

Ethernet / DP Master Gateway

PBM-ETH-3.0 Manual



V1.0

August 2024

Contents

Chapter 1 Product Introduction	1
1. Main Functionalities of PBM-ETH-3.0	1
2. Technical Specifications of PBM-ETH-3.0	1
Chapter 2 Product Appearance and LED Indicators	4
1. Product layout and normal working state of LED indicators	4
2. The meaning of the dip-switch	8
3. The 2 kinds of operation modes of the Ethernet ports	10
Chapter 3 Installation of the product	12
1. Mounting of the lead rail	12
2. The connectors and installation of PROFIBUS interfaces	12
3. The installation of power supply	13
4. Mounting of Ethernet cables	14
Chapter 4 Debugging of the configuration software PBConfi	15
1. Offline configuration via PBConfi	16
1.1 New project	16
1.2 Update device directory	17
1.3 Add a master	18
1.4 Add slave	19
1.5 Set bus parameters	23
1.6 Set the IP addresses for software to connect	23
1.7 Configuration Downloading	24
1.8 Configure the network parameters for PBM-ETH-3.0	25
1.9 Save and load the configuration files of PBM-ETH-3.0	25
2. Online debugging with PBConfi	26
2.1 The master manipulations of the master gateway	27
2.2 The slave manipulations of the master gateway (DPV1 manipulations)	27
2.3 Monitor the status of the slaves connected to the master gateway	28
2.4 PROFIBUS DPV0 IO data communication	28
2.5 Export the status of all the master gateways and slaves of the current system	29
2.6 Change slave address (special slaves)	29
2.7 View System Log	30
3. Firmware Upgrading	31
Chapter 5 Perform Monitoring to PROFIBUS-DP Slaves	32
1. Data Area of Input Registers	32
2. Hold register data area	36
3. PBM-ETH-3.0 MODBUS Communication Acknowledge Code	39
4. PBM-ETH-3.0 Modbus DP Slave Diagnostic Data Area Manipulation	40
5. PBM-ETH-3.0 Modbus System Log Area Manipulation	41
6. Description to the bit function definitions of the Modbus register areas of PBM-ETH-3.0	44
Appendix: Toxic and Hazardous Substances list	49

Chapter 1 Product Introduction

1. Main Functionalities of PBM-ETH-3.0

The master gateway PBM-ETH-3.0 of Beijing D&S is mainly used for the conversion between MODBUS/TCP protocol and PROFIBUS protocol. PBM-ETH-3.0 acts as a server on the MODBUS/TCP side, and works as a master on the PROFIBUS side, so to connect DP slave devices into MODBUS/TCP networks.

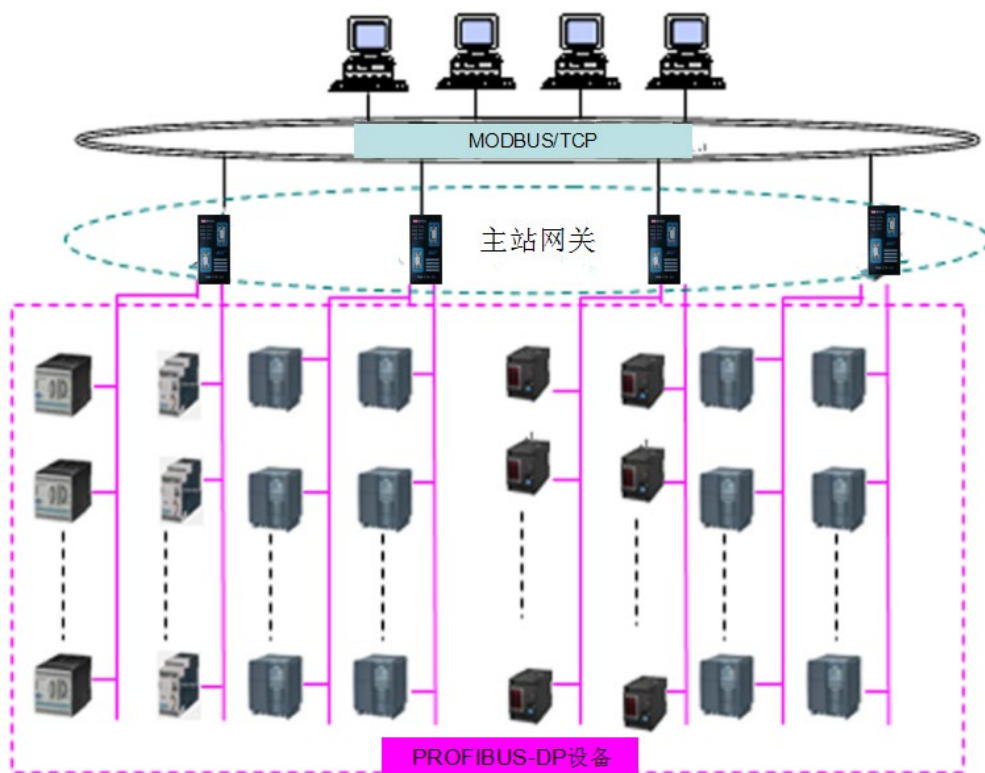


Figure 1-1

2. Technical Specifications of PBM-ETH-3.0

(1) PROFIBUS-DP interface

- **Connectors:** DB9 female X2
- **Electrical isolation:** 2 interfaces are electrically isolated, the isolation voltage is 1kV.
- **Baud rate (unit: bit/s):** 9.6k, 19.2k, 45.45k, 93.75k, 187.5k, 500k, 1.5M, 3M, 6M (set with configuration software)
- **Communication protocols:** PROFIBUS DPV0, DPV1C1, DPV1C2 (IEC 61158-3, GB/T 20540-2006)
- **Online change of slave addresses:** Supported

- **Single / Multiple master system: Single master system**
- **Maximum number of stations: 62** (2 DB9 interfaces, each interface can connect up to 31 slaves without adding any repeater)
- **Maximum amount of data for a single slave:** 244 bytes input, 244 bytes output
- **Maximum configuration data:** 8k
- **Maximum diagnostic data:** 4k
- **Maximum output data:** 8k
- **Maximum input data:** 8k
- **Maximum number of DPV0 modules of each slave:** 32
- **Number of slave connections simultaneously supported by DPV1C2:** 1

(2) Ethernet interface

- **Connectors:** RJ45 X2
- **Isolation voltage:** 1.0kV
- **Network port characteristics:** 10/100Mbps self-adaptive, support automatic line sequence identification
- **Working modes:** switch mode, dual network port mode
- **Supported protocols:** ARP, ICMP, IGMP, IP, TCP, UDP, MODBUS/TCP Server
- **Flow speed limiting:** supported
- **IP collision detection:** supported
- **Recommended cables:** Industrial Ethernet specific cables are recommended
- **Working modes:** MODBUS/TCP Server
- **Number of connections:** 4 connections in switch mode; 4 connections for each network address in dual network port mode
- **TCP connection and disconnection detection:** supported
- **Supported MODBUS/TCP function codes:** 0x03, 0x04, 0x06, 0x10
- **System log entries:** 256

(3) Configuration software

- **The required version:** 3.8 and above
- **Parse slave GSD files:** Supported
- **Operation state monitoring:** Supported

- **DPV0 IO data monitoring: Supported**
- **Firmware upgrades: Supported**
- **Device log: Supported**
- **System reports: Supported**
- **DPV1 C1/C2 functionalities: Supported**

(4) Support PROFIBUS-PA and FDT/DTM functionalities

- Provide PBM-ETH-3.0 companion communication DTM and gateway DTM;

(5) Power supply

- **Connectors:** 6 pin terminal
- **Power supply voltage:** 24V ($\pm 20\%$)
- **Working current:** 152.95MA (24V, 31 slave devices)
- **Rated power consumption:** 3.6708W
- **Redundant power supply: Supported**

(6) Protective class

- **Protective class:** IP20

(7) Environmental conditions

- **Temperature for transport and storage:** $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$
- **Working temperature:** $-25^{\circ}\text{C} \sim +55^{\circ}\text{C}$
- **Working relative humidity:** 5 ~ 90% (No condensation).

(8) Mechanical characteristic

- **Shell:** Plastic
- **Dimension:** 54mm (**Width**) X 103mm (Depth) X 118mm (Height)

(9) EMC Class

- **Pulse group:** IEC 61000-4-4 2KV (Performance Criterion Grade A)
- **Surge:** IEC61000-4-5 CM: $\pm 2\text{KV}$, DM: $\pm 1\text{KV}$ (Performance Criterion Grade A)

Chapter 2 Product Appearance and LED Indicators

1. Product layout and normal working state of LED indicators

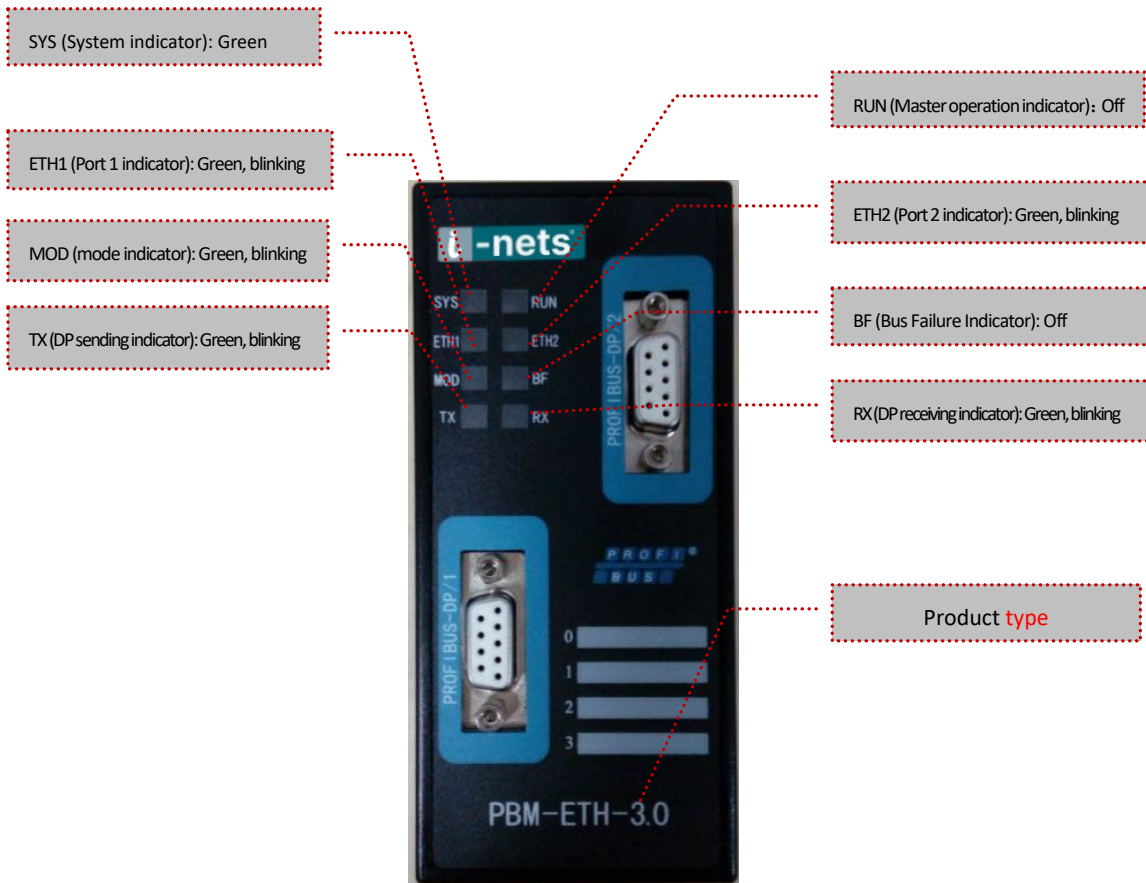


Figure 2-1 LED Indicators of the product

Table 2-1 Interfaces on the front panel

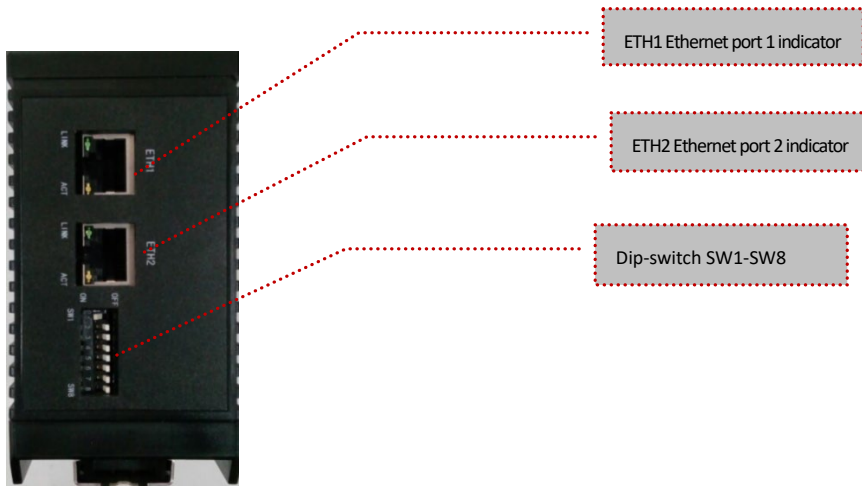
Interface Name	Functionality
PROFIBUS-DP/1	PROFIBUS DP standard interface, being used in combination with PROFIBUS specific connectors
PROFIBUS-DP/2	PROFIBUS DP standard interface, being used in combination with PROFIBUS specific connectors

