KH-54,KH-55,KH-88,KH-G56,KH-G3128B I/O control card with API (SDK)

User Manual (Programming instructions are provided in a separate document)

Version 3.102

20200429 - Updated selection instructions
20200506 - Added video tutorial link
20201016 - Added 8-in 8-out input compatibility wiring diagram
20201207 - Added 5-in 6-out input compatibility wiring diagram
20210120 - Added 5-in 4-out input compatibility wiring diagram
20210120 - Added 5-in 5-out input compatibility wiring diagram
20210120 - Added 31-in 28-out input compatibility wiring diagram

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contents

Introduction

With the advent of the Industrial 4.0 era, IO control cards are increasingly needed in various settings. In many cases, we need a suitable number of IO ports, while most popular IO expansion cards on the market have dozens of ports and are quite expensive. In this environment,

FAIO/FAMIO has emerged! FAIO/FAMIO features fast speed, high efficiency, safety, stability, and ease of learning. It does not require a PCI slot or built-in boards; it only needs a COM port, which is available on almost all industrial computers, to use FAIO/FAMIO. Therefore, FAIO/FAMIO is the best choice for projects with few ports!

Information Updates

Updates to document contents will not be separately notified;
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Link: https://pan.baidu.com/s/1J_yS1txisuBgo6-pMy745w
Extraction Code: q0gc

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Extraction Code: oxd7

The cloud storage content is updated at any time; please frequently check for the latest materials.

Video materials can also be watched online at the following URLs:
54 Card ---- https://v.qq.com/x/page/o0961ri16zm.html
G56 Card ---- https://v.qq.com/x/page/x0961mgqal9.html
88 Card ---- https://v.qq.com/x/page/y0961ceygor.html
G3128 Card ---- https://v.qq.com/x/page/d0961wgu0jy.html
Light Controller ---- https://v.qq.com/x/page/k09618x42a4.html

The materials are divided into two parts:
--- A/B Series Software Package
--- A/B Series Hardware Package

Special Declaration:

Part1- Hardware Part

Rules for defining product models:

Model	Output	CIM	APP/SDK Package	Supported Systems	Notes
KH-54A	Optocoupler + Relay	RS232	FAIO	Windows	
KH-54B	Optocoupler + Relay	RS232	FAMIO	Windows, WinCE, Linux	
KH-G56A	Optocoupler + Triode Amplification	RS232	FAIO	Windows	
KH-G56B	Optocoupler + Triode Amplification	RS232	FAMIO	Windows, WinCE, Linux	
KH-55A	Optocoupler + Relay	RS232	FAIO	Windows	This is built into the computer, making it difficult to install and connect.
KH-55B	Optocoupler + Relay	RS232	FAMIO	Windows, WinCE, Linux	
KH-88A	Optocoupler + Relay	RS232	FAIO	Windows	
KH-88B	Optocoupler + Relay	RS232	FAMIO	Windows, WinCE, Linux	
KH-G3128B	Optocoupler + Triode Amplification	RS232 RS485	FAMIO	Windows, WinCE, Linux	Without the A series
***Public Protocol Model: (PLC Character Control)**		**KH-54K， KH-G56K， KH-88K， KH-G3128K**			

1, Installation

Our company's IO card is a compact and flexible serial I/O control card, with the main feature being that it is external and does not require a PCI slot. The specific appearance is shown in the diagram below:

Figure1.1.1 Appearance of FAIO Control Cards (KH-54 and KH-88)

Figure1.1.1a FAIO/FAMIO Control Card KH-54 Upgrade Version:
Input High and Low Level Compatible Appearance Diagram

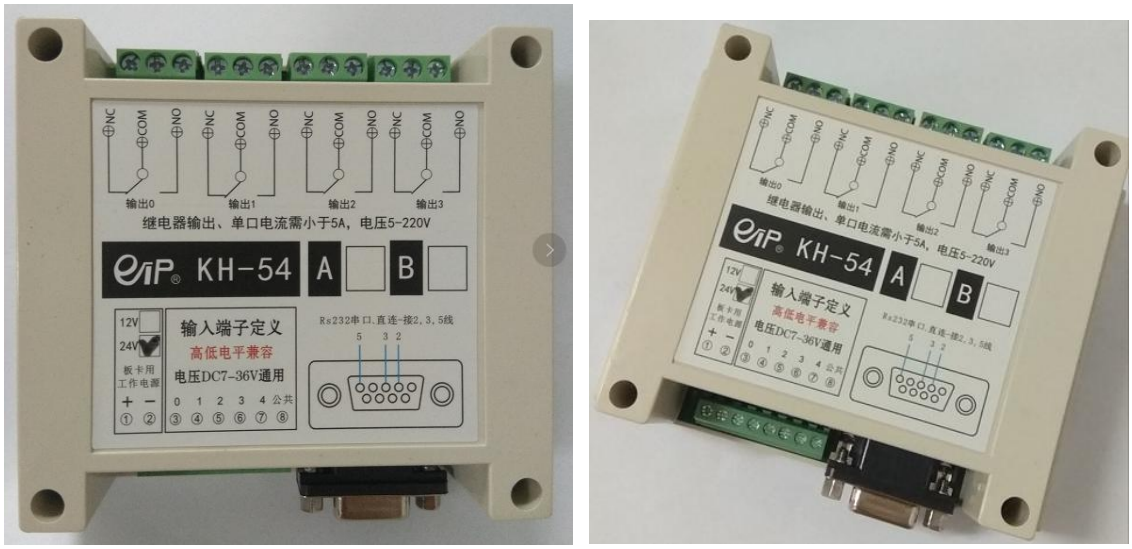


Figure 1.1.2 Appearance of FAIO Control Card (KH-55 and KH-G56)

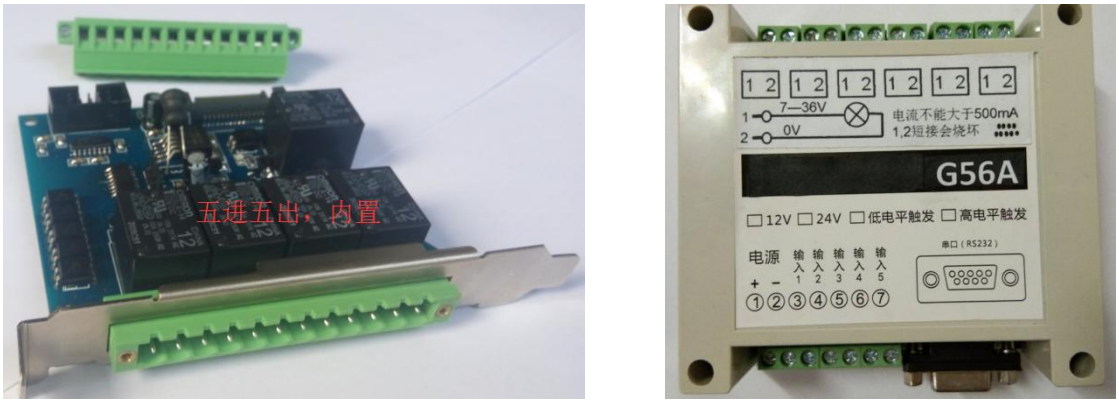


Figure 1.1.3 Appearance of FAMIO Control Card (KH-G3128B)

