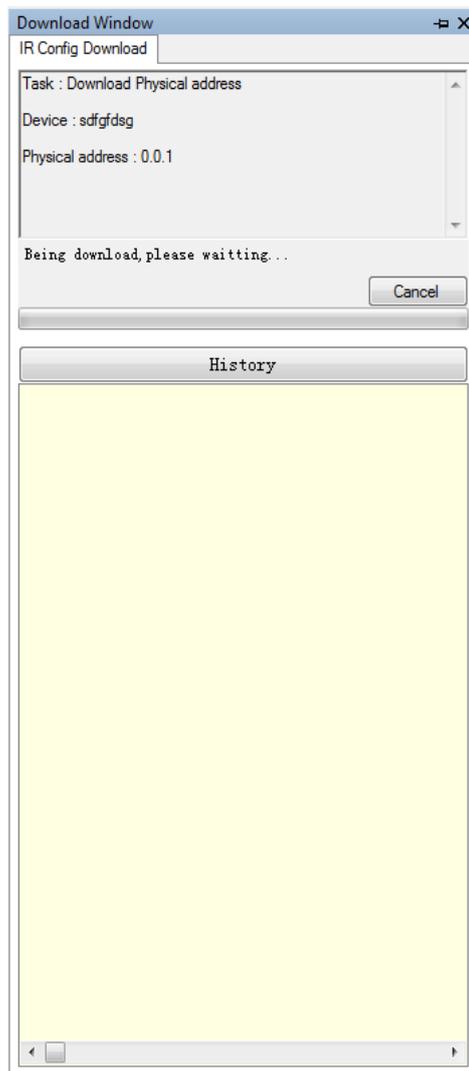


fig. 3.11 the download window

Choose the main menu bar [view] menu group drop-down menu [Download], pop up as shown in Figure 3.11 the download window when it is executing the download tasks. It can receive and perform the download task of other window, and each can only perform a download task. Users can cancel the current task's execution and view the information and schedule of the current task and task record By downloading Windows .

3.5 Error list

Select the main menu bar [view] menu group drop-down menu [Error list], Pops up as shown in Figure 3.12 The error list window. The function of error window is that receive and display the error configured information from other configuration window, and according to the error information to

jump to the wrong collocation.

Error List		
Number	Device	Explanation

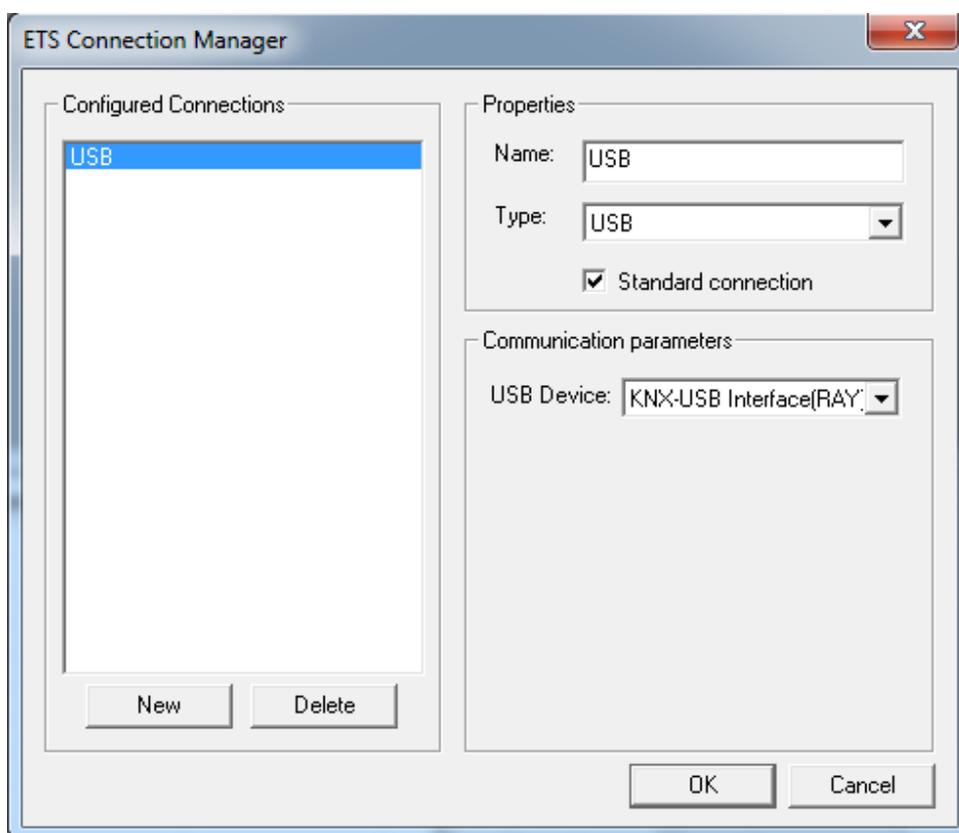
fig 3.12 Error list

4 Demo

This chapter describes all the actual operation of the software function and the matters of needing attention.

4.1 Communication settings

Select [File][Communication][Connect the bus], and then Configure the downloader in the following dialog box, click on [OK].

