

# CANHub-AF2S2

## Optical CAN Hub

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Product User Manual

Category	Contents
Keywords	CANHub-AF2S2, Optical CAN Conversion, Hub
Description	The CANHub-AF2S2 intelligent CAN hub has two optical fiber interfaces and two electrically isolated CAN bus twisted pair interfaces. This realizes data reception/storage/forwarding between four independent CAN networks of different rates, filters unnecessary CAN messages, reduces the load of the subnet, CAN network topology, extends the network communication distance, and increases the number of nodes and other functions

### Revision History

Version	Date	Description
V1.00	December 18, 2014	Created
V1.01	March 10, 2015	Added a dimension drawing.
V1.02	March 15, 2019.	Updated the document header and footer and "Sales and Service Network" content, and added the "Disclaimer" content

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## 1. Functions

### 1.1 Product Overview

The CAN transmission medium can be twisted pair, optical fiber and coaxial cable. At present, the CAN bus distributed system of twisted pair has been widely used, such as automobile, elevator control, power system control. Various technologies have matured. Compared with twisted pair and coaxial cable, the low transmission loss of optical fiber greatly increases the transmission distance. In addition, the optical cable also has the characteristics of not radiating energy, non-conducting, and non-inductive. Moreover, there is no influence of crosstalk and mutual interference of optical signals in the optical cable, it has excellent anti-EMI and EMC characteristics, and there is no safety problem caused by inductive coupling in the cable.

The CANHub-AF2S2 realizes the transparent connection of multiple CANs, and realizes multi-point connection of complex structures at the bus level; CANHub-AF2S2 enables the backbone network to have no branch length restrictions, and any two nodes in the network can reach the protocol distance. The device has four communication ports. Both twisted pair ports have independent CAN transceivers, which can double the number of nodes. Therefore, this provides a free wiring method, and eliminates the drive limit of the maximum number of nodes of the CAN transceiver on the system bus. The two optical fiber ports enable CANHub-AF2S2 to be used in high-interference field environments, especially in high-voltage applications, power applications and other environments. Each port also provides an indicator for detecting bus activity and bus failure, which helps observe the working status of the CAN bus network.

The CANHub-AF2S2 can be used in CAN networks with baud rates up to 1 Mbps. All channels can work at different baud rates. CANHub-AF2S2 complies with CAN specification 2.0A (11-bit CAN identifier) and 2.0B (29-bit CAN identifier). Transparent, protocol-independent CAN message transmission is supported, making it suitable for a variety of application scenarios.

After the CANHub-AF2S2 is connected to four CAN networks, if the user enables the adaptive bus baud rate function, the two twisted pair channels in the device can detect the bus baud rate of the CAN network (limited to nine standard CAN baud rates defined by CiA: 1Mbps, 800Kbps, 500Kbps, 250Kbps, 125Kbps, 100Kbps, 50Kbps, 20Kbps, 10Kbps), and then automatically set the baud rate of these two channels to suit the two different CAN networks. Because optical fiber communication is point-to-point, there is no concept of adaptive baud rate.

The CANHub-AF2S2 can be configured with CAN message filters to ensure that only the required data is transmitted to other CAN networks through the repeater; at the same time, it also has a data routing function, which can selectively forward CAN messages received by one channel to another channel. Therefore, the device can effectively reduce the network load. CANHub-AF2S2 can be connected to the PC through the serial port to configure its communication parameters; provide configuration software on Windows, which is easy to use and supports configuration to take effect immediately. Once the

device is configured, it can be put to work without any operation.

### 1.2 Parameters

- ◆ CAN interface: using OPEN interface (CANH, CANL);
- ◆ The CAN channel adopts electromagnetic isolation, DC/DC power isolation, isolation voltage: 2,500 V DC;
- ◆ CAN interface EMC level: contact discharge  $\pm 8$  kV, group pulse  $\pm 2$  kV;
- ◆ The fiber type is single-mode fiber, SC interface;
- ◆ Maximum frame flow: single channel can be as high as 6,000 frames per second or more (1M baud rate, extended data frame);
- ◆ Support CAN2.0A and CAN2.0B protocols, conform to ISO/DIS 11898-1/2/3 standard;
- ◆ CAN baud rate: programmable and set arbitrarily, between 5 kbps and 1 Mbps;
- ◆ Optical fiber baud rate: programmable and arbitrarily set, between 5 kbps and 800 kbps;
- ◆ The CAN can be installed with a built-in 120 ohm terminal resistor, connected to R+ and R- terminals;
- ◆ Installation method: optional standard DIN rail installation or simple fixing method;
- ◆ Can be used in environments with safety and explosion-proof requirements;
- ◆ Operating voltage: 9 V to 26 V;
- ◆ Operating temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ;
- ◆ Storage temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ;

### 1.3 Typical Applications

- Industrial automation control system;
- Intelligent building control data and broadcasting system;
- Security product;
- Electricity, mining communications;
- Other field control and communication fields;

## 2. Hardware

### 2.1 Product Appearance

Figure 2.1 shows the appearance of CANHub-AF2S2 device.



Figure 2.1 CANHub-AF2S2 optical CAN hub

### 2.2 Components and Functions

Figure 2.2 and Table 2.1 show CANHub-AF2S2 components.

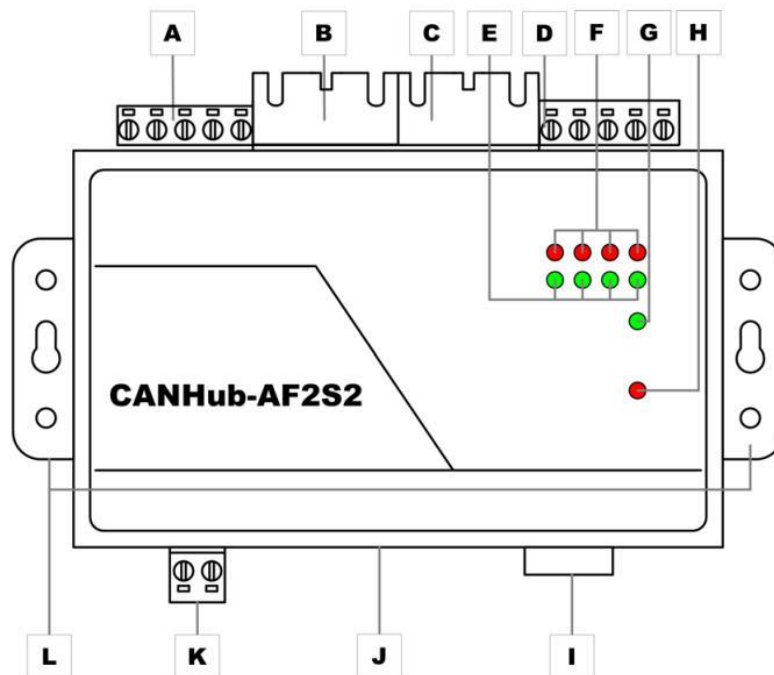


Figure 2.2 CANHub-AF2S2 components

Table 2. 1 Functions of CANHub-AF2S2 components

Label	Name	Description
A	CAN bus twisted pair port	Corresponding port: CAN2
B	CAN bus fiber optic port	Corresponding port: Fiber2
C	CAN bus fiber optic port	Corresponding port: Fiber1
D	CAN bus twisted pair port	Corresponding port: CAN1
E	Bus active indicator (Action, green)	Corresponding to four ports (from left to right in Figure 2.2): CAN2, Fiber2 , Fiber1 , CAN1
F	Bus error indicator (Fault, red)	Corresponding to four ports (from left to right in Figure 2.2): CAN2, Fiber2 , Fiber1 , CAN1
G	System running indicator (SYS, green)	Indicates that the system is operating properly. It flashes once every 2 seconds
H	Power indicator (PWR, red)	System power-on indication
I	RS232 communication port	Configure CANHub-AF2S2 through this port
J	DC JACK jack	Power Interface
K	AWG 14-22 pluggable terminal blocks	Power Interface
L	Fixed flanks	Fixed CANHub-AF2S2

### 3. Device Installation

This chapter describes how to install a CANHub-AF2S2 device, including device installation and system wiring. Be sure to install it by referring to the instructions. Improper installation may cause equipment malfunction, resulting in damage to the equipment.