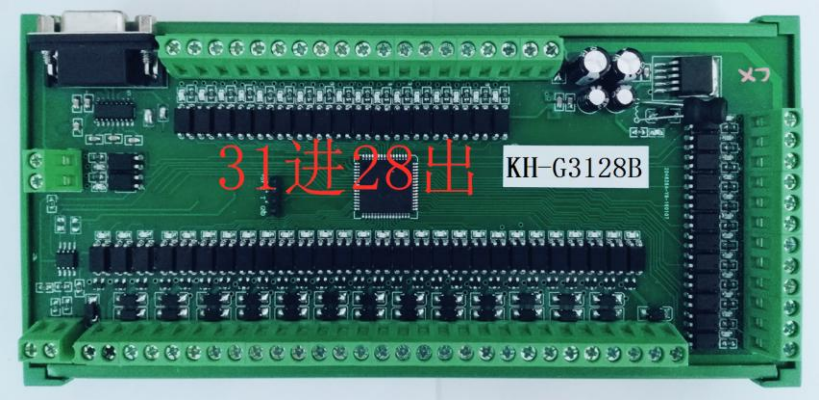
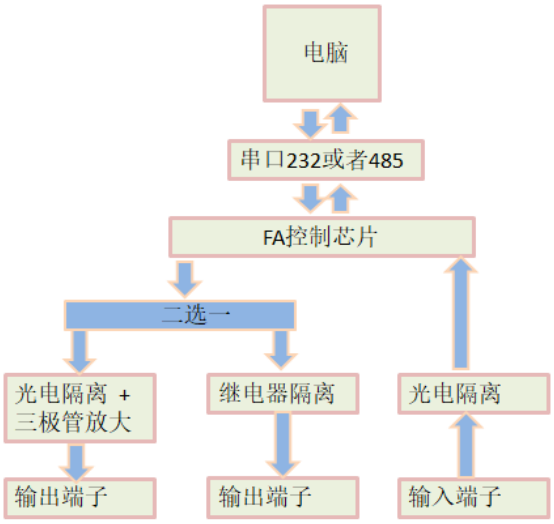


Figure 1.1.3a FAMIO Control Card KH-G3128B Upgrade Version: Compatible with both High and Low Level Inputs Appearance Diagram

The hardware system block diagram of the IO control card is as follows: (Only the KH-G3128B model is equipped with both 485 and 232 serial ports)

Figure 1.1.4 Hardware System Block Diagram



2, Hardware Information

Operating Voltage: DC 12V or 24V optional;

Product Dimensions:

KH-54A/B：115mm X 90mm X 40mm。

KH-88A/B：143mm X 98mm X 42mm。

KH-55A/B：82mm X 92mm X 20mm。

KH-G56A/B：115mm X 90mm X 40mm。

KH-G3128B：220mm X 98mm X 40mm。

Operating Temperature: -20℃ to 70℃。

Trigger Signal: Activated by a switch; a single touch between the input terminal and the ground of the circuit board counts as one trigger.

Note: The duration of the signal must exceed 15ms.

High and Low Level:

The valid levels of the circuit board signal: high and low levels.

Simply change the external trigger signal terminal to switch between high and low levels.As shown in Figure 1.2.1, the valid levels of the 5-in-4-out circuit board signal depend on the checked items in the circuit board label **(all models of IO card hardware have been upgraded to "compatible with high and low input levels"; for upgraded documentation, please contact us or download from the cloud drive):**

Figure 1.2.1 Circuit Board Label

How to select low and high levels?

If the sensor is of NPN type, a signal level of 0V is considered low level input.

If it is of PNP type, a signal level of 24V or 12V is considered high level input.

Load Capacity: For relay output, both normally open and normally closed contacts can handle 5V to 220V voltage, providing a wide application range. For outputs using optocouplers in conjunction with transistors, the load current for a single port must not exceed 500mA. However, if multiple ports are outputting simultaneously, the total current must not exceed 3.5A. Different models may have variations; please refer to the wiring diagram.

Interface Definition: See Figures 1.2.1, 1.2.2, 1.2.3, 1.2.4, and 1.2.5.

Figure 1.2.1a KH-54A/B Upgrade Version Input High-Low Level Compatible Interface Definition Diagram