Table 2-2. Status indicators on front panel – Group 1

LED Name	Color	Status	Meaning
SYS System Indicator	2 colors - Red and Green	Off	Device not powered on
		Green steady	Device start up normally in working mode
			Before firmware update in Firmware upgrade mode
			Firmware updated successfully in firmware upgrade mode
		Green blinking	Firmware being updated in firmware upgrade mode
			Open device identification functionality
		Red steady	Device being started up
			Firmware update failure in firmware upgrade mode
Downloading configuration failed			
Red blinking	Start working firmware failed in normal working mode		
RUN Master operating indicator	2 colors - Red and Yellow	Off	Master works in "RUN" status
		Yellow steady	Master works in "STOP" status
		Red steady	Master works in "OFFLINE" status
ETH1 Ethernet port 1 indicator	2 colors - Red and Green	Red steady	The physical link of Ethernet port 1 disconnected
		Red blinking	Ethernet port 1 IP conflict. There are devices with the same IP address in the network connected to Ethernet port 1.
		Green steady	Ethernet port 1 operates well
		Green blinking	There are MODBUS message communication on Ethernet port 1
ETH2 Ethernet port 2 indicator	2 colors - Red and Green	Red steady	The physical link of Ethernet port 2 disconnected
		Red blinking	Ethernet port 2 IP conflict. There are devices with the same IP address in the network connected to Ethernet port 2.
		Green steady	Ethernet port 2 operates well
		Green blinking	There are MODBUS message communication on Ethernet port 2

Table 2-3. Status indicators on front panel – Group 2

LED Name	Color	Status	Meaning
MOD Mode indicator	Red and green	Red steady	Master in idle state
		Green blinking	Master in working state
BF Bus Failure indicator	Red and yellow	Off	All the configured slaves are in data exchange state, and no alarm occurs.
		Yellow steady	Alarms with high priority generated by slaves, goes off when the high priority alarms removed.
		Red steady	There are configured slaves not in data exchange state
		Both Red and Yellow are on	Some slaves go offline, and some slaves generate high priority alarm
TX DP sending indicator	Red and green	Off	Master does not send data to the DP bus system
		Green blinking	Master sends data to the DP bus system
		Red	Master sends datagram errors to the DP bus system
RX DP receiving indicator	Red and green	Off	Master does not receive data from the DP bus system
		Green blinking	Master receive data from the DP bus system
		Red	Master receives datagram errors from the DP bus system



ETH1 Ethernet port 1 indicator

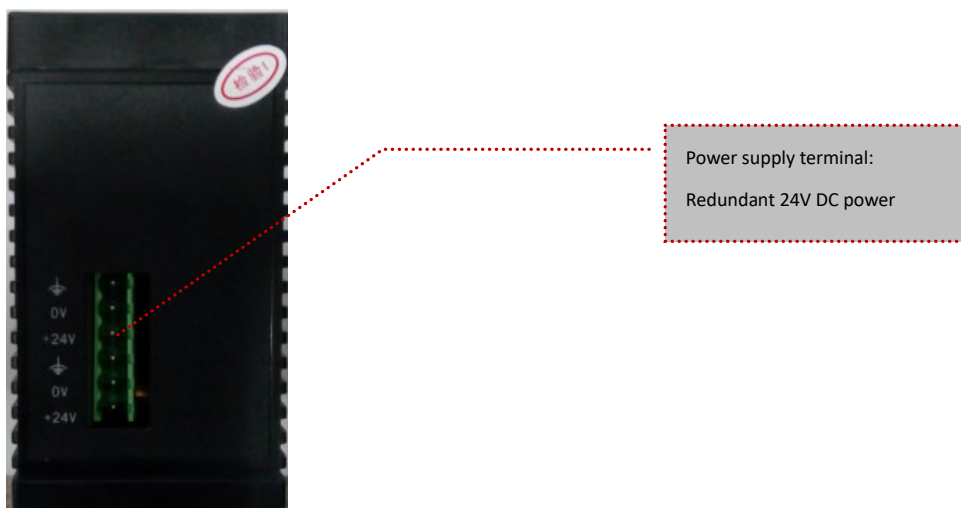
ETH2 Ethernet port 2 indicator

Dip-switch SW1-SW8

Figure 2-2 Side view of the product

Table 2-4 Network interface

Interface Name	Function
ETH1	Fast Ethernet interface, the green LED is the indicator for physical link connection, the orange LED is the indicator for communication activities.
ETH2	Fast Ethernet interface, the green LED is the indicator for physical link connection, the orange LED is the indicator for communication activities.



Power supply terminal:
Redundant 24V DC power

Figure 2-3 Side view of the product

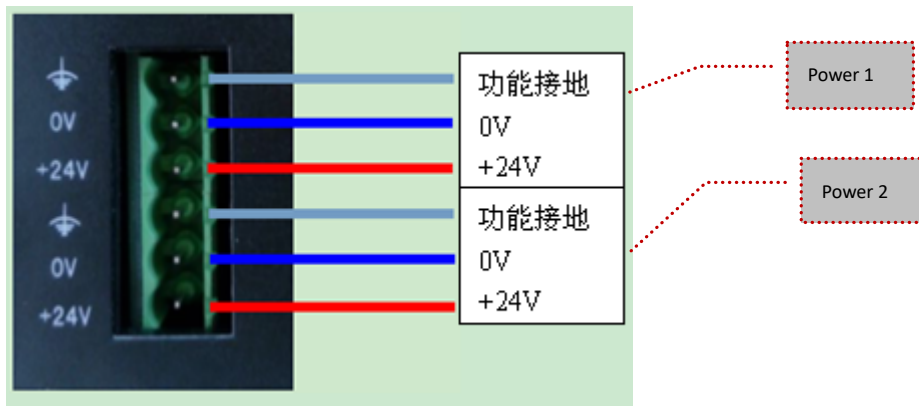


Figure 2-4 The Power Supply part of the side view of the product

Table 2-5 Power interface

Signal Name of the Interface	Functionality Description
24V Power 1	The positive input of the 1 st 24V DC power supply.
24V Power 2	The positive input of the 2 nd 24V DC power supply.
0V	The 0V of both the two 24V DC power.
Functional grounding	Grounding of the module

2.The meaning of the dip-switch

The dip-switch SW1-8 for setting product functionalities, is shown in the figure below:

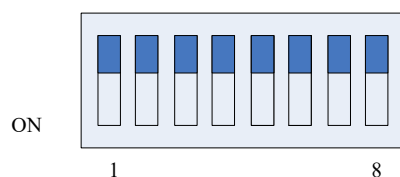


Table 2-6 Dip-switch

Bits of the dip-switch	Function	Description
Bit1	Default network parameter	ON: The network interface boots up with default network parameters; OFF: The network interface boots up with user configured IP address.
Bit2	Redundant mode setting	Being used in combination with Bit6, for setting the redundant working mode of the gateway, see table 2-7.

Bit3	Firmware upgrade mode	ON: The master gateway operates in firmware upgrading mode; OFF: The master gateway operates in normal working mode.
Bit4	Offline mode	ON: Set the master in offline mode, after power on, the gateway will not boot up the master with the local configurations, the PROFIBUS master operates in offline mode, and will not send messages to the DP bus system. If the gateway cannot be started up due to abnormal local configuration, you can switch to this mode, and download new configuration with configuration software, and then switch back to normal working mode.
Bit5	reserved	
Bit6	Redundant mode setting	Being used in combination with Bit2, for setting the redundant working mode of the gateway, see table 2-7.
Bit7~8	reserved	

Table 2-7 Redundant mode setting

Dip-switch Bit2	Dip-switch Bit6	Gateway operation mode
OFF	OFF	Non-redundant mode
ON	OFF	Redundant operation mode based on bus monitoring
OFF	ON	Redundant operation mode of hot stand-by

Note: The master gateway only check the status of the dip-switch when power on, and then determine the operation mode, so, the setting of the dip-switch must be power again to be effective.

Default network parameters

If the user has not set the network parameters, or if the dip-switch is set in the "default network parameters" mode, the master gateway will boot up according to the following network parameters:

Table 2-8 Default network parameters

Parameter	Default value
Operation mode of the Ethernet ports	Dual port mode
IP address of Ethernet Port 1	192.168.1.10
Subnet mask of Ethernet port 1	255.255.255.0
Gateway address of Ethernet port 1	192.168.1.1
IP address of Ethernet port 2	192.168.2.10
Subnet mask of Ethernet port 2	255.255.255.0
Gateway address of Ethernet port 2	192.168.2.1

3.The 2 kinds of operation modes of the Ethernet ports

Two interfaces are provided on the Ethernet side of PBM-ETH-3.0. It can operate either in switch mode, or in dual port mode. The user can select either of the operation modes when configuring the gateway PBM-ETH-3.0 with the configuration tool PBConfi bundled with the product.

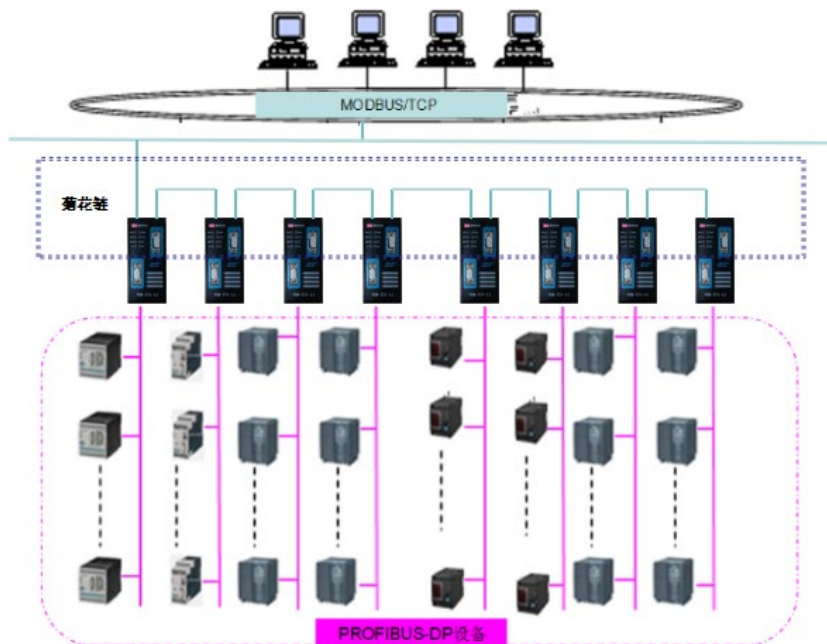


Figure 2-5 Network connection in switch mode (Based on daisy chain topology, the system does not need external switch)

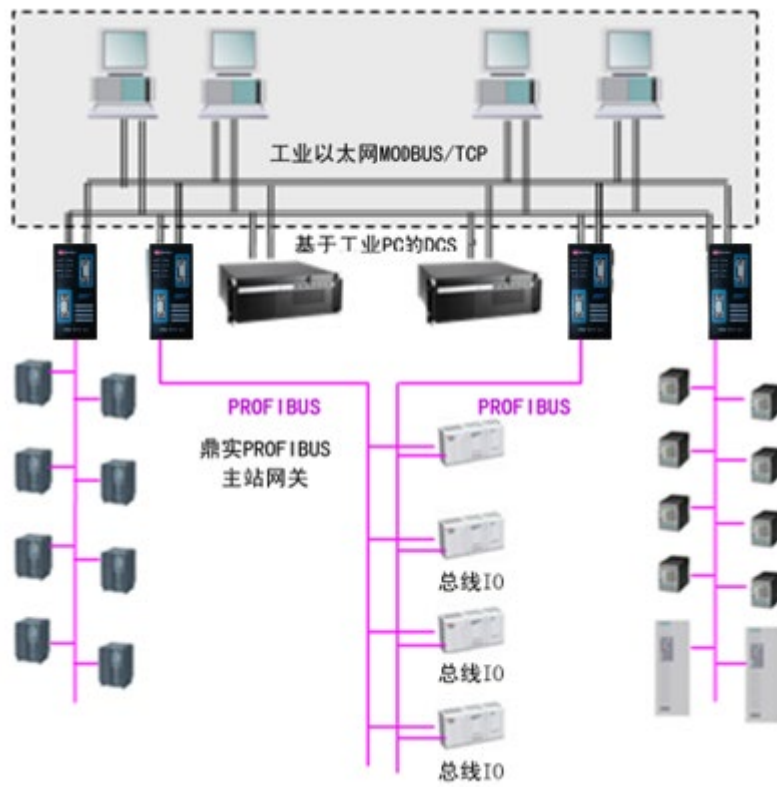


Figure 2-6 Network connection in dual port mode

Chapter 3 Installation of the product

1. Mounting of the lead rail

Use standard 35mm DIN lead rail, which needs to be mounted horizontally. Keep at least 40mm space above the upper part and below the lower part of the device is convenient for heat radiation.

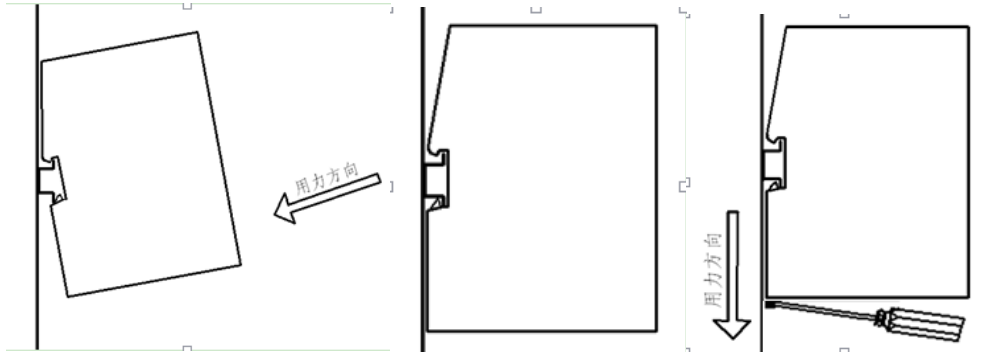


Figure 3-1 a. Mounting

Figure 3-1 b. Fastening

Figure 3-1c. Removinh

2. The connectors and installation of PROFIBUS interfaces

The interface of the bus bridge PBM-ETH-3.0 use standard 9-pin D-shaped PROFIBUS plug (female). The users are recommended to use standard PROFIBUS connectors and standard PROFIBUS cables, and to set termination resistors at both ends of the bus. For PROFIBUS installation specifications, please refer to the technical standard related PROFIBUS, see figure 2-7 below:

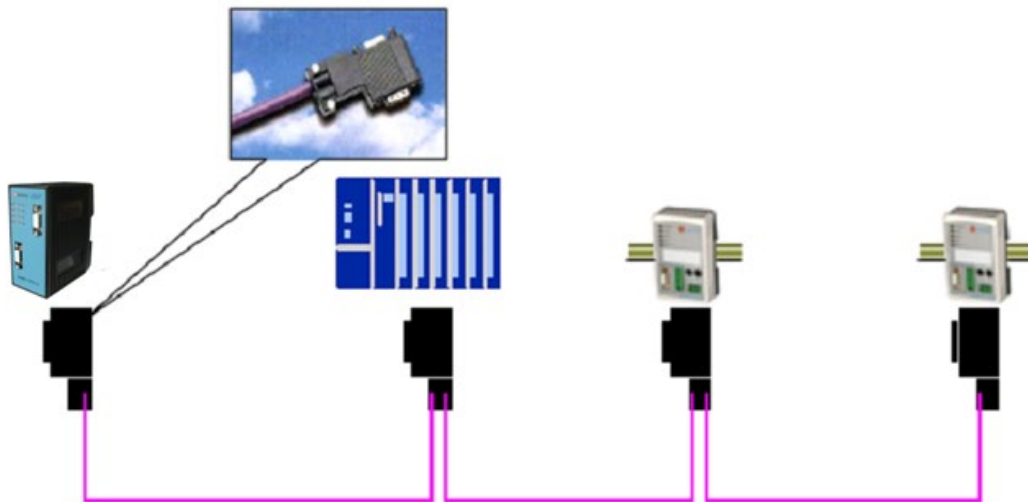


Figure 3-2 Standard cabling of PROFIBUS

For more detailed knowledge about PROFIBUS-DP installation, please refer to “Instruction manual for the installation of the fieldbus PROFIBUS”.