#### 3.1 Installation

##### 3.1.1 Precautions

To improve system reliability and maximize device functionality, be sure to consider the following factors during installation and wiring. Environmental Conditions Do not install the device in any of the following locations.

- Places where the ambient temperature is lower than  $-25^{\circ}\text{C}$  or higher than  $+70^{\circ}\text{C}$ ;
- Places with rapid temperature changes and condensation;
- The ambient humidity is lower than 10% or higher than 90%;
- Places with corrosive or flammable gases;
- Locations with excessive dust, chloride or ironwood dust;
- Places where the device is subject to direct shock or vibration;
- Places exposed to direct sunlight;
- The device may come into contact with water, oil, and chemical agents.

Be sure to adequately enclose or protect the device in the following locations.

- Places with static electricity and noise;
- Places with strong electromagnetic fields;
- Locations where there may be radioactive leakage;
- Locations near power cables.

Installation in a Cabinet or Control Panel When the device is installed in a cabinet or control panel, provide an appropriate suitable operating and maintenance environment. In a closed environment, the ambient temperature must be within the range of  $-25^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ . If necessary, maintain an appropriate temperature by:

- Provide enough space for air circulation;
- Do not install the device on top of equipment that generates high heat, such as heaters, transformers or high-power resistors; If the ambient temperature exceeds  $70^{\circ}\text{C}$ , install a cooling fan or air conditioner.

##### 3.1.2 Appearance and Dimensions

The dimensions of CANHub -AF1 S1 are 118 mm x 72 mm x 25.9 mm, and the housing has fixing holes. Figure 3.1 shows the device appearance.



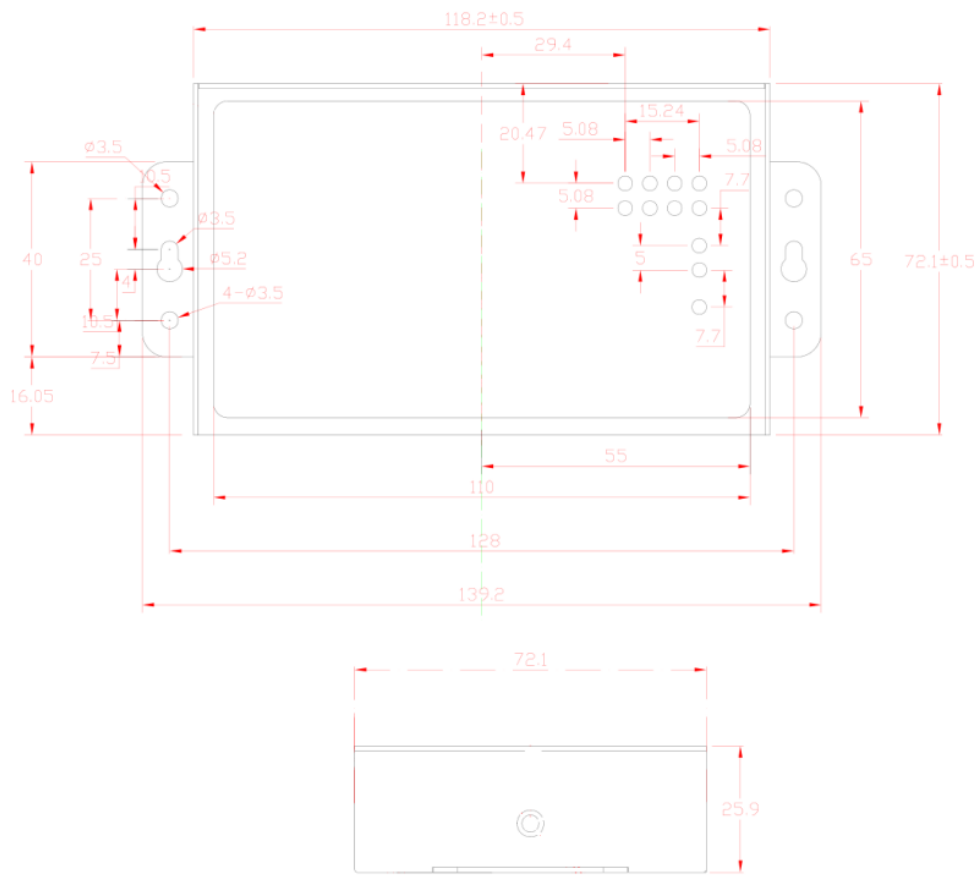


Figure 3. 1 CANHub-AF2S2 appearance

## 3.2 Wiring

### 3.2.1 Power cable connection

DC power supply: Provide 9-24 V DC/AC, and keep the voltage fluctuation within the specified range;

Power supply: TheCANHub-AF2S2 has a rated power of 5 W. But when the current is connected, the inrush current will reach about 5 times this current;

Terminals: CANHub-AF2S2 has two power input terminals: two Pin AWG 14-22 plug-in terminals and DC JACK socket. The power cord can be connected to either terminal, but not both power terminals at the same time. AWG 14-22 plug-in terminals are M3.5 terminal screws. Use crimp terminals for wiring, or connect bare stranded wires directly to the terminals, and use a screwdriver to tighten the screws of the terminal block. If the power is fully connected, the "PWR" indicator will remain red. Figure 3.2 shows the wiring.

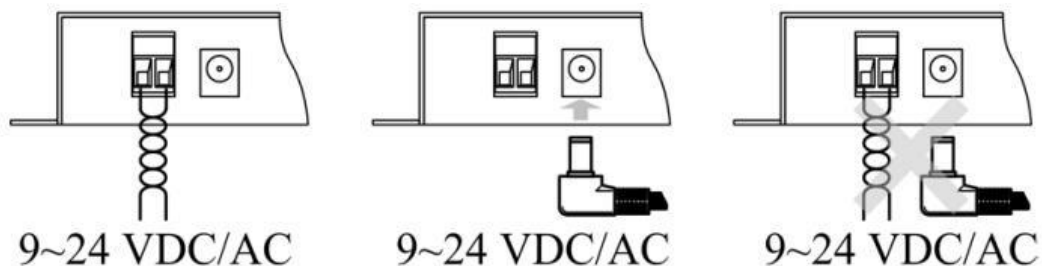


Figure 3.2 CANHub-AF2S2 power interface

### 3.2.2 Connecting to the PC from RS-232

The CANHub-AF2S2 is configured via the RS-232 interface. Figure 3.3 and Table 3.1 show the pins for the RS-232 interface on this device.

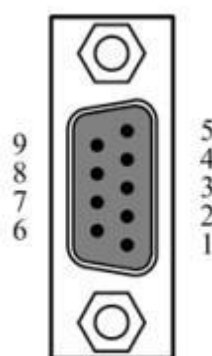


Figure 3.3 RS-232 interface of CANHub-AF2S2

Table 3.1 Description of the RS-232 interface pins of CANHub-AF2S2

Pin	Signal	Description
1	N.C.	
2	TXD	Send Data
3	RXD	Receive data
4	N.C.	
5	GND	Signal ground
6	N.C.	
7	N.C.	
8	N.C.	
9	N.C.	

This port uses a DB-9 female connector. Before configuration, connect CANHub-AF2S2 to the PC by using an RS232 extension cable (delivered with the product). If a crossover cable is used, communication fails.

**3.2.3 Connecting the Network**

CANHub-AF2S2 provides two twisted pair and two fiber CAN channels. Each channel is peer-to-peer and can be used to connect a CAN network or a device equipped with a CAN interface. The four channels are respectively routed by two 5-pin AWG 14-22 plug-in terminals and two optical fiber interfaces, as shown in Figure 3.4

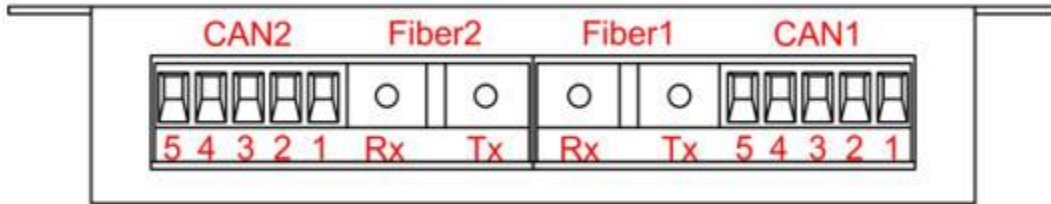


Figure 3.4 CANHub-AF2S2 communication interface

- Two twisted pair interfaces

Table 3.2 shows the pin definitions of the terminals of the two twisted pair interfaces.