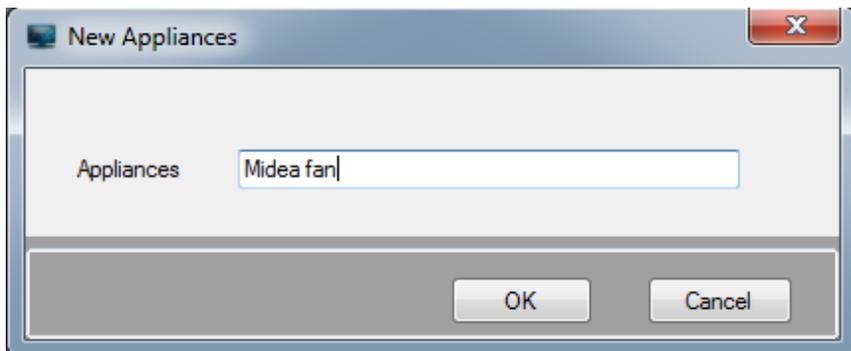


Note: If you select a USB connection in "Configure Connections" box, not detected download device in the right "Communication parameters" box, please check the connection of download device and PC machine .If the connection is well and the downloader is USB, we will need to install the driver.

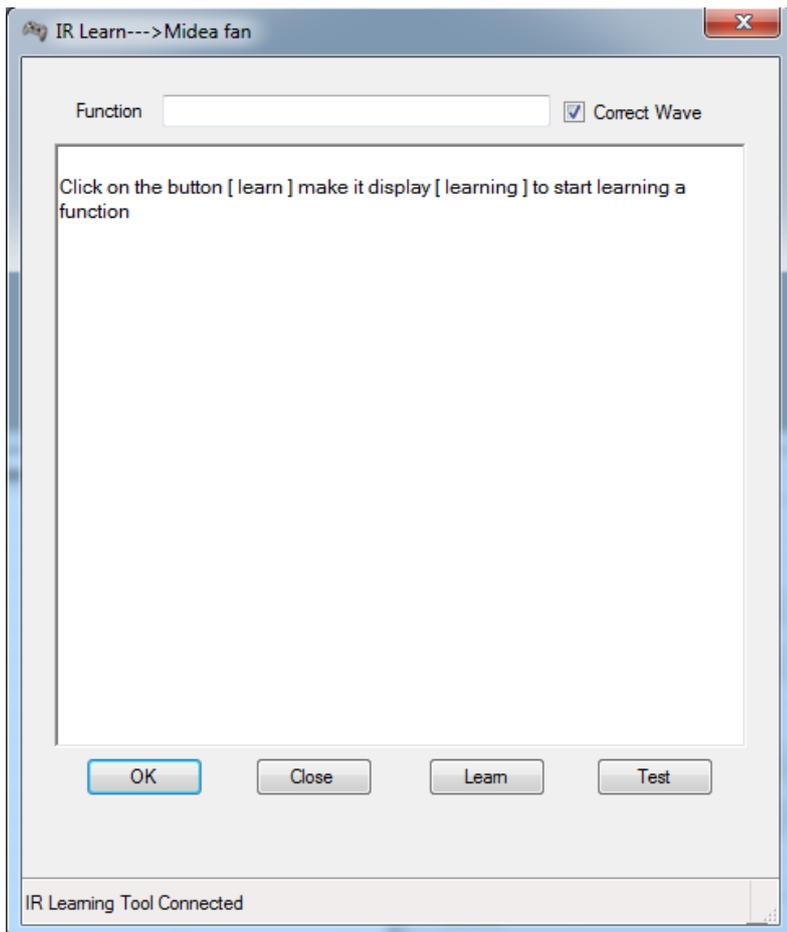
4.2 IR configuration function

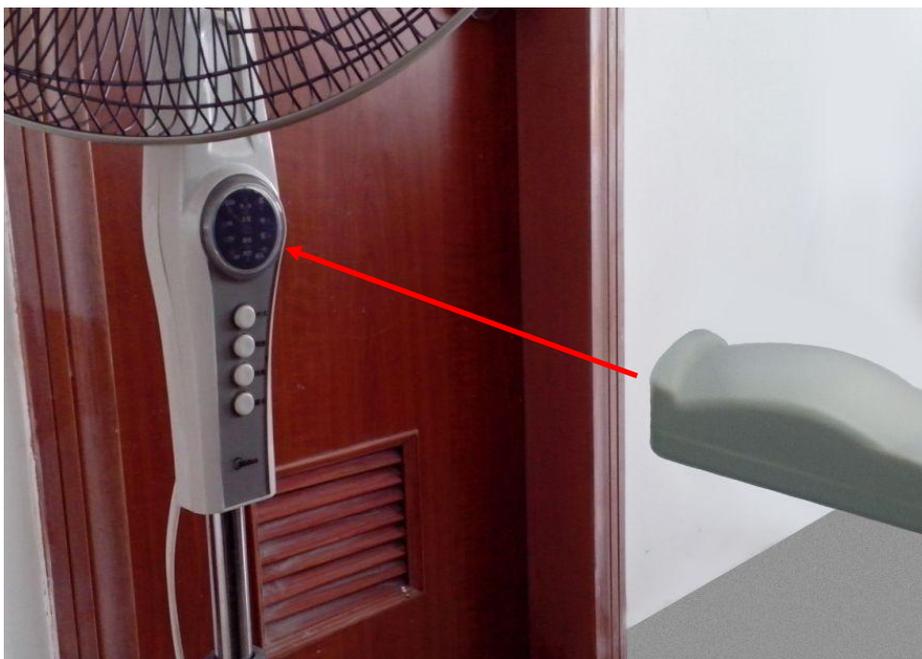
4.2.1 New Controlled appliance

(1) Right-Click the "IR learning code manager" ,In the shortcut menu,select [New Appliance],then set the appliance name in the following dialog box,click on [OK].



