

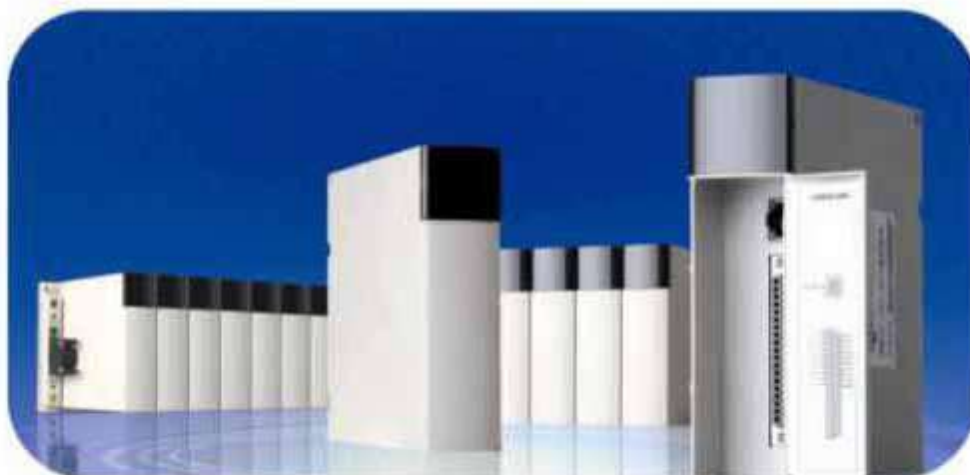
JZ-SMS-NA400-003



南大傲拓科技
Nanda Automation Technology

NA400 Series Programmable Logic Controller

Technical Specifications and User Manual A2.7



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0 Preface

The NA series Programmable Logic Controllers (NA-PLC) are designed and developed independently by Nanda Automation Technology Co., Ltd. NA-PLC draws on the successful experiences of the international main stream PLCs to improve their deficiencies, aims at the latest development of today's PLC, and adopts a combined world-leading advanced technologies in information, communication, electronics, automatic control technology and other areas. From the aspects of operating system, CPU, I/O signal processing, network communication, software development and production process, NA-PLC has a superior performance and is suitable for all kinds of automatic control. NA400 PLC has greatly enhanced traditional PLC functions, including flexibility in networking, degree of opening in system platform, flexibility in programming software and module intelligence, so that the control of complex projects can be realized perfectly.

More features about NA400 PLC are as follows:

■ Stable and Reliable

- Entire intelligent I/O and a series design in security, reliability provide the system with a strong guarantee for its' safe and secure operation.
- Solutions are provided for redundant systems including power supply redundancy, CPU redundancy, Ethernet redundancy and non-disturbance switch.

- Low-power consumption design is adopted in which CPU module power consumption is about 7W and I/O module power consumption is about 2W.
- Hot swapping /hot plugging are supported, so that replacing or adding components do not require significant interruption to the system and there will be no interference to other input and output.
- CPU boundaries, I/O boundaries, communication network boundaries and AC power supply are electrically isolated. These isolation boundaries are examined and approved as providing safe separation.
- Excellent electromagnetic compatibility.
- Users' program and data can be stored permanently.
- Protecting the intellectual property rights of users by using password configuration.

■ Comprehensive functions & modules

- Rich types of modules applying to a variety of applications, including power supply module(PWM), CPU module, communication module(CMM), digital input module(DIM), sequence of event module(SOE), digital output module(DOM), analog input module(AIM), analog output module(AOM) , temperature module, high-speed counter module etc.
- Using embedded real-time multitasking operating system to support multi-task allocation for a better use of CPU resources.
- Open network with 100Mbps NIC with support to MODBUS/TCP protocol.

- Multiple serial communications included. Supporting MODBUS and customized protocols. Supporting a variety of field-bus protocols such as CAN, DeviceNet, Profibus-DP, etc.
- Extensive built-in integration functions, including not only standard operators, control modules, standard functions, but also practical and cost effective functions such as PID, SOE (Sequence of Event) to meet the demand for high-end applications with low costs.
- Integrating a hardware watch-dog to give a wide range of fault monitoring and diagnosis.

■ **Cost effective**

- NIC is integrated in CPU module (saving communication module).
- Serial communication modules provide rich communication interfaces to work with other devices and systems.
- Expanding plug box can be done directly without additional expansion module (saving expansion module).
- Hot Standby Redundancy can be achieved by use of only one redundant electric cable (saving redundant module).
- Programming and debugging is quick and convenient.
- IEC61131-3 International Standard is conformed.
- Rich functions including system configuration, database configuration and more online functions such as database online query, ladder diagram online

monitoring, structured text online debugging and modification, technological process online testing.

- Various programming languages such as LD, IL, ST, SCC, FBD are supported.
- English-Chinese bilingual programming makes the code more readable.
- Friendly GUI with both intelligent graphic and textual edit function.
- Remote programming and debugging through Ethernet is supported.
- More friendly and intelligent help system.

1 Hardware System Overview

☐ Synopsis

NA400 PLC fully absorbs the latest achievements of international industrial electronics and industrial control technologies, with features of high integration, reliability, scalability, rich functions, high performance, and easy to use. It can be customized to fit for solutions of different industrial sectors and be widely used in metallurgy, building materials, light industry, transportation, power, petrochemical, automotive, mining, water treatment, food processing and other industries.

☐ Content

In this chapter, the following will be described:

Section	Content
1.1	Component and Structure of NA400 Hardware System
1.2	Technical Features of NA400
1.3	NA400 System Specifications
1.4	Product List of NA400
1.5	Hardware System Configuration of NA400

1.1 Component and Structure of NA400 Hardware System

The hardware system of NA400 series PLC consists of controller modules, sequence of events modules, general I/O modules, communication modules, backplane and system power supply. All modules are installed on the backplane.

- Controller module: also called CPU module. It is installed on the local backplane that can support a total of two categories of redundancy and non-redundancy controllers with a built-in 10/100 Mbps Ethernet and two serial communication interface. The internal bus leads through the local backplane, making it a convenient for a hot-plug operation.
- SOE module: It provides digital input signal acquisition and records the sequence of the displacement event. The resolution is 1.0ms.
- General I/O module: It can be installed in the local backplane and expansion backplane. It communicates with the controllers by high-speed internal bus.
- Communication module: It can be installed in the local backplane or the expansion backplane and used for appending other communication protocols. NA400 controller can communicate with third party devices by RS232/RS485, DeviceNet, PROFIBUS-DP, Ethernet and other network protocols. If NA400 control system is to provide a certain communication function, this can be achieved by simply installing an appropriate communication module on the backplane. Various types of communication modules can cover most popular network protocols.
- Power supply module: It is installed in the backplane, providing power supply to other modules. The power supply to the field devices should be installed separately in order to ensure the electrical isolation between the field and the control system.

1.2 Technical Features of NA400

- CPU Module has 2 of its own independent serial ports with 1 (or 2 independent / hot backup) Ethernet interface. In addition, it can support current widely used communication protocols through communication expanding modules to interfacing with PROFIBUS-DP, DeviceNet and etc..
- Advanced field-bus network: High speed field-bus is used for internal communication, which is of fast rate, strong anti-interference ability and ease of expansion.
- The average power consumption of CPU modules is 7W, and 2W for I/O modules.
- The program software NAPRO not only supports the four program languages complying with the international standard IEC61131-3, which are Ladder Diagram(LD), Instruction List(IL), Structured Text(ST), and Function Block Diagram(FBD), but also supports the Sequential Control Charts(SCC), which is the most classical language used in sequential control process.
- Algorithms for sequence, process, and motion control and other commonly used are included in the product.
- Optional redundancy : Dual-CPU could be configured on the same local backplane. When using master-slave redundancy scheme, master and slave CPUs will receive network data and do the control computing at the same time, but only the master CPU will output the result and refresh the real-time data. The slave CPU modules will receive data and compute, but will not output control commands. When the master module fails, the slave will raise himself as a master with a non-disturbance shifting method. This redundant configuration has greatly improved PLC's continuous runnable ability.
- Self-diagnosis : Most commonly used I/O modules have failure self-diagnosis function which is done periodically, and will report diagnosis result to CPU modules. At the same time, Status Indicator LEDs with different colors are located on the panels of every

modules, including RUN state, Fault state, and communication state, etc.. A combination of light, flicker, or off represent different running states of modules, so that one could see clear enough about the running state of every modules.

- Hot-Plugging: All the functional modules (communication modules, CPU modules and I/O modules) support hot-plugging, so that engineers could replace or repair components without significant interruption to the system when some modules failed.

1.3 NA400 System Specifications

Table 1. General system specifications of NA400 Hardware System:

System Power	5VDC	Supply Voltage	5VDC (-5 %, +5 %)
		Ripple	<5%
		Reverse Voltage Protection	YES
Electromagnetic Compatibility (EMC)	Immunity	Surge Immunity	IEC61000-4-5 4kV (CM) /2kV (DM)
		Oscillatory Wave Immunity	IEC61000-4-12 2.5kV (CM) /1kV (DM)
		Electrical Fast Transient	IEC61000-4-4 ±4kV (Power) /±2kV (I/O)
		Electro-Static Discharge	IEC61000-4-2 ±15kV (Air) /±8kV (Contact)
		Radiation Electromagnetic Immunity	IEC61000-4-3 10V/m, Frequency 80MHz~1GHz
	Electromagnetic Radiation Interference	Radiated Interference	IEC61131-2 30~230MHz 10m Quasi-peak value < 40dB(μV/m) 230~1000MHz 10m Quasi-peak value

			<47dB(μV/m)
		Conducted Interference	IEC61131-2 0.15~0.5MHz Quasi-peak value < 79dB(μV) Average value <66dB(μV) 0.5~30MHz Quasi-peak value < 73dB(μV) Average value <60dB(μV)
Environmental Adaptation	Climatic Environment	Operating Temperature	-10 °C ~+55 °C
		Operating Humidity	5%~95%, non-condensing
		Operating Altitude	0~3000m
		Storage Temperature	-40°C~+60°C
		Storage Humidity	5%~95%, non-condensing
	Mechanical Environment	Vibration	IEC 60068-2-6: Part 2-6/10 up 58 Hz, uniform amplitude 0.075 mm 1G (gravity acceleration), amplitude 0.3mm, Frequency 58~150Hz
		Shock	IEC 60068-2-27: 15G, duration 11ms
		Drop	IEC 60068-2-31 : 50mm , drop 4 times (unpacked)
		Free-Fall	IEC 60068-2-32: 1m, drop 5 times (shipping package)
	Shell Protection	Class Of Shell Protection	IEC60529 IP20 (prevent foreign articles larger than 12mm from access, but not waterproof)

1.4 Product List of NA400

NA400 PLC hardware product is composed of CPU modules, communication modules, I/O modules, backplane and power supply modules. I/O modules and communication modules can be divided into several types according to the functions.

Table 2. NA400 PLC Hardware Product List:

Module Type	Order NO.	Notes
Controller CPU	400CPU4010101	Normal CPU, RS232×2(standard MODBUS), program space 256K
	400CPU4010102	Normal CPU, RS232×2(standard MODBUS), program space 512K
	400CPU4010103	Normal CPU, RS232×2(standard MODBUS), program space 1M
	400CPU4010201	Normal CPU, RS232×2(standard MODBUS), NIC×1(standard MODBUS/TCP), program space 1M
	400CPU4010202	Normal CPU, RS232×2(standard MODBUS), NIC×1(standard MODBUS/TCP), program space 2M
	400CPU4010203	Normal CPU, RS232×2(standard MODBUS), NIC×1(standard MODBUS/TCP), program space 4M
	400CPU4010301	High Performance CPU, RS232×2(standard MODBUS), NIC×1(standard MODBUS/TCP), program space 4M
	400CPU4010302	High Performance CPU, RS232×2(standard MODBUS), NIC×1(standard MODBUS/TCP), program space 8M
	400CPU4010303	High Performance CPU, RS232×2(standard MODBUS), NIC×1(standard MODBUS/TCP), program space 16M
	400CPU4010401	High Performance CPU, RS232×2(standard MODBUS), NIC×1(standard MODBUS/TCP), program space 32M

	400CPU4010402	BNC×1(IRIG B-IN (TTL)),NIC×2(standard MODBUS/TCP), program space 32M, for SOE with IRIG B
	400CPU4010501	Redundant CPU, High Performance CPU, RS232×2(standard MODBUS), NIC×1(standard MODBUS/TCP), program space 32M
	400CPU4010701	Redundant CPU, High Performance CPU,2*RS232(MODBUS), 1* Ethernet(MODBUS/TCP), program space 32M
Digital Input	400DIM4011601	16 points input 24VDC(Sink)
	400DIM4011602	16 points input 24VDC (Source)
	400DIM4013201	32 points input 24VDC(Sink)
	400DIM4013211	16 points input 24VDC&16 points input 48VDC(Sink)
	400DIM4013202	32 points input 24VDC (Source)
Digital Output	400DOM4011601	16 points output 24VDC, transistor
	400DOM4011602	16 points output, relay
	400DOM4013201	32 points output 24VDC, transistor
Digital Input/ Output	400DIO4011601	8 points input 24VDC(Sink), 8 points output 24VDC, transistor
	400DIO4011602	8 points input 24VDC(Sink), 8 points output relay
Sequence of Event	400IIM4011601	16 points input 24VDC(Sink)
	400IIM4011612	16 points input 24VDC(Source)
	400IIM4013201	32 points input 24VDC(Sink)
Pulse Input	400PIM4010801	8 points input 24VDC(Sink)
	400PIM4010802	8 points input 24VDC (Source)
Analog Input	400AIM4010801	8 points, Current, Single Ended Input
	400AIM4011601	16 points, Current, Single Ended Input

	400AIM4010802	8 points, Current/ Voltage, Single Ended Input
	400AIM4010803	8 points, Voltage, Single Ended Input
	400AIM4011603	16 points, Voltage, Single Ended Input
	400AIM4011613	16 points, Voltage, Single Ended Input
	400AIM4010404	8 points, Current/ Voltage, Differential input
	400AIM4011804	16 points, Current/ Voltage, Differential input
	400AIM4010805	RTD input 8 points
	400AIM4010806	Thermocouple input 8 points
Analog Output	400AOM4010401	4 points, 4~20mA, current
	400AOM4010411	4 points, 0.2~22mA, current
	400AOM4010802	8 points, Current/ Voltage
	400AOM4010402	4 points, Current/ Voltage
High Speed Counter	400HCM4010201	2 points (2×500kHz)
Communication Module	400CMM4010411	4×RS485
	400CMM4010102	Profibus DP Master
	400CMM4010103	Profibus DP Slave
	400CMM4010113	Profibus DP Redundant Slave
	400CMM4010104	CANOpen Master
	400CPU4010502	MODBUS/TCP Slave Module
	400CMM4010108	Ethernet Master Station Module
	400CMM4010118	Ethernet Substation Module
	400CMM4010118	Ethernet Substation_SFP Module
	400CMM4010215	Ethernet、RS485 and RS422 interface Module
Power Supply	400PWM4010501	50W, external power supply 24V DC
	400PWM4010502	50W, external power supply 220V AC

Module	400PWM4010503	50W, N+1 Redundant Power supply 24V DC
	400PWM4010801	80W, external power supply 24V DC
	400PWM4010802	80W, external power supply 220V AC
	400PWM4011001	100W, external power supply 24V DC
	400PWM4011002	100W, external power supply 220V AC
Accessories	400BKM4010601	6-slot backplane
	400BKM4010901	9-slot backplane
	400BKM4011201	12-slot backplane
	400BKM4011501	15-slot backplane
	400CNE4010101	I/O Signal Terminal strip
	400CNL4010101	Communication Expanding Cable, 1m
	400CNL4010201	Communication Expanding Cable, 2m
	400CNL4010301	Communication Expanding Cable, 3m
	400CNL4010102	Bus Expanding Cable, 1m
	400CNL4010202	Bus Expanding Cable, 2m
	400CNL4010302	Bus Expanding Cable, 3m
	400NUL4010101	NULL Module
	400BUS4010101	Bus Adapter

1.5 Hardware System Configuration of NA400

1.5.1 Power Capacity Check and Configuration

For safety considerations, it is suggested that the total power consumption of all modules is less than 70% of the consumption of the selected power supply. Please see Table 3 which

shows the power consumption of each module. The figure listed in Table 3 is the system consumption of NA400, which is not the output consumption of power supply (i.e. power supply for switches, load, transmitters and other field apparatus). Please refer to corresponding I/O module manuals to determine the output consumption of power supply according to different loads of each I/O channel. Special attention should be paid that field power supply should not be mixed up with system supply to avoid possible damages to NA400 hardware system and to ensure electrical isolation between the field and the control system.

Table 3. NA400 PLC Module Power Consumption List:

Module Type	Model	Voltage	Current	Power Consumption
CPU	CPU401-0101	5VDC	1A	5W
	CPU401-0102	5VDC	1A	5W
	CPU401-0103	5VDC	1A	5W
	CPU401-0201	5VDC	1.5A	7.5W
	CPU401-0202	5VDC	1.5A	7.5W
	CPU401-0203	5VDC	1.5A	7.5W
	CPU401-0301	5VDC	1.5A	7.5W
	CPU401-0302	5VDC	2A	10W
	CPU401-0303	5VDC	2A	10W
	CPU401-0401	5VDC	2A	10W
	CPU401-0402	5VDC	2A	10W
	CPU401-0501	5VDC	2A	10W
	CPU401-0701	5VDC	2A	10W
DI	DIM401-1601	5VDC	380mA	1.9W
	DIM401-1602	5VDC	380mA	1.9W
	DIM401-3201	5VDC	440mA	2.2W

	DIM401-3211	5VDC	440mA	2.2W
	DIM401-3202	5VDC	440mA	2.2W
DO	DOM401-1601	5VDC	560mA	2.8W
	DOM401-1602	5VDC	560mA	2.8W
	DOM401-3201	5VDC	640mA	3.2W
DIO	DIO401-1601	5VDC	360mA	1.8W
	DIO401-1602	5VDC	360mA	1.8W
SOE	IIM401-1601	5VDC	240mA	1.2W
	IIM401-1612	5VDC	240mA	1.2W
	IIM401-3201	5VDC	280mA	1.4W
Pulse Input	PIM401-0801	5VDC	380mA	1.9W
	PIM401-0802	5VDC	380mA	1.9W
AI	AIM401-0801	5VDC	480mA	2.4W
	AIM401-1601	5VDC	480mA	2.4W
	AIM401-0802	5VDC	480mA	2.4W
	AIM401-1602	5VDC	480mA	2.4W
	AIM401-0803	5VDC	480mA	2.4W
	AIM401-1603	5VDC	480mA	2.4W
	AIM401-1613	5VDC	480mA	2.4W
	AIM401-0804	5VDC	480mA	2.4W
	AIM401-1604	5VDC	480mA	2.4W
	AIM401-0805	5VDC	500mA	3.5W
	AIM401-0806	5VDC	700mA	3.5W
AO	AOM401-0401	5VDC	700mA	3.5W
	AOM401-0411	5VDC	700mA	3.5W

	AOM401-0802	5VDC	400mA	2W
	AOM401-0402	5VDC	400mA	2W
CMM	CMM401-0411	5VDC	600mA	3.0W
	CMM401-0102	5VDC	600mA	3.2W
	CMM401-0103	5VDC	640mA	3.2W
	CMM401-0113	5VDC	640mA	3.2W
	CMM401-0104	5VDC	640mA	3.2W
	CPU401-0502	5VDC	1.5A	7.5W
	CMM401-0108	5VDC	1.2A	6W
	CMM401-0118	5VDC	1.2A	6W
	CMM401-0118_SFP	5VDC	1.2A	6W
	CMM401-0215	5VDC	0.9A	4.5W

1.5.2 Network connection

■ Ethernet

NA400 CPU has a built-in single link or dual link redundant Ethernet interface, which complies with IEEE802.3/u standard and which is 10/100Mbps self-adapted. It has the output from the front panel of CPU modules with a standard RJ45 socket. It uses shielded twisted-pair cable or non-shielded twisted-pair cable.

■ High-speed Internal Network

High-speed internal network(HIN) is the internal bus of NA400 PLC, which ensures the reliable control of NA400 PLC with its speediness, strong anti-interference capacity and easy expandability.

Features:

- HIN of every I/O module is electrically isolated, so that one module's breakdown won't affect the communication of the other modules.
- High speed and real-time HIN Communication has a strong capability of recognizing and processing errors.
- There is a double line of high-speed internal field-bus network. The data exchange between CPU modules and I/O modules uses HIN1, while the data exchange between CPU modules and other modules, such as serial communication modules, uses HIN2. These two networks are separate and will not affect each other.
- HIN is serial bus which is easy to expand and improves the flexibility of system configuration.

■ RS-485 Serial Communication Interface

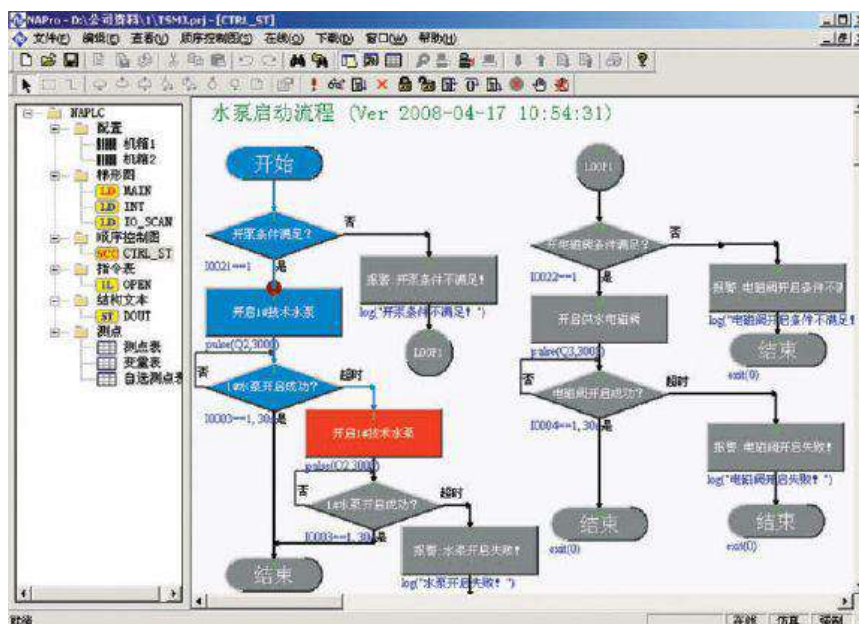
RS-485 serial communication interface connects NA400 series PLC with external intelligent devices. It not only saves cables and modules, but also avails inspection and maintenance.

1.5.3 NA400 Software Support

NA400 PLC uses NAPro software, developed solely by Nanda Automation Technolog, to program the software and debug the system. NAPro software, an IEC61131-3 standarlized programming, debugging and running software, can also be used with NA200 or NA600 PLC. It consists of an editor, a compiler, a debugger, a simulator and GUI tools. It can be used to do hardware configuration, test point configuration, software programming, simulation, debug and download.

NAPro processes a series of full functions which makes it a good choice to improve

productivity and software collaboration. With the development cost decrease and optimal operation, NAPro can ensure optimizing customer's software investment, lowering the training cost, and a peerless potential in development and compatibility.



Features of NPro programming software are as following:

Comply with IEC-61131 international standard

NAPro complies with IEC-61131 international standard, which provides an uniform and effective system configuration environment which makes it possible for the engineers to “learn once, and use everywhere”.

Fully support Chinese programming environment

Chinese is fully supported in NAPro. Chinese variables, comment, descriptions can be used in programs. Working windows, menus, tabs, online help and user manuals are also in Chinese.

Tree structure for project management

Under the concepts of project management, NAPro has a project browser with a tree structure, displaying multi-document of programs in a visualized mode, which makes it convenient to programming development and maintenance.

Supporting five programming languages specified in IEC61131-3

NAPro supports all five programming languages specified in IEC61131-3. Different languages could be used within a project and could be called by each other. These five languages include:

LD: Ladder Diagram

ST: Structured text

IL: Instruction List

FBD: Function Block Diagram

SFC: Sequential Function Chart

An original Sequential Control Chart (SCC) Programming Language

As most of control operations in control area are sequential controls, NAPro creates a Sequential Control Chart, which is a simple graphic process description and easy to be accepted by users due to its visualization and convenience.

Rich operation control functions

NAPro not only embeds many standard modules, standard operators and functions, but also provides many practical modules such as pulse digital output, serial communication, network communication, and etc..

Online real-time monitoring function

When online, NAPro could monitor all test points and variables, view SOE events and warning messages, and watch the program execution.

Perfect online editing function

When online, parameters of Ladder Diagram function can be modified directly, and the modified results can be directly transferred to running PLC on the base of ensuring program continuity. In this way, the modifications could get into effect within the same scan cycle. Module delete or movement can also be carried out but require download before real execution.

Powerful online debugging function

When online, programs can be automatically executed, monitor the execution and debug. Breakpoint can be set and single step can be taken. One can stop the execution or restart it at any time. It is very convenient to debug the program.

Perfect simulation function

A PLC simulator is integrated in NAPro, which could precisely reproduce the activity of a target program. This process of programming and debugging can be done without the hardware so as to reduce the length of program development cycle.

Friendly software design interface

NAPro makes the best use of the advantages of Windows graphic and context interface. It improves greatly user friendly experience by optimizing the use of display area, direct visit to tools and information, and bilingual comments, etc..

Effective diagnostic tool

NAPro has an overall function of diagnosing application programs. The compiler window can display clearly all the system and application faults. In this window, modifications can be easily made by simply clicking the mouse and entering the editor where the programs go wrong.

For more detailed information about NAPro programmable software, please refer to “NAPro programmable software manual for NA series PLC”.

2 CPU Modules

☐ Synopsis

The CPU module is the core part of NA400 series PLC; it constructs a complete hardware system of PLC by connecting the expansion bus and expansion modules. The CPU module is responsible for self-diagnosis, data acquisition, control of implementation, external communications, and external output functions, etc.

NA400 series PLC offer 5 different CPU modules: a basic CPU module with an Ethernet port CPU401-01 series; a standard CPU with an Ethernet interface module CPU401-02 series; a high-performance CPU module with an Ethernet port CPU401-03; a high-performance CPU module with two Ethernet ports CPU401-04 series; a high-performance Redundancy CPU Module CPU401-05; and a high-performance Redundancy CPU Module CPU401-0701.

The CPU Module is also called the system control center. Users download the completed program into the CPU module, then CPU module is activated and run the user program in a loop manner, and in each loop cycle it need to read in the process information, do logical calculation, and output the result of the operations. At the same time, it also need to handle the communications, high-speed counting, event interruption processes, and etc., periodically or according to the time set by the user.

☐ Content

CPU modules will be described in this chapter

Section	Content
2.1	Basic CPU401-01, 2×RS232 (MODBUS) , 1×NIC(MODBUS/TCP)
2.2	Normal CPU401-02, 2×RS232 (MODBUS) , 1 ×NIC(MODBUS/TCP)
2.3	High performance CPU401-03,2×RS232 (MODBUS) , 1×NIC(MODBUS/TCP)
2.4	High performance CPU401-0401,2×RS232 (MODBUS) , 2×NIC(MODBUS/TCP)
2.5	High performance CPU401-0402,BNC×1(IRIG B-IN (TTL)),NIC×2(standard MODBUS/TCP),
2.6	High performance CPU401-0501,2×RS232 (MODBUS) , 1×NIC(MODBUS/TCP)
2.7	Redundant CPU, High Performance CPU401-0701,2*RS232(MODBUS), 1* Ethernet(MODBUS/TCP), program space 32M

Table1. Maximum points of internal register in different CPU types

CPU type Register	CPU401-01	CPU401-02	CPU401-03	CPU401-04	CPU401-05
I	256	512	1024	2048	2048
Q	256	512	1024	2048	2048
IW	64	128	256	512	512
QW	64	128	256	512	512
M	2048	4096	8192	16384	16384
MW	2048	4096	8192	16384	16384
N	512	1024	2048	4096	4096
NW	512	1024	2048	4096	4096
S	512	1024	2048	4096	4096
SW	256	512	1024	2048	2048
T	128	256	512	1024	1024

C	128	256	512	1024	1024
V	20K	20K	32K	32K	32K

Each series of CPU has its own maximum allowed number of registers. When writing the programs, please check this information carefully, otherwise the compiler will report errors because of use of registers is beyond limit.

2.1 Basic CPU CPU401-01 Series

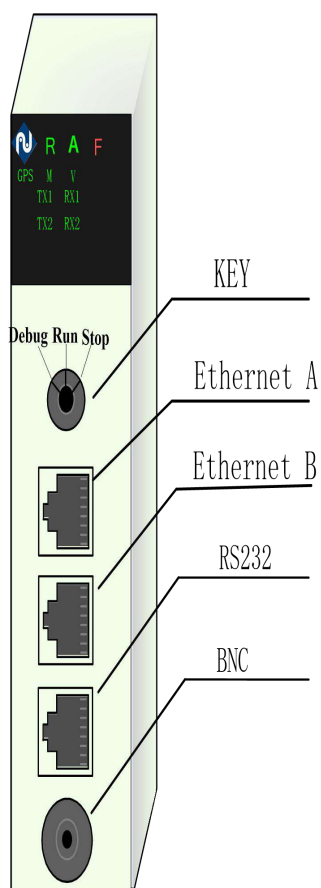
Order Number

CPU Notes	Order No.
Basic CPU, 2×RS232(MODBUS), program space 256K	400CPU4010101
Basic CPU, 2×RS232(MODBUS),program space 512K	400CPU4010102
Basic CPU, 2×RS232(MODBUS),program space 1M	400CPU4010103

Features:

1. Consisting of 2 RS232-ports, supporting MODBUS slave protocol and using RJ45 sockets to communicate with other modules;
2. One Ethernet port for user download and debugging programs;
3. With watchdog function, it can self-reset and reboot when there is fault;
4. Hot-plugging is supported;
5. Power failure safeguard.

Outlook of CPU Module:



NA400 CPU401-01 Module

LED Indicator description:

The LED indicators of CPU modules are located in the upper front panel. These indicators could help users have an understanding of CPU module running state. The LED indicators and working state of NA400 CPU401-01 is described in the following table:

	R	A	F
GPS	M	V	
	TX1	RX1	
	TX2	RX2	

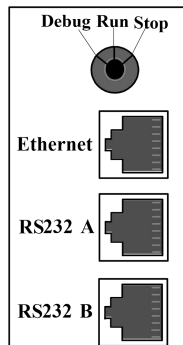
Indicator LEDs

LED	Color	State	Meaning
R	Green	Flicker	Run normally
A	Green	Constant lighting / off	The module is in the Run state / The module is in the Stop state or has a fatal fault
F	Red	Light / off	Module failure (including the network cable did not plug, CAN network failure and so on) / module no fault
TX1	Green	Flicker / off	Serial port 1 is sending data/No Data is sending
RX1	Green	Flicker / off	Serial port 1 is receiving data/No Data is received
TX2	Green	Flicker / off	Serial port 2 is sending data/No Data is Sending
RX2	Green	Flicker / off	Serial port 2 is receiving data/No Data is received

Hardware Setting and External Interface

1. Key Switch

- There is a 3-position key switch in the CPU module, which is used to setting the state of the module. The key is in run position when the module is running normal.



- Stop:** When switching the key to "Stop" position, the module is in the Stop state and the software stops scanning the user program.
- Debug:** When switching the key to "Debug" position, the module is in the Debug state and the Watchdog of the module will be disabled, and the user program can be

debugged at this time.

- RUN: When switching the key to “Run” position ,the module is in the normal running state. The Watchdog of the module will be enabled, when the module runs disorderly or crash due to some interference or hardware failure and other causes, it can automatically resume operation.

2. Serial Communication Interface

- The CPU module has two serial communication ports which comply with standard MODBUS slave station protocol. These ports can connect with external devices and the external devices shall be set as Modbus master. Both Serial port A and Serial port B are of RJ45 shape, whose pin is defined as follows:

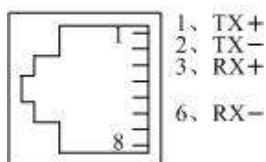
	R	A	F
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

The Definition of Serial Communication Interface

3. Ethernet interface

CPU module of NA400 CPU401-01 series has one Ethernet interface which is only used for debugging the downloaded user programs (not for communication usage).

The Ethernet interface is defined as follows:



The definition of Ethernet Interface

Technical Specification

CPU type	CPU401-0101	CPU401-0102	CPU401-0103
----------	-------------	-------------	-------------

Order NO.		400CPU4010101	400CPU4010102	400CPU4010103
CPU basic frequency		40MHz	50MHz	60MHz
CPU Processing Capacity	Bit Instruction Speed	0.2us	0.2us	0.2us
	Word Instruction Speed	0.4us	0.4us	0.4us
Memory Property	Program	256K	512K	1M
	Data	2M	4M	8M
Power Voltage	Upper Limit	5.25V	5.25V	5.25V
	Rating	5.0V	5.0V	5.0V
	Lower Limit	4.75V	4.75V	4.75V
Current Consumption	Upper Limit	0.8A	0.8A	0.8A
	Rating	0.6A	0.6A	0.6A
	Typical Power Consumption	3W	3W	3W
Support Redundant CPU		NO	NO	NO
Ethernet Interface		0	0	0
RS232 Serial Ports		2	2	2
Communication Ability	MODBUS	YES	YES	YES
	Profibus	YES	YES	YES
	CANBUS	YES	YES	YES
Program Language	LD	YES	YES	YES
	ST	YES	YES	YES
	IL	YES	YES	YES

	FBD	YES	YES	YES
	SFC			
	SCC	YES	YES	YES
Weight (g)		300	300	300
Installing Size (Length×Height×Depth) (mm)		40×145×153.5	40×145×153.5	40×145×153.5

2.2 Standard CPU CPU401-02 Series

Order Number

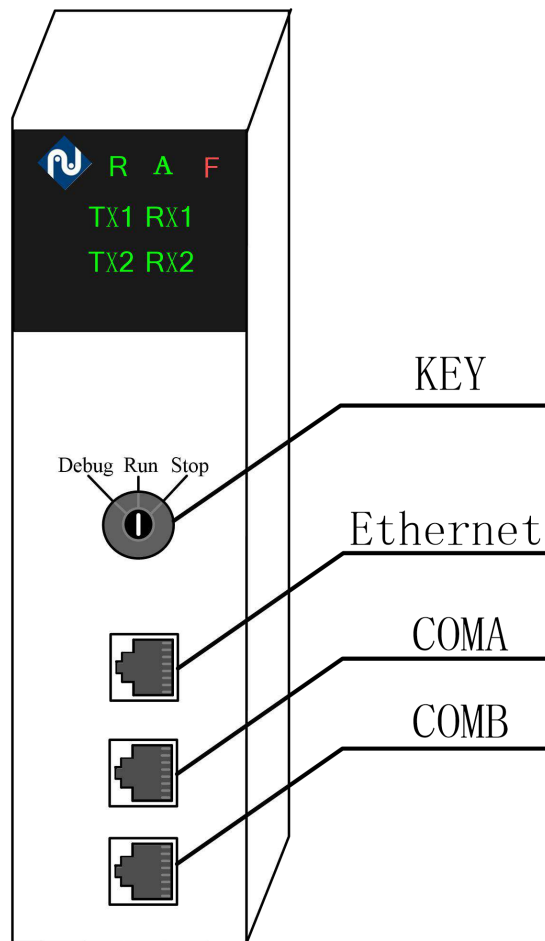
CPU Notes	Order No.
Normal CPU, 2×RS232(MODBUS), 1 ×NIC(MODBUS/TCP), program space 4M	400CPU4010201
Normal CPU, 2×RS232(MODBUS), 1 ×NIC(MODBUS/TCP), program space 8M	400CPU4010202
Normal CPU, 2×RS232(MODBUS), 1 ×NIC(MODBUS/TCP), program space 16M	400CPU4010203

Features:

CPU401-02 has the following features:

1. Containing 2 built-in RS232-ports, supporting MODBUS slave protocol, and using RJ45 sockets to download and debug user programs or communicate with other modules;
2. Has Watchdog function, can self-resetting and reboot when fault.
3. Hot-plugging is supported.
4. Power failure safeguard.
5. Has an Ethernet interface, can connect directly with host computer system.

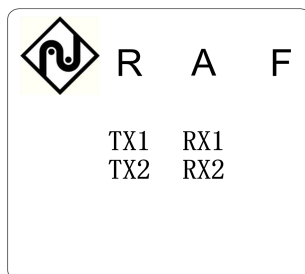
Outlook of CPU Module:



NA400 CPU401-02 Module

Indicator LED description:

The LED indicators of CPU modules are located in the upper front panel. These indicators could help users have an understanding of CPU module running state. The LED indicators and working state of NA400 CPU401-02 is described in the following table:



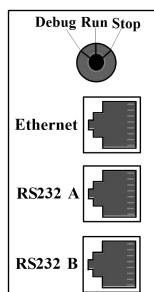
Indicator LEDs

LED	Color	State	Meaning
R	Green	Flicker	Run normally
A	Green	Constant lighting / off	The module is in the Run state / The module is in the Stop state or has a fatal fault
F	Red	Light / off	Module failure (including the network cable did not plug, CAN network failure and so on) / module no fault
TX1	Green	Flicker / off	Serial port 1 is sending data/No Data is sending
RX1	Green	Flicker / off	Serial port 1 is receiving data/No Data is received
TX2	Green	Flicker / off	Serial port 2 is sending data/No Data is Sending
RX2	Green	Flicker / off	Serial port 2 is receiving data/No Data is received

Hardware Setting and External Interface

1. Key Switch

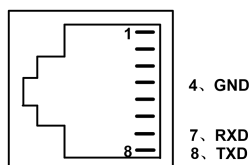
- There is a 3-position key switch in the CPU module, which is used to setting the state of the module. The key is in run position when the module is running normal.



- Stop: When switching the key to “Stop” position, the module is in the Stop state and the software stops scanning the user program.
- Debug: When switching the key to “Debug” position, the module is in the Debug state and the Watchdog of the module will be disabled, and the user program can be debugged at this time.
- RUN: When switching the key to “Run” position, the module is in the normal running state. The Watchdog of the module will be enabled, when the module runs disorderly or crash due to some interference or hardware failure and other causes, it can automatically resume operation.

2. Serial Communication Interface

- The CPU module has two serial communication ports which comply with standard MODBUS slave station protocol. These ports can connect with external devices and the external devices shall be set as Modbus master. Both Serial port A and Serial port B are of RJ45 shape, whose pin is defined as follows:

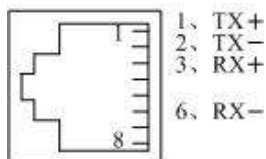


The Definition of Serial Communication Interface

3. Ethernet Interface

NA400 CPU401-02 series have one Ethernet interface.

The definition of Ethernet Interface is described in the following figure:



The definition of Ethernet Interface

Technical Specification

CPU type		CPU401-0201	CPU401-0202	CPU401-0203
Order NO.		400CPU4010201	400CPU4010202	400CPU4010203
CPU Basic Frequency		180MHz	180MHz	180MHz
CPU Processing Capacity	Bit Instruction Speed	0.1 us	0.1 us	0.1 us
	Word Instruction Speed	0.2 us	0.2 us	0.2 us
Memory Property	Program	1M	2M	4M
	Data	8M	16M	32M
Power Voltage	Upper Limit	5.25V	5.25V	5.25V
	Rating	5.0V	5.0V	5.0V
	Lower Limit	4.75V	4.75V	4.75V
Current Consumption	Upper Limit	2.0A	2.5A	2.5A
	Rating	1.5A	2.0A	2.0A
	Typical Power Consumption	7.5W	10W	10W

Support Redundant CPU		NO	NO	NO
Ethernet Interface		1	1	1
RS232 Serial Ports		2	2	2
Communication Ability	MODBUS	YES	YES	YES
	Profibus	YES	YES	YES
	CANBUS	YES	YES	YES
Program Language	LD	YES	YES	YES
	ST	YES	YES	YES
	IL	YES	YES	YES
	FBD	YES	YES	YES
	SFC			
	SCC	YES	YES	YES
Weight (g)		350	350	350
Installing Size (Length×Height×Depth) (mm)		40×145×153.5	40×145×153.5	40×145×153.5

2.3 High Performance CPU Single Ethernet CPU401-03 Series

Order Number

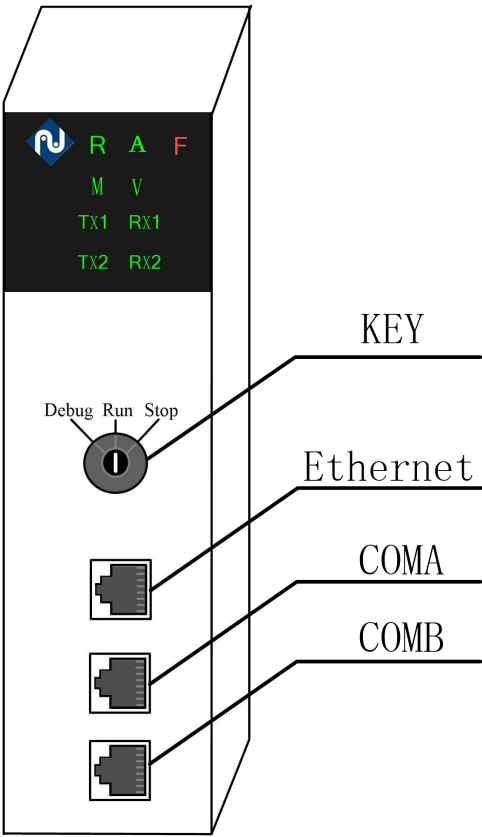
CPU Notes	Order No.
High Performance CPU, 2×RS232(MODBUS), 1×NIC(MODBUS/TCP), program space 4M	400CPU4010301
High Performance CPU, 2×RS232(MODBUS), 1×NIC(MODBUS/TCP), program space 8M	400CPU4010302
High Performance CPU, 2×RS232(MODBUS), 1×NIC(MODBUS/TCP), program space 16M	400CPU4010303

Features:

CPU401-03 module has the following features:

1. Operation speed fast, high availability.
2. Containing 2 built-in RS232-ports to download and debug user programs or communicate with other modules.
3. Supports floating point arithmetic.
4. Building in a real time clock to record current time and do the time control of the process.
5. Watchdog function, can self-reset and reboot when fault.
6. Hot-plugging is supported.
7. Power failure safeguard.
8. Has an Ethernet interface, can connect directly with host computer system.

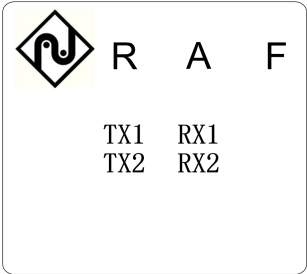
Outlook of CPU Module:



NA400 CPU401-03 Module

Indicator LED description:

The LED indicators of CPU modules are located in the upper front panel. These indicators could help users have an understanding of CPU module running state. The LED indicators and working state of NA400 CPU401-03 is described in the following table:



Indicator LEDs

Description of indicator LEDs:

LED	Color	State	Meaning
R	Green	Flicker	Run normally
A	Green	Constant lighting / off	The module is in the Run state / The module is in the Stop state or has a fatal fault
F	Red	Light / off	Module failure (including the network cable did not plug, CAN network failure and so on) / module no fault
M	Green	Constant Lighting	undefined
V	Green	Constant Light off	undefined
TX1	Green	Flicker / off	Serial port 1 is sending data/No Data is sending
RX1	Green	Flicker / off	Serial port 1 is receiving data/No Data is received
TX2	Green	Flicker / off	Serial port 2 is sending data/No Data is Sending
RX2	Green	Flicker / off	Serial port 2 is receiving data/No Data is received

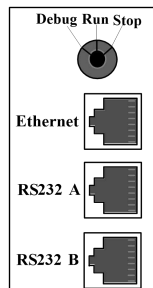
The combination of indicator LEDs means:

R	A	F	M	V	meaning
Flicker	Constant Light		Constant Light		Module run normally
Flicker fast		Flicker fast			In debug state
Constant Light	Constant Light	Constant Light	Constant Light	Constant Light	CPU type not accord with the configuration file
Constant Light	Constant Light	Constant Light			Fail in project file configuration

Hardware Setting and External Interface

1. Key Switch

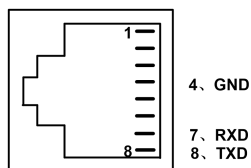
- There is a 3-position key switch in the CPU module, which is used to setting the state of the module. The key is in run position when the module is running normal.



- Stop: When switching the key to “Stop” position, the module is in the Stop state and the software stops scanning the user program.
- Debug: When switching the key to “Debug” position, the module is in the Debug state and the Watchdog of the module will be disabled, and the user program can be debugged at this time.
- RUN: When switching the key to “Run” position, the module is in the normal running state. The Watchdog of the module will be enabled, when the module runs disorderly or crash due to some interference or hardware failure and other causes, it can automatically resume operation.