3. The installation of power supply

Wiring of a single channel of 24V ($\pm 20\%$) DC power supply

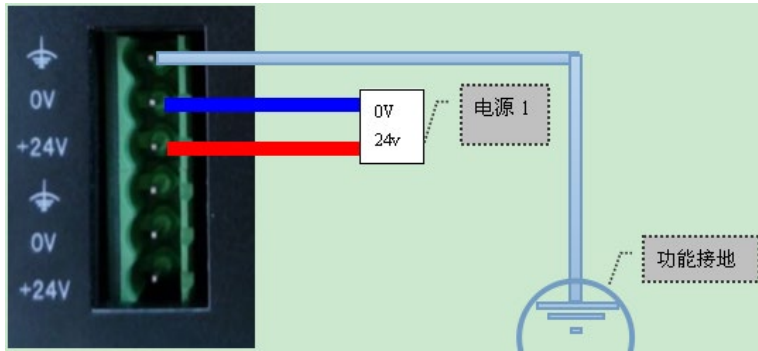


Figure 3-3a Wiring a single channel of the power supply

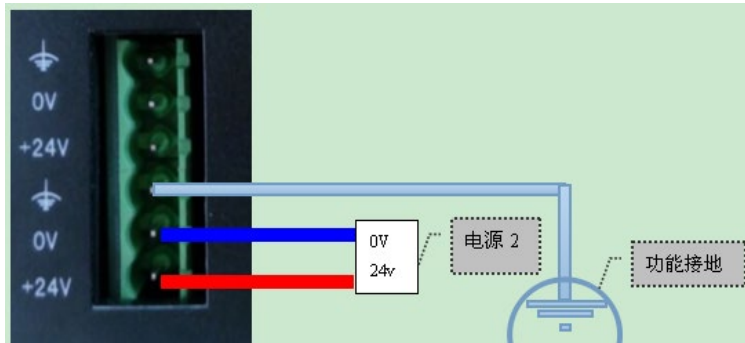


Figure 3-3b Wiring a single channel of the power supply

Wiring of redundant 24V ($\pm 20\%$) DC power supplies

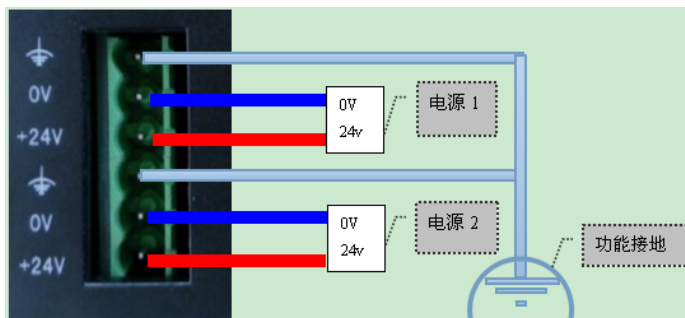


Figure 3-4 Standard wiring of redundant power supplies

4. Mounting of Ethernet cables

Ethernet port: RJ45 connector, self-adaptive to parallel line and cross line. If you want to get a more stable communication guarantee, to get stronger anti-interference ability, it is recommended to use industrial Ethernet cable. The basic structure of industrial Ethernet cable is of four copper wires with shielding layer. It has a strong ability to shield external signal interference. The use of such network cables can greatly enhance the stability of the communication system.

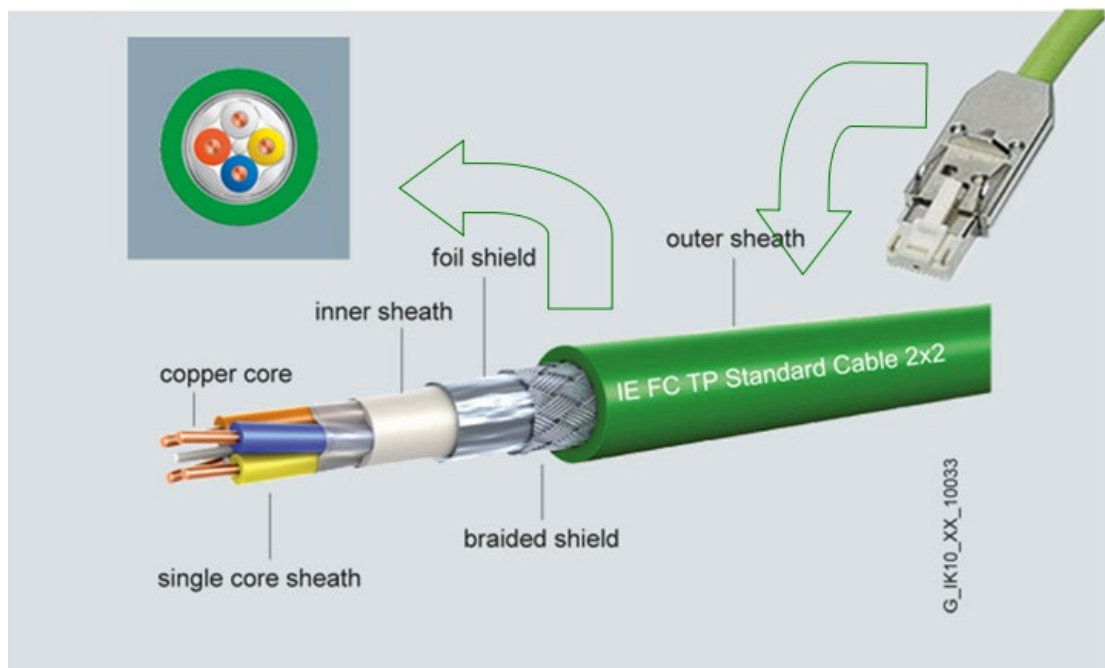


Figure 3-5 Cable for Industrial Ethernet

Chapter 4 Debugging of the configuration software PBConfi

The functionalities of the configuration software PBConfi and the configuration ways of PBM-ETH-3.0 will be introduced in this chapter.

The functionalities of the configuration software PBConfi:

- ❖ Configuration and download: Configure PBM-ETH-3.0 related parameters, and download configurations via the server interface of the Ethernet MODBUS/TCP.
- ❖ Online monitoring: Obtain IO data of DP slaves via the built-in MODBUS/TCP server interface, to perform DPV1C1/C2 communication, to get the diagnostic information of the system (master and the slaves connected), and record critical system operation events via the built-in system log functionality.
- ❖ Firmware upgrading Quickly perform function upgrading and bug fixing via the built-in device firmware upgrading function.

Configuration methods of PBM-ETH-3.0:

When downloading configuration, it is recommended to connect the DP port of the gateway PBM-ETH-3.0 with PROFIBUS-DP slave devices (for the convenience of the online debugging with PBConfi later on); and to connect the Ethernet ports on the other side to a computer that has already installed the configuration software PBConfi. Please don't connect MODBUS/TCP controller at first, and only do that after configuration downloading and debugging. The diagram is shown below:

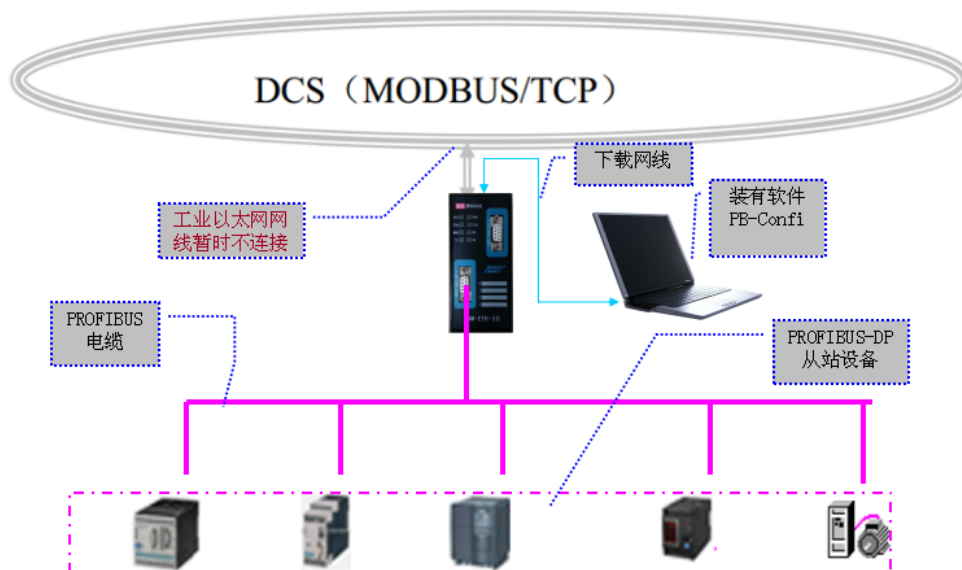


Figure 6-1 Diagram for downloading configurations

1. Offline configuration via PBConfi

This product need to be used in combination with PBConfi. PBM-ETH-3.0 makes use of the Ethernet downloading function of the software PBConfi. Here is an example of an actual application. The concrete configuration is as followings:

Table 6-1 Configuration of the instance

Instance Configuration				
No.	Device Name	Device Type and Technical Specifications	Quantity	Remark
1	Gateway device	PBM-ETH-3.0	1	This product
2	PROFIBUS slave	PB-DSDPV1	1	Any other slaves are OK.
3	MODBUS/TCP client	Computer	1	Simulate MODBUS/TCP client
		Software ModScan32.exe	1	
4	DP cable (with DP connectors)	Standard PROFIBUS cables	1	Connect the PROFIBUS part
5	Ethernet cable (with connectors)	Normal Ethernet cables	1	Connect the Ethernet part

1.1 New project

Click the icon of the configuration software PBConfi, to open the user interface of PBConfi. The following page will appear after open the configuration window of the software.

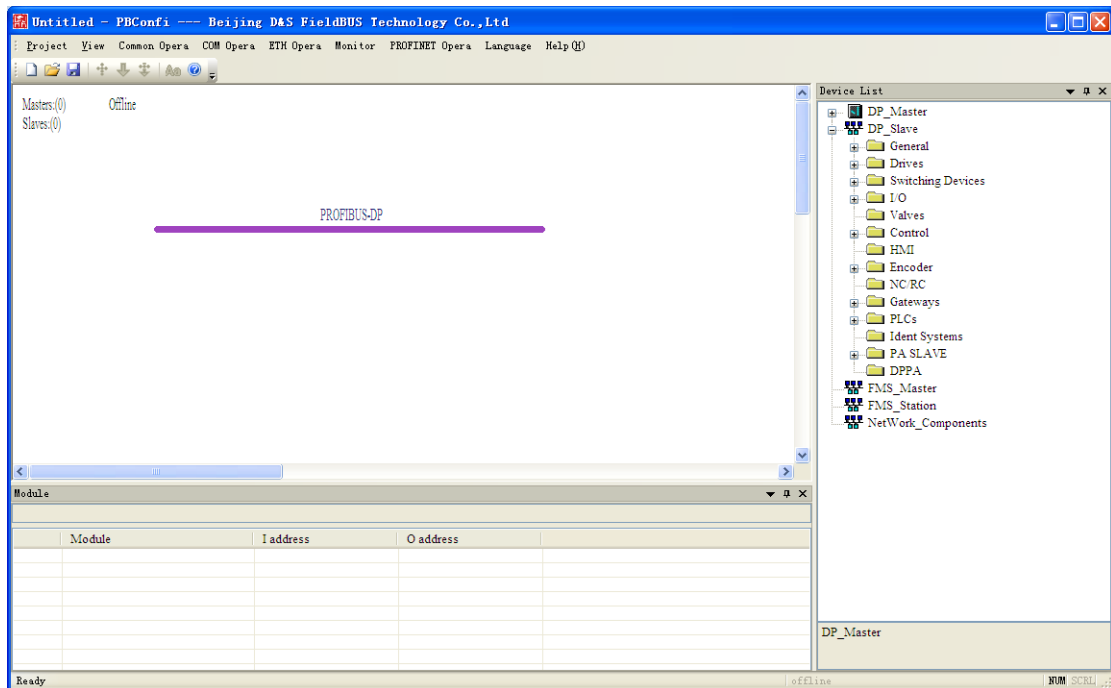


Figure 6-2 New project

1.2 Update device directory

If the GSD files of the slave devices that the user needs to configure have not been put into the corresponding directory of the software PBConfi, please click “View” → “Working Directories” → “GSD Directory”, and copy the GSD files of the slave devices into the GSD folder opened.