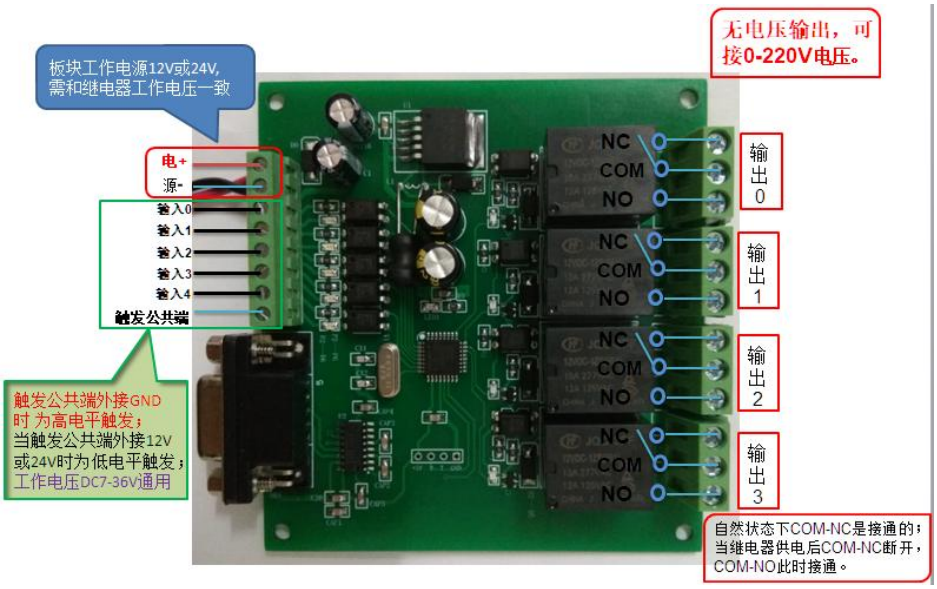


Figure 1.2.2 Diagram of KH-88A/B/K Interface Definition

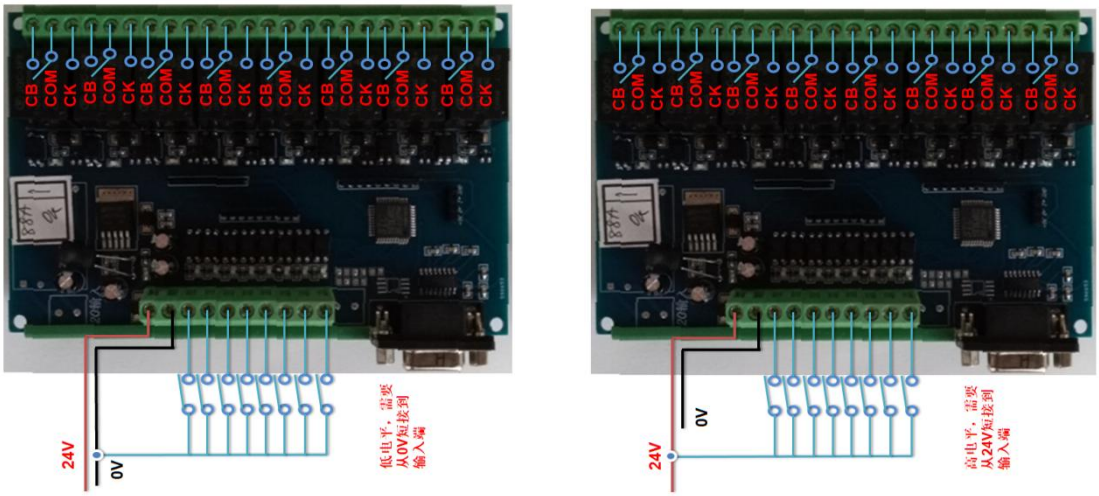
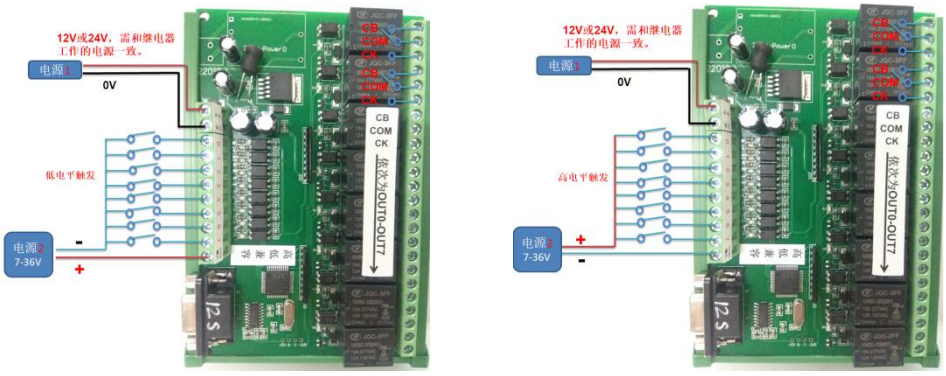


Figure 1.2.2a: The KH-88A/B/K has been upgraded to be compatible with both high and low input levels. The interface is defined as follows:



The board compatible with both high and low voltage levels has circuits that are independent from the input. It can use the same power supply or separate power supplies.

Figure 1.2.3 Diagram of the interfaces and components built into the KH-55A/B (illustration of high and low level input wiring)