2. Serial Communication Interface

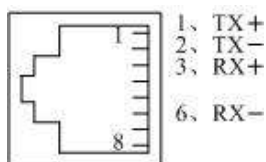
- The CPU module has two serial communication ports which comply with standard MODBUS slave station protocol. These ports can connect with external devices and the external devices shall be set as Modbus master. Both Serial port A and Serial port B are of RJ45 shape, whose pin is defined as follows:



The Definition of Serial Communication Interface

3. Ethernet Interface

CPU module NA400 CPU401-03 series have one Ethernet interface.



The definition of Ethernet Interface

Technical Specification

CPU Type		CPU401-0301	CPU401-0302	CPU401-0303
Order NO.		400CPU4010301	400CPU4010302	400CPU4010303
CPU Basic Frequency		300MHz	300MHz	300MHz
CPU Processing Capacity	Bit Instruction Speed	0.05us	0.05 us	0.05 us
	Word Instruction Speed	0.1us	0.1 us	0.1 us
	Integer Arithmetic Speed	0.1us	0.1 us	0.1 us
	Floating Point Arithmetic	1us	1us	1us

Memory Property	Program	4M	8M	16M
	Data	16M	32M	64M
Power Voltage	Upper Limit	5.25V	5.25V	5.25V
	Rating	5.0V	5.0V	5.0V
	Lower Limit	4.75V	4.75V	4.75V
Current Consumption	Upper Limit	2.0A	2.5A	2.5A
	Rating	1.5A	2.0A	2.0A
	Typical Power Consumption	7.5W	10W	10W
Support Redundant CPU		NO	NO	NO
Ethernet Interface		1	1	1
RS232 Serial Ports		2	2	2
Communication Ability	MODBUS	YES	YES	YES
	Profibus	YES	YES	YES
	CANBUS	YES	YES	YES
Program Language	LD	YES	YES	YES
	ST	YES	YES	YES
	IL	YES	YES	YES
	FBD	YES	YES	YES
	SFC			
	SCC	YES	YES	YES
Weight (g)		400	450	450
Installing Size (Length×Height×Depth) (mm)		40×145×153.5	40×145×153.5	40×145×153.5

2.4 High Performance Double Ethernet CPU401-0401

Order Number

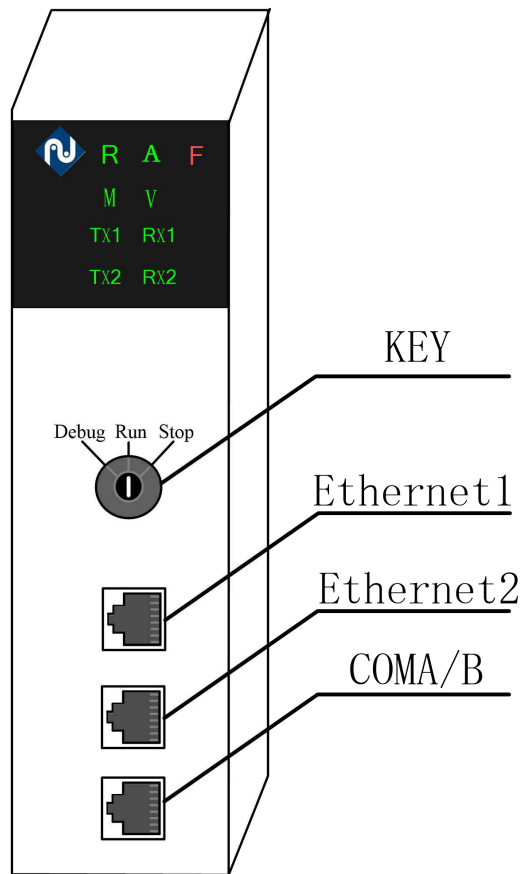
CPU Notes	Order No.
High Performance CPU, 2×RS232(MODBUS), 2 ×NIC(MODBUS/TCP), program space 32M	400CPU4010401

Features:

CPU401-040 has the following features:

1. Operation speed fast, high availability.
2. Containing 2 built-in RS232-ports to download and debug user programs or communicate with other modules.
3. Supports floating point arithmetic.
4. Building in a real time clock to record current time and do the time control of the process.
5. Watchdog function, can self-reset and reboot when fault.
6. Hot-plugging is supported.
7. Power failure safeguard.
8. Has two Ethernet interfaces with a large 32M storage space, can connect directly with host computer system.

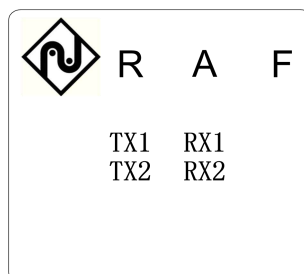
Outlook of CPU Module:



NA400 CPU401-0401 Module

Indicator LED description:

The LED indicators of CPU modules are located in the upper front panel. These indicators could help users have an understanding of CPU module running state. The LED indicators and working state of NA400 CPU401-04 is described in the following table:



Indicator LEDs

Description of indicator LEDs:

LED	Color	State	Meaning
R	Green	Flicker	Runs normally
A	Green	Constant lighting / off	The module is in the Run state / The module is in the Stop state or has a fatal fault
F	Red	Light / off	Module failure (including the network cable did not plug, CAN network failure and so on) / module no fault
M	Green	Constant Light	undefined
V	Green	Constant Light off	undefined
TX1	Green	Flicker / off	Serial port 1 is sending data/No Data is sending
RX1	Green	Flicker / off	Serial port 1 is receiving data/No Data is received
TX2	Green	Flicker / off	Serial port 2 is sending data/No Data is Sending
RX2	Green	Flicker / off	Serial port 2 is receiving data/No Data is received

The combination of indicator LEDs means:

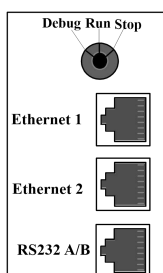
R	A	F	M	V	meaning
Flicker	Constant Light		Constant Light		Module run normally
Flicker fast		Flicker fast			In debug state
Constant Light		Constant Light			Program file is not loaded
Constant Light	Constant Light	Constant Light	Constant Light	Constant Light	CPU type not accord with the

					configuration file
Constant Light	Constant Light	Constant Light			Fail in project file configuration

Hardware Setting and External Interface

1. Key Switch

- There is a 3-position key switch in the CPU module, which is used to setting the state of the module. The key is in run position when the module is running normal.

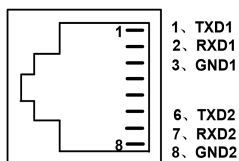


- Stop:** When switching the key to “Stop” position, the module is in the Stop state and the software stops scanning the user program.
- Debug:** When switching the key to “Debug” position, the module is in the Debug state and the Watchdog of the module will be disabled, and the user program can be debugged at this time.
- RUN:** When switching the key to “Run” position, the module is in the normal running state. The Watchdog of the module will be enabled, when the module runs disorderly or crash due to some interference or hardware failure and other causes, it can automatically resume operation.

2. Serial Communication Interface

- The CPU module has two serial communication ports which comply with standard MODBUS slave station protocol. These ports can connect with external devices and the external devices shall be set as Modbus master. The two serial ports are

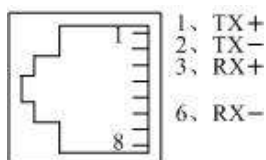
set in the same RJ-45 plug.



The Definition of Serial Communication Interface

3. Ethernet Interface

CPU module NA400 CPU401-04 series have two Ethernet interfaces.



The definition of Ethernet Interface

Technical Specification

CPU Type		CPU401-0401
Order NO.		400CPU4010401
CPU Basic Frequency		300MHz
CPU Processing Capacity	Bit Instruction Speed	0.02us
	Word Instruction Speed	0.04us
	Integer Arithmetic Speed	0.04us
	Floating Point Arithmetic	0.2us
Memory Property	Program	32M
	Data	128M
Power Voltage	Upper Limit	5.25V

	Rating	5.0V
	Lower Limit	4.75V
Current Consumption	Upper Limit	2.5A
	Rating	2.0A
	Typical Power Consumption	10W
Support Redundant CPU		NO
Ethernet Interface		2
RS232 Serial Ports		2
Communication Ability	MODBUS	YES
	Profibus	YES
	CANBUS	YES
Program Language	LD	YES
	ST	YES
	IL	YES
	FBD	YES
	SFC	
	SCC	YES
Weight (g)		450
Installing Size (Length×Height×Depth) (mm)		40×145×153.5

2.5 High Performance Double Ethernet IRIG-B

CPU401-0402

Order Number

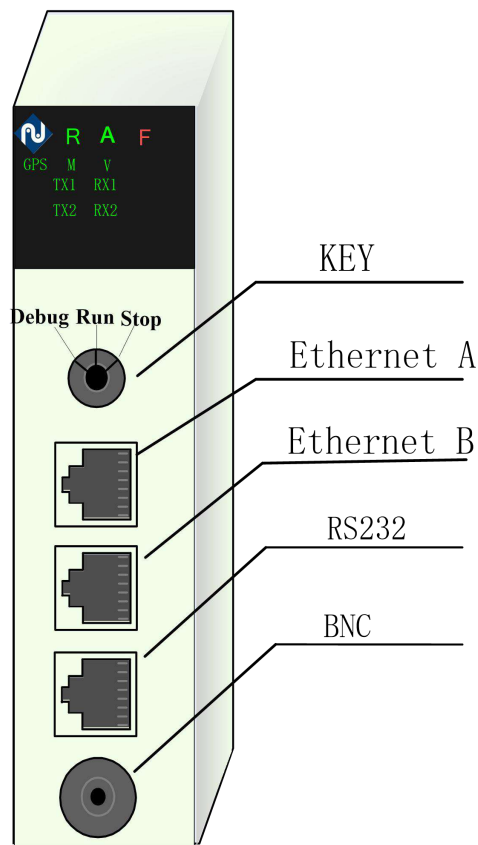
CPU Notes	Order No.
High Performance CPU,BNC×1(IRIG-B TTL), NIC×2(standard MODBUS/TCP), program space 32M	400CPU4010402

Features:

CPU401-0402 has the following features:

1. Operation speed fast, high availability.
2. Containing 1 built-in standard BNC-port to accept and decode IRIG-B IEEE1344-1995 DCLS and IRIG-B 004 DCLS time code.
3. Containing 1 built-in RS232-port to communicate with other modules.
4. Supports floating point arithmetic.
5. Building in a real time clock to record current time and do the time control of the process.
6. Watchdog function, which can self-reset and reboot when fault.
7. Hot-plugging is supported.
8. Power failure safeguard.
9. Having two Ethernet interfaces with a large 32M storage space, which can connect directly with host computer system.

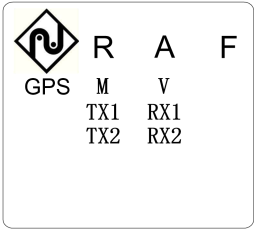
Outlook of CPU Module:



NA400CPU401-0402 Module

Indicator LED description:

The LED indicators of CPU modules are located in the upper front panel. These indicators could help users have an understanding of CPU module running state. The LED indicators and working state of CPU401-0402 is described in the following table:



Indicator LEDs

Description of indicator LEDs:

LED	Color	State	Meaning
R	Green	Flicker	Runs normally
A	Green	Light / off	The module is in the Run state / The module is in the Stop state or has a fatal fault
F	Red	Light / off	Module failure (including the network cable did not plug, CAN network failure and so on) / module no fault
M	Green	Light / off	Undefined
V	Green	off	Undefined
GP S	Green	Light / off	With /without TTL signals of IRIG-B or PPM from board; The light goes out after unplugging the B code signal (PPM from board) in 5s(1min).
TX1	Green	Flicker / off	Serial port 1 is sending data/no Data is sending
RX1	Green	Flicker / off	Serial port 1 is receiving data/no data is received.
TX2	Green	off	Undefined.
RX 2	Green	Flicker / off	There is IRIG-B data reception /no data is received.

The combination of indicator LEDs means:

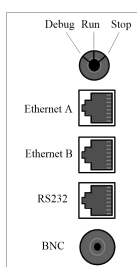
R	A	F	M	V	GPS	Meaning
Flicker	Constant Lighting		Constant Lighting			Module runs normally
Flicker fast		Flicker fast				In debug state
Constant Lighting	Constant Lighting	Constant Lighting				The project file is not configured correctly
Constant Lighting	Constant Lighting	Constant Lighting	Constant Lighting	Constant Lighting	Constant Lighting	CPU type is not accord with the

						configuration file
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Hardware Setting and External Interface

1.Key Switch

There is a 3-position key switch in the CPU module, which is used to setting the state of the module. The key is in run position when the module is running normally.



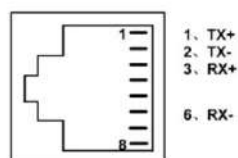
- Stop: When switching the key to “Stop” position, the module is in the Stop state and the software stops scanning the user program.
- Debug: When switching the key to “Debug” position, the module is in the Debug state and the Watchdog of the module will be disabled, and the user program can be debugged at this time.
- Run: When switching the key to “Run” position, the module is in the normal running state. The Watchdog of the module will be enabled, when the module runs disorderly or crash due to some interference or hardware failure and other causes, it can automatically resume operation.

2. Ethernet Interface

CPU module CPU401-0402 have two Ethernet interfaces(Eth1、Eth2).As below, the definition of EthA & EthB are the same.

The two Ethernet IP need to be configured on two network segments。

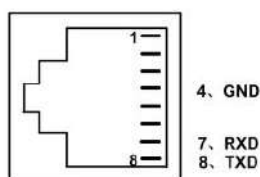
(EthA: 192.168.X.XXX; EthB: 192.168.X.XXX. 'X' should be different.)



The definition of Ethernet A& Ethernet B

3. Serial Communication Interface

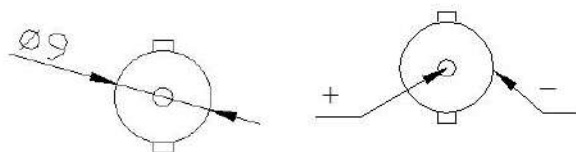
The CPU module has one serial communication port which comply with standard MODBUS slave station protocol. The port can connect with external devices and the external devices shall be set as MODBUS master. The serial port is set in the RJ-45 plug. As below is the definition of serial communication interface .



The definition of Serial Communication Interface(RS232)

4. BNC Communication Interface

The CPU module has one BNC communication port, as shown is the dimension and the electrical polarity.



The BNC communication port is used to transit IRIG-B IEEE1344-1995 DCLS time code. In order to work as expected, the angle plug was recommended as below. "d<28mm" should be promised.



5.IRIG-B TTL Signal Risk Assessment

(1) TTL level Max Communication Distance: $\leq 30\text{m}$ @Office environment

$\leq 50\text{m}$ @Terminating Resistance

TTL level transmission distance is related to the field wiring. The longer the distance, the greater possibility of interference. The field engineer needs to assess the risk of wiring disturbed by other cables.

(2) IRIG-B Message loss risk

If the TTL level transmission distance is too long , the IRIG-B message may be lost due to interference (module cannot receive the correct message).

(3) IRIG-B Message interruption risk

If the TTL level transmission distance is too long, it will lead to the IRIG-B message interruption problem due to the interference. Field engineers need to find out the sources of interference to solve the interference problem.

Technical Specification

CPU Type		CPU401-0402
Order NO.		Na400CPU4010402
CPU Basic Frequency		300MHz
CPU Processing Capacity	Bit Instruction Speed	0.02us
	Word Instruction Speed	0.04us
	Integer Arithmetic Speed	0.04us
	Floating Point Arithmetic	0.2us
Memory Property		Program: 32M

		Data: 128M
Power Voltage	Upper Limit	5.25V
	Rating	5.0V
	Lower Limit	4.75V
Current Consumption	Upper Limit	2.5A
	Rating	2.0A
	Typical Power Consumption	10W
Support Redundant CPU		NO
Ethernet Interface		2
BNC Interface		1
IRIG-B IN (TTL)	Signal type	IRIG-B IEEE1344-1995 DCLS and IRIG-B 004 DCLS time code
	Logic '0'	<0.8V
	Logic '1'	>2.0V
	Max Communication Distance	<=30m@Office environment <=50m@Terminating Resistance
Power		Through board
Weight (g)		460
Installing Size (Length×Height×Depth) (mm)		40×145×153.5

2.6 High Performance Redundant CPU401-0501

Order Number

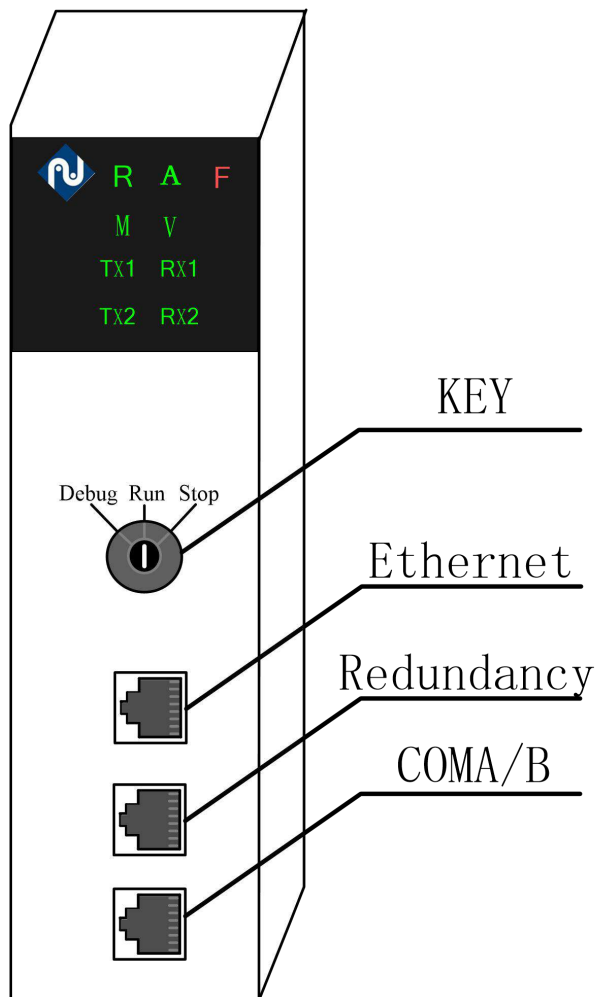
CPU Notes	Order No.
Redundant CPU, High Performance CPU, 2×RS232(MODBUS), 1×NIC(MODBUS/TCP), program space 32M	400CPU4010501

Features:

CPU401-05 has the following features:

1. Using high-end dual CPU system, with high speed and strong reliability.
2. Containing 2 built-in RS232-ports to download and debug user programs or communicate with other modules.
3. Supporting floating point arithmetic.
4. Building in a real time clock to record current time and do the time control of the process.
5. Watchdog function, can self-reset and reboot when fault.
6. Hot-plugging is supported.
7. Power failure safeguard.
8. Has one Ethernet interfaces with a large 32M storage space, major used to set up a CPU redundant system in a redundant host system. A redundant system need two CPU modules, one runs as a main CPU, and the other runs as a slaver. The two CPU modules backup data real-time by high speed internal bus. The main CPU executes the program, and backup data real-time to the slaver CPU. When the main CPU is faulty, the slaver CPU can be raised to run as a main CPU automatically to ensure the system run unaffectedly.

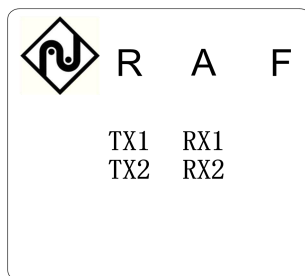
Outlook of CPU Module:



NA400 CPU401-0501 Module

Indicator LED description:

The LED indicators of CPU modules are located in the upper front panel. These indicators could help users have an understanding of CPU module running state. The LED indicators and working state of NA400 CPU401-05 is described in the following table:



Indicator LEDs

The description of indicator LEDs:

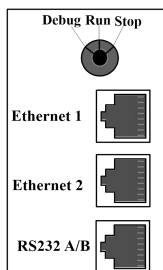
LED	Color	State	Meaning
R	Green	Flicker	Runs normally
A	Green	Light / off	The module is in the Run state / The module is in the Stop state or has a fatal fault
F	Red	Light / off	Module failure (including the network cable did not plug, CAN network failure and so on) / module no fault
M	Green	Constant Lighting / off	Current CPU is the master/slaver
V	Green	Constant Lighting / off	Program in the master or slaver is in accordance with each other / NOT
TX1	Green	Flicker / off	Serial port 1 is sending data/No Data is sending
RX1	Green	Flicker / off	Serial port 1 is receiving data/No Data is received
TX2	Green	Flicker / off	Serial port 2 is sending data/No Data is Sending
RX2	Green	Flicker / off	Serial port 2 is receiving data/No Data is received

The combination of indicator LEDs means:

R	A	F	M	V	meaning
Flicker	Constant Lighting				Module run normally
Flicker fast		Flicker fast			In debug state
Constant Lighting	Constant Lighting	Constant Lighting	Constant Lighting	Constant Lighting	CPU type not accord with the configuration file
Constant Lighting	Constant Lighting	Constant Lighting			Fail in project file configuration

Hardware Setting and External Interface**1. Key Switch**

- There is a 3-position key switch in the CPU module, which is used to setting the state of the module. The key is in run position when the module is running normal.

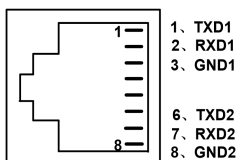


- Stop:** When switching the key to "Stop" position, the module is in the Stop state and the software stops scanning the user program.
- Debug:** When switching the key to "Debug" position, the module is in the Debug state and the Watchdog of the module will be disabled, and the user program can be debugged at this time.

- Run: When switching the key to “Run” position ,the module is in the normal running state. The Watchdog of the module will be enabled, when the module runs disorderly or crash due to some interference or hardware failure and other causes, it can automatically resume operation.

2. Serial Communication Interface

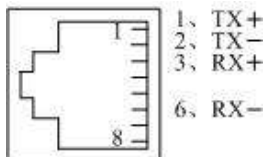
- The CPU module has two serial communication ports which comply with standard MODBUS slave station protocol. These ports can connect with external devices and the external devices shall be set as Modbus master. The two serial ports are set in the same RJ-45 plug.



The Definition of Serial Communication Interface

3. Ethernet Interface

CPU module NA400 CPU401-05 series have one Ethernet interface.



The definition of Ethernet Interface

Technical Specification

CPU Type		CPU401-0501
Order NO.		400CPU4010501
CPU Basic Frequency		300MHz
CPU Processing Capacity	Bit Instruction Speed	0.02us
	Word Instruction Speed	0.04us
	Integer Arithmetic Speed	0.04us
	Floating Point Arithmetic	0.2us

Memory Property	Program	32M
	Data	128M
Power Voltage	Upper Limit	5.25V
	Rating	5.0V
	Lower Limit	4.75V
Current Consumption	Upper Limit	2.5A
	Rating	2.0A
	Power Consumption	10W
Support Redundant CPU		YES
Ethernet Interface		1
RS232 Serial Ports		2
Communication Ability	MODBUS	YES
	Profibus	YES
	CANBUS	YES
Program Language	LD	YES
	ST	YES
	IL	YES
	FBD	YES
	SFC	
	SCC	YES
Weight (g)		450
Installing Size (Length×Height×Depth) (mm)		40×145×153.5

2.7 High Performance Redundant CPU401-0701

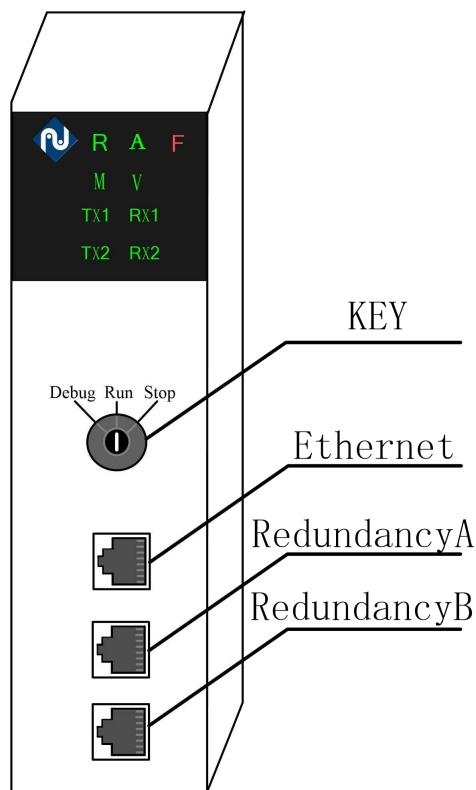
Order Number

CPU Notes	Order No.
Redundant CPU, High Performance CPU, 2*RS232(MODBUS), 1* Ethernet(MODBUS/TCP), program space 32M	400CPU401070 1

Features:

- Upmarket double CPU system, with high speed and strong reliability .
- Includes 1 Ethernet Interface(RJ45), supporting MODBUS/TCP slave protocol.
- Includes 2 RS232-ports(RJ45), supporting MODBUS slave protocol.
- Watchdog Function, can self-resetting and reboot when it is fault.
- Supports floating point arithmetic.
- Support Ethernet Remote IO
- Real time clock.
- Hot-plugging.
- Power Fail Safeguard.
- Redundant system need two CPU4010501, one run as main, and the other run as slaver. The two CPU modules backup data real-time by the high speed inner bus. The main CPU execute the program, and backup data real-time to the slaver CPU. When the main CPU is fault, the slaver CPU can run as main CPU self-acting, so the system can run unaffectedly.

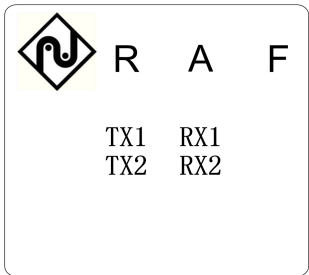
Outlook of CPU Module:



NA400 CPU401-0701 Module

Indicator LED description:

- The state specification of NA400 CPU401-0701 indication LED as follows:



Indicator LEDs

LED	Color	State	Meaning
-----	-------	-------	---------

R	Green	Flicker	Runs normally
A	Green	Light / off	The module is in the Run state / The module is in the Stop state or has a fatal fault
F	Red	Light / off	Module failure (including the network cable did not plug, CAN network failure and so on) / module no fault
M	Green	Light / off	Current CPU is the master/slaver
V	Green	Light / off	Program in the master or slaver is in accordance with each other / NOT
TX1	Green	Flicker / off	RedundancyB port Data sending data/No Data is sending
RX1	Green	Flicker / off	RedundancyB port Data receiving data/No Data is received

The indicator LEDs meaning:

R	A	F	M	V	meaning
Flicker	Constant Lighting				Module run normally
Flicker fast		Flicker fast			In debug state
Constant Lighting	Constant Lighting	Constant Lighting	Constant Lighting	Constant Lighting	CPU type not accord with the configuration file
Constant Lighting	Constant Lighting	Constant Lighting			Fail in project file configuration

LED is as follows:

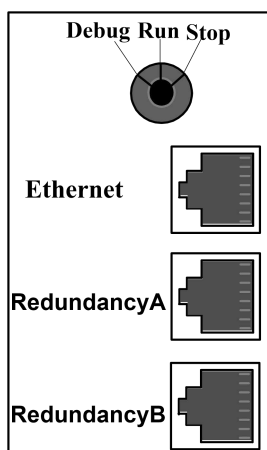
- R: Run indicating LED: Indicating the run state of CPU module. When the module is running normal, the LED flicker slowly (period 1 second), else if the LED flicker fast, it means the modules online disable.

- R: HIN Activated Indicating LED. When HIN works normally, the LED is light on, or it turns off.
- F: Fault Indicating LED. The LED is light when the module is fault.
- M: master or slaver indicating LED. The LED is light when the module is a master, and turn off when the module acts as a slaver.
- V: Version Indicating LED. The LED turn off when program in the master or slaver is in accordance with each other, and when is not accordance with each other it light on, and the CPU system stop running.
- TX1: RedundancyB port Data Sending Indicating LED.
- RX1: RedundancyB port Data receiving Indicating LED.

Hardware Setting and External Interface

■ Key Switch

- There is a 3-position key switch in the CPU module, which is used to setting the state of the module. The key is in run position when the module is running normal.

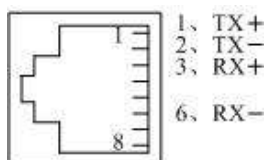


- Stop: When switching the key to “Stop” position, the module is in the Stop state and the software stops scanning the user program.
- Debug: When switching the key to “Debug” position, the module is in the Debug state and the Watchdog of the module will be disabled, and the user program can be debugged at this time.
- Run: When switching the key to “Run” position, the module is in the normal running state. The Watchdog of the module will be enabled, when the module runs disorderly

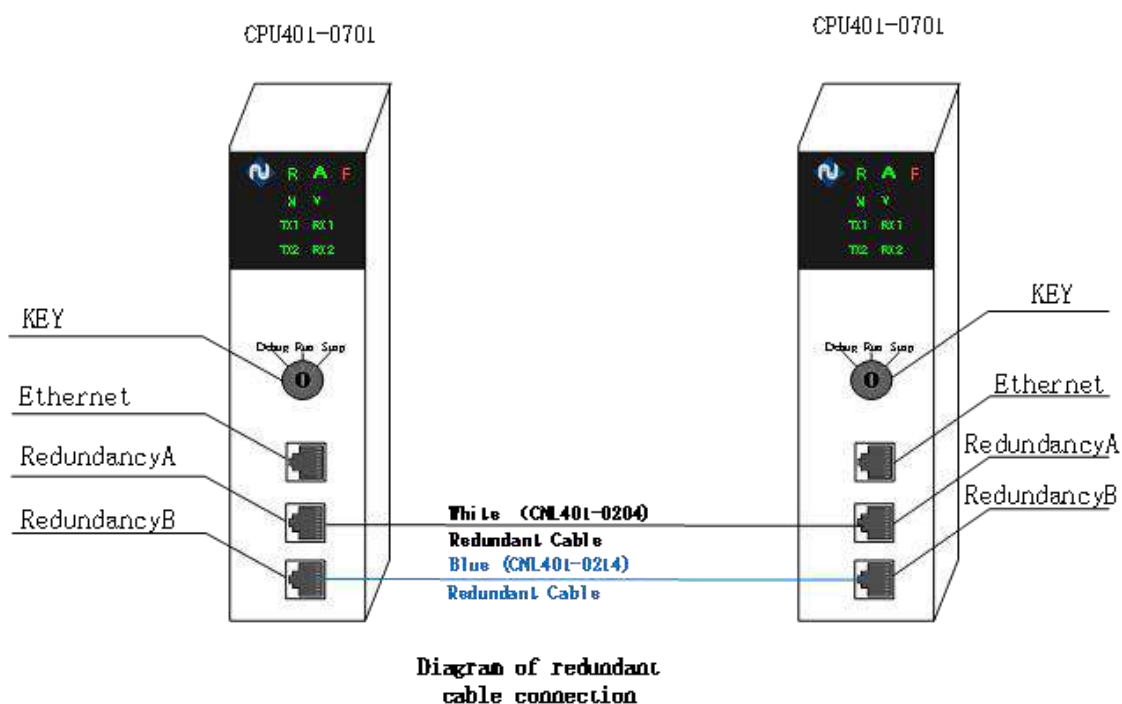
or crash due to some interference or hardware failure and other causes, it can automatically resume operation.

■ Ethernet Interface

CPU module NA400 CPU401-0401 has one Ethernet interface.



The definition of Ethernet Interface



Technical Specification

CPU Type	CPU401-0701
Order NO.	400CPU4010701
CPU Basic Frequency	400MHz

CPU Processing Capacity	Bit Instruction Speed	0.01us
	Word Instruction Speed	0.02us
	Integer Arithmetic Speed	0.03us
	Floating Point Arithmetic	0.15us
Memory Property	Program	32M
	Data	128M
Power Voltage	Upper limit	5.25V
	Rating	5.0V
	Lower limit	4.75V
Current Consumption	Upper limit	2.5A
	Rating	2.0A
	Power Consumption	10W
Support Redundant CPU		YES
Ethernet Interface		1
RS232 Serial Ports		2
Net Work	Modbus	YES
	Profibus	YES
	CanBus	YES
Program Language	LD	YES
	ST	YES
	IL	YES
	FBD	YES
	SFC	
	SCC	YES
Weight (g)		450

Installing Size (Length×Height×Depth) (mm)	40×145×158
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3 Power supply module

☐ Synopsis

In order to adapt to different of application situations, NA400 PLC offer several kinds of power supply modules. Power supply modules, CPU modules and I/O modules have the same shell such as LED window, connection terminal etc. All power supply modules can supply isolated 5VDC power to the backplane bus used by other modules.

☐ Content

In this chapter, the following will be described:

Section	Content
3.1	Power supply module PWM401-24V DC input
3.2	Power supply module PWM401-220V AC input
3.3	N+1 Redundant Power module 24V DC input

3.1 Power supply module PWM401-24VDC

Order Number

Power supply module Notes	Order No.
24V DC Input, rated current: 10A Power: 50W	400PWM4010501
24V DC Input, rated current: 10A Power: 50W N+1 Redundant Power	400PWM4010503
24V DC Input, rated current: 16A Power: 80W	400PWM4010801
24V DC Input, rated current: 20A Power: 100W	400PWM4011001

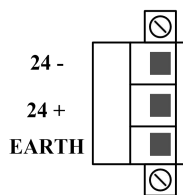
Features:

1. Input: 24V DC.

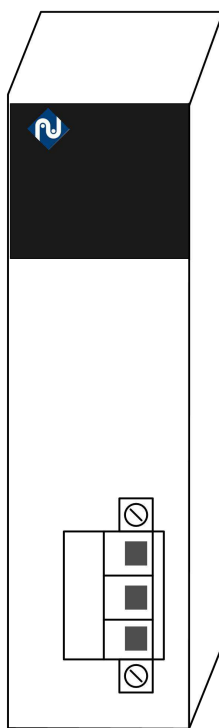
2. Output: 5V DC.
3. Short-circuit protection and over-voltage protection.
4. Reliable isolation.
5. Can be used as load power source.

Wiring Diagram

External power of power supply module is connected by a 3-position hot-plugging connection terminal. The pin definition is shown in the figure below:



Module outlook



NA400-24V Power supply module

Specification of LED indicator

If the module is power-on and works normally, the LOGO LED  will be on.

Technical Specification:

Module Type	PWM401-0501	PWM401-0503	PWM401-0801	PWM401-1001
Order NO.	400PWM4010501	400PWM4010503	400PWM4010801	400PWM4011001
Voltage Input	24VDC±20%	24VDC±20%	24VDC±20%	24VDC±20%
Voltage Output	+5V	+5V	+5V	+5V
Rated Current	10A	10A	16A	20A
Minimum Current	100mA	100mA	100mA	100mA
Connection Mode	Terminal	Terminal	Terminal	Terminal
Status Indicator	Support	Support	Support	Support
Weight (g)	500	500	550	600
Installing Size (Length×Height×Depth) (mm)	40×145×153.5	40×145×153.5	40×145×153.5	40×145×153.5

3.2 Power supply module PWM401-220VAC

Order Number

Power supply module Notes	Order No.
220V AC Input, rated current: 10A Power: 50W	400PWM4010502
220V AC Input, rated current: 16A Power: 80W	400PWM4010802
220V AC Input, rated current: 20A Power: 100W	400PWM4011002

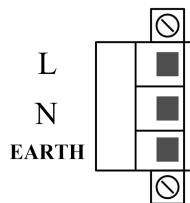
Features:

1. Input: 220V AC.

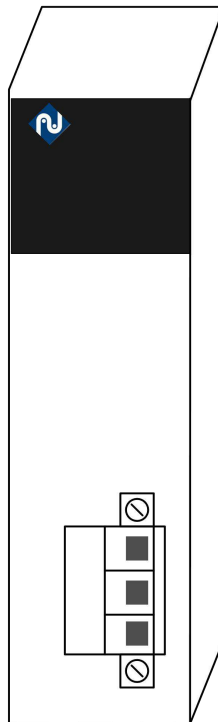
2. Output: 5V DC.
3. Short-circuit protection and over-voltage protection.
4. Reliable isolation.
5. Can be used as load power source.

Wiring Diagram

External power of power supply module is connected by a 3-position hot-plugging connection terminal. The pin definition is shown in the figure below:



Module outlook



NA400-220V Power supply module**Specification of LED indicator**

If the module is power-on and works normally, the LOGO LED  will be on.

Technical Specification:

Module type	PWM401-0502	PWM401-0802	PWM401-1002
Order NO.	400PWM4010502	400PWM4010802	400PWM4011002
Voltage Input	220V AC	220V AC	220V AC
Voltage Output	+5V	+5V	+5V
Rated Current	10A	16A	20A
Minimum Current	100mA	100mA	100mA
Connection Mode	Terminal	Terminal	Terminal
Status Indicator	Support	Support	Support
Weight (g)	500	550	600
Installing Size (Length×Height×Depth) (mm)	40×145×153.5	40×145×153.5	40×145×153.5

3.3 N+1 Redundant Power supply module PWM401-0503**Order Number**

Power supply module Notes	Order No.
24V DC Input, rated current: 10A Power: 50W N+1 Redundant Power	400PWM4010503

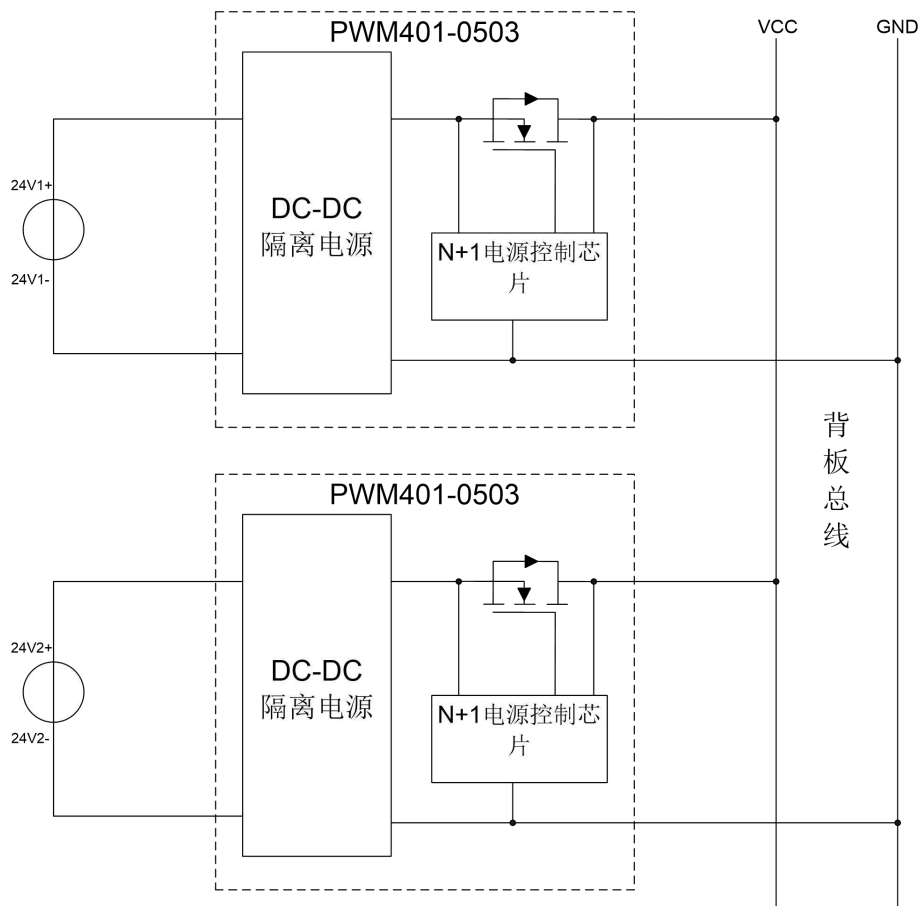
Features:

1. Input: 24V DC.
2. Output: 5V DC.
3. Short-circuit protection and over voltage protection.

4. Reliable isolation.
5. Can be used as load power source.
6. Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
7. Hot plugging support
8. Power down alarm
9. N+1 Mode Redundant Power Supply Module

Principle of The Redundancy

The N+1 power rail controller, in conjunction with an external N-channel MOSFET, emulates the function of a low forward voltage diode.

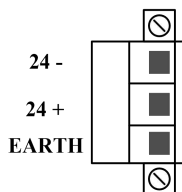


PWM401-0503 power supply example

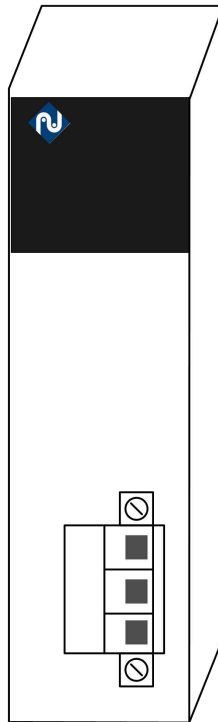
The N+1 power supply configuration shown in Figure 1 is used where multiple power supplies are paralleled for either higher capacity, redundancy or both. If it takes N supplies to power the load, adding an extra, identical unit in parallel permits the load to continue operation in the event that any one of the N supplies fails. The supplies are ORed together, rather than directly connected to the bus, to isolate the converter output from the bus when it is plugged-in or fails short. The power rail controller with an external MOSFET emulates the function of the ORing diode.

Wiring Diagram

External power of power supply module is connected by a 3-position hot-plugging connection terminal. The pin definition is shown in the figure below:



Module outlook



Power supply module PWM401-0503

Indicator LED Description



Indicator LED of PWM401-0503

Definition of LED

LED	Color	State	Meaning
LOGO	Blue	Light / off	Bus Power on/Bus Power off
R	Green	Flicker/Constant Lighting	Run normally/ Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

LED Definition of PWM401-0503

The working state corresponding to the indicator LED is as follows:

LOGO: Power indicator LED. When the power supply bus is power on, the LED is on.

R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.

A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.

F: Fault indicator LED. The LED is on when the dc-dc converter of the module is power off. The LED will go off when everything is normal.

Technical Specification:

Module type	PWM401-0503
Order NO.	400PWM4010503
Voltage Input	24VDC $\pm$ 20%
Voltage Output	+ 5V
Rated Current	10A
Mini Current	100mA
Insulation Test	500V DC

Connection Mode	Terminal
State Denotable	Support
Weight (g)	500
Operating Temperature	-10 ~ 60 °C
Installing Size (Length×Height×Depth) (mm)	40×145×153.5

4 Digital I/O Module

☐ Synopsis

In this chapter, all types of digital I/O modules are introduced, in which the I/O return circuit can not only be connected to the switch sensor of push button or limit switch, but also be connected to the digital switch actuator such as indicator lamp of motor starter or alarm annunciator. The status of certain bits on the data sheet of PLC will directly control output, and the input will directly control corresponding bits on the data sheet of PLC.

This chapter will introduce the following subjects:

1. Introduction of available modules
2. The most important characteristics of modules
3. Appearance and Wiring schematic of digital modules

☐ Content

This chapter will introduce the following I/O modules:

Section	Content
4.1	Digital input module DIM401-1601
4.2	Digital input module DIM401-1602
4.3	Digital input module DIM401-3201
4.4	Digital input module DIM401-3202
4.5	SOE module IIM401-1601
4.6	SOE module IIM401-1612
4.7	SOE module IIM401-3201
4.8	Digital output module DOM401-1601
4.9	Digital output module DOM401-1602
4.10	Digital output module DOM401-3201
4.11	Digital input /output module DIO401-1601
4.12	Digital input /output module DIO401-1602

4.13	Pulse Input module PIM401-0801
4.14	Pulse Input module PIM401-0802

NA400 series PLC provides many kinds of digital expand modules for users, including normal digital input module NA400 DIM401, sequence of events input module NA400 IIM401 and digital output module. Please see table 4.1 for more information.

Table 4.1 List of NA400 I/O modules

Type	Name	Specification
DIM401-1601	16 channel Digital input module	DI16×DC24V(Sink)
DIM401-1602	16 channel Digital input module	DI16×DC24V(Source)
DIM401-3201	32 channel Digital input module	DI32×DC24V (Sink)
DIM401-3202	32 channel Digital input module	DI32×DC24V (Source)
IIM401-1601	16 channel SOE module	IIM16×DC24V
IIM401-3201	32 channel SOE module	IIM32×DC24V
DOM401-1601	16 channel Digital output module	DO16×DC24V×Transistor
DOM401-1602	16 channel Digital output module	DO16×Relay
DOM401-3201	32 channel Digital output module	DO32×DC24V×Transistor
DIO401-1601	8 channel Digital input / 8 channel Digital output module	DI8/DO8×DC24V×Relay
DIO401-1602	8 channel Digital input / 8 channel Digital output module	DI8/DO8×DC24V×Transistor
PIM401-0801	8 channel Pulse Input module	PIM8×DC24V(Sink)
PIM401-0802	8 channel Pulse Input module	PIM8×DC24V(Source)

4.1 Digital input module DIM401-1601: DI16×DC24V

Order Number

400DIM4011601

Features:

- 16 points input with 8 points (also called “channels”) per group using a common terminal, sink input type.
- Rated input voltage 24VDC.
- Applicable to switch and 2/3/4 proximity switch.
- Every DI test point could be set of a 10~100ms filtering time by software.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Every channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Hot plugging support.