After putting the GSD files of the slave devices, you need to update the current device directory. Click “File” → “Read GSD again”, then the device directory in the side part of the software window can be updated, see the screen shot below. Now, the corresponding slave devices should appear in the “DP-slave” directory of the device directory in the left part of the window.

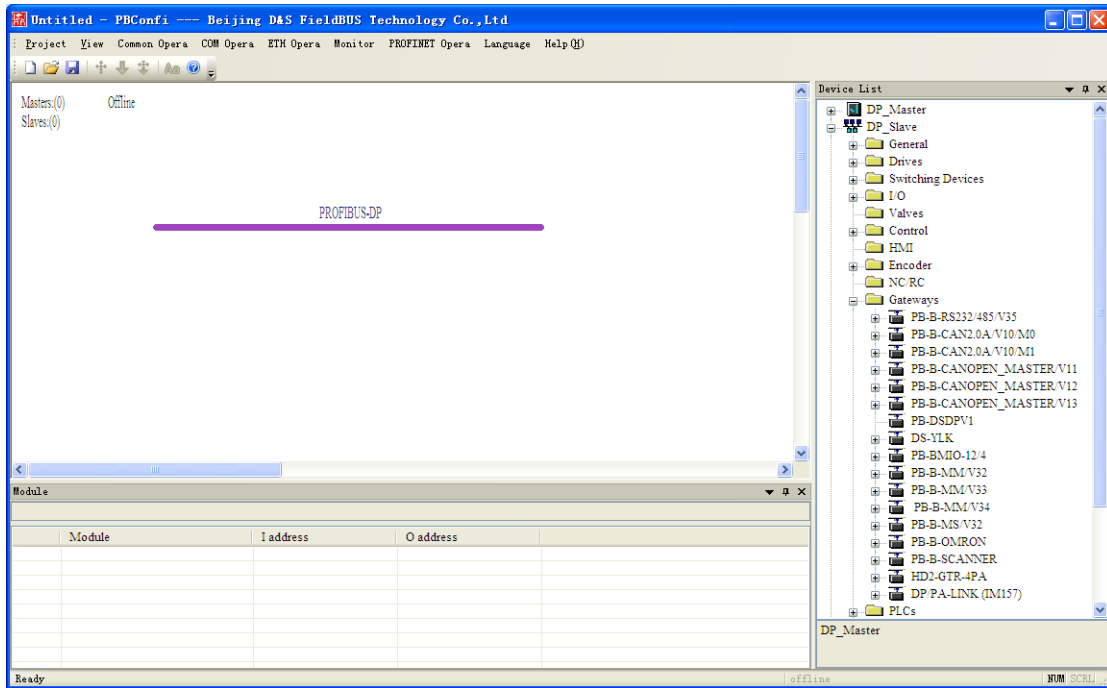


Figure 6-3 Update device directory

1.3 Add a master

Click the hardware device column in the software interface, click “DP-Master” →”PBM-ETH-3.0”, the master PBM-ETH-3.0 is automatically added by the software.

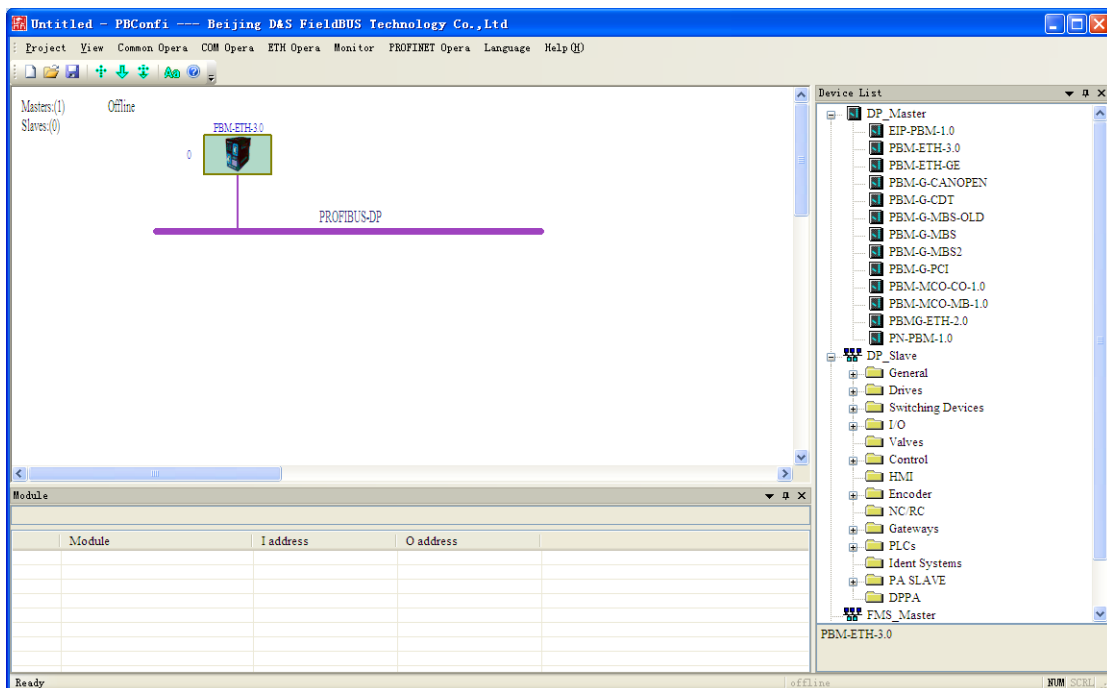


Figure 6-4 Adding master

Double clicking the master icon in the interface, a window for the definition of PROFIBUS master related properties will pop up, in which master address, bus baud rate and other related information can be defined.

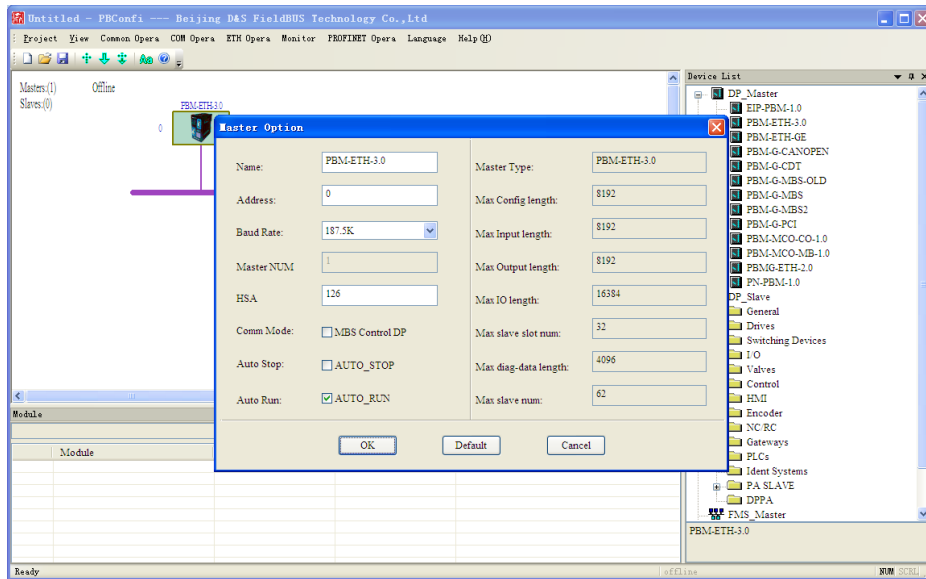


Figure 6-5 Setting of Master properties

Table 6-2 Operation modes of the master

Setting Items	Function
Automatic Stop AUTO STOP	If enabled, when the configured DP slaves are not in data exchange, the master will automatically switch to STOP state, no matter if the AUTO RUN function has been enabled, and in such STOP modes, the system will refuse any operation for the user to manually switch to RUN state. Afterwards, if all the slaves return to data exchange state, the master will still keep in STOP state in case the AUTO RUN function is disabled, and the master will return to RUN state automatically in case the AUTO_RUN function is enabled.
Automatic Run AUTO RUN	If enabled, the master will automatically run in RUN state after power on. If disabled, the master will run in STOP state after power on, and needs the user to switch to RUN state manually. When enable both the 2 functions of AUTO STOP and AUTO RUN, the priority of AUTO STOP is higher, the master will run in STOP state in case any of the configured slaves is not in data exchange, and it will return back to RUN state automatically in case all the slaves are back to data exchange state. After enabled the AUTO RUN function, if the user switch the master to STOP state when the master operates in RUN state, the master will keep in STOP mode for 50ms, and then automatically skip back to RUN state.

1.4 Add slave

Click the hardware device column in the software interface, and click “DP-Slave” → “gateway”, and then

double click the slave PB-DSPBV1 selected from the drop-down menu, the slave is now added to the user interface.

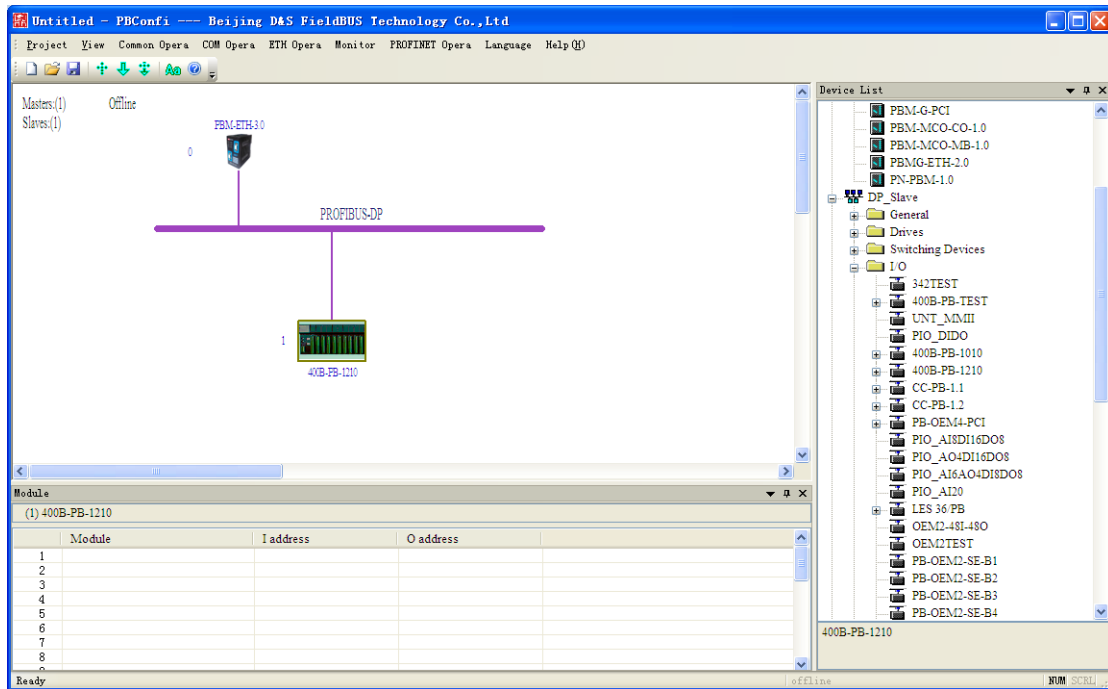


Figure 6-6 Adding slaves

Double click the slave icon from the user interface, a window will pop up, in which such parameters as slave address, user parameters, and WatchDog enabling or disabling, can be configured.

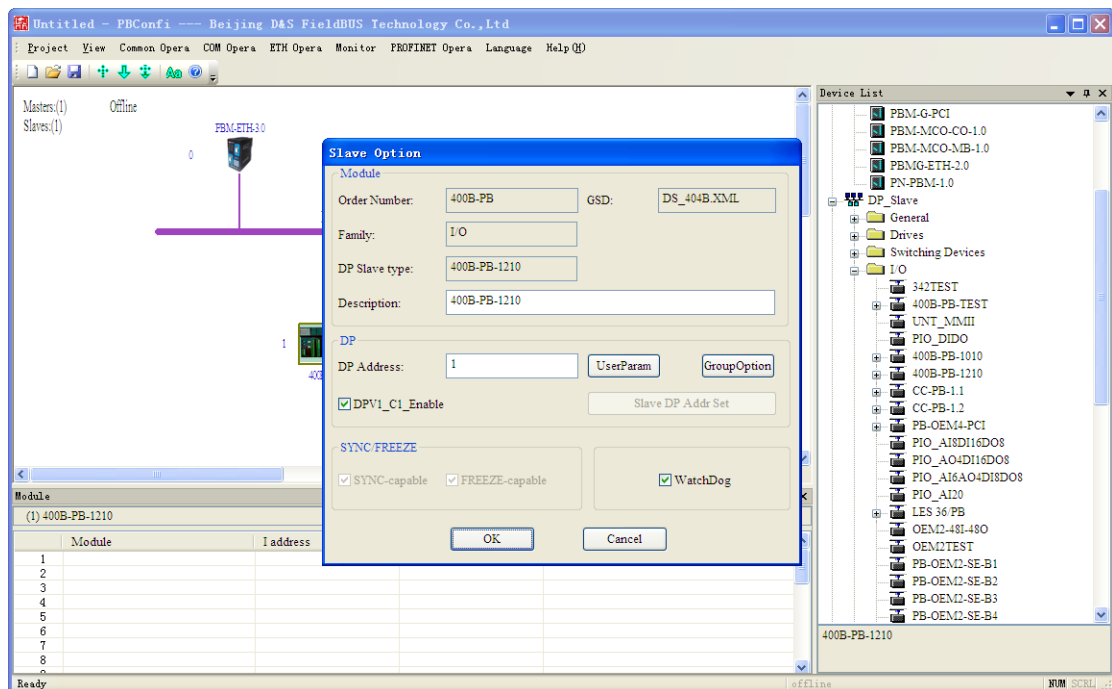


Figure 6-7 Slave properties

◆ Configure PROFIBUS DPV1 function

For the slaves supporting DPV1 function (i.e., there is a description “DPV1_Slave= 1” in the GSD file of the slaves), the default options for enabling DPV1_Enable is checked in the properties window. You can choose not to enable the DPV1_Enable options if you do not intend to use the DPV1C1/C2 function of the slave (such setting may lead to disabled DPV0 function for some DPV1 slaves). For the slaves not supporting DPV1 function, the option DPV1_Enable is not selected by default and in the state that cannot be set.