Table 3.2 Pin definition of two twisted pair terminals

Pin	Port	Name	Function
1	CAN1	CAN_L	CAN_L signal cable
2		Rext	Built-in terminating resistor short-circuit terminal
3		FG	Shielded wire ground (cannot be connected)
4		Rext	Built-in terminating resistor short-circuit terminal
5		CAN_H	CAN_H signal cable
1	CAN2	CAN_L	CAN_L signal cable
2		Rext	Built-in terminating resistor short-circuit terminal
3		FG	Shielded wire ground (cannot be connected)
4		Rext	Built-in terminating resistor short-circuit terminal
5		CAN_H	CAN_H signal cable

When the CANHub-AF2S2 device is connected to the CAN network through the twisted pair interface, CAN\_L is connected to CAN\_L, and CAN\_H is connected to CAN\_H. According to the ISO 11898 specification, to reduce the signal reflection on the CAN bus and enhance the communication reliability, the two endpoints of the bus usually require a termination matching resistor. The termination matching resistance is determined by the characteristic impedance of the transmission cable. For example, if the characteristic impedance of a twisted pair is 120 ohm, both endpoints on the bus should also be connected to 120-ohm termination resistors. CANHub-AF2S2 has a built-in terminating resistor. When the device is connected to the CAN network through two twisted pair interfaces, you need only to short-circuit the two Rexts of the twisted pair port with wires to realize the access terminal resistance, as shown in Figure 3.5

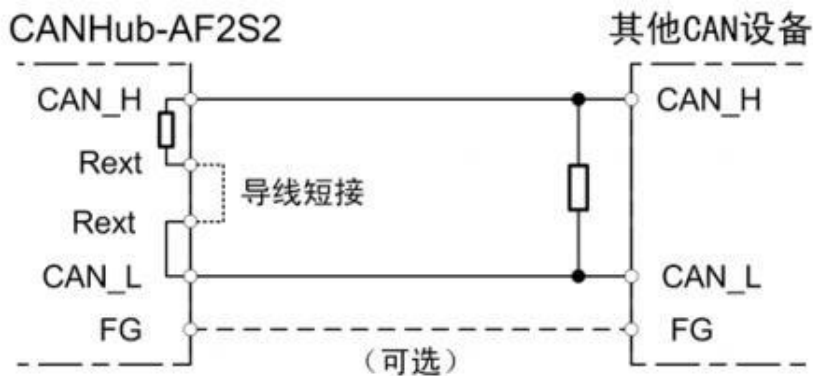


Figure 3.5 CANHub-AF2S2 connected to CAN network through the twisted pair interface

The CANHub-AF2S2 twisted pair interface is compatible with the DeviceNet port in physical structure, but is different in electrical structure. Do not directly insert the communication port of the DeviceNet device into the twisted pair port of the CANHub-AF2S2, although the device port can withstand the voltage of 36 V DC, as shown in Figure 3.6.

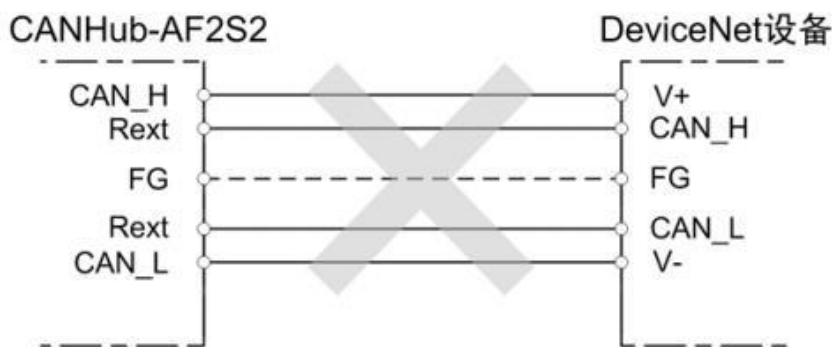


Figure 3.6 CANHub-AF2S2 twisted pair interface electrical structure not compatible with DeviceNet port

2. Two fiber optic interfaces

CANHub-AF2S2's two optical fiber interface structure is very simple. Each fiber optic interface has only two ports that provide fiber optic connections: one is the fiber optic output port (TX), and the other is the fiber optic input port (RX). See Figure 3.7.

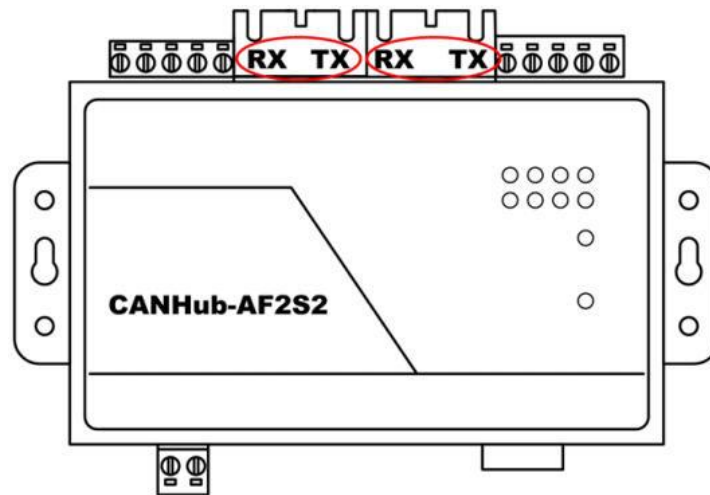


Figure 3.7 CANHub-AF2S2 optical interface

Because the optical fibers are connected point-to-point (several cables cannot be connected together like twisted pairs), each optical fiber interface of the CANHub-AF2S2 has two connectors, TX and RX, for connecting the optical fibers. The TX of the optical fiber interface can only be connected to the RX of another optical fiber interface through the optical fiber. Figure 3.8 shows the connection method.

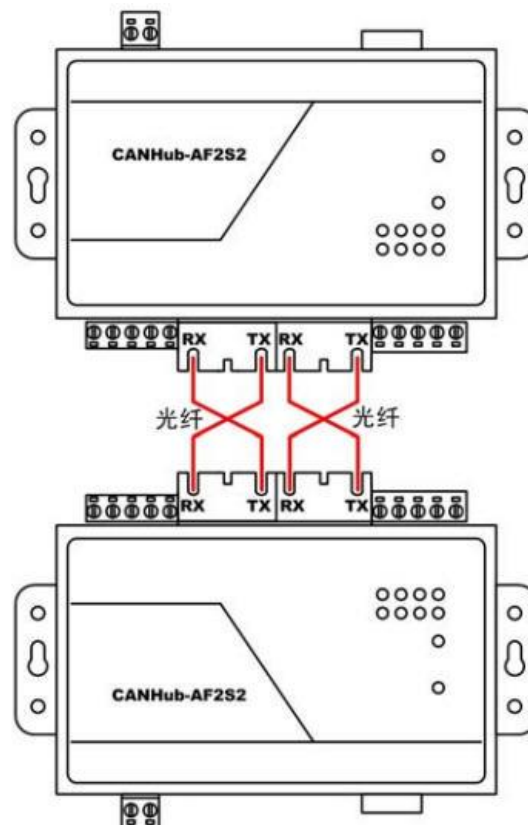


Figure 3.8 CANHub-AF2S2 optical interface connection

One CANHub-AF2S2 can be connected to another CANHub-AF2S2 or other device equipped with the optical fiber interface by using the optical fiber, but it must be ensured

that the optical fiber interface of the device is compatible with the optical fiber interface of CANHub-AF2S2.