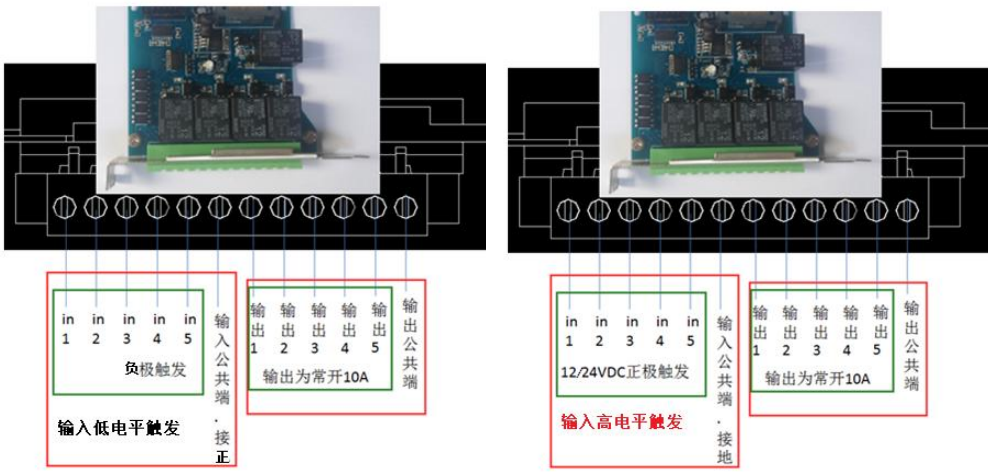


Figure 1.2.3.a KH-55A/B Serial Port Connector Definition

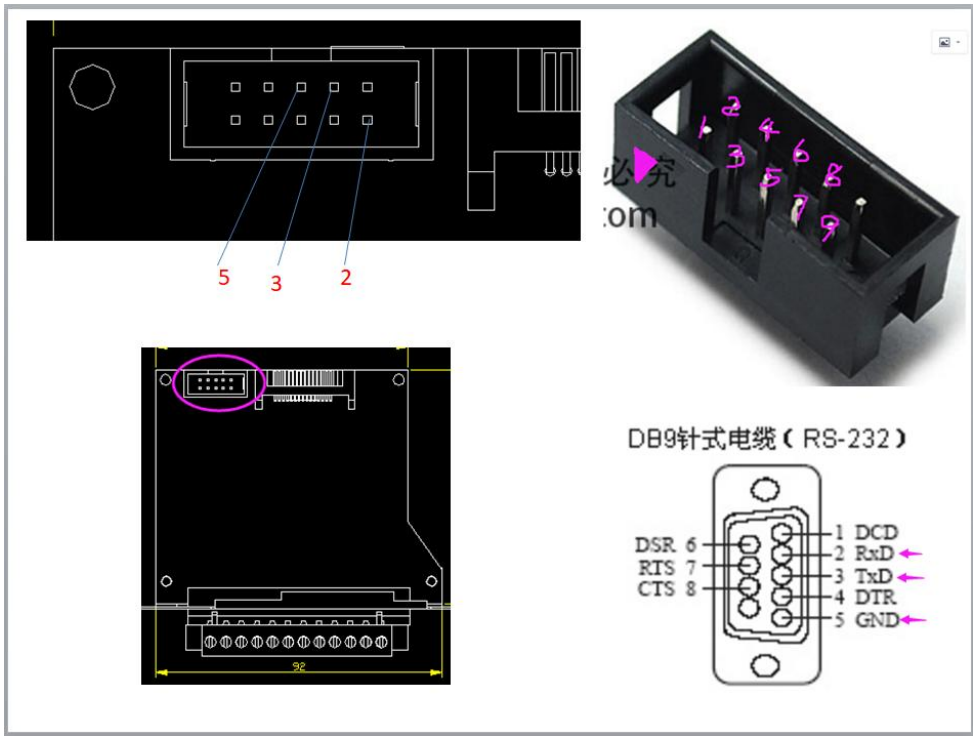


Figure 1.2.4 Diagram of KH-G56A/B Interface

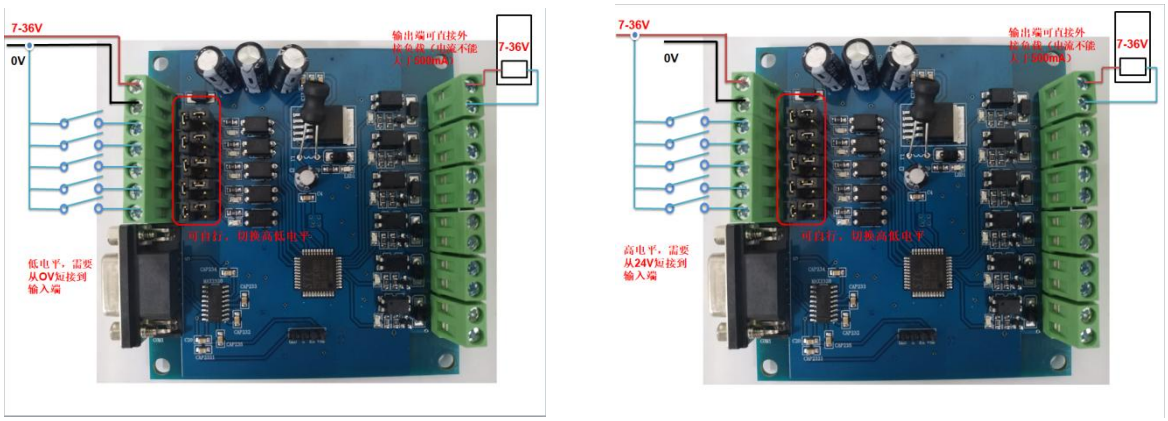


Figure 1.2.4a Diagram of the KH-G56A/B with Added Input High-Low Level Compatible Interface

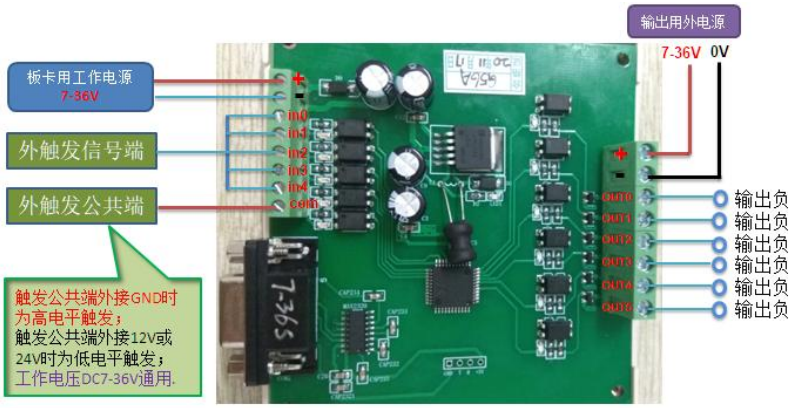


Figure 1.2.5 Diagram of KH-G3128B Interface

Please note that for the KH-G3128B model, the maximum current for a single output port is 1.5A, and the total current for all ports combined should not exceed 6A.