◆ Set Watchdog

The Watchdog of the slaves can be used to monitor the bus communication, in order to confirm that the master is in working state, and the process data value are still updated. The slave obtains the time value for the Watchdog via a parameter message. If the slave cannot retrigger the watchdog because the bus is busy, it will skip to Wait_Prm state, and will set the output to safety state. The safety state is different from application to application, and cannot be specified.

◆ Set user parameters

Most of the user parameters of the slaves are different from each other. The user parameters of some slaves cannot be modified. Some slaves provide selectable user parameters.

◆ Synchronization, freezing, and grouping settings

In Synchronization mode, the output data of the addressed slaves are locked in the current status. In the user data transmission cycle, the slave stores the output data it received, but its output state remain unchanged. When the slave receives the next synchronization command, the already stored output data are sent to the peripheral devices. Users can exit the synchronization mode with the asynchronous commands.

The freezing mode locks the input data of the slave to the current state, and can only be updated until the master sends the next freezing command. The users can exit the lock mode with the non-freeze command.

The synchronization or freezing operations are realized via sending standard DP broadcast messages to one or more groups specified by the master. The standard defined 8 groups in total. Each of them is represented by a bit of a byte in the broadcast messages. The use of synchronization and freezing function can only be possible after defining the functions of the 8 groups in the PROFIBUS system configuration phase, and then optionally add the slaves to the corresponding groups.

PBM-ETH-3.0 supports the synchronization and freezing functions of the PROFIBUS standard. The setting methods are as follows.

First define the functions of each group in the tab "Grouping Information" of the window "Grouping Settings". Any group can be set to the synchronization group, the freezing group, the group supporting both synchronization and freezing, and the group that disables these functions.

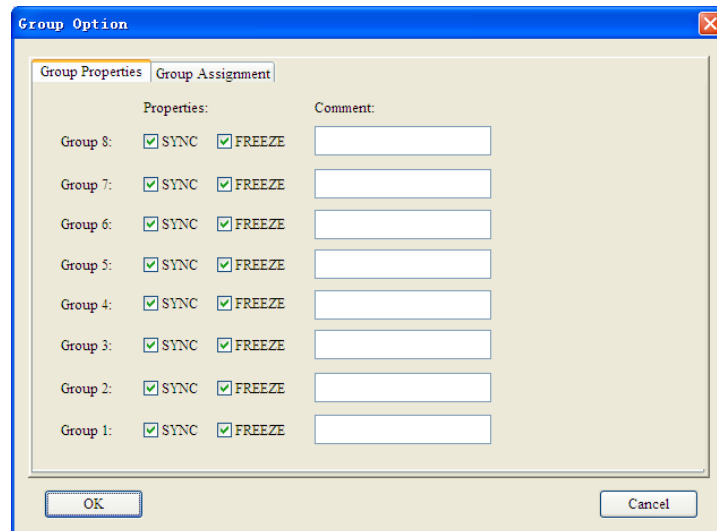


Figure 6-8 Grouping information

Secondly, add slaves to the groups in the tab "Grouping Allocation". The possible ways are to join the synchronization group, to join the freezing group, to join both the synchronous and the freezing group, and not to join any group. Slaves are only allowed to join the groups that are enabled in the tab "Group Information".

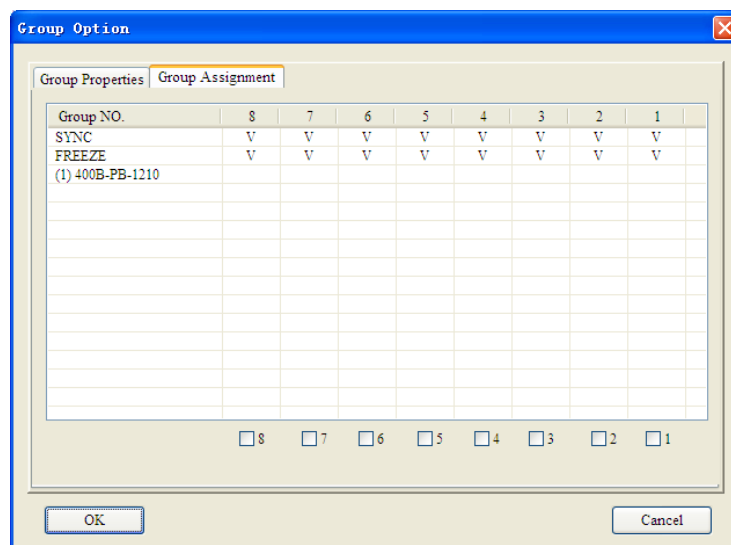


Figure 6-9 Grouping Allocation

1.5 Set bus parameters

Double click the bus, the following dialog appears. There are such parameters as Slot Time, Gap, Retry, Tid, Ttr, and WD time.

Parameter	Value	Unit
Tslot_Init:	100	t_bit
Max.Tsdr:	60	t_bit
Min.Tsdr:	11	t_bit
Tset:	1	t_bit
Tqui:	0	t_bit
Gap:	10	
Retry:	1	
Tslot:	100	t_bit
Tid2:	60	t_bit
Trdy:	11	t_bit
Tid1:	37	t_bit
Ttr:	21305	t_bit
	113.627	ms
WD:	85220	t_bit
	454.507	ms

Buttons: Recalculate, Standard, OK, Cancel

Figure 6-10 Bus parameters

- ◆ Tslot_Init decides the timeout time (tbit) for the master to wait for the response of the slave after sending a message to the slave.
- ◆ Max.Tsdr is used for calculating Watchdog time and Ttr.
- ◆ Gap decides the number of Tokens after which a FDL message will be sent.
- ◆ Retry is the number of repeats for sending messages.

1.6 Set the IP addresses for software to connect

“Ethernet Operation” -> “Setting Access Parameters”

When using PBConfi, it is needed to set the access IP of the software in accordance with the port IP.

(The default connecting IP of the software is 192.168.1.10. The default IP addresses of PBM-ETH-3.0 are: 192.168.0.10 for ETH1, and 192.168.1.10 for ETH2).

1.8 Configure the network parameters for PBM-ETH-3.0

Click “Ethernet Operations” → “Setting Network Parameters”, select mode, and modify IP address. After downloading, switch SW1 OFF, power on the module again, the new mode and new IP become effective.

Figure 6-13 Modify Network Configuration

Note: In dual Ethernet port mode, the IP addresses of the 2 Ethernet ports cannot be configured in the same network segment.

The switch operation mode of the master gateway

The master gateway in switch operation mode only provides 1 network interface and 1 IP address to outside. The two RJ45 can be considered to be the two ports of the switch. Either of the two Ethernet interfaces can be used for communicating with the master gateway. The switch operation mode can also be used to set up daisy chain network.

The dual Ethernet port operation mode of the master gateway

The master gateway in switch operation mode provides two independent Ethernet interfaces and two IP addresses, which cannot be in the same segment. The two Ethernet interfaces separately connect to different network segments. The switch operation mode can be used to set up independent redundant dual network.

1.9 Save and load the configuration files of PBM-ETH-3.0

Click the menu “File” → “Save”, input file name, and click “Save”. See the figure below.

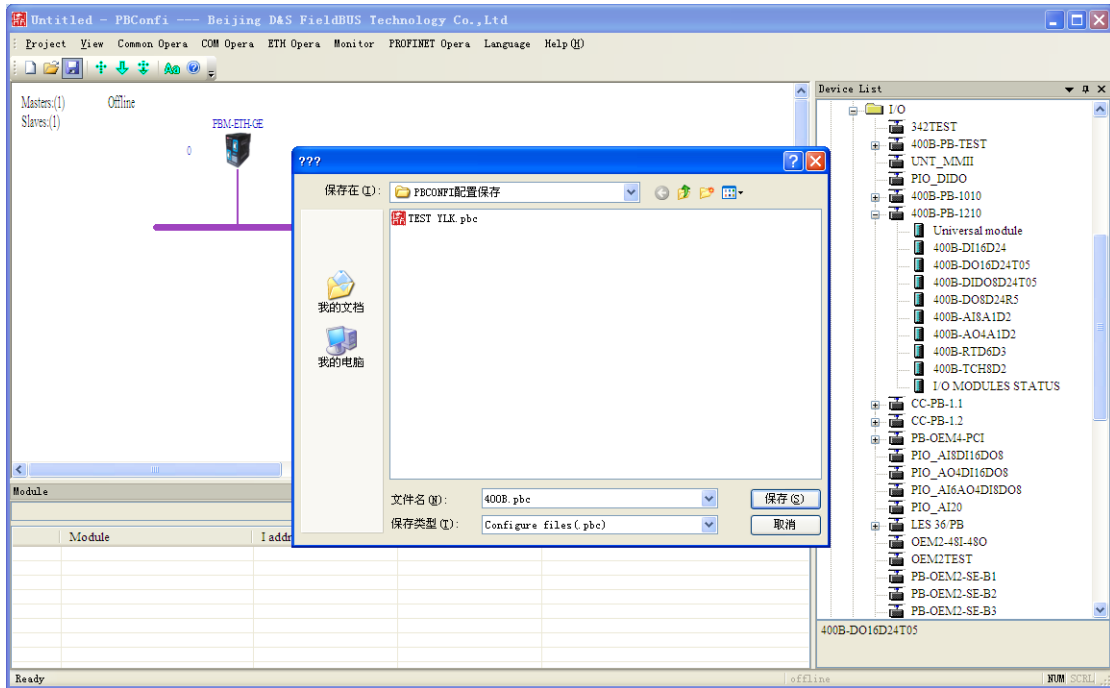


Figure 6-14 Save configuration

2. Online debugging with PBConfi

Operation method: Click “Common Operation → Device Operation”. The Device Operation window is useful for viewing the basic information of the device, adjust the system time of the gateway, monitoring the operation environment of the gateway, and setting the name and LED description of the gateway device.

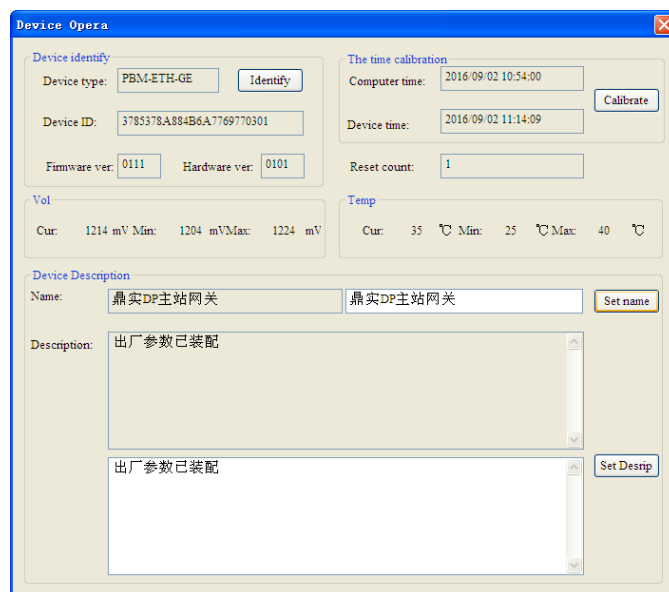


Figure 6-15 Device Operation

2.1 The master manipulations of the master gateway

Operation methods: Click “Common Operation” → “Master Operation”. This window can monitor the operation status of the master, set the master parameters, control the operation modes of the master, and so on.

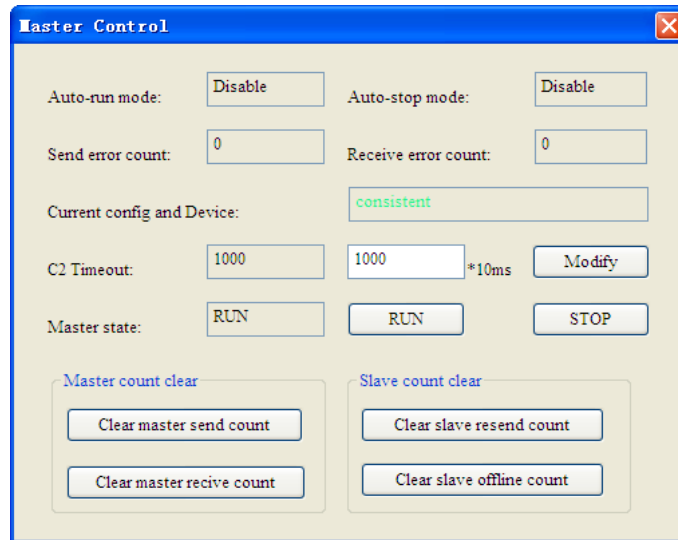


Figure 6-16 Master Operation

Switch the RUN/STOP state with the buttons “RUN”, “STOP”.

2.2 The slave manipulations of the master gateway (DPV1 manipulations)

Operation methods: Click “Common Operation” → “Slave Operation”. This window displays the operation status of the slave, diagnostic information, and operations to DPV1.

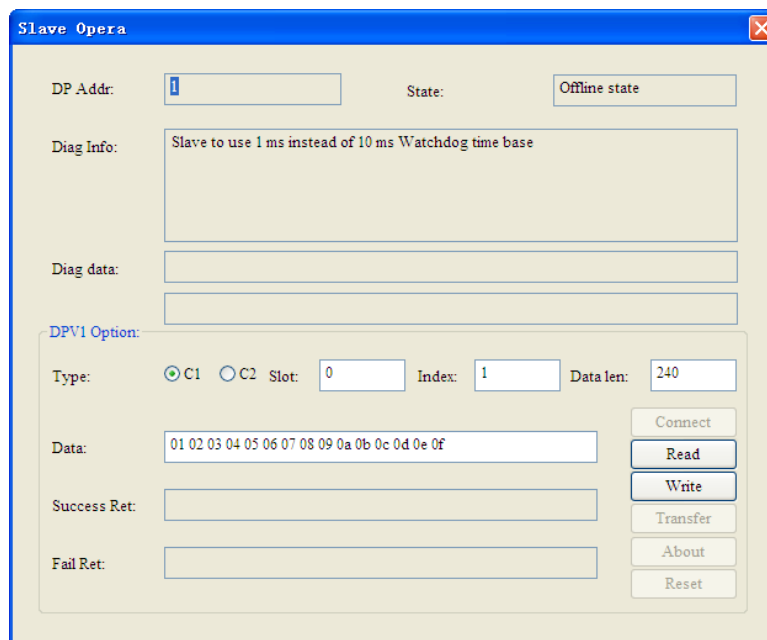


Figure 6-17 Slave Operations

2.3 Monitor the status of the slaves connected to the master gateway

Obtain the operation status of the master and the slaves. The status information of the slaves can always be obtained, no matter they are configured or not. Click “Monitor → Startup”, get the following interface.