**3.2.4 LED Indicators**

There are 10 LED indicators on the top panel of the CANHub-AF2S2. After the CAN bus is connected, when the system has no data transmission, the network active status indicator and the network error status Fault indicator should be off. When there is data transfer, all the network active status Active indicator flashes. When an error occurs on the CAN bus, the network error status Fault indicator flashes. The following table describes the functions.

Table 3.3 Indicator status and meaning

Indicator	Display	Meaning
PWR	Red	The power is on
	Turn off	There is no power supply, or the power cable is faulty.
SYS	Green (flashing frequency 0.5 Hz)	The system works properly
	Turn off	The system is not working
	Flashing quickly or erratically	Insufficient power supply

Continued

LED name	Display	Meaning
Active	Green	The bus of the corresponding port is active and flashes when there is continuous data passing through
	Turn off	The bus for the corresponding port is inactive
Fault	Red (always on)	The optical fiber is not inserted, or the optical fiber has been removed (limited to the CAN channel corresponding to the optical fiber interface)
	Red (flashing)	The bus of the corresponding port has an error
	Turn off	There is no error on the bus of the corresponding port, or the fiber has been inserted

## 4. Function Configuration

This chapter describes how to access various configuration, monitoring, and management functions of CANHub-AF2S2. Before connecting to the CAN, configure the CANHub-AF2S2 to meet the actual application requirements. The device configuration includes CAN baud rate, message routing, message filtering, and adaptive baud rate timeout. Connect the CANHub-AF2S2 to a PC via an RS232 cable, and a dedicated configuration program running on the PC completes the settings without any hardware jumper or switch configuration. The configuration takes effect immediately after it is complete.

Configure the device by using "CAN General Configuration Software - CANCfg" on Windows. The software is included on the CD-ROM delivered with the product. The configuration program can save the last successfully set parameters of the device. Before configuring the device, connect the device to the PC by using the RS232 communication cable delivered with the product. The following describes the main configuration parameters in detail with reference to the configuration software.

### 4.1 Software Startup Interface

After running the configuration software CANCfg, the software startup interface is shown in Figure 4.1. Click "CANHub-AF2S2". The CANHub-AF2S2 configuration interface appears, as shown in Figure 4.2. After opening the CANHub-AF2S2 configuration interface, you can see the five tabs: Basic Information, Baud Rate, Routing, Filtering, Status, and Product Introduction.

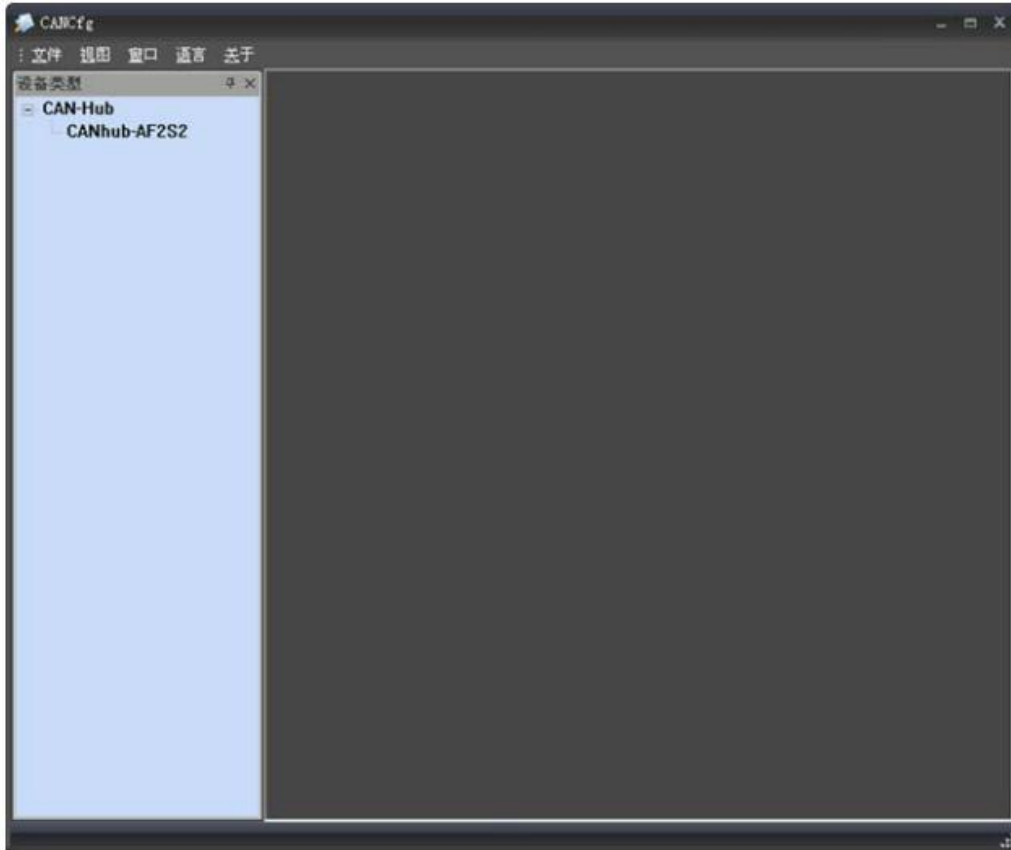


Figure 4.1 CANCfg startup interface



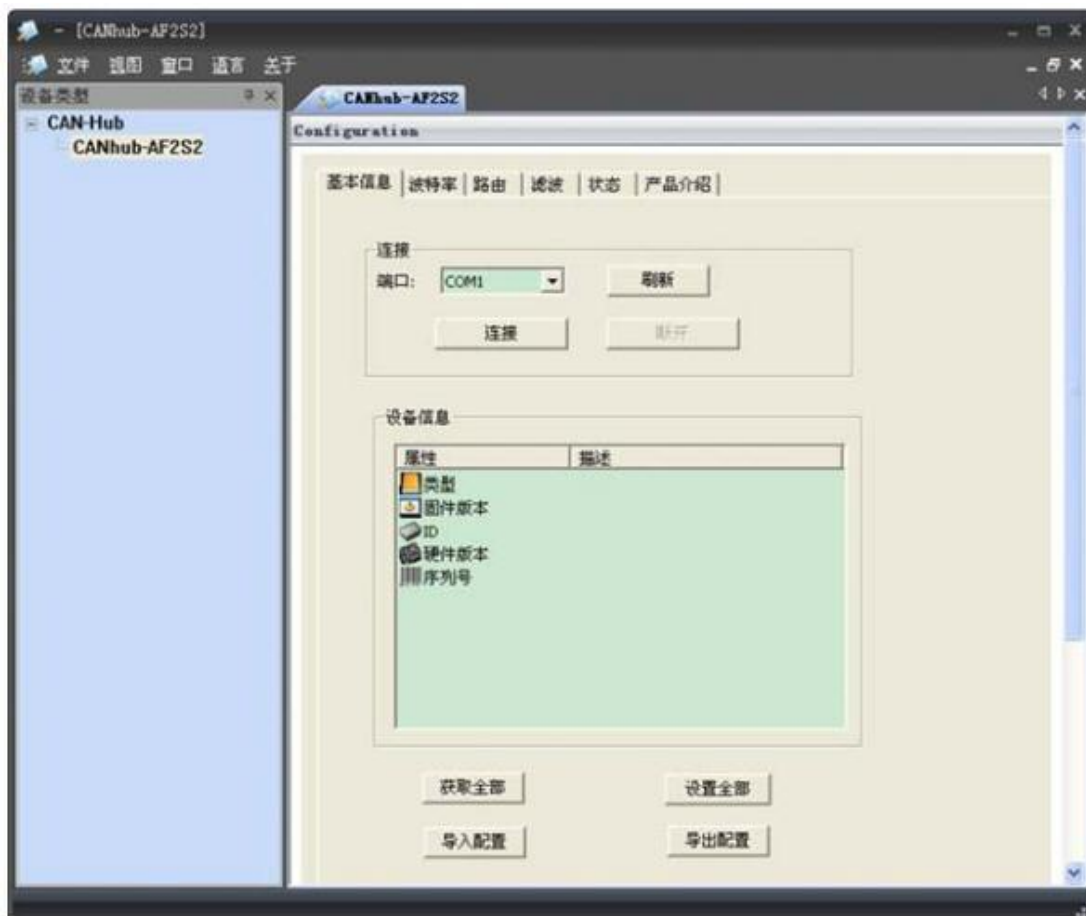


Figure 4.2 Selecting CANHub-AF2S2

## 4.2 Basic Information

The first tab of CANHub-AF2S2 configuration is basic information, including serial port connection and disconnection, basic information of the device, global settings of the device, and import and export of configuration files.