(2)Right-Click a appliance in IR learning code manager,In the shortcut menu,select [New function],Pop-up dialog box shown below.

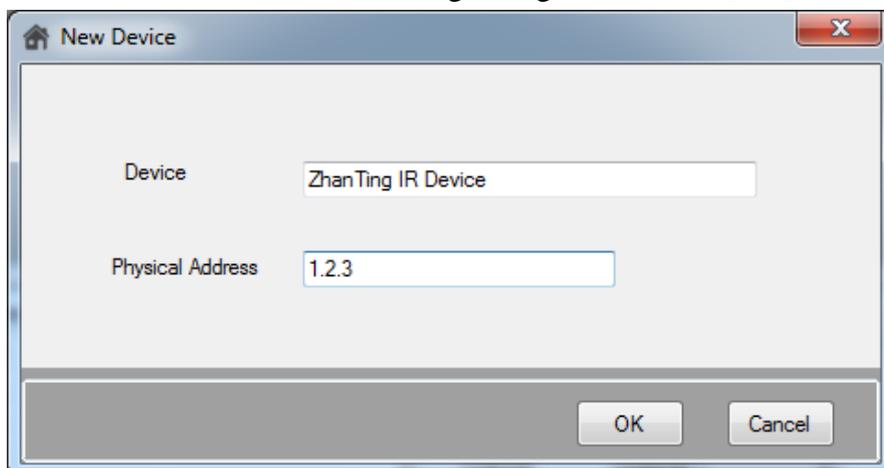




(6) Repeat (2)~(5) step to complete the learning of remote controller function.

4.2.2 New IR transmitter

(1) Right-Click the IR Device Manager, In the shortcut menu, select [New Decie]. then set the device information in the following dialog box, click on [OK].



(2) Select a device in IR Device Manager, then select a appliance in the IR Learning Code Manager, and select a function of this appliance in the detailed list box. According to the needed to input various parameters, click button [Add command] to add the command to current device, show as following.

Learning Code

Appliances: Midea fan Function: FL

Main Command

Channel: Channel 1 Send Time: 1

Scene: Scene NO.6 Delay: 0 100ms

Current Detect: No Detect

ached commands list (At most 5)

Channel: Channel 1 >>

Scene: Scene NO.1 <<

Command identifier

Device: ZhanTing IR Device Add Command

CMD: A5

Automatic naming

(3)Repeat (1)~(2) step to config the device command,Get commands show as following fig.

Number	CMD	Main Command Parameters			Attached CMD	Send Times	Delay(100ms)	Current Detect
		CMD Number	Appliances	Function				
1	A1	C1 / S1	Midea fan	KG		1	0	No Detect
2	A2	C1 / S2	Midea fan	FS		1	0	No Detect
3	A3	C1 / S3	Midea fan	YT		1	0	No Detect
4	A4	C1 / S4	Midea fan	DS		1	0	No Detect
5	A5	C1 / S5	Midea fan	FL		1	0	No Detect
6	A6	C1 / S6	Midea fan	KG	C1 / S3	1	3	No Detect
7	ON	C1 / S7	Midea fan	KG		1	0	No Current to send
8	OFF	C1 / S8	Midea fan	KG		1	0	Have Current to send
9	B1	C2 / S1	Midea fan	FS		1	0	No Detect
10	B2	C2 / S2	Midea fan	KG		1	0	No Detect
11	B3	C2 / S3	Midea fan	YT		1	3	No Detect
12	B4	C2 / S4	Midea fan	DS		1	3	No Detect
13	B5	C2 / S5	Midea fan	FL		1	0	No Detect
14	B6	C2 / S6	Midea fan	KG	C2 / S3	1	3	No Detect

(4)We have configed some command for the current device the last time ,then we will call these command to~config a device function,Configuration show as follows Fig:

①Configuration of channel A:

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Describe	
1	ScenA	1/0/0	1Byte	Any Command	Any Command		Saved
2	KG/FS	1/0/1	1Bit	A1	A2		Saved
3	YT/DS	1/0/2	1Bit	A3	A4		Saved
4	FL/KG	1/0/3	1Bit	B5	B2		Saved
5	YT	1/0/4	1Bit	A3	A3		Saved
6	ON/OFF	1/0/5	1Bit	ON	OFF		Saved
7	Absolute	1/0/6	4Bit	A2	A3		Saved

②Configuration of channel B:

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Description	
1	ScenB	2/0/0	1Byte	Any Command	Any Command		Saved
2	FS/KG	2/0/1	1Bit	B1	B2		Saved
3	YT	2/0/2	1Bit	B3	B3		Saved
4	KG Attached	2/0/3	1Bit	B6	B6		Saved
5	Com	1/0/1	1Bit	B4	A2		Saved

③Configuration of channel C:

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Description
1	SceneC	3/0/0	1Byte	Any Command	Any Command	Saved
2	DS/FS	1/0/1	1Bit	A4	B1	Saved

④ Configuration of channel D: No configuration

The Group configuration analysis as follows table:

Telegram			The response process of IR Emitter			
Group Address	Data Format	Value	Chanel A	Chanel B	Chanel C	Chanel D
1/0/0	Byte	0	C1/S1			
1/0/0	Byte	1	C1/S2			
1/0/0	Byte	2	C1/S3			
1/0/0	Byte	...	C1/S...			
1/0/0	Byte	x	C1/S(1+x)			
1/0/1	1Bit	1	A1	B4	A4	
1/0/1	1Bit	0	A2	A2	B1	
1/0/2	1Bit	1	A3			
1/0/2	1Bit	0	A4			
1/0/3	1Bit	1	B5			
1/0/3	1Bit	0	B2			
1/0/4	1Bit	1	A3			
1/0/4	1Bit	0	A3			
1/0/5	1Bit	1	ON			
1/0/5	1Bit	0	OFF			
1/0/6	4Bit	1~7	A3			
1/0/6	4Bit	8~15	A2			
2/0/0	Byte	0		C2/S1		
2/0/0	Byte	1		C2/S2		
2/0/0	Byte	2		C2/S3		
2/0/0	Byte	...		C2/S...		
2/0/0	Byte	x		C2/S(1+x)		
2/0/1	1Bit	1		B1		
2/0/1	1Bit	0		B2		
2/0/2	1Bit	1		B3		
2/0/2	1Bit	0		B3		
2/0/3	1Bit	1		B6		
2/0/3	1Bit	0		B6		
3/0/0	Byte	0			C3/S1	
3/0/0	Byte	1			C3/S2	

3/0/0	Byte	2			C3/S3	
3/0/0	Byte	...			C3/S...	
3/0/0	Byte	x			C3/S(1+x)	

4.2.3 Error correction

In the configuration process, we often have to create, delete, modify some commands, and these operations may affect the group configuration function. For example, the command "A6" have been some function calls in channel A, if you delete it that will show the error as following Fig .Double click the error term, jump to the point of error ,then modification.If not timely amended, will lead to the same mistake at the download data validation and cannot download.

Error List		
Number	Device	Explanation
1	ZhanTing IR Device	In [Channel A],the command[Value=1] of function [YT/DS] is deleted
2	ZhanTing IR Device	In [Channel A],the command[Value=1] of function [YT] is deleted
3	ZhanTing IR Device	In [Channel A],the command[Value=0] of function [YT] is deleted
4	ZhanTing IR Device	In device command{ A6 },the attached command number [C1 / S3] is deleted

4.2.4 Download

In the previous subsection, we have provided a simple infrared transmitter devices, this section describes how to download configuration to the IR Emitter via the KNX bus, the example of download all as follow:Right-Click a device,In the shortcut menu,select [Download][All].You must to press the programming button before downloading physical address or downloading all.

4.2.5 Debug

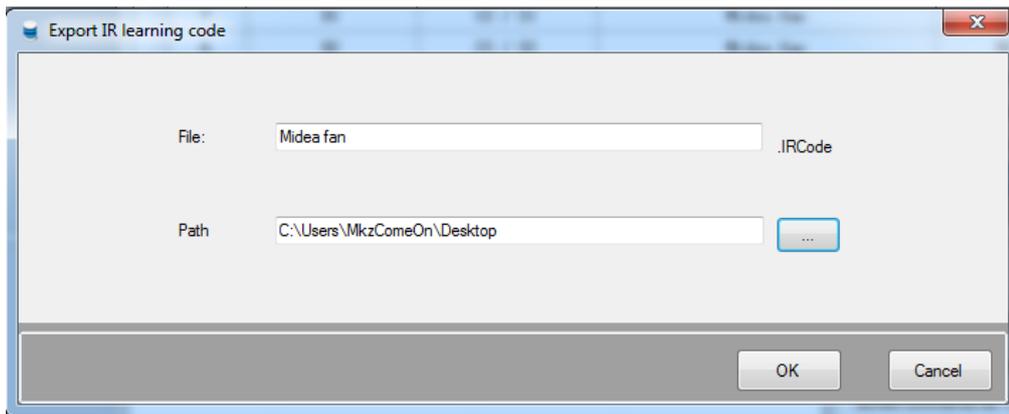
Right-Click a device,in the shortcut menu,select [Debug] jump to the debug window.then you can send the write or read telegram to test you device.

4.2.6 Import\Export IR learning encoding data

After create electrical appliances, in order to backup data, we can Export encoding data to the file ".IRCode".or import encoding data of file ".IRCode" or ".IRConfig" .

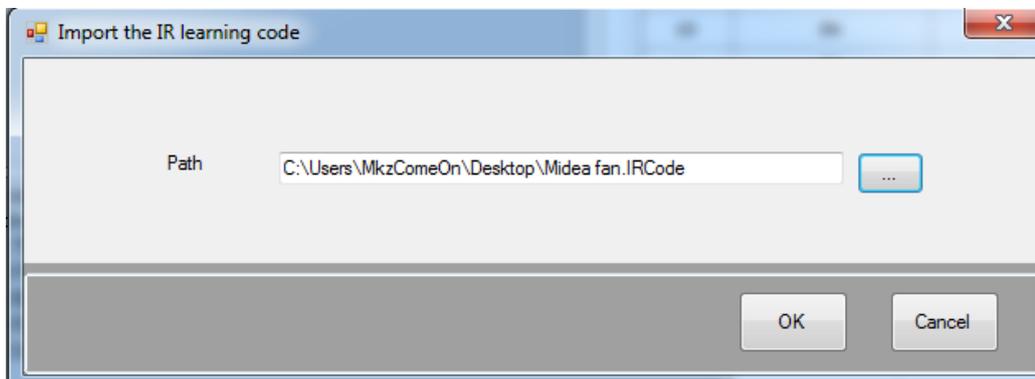
(1)Export file ".IRCode"

Right-Click a appliance,in the shortcut menu,select [Export],then export the encoding of appliance.Show as follow fig.(You can also Right click the IR Learning Code Manager to export all appliances).