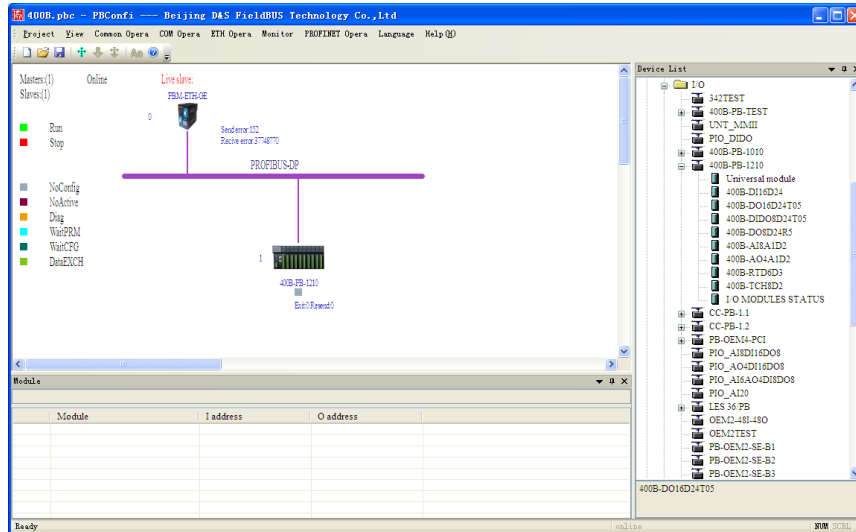


Figure 6-18 Monitoring

The operation status of the master and the slaves can be learnt from different colored icons. The numbers under the master icon contain the number of error messages sent out, and the number of error messages received. The numbers under the slave icon contain the number of repeated messages sent by the slave, and the times that the slave dropped out of data exchange.

2.4 PROFIBUS DPV0 IO data communication

Operation method: Click “Common Operation” → “IO Data Mapping / Online Monitoring”.

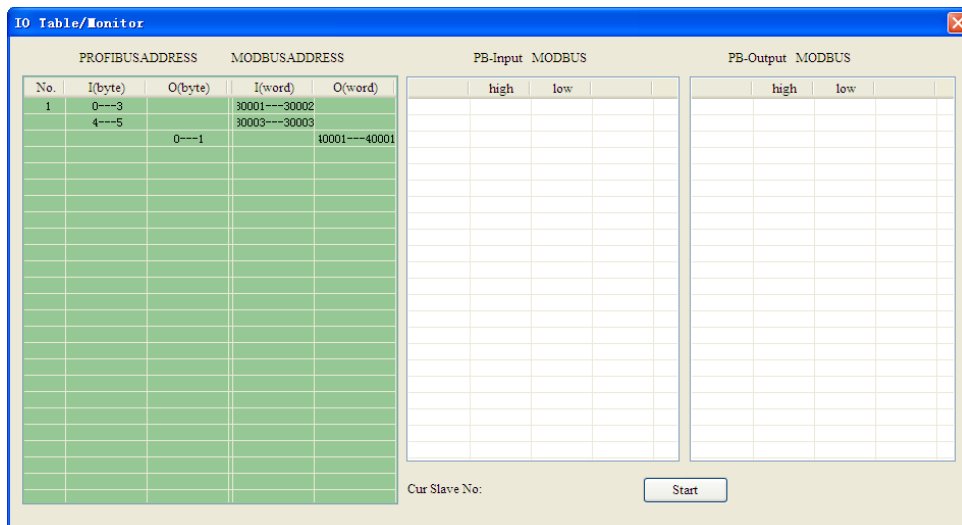


Figure 6-19 Online Monitoring

Select the slave to be monitored, a "*" will be added to the corresponding slave address, and "Current Slave:" indicates the slave currently selected. Click "Start Monitoring", or remove the input data and output data of the slave from the data fields PB-Input and PB-Output. Select the data in the data field PB-Output, modify and click "Send down data", to send the modified data down to the corresponding slave.

2.5 Export the status of all the master gateways and slaves of the current system

Operation: Click "Common Operation" → "Bus Operation Report".

Export the device state of the current gateway, the master state, and the states of all the connected slaves.



```

Report-20160811-144135.txt - 记事本
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)
=====
文件名称      : Report-20160811-144135.txt
注意         : 本文件为软件自动生成, 请勿修改!
校验编码     : 307F5C43DDF96433
生成时间     : PBConfi时间: 2016/08/11 14:41:35 设备时间:
2016/08/11 14:58:09
-----

设备状态
#####
产品型号      : PBMG-ETH-3.0
唯一ID       : 376a3795884a6a7769770301
硬件版本     : 0101
固件版本     : 010d
设备名称     : 鼎实DP主站网关
设备描述     : 出厂参数已装配
重启次数     : 0
工作电压     : 最小 1211mV 最大 1229mV 当前 1224mV
工作温度     : 最小 42度 最大 51度 当前 46度
-----

网口状态

```

Figure 6-20 Bus Operation Report

2.6 Change slave address (special slaves)

Some DP slaves don't provide dip-switch to set the address, but set the slave addresses by means of messages for setting addresses. Normally, the factory default addresses of the slaves are 126. The slave will save the address being set in its own non-volatile memory, and the address will not be lost when powered on again. The software PBConfi support the function for setting slave addresses.

Operation: Click "Common Operation" → "Set Slave Address".



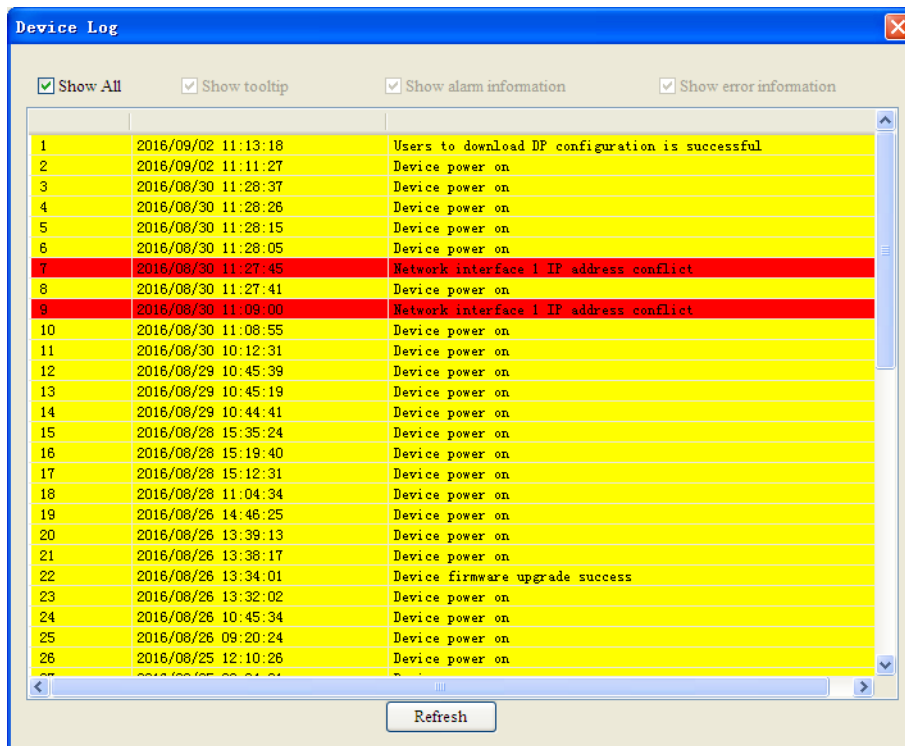
A dialog box titled "Slave DP Addr" with a close button (X) in the top right corner. It contains the following fields and controls:

- Cur Addr: Input field containing the number 2.
- Set Addr: Input field containing the number 1.
- Slave ID: Input field containing the number 1551.
- Modify
- Result: Empty input field.
- Set: Button at the bottom.

Figure 6-21 slave address update

2.7 View System Log

The system log can be viewed with PBConfi. The following window appears after clicking “Common Operation → System Log of the Gateway”.



A window titled "Device Log" with a close button (X) in the top right corner. It features four checked checkboxes at the top: "Show All", "Show tooltip", "Show alarm information", and "Show error information". Below these is a table of log entries. The table has three columns: an index (1-26), a timestamp, and a description. Two entries (7 and 9) are highlighted in red, indicating errors.

Index	Timestamp	Description
1	2016/09/02 11:13:18	Users to download DP configuration is successful
2	2016/09/02 11:11:27	Device power on
3	2016/08/30 11:28:37	Device power on
4	2016/08/30 11:28:26	Device power on
5	2016/08/30 11:28:15	Device power on
6	2016/08/30 11:28:05	Device power on
7	2016/08/30 11:27:45	Network interface 1 IP address conflict
8	2016/08/30 11:27:41	Device power on
9	2016/08/30 11:09:00	Network interface 1 IP address conflict
10	2016/08/30 11:08:55	Device power on
11	2016/08/30 10:12:31	Device power on
12	2016/08/29 10:45:39	Device power on
13	2016/08/29 10:45:19	Device power on
14	2016/08/29 10:44:41	Device power on
15	2016/08/28 15:35:24	Device power on
16	2016/08/28 15:19:40	Device power on
17	2016/08/28 15:12:31	Device power on
18	2016/08/28 11:04:34	Device power on
19	2016/08/26 14:46:25	Device power on
20	2016/08/26 13:39:13	Device power on
21	2016/08/26 13:38:17	Device power on
22	2016/08/26 13:34:01	Device firmware upgrade success
23	2016/08/26 13:32:02	Device power on
24	2016/08/26 10:45:34	Device power on
25	2016/08/26 09:20:24	Device power on
26	2016/08/25 12:10:26	Device power on

At the bottom of the window is a "Refresh" button.

Figure 6-22 System log

Filter function of log entries.

Event ID less than 0x0013 is called a critical event. These events will be saved in the non-volatile memory of the gateway. Power failure will not cause any lost to these information. The Gateway can save up to 256 items of system logs at most. When the number of system log entries exceeds 256, the

latest log entries will cover the earliest log entries.

3. Firmware Upgrading

In order to fix the software bug or to upgrade the functions of the product in time, PBM-ETH-3.0 provides the function of firmware upgrade via Ethernet.

To use the firmware upgrade function, the master gateway is required to run in the firmware upgrade mode. The mode can be set by setting the "firmware upgrade" bit SW3 of the dip-switch to the firmware upgrade mode (i.e., SW3=1), and then power on the master gateway again. If the Ethernet link is connected, the SYS indicator will switch from steady red state to steady green state, otherwise, the SYS indicator will remain steady red until the Ethernet link is connected.

Run PBConfi software, open the firmware upgrade window by clicking the menu "Common Operation" - "Firmware Upgrade", select the firmware version to be upgraded from the drop-down menu, click the "upgrade" button to start the firmware upgrade. The moving forward of the progress bar indicates that the firmware upgrade is in progress.

In the firmware upgrade process, the SYS indicator is in green blinking status. After successful upgrading, the progress bar of the configuration software will be completed, the corresponding prompt information will appear, and meanwhile, the SYS indicator will turn to steady green. After completing the upgrade, switch the dip-switch back to normal operation mode, and power on the device again.

If the firmware upgrade is successful, the device will start running with the latest firmware, the SYS indicator will be in steady green state. If firmware upgrade failed for some reasons (E.g., closing PBConfi software, cable broken, power failure of the gateway, etc.), please switch back to normal mode to start up, the SYS indicator will be in red blinking state, indicating that the firmware failed to start. In this case, it is needed to return to the firmware update mode to update the device firmware again.

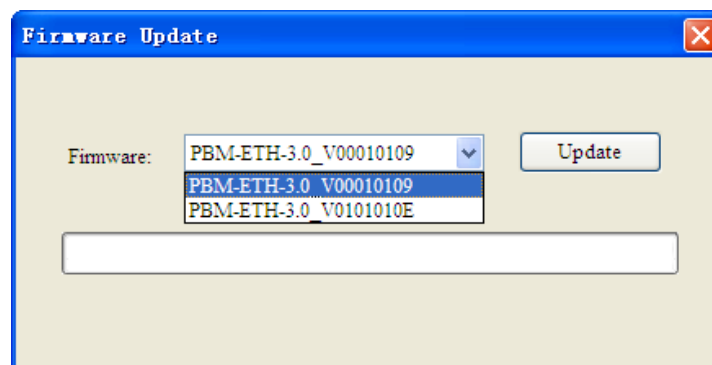


Figure 6-23 Firmware Upgrading

Chapter 5 Perform Monitoring to PROFIBUS-DP Slaves

This chapter mainly introduces how to perform the monitoring of PROFIBUS-DP slaves with the master gateway PBM-ETH-3.0. From the previous chapters, we can learn that all these are achieved by means of reading and writing the Modbus registers. We first need to understand the Modbus data area. The meanings of the Modbus PBM-ETH-3.0 data area are shown in the following table.