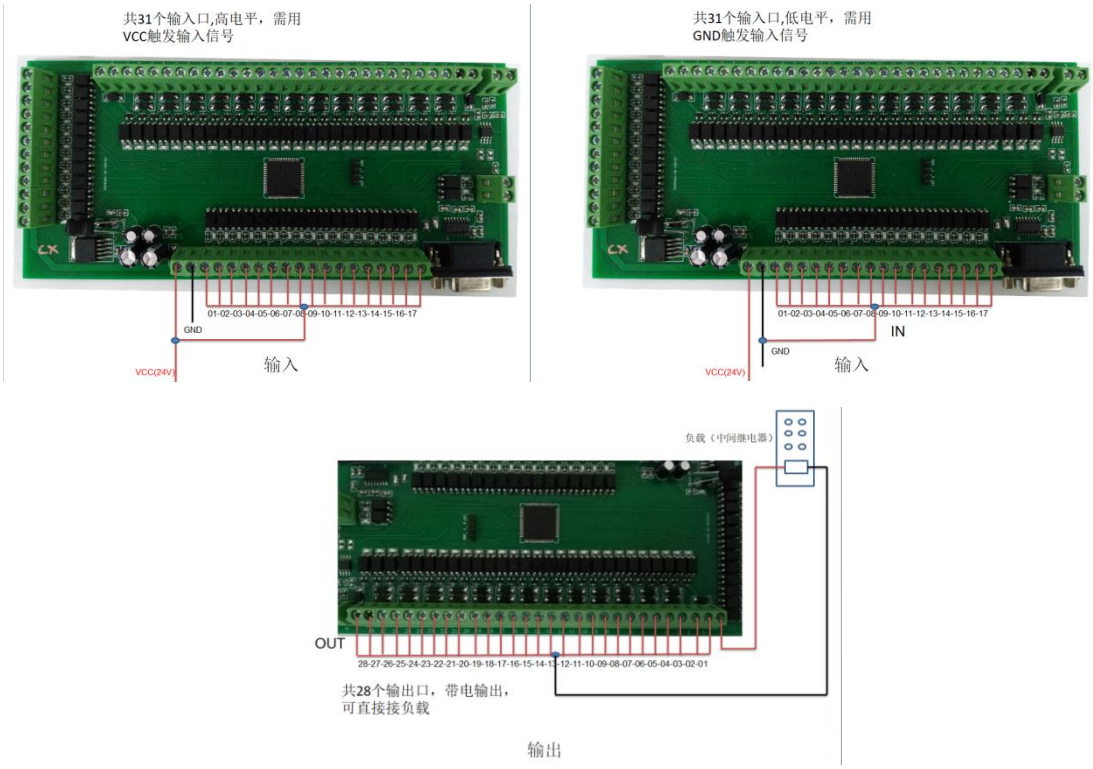
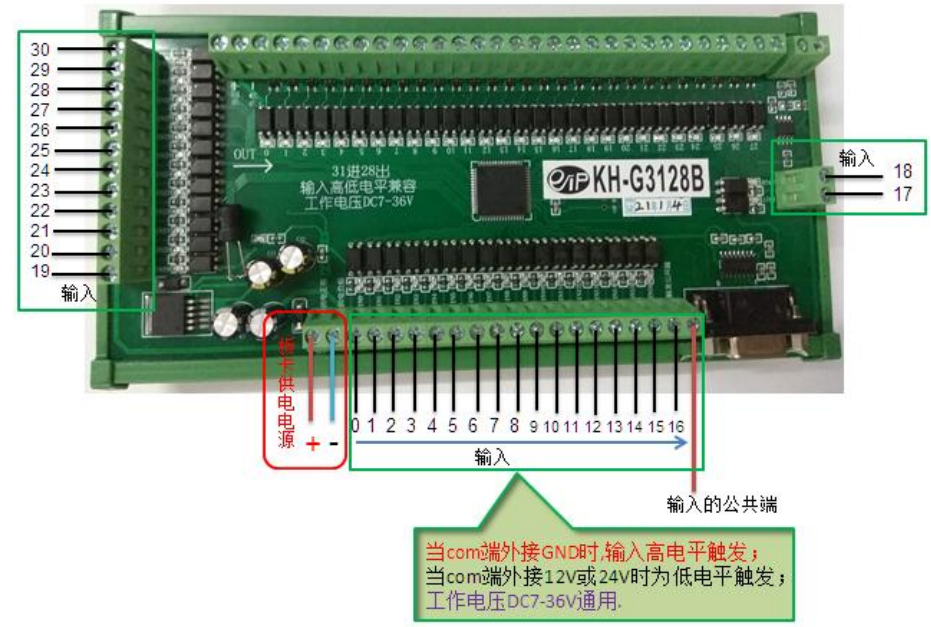
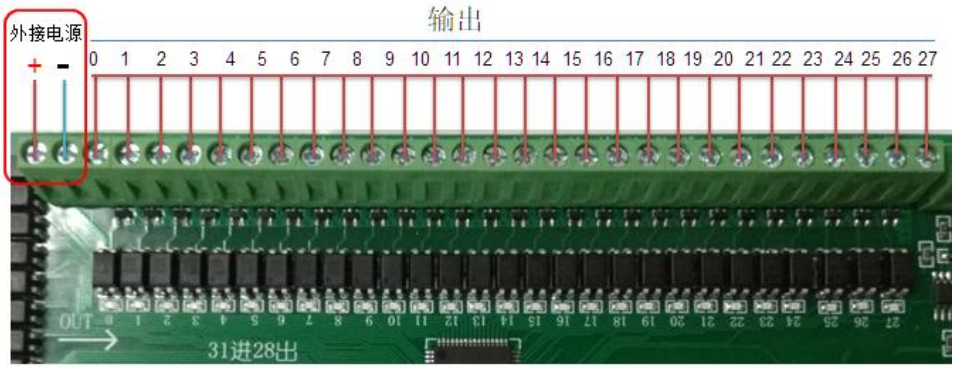


Figure 1.2.5a Diagram of KH-G3128B Input High-Low Level Compatible Interface





3, Port Expansion

The IO card is connected to independent serial ports, therefore, the FAIO/FAMIO cards can be connected in parallel through multiple serial ports, as shown in Figure 1.3.1.

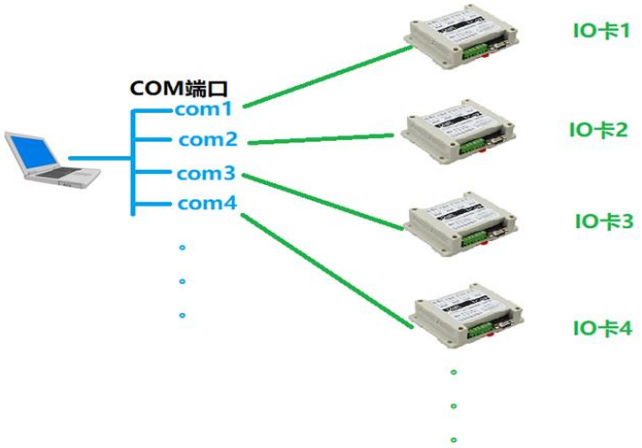


Figure 1.3.1 Schematic of FAMIO Card Paralleling

Note: The maximum COM port number supported by FAIO is 15. FAMIO supports any port number. The method to check the COM port number is shown in Figure 1.3.2.

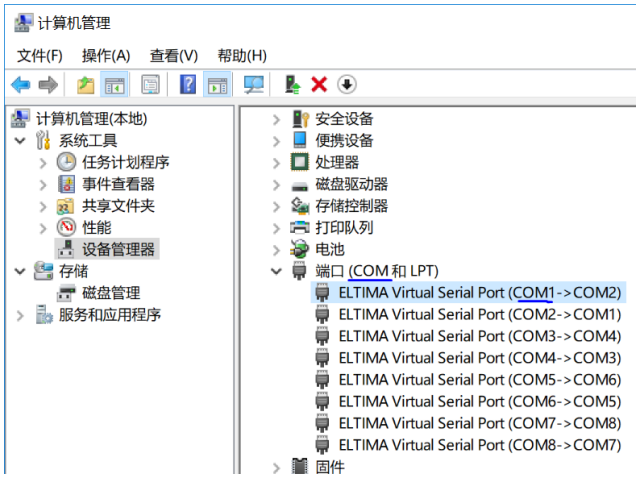


Figure 1.3.2 Current Computer's COM Port Number

4, Product List

1， All FAIO/FAMIO apps, demos, and virtual cards for testing. (Download from the cloud.)
2， Corresponding cables (configured with serial cables; direct connection to 2, 3, 5).