(1) Import file ".IRCode" or ".IRConfig"

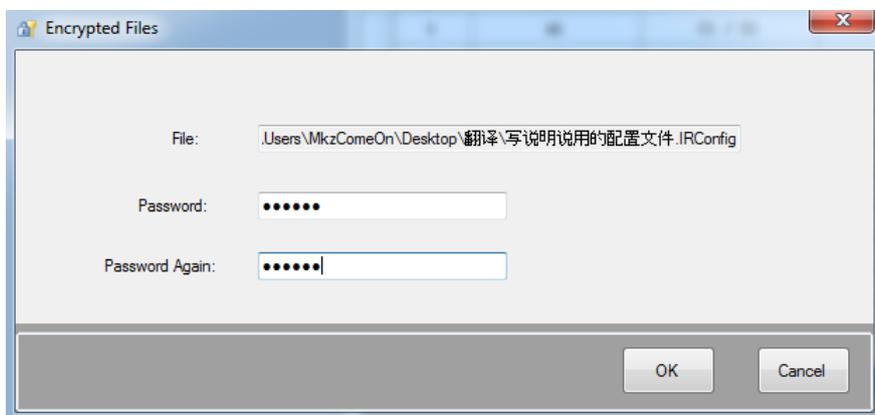
Right-Click the IR Learning Code Manager, in the shortcut menu, select [Import] to import all encoding data of the file ".IRCode" or ".IRConfig". In the Dialog, click button [...] to select the file, then click [OK].



4.3 Security settings

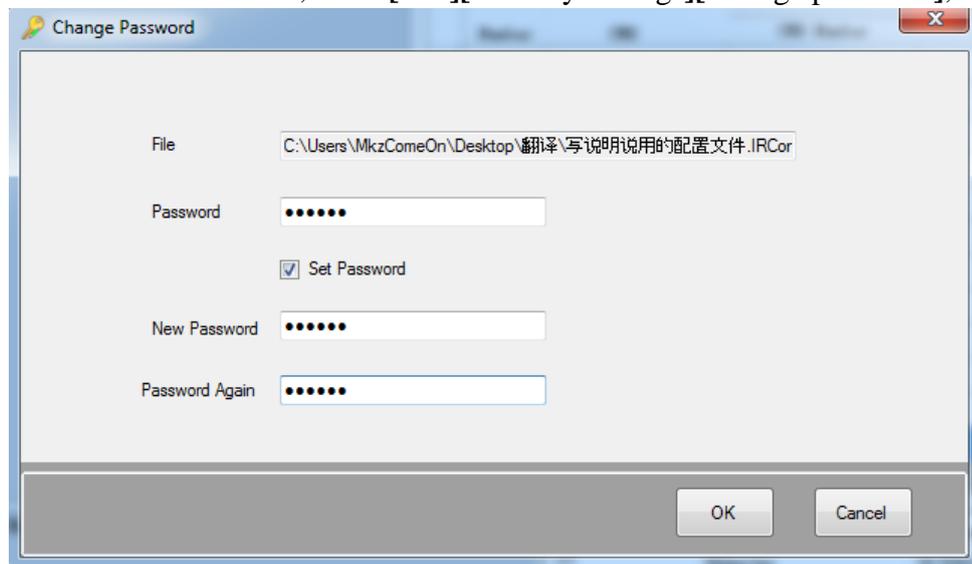
4.3.1 Encryption

In the main menu, select [File][Security settings][Encryption], show as follow Dialog.



4.3.2 Change Password

In the main menu,select [File][Security settings][Change password],show as follow Dialog.



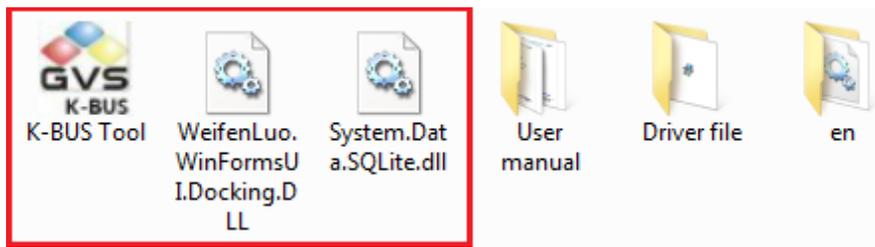
4.4 The language switching

In the software operation, Select [语言(Language)][Simplified Chinese]or[English], then Restart the software. Note:Only to restart software, language changing take effect.

4.5 Precautions

- ①The stored path of configuration file should not be too long, the total path characters cannot exceed 255 characters;
- ②The configuration file name cannot exceed 255 characters;
- ③Object (such as device, appliances, device command) name cannot exceed 255 characters;
- ④If the device command sending times more than 2 times or also as other attached commands ,Suggest to add some delay, otherwise the controlled electric appliance will respond not to come over;
- ⑤The file cannot be deleted when opened, otherwise the software will pop-up anomaly with cannot find the file;
- ⑥".IRCode" and ".IRConfig" files can only be opened with the software,otherwise it will damage the file;
- ⑦File encryption to protect the file only in a certain extent, so the important data must to be make a backup;
- ⑧This software does not provide the password retake service , so be sure to remember file password;

⑨The red box files are software system files,missing software will not run.



Note: The red box files are software system files.The file "en" is English language pack, missing English interface cannot be used.

Appendix 1 Device Command execution process

The orders of the principal and subordinate command are determined by the delay of command preferentially when executing command. If there is no difference in delay, then the principal command is before the subordinate command while the subordinate command determined by the position sequence of "Attached CMD". And the command does't support the recursive call—that is the subordinate command of command can not be executed. Here are some examples below that will introduce the process in detail.