Diagram of Interface

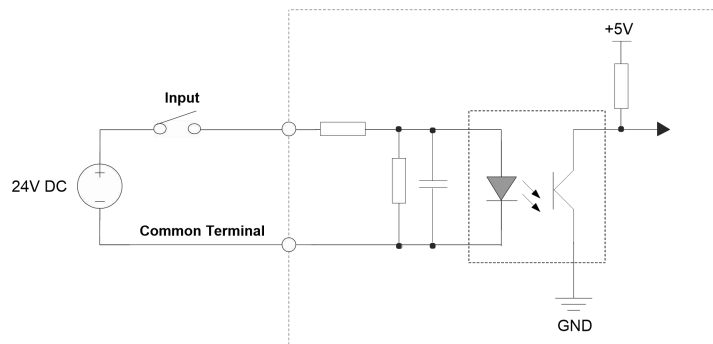


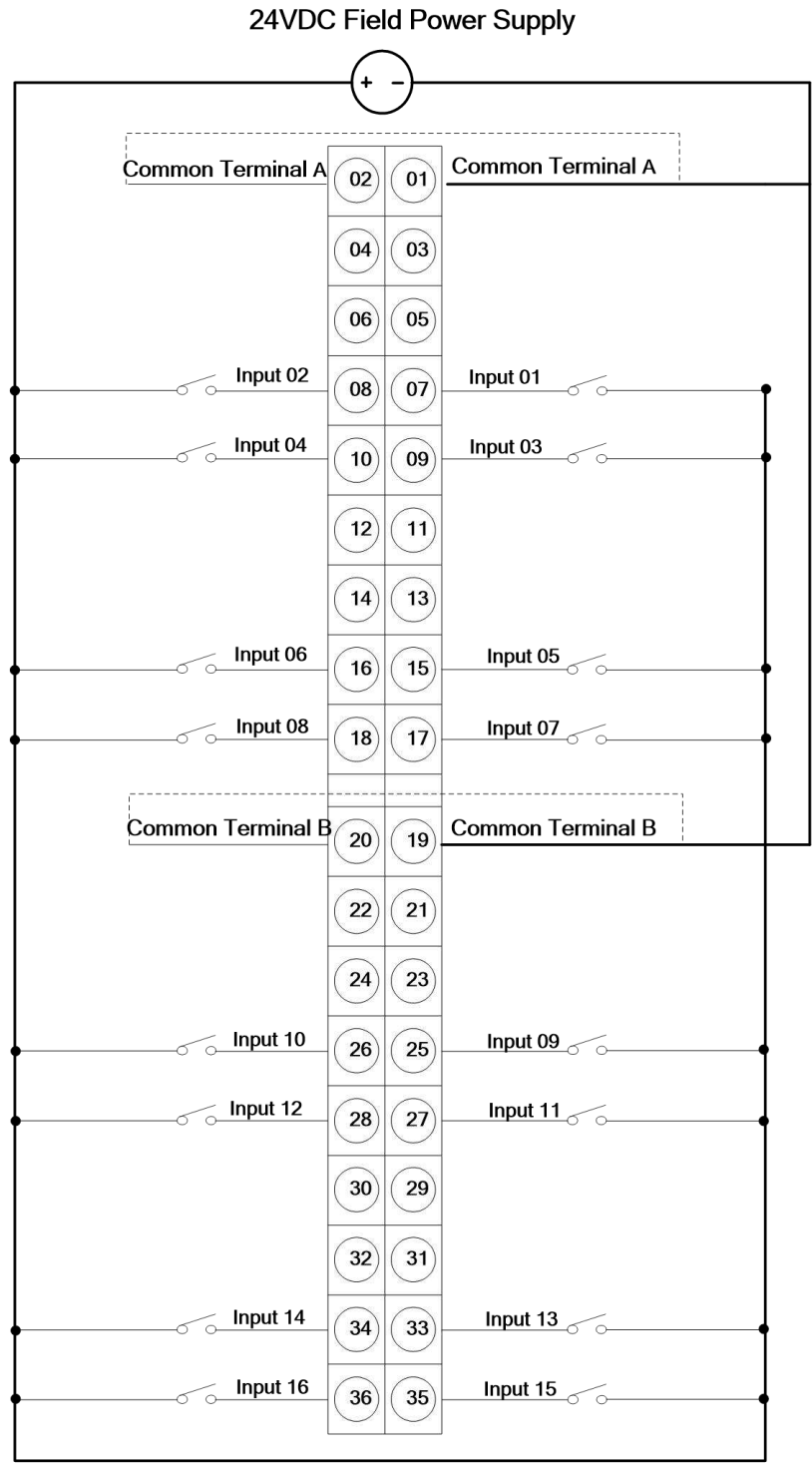
Diagram of DIM401-1601 Single Channel Interface Circuit

Terminal wiring diagram

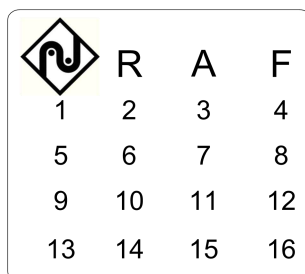
DIM401-1601 Digital input module connect with external devices by terminal blocks in front of the module. Correspondence of each channel is described in the following figure.

And please pay attention to the following:

- DIM401-1601 digital input module requires a separate 24VDC field power supply.
- NO. "1, 2" pin of the terminal, as the common terminal of point 1 to 8, should be connected to the negative pole of field power supply; NO.7~NO.10 pin and NO.15~NO.18 pin are the digital input for point 1 to 8 in turn; NO. "19,20" pin of the terminal, as the common terminal of point 9 to 16, should be connected to the negative pole of another field power supply; NO.25~NO.28 pin and NO.33~NO.36 pin are the digital input for point 9 to 16 in turn.
- Please don't connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.



DIM401-1601Terminal wiring diagram

INDICATOR LED DESCRIPTION:**INDICATOR LEDS****Description of indicator LEDs:**

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-16	Green	Light / off	Current state of input is 1/ Current state of input is 0

The working state corresponding to the indicator LED is as follows:

- R: Run Indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication Indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault Indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1-16 Channel Indicator LED: Every green light shows state of one input signal. For digital input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0.

Technical Specification

Points	16
Input Type	Sink
Module Load	380mA/5V
Power Consumption	1.9W
Self Diagnosis Function	YES
Input Filter	10~100ms manually
Insulation Test	500VDC
Nominal Input Voltage	24VDC
"1"Signal Voltage	14~28.8V
"0"Signal Voltage	0~13.2V
"1"Signal Average Current(DC24V)	6mA
Response Time (ON)	<=0.5ms
Response Time (OFF)	<=0.5ms
Installing Size (width×height×depth mm)	40×145×153.5
Weight	350g
Operating Temperature	-10~60℃
Status Indicator	Green indicator LED for each digital input point

4.2.Digital input module DIM401-1602: DI16×DC24V

Order Number

400DIM4011602

Features:

- 16 points input with 8 points (also called “channels”) per group sharing a common terminal, source input type.
- Rated input voltage 24VDC.
- Applicable to switch and 2/3/4 proximity switch.
- Every DI point could be set 10~100ms filtering time by software.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Every channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Hot plugging support.

Diagram of Interface

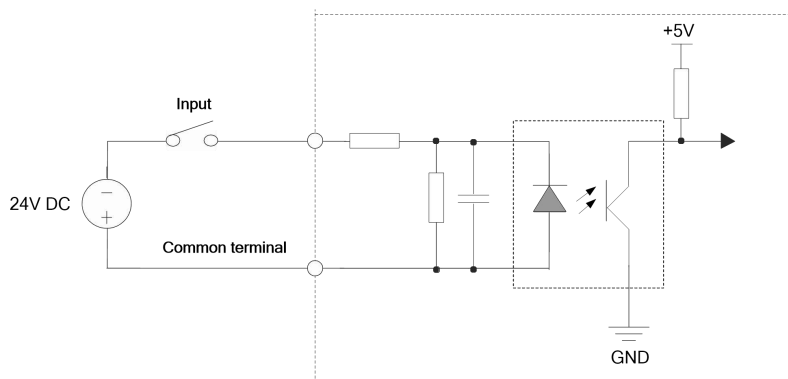


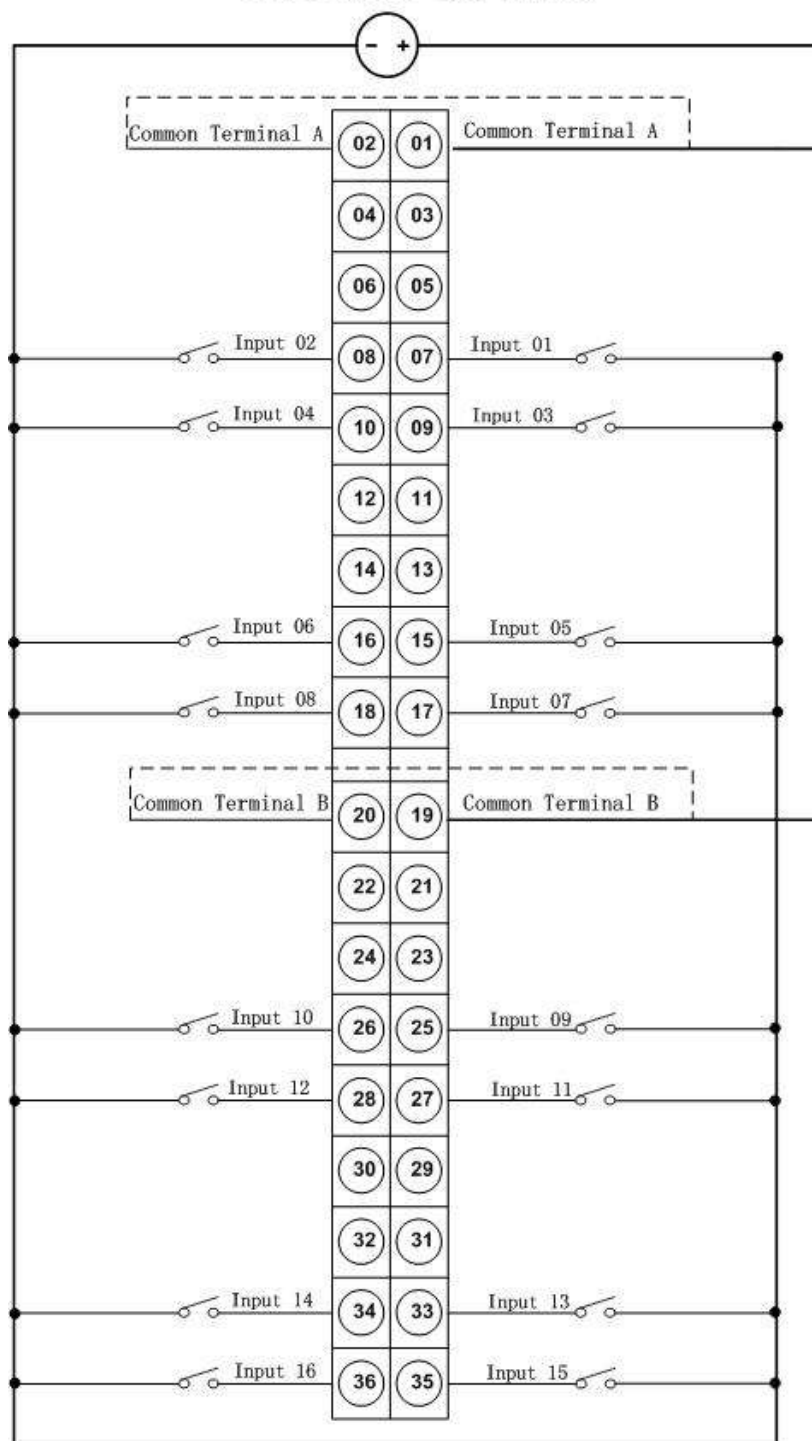
Diagram of DIM401-1602 Single Channel Interface Circuit

Terminal wiring diagram

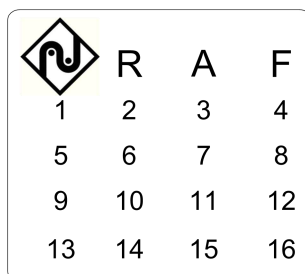
DIM401-1602 Digital input module connect with external devices by terminal blocks in front of the module. Correspondence of each channel is described in the following figure. And please pay attention to the following:

- DIM401-1602 digital input module requires a separate 24VDC field power supply.
- 16 channels share a common 24VDC field power supply.
- NO. "1, 2" pin of the terminal, as the common terminal of point 1 to 8, should be connected to the positive pole of field power supply; NO.7~NO.10 pin and NO.15~NO.18 pin are the digital input for point 1 to 8 in turn; NO. "19,20" pin of the terminal, as the common terminal of point 9 to 16, should be connected to the positive pole of another field power supply; NO.25~NO.28 pin and NO.33~NO.36 pin are the digital input for point 9 to 16 in turn.
- Please don't connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.

24VDC Field Power Supply



DIM401-1602 Terminal wiring diagram

INDICATOR LED DESCRIPTION:**INDICATOR LEDS**

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/ Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-16	Green	Light / off	Current state of input is 1/ Current state of input is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1-16 Channel indicator LED: Every green light shows state of one input signal. For digital input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0.

Technical Specification

Points	16
Input Type	Source
Module Load	380mA/5V
Power Consumption	1.9W
Self Diagnosis Function	Yes
Input Filter	10~100ms manually
Insulation Test	500VDC
Nominal Input Voltage	24VDC
“1”Signal Voltage	14~28.8V
“0”Signal Voltage	0~13.2V
“1”Signal Average Current(DC24V)	6mA
Response Time (ON)	<=0.5ms
Response Time (OFF)	<=0.5ms
Installing Size (width×height×depth mm)	40×145×153.5
Weight	350g
Operating Temperature	-10~60℃
Status Indicator	Green indicator LED for each digital input point

4.3.Digital input module DIM401-3201: DI32×DC24V

Order Number

400DIM4013201

Features:

- 32 points input with 2 groups, 16 points per group, using a common terminal, sink input type.
- Rated input voltage 24VDC.
- Applicable to switch and 2/3/4 proximity switch.
- Every DI point could be set 10~100ms filtering time by software.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Every channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Hot plugging support.

Diagram of Interface

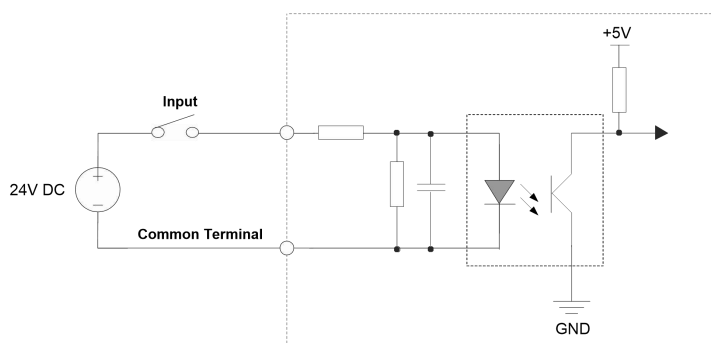


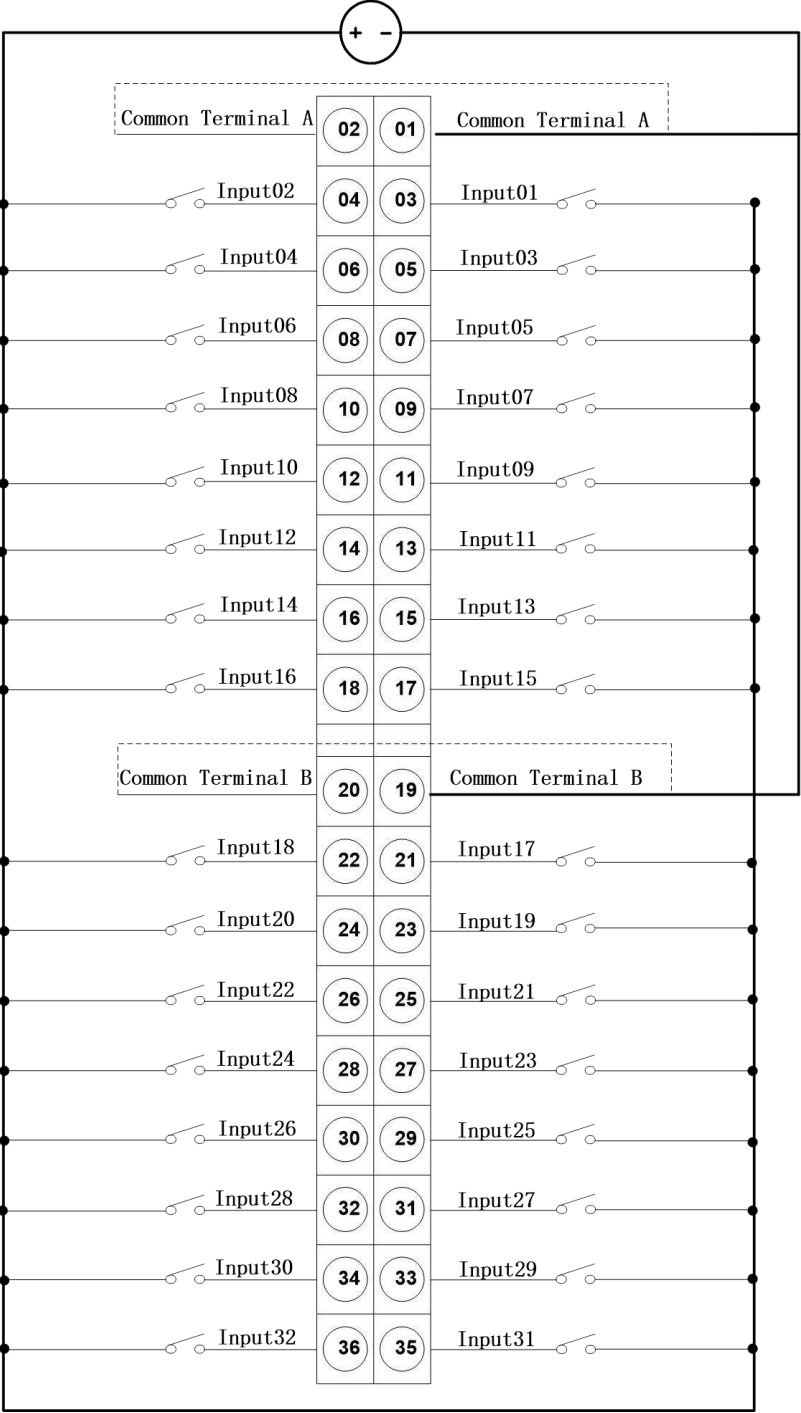
Diagram of DIM401-3201 Single Channel Interface Circuit

Terminal wiring diagram

DIM401-3201 Digital input module connect with external devices by terminal blocks in front of the module. Correspondence of each channel is described in the following figure. And please pay attention to the following:

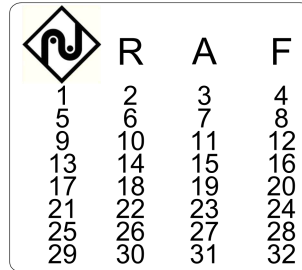
- DIM401-3201 digital input module requires a separate 24VDC field power supply.
- Every 16 channels form a group and share a common terminal. 32 channels can be divided into 2 groups, each of which requires a separate 24VDC field power supply.
- NO. “1, 2” pin of the terminal, as the common terminal of point 1 to 16, should be connected to the negative pole of field power supply; NO.3~NO.18 pin are the digital input for point 1 to 16 in turn; NO. “19, 20” pin of the terminal, as the common terminal of point 17 to 32, should be connected to the negative pole of another field power supply; NO.21~NO.36 pin are the digital input for point 17 to 32 in turn.
- Please don't connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.

24VDC Field Power Supply



DIM401-3201 Terminal wiring diagram

INDICATOR LED DESCRIPTION:



INDICATOR LEDS

Descriptions of indicator LEDs:

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/ Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light1-32	Green	Light / off	Current state of a way input is 1/ Current state of a way input is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1-32 Channel indicator LED: Every green light shows state of one input signal. For digital input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0.

Technical Specification

Points	32
Input Type	Sink
Module Load	440mA/5V
Power Consumption	2.2W
Self Diagnosis Function	Yes
Input Filter	10~100ms manually
Insulation Test	500VDC
Nominal Input Voltage	24VDC
“1”Signal Voltage	14~28.8V
“0”Signal Voltage	0~13.2V
“1”Signal Average Current(DC24V)	6mA
Response Time (ON)	<=0.5ms
Response Time (OFF)	<=0.5ms
Installing Size (width×height×depth mm)	40×145×153.5
Weight	400g
Operating Temperature	-10~60℃
Status Indicator	Green indicator LED for each digital input point

4.4.Digital input module DIM401-3202: DI32×DC24V

Order Number

400DIM4013202

Features:

- 32 points input with 2 groups, 16 points per group, using a common terminal, source input type.
- Rated input voltage 24VDC.
- Applicable to switch and 2/3/4 proximity switch.
- Every DI point could be set 10~100ms filtering time by software.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Every channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Hot plugging support.

Diagram of Interface

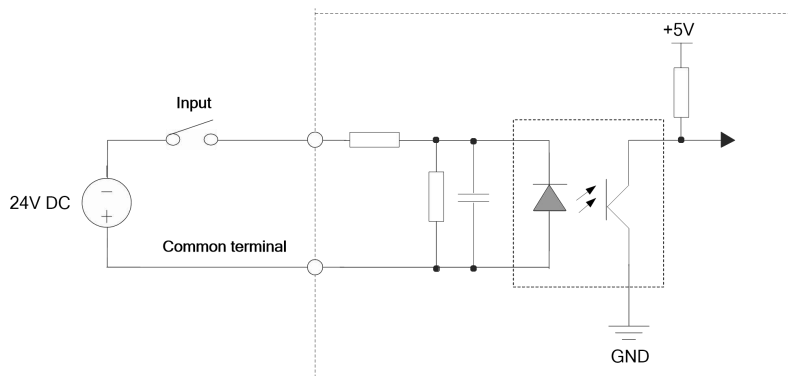


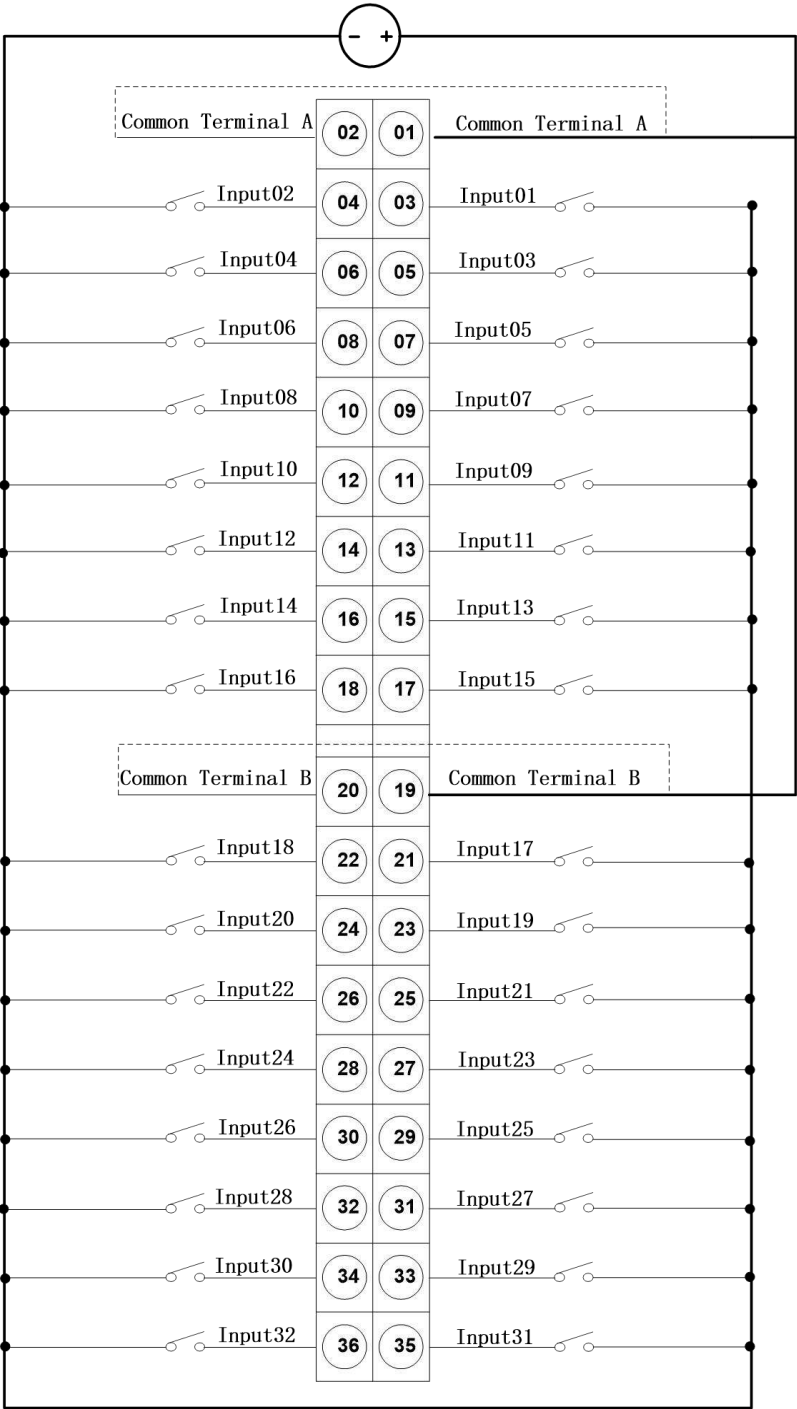
Diagram of DIM401-3202 Single Channel Interface Circuit

Terminal wiring diagram

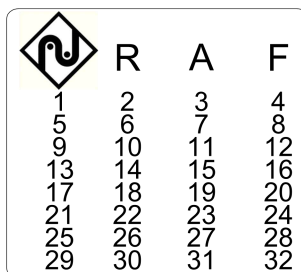
DIM401-3202 Digital input module connect with external devices by terminal blocks in front of the module. Correspondence of each channel is described in the following figure. And please pay attention to the following:

- DIM401-3202 digital input module requires a separate 24VDC field power supply.
- Every 16 channels form a group and share a common terminal. 32 channels can be divided into 2 groups, each of which requires a separate 24VDC field power supply.
- NO. "1, 2" pin of the terminal, as the common terminal of point 1 to 16, should be connected to the positive pole of field power supply; NO.3~NO.18 pin are the digital input for point 1 to 16 in turn; NO. "19, 20" pin of the terminal, as the common terminal of point 17 to 32, should be connected to the positive pole of another field power supply; NO.21~NO.36 pin are the digital input for point 17 to 32 in turn.
- Please don't connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.

24VDC Field Power Supply



DIM401-3202 Terminal wiring diagram

INDICATOR LED DESCRIPTION:**INDICATOR LEDS****Descriptions of indicator LEDs:**

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/ Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-32	Green	Light / off	Current state of input is 1/ Current state of input is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1-32 Channel indicator LED: Every green light shows state of one input signal. For digital input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0.

Technical Specification

Points	32
Input Type	Source
Module Load	440mA/5V
Power Consumption	2.2W
Self Diagnosis Function	Yes
Input Filter	10~100ms manually
Insulation Test	500VDC
Nominal Input Voltage	24VDC
“1”Signal Voltage	14~28.8V
“0”Signal Voltage	0~13.2V
“1”Signal Average Current(DC24V)	6mA
Response Time (ON)	<=0.5ms
Response Time (OFF)	<=0.5ms
Installing Size (width×height×depth mm)	40×145×153.5
Weight	400g
Operating Temperature	-10~60℃
Status Indicator	Green indicator LED for each digital input point

4.5. Digital input module DIM401-3211 : DI16xDC24V&DI16x

DC48V

Order Number

400DIM4013211

Features:

- 32 points input with 2 groups, DI16xDC24V&DI16xDC48V, 16 points per group, using a common terminal, sink input type.
- Rated input voltage 24VDC&48VDC.
- Applicable to switch and 2/3/4 proximity switch.
- Every DI point could be set 10~100ms filtering time by software.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Every channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Hot plugging support.

Diagram of Interface

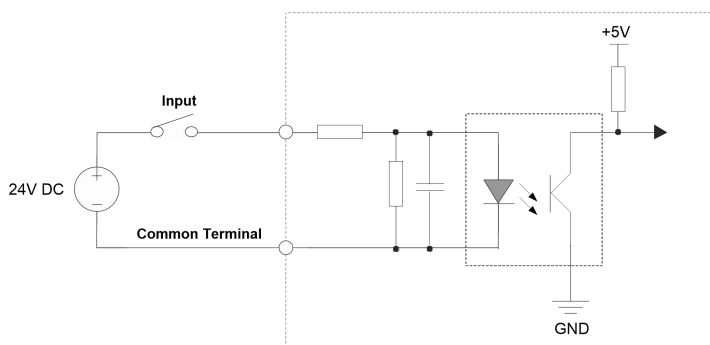
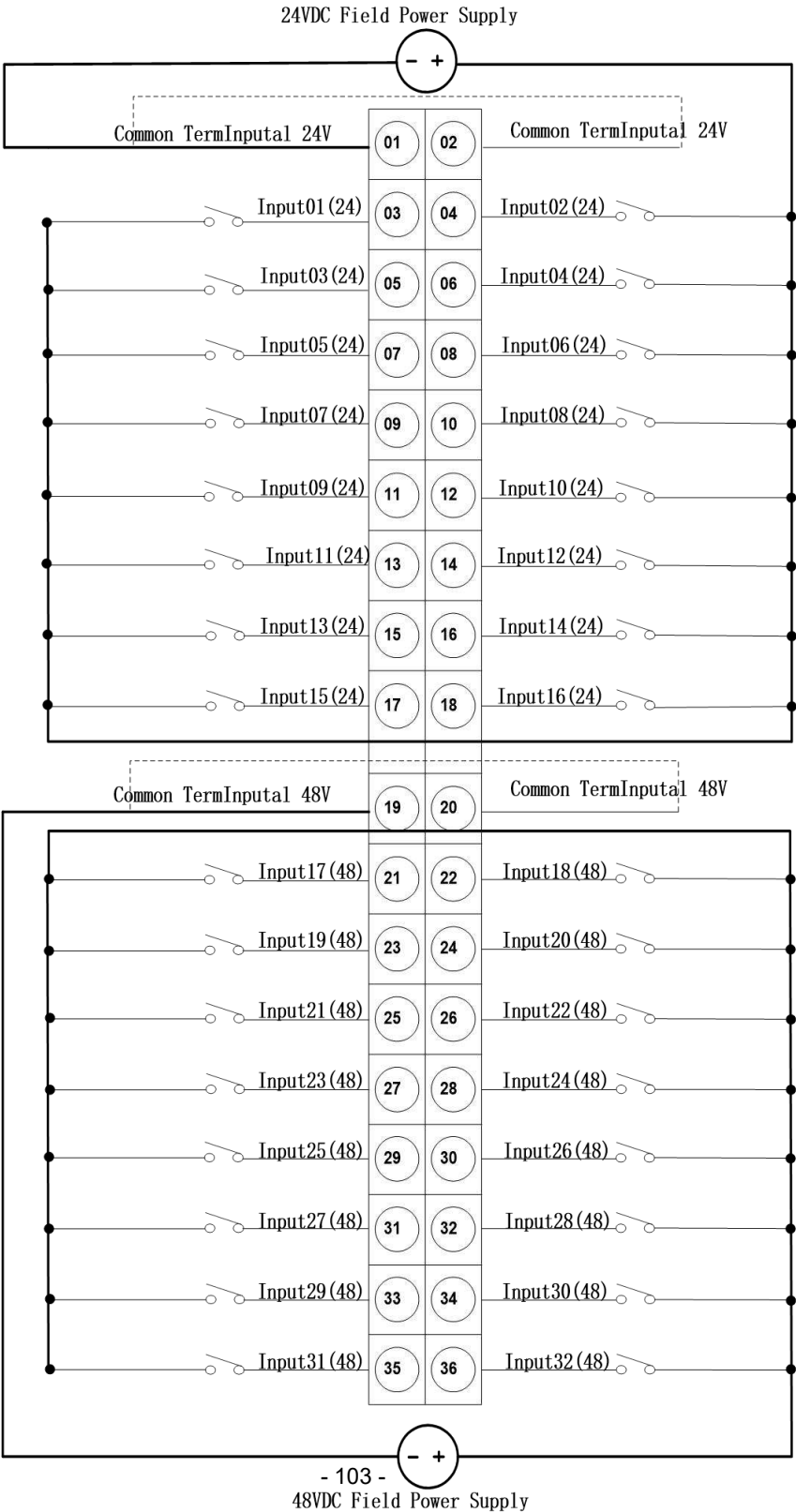


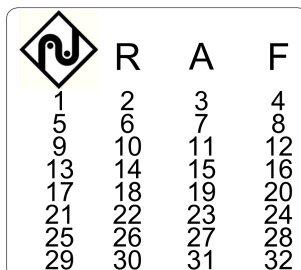
Diagram of DIM401-3211 Single Channel Interface Circuit

Terminal wiring diagram

DIM401-3211 Digital input module connect with external devices by terminal blocks in front of the module. Correspondence of each channel is described in the following figure. And please pay attention to the following:

- DIM401-3211 digital input module requires separate 24VDC and 48VDC field power supply.
- Every 16 channels form a group and share a common terminal. 32 channels can be divided into 2 groups, Point 1-16 requires a separate 24VDC field power supply, Point 17 - 32 requires a separate 48VDC field power supply .
- NO. "1, 2" pin of the terminal, as the common terminal of point 1 to 16, should be connected to the negative pole of 24VDC field power supply; NO.3~NO.18 pin are the digital input for point 1 to 16 in turn, should be connected to the positive pole of 24VDC field power supply; NO. "19, 20" pin of the terminal, as the common terminal of point 17 to 32, should be connected to the negative pole of 48VDC field power supply; NO.21~NO.36 pin are the digital input for point 17 to 32 in turn, should be connected to the positive pole of 48VDC field power supply.
- Please don't connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.



DIM401-3211 Terminal wiring diagram**INDICATOR LED DESCRIPTION:****INDICATOR LEDS****Descriptions of indicator LEDs:**

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/ Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light1-32	Green	Light / off	Current state of a way input is 1/ Current state of a way input is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1-32 Channel indicator LED: Every green light shows state of one input signal. For digital input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0.

Technical Specification

Points	32
Input Type	Sink
Module Load	440mA/5V
Power Consumption	2.2W
Self Diagnosis Function	Yes
Input Filter	10～100ms manually
Insulation Test	500VDC
Nominal Input Voltage	24VDC&48VDC
“1”Signal Voltage	11～30V (Standard voltage 24VDC) 30～60V (Standard voltage 48VDC)
“0”Signal Voltage	-30～5V (Standard voltage 24VDC) -30～10V (Standard voltage 48VDC)
“1”Signal Average Current(DC24V)	6mA
“1”Signal Average Current(DC48V)	4mA
Response Time (ON)	<=0.5ms
Response Time (OFF)	<=0.5ms
Installing Size (width×height×depth mm)	40×145×153.5
Weight	400g
Operating Temperature	-10～60℃
Status Indicator	Green indicator LED for each digital input point

4.6 Sequence of Event (SOE) Module IIM401-1601: IIM16×DC24V

Order Number

400IIM4011601

Features:

- 16 points input with 1 group, 16 points(also called “channels”) per group, using a common terminal, sink input type.
- Rated input voltage 24VDC.
- Applicable to switch and 2/3/4 proximity switch.
- Every DI point could be set 10~100ms filtering time by software.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Every channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Every channel in IIM401-1601 module has SOE function. When shift takes place in input signal, the shift information and action time can be transmitted automatically to CPU module with a resolution of 1ms.
- Hot plugging support.

Diagram of Interface

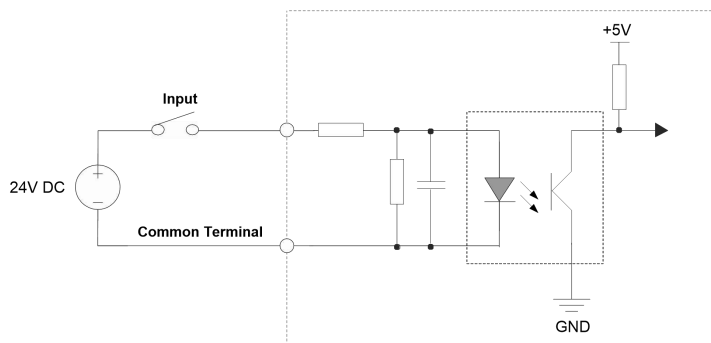


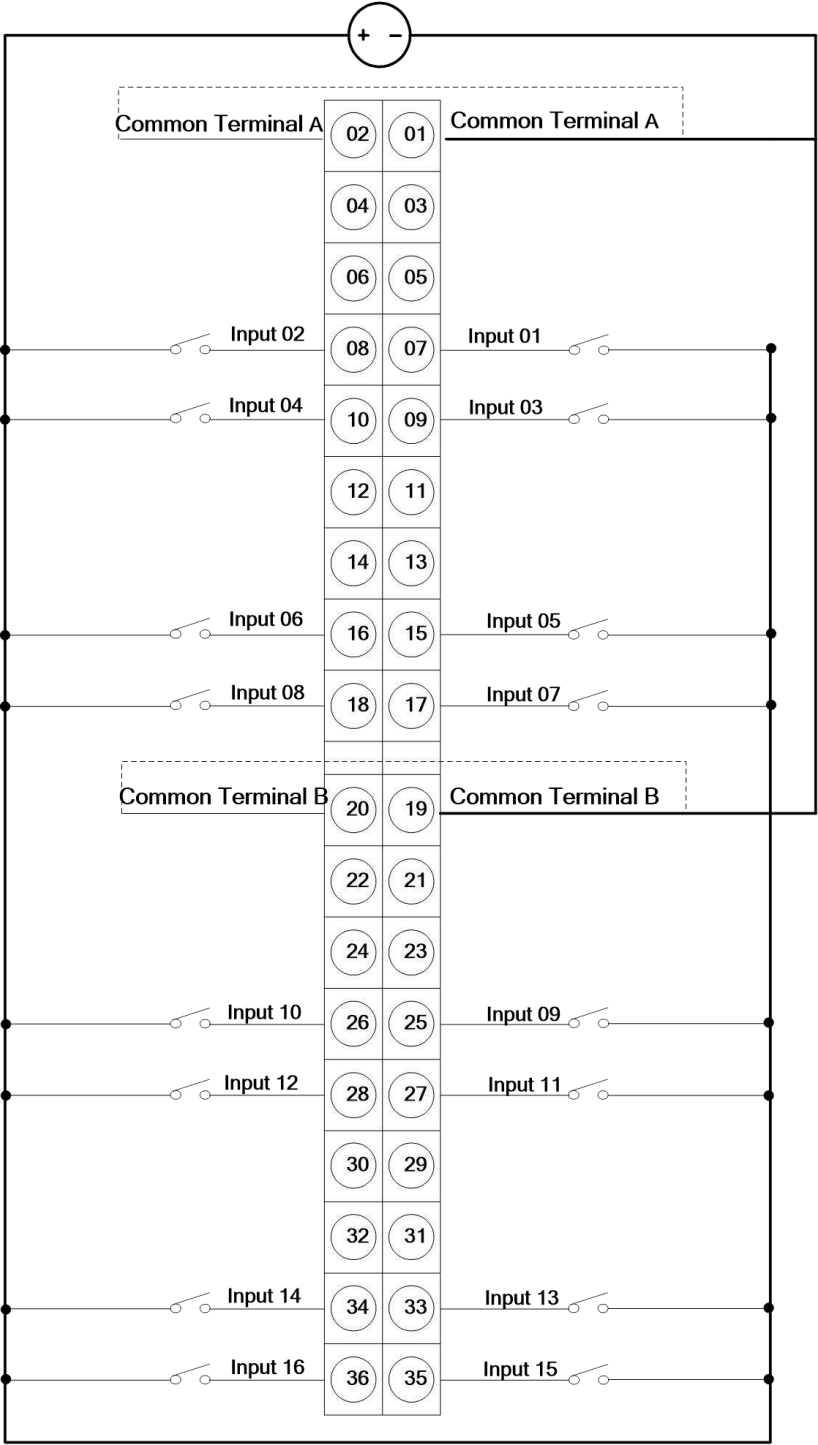
Diagram of IIM401-1601 Single Channel Interface Circuit

Terminal wiring diagram

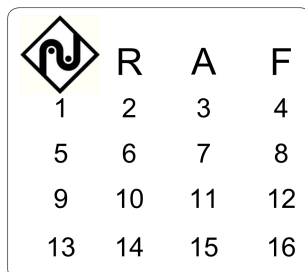
IIM401-1601 sequence of event module connects with external devices by terminal blocks in front of the module. Correspondence of each channel is described in the following figure. And please pay attention to the following:

- IIM401-1601 sequence of event module requires a separate 24VDC field power supply.
- 16 channels share a common 24VDC field power supply.
- NO. "1, 2" pin of the terminal, as the common terminal of point 1 to 8, should be connected to the negative pole of field power supply; NO.7~NO.10 pin and NO.15~NO.18 pin are the digital input for point 1 to 8 in turn; NO. "19, 20" pin of the terminal, as the common terminal of point 9 to 16, should be connected to the negative pole of another field power supply; NO.25~NO.28 pin and NO.33~NO.36 pin are the digital input for point 9 to 16 in turn.
- Please don't connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.

24VDC Field Power Supply



IIM401-1601Terminal wiring diagram

INDICATOR LED DESCRIPTION:**INDICATOR LEDS****Description of indicator LEDs:**

LED	Color	State	Meaning
R	Green	Flicker / Constant Lighting	Run normally
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-16	Green	Light / off	Current state of a way input is 1/ Current state of a way input is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1-16 Channel indicator LED: Every green light shows state of one input signal. For digital input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0.

Technical Specification

Points	16
Input Type	Sink
Module Load	440mA/5V
Power Consumption	2.2W
Self Diagnosis Function	Yes
Input Filter	10~100ms manually
Insulation Test	500VDC
Nominal Input Voltage	24VDC
“1”Signal Voltage	14~28.8V
“0”Signal Voltage	0~13.2V
“1”Signal Average Current(DC24V)	6mA
Response Time (ON)	<=0.5ms
Response Time (OFF)	<=0.5ms
Installing Size (width×height×depth mm)	40×145×153.5
Weight	350g
Operating Temperature	-10~60℃
Status Indicator	Green indicator LED for each digital input point

4.7 Sequence of Event (SOE) Module IIM401-1612: IIM16×DC24V**Order Number**

400IIM4011612

Features:

- 16 points input with 1 group, 8 points(also called “channels”) per group, using a common terminal, source input type.

- Rated input voltage 24VDC.
- Applicable to switch and 2/3/4 proximity switch.
- Every DI point could be set 1~100ms filtering time by software.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Every channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Every channel in IIM401-1612 module has SOE function. When shift takes place in input signal, the shift information and action time can be transmitted automatically to CPU module with a resolution of 1ms.
- Hot plugging support.