Table 6-1 Modbus Data Area

MODBUS Data Area	Data Name	Access Attributes	Function Code	Data Function
MODBUS Data Area 3	Input Register	Read only	0x04: Read Input Registers	<ul style="list-style-type: none"> ● PROFIBUS DPV0 input data ● PROFIBUS DPV1 read data ● PROFIBUS slave diagnostic data ● System log data of the master gateway ● Status registers of the master gateway
MODBUS Data Area 4	Hold Register	Read & Write	0x03: Read Hold Registers 0x06: Read a single register 0x10: Write multiple registers	<ul style="list-style-type: none"> ● PROFIBUS DPV0 output data ● PROFIBUS DPV1 write data ● Control registers of the master gateway

1. Data Area of Input Registers

The MODBUS Data Area 3 is divided into the following areas: DPV0 input data area, DPV1 acknowledge data area, DP diagnostic data area, System log data area, and Gateway status register area. Each MODBUS read request can only access 1 data area. Cross-area access is not possible. The addresses and functions of MODBUS Data Area 3 of PBM-ETH-3.0 are shown in the table below.

Table 6-2 Addresses and Functions of Data Area 3

Type	Name	Address	Length (Word)	Description
DPV0 input data area	DPV0_IDATA	0x0000~0x0FFF (0~4095)	4k	PROFIBUS DPV0 input data
DPV1C1 acknowledge data area	DPV1_C1RSP	0x2000~0x207F (8192~8319)	128	PROFIBUS DPV1C1 request acknowledge message
DPV1C2 acknowledge data area	DPV1_C2RSP	0x3000~0x307F (12288~12415)	128	PROFIBUS DPV1C2 request acknowledge message
DP diagnostic data area	SLAVE_DIAGRSP	0x4000~0x407F (16384~16511)	128	PROFIBUS DIAG data
System log data area	SYSLOG	0x5000~0x55FF (20480~22015)	1280	System log info, up to 256 log entries will be saved.

Table 6-3 System Status Register Area (1)

Type	Name	Address	Length (Word)	Description
System status register area (1)		0x8000 (32768)	1	Product ID, the value is 0x06FA
		0x8001 (32769)	6	The unique ID of the device. Each device has a unique ID.
		0x8007 (32775)	1	Hardware version number
		0x8008 (32776)	1	Firmware version number, High Byte is major version number, Low Byte is minor version number
		0x8009 (32777)	1	System status register *
		0x800A (32778)	1	System restart number register, whose highest bit is overflow bit, and bit14~0 are counter bits. If the counter is overflow, the overflow bit becomes 1.
		0x800B (32779)	1	Number of system log entries in the system log area
		Reserved		
		0x8015 (32789)	1	The current voltage value of the power supply of the device during this power on process. The unit is mV.
		0x8016 (32790)	1	The minimal voltage value of the power supply of the device during this power on process. The unit is mV.
		0x8017 (32791)	1	The maximal voltage value of the power supply of the device during this power on process. The unit is mV.
		0x8018 (32792)	1	The complement code of the current value of the operation temperature of the device during this power on process. The unit is Celsius degree.
		0x8019 (32793)	1	The complement code of the minimal value of the operation temperature of the device during this power on process. The unit is Celsius degree.
		0x801A (32794)	1	The complement code of the maximal value of the operation temperature of the device during this power on process. The unit is Celsius degree.
		Reserved		
		0x801F (32799)	1	CRC check value for the current configuration.
		0x8020 (32800)	2	User configured IP address of Ethernet interface 1 of the master gateway. The high BYTE of the first WORD corresponds to the lowest BYTE of the network address, the low BYTE of the last WORD corresponds to the highest BYTE of the network address.

Table 6-4 System Status Register Area (2)

Type	Name	Address	Length (Word)	Description
System status register area (2)		0x8022 (32802)	2	User configured subnet mask of the Ethernet interface 1 of the master gateway. The high BYTE of the first WORD corresponds to the lowest BYTE of the network address, the low BYTE of the last WORD corresponds to the highest BYTE of the network address.
		0x8024 (32804)	2	User configured default gateway address of the Ethernet interface 1 of the master gateway. The high BYTE of the first WORD corresponds to the lowest BYTE of the network address, the low BYTE of the last WORD corresponds to the highest BYTE of the network address.
		0x8026 (32806)	1	User configured MODBUS/TCP service port number of the Ethernet interface 1 of the master gateway.
		0x8027 (32807)	1	Number of TCP connections of the Ethernet interface 1 of the master gateway.
		0x8028 (32808)	2	User configured IP address of the Ethernet interface 2 of the master gateway. The high BYTE of the first WORD corresponds to the lowest BYTE of the network address, the low BYTE of the last WORD corresponds to the highest BYTE of the network address.
		0x802A (32810)	2	User configured subnet mask of the Ethernet interface 2 of the master gateway. The high BYTE of the first WORD corresponds to the lowest BYTE of the network address, the low BYTE of the last WORD corresponds to the highest BYTE of the network address.
		0x802C (32812)	2	User configured default gateway address of the Ethernet interface 2 of the master gateway. The high BYTE of the first WORD corresponds to the lowest BYTE of the network address, the low BYTE of the last WORD corresponds to the highest BYTE of the network address.
		0x802E (32814)	1	User configured MODBUS/TCP service port number of the Ethernet interface 2 of the master gateway.
	0x802F (32815)	1	Number of TCP connections of the Ethernet interface 2 of the master gateway.	
		Reserved		

Table 6-5 Master Status Register Area

Type	Name	Address	Length (Word)	Description
Master Status Register Area		0x8040 (32832)	1	Master address and the highest possible station address, the low BYTE is the highest possible station address, the high BYTE is the master address
		0x8041 (32833)	1	Baud rate of the master. The meaning of the values: 1: 9.6k, 2: 19.2k, 3: 45.45k, 4: 93.75k, 5: 187.5k, 6: 500k, 7: 1.5M, 8: 3M, 9: 6M
		0x8042 (32834)	1	GAP and RETRY, the high BYTE is GAP (For every GAP number of Tokens, an FDL message will be sent out), the low BYTE is the number of RETRIES.
		0x8043 (32835)	1	Slot time of the master
		0x8044 (32836)	1	The high WORD of the target token rotation time of the master
		0x8045 (32837)	1	The low WORD of the target token rotation time of the master
		Reserved		
		0x8047 (32839)	1	The automatic mode register of the master *
		0x8048 (32840)	1	Master configuration register*
		0x8049 (32841)	1	Master configuration status register *
		0x804A (32842)	1	The high WORD of the actual token rotation time of the master
		0x804B (32843)	1	The low WORD of the actual token rotation time of the master
		0x804C (32844)	1	The high WORD of the max token rotation time of the master (the max token rotation time must not exceed Ttr)
		0x804D (32845)	1	The low WORD of the max token rotation time of the master (the max token rotation time must not exceed Ttr)
		Reserved		
		0x8051 (32849)	1	Counter for failures of DP messages sent by master, whose highest bit is overflow bit, and bit14~0 are counter bits. If the counter is overflow, then the overflow bit is always 1.
	0x8052 (32850)	1	Counter for failures of DP messages received by master, whose highest bit is overflow bit, and bit14~0 are counter bits. If the counter is overflow, then the overflow bit is always 1.	

Table 6-6 Slave Status Register Area

Type	Name	Address	Length (Word)	Description
		Reserved		
Slave Status Register Area		0x805B (32859)	1	Configured Slave number register
		0x805C (32860)	1	Status register for setting slave address
		0x805D (32861)	1	The status register of slave 0 *
			
		0x80DA (32986)	1	The status register of slave 125
		0x80DB (32987)	1	Register for the times that slave 0 dropped out of data exchange. The highest bit is overflow bit, bit14~0 are counter bits. If the counter is overflow, then the overflow bit is always 1.
			
		0x8158 (33112)	1	Register for the times that slave 125 dropped out of data exchange. The highest bit is overflow bit, bit14~0 are counter bits. If the counter is overflow, then the overflow bit is always 1.
		0x8159 (33113)	1	Register for counting the times of Retries of slave 0. The highest bit is overflow bit, bit14~0 are counter bits. If the counter is overflow, then the overflow bit is always 1.
			
	0x81D6 (33238)	1	Register for counting the times of Retries of slave 125. The highest bit is overflow bit, bit14~0 are counter bits. If the counter is overflow, then the overflow bit is always 1.	

Note:

- (1) *The above dresses are the data address in MODBUS messages, addressing from 0. If the tool ModScan is used, the addresses to be filled in are the above addresses plus 1.*
- (2) *For the concrete meaning of the items with “*”, please refer to [6 Description to the bit function definitions of the Modbus register areas of PBM-ETH-3.0](#) of this chapter*

2. Hold register data area

The MODBUS Data Area 4 is divided into the following areas: DPV0 Output Data area, DPV1 Request Data area, and Control Register area.

Each MODBUS request can only access 1 data area. Cross-area access is not possible. The addresses and functions of the MODBUS Data Area 4 of PBM-ETH-3.0 are shown in the table below.

Table 6-7 The addresses and functions of the data area 4

Type	Name	Address	Length (Word)	Description
DPV0 Output Data area	DPV0_ODATA	0x0000~ 0x0FFF(0~4095)	4k	PROFIBUS DPV0 Output Data
DPV1C1 Request Data area	DPV1_C1REQ	0x2000~ 0x207F (8192~8319)	128	PROFIBUS DPV1C1 Request Message
DPV1C2 Request Data area	DPV1_C2REQ	0x3000~ 0x307F (12288~12415)	128	PROFIBUS DPV1C2 Request Message
System Control Register Area	RUNTIME_YEAR	0x8000 (32768)	1	Device operation time - year*
	RUNTIME_MONDAY	0x8001 (32769)	1	Device operation time - month&date*
	RUNTIME_HOURMIN	0x8002 (32770)	1	Device operation time - hour&minute*
	RUNTIME_MSEC	0x8003 (32771)	1	Device operation time - millisecond*
	DEVICE_CTRL	0x8004(32772)	1	Device control register. Set bit2 to 1, it will open the device identification function, then the SYS indicator turns to green blinking state; Reset bit2 to 0, will close the device identification function.
		Reserved		
	DEVICE_NAME	0x8010~0x802F (32784~32815)	32	Device Name, after being written, will not be lost in case of power down
DEVICE_DESCRIP	0x8030~0x80AF (32816~32943)	128	Device Description, after being written, will not be lost in case of power down	

Table 6-8 Control register area

Type	Name	Address	Length (Word)	Description
Master Control Register Area	MASTER_OPCTRL	0x80B0 (32944)	1	Master state machine registers*
		Reserved		
	MASTER_C2RSPTOUT	0x80B2 (32946)	1	Master DPV1C2 response timeout register. After being written, will not be lost in case of power down. The legal value range of the register is 100~3000. The corresponding actual timeout value can be calculated by this value * 10ms. The value of this register should be greater than the attribute value of C2_Response_Timeout in the GSD file of the slave C2.
	MASTER_COMCNTCLR	0x80B3 (32947)	1	Master communication counter clearing register*
		Reserved		
Slave Control Register Area	SLAVE_SYNFRZCTRL	0x80C0 (32960)	1	Slave synchronization, freezing, and control register*
	SLAVE_COMCNTCLR	0x80C1 (32961)	1	Slave communication counter clearing register *
	SLAVE_SETSADDR_ADDR	0x80C2 (32962)	1	The register for setting slave address, the high BYTE is the current address of the slave, the low BYTE is the destination address of the slave
	SLAVE_SETSADDR_IDNUM	0x80C3 (32963)	1	The register for setting the Ident Number of the slave address
	SLAVE_SETSADDR_NOCHG	0x80C4 (32964)	1	The register for setting whether or not to allow the change of slave address. The value 0 means the slave address is allowed to be change again. If the value is not 0, it means the slave address is now allowed to be changed again.

Note:

- (1) *The above dresses are the data address in MODBUS messages, addressing from 0. If the tool ModScan is used, the addresses to be filled in are the above addresses plus 1.*
- (3) *For the concrete meaning of the items with “*”, please refer to [6 Description to the bit function definitions of the Modbus register areas of PBM-ETH-3.0](#) of this chapter.*

3. PBM-ETH-3.0 MODBUS Communication Acknowledge Code

The Gateway will judge the MODBUS/TCP access request from the client. If the service request is wrong or the gateway cannot complete the service request, the MODBUS acknowledge will be used to return the corresponding error code. The error codes that the gateway may return and their meanings are shown in the following table.

Table 6-9 Acknowledge code value

MODBUS Acknowledge Code Name	Acknowledge Code Value	Meaning
MBSRET_INVALIDFC	0x01	Illegal MODBUS function code.
MBSRET_OFFSETERR	0x02	Illegal data address.
MBSRET_VALUEERR	0x03	Illegal data value.
MBSRET_AREA_INVALID	0x10	MODBUS access area invalid.
MBSRET_AREA_CROSS	0x11	Cross access to 2 MODBUS function area.
MBSRET_SERVIC_BUSY	0x12	Device service busy.
MBSRET_SETTIME_FAIL	0x20	Setting master system time failed.
MBSRET_GETLOG_FAIL	0x21	Getting system log failed.
MBSRET_USRCONF_ERR	0x40	Error user configuration for master.
MBSRET_NOTPMMASTER_ERR	0x41	Current master is not a P master
MBSRET_REDUSW_FAIL	0x42	Redundant master switch failed.
MBSRET_RUNSTOPSW_FAIL	0x43	Master RUN/STOP switch failed.
MBSRET_HIGH_DIAG	0x60	High priority warning from slave.
MBSRET_SLAVE_OFFLINE	0x61	The accessed slave is offline (no acknowledge to the SD2 message of the master).
MBSRET_SLAVE_NDEX	0x62	The accessed slave is not in data exchange state.
MBSRET_V0_UNREADY	0x63	DPV0 data of the accessed slave are not ready.
MBSRET_SYNFRZ_FAIL	0x64	The synchronization or freezing operation of the slave failed.
MBSRET_V1_FAIL	0x65	The slave DPV1 operation request failed.
MBSRET_V1_UNREADY	0x66	The slave DPV1 acknowledge not ready.
MBSRET_V1_NOTSUPP	0x67	The slave does not support DPV1 function.
MBSRET_SETSADDR_FAIL	0x68	Setting slave address failed.