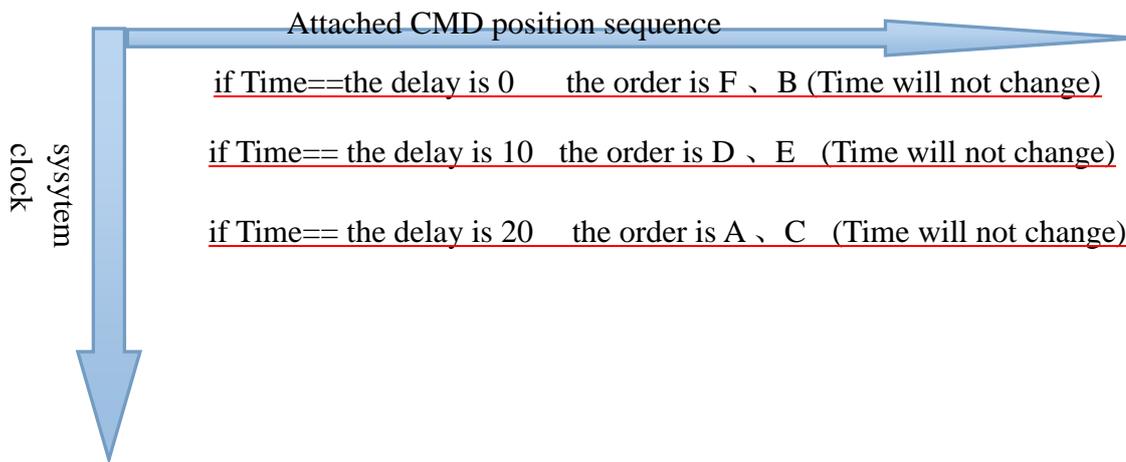
(1) Part in common for principal and subordinate command

Number	CMD	Main Command Parameters			Attached CMD	Send Times	Delay(100ms)	Current Detect
		CMD Number	Appliances	Function				
1	D	C1 / S5	Midea fan	KG	C1 / S10 , C1 / S8 , C1 / S6 , C1 / S9 , C1 / S7	1	10	No Detect
2	A	C1 / S6	Midea fan	DS		1	20	No Detect
3	B	C1 / S7	Midea fan	FS		4	0	No Detect
4	C	C1 / S8	Midea fan	YT		1	20	No Detect
5	E	C1 / S9	Midea fan	FL		4	10	No Detect
6	F	C1 / S10	Midea fan	CQ		2	0	No Detect

In the chart, C1/S5 corresponding to D, C1/S6 corresponding to A, C1/S7 corresponding to B, C1/S8 corresponding to C, C1/S9 corresponding to E, C1/S10 corresponding to F.

When the emitter calls command D, we can get the sequence from the delay time preferentially: (B、F) < (D、E) < (A、C); the orders of those have the same delay time are based on the the position sequence of "Attached CMD". Then we can get the final sequence: F(2)-B(4)-D(1)-E(4)-A(1)-C(1) and the execution time $N=2+4+1+4+1+1=13$.

The system schematic diagram as follow (will not mention below): when the command begins, the time -counter variate Time start to change (added by 1 in every 100ms) as well as the total execution time N (decreased by 1).



(2) Totally Different delay time for principal and subordinate command

① When the emitter calls command D, the ascending order according to the delay time is $A < B < D < C$. Then we can send the commands in sequence: A(1)-B(1)-D(1)-C(1), in which the

numbers in the brackets represent the execution time.

Number	CMD	Main Command Parameters			Attached CMD	Send Times	Delay(100ms)	Current Detect
		CMD Number	Appliances	Function				
1	D	C1 / S5	Midea fan	KG	C1 / S6 , C1 / S7 , C1 / S8	1	20	No Detect
2	A	C1 / S6	Midea fan	DS		1	0	No Detect
3	B	C1 / S7	Midea fan	FS		1	10	No Detect
4	C	C1 / S8	Midea fan	YT		1	30	No Detect
▶ 5	E	C1 / S9	Midea fan	FL		1	0	No Detect

②When the emitter calls command D,the ascending order according to the delay time is A<B<D<C. Then we can send the commands in sequence : A(1)-B(5)-D(3)-C(1),in which the numbers in the brackets represent the execution

Number	CMD	Main Command Parameters			Attached CMD	Send Times	Delay(100ms)	Current Detect
		CMD Number	Appliances	Function				
1	D	C1 / S5	Midea fan	KG	C1 / S6 , C1 / S7 , C1 / S8	3	20	No Detect
2	A	C1 / S6	Midea fan	DS		1	0	No Detect
3	B	C1 / S7	Midea fan	FS		5	10	No Detect
4	C	C1 / S8	Midea fan	YT		1	30	No Detect
▶ 5	E	C1 / S9	Midea fan	FL		1	0	No Detect

time.

(3)No difference in delay time for principal and subordinate command

①When the emitter calls command D, the commands can not be ranked according to the delay time. Then the principal command D will be executed preferentially. Besides, the sequence of the subordinate commands are determined by the position sequence of "Attached CMD"—that is A、B、C、E、F. Finally, we can send the the commands in sequence: D(1)-A(1)-B(1)-C(1)-E(1)-F(1), in which the numbers in the brackets represent the execution time.