### 1. Serial port connection

Select the port where the program communicates with CANHub-AF2S2. The drop-down list in the combo box lists the serial communication ports available in the system. Click the "Connect" button to open the selected serial port, as shown in Figure 4.3.

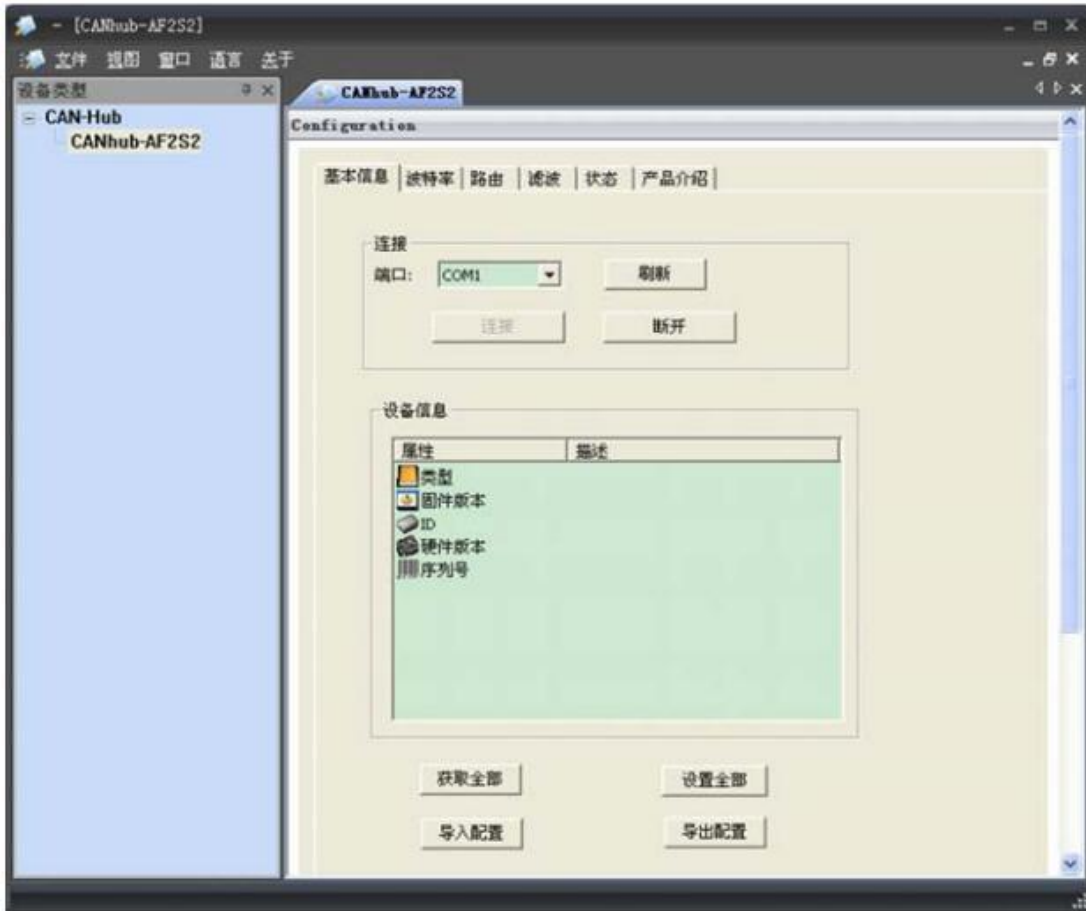


Figure 4.3 Connecting the serial port

### 2. Device information

Click the "Get All" button. If all the information and settings of the device are obtained successfully, the product information of the device will be displayed in the device information list.

### 3. Get All

Read configuration from CANHub-AF2S2 (including configuration of other tabs).

### 4. Set All

Writes all configurations (including those of other tabs) to the CANHub-AF2S2 device. After configuring the baud rate parameters, routing parameters, and filtering parameters of the device, switch to the "Basic Information" page, and click the "Set All" button to complete all the device configurations.

### 5. Import the configuration file

Import the configured device configuration file. See Figure 4.4.

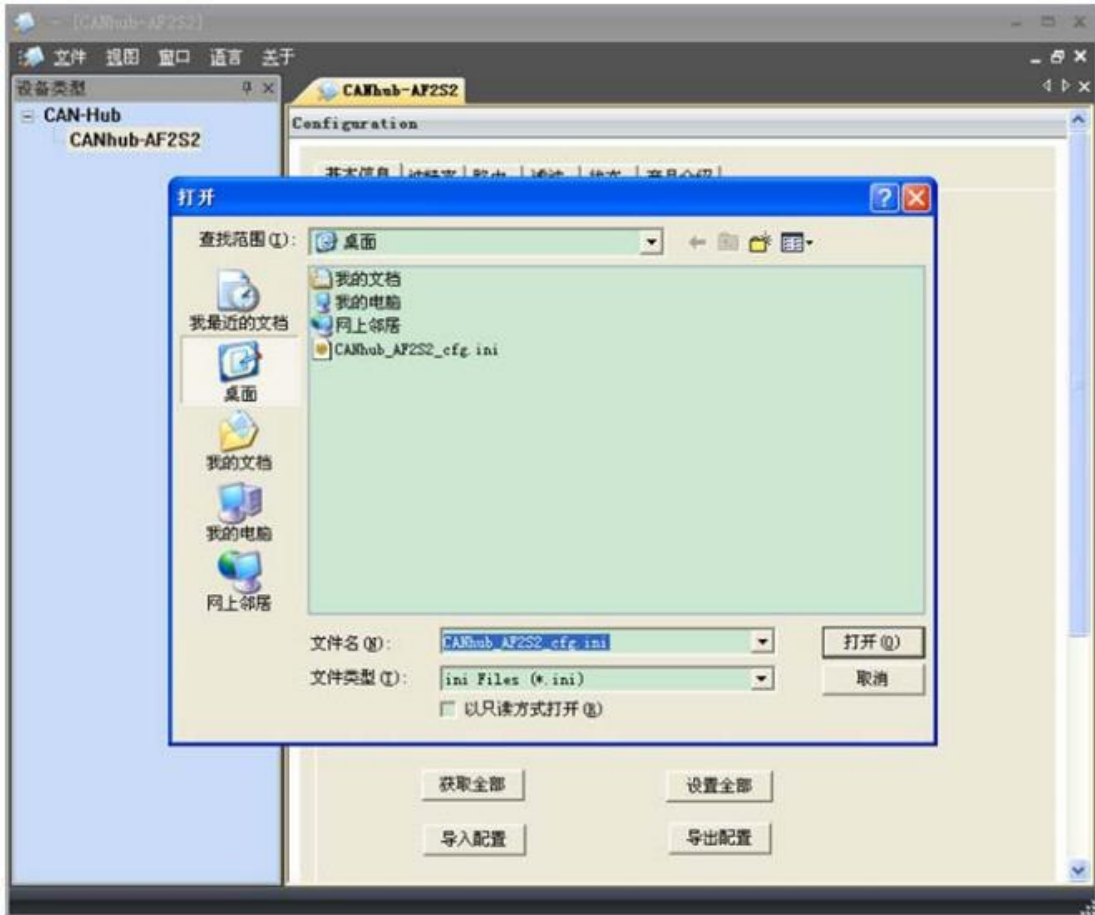


Figure 4.4 Importing the configuration file

#### 6. Write the configuration file

After configuring the device, you can export all the configurations through the file by using the "Write Configuration File" button.