Diagram of Interface

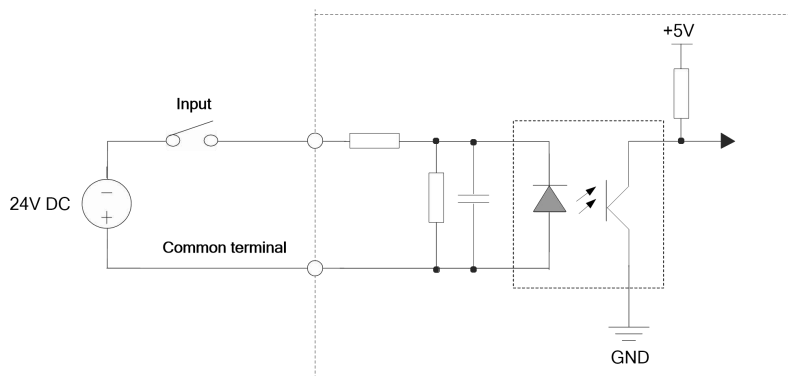
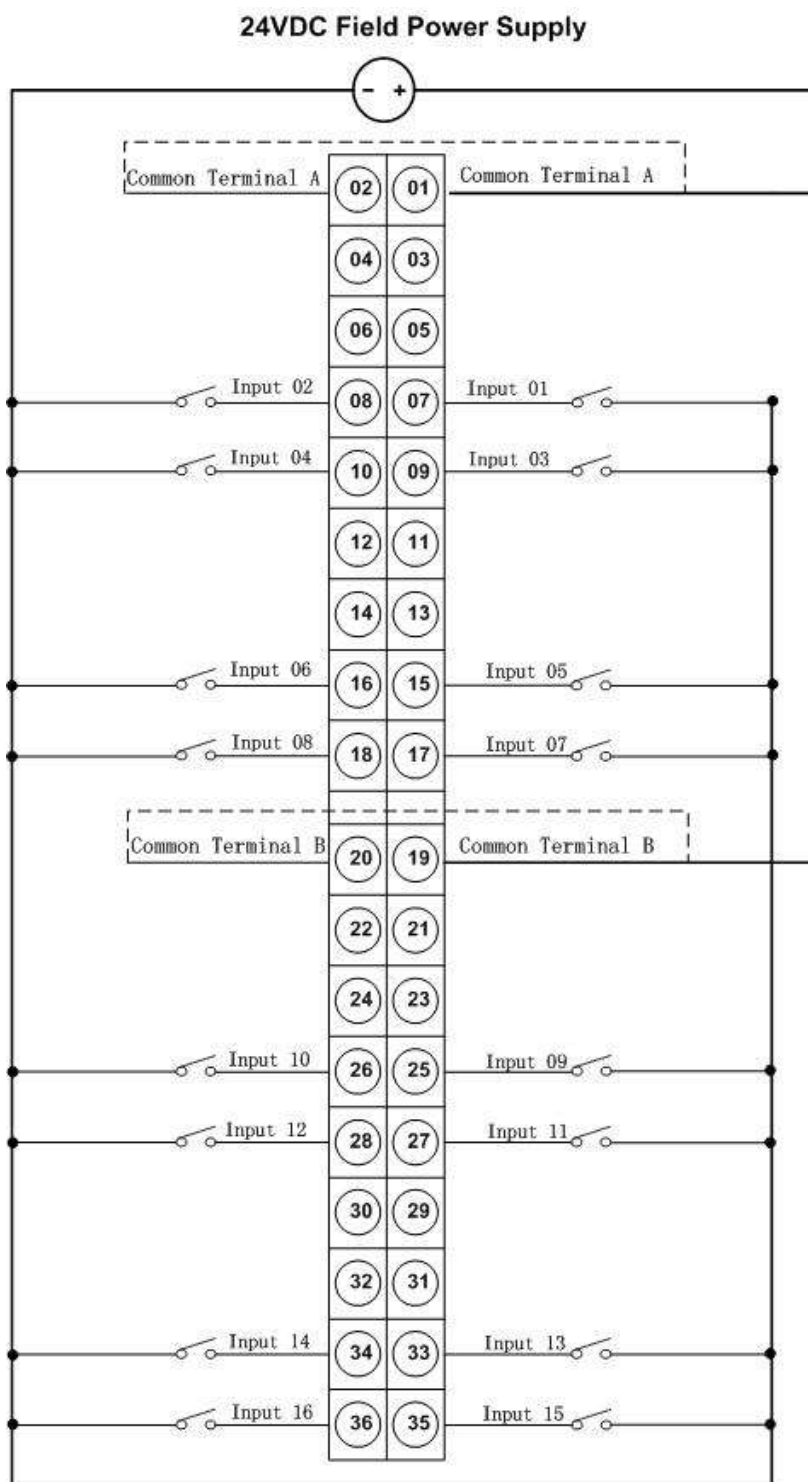


Diagram of IIM401-1612 Single Channel Interface Circuit

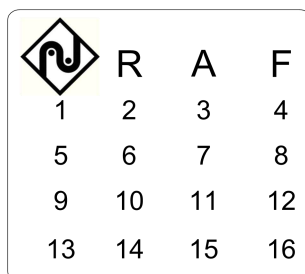
Terminal wiring diagram

IIM401-1612 sequence of event module connects with external devices by terminal blocks in front of the module. Correspondence of each channel is described in the following figure. And please pay attention to the following:

- IIM401-1612 sequence of event module requires a separate 24VDC field power supply.
- 16 channels share a common 24VDC field power supply.
- NO. "1, 2" pin of the terminal, as the common terminal of point 1 to 8, should be connected to the negative pole of field power supply; NO.7~NO.10 pin and NO.15~NO.18 pin are the digital input for point 1 to 8 in turn; NO. "19, 20" pin of the terminal, as the common terminal of point 9 to 16, should be connected to the negative pole of another field power supply; NO.25~NO.28 pin and NO.33~NO.36 pin are the digital input for point 9 to 16 in turn.
- Please don't connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.



IIM401-1612 Terminal wiring diagram

INDICATOR LED DESCRIPTION:**INDICATOR LEDS****Description of indicator LEDs:**

LED	Color	State	Meaning
R	Green	Flicker / Constant Lighting	Run normally
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-16	Green	Light / off	Current state of a way input is 1/ Current state of a way input is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1-16 Channel indicator LED: Every green light shows state of one input signal. For digital input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0.

Technical Specification

Points	16
Input Type	Source
Module Load	440mA/5V
Power Consumption	2.2W
Self Diagnosis Function	Yes
Input Filter	1~100ms manually
Insulation Test	500VDC
Nominal Input Voltage	24VDC
“1”Signal Voltage	14~28.8V
“0”Signal Voltage	0~13.2V
“1”Signal Average Current(DC24V)	6mA
Response Time (ON)	<=0.5ms
Response Time (OFF)	<=0.5ms
Installing Size (width×height×depth mm)	40×145×153.5
Weight	350g
Operating Temperature	-10~60℃
Status Indicator	Green indicator LED for each digital input point

4.8 Sequence of Event (SOE) Module IIM401-3201: IIM32×DC24V

Order Number

400IIM4013201

Features:

- 32 points input with 2 groups, 16 points (also called “channels”) per group, using a common terminal.
- Rated input voltage 24VDC.
- Applicable to switch and 2/3/4 proximity switch.
- Every DI point could be set 10~100ms filtering time by software.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Every channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Every channel in IIM401-3201 module has SOE function. When shift takes place in input signal, the shift information and action time can be transmitted automatically to CPU module with a resolution of 1ms.
- Hot plugging support.

Diagram of Interface

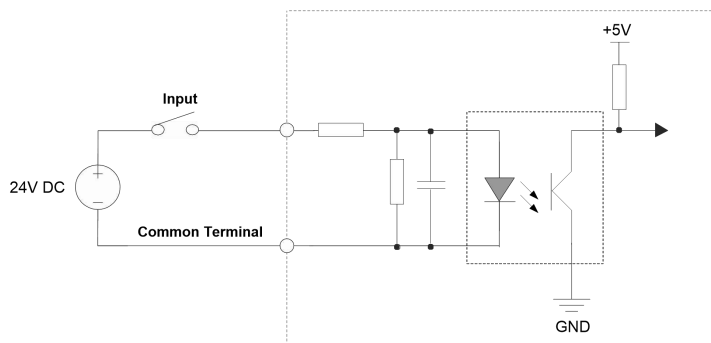


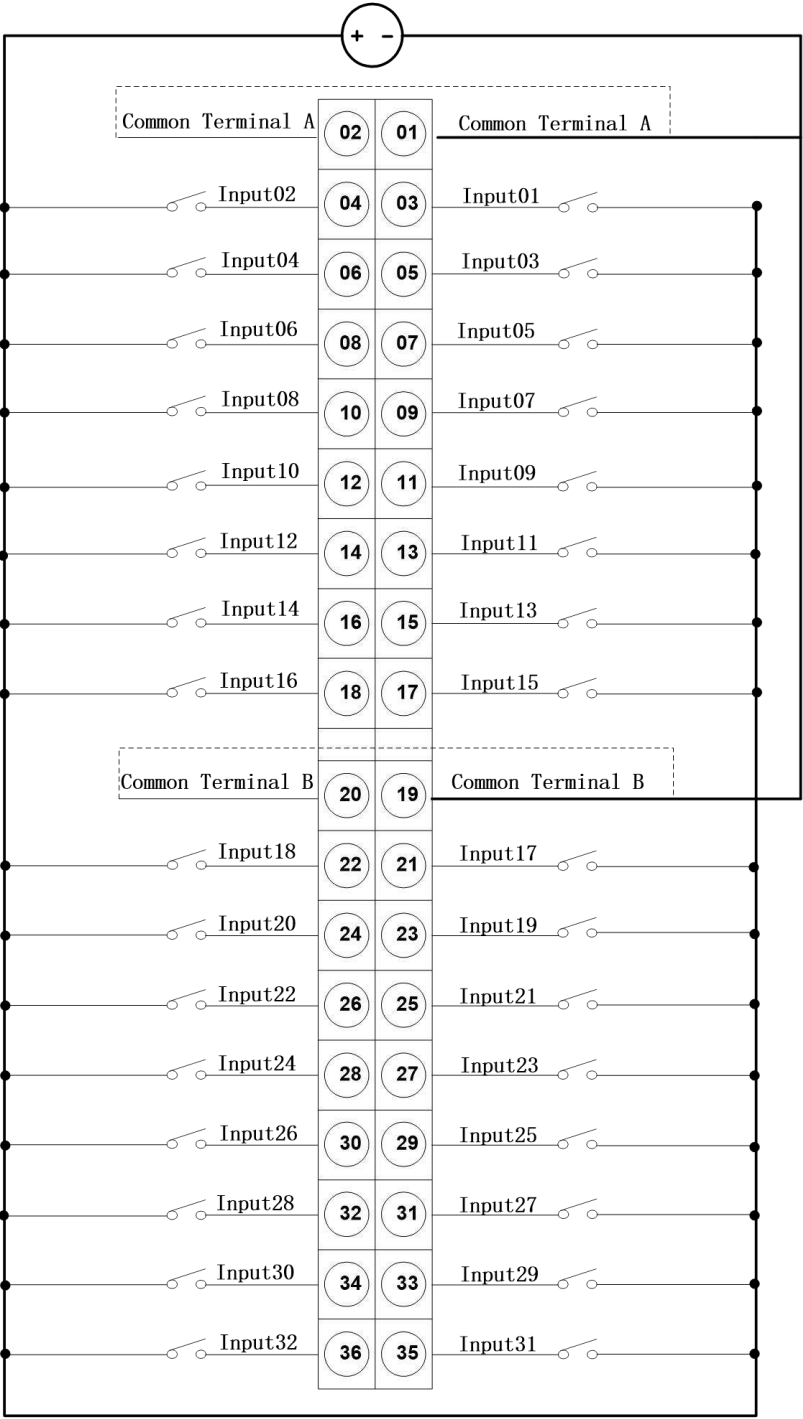
Diagram of IIM401-3201 Single Channel Interface Circuit

Terminal wiring diagram

IIM401-3201 sequence of event module connects with external devices by terminal blocks in front of the module. Correspondence of each channel is described in the following figure. And please pay attention to the following:

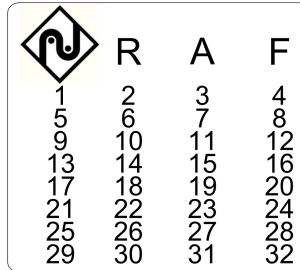
- IIM401-3201 sequence of event module requires a separate 24VDC field power supply.
- 16 channels share a common 24VDC field power supply.
- NO. "1, 2" pin of the terminal, as the common terminal of point 1 to 16, should be connected to the negative pole of field power supply; NO.3~NO.18 pin are the digital input for point 1 to 16 in turn; NO. "19, 20" pin of the terminal, as the common terminal of point 17 to 32, should be connected to the negative pole of another field power supply; NO.21~NO.36 pin are the digital input for point 17 to 32 in turn.
- Please don't connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.

24VDC Field Power Supply



IIM401-3201 Terminal wiring diagram

INDICATOR LED DESCRIPTION:



INDICATOR LEDS

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-32	Green	Light / off	Current state of a way input is 1/ Current state of a way input is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1-32 Channel indicator LED: Every green light shows state of one input signal. For digital input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0.

Technical Specification

Points	32
Input Type	Sink
Module Load	440mA/5V
Power Consumption	2.2W
Self Diagnosis Function	Yes
Input Filter	10~100ms manually
Insulation Test	500VDC
Nominal Input Voltage	24VDC
“1”Signal Voltage	14~28.8V
“0”Signal Voltage	0~13.2V
“1”Signal Average Current(DC24V)	6mA
Response Time (ON)	<=0.5ms
Response Time (OFF)	<=0.5ms
Installing Size (width×height×depth mm)	40×145×153.5
Weight	400g
Operating Temperature	-10~60℃
Status Indicator	Green indicator LED for each digital input point

4.9 Digital output module DOM401-1601: DO16×DC24V×Transistor

Order Number

400DOM4011601

Features:

- 16 points output with isolation, 8 points(also called “channels”) per group using a common terminal
- Rated output type 24VDC transistor, source type of output.
- Every group of output has a fuse which can protect the module automatically if it is over loaded.
- Every output point has code lock function which could prevent the module from wrong acting and rejecting action.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

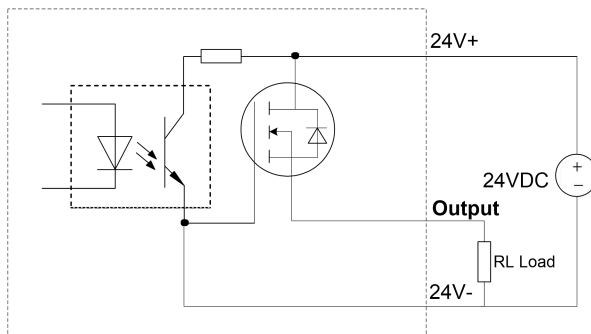


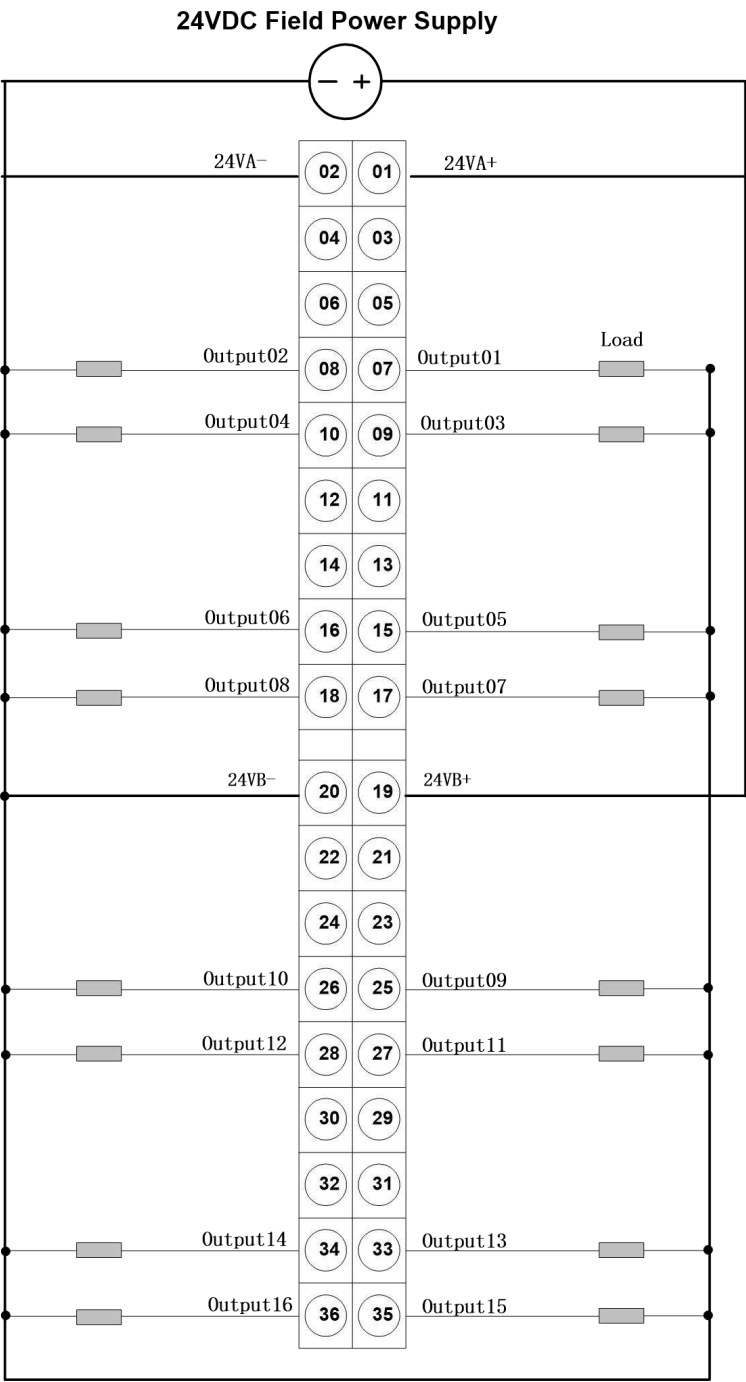
Diagram of DOM401-1601 Single Channel Interface Circuit

Terminal wiring diagram

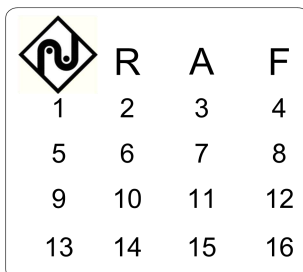
DOM401-1601 Digital output module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- DOM401-1601 digital output module need to use user-supplied power supply 24VDC separately.
- All the 16 points in one group use the same 24VDC supply.
- NO. "1、2" are pins of the terminal should be connected to the field power supply, with NO.1 connecting to positive pole of 24VDC, and NO.2 connecting to negative pole of 24VDC. NO."3、5、7、9、11、13、15、17" pin is digital output point 1 to digital output point 8 in turn. And NO. "19、20" are pins of the terminal which should be connected to the field power supply, with NO.19 connecting to positive pole of 24VDC, and NO.20 connecting to negative pole of 24VDC. NO."21、23、25、27、29、31、33、35" pin is digital output for point 9 to 16 in turn.
- Please don't connect more than 2 cables to the same pin of the terminal, it is better to

realize multipoint cable access by busbar or transfer terminal.



DOM401-1601Terminal wiring diagram

INDICATOR LED DESCRIPTION:**INDICATOR LEDS**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-16	Green	Light / off	Current state of a way output is 1/ Current state of a way output is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: HIN Active Indicator LED. When HIN works normally, the LED is on, or it turns off.
- F: Fault Indicator LED. The LED is light when the module is fault.
- 1-16 Channel indicator LED: Every green light shows state of one output signal. For digital output module, when the light is on, it means the current state of the output signal is 1, otherwise it is 0.

Technical Specification

Points		16
Module Load		560mA/5V
Power Consumption		2.8W
Output Voltage		24VDC
Output Type		Transistor, source type
Continuous current per channel (0~40℃)		0.5A
Maximum continuous current per channel (0~40℃)		0.6A, 100ms
Minimum continuous current per channel		5mA
Switching Frequency	Resistive Loading	100Hz
	Inductive Loading	0.5 Hz
Installing Size (width×height×depth mm)		40×145×153.5
Weight		300g
Operating Temperature		-10~60℃
Status Indicator		Green indicator LED for each digital input point
Self Diagnosis Function		Yes
Insulation Test		500VDC
Channel Separation	Adjacent Channel Isolation	Yes
	Isolation Between Channel and Backplane	Yes, optical isolation

4.10 Digital output module DOM401-1602: DO16×Relay

Order Number

400DOM4011602

Features:

- 16 points relay output.
- Every group of output has a fuse which can protect the module automatically if it is over loaded.
- Every output point has code lock function which could prevent the module from wrong acting and rejecting action.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

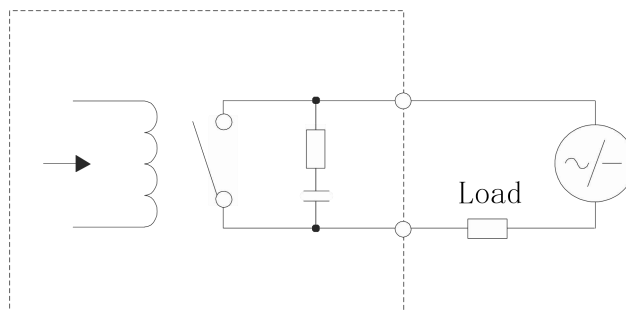
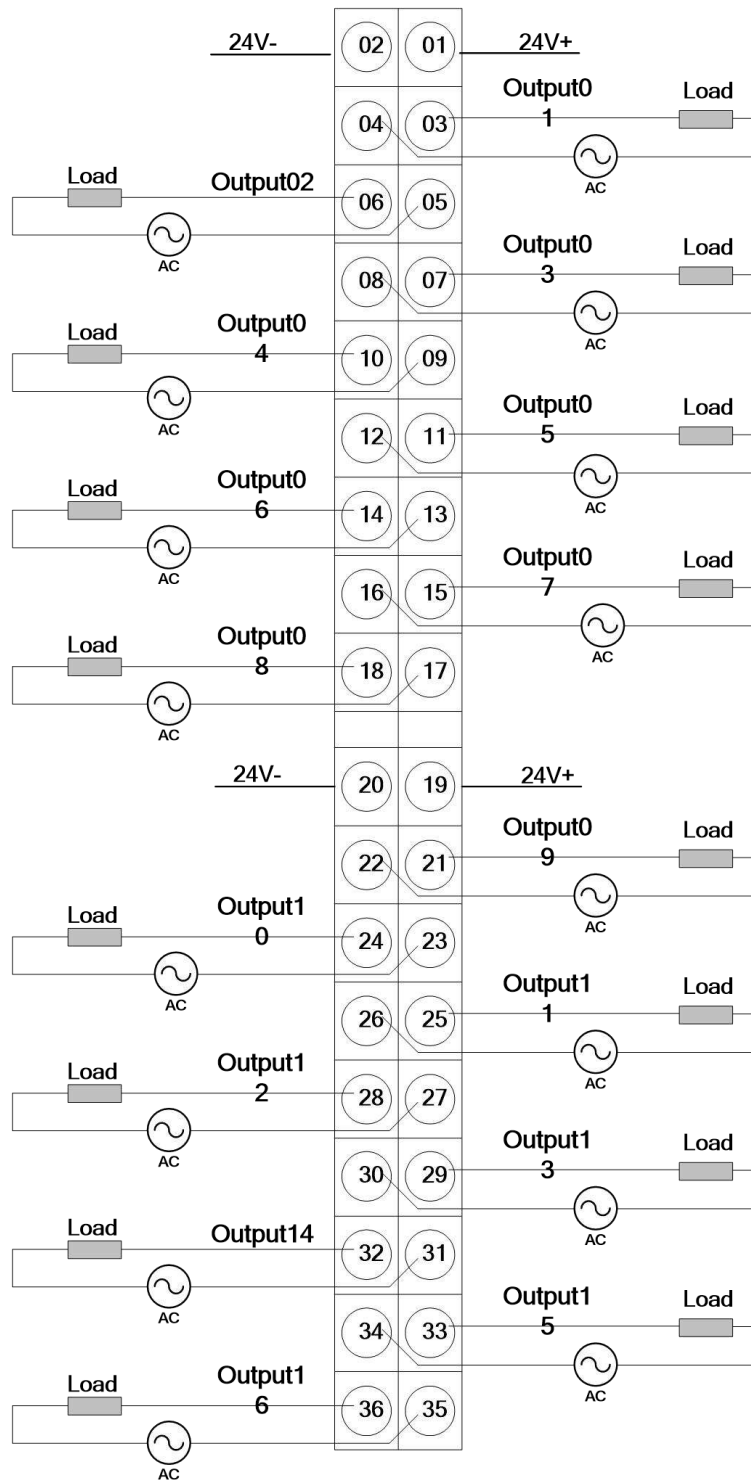


Diagram of DOM401-1602 Single Channel Interface Circuit

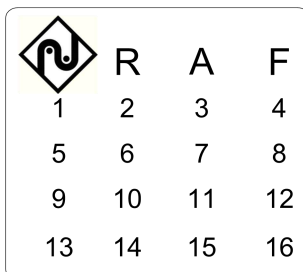
Terminal wiring diagram

DOM401-1602 Digital output module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- The power for relay is supplied with an external power supply with DC24V.
- Each output signal is an idle contact passive signal. If external devices needs power supply, users need to find extra cascading power themselves.
- Please don't connect more than 2 cables to the same pin of the terminal, it is better to realize multipoint cable access by busbar or transfer terminal.



DOM401-1602 Terminal wiring diagram

INDICATOR LED DESCRIPTION:**INDICATOR LEDS**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-16	Green	Light / off	Current state of output is 1/ Current state of output is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: HIN Active Indicator LED. When HIN works normally, the LED is on, or it turns off.
- F: Fault Indicator LED. The LED is light when the module is fault.
- 1-16 Channel indicator LED: Every green light shows state of one output signal. For digital output module, when the light is on, it means the current state of the output signal is 1, otherwise it is 0.

Technical Specification

Points		16
Module Load		560mA/5V
Power Consumption		2.8W
Output voltage		relay
Output type		Relay passive normally open contacts
Continuous current per channel (0~40℃)		5A (DC24V)
		0.3A (DC110V)
Switching Frequency	Resistive Loading	2Hz
	Inductive Loading	0.5 Hz
Installing Size (width×height×depth mm)		40×145×153.5
Weight		330g
Operating Temperature		-10~60℃
Status Indicator		Green indicator LED for each digital input point
Self Diagnosis Function		Yes
Insulation Test		500VDC
Channel Separation	Adjacent Channel Isolation	Yes
	Isolation between Channel and Backplane	Yes, optical isolation

4.11 Digital output module DOM401-3201:

DO32×DC24V×Transistor

Order Number

400DOM4013201

Features:

- 32 points output with isolation, 16 points (also called “channels”) per group using two common terminals.
- Rated output type 24VDC transistor, source type of output.
- Every group of output has a fuse which can protect the module automatically if it is overloaded.
- Every output point has code lock function which could prevent the module from wrong acting and rejecting action.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

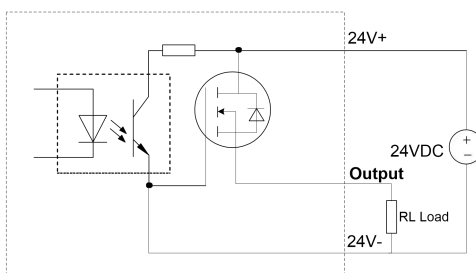


Diagram of DOM401-3201 Single Channel Interface Circuit

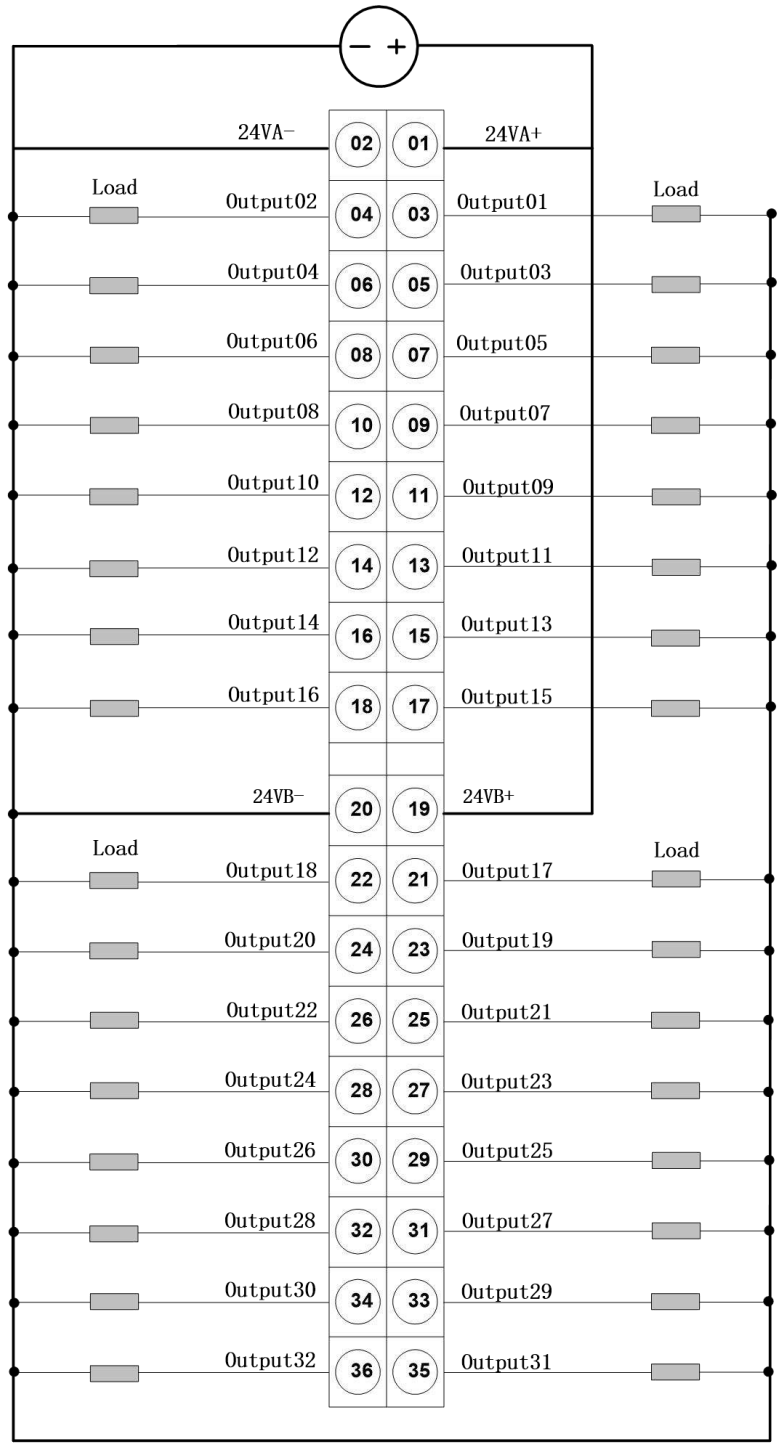
Terminal wiring diagram

DOM401-3201 Digital output module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing.

And please pay attention to the following:

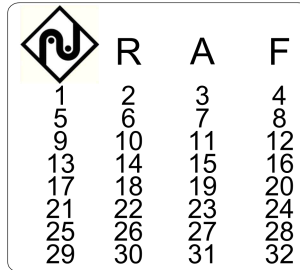
- DIM401-3201 digital input module requires a separate 24VDC field power supply.
- Every 16 channels form a group and share a common terminal. 32 channels can be divided into 2 groups, each of which requires a separate 24VDC field power supply.
- NO. "1, 2" pin of the terminal serves as the power terminal of 16 channels in group 1, with "1" pin connected to the positive pole of external 24V power supply and "2" pin connected to the negative pole; NO.3~NO.18 pin are the digital output for point 1 to 16 in turn; NO. "19, 20" pin of the terminal serves as the power terminal of 16 channels in group 2 with "19" pin connected to the positive pole of external 24V power supply and "20" pin connected to the negative pole;; NO.21~NO.36 pin are the digital output for point 17 to 32 in turn.
- Please don't connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.

24VDC Field Power Supply



DOM401-3201Terminal wiring diagram

INDICATOR LED DESCRIPTION:



INDICATOR LEDS

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-32	Green	Light / off	Current state of output is 1/ Current state of output is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: HIN Active Indicator LED. When HIN works normally, the LED is on, or it turns off.
- F: Fault Indicator LED. The LED is light when the module is fault.
- 1-32 Channel indicator LED: Every green light shows state of one output signal. For digital output module, when the light is on, it means the current state of the output signal is 1, otherwise it is 0.

Technical Specification

Points		32
Module Load		640mA/5V
Power Consumption		3.2W
Output Voltage		24VDC
Output Type		Transistor, source type
Continuous current per channel		0.5A
Maximum load current (0~40℃)		0.6A, 100ms
Minimum load current (0~40℃)		5mA
Switching Frequency	Resistive Loading	100Hz
	Inductive Loading	0.5 Hz
Installing Size (width×height×depth mm)		40×145×153.5
Weight		350g
Operating Temperature		-10~60℃
Status Indicator		Green indicator LED for each digital input point
Self Diagnosis Function		Yes
Insulation Test		500VDC
Channel Separation	Adjacent Channel Isolation	Yes
	Isolation between Channel and Backplane	Yes, optical isolation

4.12 Pulse Input Module PIM401-0801

Module Name and Module Type

Pulse Input Module PIM401-0801: PI8×DC24V Sink Type

Order Number

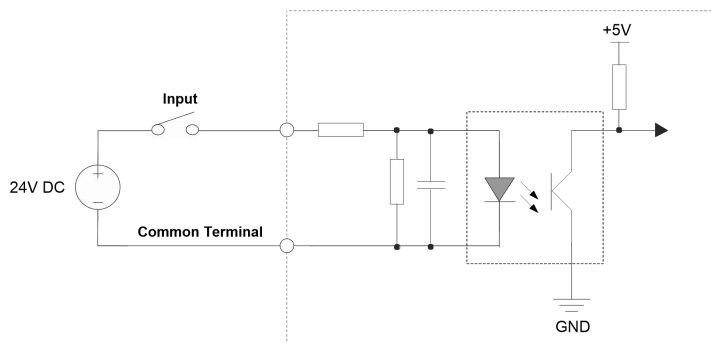
400PIM4010801

Features

PIM401-0801 Pulse Input Module has features as follows.

- 8-point (also called “channel”) pulse input with a common terminal, sink input type.
- 1-point (also called “channel”) zero reset input with it's own common terminal, source input type, which can clear all 8 counters' data..
- supporting zero reset command for each input channel.
- Rated input voltage 24VDC ($\pm 20\%$) .
- Measuring frequency is less than 100Hz.
- Filtering time for each PI point is 4ms .
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup
- Each channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Hot plugging support

Diagram of Interface

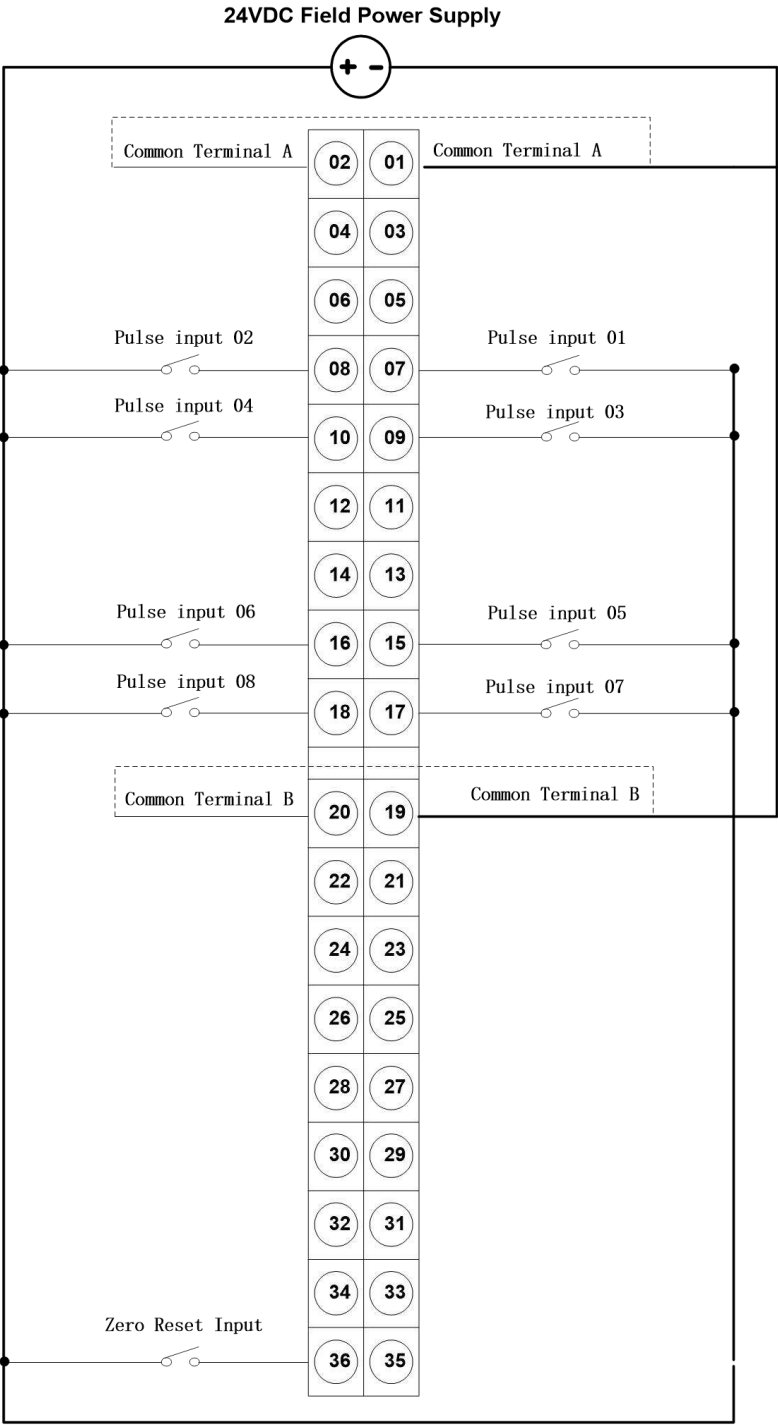


Schematic Diagram of PIM401-0801 Single Channel Interface Circuit

Terminal Wiring Diagram

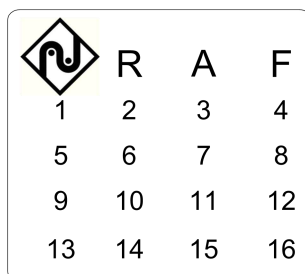
PIM401-0801 pulse input module connects with external devices by a terminal block in front of the module. Correspondence of each channel is described in the following figure. And please pay attention to the following.

- PIM401-0801 pulse input module requires a separate 24VDC field power supply.
8 channels share a common 24VDC field power supply.
- NO. "1, 2" pin of the terminal, as the common terminal of point 1 to 8, should be connected to the negative pole of field power supply; NO.7~NO.10 pin and NO.15~NO.18 pin are the pulse input for point 1 to 8 in turn, NO. "19,20" pin of the terminal, as the common terminal of point 16, which is defined to the zero reset input, should be connected to the positive pole of another field power supply, and NO.36 pin is the zero reset input.
- Please do not connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.



Terminal wiring diagram of PIM401-0801

Indicator LED Description



Indicator LED of PIM401-0801

Definition of LED

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/ Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-8	Green	Light / off	Current state of input is 1/ Current state of input is 0
Indicator Light 16	Green	Light / off	Current state of zero reset signal is 1/ Current state of zero reset signal is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- NO.1-8 Channel indicator LED. Every green light shows state of one input signal. For pulse input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0, and according to it's own input signal frequency , flicker

brightness of each LED is different.

- NO.16 Channel indicator LED. Green light shows state of zero reset input signal, and when the light is on, it means the current state of the input signal is 1, and all the counters' data is cleared to zero, otherwise it is 0, and all the counters count up normally.

Technical Specification

Channels	8
Input Type	Sink
Nominal Input Voltage	24V
Maximum Input Voltage	26.4V
"1"Signal Voltage	More than 12.3V
"0" Signal Voltage	Less than 11.5V
"1"Signal Average Current(DC24V)	6mA
Response Time (ON)	<=0.5ms
Response Time (OFF)	<=0.5ms
Input Filter	4ms
Measuring Frequency	0-100Hz
Minimum Pulse Width	4.5ms
Count Timing	0 to1 (rising edge)
Count Range	1-32767 (count from 0 after start up, and recount from 1 when overflow)
Count Direction	Count up only
External Zero Reset Signal	Supporting (only one zero reset signal, which affects that all count data can be cleared to zero with the signal state of ON)
*Internal Zero Reset Command	Supporting, rising edge (each counter has it's individual zero reset command from the upper controller, by which it's count data can be cleared to zero .)

Insulation Test	500V DC
Isolation Voltage Between Logic Circuit and Input Channels	>1500V
Isolation Voltage Between Input Channels	>500V
Point State Indicator	Green indicator LED for each pulse input channel
Operating Temperature	-10 ~ 60 °C
Ambient Humidity Condition	5—90% (non-condensing)
Applied standards	CE,RoHS,EMC(EMI EN 61000-6-4、EMS EN 61000-6-2)
Module Load	380mA/5V
Power Consumption	1.9W
Installing Size (width×height×depth mm)	40×145×153.5
Weight	350g

*** Internal Zero Reset Command Specification:**

There are eight Internal Zero Reset DO Registers Q1-Q8 in each PIM401-0802 Module. When Profibus Master sends 1(One) to a certain DO register, it's counter of the channel shall be reset to zero.

Sample: Q1-Q8 reset the counters of the 1th-8th. .If you want to reset the first Channel ,you should send “1” to Q1 register.

4.13 Pulse Input Module PIM401-0802

Module Name and Module Type

Pulse Input Module PIM401-0802: PI8×DC24V Source Type

Order Number

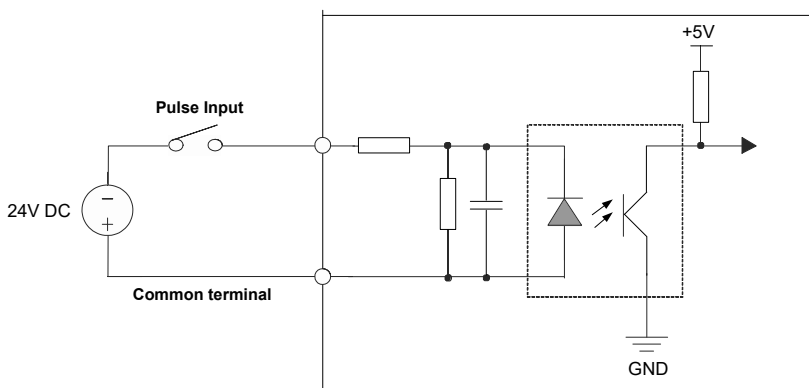
400PIM4010802

Features

PIM401-0802 Pulse Input Module has features as follows.

- 8-point (also called “channel”) pulse input with a common terminal, source input type.
- 1-point (also called “channel”) zero reset input with it's own common terminal, source input type, which can clear all 8 counters' data..
- supporting zero reset command for each input channel.
- Rated input voltage 24VDC ($\pm 20\%$) .
- Measuring frequency is less than 100Hz.
- Filtering time for each PI point is 4ms .
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup
- Each channel has an independent electricity isolation, which ensures that whole module can run safely even when a certain signal channel is disturbed by heavy current.
- Hot plugging support

Diagram of Interface



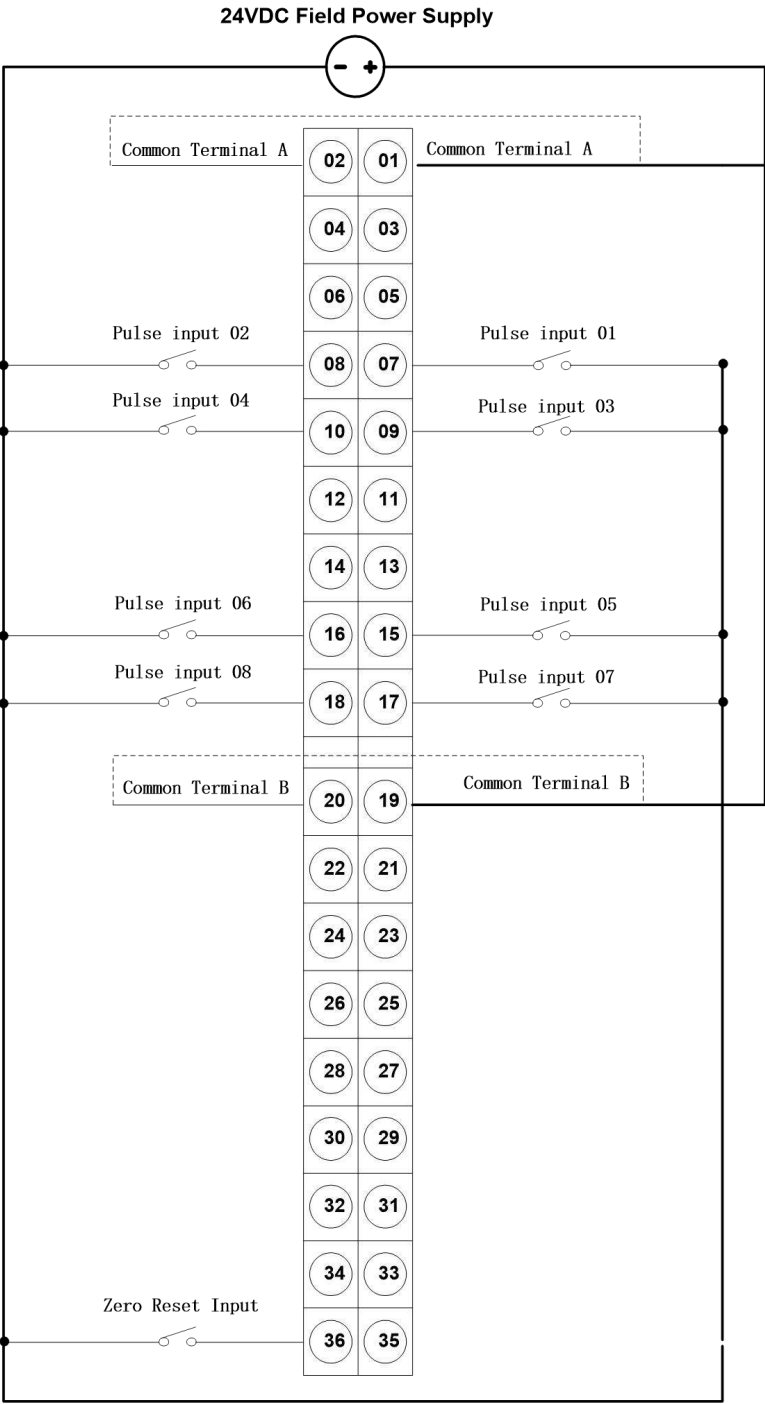
Schematic Diagram of PIM401-0802 Single Channel Interface Circuit

Terminal Wiring Diagram

PIM401-0802 pulse input module connects with external devices by a terminal block in

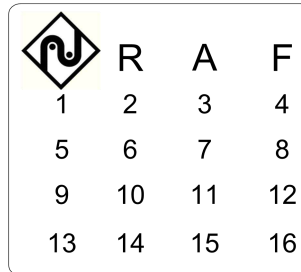
front of the module. Correspondence of each channel is described in the following figure. And please pay attention to the following.