Number	CMD	Main Command Parameters			Attached CMD	Send Times	Delay(100ms)	Current Detect
		CMD Number	Appliances	Function				
1	D	C1 / S5	Midea fan	KG	C1 / S6 , C1 / S7 , C1 / S8 , C1 / S9 , C1 / S10	1	0	No Detect
2	A	C1 / S6	Midea fan	DS		1	0	No Detect
3	B	C1 / S7	Midea fan	FS		1	0	No Detect
4	C	C1 / S8	Midea fan	YT		1	0	No Detect
5	E	C1 / S9	Midea fan	FL		1	0	No Detect
▶ 6	F	C1 / S10	Midea fan	CQ		1	0	No Detect

②When the emitter calls command D, the commands can not be ranked according to the delay time. Then the principal command D will be executed preferentially. Besides, the sequence of the subordinate commands are determined by the position sequence of "Attached CMD"—that is F、C、A、E、B. Finally, we can send the commands in sequence: D(1)-F(2)-C(1)-A(1)-E(4)-B(4),in which the numbers in the brackets represent the execution time.

Number	CMD	Main Command Parameters			Attached CMD	Send Times	Delay(100ms)	Current Detect
		CMD Number	Appliances	Function				
1	D	C1 / S5	Midea fan	KG	C1 / S10 , C1 / S8 , C1 / S6 , C1 / S9 , C1 / S7	1	0	No Detect
2	A	C1 / S6	Midea fan	DS		1	0	No Detect
3	B	C1 / S7	Midea fan	FS		4	0	No Detect
4	C	C1 / S8	Midea fan	YT		1	0	No Detect
5	E	C1 / S9	Midea fan	FL		4	0	No Detect
▶ 6	F	C1 / S10	Midea fan	CQ		2	0	No Detect

Appendix 2

The response process of IR Transmitter receiving the group telegram

The IR transmitter according to the data type and the group telegram value call related commands after receiving a correct group telegram(see 4.2.2 section),Here are some examples below that will introduce the process in detail. (Note: In order to understand of the appendix two, please read the appendix first).

Example 1

Channel A

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Describe	
1	GFSDGFDS	1/0/112	1Byte	Any Command	Any Command		Saved
2	GG	1/0/100	1Bit	D	D		Saved
3	SSS	1/0/100	1Bit	A	B		Saved
4	DSD	1/0/100	1Bit	C	C		Saved
5	SS	1/0/100	1Bit	F	C		Saved

Channel B

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Description	
1	dddd	1/0/11	1Bit	B	E		Saved
2	afdfs	1/0/12	1Bit	C	A		Saved

Channel C

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Description	
1	fasf	1/0/13	1Bit	C	E		Saved

Channel D

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Description	
1	fasdf	1/0/14	1Bit	E	E		Saved

Device Command Library

Number	CMD	Main Command Parameters			Attached CMD	Send Times	Delay(100ms)	Current Detect
		CMD Number	Appliances	Function				
1	D	C1 / S5	Midea fan	KG	C1 / S10 , C1 / S8 , C1 / S6 , C1 / S9 , C1 / S7	1	10	No Detect
2	A	C1 / S6	Midea fan	DS		1	20	No Detect
3	B	C1 / S7	Midea fan	FS		4	0	No Detect
4	C	C1 / S8	Midea fan	YT		1	20	No Detect
5	E	C1 / S9	Midea fan	FL		4	10	No Detect
6	F	C1 / S10	Midea fan	CQ		2	0	No Detect

The response process of IR Transmitter receiving the group telegram[1/0/100 1bit value=1]:

When receiving the group telegram, all the currnt commands of Channel A:

D(GG)\A(SSS)\C(DSD)\F(SS)(Parenthesis corresponding to the group configuration function),do the following:

First,According to the position sequence(Ascending):

Delay time 0: F(SS)

Delay time 10: D(GG)

Delay time 20: C(DSD)\A(SSS)

Second,According to the position in channel configuration sequence (From top to bottom):

①D(GG)

②A(SSS)

③C(DSD)

④F(SS)

Third,Based on the results of the last step,sort their Attached CMD according to the delay time:

①Attached CMD of D(GG):

(B[D(GG)]\F[D(GG)])<E[D(GG)]<(A[D(GG)]\C[D(GG)])

Delay time 0: B[D(GG)]\F[D(GG)]

Delay time 10: E[D(GG)]

Delay time 20: A[D(GG)]\C[D(GG)],**Square brackets is the main CMD.**

②A(SSS): have no Attached CMD;

③C(DSD): have no Attached CMD;

④F(SS): have no Attached CMD;

Fourth,Based on the results of the last step,According to the position in Attached CMD sequence (From left to right):

①Attached CMD of D(GG):

F[D(GG)]<B[D(GG)]<E[D(GG)]<C[D(GG)]<A[D(GG)]

Delay time 0: F[D(GG)]<B[D(GG)]

Delay time 10: E[D(GG)]

Delay time 20: C[D(GG)]<A[D(GG)]

②A(SSS): have no Attached CMD;

③C(DSD): have no Attached CMD;

④F(SS): have no Attached CMD;

Fifth,Insert the results of the last step into the results of the first step(From left to right and From top to bottom),Finally, we can get the results as follows:

When the IR Transmitter receiving the group telegram[1/0/100 1bit value=1],the channelA send the commands in sequence:

Alfter 0*100ms:

F(SS)\F[D(GG)]\B[D(GG)]

Alfter 10*100ms:

D(GG)\E[D(GG)]

Alfter 20*100ms:

C(DSD)\A(SSS)\C[D(GG)]\A[D(GG)]

For ease of observation(The sending times of each command see in the device library):