Part2-Software Section

The following is an example using the FAIO software package (the FAMIO software package has slight differences and will not be described again). FAIO provides 20 basic functions and 4 extended functions for users, aimed at utilizing FAMIO most efficiently to assist users in secondary development. For details, please refer to the FAIO SDK.chm in the installation directory. (For FAMIO, refer to FAMIO SDK.chm). FAIO also offers programming examples in various languages such as VB, VB.net, C/C++, C#, LabView, Python, and QT, as detailed in the demo. FAIO supports both 32-bit and 64-bit programming development; please be aware of the version issues during development. Function header files, module files, or definition files can be found in the FAIOlib directory under the installation path. As shown in Figures 2.0.1 and 2.0.2:

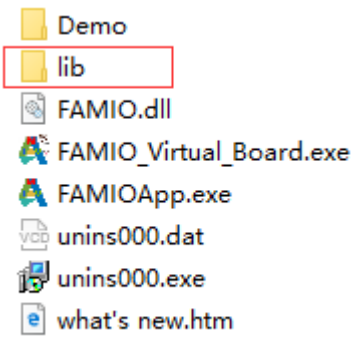


Figure 2.0.1 Location of FAIOlib in the installation directory

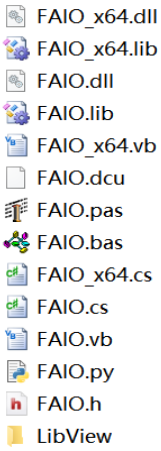


Figure 2.0.2 Files in FAIOlib

1,Development Environment

The API library of FAIO/FAMIO adopts the standard C interface __stdcall calling convention:

(a) Supported Languages: All programming languages that support C interface DLLs.

(b) Operating Environment: All Windows operating systems from Windows XP and later. (FAMIO also supports WinCE and Linux operating systems.)

(c) Thread Safety: All API functions other than iob_boar_init and iob_board_close are thread-safe, meeting the requirements for multithreaded development.

2,Library Function List

FAMIO provides a large number of practical library functions for development; the information about the library functions is listed in Table 2.2.1:

Table 2.2.1 Library Function List

For details, refer to the programming guide document.

FAIO：(Refer to FAIO SDK.chm)

FAMIO：(Refer to FAMIO SDK.chm)

FAIO/FAMIO control cards support two methods for real-time acquisition of port information: threads and callback functions. (The FAMIO software package is simpler, with no steps for creating or setting events; see the demo for specifics.)

1. The flowchart for the thread method is shown below:

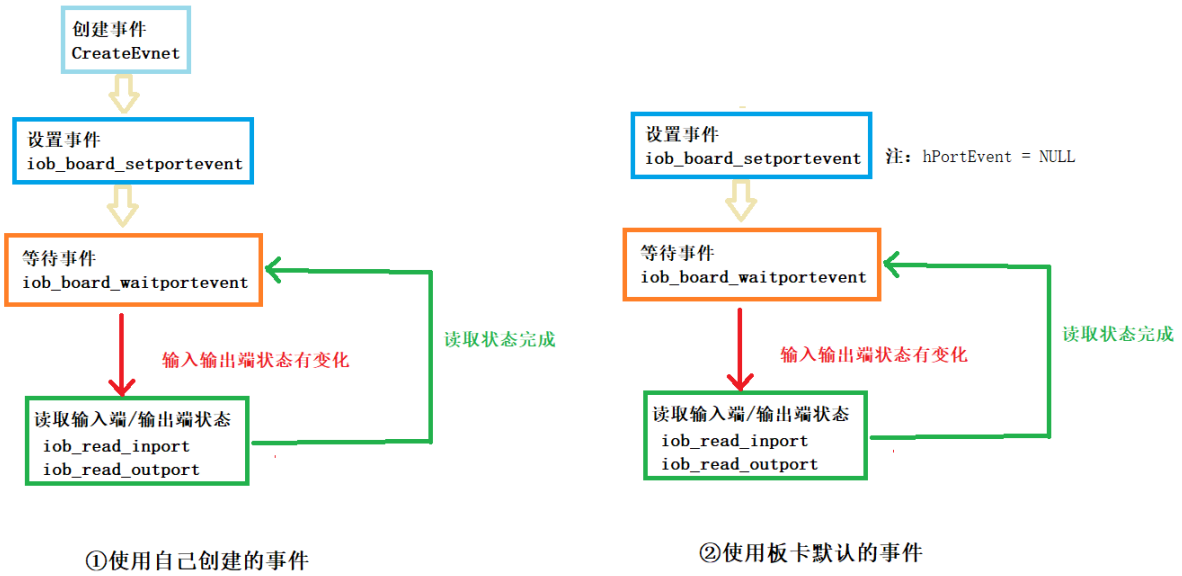


Figure 2.2.1 Flowchart for the thread method

2. Callback Method:

① Set the callback function (iob_board_setcallback2).

② Write the processing code in the callback function. For details on the two methods, refer to the demo files in the installation directory.

Note: When multiple input/output ports have input signals simultaneously, the callback function and iob_board_waitportevent respond only once. Please compare the current input/output status with the last input/output status to determine which input/output ports have signals.

3,QT Environment Configuration

Taking a 32-bit Windows system as an example:

① Copy FAIO.h and FAIO.lib to the directory where the project file (as shown in Figure 2.3.1 for FAIODemo.pro) is located, and copy FAIO.dll to the directory where the executable program (as shown in Figure 2.3.1 for FAIODemo.exe) is located.

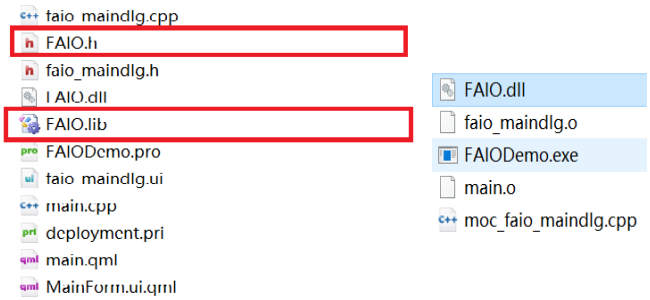


Figure 2.3.1 FAIO library files in various directories

② Include FAIO.h in the header file of the interface.

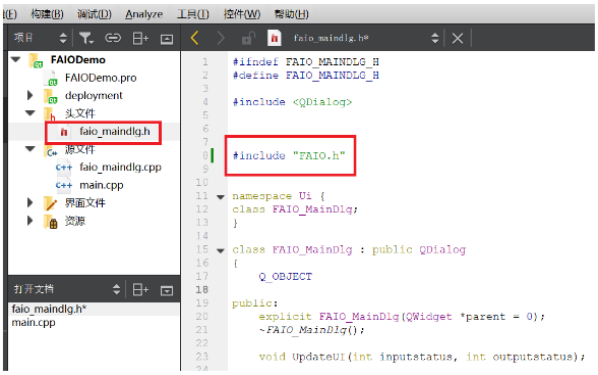


Figure 2.3.2 FAMIO.h included in the project

③ Add the path to FAIO.lib in the project file (.pro).