4. PBM-ETH-3.0 Modbus DP Slave Diagnostic Data Area Manipulation

The format of the diagnostic data of each slave in MODBUS Area 3

By reading the MODBUS diagnostic data area 3, the users are able to get the diagnostic data and the corresponding timestamp of all the configured DP slaves, to set the unit identifier of the MODBUS message (the 7th BYTE of the Modbus/TCP message) as the address of the slave whose diagnostic data are expected to be obtained. When reading the Modbus data area to obtain the diagnostic data of the slaves, the starting address for reading the data must be 0x4000, which is the starting address of the DP diagnostic data area. The data structure of the diagnostic data of each slave in the corresponding area is shown in the table below.

Table 6-10 Data Structure of the Diagnostic Data

Relative Offset Address (WORD)	Data Function
0x00	Timestamp of the diagnostic data - year
0x01	Timestamp of the diagnostic data - month and date, the 1 st BYTE is month, the 2 nd BYTE is date
0x02	Timestamp of the diagnostic data - hour and minute, the 1 st BYTE is hour, the 2 nd BYTE is minute
0x03	Timestamp of the diagnostic data - millisecond
0x04	Length of the actual diagnostic data, the unit is BYTE
0x05	The 1 st WORD of the actual diagnostic data
.....
	The last WORD of the actual diagnostic data. If it is a single WORD, then the high BYTE is effective, the low BYTE is 0.

In the data structure of the slave diagnosis, the timestamp of the diagnostic data shows the time that the master receives diagnostic acknowledge message from the slave. Because the length of the diagnostic data actually replied from the slave may be less than the maximum length of the diagnostic data, the actual diagnostic data length field reflects the length of the actual effective diagnostic data in the data structure. If the length of the diagnostic data that the user reads exceeds the length of the actual data returned from the station, the excessive part of the data is not valid.

5. PBM-ETH-3.0 Modbus System Log Area Manipulation

For the convenience of the system fault analysis, PBM-ETH-3.0 support system log function. The key events during the system operation process can be recorded with the system log function. Users can read the log event from the log data area of the MODBUS area 3. When reading the Modbus data area to obtain the diagnostic data of the slaves, the starting address for reading the data must be 0x5000, which is the starting address of the DP diagnostic data area.

System log events are classified to critical log events and non critical log events. PBM-ETH-3.0 will write the critical log events into the non-volatile memory, which can still be saved after power down, and is convenient for device maintenance.

Format of System Log

The system log area in MODBUS area 3 is of 3kB in total, each log entry occupies 10 bytes, up to 256 log entries can be stored. Nonvolatile memory can save up to 256 critical log events. The data format for each log entry is as follows:

Table 6-11 The data format of log entries

Relative Offset Address (WORD)	Contents
0x00	Timestamp of the log entry - year
0x01	Timestamp of the log entry - month and date. In MODBUS messages, the month BYTE is at the front, and the date BYTE is at rear.
0x02	Timestamp of the log entry - hour and minute. In MODBUS messages, the hour BYTE is at the front, and the minute BYTE is at rear.
0x03	Timestamp of the log entry – millisecond. In MODBUS messages, the high byte of millisecond is at the front, and the low byte is at the rear
0x04	Log Entry ID. In MODBUS messages, the high byte of Log Entry ID is at the front.

Therein, the timestamp of the log occupies 8 bytes. The format is "year: month date: hour minute:

millisecond". It indicates the occurrence time of the system event being recorded. The time benchmark is the internal time of PBM-ETH-3.0.

If you want to use the absolute time to record the system event, the user needs to set the system time for PBM-ETH-3.0 by setting the system time register in the 4th area of MODBUS whenever power on PBM-ETH-3.0.

Log entry ID indicates the type of the log event, which accounts for 2 bytes. Each type of the log event has a unique ID value. The number of log entries in the current log area can be obtained by accessing the register "number of system log entries in the system log area".

System Log ID

The system event IDs that PBM-ETH-3.0 currently supports are listed in the following table.

Table 6-12 System Log ID

ID Names of the Log Events	ID value of Log Event	Log Event Descriptions
SYSLOG_SYS_PWRUP	0x0001	Device power on
SYSLOG_SYS_PBMWTGRESET	0x0002	Watchdog of DP master CPU restarted
SYSLOG_SYS_ETHWTGRESET	0x0003	Watchdog of Ethernet CPU restarted
SYSLOG_SYS_PBMCPUEXCEPT	0x0006	Master CPU reset abnormally
SYSLOG_SYS_ETHCPUEXCEPT	0x0007	Ethernet CPU reset abnormally
SYSLOG_SYS_TEMPUPLIMIT	0x0008	Device environment temperature over the upper limit
SYSLOG_SYS_TEMPLOWLIMIT	0x0009	Device environment temperature below the lower limit
SYSLOG_SYS_VOLTUPLIMIT	0x000A	Device operation voltage over upper limit
SYSLOG_SYS_VOLTLOWLIMIT	0x000B	Device operation voltage below lower limit
SYSLOG_SYS_ETH1IPCRASH	0x000E	IP Address conflict at Ethernet Port 1
SYSLOG_SYS_ETH2IPCRASH	0x000F	IP Address conflict at Ethernet Port 2
SYSLOG_SYS_USRLOADCONFOK	0x0010	Users download configuration successful
SYSLOG_SYS_USRLOADCONFERR	0x0011	Users download configuration failed
SYSLOG_SYS_FIRMWAREUPDATEOK	0x0012	Device firmware upgrade successful
SYSLOG_SYS_FIRMWAREUPDATEERR	0x0013	Device firmware upgrade failed
The above log events are critical log events, will be written into non-volatile memory when happens, and will not get lost when power off.		
SYSLOG_SYS_ETH1CONNECOFF	0x0021	Network disconnected at Ethernet Port 1
SYSLOG_SYS_ETH2CONNECOFF	0x0022	Network disconnected at Ethernet Port 2
SYSLOG_MASTER_P2IDLE	0x0040	The redundant operation state of the device

		was switched from the primary mode to the idle mode
SYSLOG_MASTER_B2IDLE	0x0041	The redundant operation state of the device was switched from the backup mode to the idle mode
SYSLOG_MASTER_P2B	0x0042	The redundant operation state of the device was switched from the primary mode to the backup mode
SYSLOG_MASTER_B2P	0x0043	The redundant operation state of the device was switched from the backup mode to the primary mode
SYSLOG_MASTER_IDLE2B	0x0044	The redundant operation state of the device was switched from the idle mode to the backup mode
SYSLOG_MASTER_STOP2RUN	0x0045	The device operation state was switched from Stop mode to Run mode.
SYSLOG_MASTER_RUN2STOP	0x0046	The device operation state was switched from Run mode to Stop mode.
SYSLOG_SLAVE0_LEAVDEXCH	0x0060	The slave with the address 0 left data exchange state
.....		
SYSLOG_SLAVE125_LEAVDEXCH	0x00DD	The slave with the address 125 left data exchange state
SYSLOG_SLAVE0_HALARM	0x00DE	The slave with the address 0 generated a high priority alarm
.....		
SYSLOG_SLAVE125_HALARM	0x015B	The slave with the address 125 generated a high priority alarm

Therein, the read operation to the system log area does not require an integer multiple times of the log entries. The starting address for the read access is not required to be the starting address of the log entries. If the length of the log data being read exceeds the total length of the log entries, 0 will be used for padding the length in the acknowledgement.

6. Description to the bit function definitions of the Modbus register areas of PBM-ETH-3.0

System Status Registers [Input Register 0x8009\(32777\)](#)

Table 6-13 System Status Registers

Bit Number	Name	Function
Bit3	TOO_HIGH_TEMP	1 means working temperature too high
Bit2	TOO_LOW_TEMP	1 means working temperature too low
Bit1	TOO_HIGH_VLT	1 means working voltage too high
Bit0	TOO_LOW_VLT	1 means working voltage too low

Register Operations of the Master State Machine [Hold Register 0x80B0 \(32944\)](#)

The meaning of Reading Status:

Table 6-14 The meaning of reading the status of the Master State Machine Registers

Bit Number	Name	Function
Bit2:0	Master Operation Status	001: Master is in Offline mode 010: Master is in Configuration mode 011: Master is in STOP mode 100: Master is in RUN mode

The meaning of Writing Operations:

Table 6-15 The meaning of the writing operations of the Master State Machine Registers

Bit Number	Name	Function
Bit2:0	Master Operation Control	001: Invalid 010: Invalid 011: Set the Master to STOP mode 100: Set the Master to RUN mode

Slave status register operations [Input Registers 0x805D\(32861\)~0x80DA\(32986\)](#) shows the status of [slave 0 to slave 125](#)

Each slave has its unique slave status register. The format of the register is as followings:

Table 6-16 Slave status register

Bit Number	Name	Function
Bit15	SLAVE_WITHINCONF	1 means the current configuration include this slave
Bit14	SLAVE_ONLINE	Slave on line (live slave, i.e., there are responds to the FDL messages)
Bit13~12	SLAVE_FSMSTATE	Status of the slave state machine 00: Diagnostic state 01: Parameterization state 10: Configuration state 11: Data Exchange state
Bit11	WTG1MS_ENABLE	The slave use 1ms as the Time Base of Watchdog, instead of 10ms
Bit10	DEXCH_HALARM	Data exchange Respond: slave generated a high priority alarm
Bit9	DIAGRESP_NOTSUPPORT	Diagnostic Respond: slave doesn't support some functions of the configuration
Bit8	DIAGRESP_STATIONNTRDY	Diagnostic Respond: slave not ready
Bit7	DIAGRESP_PARAMCONFERR	Diagnostic Respond: slave parameter or configuration error
Bit6	DIAGRESP_NEEDPARAM	Diagnostic Respond: slave need parameterization
Bit5	DIAGRESP_EXTERNDIAGN	Diagnostic Respond: extended diagnostic valid
Bit4	DIAGRESP_STATICDIAGN	Diagnostic Respond: static diagnostic valid
Bit3	DIAGRESP_SLAVELOCKED	Diagnostic Respond: slaved locked by other masters
Bit2	DIAGRESP_INVALIDMADDR	Diagnostic Respond: master address error
Bit1	DIAGRESP_INVALIDSID	Diagnostic Respond: slave ID error
Bit0	DIAGRESP_LENVERRUN	Diagnostic Respond: length exceeds upper limit

System Control Registers operations [Hold Register](#)

The functions currently provided by the system control registers are shown in the table below.

Table 6-17 System Control Registers

Functions of System Control Registers	Operation Ways
Adjust system time 0x8000~0x8003 (32768~32771)	Each of the 4 fields of the system time, namely, year, month & date, hour & minute, and millisecond, occupies 1 WORD. They can be adjusted together or separately. The hour field follows 24 hour timing system.
Set Device Name 0x8010~0x802F (32784~32815)	64 BYTES in non-volatile memory data area, define device name for the master gateway of the system.
Set Device Description 0x8030~0x80AF (32816~32943)	256 BYTES in non-volatile memory data area, being used for the device description information of the master gateway in the system.

Master Communication Counter Clearing Register [Hold Register 0x80B3 \(32947\)](#)

Table 6-18 Master communication counter clearing register

Bit Number	Name	Function
Bit1	COMCNTCLR_TX	1 means the counter for master receiving errors cleared
Bit0	COMCNTCLR_RX	1 means the counter for master sending errors cleared

Master's Automatic Mode Register [Input Register 0x8047\(32839\)](#)

Table 6-19 Master's automatic mode register

Bit Number	Name	Function
Bit1	AUTO_RUN	1 means the gateway automatically goes into RUN state after power on
Bit0	AUTO_STOP	1 means the gateway enables the automatic STOP function, i.e., when any configured slave is not in data exchange, the master will automatically switch to safe output status.

Master Configuration Register [Input Register 0x8048\(32840\)](#)

Table 6-20 Master configuration register

Bit Number	Name	Function
Bit3	CONFCTRL_PREPM	1 means the gateway is an preferred P master. The bit is constantly 1 in non redundant mode
Bit2	CONFCTRL_REDUN	1 means dual device redundant operation mode, otherwise, non redundant operation mode.

Master Configuration Status Register [Input Register 0x8049\(32841\)](#)

Table 6-21 Master configuration status register

Bit Number	Name	Function
Bit3:2	CONFSTAT	00: Configuring master not complete 01: Configuring master failed 10: Configuring master successful

Setting slave address status register [Input Register 0x805C\(32860\)](#)

Table 6-22 Slave address status register

Bit Number	Name	Function
Bit1:0	SET_SADDR_RSLT	00: Setting slave address not ready 01: Setting slave address successful 10: Setting slave address respond overtime 11: Setting slave address refused

Slave synchronization, freezing, and control register [Hold register 0x80C0 \(32960\)](#)

Table 6-23 Slave synchronization, freezing, and control register

Bit Number	Name	Function
Bit11	SYNC_ENABLE	1 means synchronization enabled
Bit10	SYNC_DISABLE	1 means synchronization disabled
Bit9	FREEZE_ENABLE	1 means freezing enabled
Bit8	FREEZE_DISABLE	1 means freezing disabled
Bit7:0	GROUP_NUM	The group number of the synchronization and freezing grouping

Slave Communication Counter Clearing Register [Hold Register 0x80C1 \(32961\)](#)

Table 6-24 Slave communication counter clearing register

Bit Number	Name	Function
Bit1	COMCNTCLR_LEAVDEXC	1 means to clear the statistics of the times that the slave get out of data exchange
Bit0	COMCNTCLR_RETRY	1 means to clear the statistics of the number of retries for the slave

Appendix: Toxic and Hazardous Substances list

Introduced here according to the request of "Management Measures for the pollution control of electronic information products"

Component Name	Toxic and Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Plastic Shell	0	0	0	0	0	0
Circuit Board	X	0	0	0	0	0
Copper Stud	0	0	0	0	0	0
Film	0	0	0	0	0	0
Socket/Plug	X	0	0	0	0	0

0: means that, in all the same kinds of materials used in this component, the contained toxic or hazardous substances are below the limit requirements of SJ/T1163-2006;

X: means that, in all the same kinds of materials used in this component, at least a kind of the contained toxic or hazardous substances are higher than the limit requirements of SJ/T1163-2006.

Note: The referenced "environmental protection using period" is based on using the products under the normal temperature and humidity conditions.

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