Alfter 0*100ms:

F\F\B

Alfter 10*100ms:

D\E

Alfter 20*100ms:

C\A\C\A

Example 2

Channel A

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Describe	
1	GFSDGFDS	1/0/112	lByte	Any Command	Any Command		Saved
2	GG	1/0/100	lBit	D	D		Saved
3	SSS	1/0/100	lBit	A	B		Saved
4	DSD	1/0/100	lBit	C	C		Saved
5	SS	1/0/100	lBit	F	C		Saved

Channel B

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Description	
1	ddddd	1/0/11	lBit	B	E		Saved
2	afdfs	1/0/12	lBit	C	A		Saved

Channel C

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Description	
1	fasf	1/0/13	lBit	C	E		Saved

Channel D

Number	Function	GroupAddress	Data Type	Value=1	Value=0	Description	
1	fasdf	1/0/14	lBit	E	E		Saved

Device Command Library

Number	CMD	Main Command Parameters			Attached CMD	Send Times	Delay(100ms)	Current Detect
		CMD Number	Appliances	Function				
1	D	C1 / S5	Midea fan	KG	C1 / S10 , C1 / S8 , C1 / S6 , C1 / S9 , C1 / S7	1	10	No Detect
2	A	C1 / S6	Midea fan	DS	C1 / S9 , C1 / S8 , C1 / S5 , C1 / S10	1	20	No Detect
3	B	C1 / S7	Midea fan	FS	C1 / S5 , C1 / S9 , C1 / S6	4	0	No Detect
4	C	C1 / S8	Midea fan	YT	C1 / S7 , C1 / S10 , C1 / S5 , C1 / S9 , C1 / S6	1	20	No Detect
5	E	C1 / S9	Midea fan	FL	C1 / S5 , C1 / S7	4	10	No Detect
6	F	C1 / S10	Midea fan	CQ		2	0	No Detect

The response process of IR Transmitter receiving the group telegram[1/0/100 1bit value=1]:

When receiving the group telegram, all the currnt commands of Channel A:

D(GG)\A(SSS)\C(DSD)\F(SS)(Parenthesis corresponding to the group configuration function),do the following:

First,According to the position sequence(Ascending):

Delay time 0: F(SS)

Delay time 10: D(GG)

Delay time 20: C(DSD)\A(SSS)

Second,According to the position in channel configuration sequence (From top to bottom):

①D(GG)

②A(SSS)

③C(DSD)

④F(SS)

Third,Based on the results of the last step,sort their Attached CMD according to the delay time:

①Attached CMD of D(GG):

(B[D(GG)]F[D(GG)])<E[D(GG)]<(A[D(GG)]\C[D(GG)])

Delay time 0: B[D(GG)]\F[D(GG)]

Delay time 10: E[D(GG)]

Delay time 20: A[D(GG)]\C[D(GG)],Square brackets is the main CMD.

②Attached CMD of A(SSS):

F[A(SSS)]<(D[A(SSS)]\E[A(SSS)])<C[A(SSS)]

Delay time 0: F[A(SSS)]

Delay time 10: D[A(SSS)]\E[A(SSS)]

Delay time 20: C[A(SSS)]

③Attached CMD of C(DSD):

(B[C(DSD)], F[C(DSD)])<(D[C(DSD)]\E[C(DSD)])<A[C(DSD)]

Delay time 0: B[C(DSD)]\F[C(DSD)]

Delay time 10: D[C(DSD)]\E[C(DSD)]

Delay time 20: A[C(DSD)]

④F(SS):have no Attached CMD;

Fourth,Based on the results of the last step,According to the position in Attached CMD sequence (From left to right):

①Attached CMD of D(GG):

F[D(GG)]<B[D(GG)]<E[D(GG)]<C[D(GG)]<A[D(GG)]

Delay time 0: F[D(GG)]<B[D(GG)]

Delay time 10: E[D(GG)]

Delay time 20: C[D(GG)]<A[D(GG)]

②Attached CMD of A(SSS):

F[A(SSS)]<E[A(SSS)]<D[A(SSS)]<C[A(SSS)]

Delay time 0: F[A(SSS)]

Delay time 10: E[A(SSS)]<D[A(SSS)]

Delay time 20: C[A(SSS)]

③Attached CMD of C(DSD):

B[C(DSD)]<F[C(DSD)]<D[C(DSD)]<E[C(DSD)]<A[C(DSD)]

Delay time 0: B[C(DSD)]<F[C(DSD)]

Delay time 10: D[C(DSD)]<E[C(DSD)]

Delay time 20: A[C(DSD)]

④F(SS):have no Attached CMD;

Fifth,Insert the results of the last step into the results of the first step(From left to right and From top to bottom),Finally, we can get the results as follows:

When the IR Transmitter receiving the group telegram[1/0/100 1bit value=1],the channelA send the commands in sequence:

alfter 0*100ms:

F(SS)\F[D(GG)]\B[D(GG)]\F[A(SSS)]\B[C(DSD)]\F[C(DSD)]

alfter 10*100ms:

D(GG)\E[D(GG)]\E[A(SSS)]\D[A(SSS)]\D[C(DSD)]\E[C(DSD)]

alfter 20*100ms:

C(DSD)\A(SSS)\C[D(GG)]\A[D(GG)]\C[A(SSS)]\A[C(DSD)]

For ease of observation(The sending times of each command see in the device library):

after 0*100ms:

F、F、B、F、B、F

after 0*100ms:

D、E、E、D、D、E

after 0*100ms:

C、A、C、A、C、A