### 4.3 Baud Rate

Figure 4.5 shows the baud rate setting interface, including the setting of the baud rate parameters of four channels and the parameter setting of the adaptive baud rate (only applicable to two electrically isolated twisted pair CAN channels: CAN1, CAN2).

On the basic information page, click the "Get All" button to obtain all the configuration information of the device, including the 4-channel baud rate setting parameters and the adaptive bus baud rate setting parameters.

After setting the baud rate parameters, write these parameters into the CANHub-AF2S2 device. After the self-adaptive baud rate parameters are set, they will take effect after the device is powered on again.

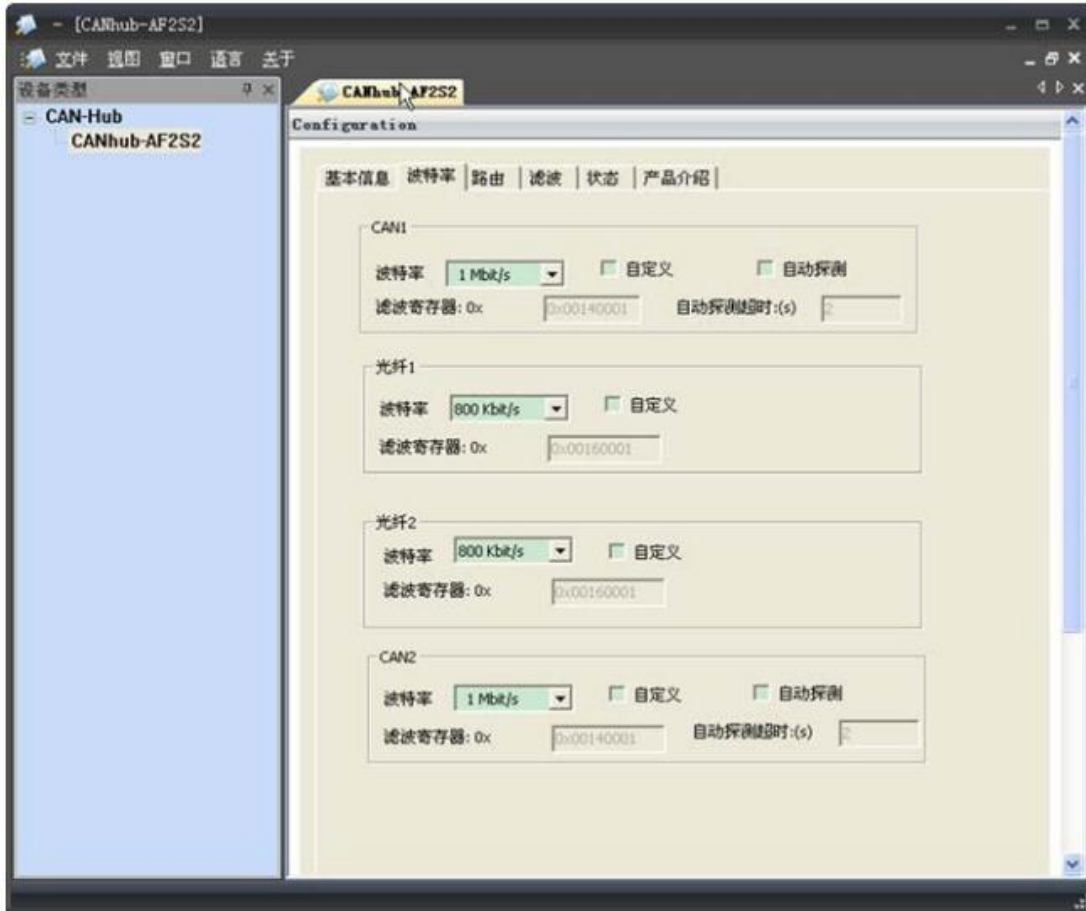


Figure 4.5 Baud rate setting interface

1. Baud rate setting (four channels: CAN1, fiber 1, fiber 2, CAN2)

Select the baud rate of the corresponding channel. If you need to customize the baud rate of a channel, click "Customize" and enter the baud rate calculated by yourself in the edit box below.

CANCfg has preset several baud rates, some of which are compliant with CiA recommended baud rates. But these preset baud rates do not necessarily meet the requirements of practical applications. Therefore, the configuration software allows you to customize the baud rate. Many elements of the baud rate can be customized. Use a 32-bit value to describe the entire baud rate. The following figure shows its structure.

- BRP**      Preset baud rate      Range: 1 to 64  

$$BRP = 2^9 BRP.3 + 2^8 BRP.2 + 2^7 BRP.1 + 2^6 BRP.0 + 2^5 BRP.5 + 2^4 BRP.4 + 2^3 BRP.3 + 2^2 BRP.2 + 2^1 BRP.1 + 2^0 BRP.0 + 1$$
- SAM**      Sampling mode      Register BTR1  
 SAM = 0:    Single sample mode  
 SAM = 1:    Three-sampling mode
- SJW**      Synchronize jump width      Range: 1-4



20	0x001C0031	0	1	12	0	49
50	0x001C0013	0	1	12	0	19
100	0x001C0009	0	1	12	0	9
125	0x001C0007	0	1	12	0	7
250	0x001C0003	0	1	12	0	4
500	0x001C0001	0	1	12	0	1
800	0x00160001	0	1	6	0	1
1000	0x00140001	0	1	4	0	1

Calculate the baud rate for other non-standard values. It is recommended to use dedicated computing software, or contact technical support or sales engineers.

2. Adaptive bus baud rate

CANHub-AF2S2 provides the adaptive bus baud rate function. When the device is connected to the CAN network over the twisted pair interface, if the adaptive baud rate function is enabled, the CANHub-AF2S2 can automatically set the baud rate of its corresponding channel based on the bus baud rate of the connected CAN network. CAN1 or CAN2. Select the radio button in front of "Auto Detect" to enable the auto-adaptive bus baud rate function of this channel.

The adaptive bus baud rate has a certain timeout period, which can be configured by the user. The default value is 5 seconds.

When the device is powered on, if the adaptive baud rate function is enabled, within the adaptive baud rate timeout time configured by the user, if the bus baud rate is successfully detected, CANHub-AF2S2 will automatically configure the baud rate (the CAN channel of the bus baud rate successfully detected); if the bus baud rate is not detected successfully, CANHub-AF2S2 will set the baud rate of the channel based on the bus baud rate configured by the user in the previous step.

**4.4 Routing**

CANHub-AF2S2 has a simple message routing function, which can selectively forward CAN messages received on one channel to another channel. These operations are performed on the Routing tab page. As shown in the following figure, selecting the radio box of the corresponding channel forwards the message to that channel.

After setting the packet forwarding parameters, switch to the basic information interface and click the "Set All" button to write the routing parameters to the device.