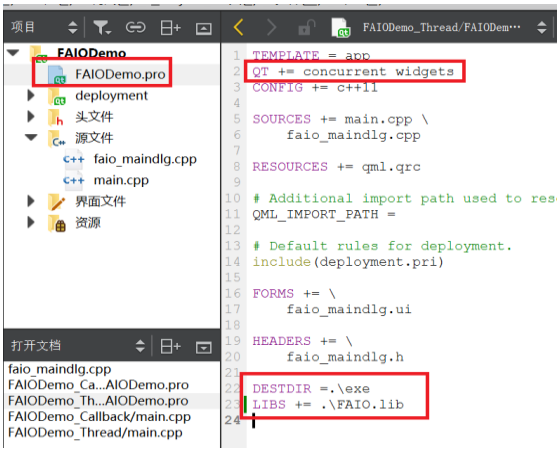


Figure 2.3.3 Adding the path to FAIO.lib

Note: The above configuration is based on qt-opensource-windows-x86-mingw492-5.6.2.

4,VS Environment Configuration

1. Installation. FAIO setup.exe
2. Configure the project environment, as shown in figures 2.4.1, 2.4.2, and 2.4.3:

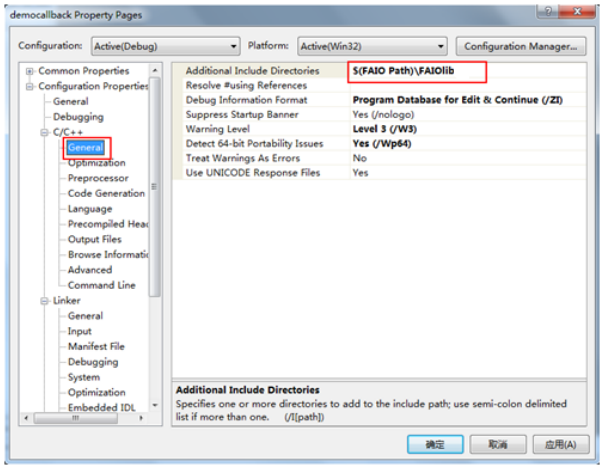


Figure 2.4.1 General configuration for C/C++

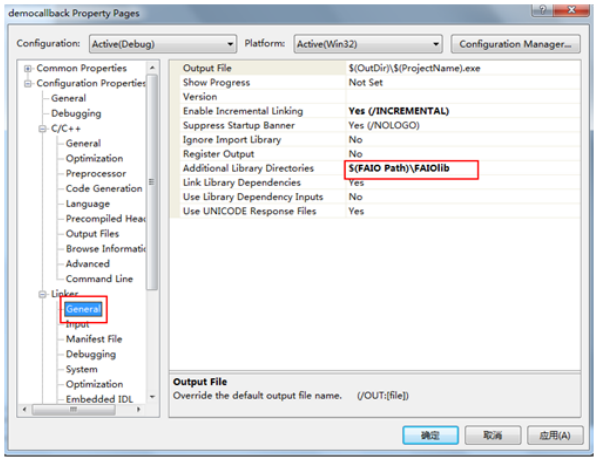


Figure 2.4.2 General configuration for Linker

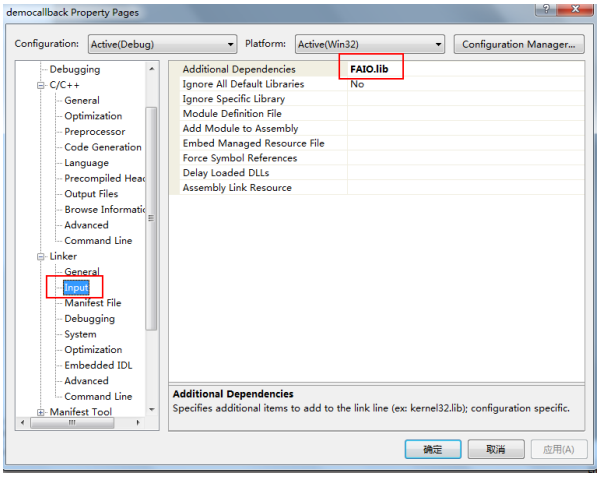


Figure 2.4.3 Input configuration for Linker

5, Software Installation

Download FAIO setup.exe from the Baidu Cloud link provided at the beginning of the manual and double-click to install.

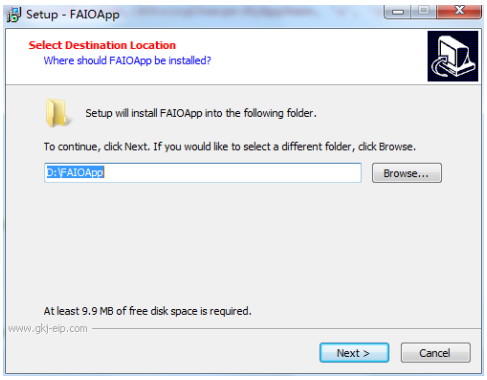


Figure 2.5.1 Installing FAIO

Once the installation is complete, you can find all resources for FAIO in the "All Programs" section of the "Start" menu on your computer.

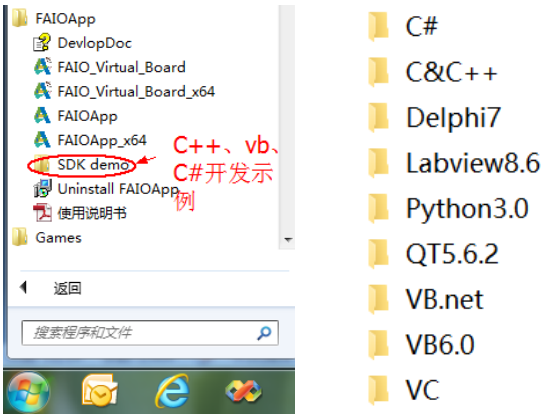
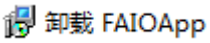


Figure 2.5.2 Resources after FAIO installation completion

6,Uninstall Software

Locate and double-click in the Start menu to uninstall FAIOApp. 

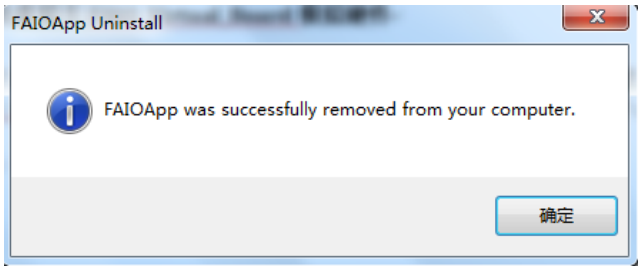


Figure 2.6.1 Uninstalling FAIO

7,Simulating Hardware with the Virtual Card FAIO_Virtual_Board

When you do not have the KH-54A/B, KH-88A/B, KH-55A/B, KH-G56A/B, KH-G3128B serial I/O control cards at hand, you can simulate these serial I/O control cards using a virtual card. The method can be divided into the following three steps:

(1)Use virtual serial port software to create a pair of virtual serial ports.