- PIM401-0802 pulse input module requires a separate 24VDC field power supply.
8 channels share a common 24VDC field power supply.
- NO. "1, 2" pin of the terminal, as the common terminal of point 1 to 8, should be connected to the positive pole of field power supply; NO.7~NO.10 pin and NO.15~NO.18 pin are the pulse input for point 1 to 8 in turn, NO. "19,20" pin of the terminal, as the common terminal of point 16, which is defined to the zero reset input, should be connected to the positive pole of another field power supply, and NO.36 pin is the zero reset input.
- Please do not connect more than 2 cables to the same pin of the terminal. It is better to realize multipoint cable access by busbar or transfer terminal.



Terminal wiring diagram of PIM401-0802

Indicator LED Description



Definition of LED

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/ Run but parameters are not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
Indicator Light 1-8	Green	Light / off	Current state of input is 1/ Current state of input is 0
Indicator Light 16	Green	Light / off	Current state of zero reset signal is 1/ Current state of zero reset signal is 0

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- NO.1-8 Channel indicator LED. Every green light shows state of one input signal. For pulse input module, when the light is on, it means the current state of the input signal is 1, otherwise it is 0, and according to it's own input signal frequency , flicker brightness of each LED is different.
- NO.16 Channel indicator LED. Green light shows state of zero reset input signal,

and when the light is on, it means the current state of the input signal is 1, and all the counters' data is cleared to zero, otherwise it is 0, and all the counters count up normally.

Technical Specification

Channels	8
Input Type	Source
Nominal Input Voltage	24V
Maximum Input Voltage	26.4V
"1"Signal Voltage	More than 12.3V
"0" Signal Voltage	Less than 11.5V
"1"Signal Current	More than 4.4mA
"0" Signal Current	Less than 3.9mA
Response Time (ON)	$\leq 0.5\text{ms}$
Response Time (OFF)	$\leq 0.5\text{ms}$
Input Filter	4ms
Measuring Frequency	0-100Hz
Minimum Pulse Width	4.5ms
Count Timing	0 to 1 (rising edge)
Count Range	1-32767 (count from 0 after start up, and recount from 1 when overflow)
Count Direction	Count up only
External Zero Reset Signal	Supporting (only one zero reset signal, which affects that all count data can be cleared to zero with the signal state of ON)
*Internal Zero Reset Command	Supporting, rising edge (each counter has it's individual zero reset command from the upper controller, by which it's count data can be cleared to zero .)

Insulation Test	500V DC
Isolation Voltage Between Logic Circuit and Input Channels	>1500V
Isolation Voltage Between Input Channels	>500V
Point State Indicator	Green indicator LED for each pulse input channel
Operating Temperature	-10 ~ 60 °C
Ambient Humidity Condition	5—90% (non-condensing)
Applied standards	CE,RoHS,EMC(EMI EN 61000-6-4、EMS EN 61000-6-2)
Module Load	380mA/5V
Power Consumption	1.9W
Installing Size (width×height×depth mm)	40×145×153.5
Weight	350g

*** Internal Zero Reset Command Specification:**

There are eight Internal Zero Reset DO Registers Q1-Q8 in each PIM401-0802 Module. When Profibus Master sends 1(One) to a certain DO register, it's counter of the channel shall be reset to zero.

Sample: Q1-Q8 reset the counters of the 1th-8th. .If you want to reset the first Channel ,you should send “1” to Q1 register.

5 Analog I/O Module

☐ Synopsis

AI module has four types: current mode AI module、voltage mode AI module、RTD mode AI module and thermocouple mode AI module.

This chapter will introduce the following subjects:

- 1、Introduction of available Analog modules
- 2、The most important characteristics of Analog module
- 3、Appearance and Wiring schematic of Analog module

☐ Content

Section	Content
5.1	Current mode AI module AIM401-0801
5.2	Current mode AI module AIM401-1601
5.3	Current mode AI module AIM401-1611
5.4	Current/Voltage mode AI module AIM401-0802
5.5	Voltage mode AI module AIM401-0803
5.6	Voltage mode AI module AIM401-1603
5.7	Voltage mode AI module AIM401-1613
5.8	Current/Voltage mode AI module AIM401-0404
5.9	Current/Voltage mode AI module AIM401-0804
5.10	RTD mode AI module AIM401-0805
5.11	Thermocouple mode AI module AIM401-0806
5.12	AO module AOM401-0401
5.13	AO module AOM401-0411
5.14	AO module AOM401-0402

5.15	AO module AOM401-0402
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NA400 series PLC provides many kinds of analog expand modules for users. For more information, please see List 5.1.

List 5.1 Analog Module

Type	Content	Specifications
AIM401-0801	8 channel AI module	AI8×current,single ended
AIM401-1601 AIM401-1611	16channel AI module	AI16×current,single ended
AIM401-0802	8 channel AI module	AI8×current/ voltage,single ended
AIM401-0803	8 channel AI module	AI8×voltage,single ended
AIM401-1603 AIM401-1613	16channel AI module	AI16×voltage,single ended
AIM401-0404	4 channel AI module	AI4×current/ voltage,differential
AIM401-0804	8channel AI module	AI8×current/ voltage ,differential
AIM401-0805	8 channel RTD module	AI8×RTD
AIM401-0806	8 channel thermocouple AI module	AI8×thermocouple
AOM401-0401 AOM401-0411	4 channel AO module	AO4×current
AOM401-0802	8 channel AO module	AO8×current/ voltage
AOM401-0402	4 channel AO module	AO4×current/ voltage

5.1. Analog Input module AIM401-0801: AI8×current

Order Number

400AIM4010801

Features:

- 8 channel current mode AI module.
- Measurement accuracy is 16 bit.
- Signal form: Single-ended input.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

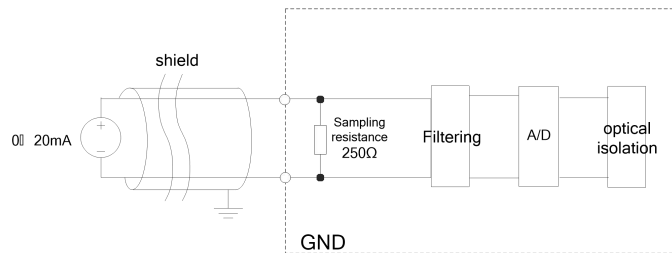


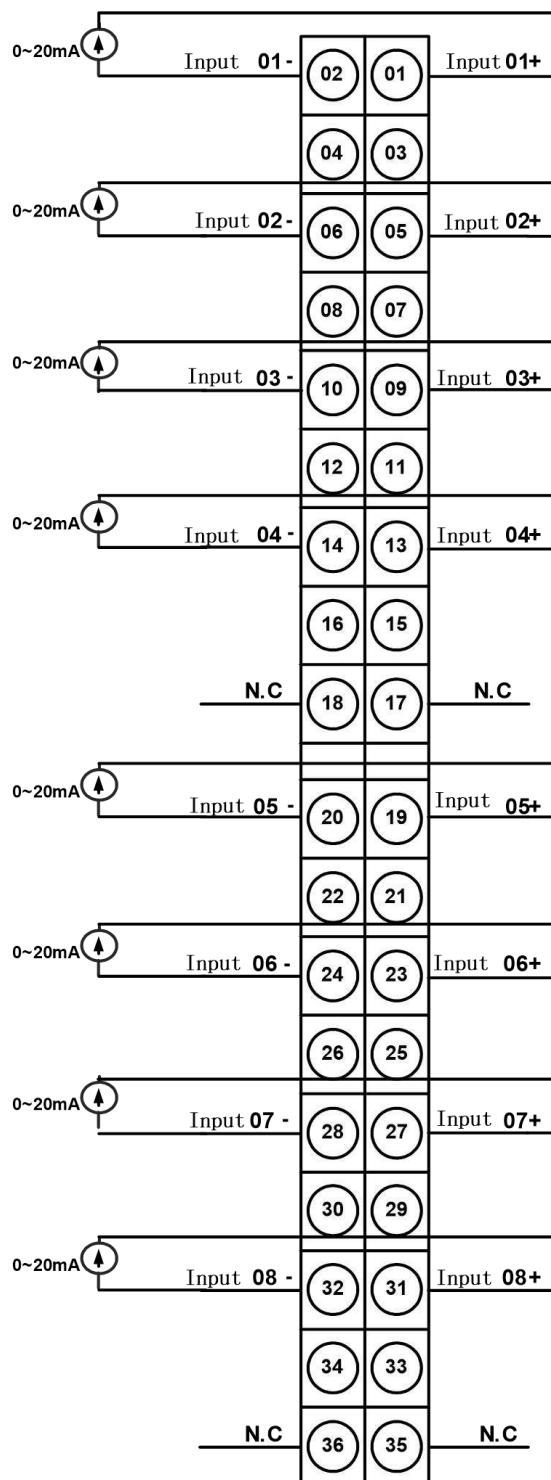
Diagram of AIM401-0801 Single Channel Interface Circuit

After transformed by current-voltage device and a filtering circuit, the current signal is transformed into digital signal by A/D device. The digital signal gets through an optical isolation, and then will be read by a microprocessor. The microprocessor uploads the data to master controller through high speed internal bus at last.

Terminal wiring diagram

AIM401-0801 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each field AI signal is connected to terminals by two wires (shielded cable).
- Even-numbered terminals connect to negative pole of current signals , odd-numbered terminals connect to positive pole of current signals.
- Do not supply power to transmitter with input channel. A separate 24V DC power supply must be used when a two-wired transmitter is connected.
- Prohibition of wiring: “17”、 “18” 、 “35”、 “36”.



AIM401-0801 Terminal wiring diagram

Indicator LED description:



Indicator LEDs

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally/ Program has been running but parameter is unloaded
A	Green	Constant Lighting/ off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	8
Power Consumption	2.4W/5V
Signal Type	4~20mA 0~20mA 0~10mA
Data Type	4000~20000(4~20mA) 0~20000(0~20mA) 0~10000(0~10mA)
Maximum Current	25mA
Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.1%
Sampling Period	30ms/each channel
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by software program separately
Self-diagnosis	Yes
Insulation	500V DC
Dimension W×H×D	40×145×153.5
Weight	350g
Operating Temperature	-10~60℃

5.2. Analog Input module AIM401-1601: AI16×current

Order Number

400AIM4011601

Features:

- 16 channel current mode AI module.
- Measurement accuracy is 16 bit.
- Signal form: Single-ended input.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

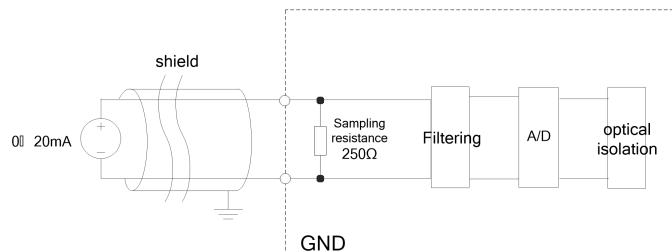


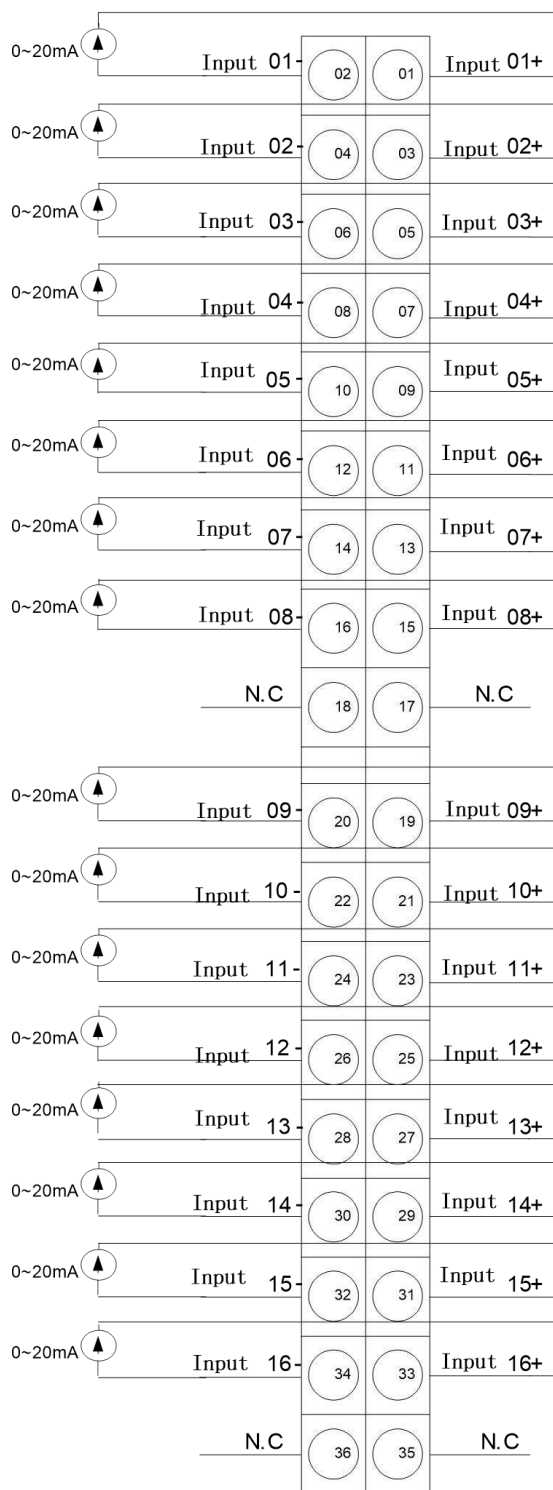
Diagram of AIM401-1601 Single Channel Interface Circuit

After transformed by current-voltage device and a filtering circuit, the current signal is transformed into digital signal by A/D device. The digital signal gets through an optical isolation, and then will be read by a microprocessor. The microprocessor uploads the data to master controller through high speed internal bus at last.

Terminal wiring diagram

AIM401-1601 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each field AI signal is connected to terminals by two wires (shielded cable).
- Even-numbered terminals connect to negative pole of current signals , odd-numbered terminals connect to positive pole of current signals.
- Do not supply power to transmitter with input channel. A separate 24V DC power supply must be used when a two-wired transmitter is connected.
- Prohibition of wiring: “17”、 “18” 、 “35”、 “36”.



AIM401-1601 Terminal wiring diagram

Indicator LED description:



Indicator LEDs

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally /program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	16
Power Consumption	2.6W/5V
Signal Type	4~20mA 0~20mA 0~10mA
Data Type	4000~20000(4~20mA) 0~20000(0~20mA) 0~10000(0~10mA)
Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.1%
Sampling Period	30ms/each channel
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by software program separately
Self-diagnosis	yes
Insulation	500V DC
Dimension W×H×D	40×145×153.5
Weight	400g
Operating Temperature	-10~60℃

5.3. Analog Input module AIM401-1611: AI16×current

Order Number

400AIM4011611

Features:

- 16 channel current mode AI module.

- Measurement accuracy is 16 bit.
- Signal form: Single-ended input.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

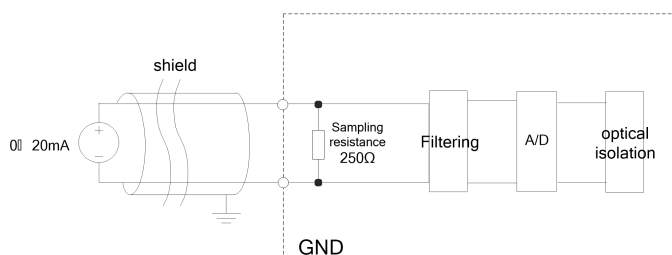


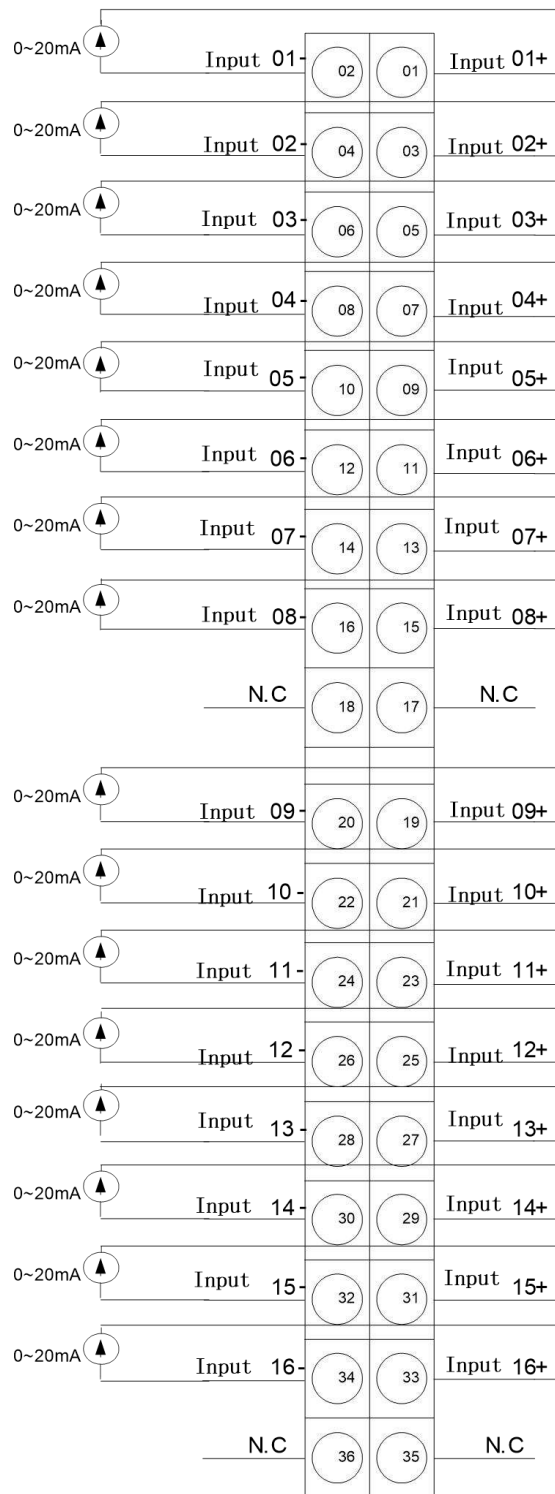
Diagram of AIM401-1611 Single Channel Interface Circuit

After transformed by current-voltage device and a filtering circuit, the current signal is transformed into digital signal by A/D device. The digital signal gets through an optical isolation, and then will be read by a microprocessor. The microprocessor uploads the data to master controller through high speed internal bus at last.

Terminal wiring diagram

AIM401-1611 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each field AI signal is connected to terminals by two wires (shielded cable).
- Even-numbered terminals connect to negative pole of current signals , odd-numbered terminals connect to positive pole of current signals.
- Do not supply power to transmitter with input channel. A separate 24V DC power supply must be used when a two-wired transmitter is connected.
- Prohibition of wiring: “17”、 “18” 、 “35”、 “36”.



AIM401-1611 Terminal wiring diagram

Indicator LED description:



Indicator LEDs

LED	Color	State	Meaning
R	Green	Flicker/Constant Lighting	Run normally /program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	16
Power Consumption	2.6W/5V
Signal Type	0~22mA
Data Type	0~22000
Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.1%
Sampling Period	30ms/each channel
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by software program separately
Self-diagnosis	yes
Insulation	500V DC
Dimension W×H×D	40×145×153.5
Weight	400g
Operating Temperature	-10~60℃

5.4. Analog Input module AIM401-0802: AI8×current/ voltage

Order Number

400AIM4010802

Features:

- 8 channel current/voltage mode AI module.
- Measurement accuracy is 16 bit.
- Signal form: Single-ended input.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

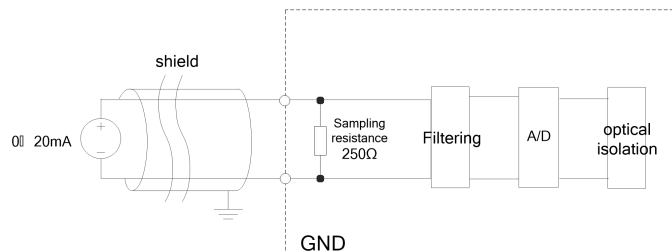


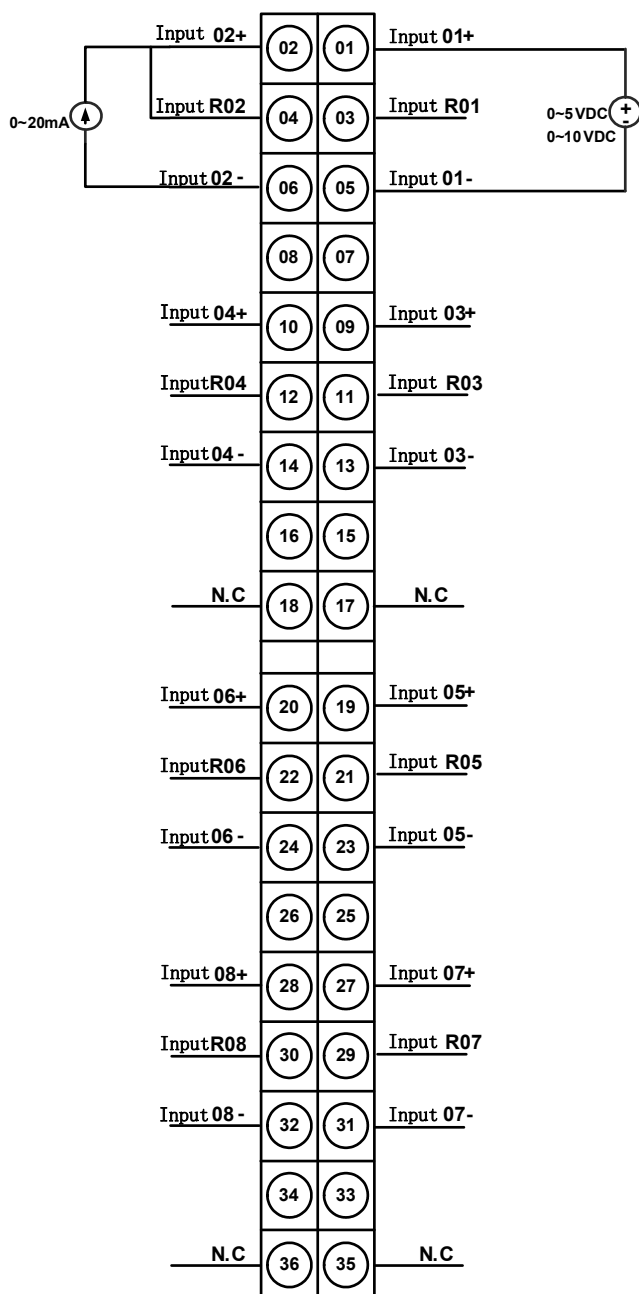
Diagram of AIM401-0802 Single Channel Interface Circuit

After transformed by current-voltage device and a filtering circuit, the current signal is transformed into digital signal by A/D device. The digital signal gets through an optical isolation, and then will be read by a microprocessor. The microprocessor uploads the data to master controller through high speed internal bus at last.

Terminal wiring diagram

AIM401-0802 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each field AI signal is connected to terminals by two wires (shielded cable).
- When connecting current mode signals, negative pole and R pole of current signals should be shorted. If connecting voltage mode signals, there is no need to be shorted, and please refer to the following wiring diagram.
- Do not supply power to transmitter with input channel. A separate 24V DC power supply must be used when a two-wired transmitter is connected.
- Prohibition of wiring: “17”、 “18” 、 “35”、 “36”.



AIM401-0802 Terminal wiring diagram

Indicator LED description:**Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	8
Power Consumption	2.4W/5V
Signal Type	-10V~+10V, 0V~+10V , -5V~+5V, 0V~+5V , 0~20mA, 4~20mA

Data Type	0~20000;
Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.2%
Sampling Period	30ms/ each channel
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by software program separately
Self-diagnosis	Yes
Insulation	500V DC
Dimension W×H×D	40×145×153.5
Weight	350g
Operating Temperature	-10~60℃

5.5. Analog Input module AIM401-0803: AI8×voltage

Order Number

400AIM4010803

Features:

- 8 channel voltage mode AI module.
- Measurement accuracy is 16 bit.
- Signal form: Single-ended input.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

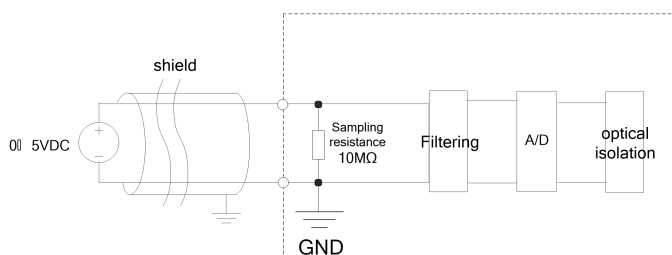


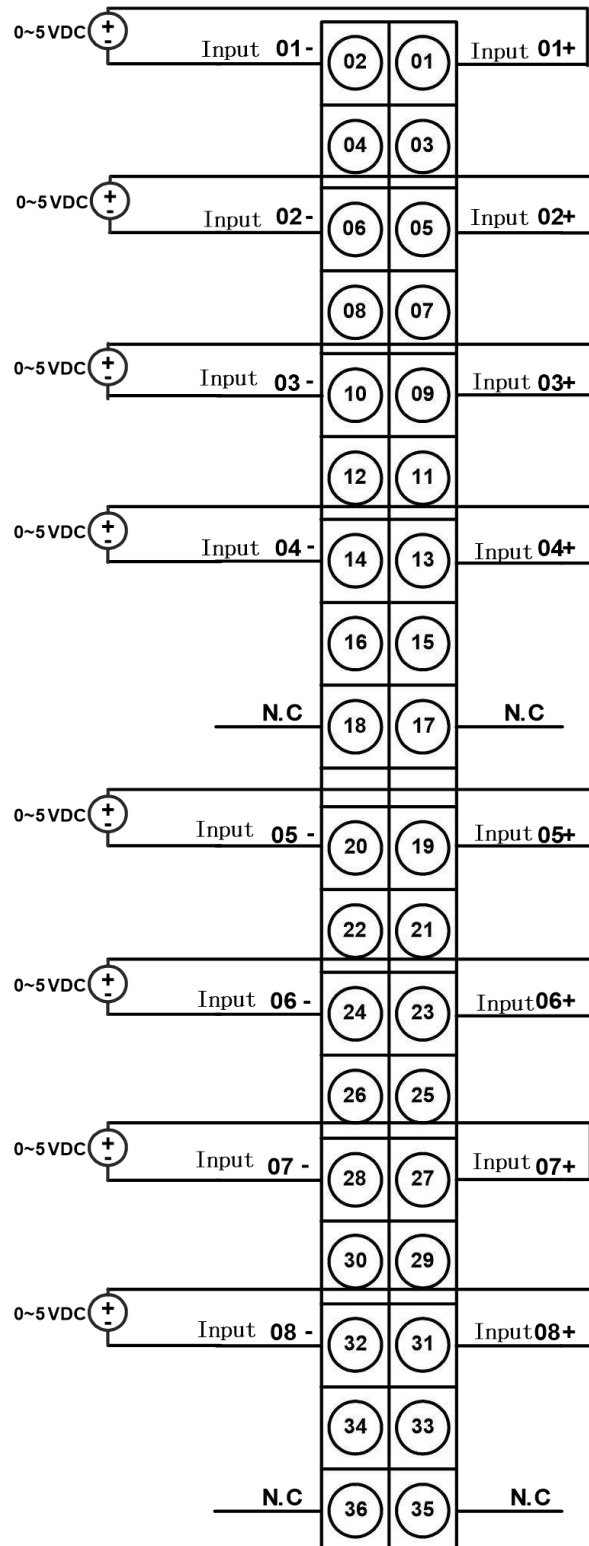
Diagram of AIM401-0803 Single Channel Interface Circuit

After transformed by voltage device and a filtering circuit, the voltage signal is transformed into digital signal by A/D device. The digital signal gets through an optical isolation, and then will be read by a microprocessor. The microprocessor uploads the data to master controller through high speed internal bus at last.

Terminal wiring diagram

AIM401-0803 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each field AI signal is connected to terminals by two wires (shielded cable).
- Even-numbered terminals connect to negative pole of voltage signals , odd-numbered terminals connect to positive pole of voltage signals.
- Prohibition of wiring: “17”、 “18” 、 “35”、 “36”.



AIM401-0803 Terminal wiring diagram**Indicator LED description:****Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	8
Power Consumption	2.4W/5V
Signal Type	0~5V , 1~5V
Data Type	0~20000(0~5V), 4000~20000(1~5V)

Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.1%
Sampling Period	30ms/ each channel
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by program separately
Self-diagnosis	Yes
Insulation	500V DC
Dimension W×H×D	40×145×153.5
Weight	350g
Operating Temperature	-10~60℃

5.6. Analog Input module AIM401-1603: AI16×voltage

Order Number

400AIM4011603

Features:

- 16 channel voltage mode AI module.
- Measurement accuracy is 16 bit.
- Signal form: Single-ended input.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

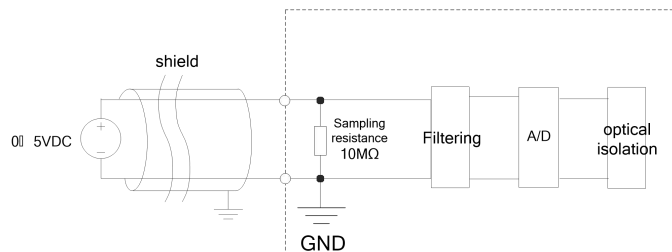


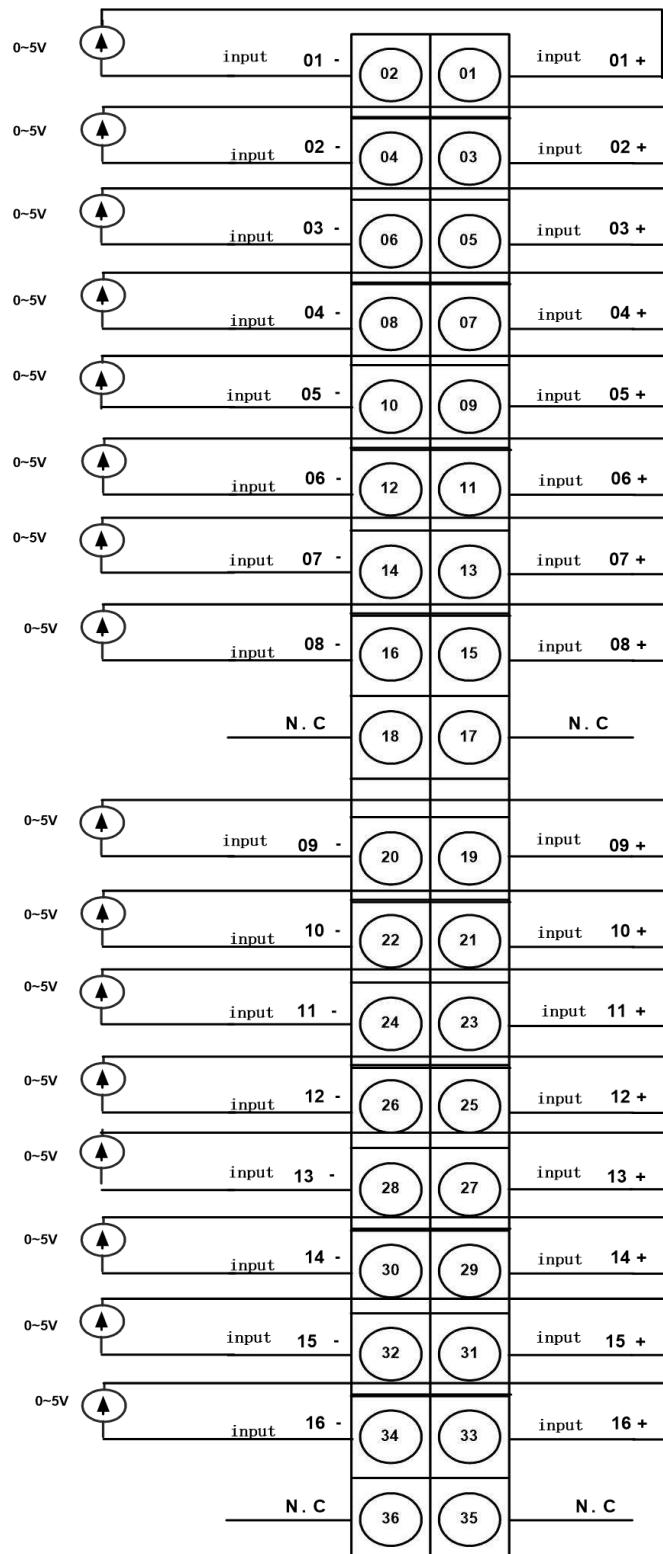
Diagram of AIM401-1603 Single Channel Interface Circuit

After transformed by voltage device and a filtering circuit, the voltage signal is transformed into digital signal by A/D device. The digital signal gets through an optical isolation, and then will be read by a microprocessor. The microprocessor uploads the data to master controller through high speed internal bus at last.

Terminal wiring diagram

AIM401-1603 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each AI signal is connected to terminals by two wires (shielded cable).
- Even-numbered terminals connect to negative pole of voltage signals , Odd-numbered terminals connect to positive pole of voltage signals.
- prohibition of wiring: “17”、 “18” 、 “35”、 “36” .



AIM401-1603 Terminal wiring diagram**Indicator LED description:****Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	16
Power Consumption	2.6W/5V
Signal Type	0~5V , 1~5V
Data Type	0~20000(0~5V), 4000~20000(1~5V)

Maximum Voltage	5V
Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.1%
Sampling Period	30ms/ each channel
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by software program separately
Self-diagnosis	Yes
Insulation	500V DC
Dimension W×H×D	40×145×153.5
Weight	400g
Operating Temperature	-10~60℃

5.7. Analog Input module AIM401-1613: AI16×voltage

Order Number

400AIM4011613

Features:

- 16 channel voltage mode AI module.
- Measurement accuracy is 16 bit.
- Signal form: Single-ended input.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

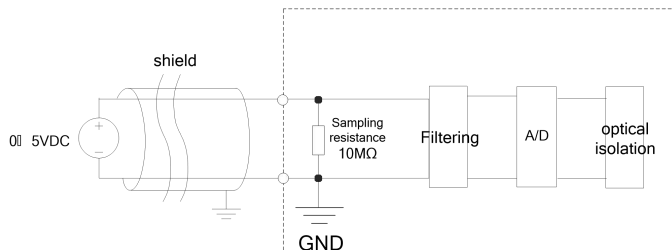


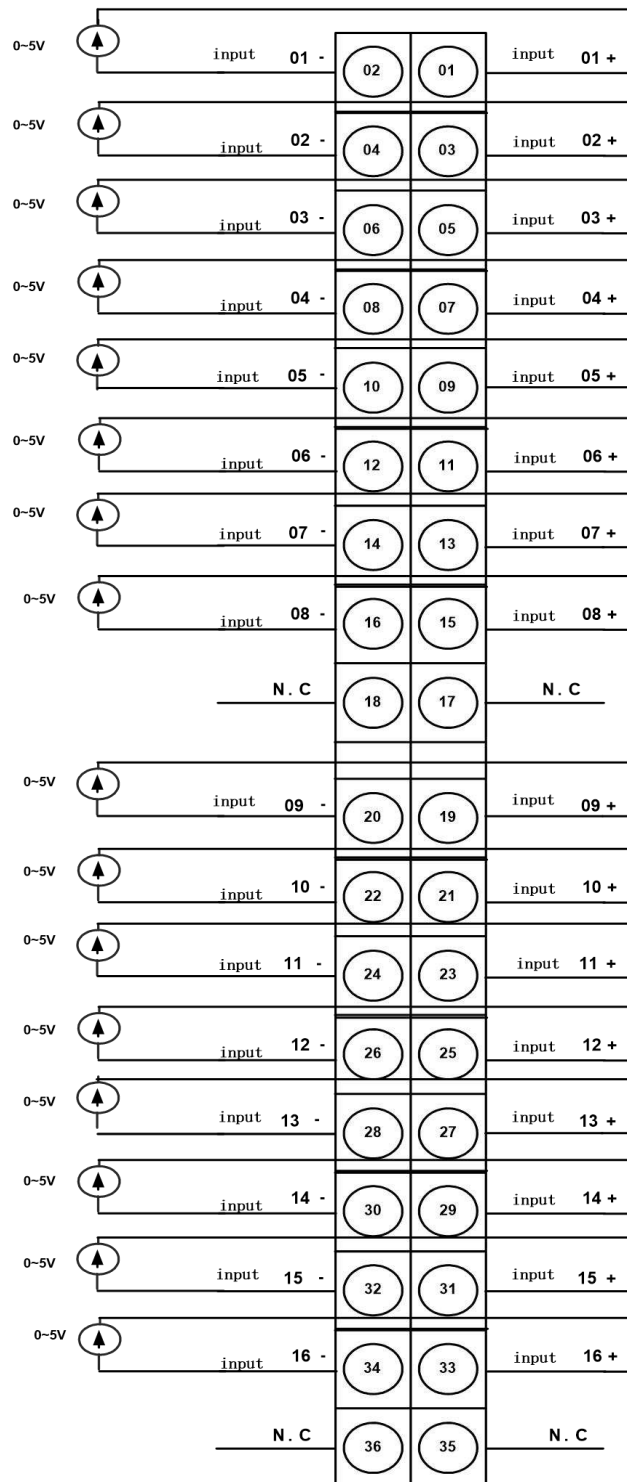
Diagram of AIM401-1613 Single Channel Interface Circuit

After transformed by voltage device and a filtering circuit, the voltage signal is transformed into digital signal by A/D device. The digital signal gets through an optical isolation, and then will be read by a microprocessor. The microprocessor uploads the data to master controller through high speed internal bus at last.

Terminal wiring diagram

AIM401-1613 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each AI signal is connected to terminals by two wires (shielded cable).
- Even-numbered terminals connect to negative pole of voltage signals , Odd-numbered terminals connect to positive pole of voltage signals.
- prohibition of wiring: “17”、 “18” 、 “35”、 “36”.



AIM401-1613 Terminal wiring diagram

Indicator LED description:**Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	16
Power Consumption	2.6W/5V
Signal Type	0~5V , 1~5V
Data Type	0~22000(0~4.84V), 4000~22000(1~4.84V)
Maximum Voltage	5V

Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.1%
Sampling Period	30ms/ each channel
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by software program separately
Self-diagnosis	Yes
Insulation	500V DC
Dimension W×H×D	40×145×153.5
Weight	400g
Operating Temperature	-10~60℃

Note: AIM401-1613 is voltage mode while it must be used to input current signal (0-22mA) via an external 220Ω precision resistance.

Input current signal(0-22mA) Diagram of Interface

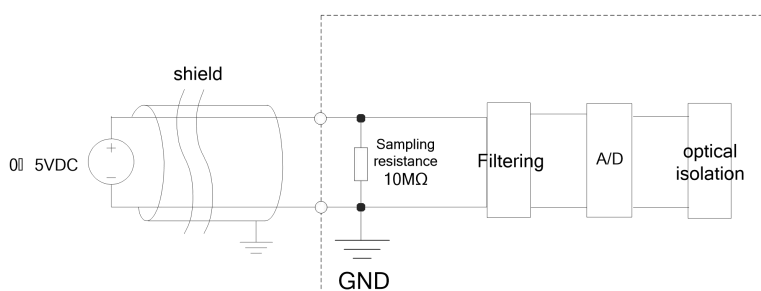


Diagram of AIM401-1613 Single Channel current Input

As shown, an external 220Ω precision resistance can support 0-22mA(Data Type:0-22000) input signal. Selecting the 220Ω precision resistance, AIM401-1613 precision is required to meet 0.1% (-10℃-60℃).

5.8. Analog Input module AIM401-0404: AI4×current /voltage

Order Number

400AIM4010404

Features:

- 4 channel current/voltage mode AI module.
- Measurement accuracy is 16 bit.
- Signal form: Differential input.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

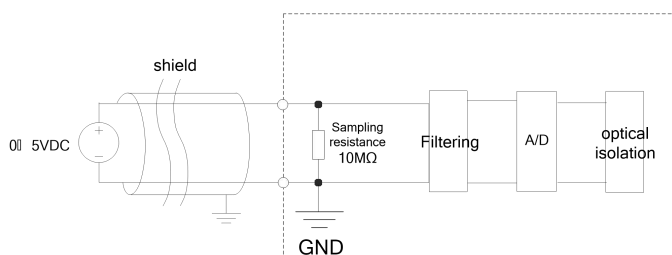


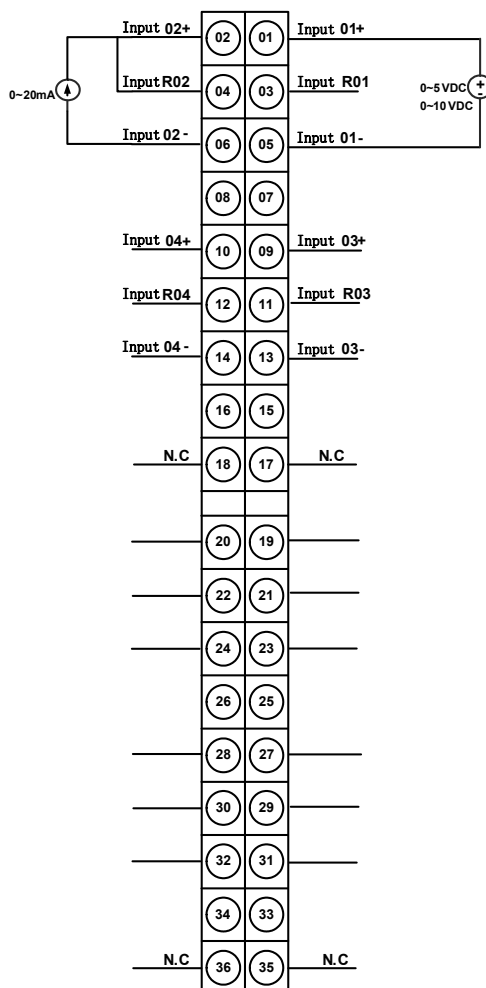
Diagram of AIM401-0804 Single Channel Interface Circuit

After transformed by voltage device and a filtering circuit, the voltage signal is transformed into digital signal by A/D device. The digital signal gets through an optical isolation, and then will be read by a microprocessor. The microprocessor uploads the data to master controller through high speed internal bus at last.

Terminal wiring diagram

AIM401-0404 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each AI signal is connected to terminals by two wires (shielded cable).
- When connecting current mode signals, negative pole and R pole of current signals should be shorted. If connecting voltage mode signals, there is no need to be shorted, and please refer to the following wiring diagram.
- prohibition of wiring: “17”、 “18” 、 “35”、 “36”.