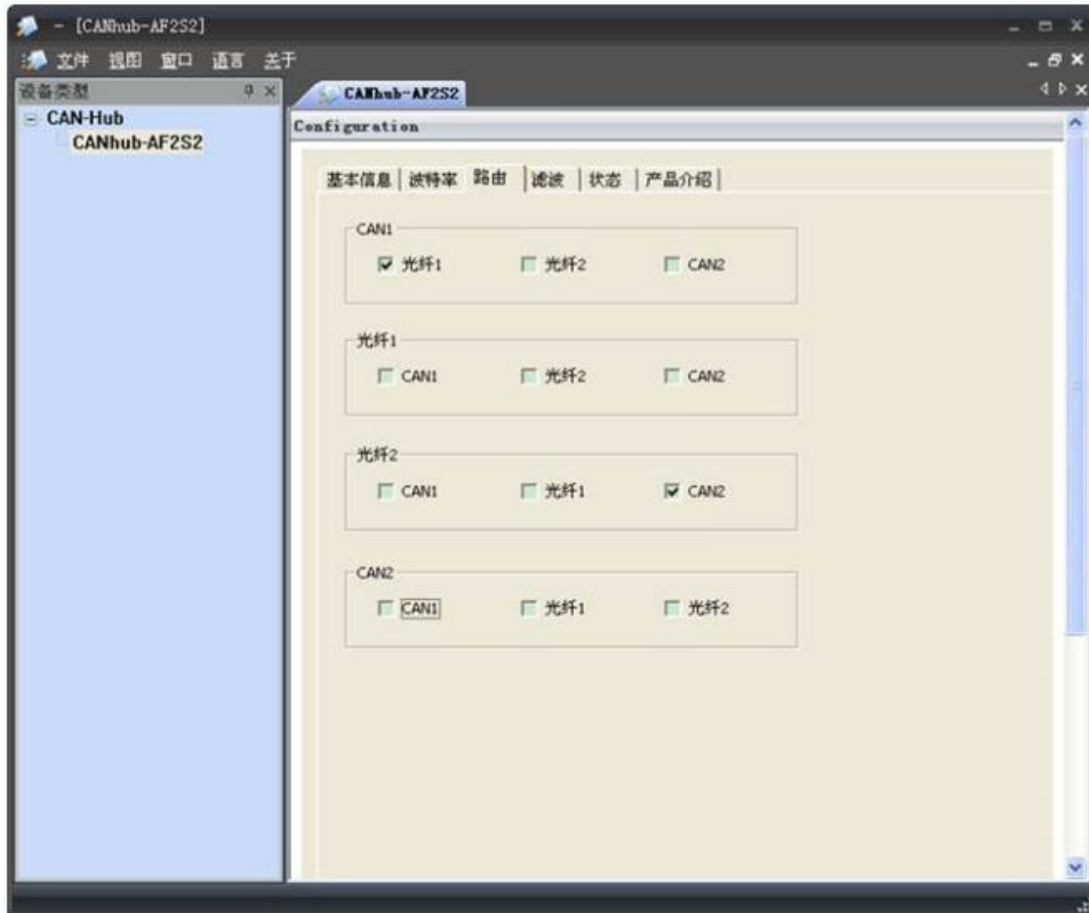


Figure 4.6 Routing function

## 4.5 Filtering

CANHub-AF2S2 has a powerful message filter. The filter has 1,024 cells and can hold 1,024 standard identifiers or 512 extended identifiers or a mixture of both types. On the "Filter" tab page, the filter types are divided into four types: Standard Frame Identifier, Standard Frame Group Identifier, Extended Frame Identifier, and Extended Frame Group Identifier. The group identifier refers to a group of continuous identifiers. Click the corresponding button on the configuration program interface. The list box below shows the details of the corresponding filter. You can modify the content of the filter. See Figure 4.7.

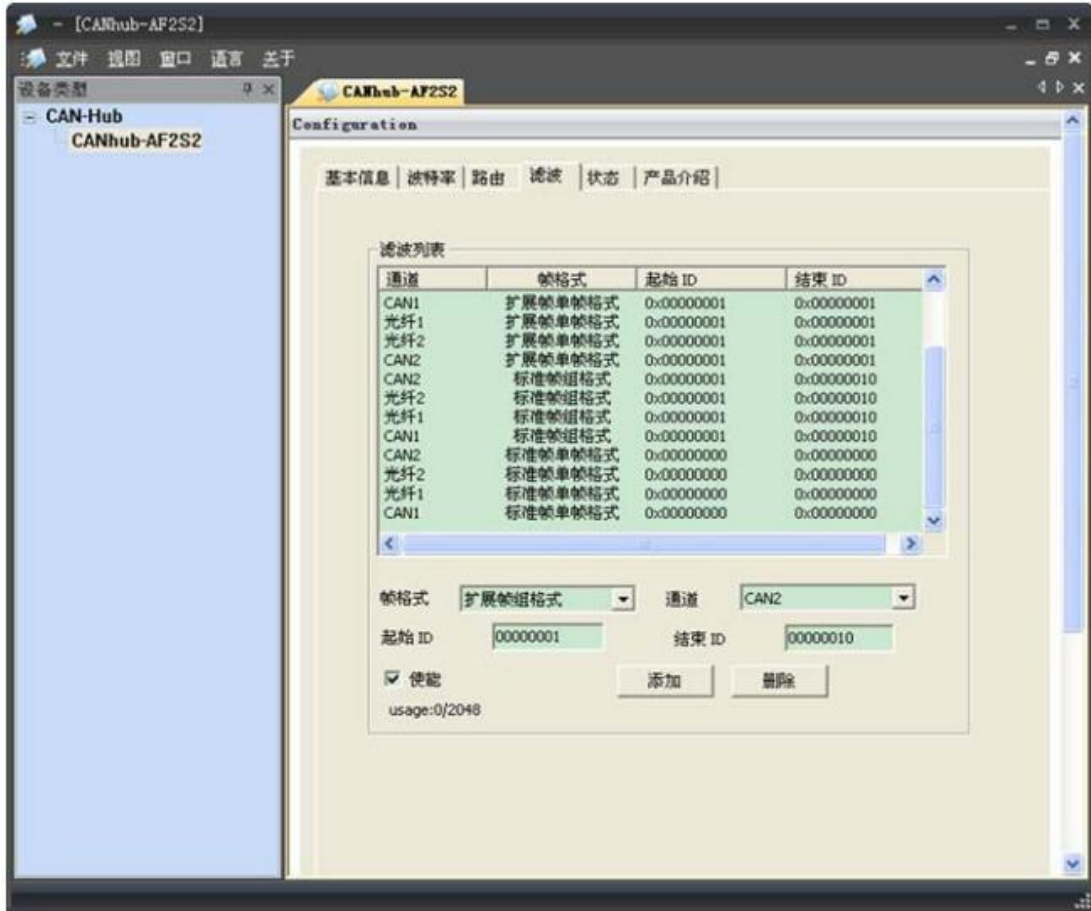


Figure 4.7 Filter function

1. Select "Use" to modify the filter content.
2. In the "Channel" drop-down list, select the channel to which the filtering function needs to be added, CAN1, optical fiber 1, optical fiber 2, CAN2.
3. In the "Frame Format" drop-down list, select the frame format to be filtered, including standard single frame format, standard frame group format, extended frame single frame format, and extended frame group format.
4. In "Start ID" and "End ID", enter the frame IDs that need to be filtered. If the single frame format is selected in step 3, only the "Start ID" is valid. Note: The standard frame identifier range is 0-2047 (0x7FF), and the extended frame identifier range is 0-536870911 (0x1FFFFFFF).
5. Switch to the basic information interface, and click the "Set All" button to complete the configuration of device packet filtering.

#### 4.6 Status

You can view the status of each channel of CANHub-AF2S2 by using the configuration program, as shown in Figure 3.8.



Click the "Refresh" button to obtain the latest working status of the device.

Note: The two fibre channels are active only after the fiber is inserted.