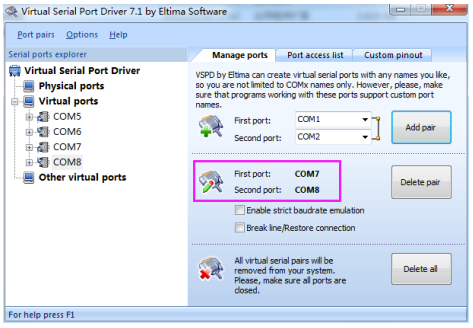


Figure 2.7.1 Virtual Serial Port

(2)Open the virtual card FAIO_Virtual_Board.exe , enter the serial port number (the first port of the virtual COM port pair created by the virtual serial port software, which is 7 in Figure 2.7.2), and click the "Open" button.

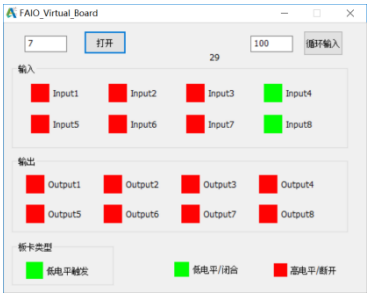


Figure 2.7.2 Virtual Card Opening Interface

(3) Open FAIOApp.exe and select the board number (the second port of the virtual COM port pair created by the virtual serial port software, which is 8 in Figure 2.7.3), then click the "Open" button.

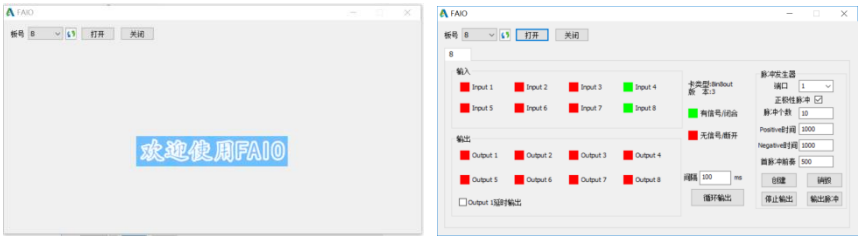


Figure 2.7.3 FAIO Start and Operation Interface

(4) FAIOApp.exe Added search board function: Press the "Search" button to display the serial port numbers connected to the board. **Select the board number (example board number is 1), and click the "Open" button, as shown below:**

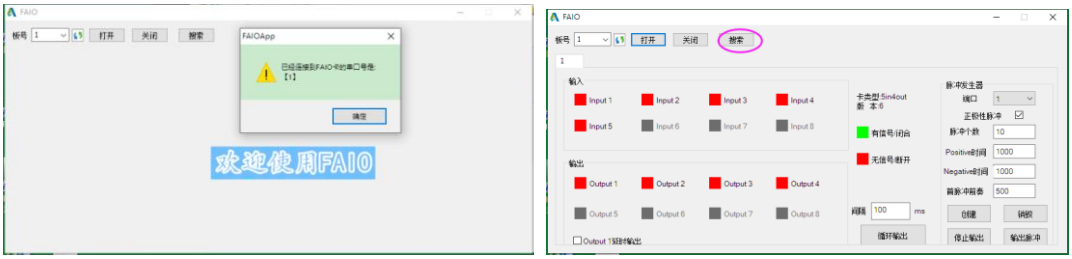


Figure 2.7.3a FAIO Start and Operation Interface

If you are programming with the SDK, this step can be ignored. Using the virtual card allows you to overcome the hardware limitations of FAIO and expedite the debugging and development of the I/O section.

Note: Do not check the box inside the red frame shown in Figure 2.7.4 in the serial port settings. Otherwise, virtual card status errors may occur.

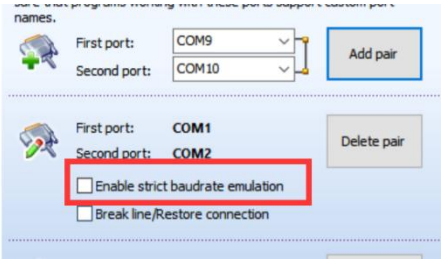


Figure 2.7.4 Virtual Serial Port Settings Notice

8, Frequently Asked Questions

Q1: There is no card number in the drop-down selection box under the board number after opening, as shown in the figure 

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A1: The board number shows the serial port number that the current system can access. If that serial port has already been opened or does not exist, it will not be displayed.

Q2: An error occurs when using the application. 

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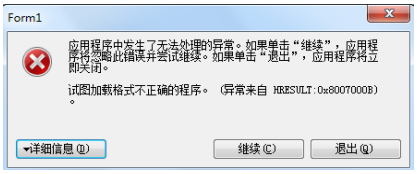
A2: Check if the serial port number for the board connection is correct. If using a virtual card, verify that the virtual card is enabled and that the corresponding serial port number is correct.

Q3: Using .net programming, the program runs, and the interface shown on the right appears:：



A3: The version of FAIO.dll being used is incorrect; FAIO.dll comes in two versions: 32-bit (x86) and 64-bit (x64). Please pay attention to the version during use.

Q4: An error message similar to the one shown on the right appears when running:

A4: It can only run on a 64-bit system. If your system is 32-bit, please use that version.

Q5: How do I write a program to send pulses?

A5: The new version (2017 version) of FAIO provides four additional functions for pulse generation. You can use these functions to send pulses. If you are using the new version (2017 version) of FAIO, you can download the latest version of the software from the website, where the demo includes detailed instructions.

Q6: Does it support VB or VB.net, and can it support QT and LabView?

A6: The FAIO API functions use the standard C calling convention (stdcall), theoretically supporting all programming languages that support standard DLLs. Therefore, VB, VB.net, QT, and LabView are all supported.

Q7: Despite configuring according to the manual's VS environment setup, I still cannot find files like FAIO.h.

A7: Please reinstall. The Release in the example does not configure the related environment; if configuration is needed, please follow the setup instructions in the manual.

Q8: Does the FAIO card only support Windows systems? Can it support other systems like Unix, Linux, or IOS?

A8: Currently, the FAIO card only supports Windows systems. For updates regarding support for more systems, please follow the official website or contact us. We will adjust the development schedule based on customer demand. FAMIO currently supports Windows, WinCE, and Linux systems.

If you encounter other issues during use, you can call the technical support hotline at the bottom of the page (for quick assistance) or send your questions or suggestions to 410795858@qq.com. We are dedicated to providing you with the highest quality technical services.