AIM401-0404 Terminal wiring diagram**Indicator LED description:****Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	4
Power Consumption	2.4W/5V
Signal Type	-10V~+10V, 0V~+10V , -5V~+5V, 0V~+5V , 0~20mA, 4~20mA
Data Type	0~20000(-10V~+10V/0~20mA,),

Maximum Voltage	24V
Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.2%
Sampling Period	30ms/ each channel
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by program separately
Self-diagnosis	Yes
Insulation	500V DC
Dimension W×H×D	40×145×153.5
Weight	350g
Operating Temperature	-10~60℃

5.9. Analog Input module AIM401-0804: AI8×current/voltage

Order Number

400AIM4010804

Features:

- 8 channel current/voltage mode AI module.
- Measurement accuracy is 16 bit.
- Signal form: Differential input.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

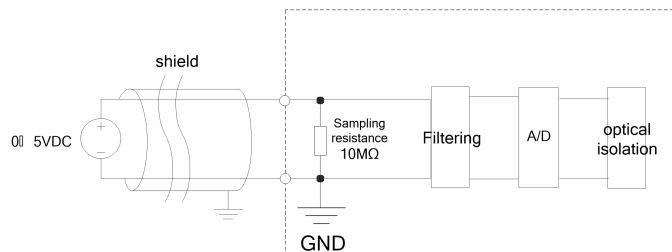


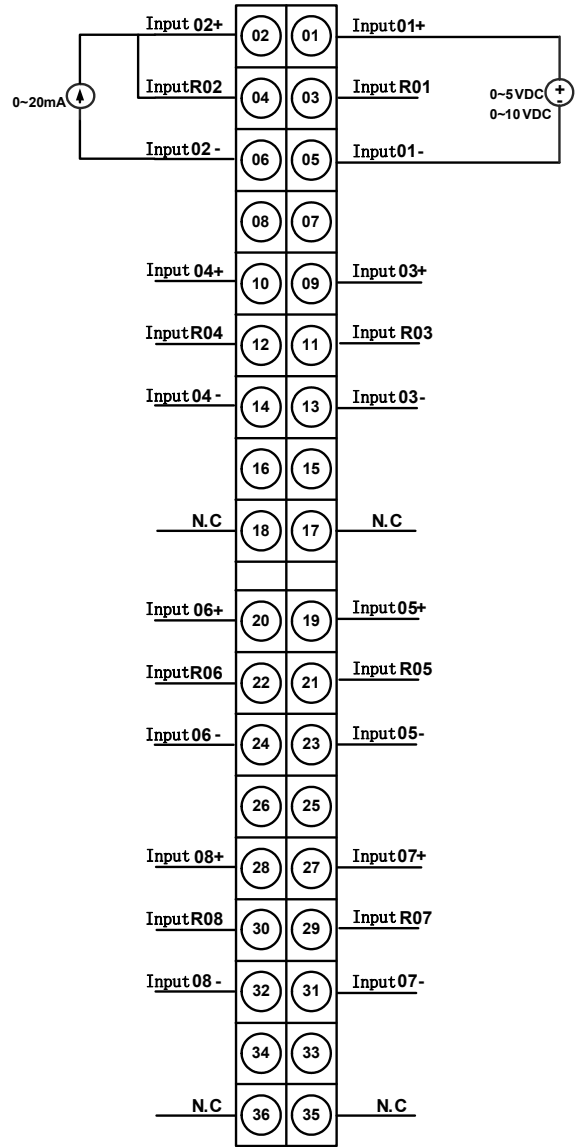
Diagram of AIM401-0804 Single Channel Interface Circuit

After transformed by voltage device and a filtering circuit, the voltage signal is transformed into digital signal by A/D device. The digital signal gets through an optical isolation, and then will be read by a microprocessor. The microprocessor uploads the data to master controller through high speed internal bus at last.

Terminal wiring diagram

AIM401-0804 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each AI signal is connected to terminals by two wires (shielded cable).
- When connecting current mode signals, negative pole and R pole of current signals should be shorted. If connecting voltage mode signals, there is no need to be shorted, and please refer to the following wiring diagram.
- prohibition of wiring: “17”、 “18” 、 “35”、 “36”.



AIM401-0804 Terminal wiring diagram

Indicator LED description:



Indicator LEDs

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	8
Power Consumption	2.4W/5V
Signal Type	-10V~+10V, 0V~+10V, -5V~+5V, 0V~+5V, 0~20mA, 4~20mA
Data Type	0~20000(-10V~+10V/0~20mA,),
Maximum Voltage	24V
Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.2%
Sampling Period	30ms/ each channel
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by program separately
Self-diagnosis	Yes
Insulation	500V DC

Dimension W×H×D	40×145×153.5
Weight	350g
Operating Temperature	-10~60℃

5.10. Analog Input module AIM401-0805: AI8×RTD

Order Number

400AIM4010805

Features:

- 8 channel, RTD temperature probe input.
- The type of thermistor for each channel can be set optionally.
- Measurement of each channel: RTD.
- Wiring mode: Two-wire、Three-wire.
- Measurement accuracy is 16 bit.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

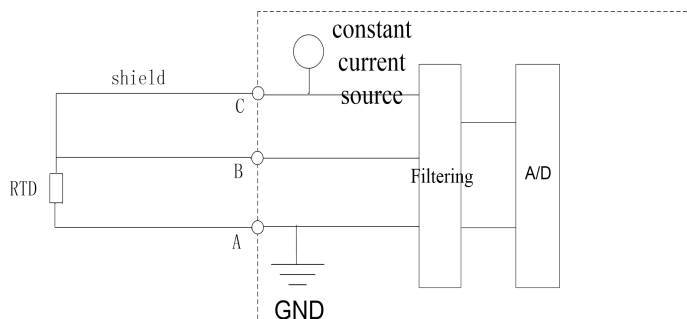


Diagram of AIM401-0805 Single Channel Interface Circuit

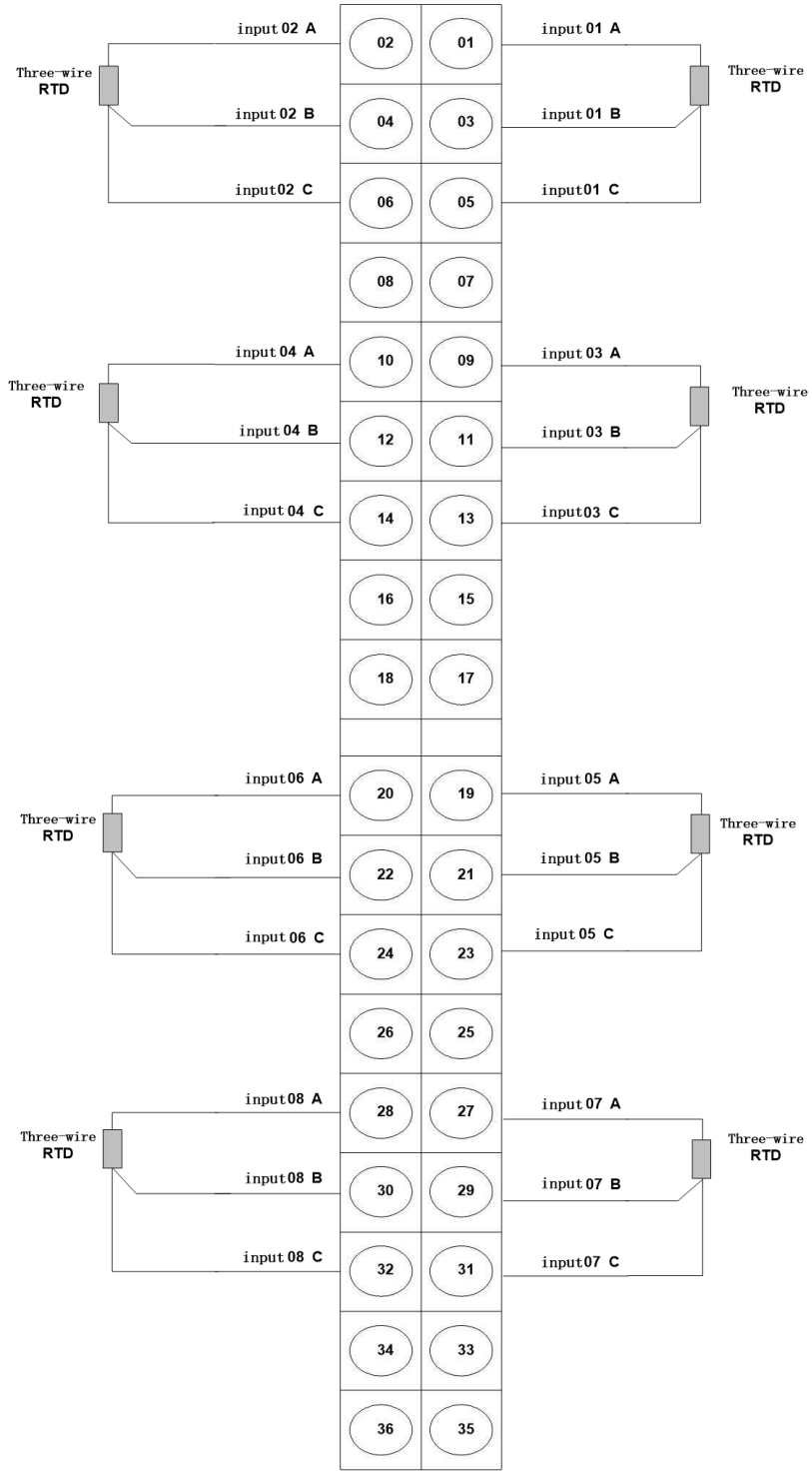
The use of constant current source incentive measurement method, comparative to the

traditional electrical bridge measurement, can be more effective in eliminating the impact of measurement accuracy which is caused by line resistance of RTD long wire when electrical bridge is in the state of imbalance. Of course, both the constant current source and electrical bridge measurement methods require an equal value of line resistance of 3 RTD wires, otherwise wire resistance deviation will affect the measurement accuracy.

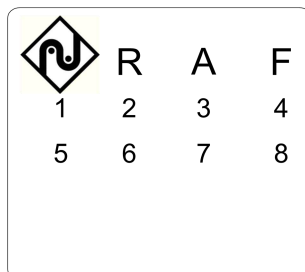
Terminal wiring diagram

AIM401-0805 AI module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each field RTD resistance connects to the terminals A, B, C with three separate wires (shielded cable).
- "1,3,5", "2,4,6" are the input terminals for the first and the second channel of temperature signals, and please see the terminal wiring diagram for other signal wiring method.
- If the resistance which is provided by user is of two-wire, B, C terminals of input channels need to be shorted.
- Please don't connect more than 2 cables to the same pin of the terminal.



AIM401-0805 Terminal wiring diagram

Indicator LED description:**Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
1~8	Green	Light / off	Signals/ Faulty in data receiving or no wiring

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1~8: Channel indicator LED. Every green LED shows state of one input signal. If the LED turns off, it means data receiving is abnormal or a wrong wiring for input resistance.

Technical Specification

The number of channels	8
Unit of measurement	℃
Power Consumption	3.0W/5V
Signal Type	Pt100, Cu50, Cu53, Cu100
Data Type	Actual value×10 (32767 when signal offline)
Working Limit Within Temperature Range	0.2%
Precision Acquisition	0.1% FS
Linear Error	0.2%
Sampling Period	0.4s
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by program separately
Self-diagnosis	Yes
Dimension W×H×D	40×145×153.5
Weight	380g
Operating Temperature	-10~60℃

RTD corresponding relation table

Signal Type	Actual temperature value (℃)	Data Type
PT100	-200~800	-2000~8000
CU50	-50~150	-500~1500
CU53	-50~150	-500~1500
CU100	-50~150	-500~1500

5.11. Analog Input module AIM401-0806: AI8×thermocouple

Order Number

400AIM4010806

Features:

- 8 channel thermocouple (TC) differential input.
- The type of thermocouple can be set optionally.
- Measurement of each channel: Thermocouple.
- Measurement accuracy is 16 bit.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

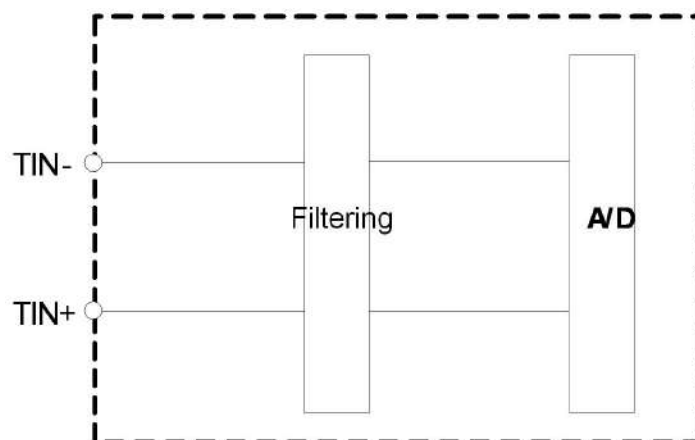
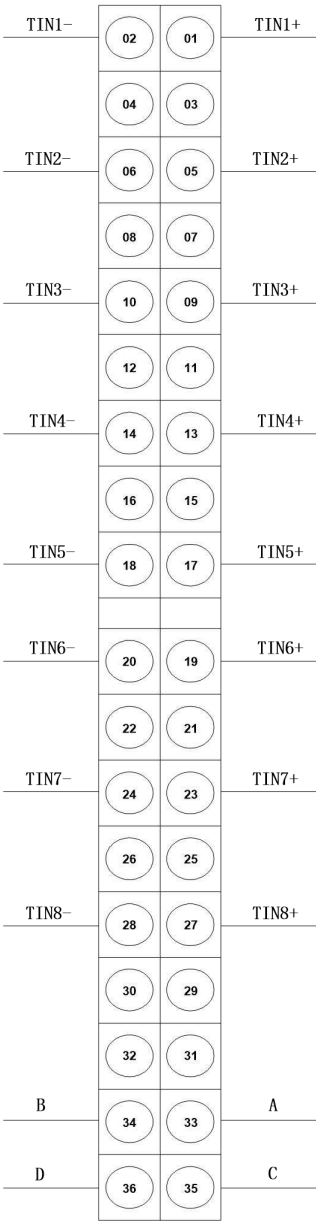


Diagram of AIM401-0806 Single Channel Interface Circuit

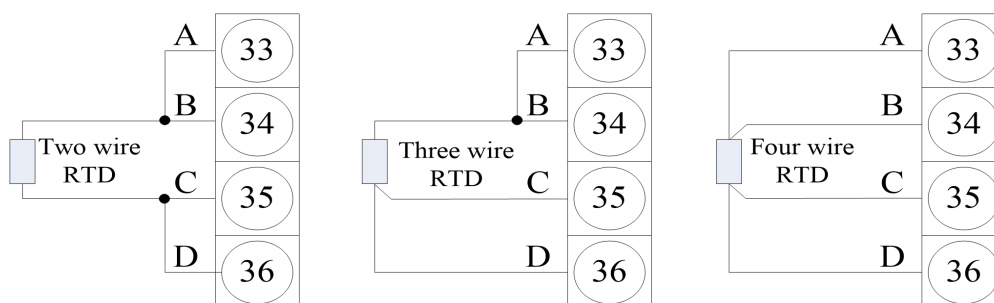
Terminal wiring diagram



AIM401-0806 Terminal wiring diagram

A、B、C、D is the input of **RTD for** measuring of the temperature of cold Terminal。

Terminal wiring diagram



AIM401-0806 RTD cold Terminal wiring diagram

Indicator LED description:

Indicator LEDs			
LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
1~8	Green	Light / off	Signals/ Faulty in data receiving or no wiring

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.

Technical Specification

The number of channels	8
Unit of measurement	°C

Power Consumption	2.8W/5V
Signal Type	B、N、E、E2、R、S、J、T、K、K2
Data Type	Actual value×10 (32767 when signal offline)
Maximum Input Voltage	20VDC
Resolution	24bits
Elementary Error	0.05%FS(Voltage)
Breakwire Sense Leakage Current	≤0.1uA
Working Limit Within Temperature Range	0.2%(for type of S,R and T); 0.1%(for other type);
Sampling Period	150ms/c
Noise Suppression	50Hz/60Hz
CMRR	>90dB
DMRR	>45dB
Zero Drift Compensation	Each channel can be compensated by program separately
Dimension W×H×D	40×145×153.5
Weight	400g
Operating Temperature	-10~60℃
Self-diagnosis	Yes

TC corresponding relation table

Signal Type	Actual temperature value (℃)	Data Type	Reference temperature (℃)
B	0~1800	0~18000	0
N	-200~1300	-2000~13000	0
E	-200~1000	-2000~10000	0
E2	-20~620	-200~6200	0
R	-0~1700	0~17000	0
S	-0~1700	0~17000	0
J	-200~1200	-2000~12000	0

T	-200~400	-2000~4000	0
K	-200~1300	-2000~13000	0
K2	-20~520	-200~5200	0

* The final value of module collection is the data of increasing cold forging compensation temperature treatment.

5.12. Analog Output module AOM401-0401: AO4×current

Order Number

400AOM4010401

Features:

- 4channel current output.
- Output range of each channel: 4-20mA.
- Measurement accuracy is 12 bit.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

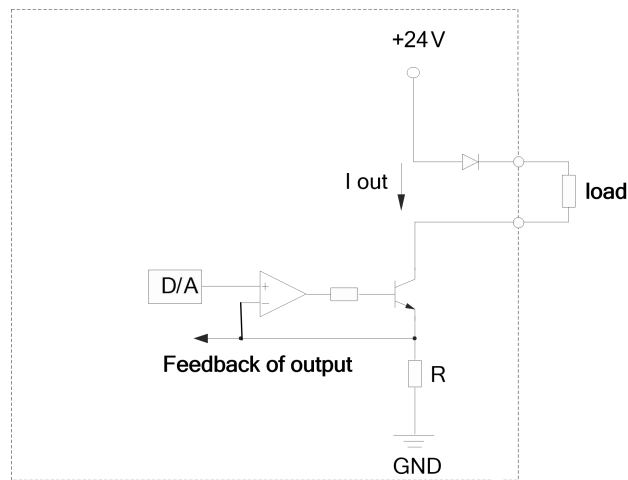
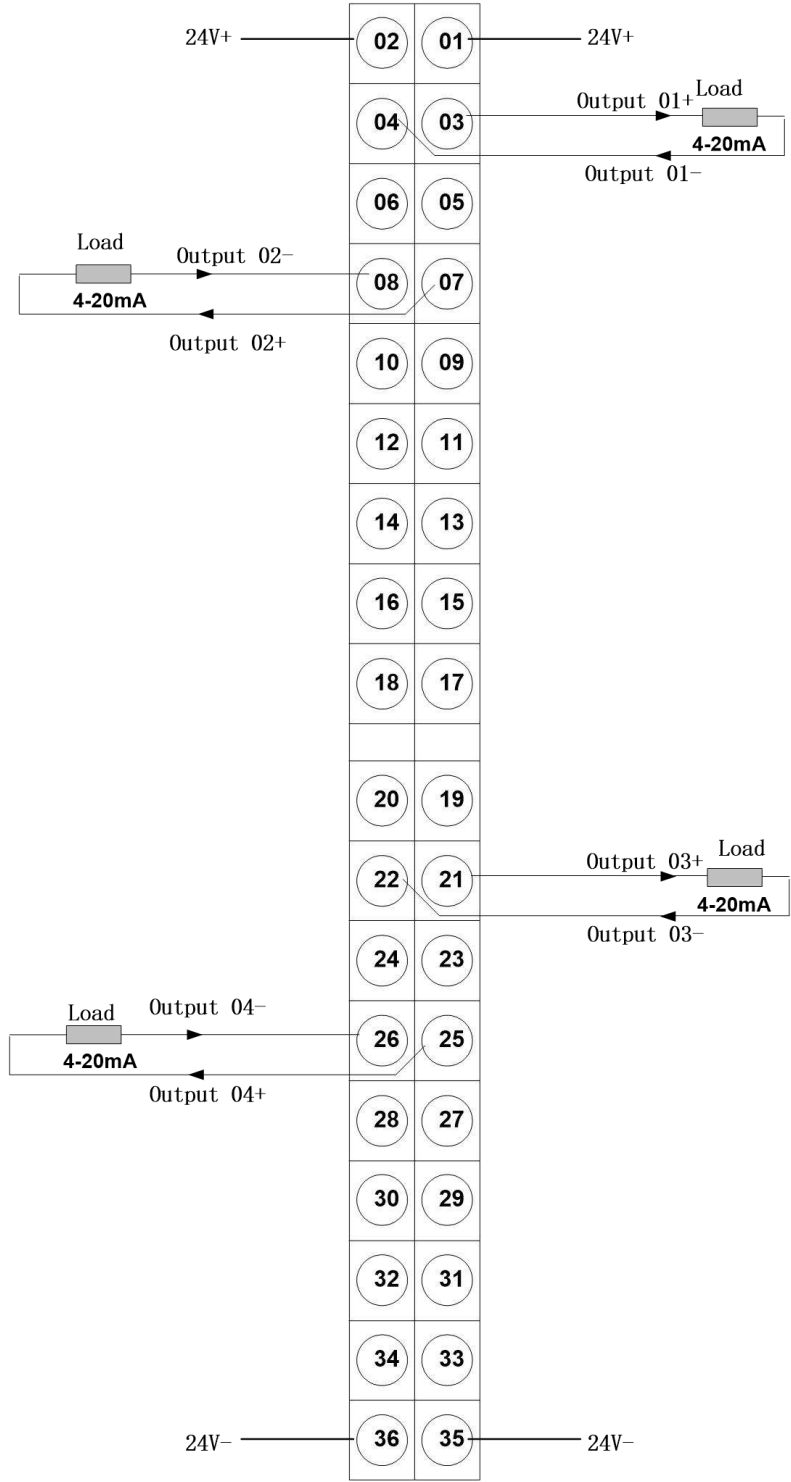


Diagram of AOM401-0401 Single Channel Interface Circuit

Terminal wiring diagram

AOM401-0401 AO module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- each field AO output signal connects to the load respectively by two wires (shielded cable)
- Even-numbered terminals connect to negative pole of current signals , Odd-numbered terminals connect to positive pole of current signals.



AOM401-0401 Terminal wiring diagram

Indicator LED description:**Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED

Technical Specification

The number of channels	4
Power Consumption	4.0W/5V
Output Type	current
Output Range	4~20mA 0~20mA
Data Type	4000~20000 0~20000
Load Resistance	Maximum 500Ω

Rated Voltage		5VDC
Output Error		0.2%
Linear Error		0.05%
Conversion Time (each channel)		Maximum 0.8ms
Set-up Time	Resistive Load	0.2 ms
	Capacitive Load	3.3 ms
	Inductive Load	0.5 ms(1mH)
Limit damage of impressed current		Maximum DC50mA
Maximum open circuit voltage		24V
Self-diagnosis		Yes
Isolation	Between Channels	Yes
	Between Channel and Backplane	Yes
Dimension W×H×D		40×145×153.5
Weight		380g
Operating Temperature		-10~60℃

5.13. Analog Output module AOM401-0411: AO4×current

Order Number

400AOM4010411

Features:

- 4channel current output.
- Output range of each channel: 0.2-22mA.
- Measurement accuracy is 12 bit.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when

fault.

- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

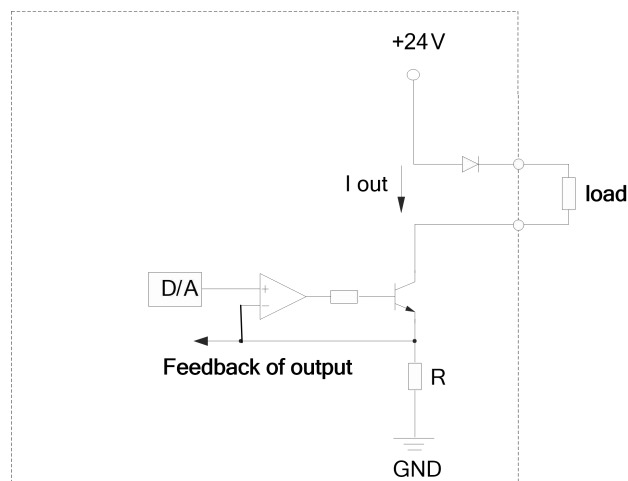
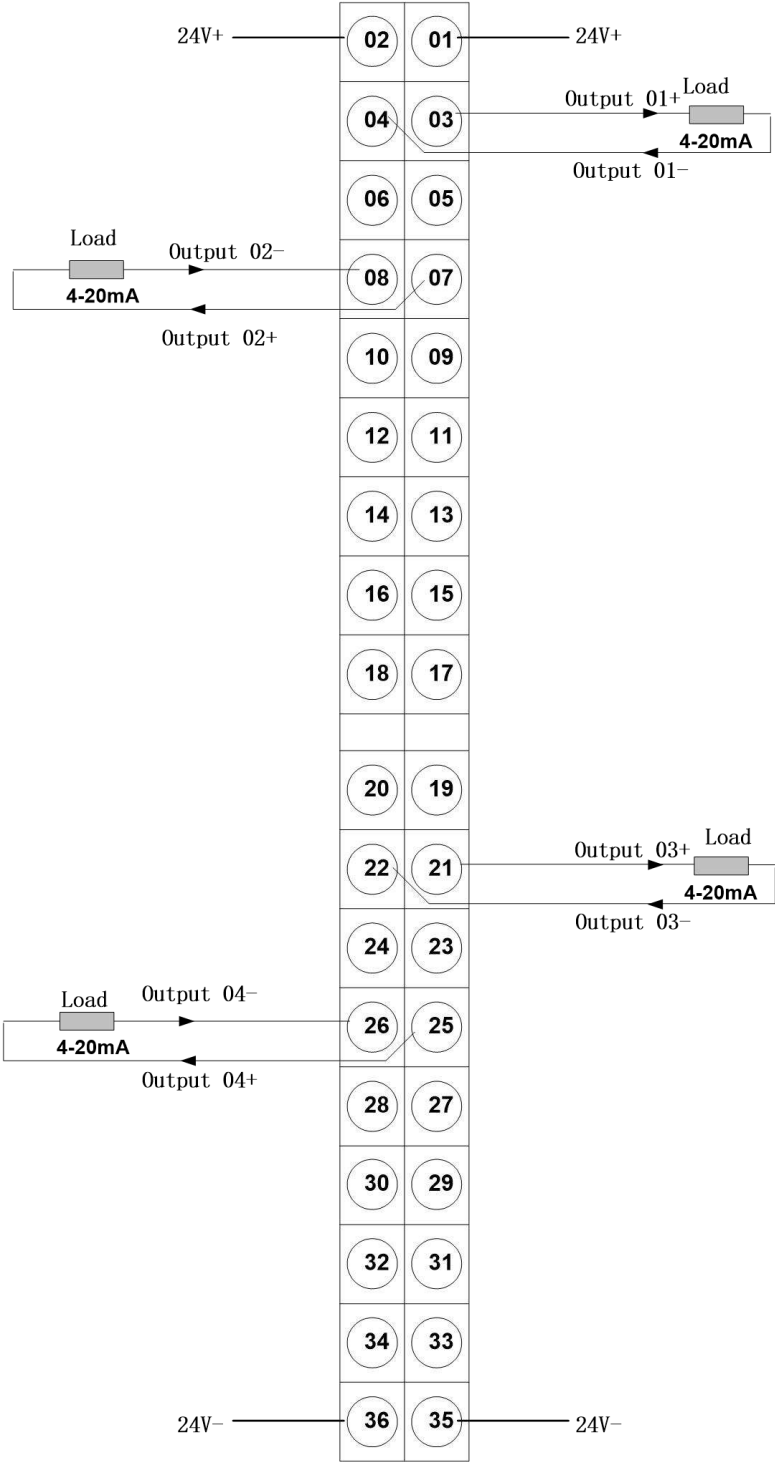


Diagram of AOM401-0411 Single Channel Interface Circuit

Terminal wiring diagram

AOM401-0411 AO module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- each field AO output signal connects to the load respectively by two wires (shielded cable)
- Even-numbered terminals connect to negative pole of current signals, Odd-numbered terminals connect to positive pole of current signals.



AOM401-0411 Terminal wiring diagram

Indicator LED description:**Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED

Technical Specification

The number of channels	4
Power Consumption	4.0W/5V
Output Type	current
Output Range	0.2~22mA
Data Type	200~22000
Load Resistance	Maximum 500Ω

Rated Voltage		5VDC
Output Error		0.2%
Linear Error		0.05%
Conversion Time (each channel)		Maximum 0.8ms
Set-up Time	Resistive Load	0.2 ms
	Capacitive Load	3.3 ms
	Inductive Load	0.5 ms(1mH)
Limit damage of impressed current		Maximum DC50mA
Maximum open circuit voltage		24V
Self-diagnosis		Yes
Isolation	Between Channels	Yes
	Between Channel and Backplane	Yes
Dimension W×H×D		40×145×153.5
Weight		380g
Operating Temperature		-10~60℃

5.14. Analog Output module AOM401-0402: AO4×current/voltage

Order Number

400AOM4010402

Features:

- 4channel current/voltage output.
- Output range of each channel: 0~5V,1~5V,-5V~5V,-10V~10V; 4~20mA,0~20mA,0~10mA.
- Measurement accuracy is 12 bit.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

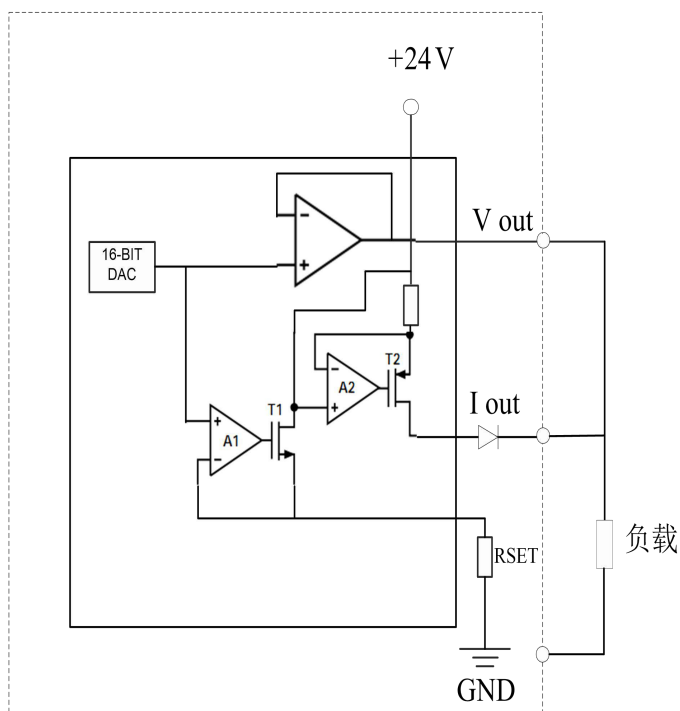
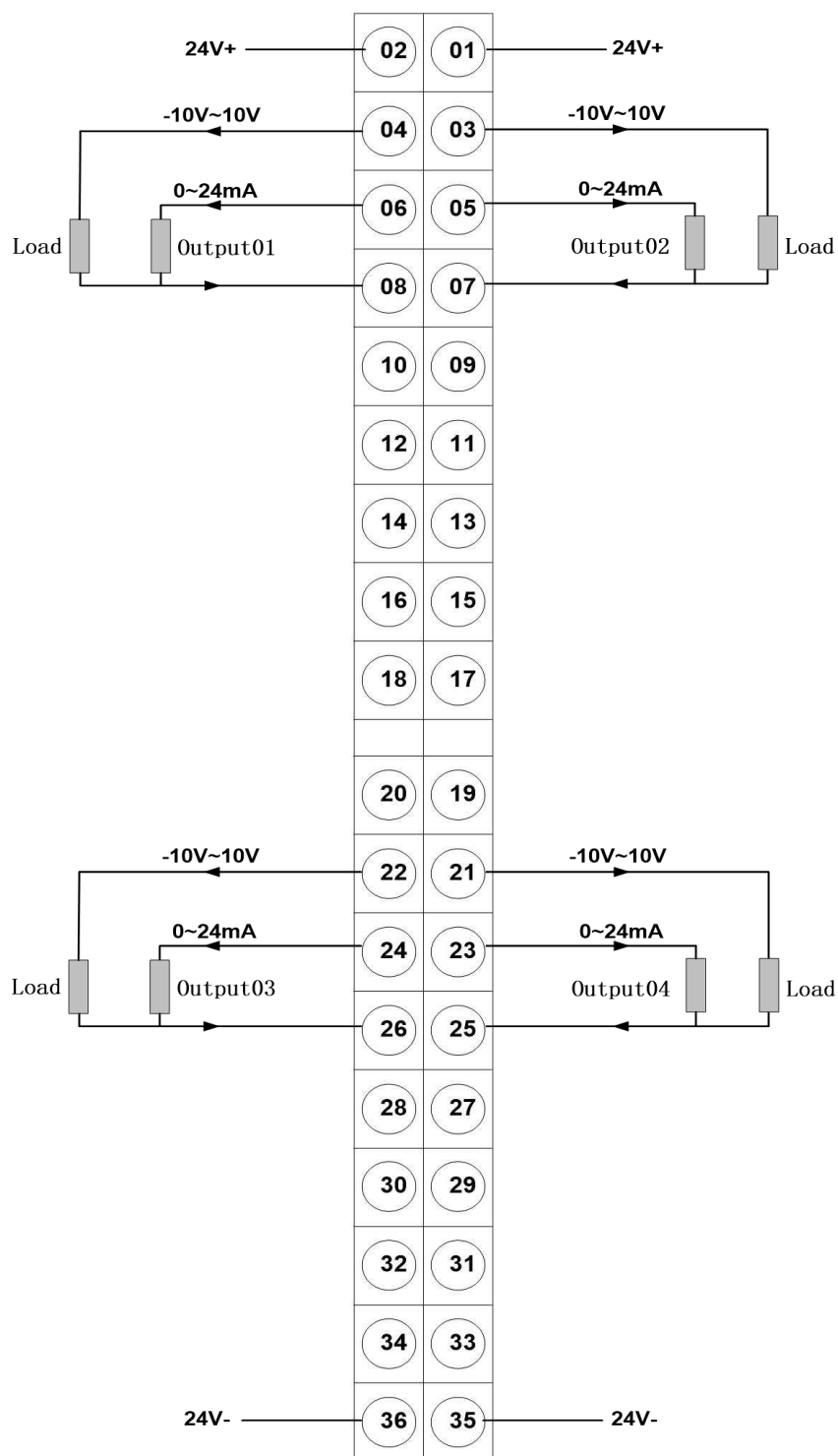


Diagram of AOM401-0402 Single Channel Interface Circuit

Terminal wiring diagram

AOM401-0402 AO module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each field AO output signal connects to the load respectively by two wires (shielded cable).
- Even-numbered terminals connect to negative pole of current signals , Odd-numbered terminals connect to positive pole of current signals.



AOM401-0402 Terminal wiring diagram

Indicator LED description:**Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
1~4	Green	Light / off	Current type output indicator : Output fault /Output normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1~4: Current type output indicator (Voltage type output has no display),The LED is on When the Current type Output fault. The LED will go off when the Current type Output normal.

Technical Specification

The number of channels		4
Power Consumption		2W/5V
Output Type		Current, Voltage
Output Range		0~5V, 1~5V, -5V~5V, -10V~10V; 4~20mA, 0~20mA, 0~10mA
Data Type		4000~20000 0~20000
Load Resistance	Current	Maximum 850Ω
	Voltage	Maximum 2000Ω
Output Error		0.2%
Linear Error		0.05%
Conversion Time (each channel)		Maximum 0.8ms
Setup Time	Resistive Load	0.2 ms
	Capacitive Load	3.3 ms
	Inductive Load	0.5 ms(1mH)
Maximum open circuit voltage		24V
Self-diagnosis		Yes
Isolation	Between Channels	NO
	Between Channel and Backplane	Yes
Dimension W×H×D		40×145×153.5
Weight		410g
Operating Temperature		-10~60℃

5.15. Analog Output module AOM401-0802: AO8×current/voltage

Order Number

400AOM4010802

Features:

- 8channel current/voltage output.
- Output range of each channel: 0~5V,1~5V,-5V~5V,-10V~10V; 4~20mA,0~20mA,0~10mA.
- Measurement accuracy is 12 bit.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Diagram of Interface

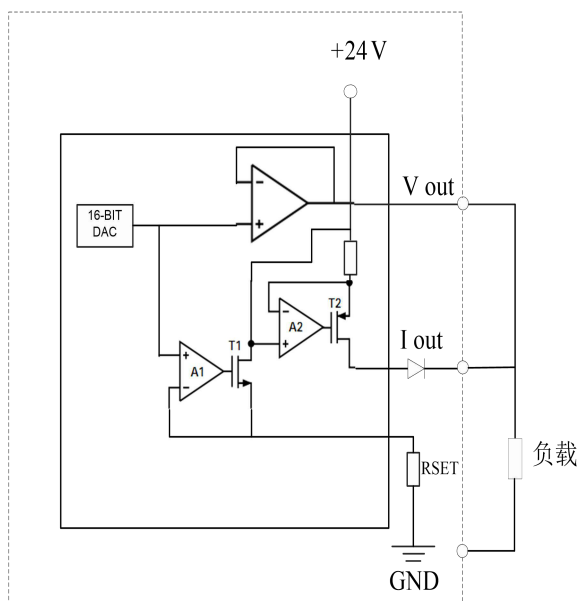
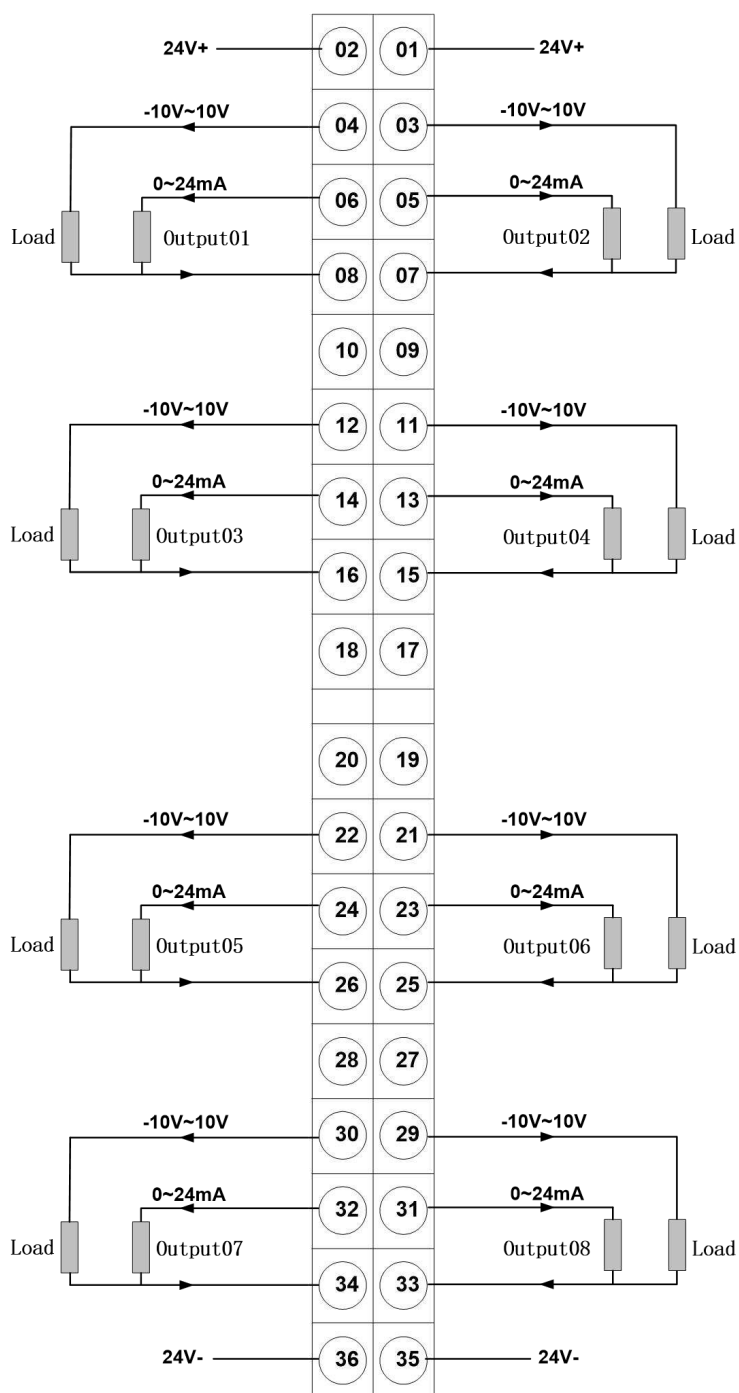


Diagram of AOM401-0802 Single Channel Interface Circuit

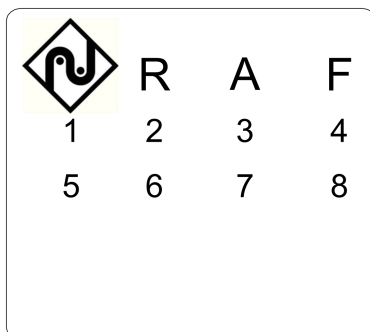
Terminal wiring diagram

AOM401-0802 AO module connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. And please pay attention to the following:

- Each field AO output signal connects to the load respectively by two wires (shielded cable).
- Even-numbered terminals connect to negative pole of current signals , Odd-numbered terminals connect to positive pole of current signals.



AOM401-0802 Terminal wiring diagram

Indicator LED description:**Indicator LEDs**

LED	Color	State	Meaning
R	Green	Flicker/ Constant Lighting	Run normally/ program has been running but parameter is unloaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
1~8	Green	Light / off	Current type output indicator : Output fault /Output normal

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: Communication indicator LED. When CPU module can communicate normally with other modules through HIN, the LED is on.
- F: Fault indicator LED. The LED is on when the modules has fault. The LED will go off when everything is normal.
- 1~8: Current type output indicator (Voltage type output has no display),The LED is on When the Current type Output fault. The LED will go off when the Current type Output normal.

Technical Specification

The number of channels		8
Power Consumption		2W/5V
Output Type		Current, Voltage
Output Range		0~5V, 1~5V, -5V~5V, -10V~10V; 4~20mA, 0~20mA, 0~10mA
Data Type		4000~20000 0~20000
Load Resistance	Current	Maximum 850Ω
	Voltage	Maximum 2000Ω
Output Error		0.2%
Linear Error		0.05%
Conversion Time (each channel)		Maximum 0.8ms
Setup Time	Resistive Load	0.2 ms
	Capacitive Load	3.3 ms
	Inductive Load	0.5 ms(1mH)
Maximum open circuit voltage		24V
Self-diagnosis		Yes
Isolation	Between Channels	NO
	Between Channel and Backplane	Yes
Dimension W×H×D		40×145×153.5
Weight		410g
Operating Temperature		-10~60℃

6 High Speed Count Module

☐ Synopsis

HCM401, an intelligent high-speed count module, is widely used in counting and measurement. Based on the direct-connect gate signals, it could capture pulses from incremental 5V or 24V encoders, direction sensor and pulse of starter. This module can share some tasks of CPU by ways as follow:

1. Direct connect to incremental 5 V encoders and incremental 24 V encoders
2. Direct connect to gated signal by integrated digital inputs
3. Comparison functions and output responds by an integrated digital output terminal.