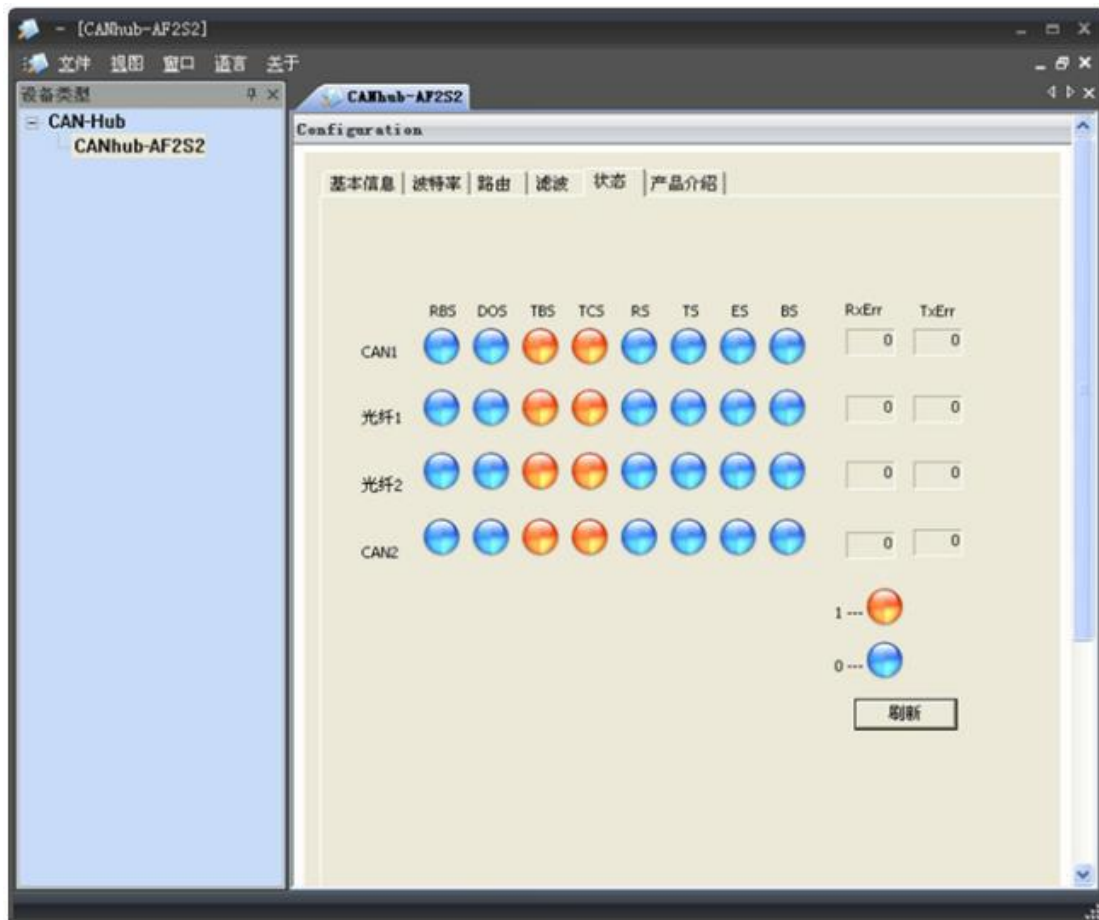


Figure 4.8 Device status indication

Table 4.2 Device status description

Name	Function
RBS	Receive buffer status: received available information. Blue: no available message received; Yellow: available message received.
DOS	Data overflow status: Because the data previously transmitted to the CAN controller has not been read out, and the receiving buffer is not released in time, the subsequent information is lost. Blue: no data overflow. Yellow: data overflow.

Continued

Name	Function
TBS	<p>Send buffer status: no message to send.</p> <p>Blue: There is no message in the send buffer, and the message to be sent can be written into the send buffer.</p> <p>Yellow: There is a message in the send buffer, and the message cannot be written into the send buffer.</p>
TCS	<p>Send end status: All sent requests are processed successfully.</p> <p>Blue: The send request is processed successfully;</p> <p>Yellow: The send request is not processed successfully.</p>
RS	<p>Receive status: The CAN controller is receiving data.</p> <p>Blue: The CAN controller is receiving a frame of message;</p> <p>Yellow: The CAN controller is idle.</p>
TS	<p>Sending status: The CAN controller is sending data.</p> <p>Blue: The CAN controller is receiving a frame of message.</p> <p>Yellow: The CAN controller is idle.</p>
ES	<p>Error status: The count value of the transmit and receive error counters, or one of them, has reached the threshold set in the error warning limit register.</p> <p>Blue: The value of both error counters is below the false alarm limit.</p> <p>Yellow: One or both of the send and receive error counters have reached the error alarm limit, the preset limit will be taken.</p>
BS	<p>Bus status: The CAN controller is disabled because the send error counter has reached its threshold 255.</p> <p>Blue: The CAN controller is processing bus activities.</p> <p>Yellow: The CAN controller is not processing/is inhibited from processing bus activity because the value of the send error counter has reached the limit value 255.</p>
RXERR	Current value of the Rx error counter.
TXERR	Current value of the Tx error counter.

## 5. Inspection and Maintenance

The main electrical components in the CANHub-AF2S2 are all semiconductor components. Although they have a long service life, they may age rapidly under inappropriate conditions. Periodic inspections should be carried out to ensure that the required conditions are maintained. It is recommended to check at least once every 6 months to one year. Under unfavorable environmental conditions, more frequent inspections should be carried out.

If you encounter a problem during maintenance, refer to Table 5.1 for troubleshooting. If the fault persists, contact Guangzhou ZLG Electronics Co., Ltd.

Table 5. 1 Inspection and maintenance

No.	Item	Inspection	Standard	Action
1	Power supply	Check for voltage fluctuations at the power supply side	The external power supply is within the allowable voltage fluctuation range: + 9 V to +25 V DC	Use a voltmeter to check the power supply at the power input. Take necessary measures to keep the voltage fluctuation within the range
2	Surrounding environment	Check the ambient temperature (including the internal temperature of the enclosed environment)	-25°C to + 70°C	Use a thermometer to check the temperature and ensure that the ambient temperature is kept within the allowable range
		Check the ambient humidity (including the internal humidity of the enclosed environment)	The humidity must be between 10% and 90% RH when there is no air conditioner	Use a hygrometer to check the humidity and ensure that the ambient humidity is kept within the allowable range
		Check for dust, powder, salt, metal chips	No accumulation	Clean and protect the equipment
		Check that water, oil or chemical spray	No spray touches the device	To clean and protect the equipment

		should not touch the equipment		
		Check for corrosive or flammable gases in the equipment area	No corrosive or flammable gas	Check by smelling or using a sensor
		Check vibration and shock levels	Vibration and shock are within the specified range	If necessary, install gaskets or other shock absorbers
		Check the noise source near the equipment	No significant noise signal source	Isolate the device from the noise source or protect the device
3	Installation and Wiring	Check that each unit is securely connected and has been safely locked with the next unit	No looseness	Press the connectors together completely and lock them with the slider
		Check that the cable connector is fully inserted and locked	No looseness	Correct any incorrectly installed connectors

Continued

No.	Item	Inspection	Standard	Action
3	Installation and Wiring	Check for loose screws in external wiring	No looseness	Tighten the screws with a screwdriver
		Check crimp connectors in external wiring	Leave enough space between connectors	Visual inspection. If necessary, adjust the operating voltage
		Check for damage to external cables	No damage	Visual inspection. Replace the cable if necessary

## **6. Disclaimer**

Based on the principle of providing better service for users, Guangzhou ZLG Electronics Co., Ltd. ("ZLG Electronics") will try to present detailed and accurate product information in this manual. However, due to the effectiveness of this manual within a particular period of time, ZLG Electronics does not guarantee the applicability of this document at any time. ZLG Electronics shall reserve the right to update this manual without prior notice. To get the latest version, please visit the official website of ZLG Electronics regularly or contact ZLG Electronics. Thank you!

## Appendix A Specification

Item	Specification
and frequency range	9-24 V DC/AC
Power consumption	4 W
Surge current	At 9 V DC: less than 400 mA/2 ms, cold start at room temperature
Isolation voltage	2500V DC
CAN baud rate	Twisted pair (5 kbps-1 Mbps), optical fiber (5 kbps-800 kbps)
CAN port throughput	Maximum 5,000 frames/s (1 Mbps baud rate, 29-bit ID, 8-byte data)
Process type	Store and forward
Forwarding delay time	About >106 us at 1 Mbps, inversely proportional to the communication baud rate
Anti-vibration	5-17 Hz, 0.1" double peak displacement; 17-640 Hz, 1.5 G peak-to-peak acceleration
Impact resistance	10G peak-to-peak acceleration (11 ms)
Ambient humidity	5%-95%@25°C (non-condensing)
Operation ambient temperature	-25°C to +70°C
Storage ambient temperature	-40°C to +85°C
Air	Kept away from corrosive gases
Housing	Metal housing
External dimension	115 x 70 x 25 mm (L x W x H) (excluding cables)
Interface	DC JACK IN power terminal 2-pin AWG 14-22 pluggable power terminal 5-pin AWG 14-22 pluggable terminal terminal Dual SC pluggable fiber optic interface DB9 serial communication port
LED indicator	Power (PWR), Running (SYS), Active (Active) (2), Error (Fault) (2)

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