☐ Content

In this chapter, the following count module will be introduced:

Section	Content
6.1	High speed count module 2 channel(2×500kHz)

6.1.High Speed Count Module HCM401-0201

Order Number

400HCM4010201

Features:

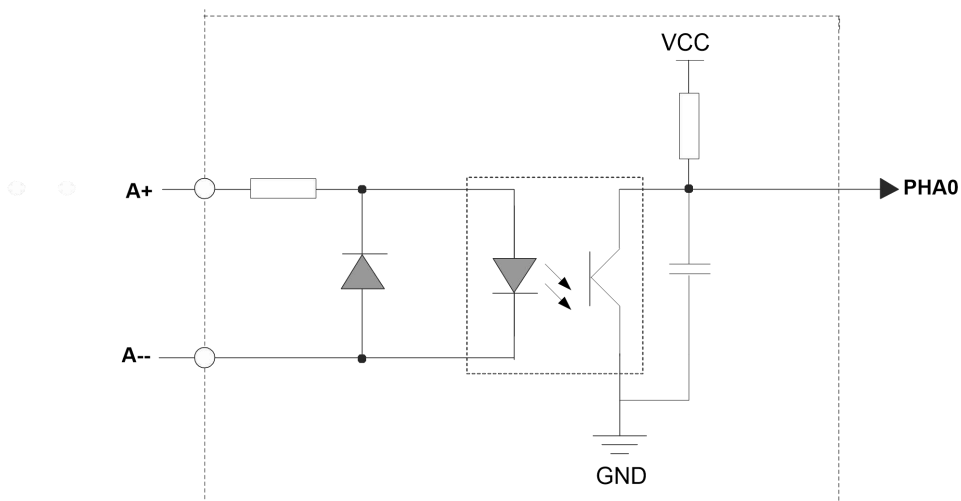
- 2-channel intelligent high-speed count module, be used to count and measure.
- Directly connect to incremental 5 V encoders and incremental 24V encoders.
- Function of comparing with programmable reference value.
- When the comparison value is reached, the internal digital terminal will output responds.
- Operating modes:

Single counting / Continuous counting / Periodic counting

Frequency / Rotational speed measurement

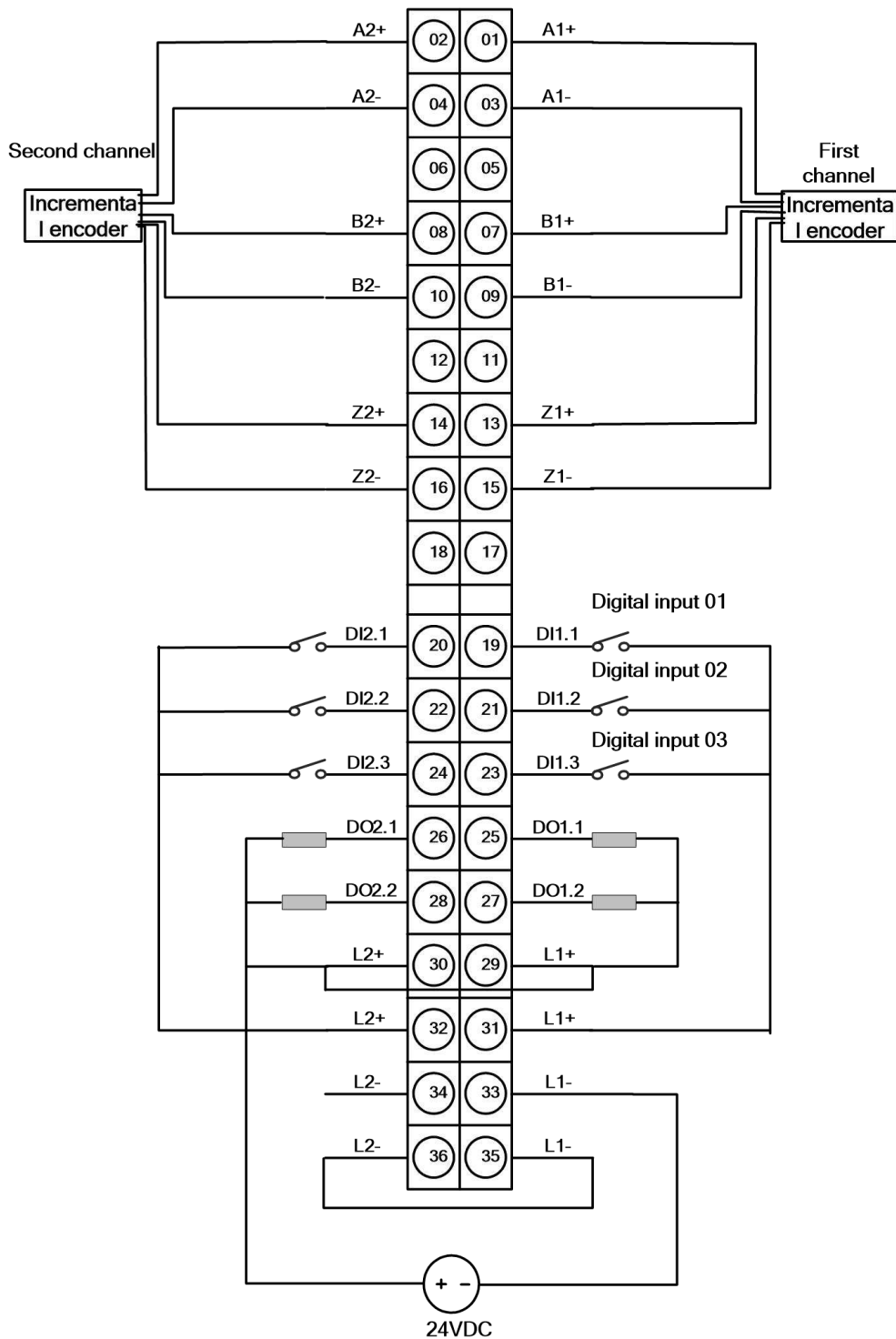
Period duration measurement

Diagram of Interface



Terminal wiring diagram

HCM401-0201 connects with external devices by terminal blocks in front of module. Correspondence of each channel is described in the following drawing. Different signals should be wired according to Table 1.

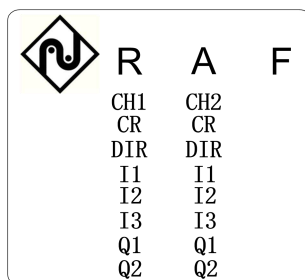


HCM401-0201 Terminal wiring diagram

Table1. Definition of HCM401-0201 terminal wiring

Terminal		Definition		Input/ output	Function			
Chan nel 2	Chann el 1	Channe l 2	Channe l 1	I/O	5 V encoders (Differen tial Signals)	24 V encod ers	24 V pulse encoders with direction	24 V pulse without directio n
02	01	A2+	A1+	Input	A+	A		
04	03	A2-	A1-	Input	A-	-		
06	05	NC	NC	NC				
08	07	B2+	B1+	Input	B+	B	Direction signal	-
10	09	B2-	B1-	Input	B-	-		
12	11	NC	NC	NC				
14	13	Z2+	Z1+	Input	Z+	Z	-	
16	15	Z2-	Z1-	Input	Z-	-		
18	17	NC	V	NC				
Digital input/output								
20	19	DI2.1	DI1.1	Input	Digital input channel			
22	21	DI2.2	DI1.2	Input	Digital input channel			
24	23	DI2.3	DI1.3	Input	Digital input channel			
26	25	DO2.1	DO1.1	Output	Digital output channel			
28	27	DO2.2	DO1.2	Output	Digital output channel			
24V auxiliary power supply								
30	29	L2+	L1+	Input	Positive pole of 24V			
32	31	L2+	L1+	Input				
34	33	L2-	L1-	Input	Negative pole of 24V, the common terminal of digital input			
36	35	L2-	L1-	Input				

INDICATOR LED DESCRIPTION:



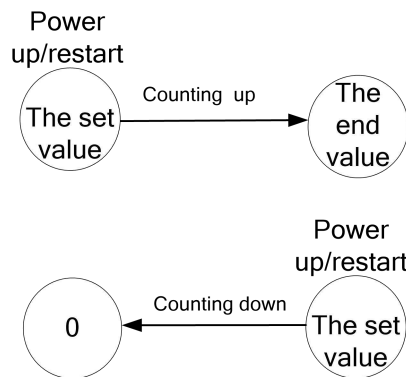
INDICATOR LEDS

LED	Color	State	Function
R	Green	Flicker / Constant Lighting	Run normally /program is running but parameters unload
A	Green	Constant Lighting /off	HIN work normally/ abnormally
F	Red	Light /off	Fault /Run normally
CH1	Green	Constant Lighting /off	Counter 1 is working /free
CH2	Green	Constant Lighting /off	Counter 2 is working /free
CR	Green	Constant Lighting /off	Counters have been started/ Counters have not been started
DIR	Green	Constant Lighting /off	counting down / counting up
I1~I3	Green	Constant Lighting /off	Indications of digital inputs
Q1~Q2	Green	Constant Lighting /off	Indications of digital outputs

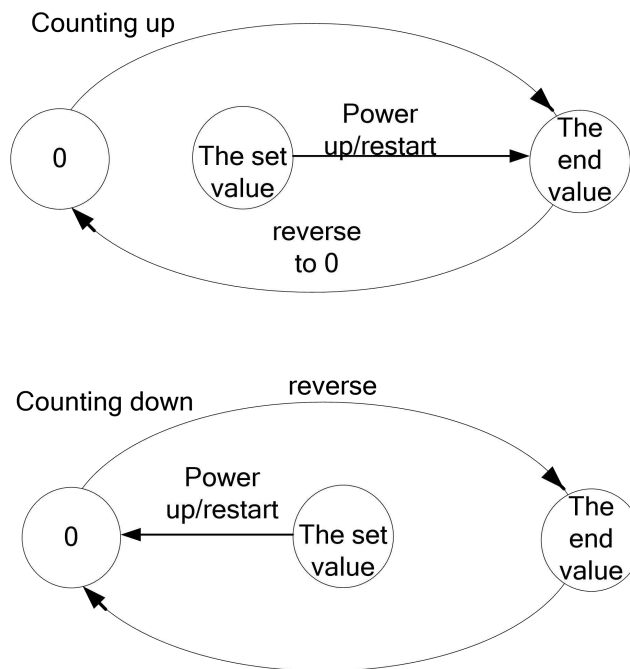
Operating Modes

Continuous Counting	In this mode, the counter could count from 0 to 4294967295 continuously.
Single Counting	In single counting,, the HCM401-0201 counts up or down from the load value, according to the main count direction.

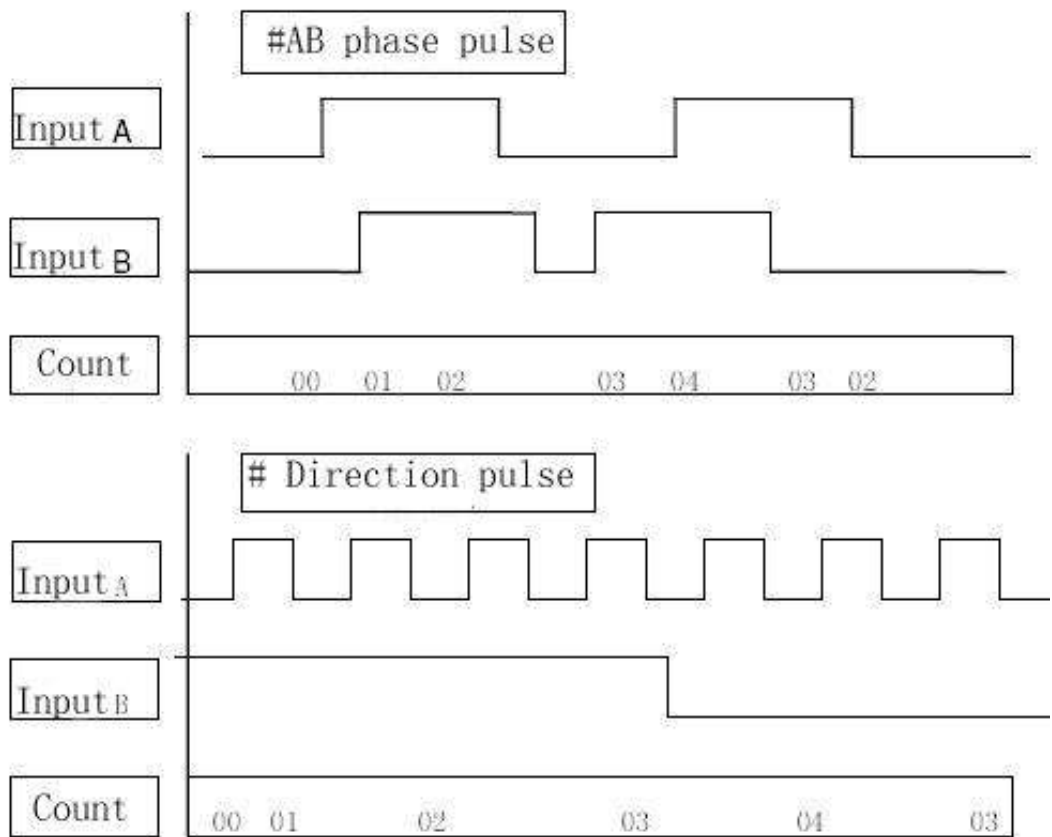
	● If the main count direction is up, the counter counts from the programmable pre-set start value to the turn value which can also be programmed. ● If the main count direction is down, the counter counts from the programmable pre-set start value to 0.
Periodic Counting	In periodic counting, HCM401-0201 counts periodically from the programmable pre-set start value to any value which is in the count range according to the main count direction. ● If the main count direction is up, the counter counts from 0 to the “turn value -1”. ● If the main count direction is down, the counter counts from programmable start value to 0
Frequency Measurement	In Frequency Measurement, the HCM401-0201 counts the pulses that occur within 10ms of time window to calculate the frequency.
Rotational Speed Measurement	In Rotational Speed Measurement, the HCM401-0201 counts the pulses that occur within 10ms of time window to calculate the Rotational speed.
Period Duration Measurement	In Period Duration Measurement, the HCM401-0201 measures time (in us) between the two rising edges of the counting pulse.
Comparison Counting	In Comparison Counting, the HCM401-0201 compares the counts with the set value . If they are equal, the HCM401-0201 gives one digital output. It has two channels of output.



Single Counting



Periodic counting



Input type of counters

Output Respond Modes:

Digital output

Each counter has one fast respond digital output.

Respond to CPU errors

Continue counting.

Summary of HCM401-0201's registers

HCM401-0201 has two counters, and each counter has 16 16-bit registers. Details are shown below:

No.	Register	Content	No.	Register	Content
1	CR 1	Mode register of counter 1	17	CR 17	Mode Register Of Counter 2
2	CR 2	Lower byte of the pre-set value of counter 1	18	CR 18	Lower Byte Of The Pre-Set Value Of Counter 2
3	CR 3	High byte of the pre-set value of counter1	19	CR 19	High Byte Of The Pre-Set Value Of Counter 2
4	CR 4	Lower byte of the turn value of counter1	20	CR 20	Lower Byte Of The Turn Value Of Counter 2
5	CR 5	High byte of the turn value of counter 1	21	CR 21	High Byte Of The Turn Value Of Counter 2
6	CR 6	Lower byte of the comparison register of DO1.1 ON	22	CR 22	Lower Byte Of The Comparison Register Of DO2.1 ON
7	CR 7	High byte of the comparison register of DO1.1 ON	23	CR 23	High Byte Of The Comparison Register Of DO2.1 ON
8	CR 8	Lower byte of the comparison register of DO1.1 OFF	24	CR24	Lower Byte Of The Comparison Register Of DO2.1 OFF
9	CR 9	High byte of the comparison register of DO1.1 OFF	25	CR 25	High Byte Of The Comparison Register Of DO2.1 OFF
10	CR 10	Lower byte of the comparison register of DO1.2 ON	26	CR 26	Lower Byte Of The Comparison Register Of DO2.2 ON
11	CR 11	High byte of the comparison register of DO1.2 ON	27	CR 27	High Byte Of The Comparison Register Of DO2.2 ON
12	CR 12	Lower byte of the comparison register of DO1.2 OFF	28	CR 28	Lower Byte Of The Comparison Register Of DO2.2 OFF
13	CR 13	High byte of the comparison register of DO1.2 OFF	29	CR 29	High Byte Of The Comparison Register Of DO1.2 OFF
14	CR 14	Status register of counter 1	30	CR 30	Status Register Of Counter 2

15	CR 15	Command register of counter 1	31	CR 31	Command Register Of Counter 2
16	CR 16	Lines of counter1/ prescaler register	32	CR 32	Lines Of Counter2/ Prescaler Register

Mode register

16bit

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
COUNT_MULRIPLE		SOFT_STO P_CS	SOFT_STA RT_CS	EX_STOP _CS	EX_STAR T_CS	GMO D		Keep reser ved							

Sign	Bit	Function
C_TYPE	[2:0]	External encoder selection register:
	=000	AB phase encoder (default setting)
	=001	pulse encoders with direction
	=010	pulse encoders without direction
	=011-111	Keep reserved
FUN	[6:3]	Operating mode selection:
	=0000	Forbidden to count *
	=0001	Continuous Counting (default setting) *
	=0010	Keep reserved
	=0011	Single Counting
	=0100	Periodic counting
	=0101	Frequency measurement
	=0110	Rotational speed measurement
	=0111	Period duration measurement
	=1000	Comparison counting
	=1001-1111	Keep reserved
Keep reserved	[7]	
GMOD	[9:8]	Gate control mode selection:
	=00	No gate control (default setting) (invalid when FUN = 0011)
	=01	Gate control by Software (invalid when FUN = 0011)
	=10	Gate control by hardware (invalid when FUN = 0011)
	=11	Keep reserved
EX_START_CS	[10]	External digital input

		START selection (valid when GMOD = 10)
	=0	No External digital input START (default setting)
	=1	External digital input “DI*.1” START
EX_STOP_CS	[11]	External digital input STOP selection (valid when GMOD = 10)
	=0	No External digital input STOP (default setting)
	=1	External digital input “DI*.2” STOP
SOFT_START_CS	[12]	Software start selection (valid when GMOD = 01) *
	=0	No software start (default setting)
	=1	Software start
SOFT_STOP_CS	[13]	Software stop selection (valid when GMOD = 01)
	=0	No software stop (default setting)
	=1	Software stop
COUNT_MULTIPLE	[15:14]	Multiple Setting
	=00	×1
	=01	×2
	=10	×4 (default setting)
	=11	Keep reserved

***NOTE 1: When FUN = 0000, the other bits are invalid.**

***NOTE 2: When the counter is working in the Continuous Counting Mode, the pre-set value register and the turn value register are invalid.**

***NOTE 3: When the counter is set in the Single Counting mode and Gate control by Software, counter counts only when “SOFT_START_CS | SOFT_STOP_CS = 10”; Counter stops count when SOFT_STOP_CS = 1.**

Command register

Command register is used to determine external input trigger mode of Status digital input START/STOP in setting gate control by hardware. Command register is valid only in Single Counting mode and outside gate control. The explanation is as follows:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Keep reserved							EXTTRMOD			Keep reserved					

Sign	Bit	Function
Keep reserved	[5:0]	
EXTTRMOD	[8:6]	Settings of external input trigger mode:
	=000	Rising edge of external input trigger START/STOP (default setting)
	=001	Falling edge of external input trigger START/STOP
	=010	High-level voltage of external input trigger START/STOP
	=011	Low-level voltage of external input trigger START/STOP
Keep reserved	[15:9]	

Status register

Status register is read-only register, which indicates state of counter.

The explanation is as follows:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CTRMOD			DOS		DIS			Keep reserved	DIR	Keep reserved			WORKMOD		

Sign	Bit	Function
WORKMOD	[2:0]	Operating mode:
	=000	Continuous Counting (default setting)
	=001	Keep reserved
	=010	Single Counting
	=011	Periodic counting
	=100	Frequency measurement
	=101	Rotational speed measurement
	=110	Period duration measurement
	=111	Comparison counting
Keep reserved	[5:3]	
DIR	[6]	Direction of motor rotation:
	=0	Forward
	=1	Backward
Keep reserved	[7]	
DIS	[10:8]	Voltage Level of input:
	=001	High-level voltage of input channel1 (ON)
	=010	High-level voltage of input channel2 (ON)

	=100	High-level voltage of input channel3 (ON)
DOS	[12:11]	Output status:
	=01	High-level voltage of output channel1 (ON)
	=10	High-level voltage of output channel2 (ON)
CTRMOD	[15:13]	What kind of gate control:
	=000	No gate control
	=001	Keep reserved
	=010	Keep reserved
	=011	Software control
	=100	Rising edge of external input trigger START/STOP
	=101	Falling edge of external input trigger START/STOP
	=110	High-level voltage of external input trigger START/STOP
	=111	Low-level voltage of external input trigger START/STOP

Line / prescaler register

The higher 13 bits of prescaler register are used to set Encoder line. The maximum value is 8191, and minimum is 0. The lower 3 bits are used to set scale coefficient. When the encoder outputs very high frequency pulses, this register can be used to set an appropriate value of fractional frequency. The detail is described as follows:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Encoder line (default setting "0")													scale coefficient		

Sign	Bit	Function
scale coefficient	[2,0]	scale coefficient:
	=000	1 scale (default setting)
	=001	2 scale
	=010	4 scale
	=011	8 scale
	=100	16 scale
	=101	32 scale
	=110	64 scale
	=111	128 scale

Note : If your register settings are equal to the previous setting, the MCU consider your operation is not changed and will not do the configuration.

Technical Specification

Counters	2
Counting Range	32 bit or ± 31 bit
Counting Frequency	500kHz
Digital Input	
Inputs Of Counter	
Input Voltage “1” “0”	11~30V(“1”) -3~+5V(“0”)
Input Delay	$\leq 50\mu\text{s}$
Digital Output	
Output Channel	2
Voltage Rating	24VDC
Output Current	500mA, short circuit protect
Switching Frequency	100Hz
Dimension W×H×D (mm)	40×145×153.5
Weight	500g
Operating Temperature	-10~60℃
Status Display	One green LED for each channel
Self-Diagnosis	yes

7 Communication Module

☐ Synopsis

NA400 controllers support several communication protocols to communicate with third party local intelligent devices, such as MODBUS, PROFIBUS-DP, CANOpen, Ethernet and so on. If NA400 control system is to provide a certain communication function, this can be achieved by simply installing an appropriate communication module on the backplane. Various types of communication modules can cover most popular network protocols, so that traditional field control devices could improve their communication ability.

☐ Content

Several kinds of CMM modules are described in this chapter.

Section	Content
7.1	Serial Communication Module CMM401-0401
7.2	Profibus DP Master Communication Module CMM401-0102
7.3	Profibus DP Slave Communication Module CMM401-0103
7.4	Profibus DP Redundant Slave Communication Module CMM401-0113
7.5	CANOpen Master Communication Module CMM401-0104
7.6	MODBUS/TCP Slave Communication Module CPU401-0502
7.7	Ethernet Master Station Module CMM401-0108
7.8	Ethernet Substation Module CMM401-0118
7.9	Ethernet Substation Module CMM401-0118_SFP
7.10	Ethernet、RS485 and RS422 interface Module CMM401-0215
7.11	Software Programming

NA400 PLC provides different types of communication modules for user choice. Please

see Table 7.1 for detailed information.

Table 7.1 Communication Modules List

Type	Name	Content
CMM401-0401	Serial Communication Module	4 × RS232/RS485
CMM401-0102	Profibus DP Master Communication Module	DP Master
CMM401-0103	Profibus DP Slave Communication Module	DP Slave
CMM401-0113	Profibus DP Redundant Slave Communication Module	DP Redundant Slave
CMM401-0104	CANOpen Master Communication Module	CANOpen Master
CPU401-0502	MODBUS/TCP Slave Communication Module	MODBUS/TCP Slave
CMM401-0108	Ethernet Master Station Module	Ethernet Master
CMM401-0118	Ethernet Substation Module	Ethernet Substation
CMM401-0118_SFP	Ethernet Substation Module	Ethernet Substation_SFP

7.1 Serial Communication Module CMM401-0411

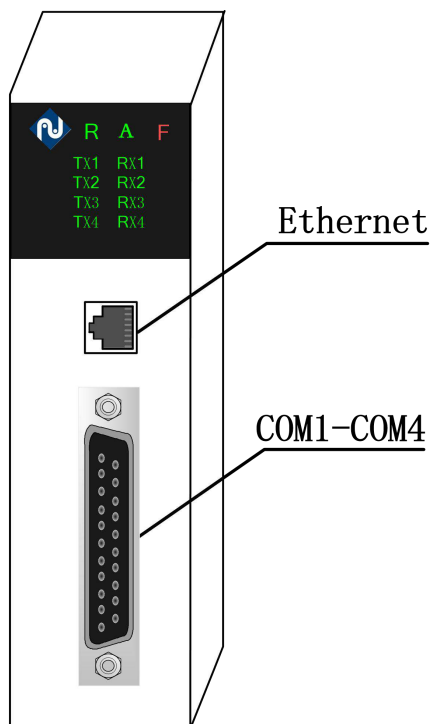
Order Number

400CMM4010411

Features:

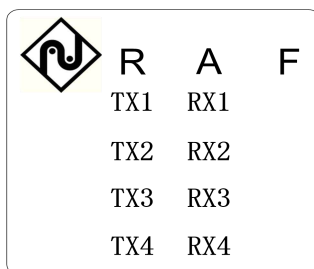
- It can expand up to four external serials.
- Serial ports of RS485 type.
- Programmable serial interface driver.
- Independently accomplishing serial communication task, only exchanging data with CPU without requiring CPU resource.
- Different from the network of I/O modules, data exchange with CPU uses a separate internal network, so as to lower the load of internal network.
- The maximum of communication nodes is 32 when using RS-485 converter.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Outlook



CMM401-0411

Indicator LED description:



Indicator LEDs

LED	Color	State	Function
R	Green	Flicker/ Constant Lighting	Run normally/ program is running but parameters are not loaded
A	Green	Light/ off	HIN work normally/ abnormally

F	Red	Light/ off	Fault/ Running normally
TX1~TX4	Green	Light/ off	Serial port is sending data/No Data is sending
RX1~RX4	Green	Light/ off	Serial port is receiving data/No Data is receiving

The working state corresponding to the indicator LED is as follows:

- R: Run indicator LED. When the module is running normal, the green LED flickers.
If the green LED is always on, that means program has been running but parameter is unloaded.
- A: HIN Active Indicator LED. When HIN works normally, the LED is on, or it turns off.
- F: Fault Indicator LED. The LED is light when the module is fault.
- Tx1~Tx4: Data transmission indicating light for four serial ports (COM1~COM4). The corresponding "Tx" lamp is on when the serial port is sending data.
- Rx1~Rx4: Data receiving indicating lights for four serial ports (COM1~COM4). The corresponding "Rx" lamp is on when the serial port is receiving data.

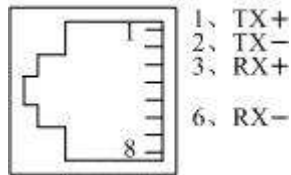
Technical Specification

CMM type	CMM401-0411
Order NO.	400CMM4010411
Power Consumption	3.0W/5V
Current Consumption	600mA/5V
Number Of Expansion Serials	4
Type Of The Serial Port	RS485
Baud Rate	4.8~115.2 kbps
Electrical Isolation	RS485 (yes)
Independent Interruption	yes
Communication Program	Programmable mode
Weight	250g
Dimensions W×H×D (mm)	40×145×153.5

Hardware Setting and Communication Interface of CMM401-0411

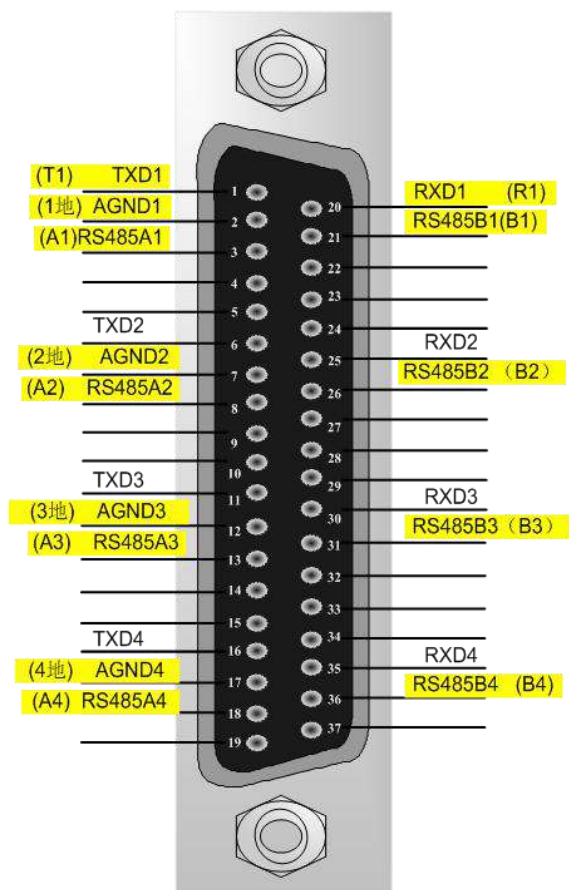
1. Ethernet Interface

The module provides a 10Mbps Ethernet interface with IP address as 192.168.1.65. Debugging program or file transmission can be done through Ethernet.



2. How to connect peripheral devices

Please use serial communication cable to connect serial communication modules. The module itself has a 37-pin D shape socket to provide standard RS-485 serial communication interface. Each communication port has an indicator LED.



Definition of DB37

Connect line CNL401-0203



CNL401-0203

7.2 Profibus DP Master Communication Module CMM401-0102

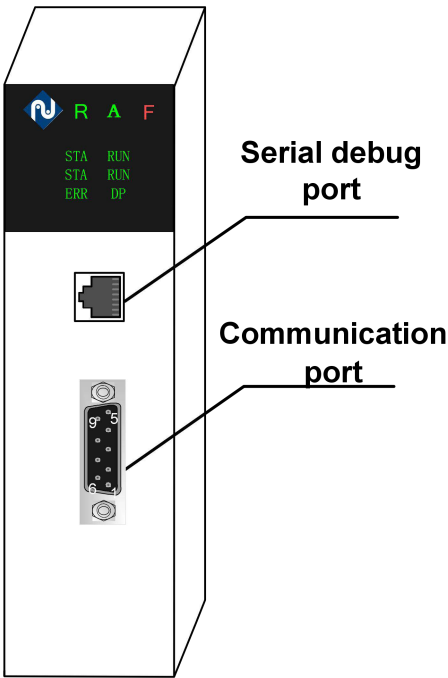
Order Number

400CMM4010102

Features:

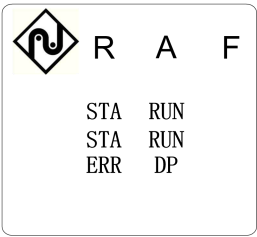
- Independently accomplishing serial communication task, only exchanging data with CPU without requiring CPU resource.
- Different from the network of I/O modules, data exchange with CPU uses a separate internal network, so as to lower the load of internal network.
- The maximum of communication nodes is 126, address 0~125.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Outlook



CMM401-0102

Indicator LED description:



Indicator LEDs

LED	Color	State	Function
R	Green	Flicker/ Constant Lighting	Run normally/ program is running but parameters are not loaded
A	Green	Light/ off	HIN work normally/ abnormally

	Red	Light/ off	Fault/ Running normally
STA	Green	Light/ off	Keep reserved
RUN	Green	Flicker/ Constant Lighting	Main module running indicator Communication error/ Running normally
ERR	Red	Off / Light	Communication error with slave/ Running normally
DP	Green	Flicker/ off	Communicate normally with slave/Communicate abnormally with slave

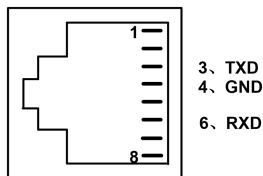
Technical Specification

CMM type	CMM401-0102
Order NO.	400CMM4010102
Power Consumption	3.0W/5V
Current Consumption	600mA/5V
Number of communication port	1
Type of The Port	RS485
Baud Rate	9.6~12000kbps
Maximum Stations	32
Maximum Nodes Of Each Station	126
Communication Program	Programmable mode
Weight	250g
Dimensions W×H×D (mm)	40×145×153.5

Hardware Setting and Communication Interface of CMM401-0102

1. Serial debug port

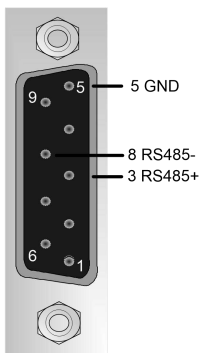
The module provides a RS232 serial port by RJ45. Users can download settings to the module through this port.



Definition of RJ45

2. Communication port

Module communicates with peripheral devices by DB9 female, RS485.



Definition of DB9

7.3 Profibus DP Slave Communication Module CMM401-0103

Order Number

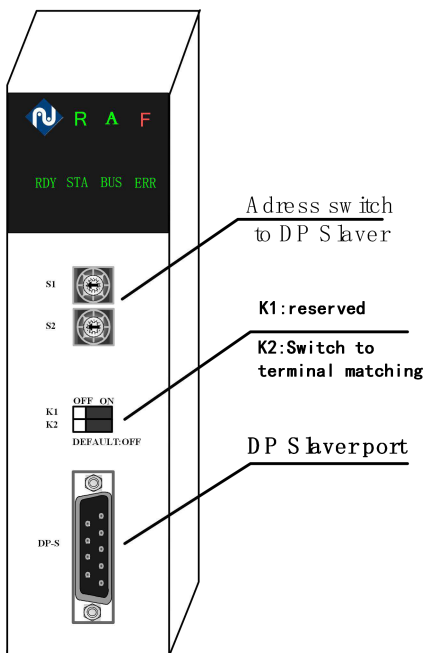
400CMM4010103

Features:

- Standard PROFIBUS-DP slaver interface, DP-V0/V1, complying with IEC61158 and GB/T 20540-2006: the third part of "Digital data communication for measurement and control - Fieldbus for use in industrial systems".
- Baudrate can be set by user, and the maximum value is 12M bps
- The amount of Slave station in Profibus system is up to 30

- Supporting extend modules: less than 32(for 32-point DI or DO module), 7(for 16-point AI module) and 7(for 4-point AO module);
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault, which enables the controller to be safer.
- Overall LED indicator: run or fault states of power supply, module activation, module operation, or Profibus operation can all be indicated by LED indicators.
- Hot plugging support.

Outlook



CMM401-0103

Indicator LED description:

The table below describes LED display indication and work status of DP slave communication module CMM401-0103.



Indicator LEDs

LED	Color	State	Function
LOGO	Blue	Light/ off	Power Supply normal / abnormal
R	Green	Flicker/ Constant	Run normally/ program is running but parameters are not loaded
A	Green	Light/ off	HIN work normally/ abnormally
F	Red	Light/ off	Fault/ Running normally
RDY	Green	Light/ off Flicker/Li	Main control exchanges data with profibus normally / abnormally
STA	Green	Light/ off	Correctly/not correctly received the configuration message from the master
BUS	Green	Flicker/ off	Communicate normally with slave/Communicate abnormally with
ERR	Red	off / Light	Diagnosable Fieldbus error / Running normally

The working state corresponding to the indicator LED is as follows:

- LOGO: power supply indicator LED. It shows if the power supply is normal.
- R: Run indicator LED. When the module is running normal, the green LED flickers.
If the green LED is always on, that means program has been running but parameter is unloaded.
- A: HIN Active Indicator LED. When HIN works normally, the LED is on, or it turns off.
- F: Fault Indicator LED. The LED is light when the module is fault.
- RDY: Main control exchanging data with Profibus indicator LED. When it blinks, data exchange goes normally. When it lights always or goes off, data exchange goes abnormally.

- STA: Slave Configuration Indicator LED. It goes on when receiving data correctly from the master
- BUS: Bus Communication Indicator LED. It lights always when the master could communicate normally with slave; and it goes off when the communication is abnormal.
- ERR: Bus Error Indicator LED. It lights always when a diagnosable Fieldbus error occurs; and it goes off when bus communication is normal.

Technical Specification

CMM type	CMM401-0103
Order NO.	400CMM4010103
Power Consumption	2.0W/5V
Current Consumption	400mA/5V
Number of Communication Port	1
Type of the port	Standard PROFIBUS-DP slaver
Baud Rate	4800~12Mbps
Interface Isolation	optoelectronic isolator 2500V rms
Communication Program	GSD file supported by offer
Weight	220g
Dimensions W×H×D (mm)	40×145×153.5

7.4 Profibus DP Redundant Slave Communication Module

CMM401-0113

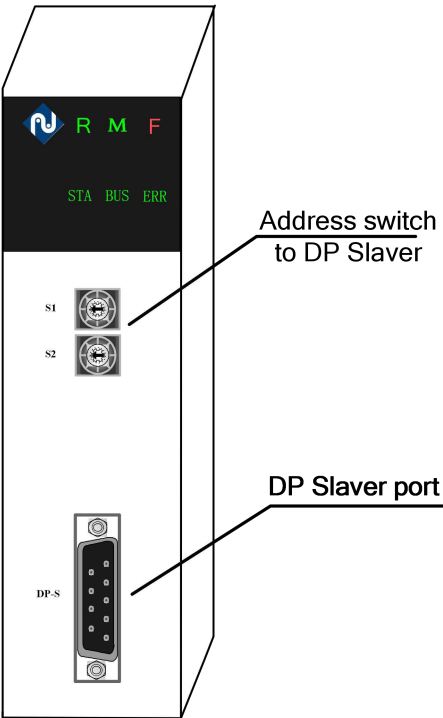
Order Number

400CMM4010113

Features:

- Standard PROFIBUS-DP slaver interface, DP-V0/V1, complying with IEC61158 and GB/T 20540-2006: the third part of “Digital data communication for measurement and control - Fieldbus for use in industrial systems”.
- Baudrate can be set by user, and the maximum value is 12M bps
- The number of Slave station in Profibus system is up to 30
- Supporting extend modules: less than 32(for 32-point DI or DO module), 7(for 16-point AI module) and 7(for 4-point AO module);
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault, which enables the controller to be safer.
- Overall LED indicator: run or fault states of power supply, module activation, module operation, or Profibus operation can all be indicated by LED indicators.
- Hot plugging support.
- Redundancy is provided for Profibus DP communication redundant system.

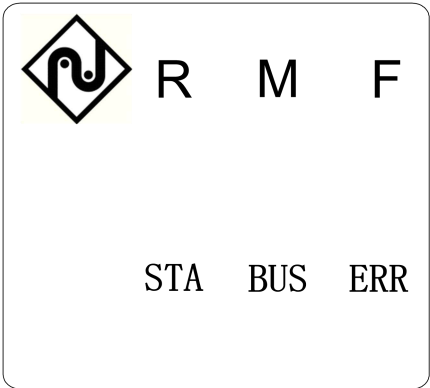
Outlook



CMM401-0113

Indicator LED description:

The table below describes LED display indication and work status of DP slave communication module CMM401-0113.



Indicator LEDs

LED	Color	State	Function
LOGO	Blue	ON/OFF	Power supply normally / Abnormally
R	Green	Blink	Run normally
M	Green	ON/OFF	Primary slave / Backup slave
F	Red	ON/OFF	Fault / Run normally
STA	Green	ON/OFF	Profibus DP protocol function chip initiate successfully / Unsuccessfully
BUS	Green	ON / OFF	Communicate with master normally /
ERR	Green	ON/OFF	Diagnosable Fieldbus error / Run normally

The working state corresponding to the indicator LED is as follows:

- LOGO: power supply indicator LED. It shows if the power supply is normal.
- R: Run indicator LED. When the module is running normal, the green LED flickers.
If the green LED is always on, that means program has been running but parameter is unloaded.
- A: HIN Active Indicator LED. When HIN works normally, the LED is on, or it turns off.
- F: Fault Indicator LED. The LED is light when the module is fault.
- STA: Slave Configuration Indicator LED. It goes on when receiving data correctly from the master
- BUS: Bus Communication Indicator LED. It lights always when the master could communicate normally with slave; and it goes off when the communication is abnormal.
- ERR: Bus Error Indicator LED. It lights always when a diagnosable Fieldbus error occurs; and it goes off when bus communication is normal.

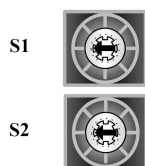
Technical Specification

CMM type	CMM401-0113
Order NO.	400CMM4010113
Power Consumption	2.0W/5V
Current Consumption	400mA/5V
Number of Communication Port	1
Type of the port	Standard PROFIBUS-DP slaver
Baud Rate	4800~12Mbps
Interface Isolation	optoelectronic isolator 2500V rms
Communication Program	GSD file supported by offer
Weight	220g
Dimensions W×H×D (mm)	40×145×153.5

Hardware Setting and Communication Interface of CMM401-0113

1. DP Slaver address switch

The module provides two decimal rotary address encoder switches S1 and S2. The DP slave address is equal to $S1*1+S2*10$, which should be set correctly before power up.

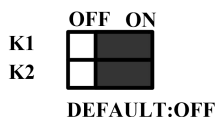


2 Two-bits Dial Switch K1 and K2

K1: reserved by system manufacturer to replace firmware. Default is in off position

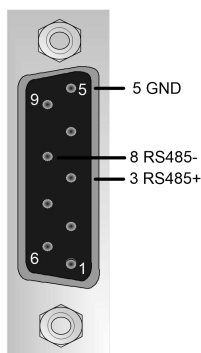
K2: terminal matching switch (default matching resistor value is 120Ohm). Off position shows

that no resistor is connected, while on position shows that there are resistors connected.



3. DP Communication port

DP-S: Standard SUB DB9 Female interface, with description shown below:



Definition of DB9 female

DP-S: standard SUB DB9 Female port, the pin definition is shown as follows:

NO.	Pin definition	NO.	Pin definition	NO.	Pin definition
1	[SHIELD] optional	4	CNTR_P	7	P24
2	[M24] optional	5	DGND	8	RS485_N
3	RS485_P	6	P5V	9	NC

Note: NC—NO CONNECTION.

With the physical and electric property limitation, Profibus could support at most 30 **CMM401-0113** modules. Please pay attention to this limitation when configuring. If slave stations are more than 30, please add Profibus relay device.

7.5 CANOpen Master Communication Module CMM401-0104

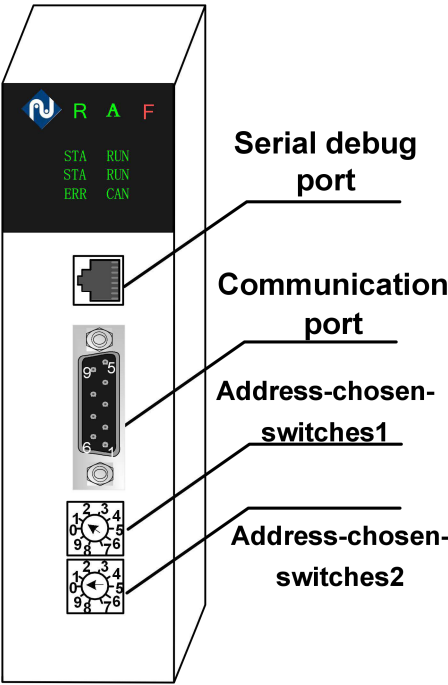
Order Number

400CMM4010104

Features:

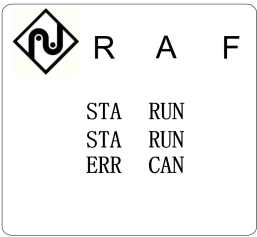
- Independently accomplishing communication task, only exchanging data with CPU without requiring CPU resource.
- Using one separate internal network, different from the network of I/O modules, to exchange data with CPU, so that the load of internal network is lowered.
- The maximum of communication nodes is 99, address 1~99.
- Intelligent module with self-diagnosis function can be reset and reboot automatically when fault.
- No need for hardware setting. The CPU Module can load parameters on it automatically after startup.
- Hot plugging support.

Outlook



CMM401-0104

Indicator LED description:



Indicator LEDs

LED	Color	State	Function
R	Green	Flicker/ Constant	Run normally/ program is running but parameters are not loaded
A	Green	Light/ off	HIN work normally/ abnormally
F	Red	Light/ off	Fault/ Running normally

STA	Green	Light/ off	Keep reserved
RUN	Green	Flicker/ Constant	Main module running indicator Communication error/ Running normally
ERR	Red	off / Light	Diagnosable Fieldbus error / Running normally
CAN	Green	Flicker/ off	Communicate normally with slave/Communicate abnormally with slave

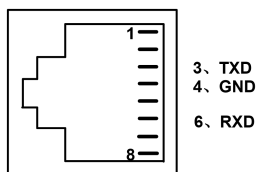
Technical Specification

CMM type	CMM401-0104
Order NO.	400CMM4010104
Power Consumption	3.0W/5V
Current Consumption	600mA/5V
Number of Communication Port	1
Type of the Port	CAN
Baud Rate	10~1000kbps
Maximum Nodes	126
Communication Program	Programmable mode
Weight	250g
Dimensions W×H×D (mm)	40×145×153.5

Hardware Setting and Communication Interface of CMM401-0102

1. Serial debug port

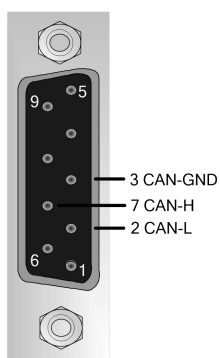
The module provides a RS232 serial port by RJ45. Users can download settings to the module through this port.



Definition of RJ45

2. Communication port

Module communicates with peripheral devices by DB9 female, CAN.



Definition of DB9

7.6 MODBUS/TCP Slave Communication Module CPU401-0502

Introduction

CPU401-0502 module is regarded as MODBUS/TCP slave station, which communicates with Toshiba MODBUS/TCP master station. The CPU401-0502 module is responsible for self-diagnosis, data acquisition, control of implementation, external communications, and external output functions, etc.

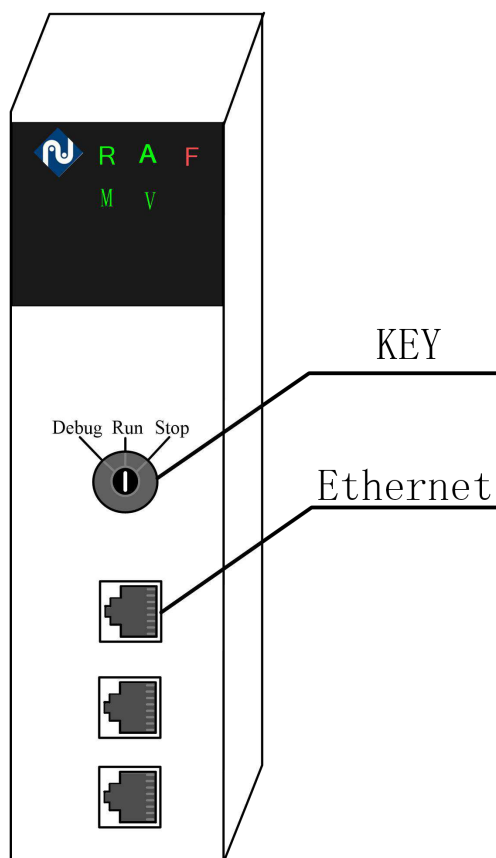
Order Number

400CPU401-0502

Features:

- Using high-end dual CPU system having high speed and strong reliability.
- Building in a real time clock to record current time and do the time control of the process.
- Watchdog function, can self-reset and reboot when faulty.
- Hot-plugging is supported.
- Power failure safeguard.
- Two CPU modules backup data real-time by high speed internal bus. The master CPU executes the program, and backup data real-time to the slave CPU. When the master CPU is faulty, the slave CPU can be raised to run as a main CPU automatically to ensure the system run unaffectedly.

Outlook



NA400CPU401-0502 Module

Indicator LED description:

The LED indicators of CPU modules are located in the upper front panel. These indicators could help users have an understanding of CPU module running state. The LED indicators and working state of NA400 CPU401-0502 are described in the following table:



Indicator LEDs

The Description Of Indicator LEDs:

LED	Color	State	Meaning
R	Green	Flicker	Run normally
A	Green	Constant Lighting / off	The module is in the Run state / The module is in the Stop state or has a fatal fault
F	Red	Light / off	Module failure (including the network cable did not plug, CAN network failure and so on) / module no fault
M	Green	Constant Lighting / off	Current CPU is the master/slaver
V	Green	Constant Lighting / off	Master and slave project versions are inconsistent / NOT

The Combination Of Indicator LEDs Meanings:

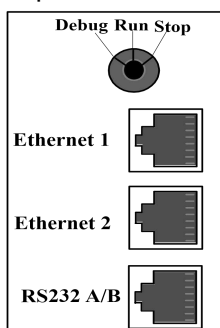
R	A	F	M	V	Meaning
Flicker	Constant Lighting				Module run normally
Flicker fast		Flicker fast			In debug state
	Constant Lighting	Constant Lighting			The project file is not configured correctly
Constant Lighting	Constant Lighting	Constant Lighting			CPU type is not accord with the configuration file
Flicker	Constant Lighting		Constant Lighting	Constant Lighting	The master and slave project versions are inconsistent, and this module is Master CPU

Flicker				Constant Lighting	The master and slave project versions are inconsistent, and this module is Slave CPU
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Hardware Setting and External Interface

1. Key Switch

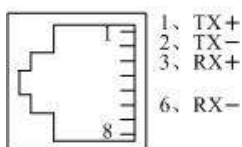
- There is a 3-position key switch in the CPU module, which is used to set the state of the module. The key is in “run” position when the module is running normal.



- Stop: When switching the key to “Stop” position, the module is in the Stop state and the software stops scanning the user program.
- Debug: When switching the key to “Debug” position, the module is in the Debug state and the Watchdog of the module will be disabled, and the user program can be debugged at this time.
- RUN: When switching the key to “Run” position, the module is in the normal running state. The Watchdog of the module will be enabled, when the module runs disorderly or crash due to some interference or hardware failure and other causes, it can automatically resume operation .

2. Ethernet Interface

CPU module have one Ethernet interface.



The Definition of Ethernet Interface

Technical Specification

Table1. Maximum points of internal register in CPU

Register \ CPU	CPU401-0502
I	1024
Q	1024
IW	256
QW	256
M	8192
MW	8192
N	2048
NW	2048
S	2048
SW	2048
T	512
C	512

Table2. CPU Hardware Parameters

CPU Type		CPU401-0502
Order NO.		400CPU4010502
CPU Basic Frequency		180MHz
CPU Processing Capacity	Bit Instruction Speed	0.1us
	Word Instruction Speed	0.2us
Power Voltage	Upper Limit	5.25V
	Rating	5.0V
	Lower Limit	4.75V

Current Consumption	Upper Limit	2.0A
	Rating	1.5A
	Power Consumption	7.5W
Support Redundant CPU		YES
Ethernet Interface		1
Communication Ability	MODBUS	YES
	Profibus	YES
	CANBUS	YES
Program Language	LD	YES
	ST	YES
	IL	YES
	FBD	YES
	SCC	YES
Weight (g)		350
Installing Size (Length×Height×Depth) (mm)		40×145×158

7.7 Ethernet Master Station Module CMM401-0108

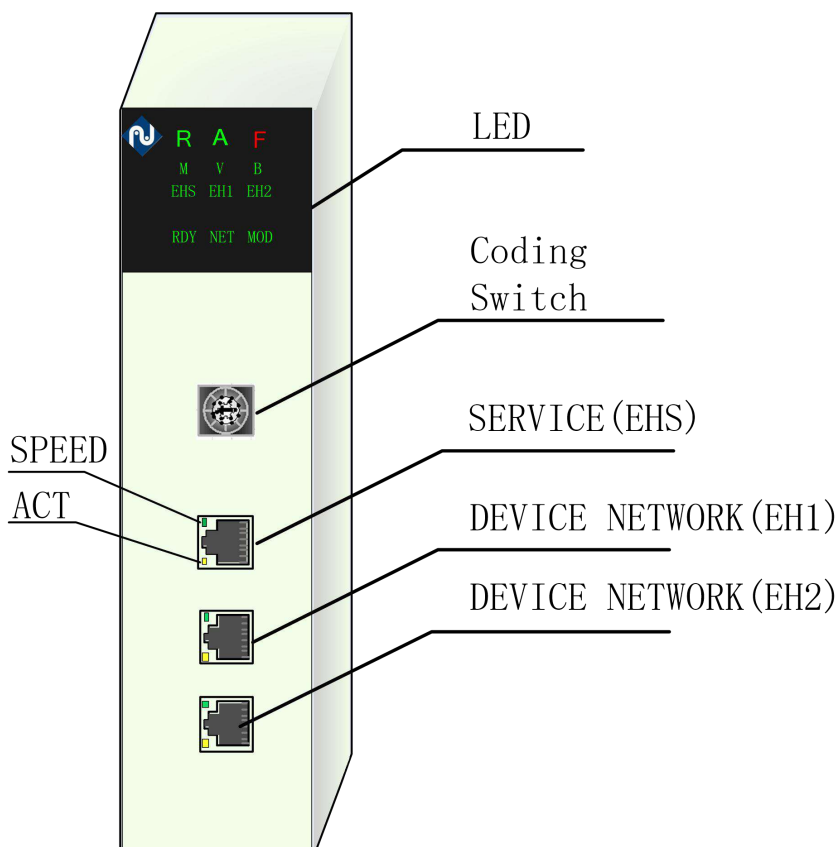
Order Number

400CMM4010108

Features:

1. Communication speed is 10/100Mbps adaptive.
2. IP conflict detection alarm.
3. Comprehensive LED indicator.
4. Hot plugging support.
5. The maximum data exchange capacity for each master module is 4K for each uplink and downlink.
6. Each CPU can support four substation modules.

Outlook



NA400CMM401-0108 Module

Mounting dimensions (width×height×depth): 40mm×145mm×158mm.

LED indicator:



Indicator LEDs

The LED indicator is only on, off, or blinking (blinking means the indicator is on for 0.5 seconds, off for 0.5 seconds). The specific definitions are shown below.

CMM401-0108 Indicator Meaning

LED	Color	State	Meaning
Logo	Blue	Constant Lighting/ off	Power on/ Power off
R	Green	Flicker/Constant Lighting	Run normally/ Program has been running but parameter is unloaded
A	Green	Constant Lighting/ off	Normal communication/disconnection between the IO module above the rack
F	Red	Light / off	Fault/ Running normal
EHS	Green	Constant Lighting/ off	Service port function is normal/abnormal
EH1	Green	Constant Lighting/ off	Daisy chain ring network port 1 function is normal/abnormal
EH2	Green	Constant Lighting/ off	Daisy chain ring network port 2 function is normal/abnormal
RDY	Green	Constant Lighting/ ON	CPU load information is accepted, the master station is ready for work/the master station is not ready for work
		off	IP conflicts in substation Ethernet
NET	Green	Constant Lighting	Normal communication with the master station
		Flicker	Abnormal communication with the master station

MOD	Green	Constant Lighting/off	This module's position dialing code has been changed / The module dialing code has not been changed, IP has no conflict
		Flicker	This module has conflicting IP

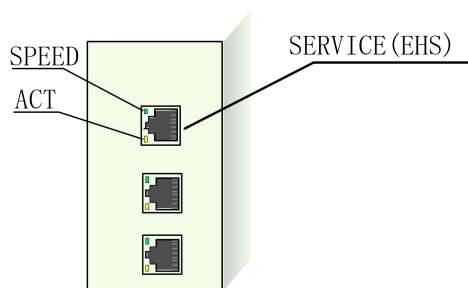
The working state corresponding to the indicator LED is as follows:

- Logo: Power indicator LED. When module power on, the LED is on; When module power off, the LED is off.
- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: The indicator lights up when there is a normal communication between the substation module and the IO module on the rack, and the indicator is off when the communication with all IO modules is abnormal.
- F: Fault indicator LED. The indicator is off when the module runs normally. When the module is abnormal (usually the switch module is faulty or the module is not inserted in the corresponding backplane slot), the indicator lights up.
- EHS: Service port indicator. the indicator light is on after the network cable is plugged in to establish the link on the service interface, and the indicator is off when no link is established on the service interface.
- EH1: Ring network port 1 indicator. When the ring network port 1 function is normal, the indicator is on. When the ring network port 1 function is abnormal, the indicator is off.
- EH2: Ring network port 2 indicator. When the ring network port 2 function is normal, the indicator is on. When the ring network port 2 function is abnormal, the indicator is off.

off.

- RDY: Ready light. When CPU load information is accepted, the master station is ready for work, the indicator is flashing. When the master station is not ready for work, the indicator is on. When IP conflicts in substation Ethernet, the indicator is off.
- NET: Communication indicator LED, the indicator is on when the communication between the substation and the master station is normal, and the indicator is flashing when the communication is abnormal.
- MOD: Status indicator LED, the indicator is off when the substation module works normally, the indicator is on when the substation dial code is changed but the module is not restarted, and the indicator flicker when there is the IP conflict between the substation module and the network.

RJ45 network port indicator as shown below:



RJ45 network port indicator

Three RJ45 network ports have their own indicators, which are SPEED and ACT lamps. The module SPEED light is green and can be judged as 10Mbps or 100Mbps. The ACT light is yellow and can represent the link status. The specific indications are as follows:

Table Indicators on the RJ45 network port

Name	Colour	Status	Indicator status meaning
SPEED	Green	Light	100 Mbps link detected

		off	10 Mbps link detected
ACT	Yellow	Light	Ethernet link detected
		Flicker	Data on the Ethernet link
		off	No data on the Ethernet link

Technical Specification

Communication module type	CMM401-0108
Order number	400CMM4010108
Power consumption	<6W
Current consumption	<1.2A@5V
Physical interface	3 RJ45 ports (only 1 IP address)
Communication Port Protocol	Custom protocol, named NARING
Exchange mode	Full duplex
Maximum number of connections	64 Ethernet substations communication modules
Transmission rate	10/100Mbps
redundancy	Cable redundancy
Topology	Daisy Chain Ring Network
Transmission support media	Twisted pair
Logo	CE FCC
Power supply	Rack power supply
Weight	<1kg
Size Width × Height × Depth	40mm × 145mm × 158mm

Hardware settings and external interfaces

1. Service port function

This port supports the following modes (select by rotary dial switch)

(1) Access port (module default state, dialing code set to 0): This mode supports Ethernet communication, can access the module connected to the daisy chain ring network, and can also be used as the underlying software update interface of the master station (The maintenance port function needs to connect the CPU download network port to other service ports that are connected to the ring network module).

(2) Port mirroring (dialing code placed in F position): In this mode, the data traffic of the other 2 ports is copied to this port, so that the connected tools can be used to monitor and analyze the port traffic.

Port mirroring feature can use Wireshark packet capture tool.

2. DEVICE NETWORK interface

RJ45 Interface: Provides connections for remote I/O communications, providing cable redundancy through a daisy-chained ring network architecture.

3. The substation IP is set to 192.168.1.66 or 192.168.2.66

In order to facilitate the diagnosis of the module, you can dial code to the E position, so that the substation module IP is set to 192.168.1.66; the dial code is dialed to the D position, so that the substation module IP is set to 192.168.2.66.

When the dialing code is dialed to the E position or the D position, the substation IP takes effect immediately and there is no need to restart the substation module.

7.8 Ethernet Substation Module CMM401-0118

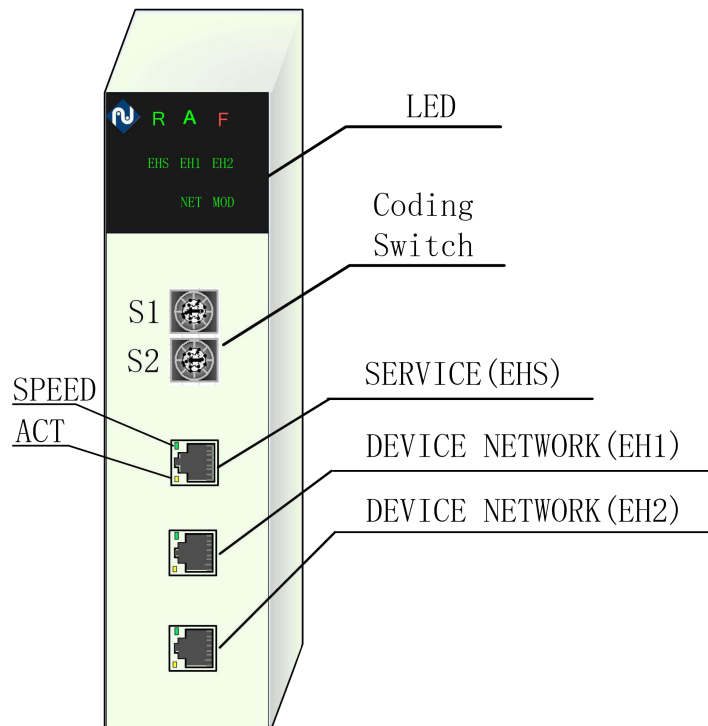
Order Number

400CMM4010118

Features:

1. Communication speed is 10/100Mbps adaptive.
2. IP conflict detection alarm.
3. Comprehensive LED indicator.
4. Hot plugging support.
5. The maximum data exchange capacity for each substation module is 1K for each uplink and downlink.
6. Supports up to 4 backplanes (15 slots).
7. Support serial port module.
8. Two ring network ports have By-pass function.

Outlook



NA400CMM401-0118 Module

Mounting dimensions (width×height×depth): 40mm×145mm×158mm.

LED indicator:



Indicator LEDs

The LED indicator is only on, off, or blinking (blinking means the indicator is on for 0.5 seconds, off for 0.5 seconds). The specific definitions are shown below.

CMM401-0118 Substation Indicator Meaning

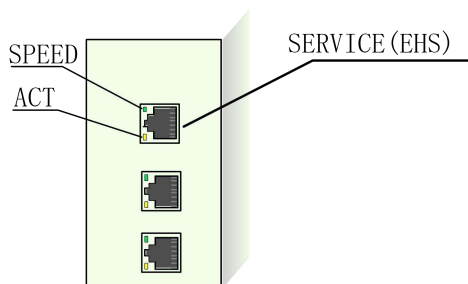
LED	Color	State	Meaning
Logo	Blue	Constant Lighting/ off	Power on/ Power off
R	Green	Flicker/Constant Lighting	Run normally/ Program has been running but parameter is unloaded
A	Green	Constant Lighting/ off	Normal communication/disconnection between the IO module above the rack
F	Red	Light / off	Fault/ Running normal
EHS	Green	Constant Lighting/ off	Service port function is normal/abnormal
EH1	Green	Constant Lighting/ off	Daisy chain ring network port 1 function is normal/abnormal
EH2	Green	Constant Lighting/ off	Daisy chain ring network port 2 function is normal/abnormal
NET	Green	Constant Lighting	Normal communication with the master station
		Flicker	Abnormal communication with the master station
MOD	Green	Constant Lighting/off	This module's position dialing code has been changed / The module dialing code has not been changed, IP has no conflict
		Flicker	This module has conflicting IP

The working state corresponding to the indicator LED is as follows:

- Logo: Power indicator LED. When module power on, the LED is on; When module power off, the LED is off.
- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: The indicator lights up when there is a normal communication between the substation module and the IO module on the rack, and the indicator is off when the communication with all IO modules is abnormal.
- F: Fault indicator LED. The indicator is off when the module runs normally. When the module is abnormal (usually the switch module is faulty or the module is not inserted in the corresponding backplane slot), the indicator lights up.
- EHS: Service port indicator. the indicator light is on after the network cable is plugged in to establish the link on the service interface, and the indicator is off when no link is established on the service interface.
- EH1: Ring network port 1 indicator. When the ring network port 1 function is normal, the indicator is on. When the ring network port 1 function is abnormal, the indicator is off.
- EH2: Ring network port 2 indicator. When the ring network port 2 function is normal, the indicator is on. When the ring network port 2 function is abnormal, the indicator is off.
- NET: Communication indicator LED, the indicator is on when the communication between the substation and the master station is normal, and the indicator is flashing when the communication is abnormal.
- MOD: Status indicator LED, the indicator is off when the substation module works normally, the indicator is on when the substation dial code is changed but the module

is not restarted, and the indicator flicker when there is the IP conflict between the substation module and the network.

RJ45 network port indicator as shown below:



RJ45 network port indicator

Three RJ45 network ports have their own indicators, which are SPEED and ACT lamps. The module SPEED light is green and can be judged as 10Mbps or 100Mbps. The ACT light is yellow and can represent the link status. The specific indications are as follows:

Table Indicators on the RJ45 network port

Name	Colour	Status	Indicator status meaning
SPEED	Green	Light	100 Mbps link detected
		off	10 Mbps link detected
ACT	Yellow	Light	Ethernet link detected
		Flicker	Data on the Ethernet link
		off	No data on the Ethernet link

Technical Specification

Communication module type	CMM401-0118
Order number	400CMM4010118
Power consumption	<6W
Current consumption	<1.2A@5V
Physical interface	3 RJ45 ports (only 1 IP address)
Communication Port Protocol	Custom protocol, named NARING
Exchange mode	Full duplex
Maximum number of connections	64 Ethernet substations communication modules
Transmission rate	10/100Mbps
redundancy	Cable redundancy
Topology	Daisy Chain Ring Network
Transmission support media	Twisted pair
Logo	CE FCC
Power supply	Rack power supply
Weight	<1kg
Size Width × Height × Depth	40mm × 145mm × 158mm

Hardware settings and external interfaces**4. Service port function**

This port supports the following modes (select by rotary dial switch)

(1) Access port (module default state, dialing codes S1 and S2 are all set to 0): This mode supports Ethernet communication, can access the module connected to the daisy chain ring network, and can also be used as the underlying software update interface of the master station (The maintenance port function needs to connect the CPU download network port to

other service ports that are connected to the ring network module).

(2) Port mirroring (S1 is placed in F position, and S2 is arbitrary): In this mode, the data traffic of the other 2 ports is copied to this port, so that the connected tools can be used to monitor and analyze the port traffic.

Port mirroring feature can use Wireshark packet capture tool.

5. DEVICE NETWORK interface

RJ45 Interface: Provides connections for remote I/O communications, providing cable redundancy through a daisy-chained ring network architecture.

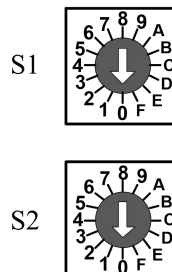
6. Module By-pass function

The two ring network ports of the CMM401-0118 module have a By-pass function. When the module is powered off, the By-pass function is triggered. The network skips this module. At this time, the two ring network ports connected to the module are physically implemented. The entire link will not cause the entire network to fail because of a power failure of one module.

The length of the communication between two sub-stations of By-pass cannot exceed 100m.

7. Set substation number

Before powering up the CMM401-0118 substation module and before downloading the application program, use the rotary dial switch on the front of the module to set the substation number of the Ethernet substation.



Set the substation number by dialing

The substation module provides two hexadecimal rotary code switches S1 and S2, but the substation number only uses the lower 10 bits of S1 and S2 (S1 range is 0-9, S2 range is 0-9). The station number is calculated as:

$$\text{substation number} = S2 \times 10 + S1$$

Note:

- (1) The changed dialing value does not take effect until the module is restarted.
- (2) Live change of the dial code will activate the module's MOD indicator and an unmatched message will be recorded in the module diagnosis.
- (3) The effective value of substation number is 1-99 (decimal method).

8. The substation IP is set to 192.168.1.66 or 192.168.2.66

In order to facilitate the diagnosis of the module, you can dial S1 to the E position (the dial code S2 is an arbitrary value), so that the substation module IP is set to 192.168.1.66; the dial code S1 is dialed to the D position (the dial code S2 is an arbitrary value), so that the substation module IP is set to 192.168.2.66.

When the dialing code S1 is dialed to the E position or the D position, the substation IP takes effect immediately and there is no need to restart the substation module.

7.9 Ethernet Substation Module CMM401-0118_SFP

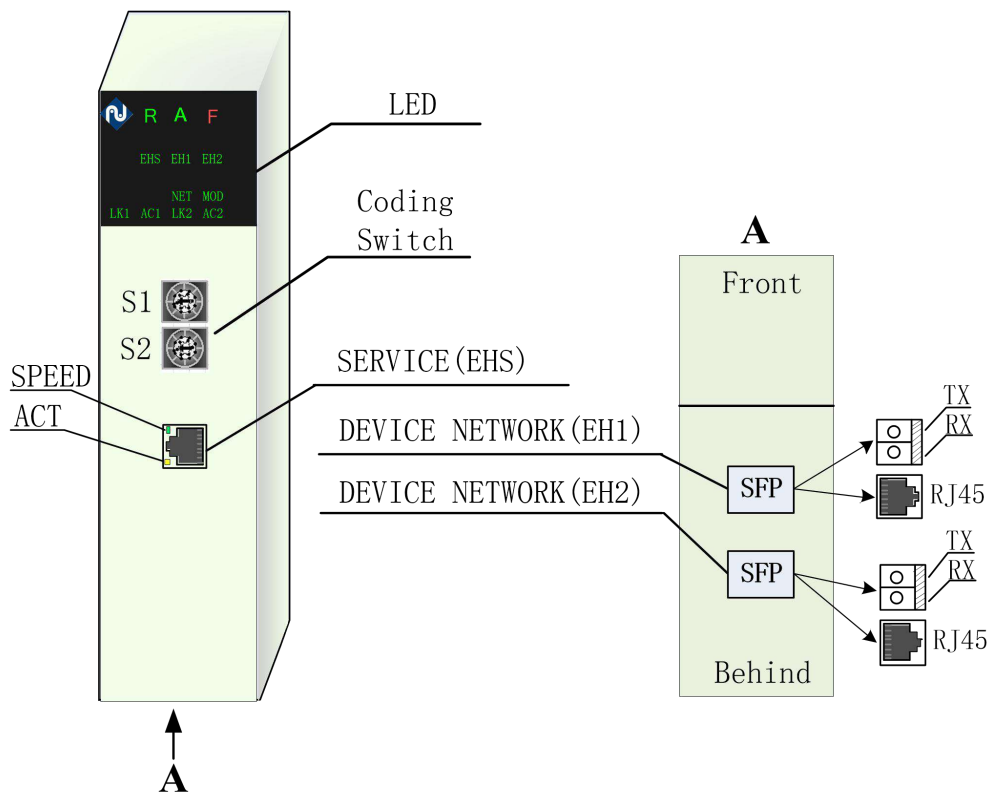
Order Number

400CMM4010118_SFP

Features:

1. Communication speed is 10/100Mbps adaptive.
2. IP conflict detection alarm.
3. Comprehensive LED indicator.
4. Hot plugging support.
5. The maximum data exchange capacity for each substation module is 1K for each uplink and downlink.
6. Supports up to 4 backplanes (15 slots).
7. Support serial port module.

Outlook



NA400 CMM401-0118_SFP Module

Mounting dimensions (width × height × depth): 40mm × 145mm × 158mm.

LED indicator:



Indicator LEDs

The LED indicator is only on, off, or blinking (blinking means the indicator is on for 0.5

seconds, off for 0.5 seconds). The specific definitions are shown below.

CMM401-0118_SFP Substation Indicator Meaning

LED	Color	State	Meaning
Logo	Blue	Constant Lighting/ off	Power on/ Power off
R	Green	Flicker/Constant Lighting	Run normally/ Program has been running but parameter is unloaded
A	Green	Constant Lighting/ off	Normal communication/disconnection between the IO module above the rack
F	Red	Light / off	Fault/ Running normal
EHS	Green	Constant Lighting/ off	Service port function is normal/abnormal
EH1	Green	Constant Lighting/ off	Daisy chain ring network port 1 function is normal/abnormal
EH2	Green	Constant Lighting/ off	Daisy chain ring network port 2 function is normal/abnormal
NET	Green	Constant Lighting	Normal communication with the master station
		Flicker	Abnormal communication with the master station
MOD	Green	Constant Lighting/off	This module's position dialing code has been changed / The module dialing code has not been changed, IP has no conflict
		Flicker	This module has conflicting IP
LK1	Green	Constant Lighting	The EH1 has a 100Mbps link

		off	No link
AC1	Yellow	Flicker	The data in the EH1 port is being transmitted
		off	No link
LK2	Green	Constant Lighting	The EH2 has a 100Mbps link
		off	No link
AC2	Yellow	Flicker	The data in the EH2 port is being transmitted
		off	No link

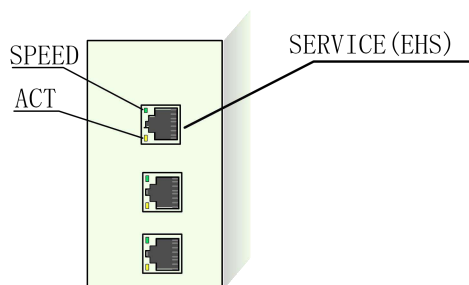
The working state corresponding to the indicator LED is as follows:

- Logo: Power indicator LED. When module power on, the LED is on; When module power off ,the LED is off.
- R: Run indicator LED. When the module is running normal, the green LED flickers. If the green LED is always on, that means program has been running but parameter is unloaded.
- A: The indicator lights up when there is a normal communication between the substation module and the IO module on the rack, and the indicator is off when the communication with all IO modules is abnormal.
- F: Fault indicator LED. The indicator is off when the module runs normally. When the module is abnormal (usually the switch module is faulty or the module is not inserted in the corresponding backplane slot), the indicator lights up.
- EHS: Service port indicator. The indicator light is on after the network cable is plugged in to establish the link on the service interface, and the indicator is off when no link is established on the service interface.
- EH1: Ring network port 1 indicator. When the ring network port 1 function is normal, the indicator is on. When the ring network port 1 function is abnormal, the indicator is off.
- EH2: Ring network port 2 indicator. When the ring network port 2 function is normal,

the indicator is on. When the ring network port 2 function is abnormal, the indicator is off.

- **NET:** Communication indicator LED, the indicator is on when the communication between the substation and the master station is normal, and the indicator is flashing when the communication is abnormal.
- **MOD:** Status indicator LED, the indicator is off when the substation module works normally, the indicator is on when the substation dial code is changed but the module is not restarted, and the indicator flicker when there is the IP conflict between the substation module and the network.

RJ45 network port indicator as shown below:



RJ45 network port indicator

Three RJ45 network ports have their own indicators, which are SPEED and ACT lamps. The module SPEED light is green and can be judged as 10Mbps or 100Mbps. The ACT light is yellow and can represent the link status. The specific indications are as follows:

Table Indicators on the RJ45 network port

Name	Colour	Status	Indicator status meaning
SPEED	Green	Light	100 Mbps link detected
		off	10 Mbps link detected
ACT	Yellow	Light	Ethernet link detected

		Flicker	Data on the Ethernet link
		off	No data on the Ethernet link

Technical Specification

Communication module type	CMM401-0118_SFP
Order number	400CMM4010118_SFP
Power consumption	<7.5W
Current consumption	<1.5A@5V
Physical interface	Only 1 IP address EHS: RJ45 ports EH1/EH2: SFP Copper or SFP optical fiber
Communication Port Protocol	Custom protocol, named NARING
Exchange mode	Full duplex
Maximum number of connections	64 Ethernet substations communication modules
Transmission rate	10/100Mbps(RJ45) 100Mbps(SFP)
redundancy	Cable redundancy
Topology	Daisy Chain Ring Network
Transmission support media	Twisted pair(RJ45) LC-LC(SFP)
Logo	CE FCC
Power supply	Rack power supply
Weight	<1kg
Size Width × Height × Depth	40mm × 145mm × 158mm

Hardware settings and external interfaces

9. Service port function

This port supports the following modes (select by rotary dial switch)

- (1) Access port (module default state, dialing codes S1 and S2 are all set to 0): This mode supports Ethernet communication, can access the module connected to the daisy chain ring network, and can also be used as the underlying software update interface of the master station (The maintenance port function needs to connect the CPU download network port to other service ports that are connected to the ring network module).
- (2) Port mirroring (S1 is placed in F position, and S2 is arbitrary): In this mode, the data traffic of the other 2 ports is copied to this port, so that the connected tools can be used to monitor and analyze the port traffic.

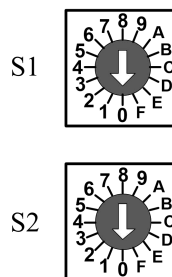
Port mirroring feature can use Wireshark packet capture tool.

10. DEVICE NETWORK interface

RJ45 Interface: Provides connections for remote I/O communications, providing cable redundancy through a daisy-chained ring network architecture.

11. Set substation number

Before powering up the CMM401-0118 substation module and before downloading the application program, use the rotary dial switch on the front of the module to set the substation number of the Ethernet substation.



Set the substation number by dialing

The substation module provides two hexadecimal rotary code switches S1 and S2, but the substation number only uses the lower 10 bits of S1 and S2 (S1 range is 0-9, S2 range is

0-9). The station number is calculated as:

$$\text{substation number} = S2 \times 10 + S1$$

Note:

- (1) The changed dialing value does not take effect until the module is restarted.
- (2) Live change of the dial code will activate the module's MOD indicator and an unmatched message will be recorded in the module diagnosis.
- (3) The effective value of substation number is 1-99 (decimal method).

12. The substation IP is set to 192.168.1.66 or 192.168.2.66

In order to facilitate the diagnosis of the module, you can dial S1 to the E position (the dial code S2 is an arbitrary value), so that the substation module IP is set to 192.168.1.66; the dial code S1 is dialed to the D position (the dial code S2 is an arbitrary value), so that the substation module IP is set to 192.168.2.66.

When the dialing code S1 is dialed to the E position or the D position, the substation IP takes effect immediately and there is no need to restart the substation module.

7.10 Ethernet 、 RS485 and RS422 interface Module CMM401-0215

Order Number

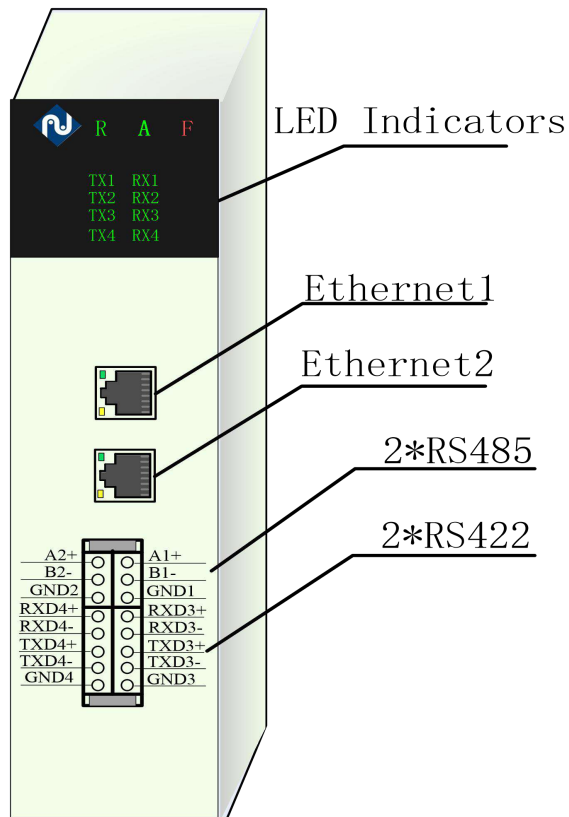
400CMM4010215

Features:

CMM401-0215T has the following features:

1. Used under NA400CPU
2. Support Ethernet interface (Modbus / TCP master and slave mode alternatively) , RS485 interface (Modbus / RTU master and slave mode alternatively) and RS422 interface (Modbus / RTU master and slave mode alternatively) .
3. Single module data quantity up to 1KByte, can be configured up to 8KByte data on one 15 slots I/O plate.
4. Independently communication task exchanged data with the CPU without affecting CPU performance.
5. Intelligent module with self-diagnosis function which can reboot automatically when faults occur.
6. The module can load parameters from CPU automatically after startup, so it does not require any special hardware or software setting.
7. Hot plugging.

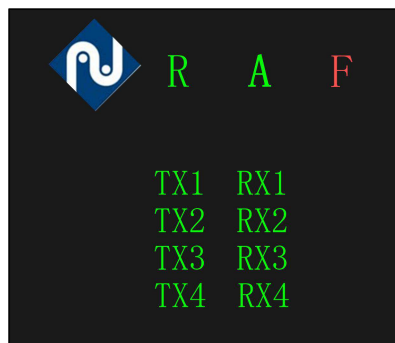
Outlook :



CMM401-0215 Module

Indicator LED description:

The LED indicators of CMM401-0215 module are located in the upper front panel. These indicators could help users understand CMM401-0215 module current working state.



Indicator LEDs of CMM401-0215 Module

The LED indicators and working state of NA400 CMM401-0215 are described in the following table:

Description of LED indicators:

LED	Color	State	Meaning
R	Green	Flicker / Constant Lighting	Running normally/program has been running but parameter is not loaded
A	Green	Constant Lighting / off	HIN work normally/ abnormally
F	Red	Light / off	Fault/ Running normal
TX1	Green	Light / off	Serial Port is sending data/No Data is sending
RX1	Green	Light / off	Serial Port is receiving data/No Data is receiving
TX2	Green	Light / off	Serial Port is sending data/No Data is sending
RX2	Green	Light / off	Serial Port is receiving data/No Data is receiving
TX3	Green	Light / off	Serial Port is sending data/No Data is sending
RX3	Green	Light / off	Serial Port is receiving data/No Data is receiving
TX4	Green	Light / off	Serial Port is sending data/No Data is sending
RX4	Green	Light / off	Serial Port is receiving data/No Data is receiving

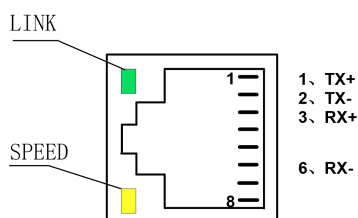
The working state corresponding to the LED indicators is as follows:

- R: Running indicator LED. When the module is running normally, the green LED flickers. If the green LED is always on, that means the program is running but parameter is not loaded.
- A: HIN Active Indicator LED. When HIN works normally, the LED is on, otherwise it turns off.
- F: Fault Indicator LED. The LED is light when the module has faults.
- TX1: data transmission indicating light for Serial Port. The corresponding “TX1” lamp is on when the Serial Port is sending data.
- RX1: data receiving indicating light for Serial Port. The corresponding “RX1” lamp is on when the Serial Port is receiving data.
- TX2: data transmission indicating light for Serial Port. The corresponding “TX2” lamp is on when the Serial Port is sending data.
- RX2: data receiving indicating light for Serial Port. The corresponding “RX2” lamp is on when the Serial Port is receiving data.
- TX3: data transmission indicating light for Serial Port. The corresponding “TX3” lamp is on when the Serial Port is sending data.
- RX3: data receiving indicating light for Serial Port. The corresponding “RX3” lamp is on when the Serial Port is receiving data.
- TX4: data transmission indicating light for Serial Port. The corresponding “TX4” lamp is on when the Serial Port is sending data.
- RX4: data receiving indicating light for Serial Port. The corresponding “RX4” lamp is on when the Serial Port is receiving data.

Hardware Setting and External Interface

1. Ethernet Interface

NA400CMM401-0215 have two 10/100Mbps Ethernet interfaces and support Modbus / TCP master and slave mode alternatively. The definition of Ethernet interface is shown in the following figure:



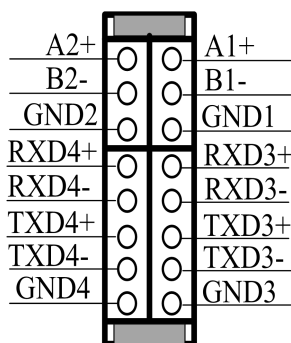
The definition of Ethernet Interface

The Ethernet interface comes with indicator lights, LINK light and SPEED light. LINK light is green, can determine the 10Mbps or 100Mbps; SPEED lights are yellow, represent the status of the link, the working state corresponding to the indicator LED is as follows:

LED	Color	State	Meaning
LINK	Green	Light	100Mbps link is detected
		off	10Mbps link is detected
SPEED	Yellow	Light	The Ethernet link is detected
		Flicker	Ethernet link have data
		off	The Ethernet link is not detected

2. Serial Communication Interface

NA400CMM401-0215 have two RS485 serial communication interfaces and two RS422 serial communication interfaces support Modbus / RTU master and slave function alternatively. The definition of interfaces are shown in the following figure: using 16 pin terminals.



The definition of Serial Port

The definition of Serial Port is described in the following table:

Serial Port	Name	Technical Specifications
Serial Port 1	A1+	Serial Port1: Bus I/O port, A or RS485+
	B1-	Serial Port1: Bus I/O port, B or RS485-
	GND1	Serial Port1: Electronicsground
Serial Port 2	A2+	Serial Port2: Bus I/O port, A or RS485+
	B2-	Serial Port2: Bus I/O port, B or RS485-
	GND2	Serial Port2: Electronicsground
Serial Port 3	RXD3+	Serial Port3: Receive data+
	RXD3-	Serial Port3: Receive data-
	TXD3+	Serial Port3: Transmit data+
	TXD3-	Serial Port3: Transmit data-
	GND3	Serial Port3: Electronicsground
	RXD4+	Serial Port4: Receive data+
	RXD4-	Serial Port4: Receive data-

Serial Port 4	TXD4+	Serial Port4: Transmit data+
	TXD4-	Serial Port4: Transmit data-
	GND4	Serial Port4: Electronicsground

Technical Specification

Module Type		CMM401-0215
Order NO.		400CMM4010215
Power Consumption		4.5W/5V
Current Consumptio		900mA/5V
Serial Port	Type of The Port	RS485 (Modbus/RTU Master or Slave)
	Number of Serial Port	2
	Baud Rate	1200 ~38400bps
Serial Port	Type of The Port	RS422 (Modbus/RTU Master or Slave)
	Number of Serial Port	2
	Baud Rate	1200 ~38400bps
Ethernet Interface	Type of Protocol	Modbus/TCP Master or Slave
	Number of Ethernet Interface	2
	Ethernet rate	10/100Mbps Adaptive
Interface Isolation		Yes
Single Backplane maximum data		8KByte
Weight		300g
Dimensions W×H×D (mm)		40×145×158

7.11 Software Programming

For more information on serial communication programming, please refer to “User Manual of NA-COM” and “User Manual of programming NA-COM”.

For more information on Profibus DP master modules, please refer to “User Manual of NA400 Profibus DP Master Communication Module”.

For more information on Profibus DP slave modules, please refer to “User Manual of NA400 Profibus DP Slave Communication Module”.

For more information on CANOpen master modules, please refer to “User Manual of NA400 CANOpen Master Communication Module”.

8 NA400 System Configuration

☐ Synopsis

NA400 intelligent programmable controller provides flexible system configuration, in which I/O module includes local I/O and remote I/O. Because different types of NA400 PLC modules can be fixed in any position of the backplane, flexibility of system configuration is greatly improved. To build a NA400 system, CPU module, I/O modules, backplane, wiring cable and relay accessories need to be selected. This chapter will introduce how to choose them.

☐ Content

Section	Content
8.1	Calculate I/O points, and choose I/O modules
8.2	Make out system solutions and choose CPU
8.3	Choose backplane and accessories
8.4	Configuration Case Study

8.1 How to choose I/O modules

Before system configuration, you may calculate the number of I/O points according to the practical application at first. Final number of I/O points is the number you calculated multiplied by 1.1-1.2. This may facilitate expansion.

Table 1 I/O type (Choose according to the number of points and types of modules)

Type	Order NO	Specifications	Remarks
Digital input module	400DIM4011601	DI16×DC24V	Sink
	400DIM4011602	DI16×DC24V	Source

	400DIM4013201	DI32×DC24V	Sink
	400DIM4013211	DI16×DC24V&DI16×DC48V	Sink
	400DIM4013202	DI32×DC24V	Source
Digital output module	400DOM4011601	DO16×DC24V×Transistor	Source
	400DOM4011602	DO16×Relay	NO
	400DOM4013201	DO32×DC24V×Transistor	Source
SOE module	400IIM4011601	IIM16×DC24V	Sink
	400IIM4011612	IIM16×DC24V	Source
	400IIM4013201	IIM32×DC24V	Sink
Analog input module	400AIM4010801	AI8×current×Single-ended input	
	400AIM4011601	AI16×current×Single-ended input	
	400AIM4011611	AI16×current×Single-ended input	
	400AIM4010802	AI8×current/voltage×Single-ended input	
	400AIM4010803	AI8×voltage×Single-ended input	
	400AIM4011603	AI16×voltage×Single-ended input	
	400AIM4011613	AI16×voltage×Single-ended input	
	400AIM4010404	AI4×voltage×Differential input	
	400AIM4010804	AI8×voltage×Differential input	
	400AIM4010805	AI8×RTD	
	400AIM4010806	AI8×Thermocouple	
Analog output module	400AOM4010401	AO4×current 4~20mA	
	400AOM4010411	AO4×current 0.2~22mA	
	400AOM4010402	AO4×current/voltage	
	400AOM4010802	AO8×current/voltage	

8.2 How to choose CPU

The system integration solution must be taken into consideration when making the choice of CPU. Questions will be clarified in this integration solution, whether PLC will communicate with external devices and how, whether the communication requires monitor and whether single CPU with single network or dual CPU with dual network will be used.

When choosing CPUs, the questions you must think about are shown as follows:

- Do you need NIC, single network or dual network?
- Single CPU system or Dual CPU system?
- Basic CPU or High Performance CPU?
- Memory size of CPU.
- Maximum I/O points of CPU.

Calculation of CPU's Memory size:

Memory size is the size of hardware memory unit in PLC, while program size is the size used in a memory unit to store user program. Therefore, program size is usually smaller than memory size. Before the program is debugged, program size is unknown in the design phase. So we always use an estimated memory size instead of program size for choosing modules. Estimation of memory size has no settled formula. Many documents give different formula. In general, it can be estimated by the sum of 10 to 15 times of digital I / O points and 100 times of analog I / O points. The result can be regarded as a total number of words of memory size (16 bit/ word). And 25% margin should be considered based on the result.

Table 2 Types of CPU

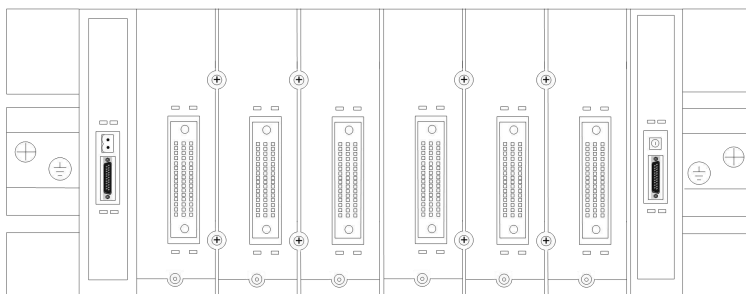
Type	Order No	Explanation
Low-grade CPU	400CPU4010101	Basic CPU,RS232×2, standard MODBUS, Memory size 256K
	400CPU4010102	Basic CPU,RS232×2, standard MODBUS, Memory size 512K
	400CPU4010103	Basic CPU,RS232×2, standard MODBUS, Memory size 1M
Mid-grade CPU	400CPU4010201	Normal CPU,RS232×2, standard MODBUS, 1 Ethernet interface(standard MODBUS/TCP), Memory size 1M
	400CPU4010202	Normal CPU,RS232×2, standard MODBUS, 1 Ethernet interface(standard MODBUS/TCP), Memory size 2M
	400CPU4010203	Normal CPU,RS232×2, standard MODBUS, 1 Ethernet interface(standard MODBUS/TCP), Memory size 4M
High-grade CPU	400CPU4010301	High Performance CPU, RS232×2, standard MODBUS, 1 Ethernet interface(standard MODBUS/TCP), Memory size 4M
	400CPU4010302	High Performance CPU, RS232×2, standard MODBUS, 1 Ethernet interface(standard MODBUS/TCP), Memory size 8M
	400CPU4010303	High Performance CPU,RS232×2, standard MODBUS, 1 Ethernet interface(standard MODBUS/TCP), Memory size 16M
Single CPU with dual network	400CPU4010401	High Performance CPU,RS232×2, standard MODBUS, 2 Ethernet interface(standard MODBUS/TCP), Memory size 32M
	400CPU4010402	BNC×1(IRIG B-IN (TTL)),NIC×2(standard MODBUS/TCP), program space 32M, for SOE with IRIG B
Redundant CPU	400CPU4010501	Redundant CPU, High Performance CPU, RS232×2(standard MODBUS), NIC×1(standard MODBUS/TCP), program space 32M
	400CPU4010701	Redundant CPU, High Performance

		CPU,2*RS232(MODBUS), 1*Ethernet(MODBUS/TCP), program space 32M
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8.3 How to choose backplane

8.3.1 Backplane type

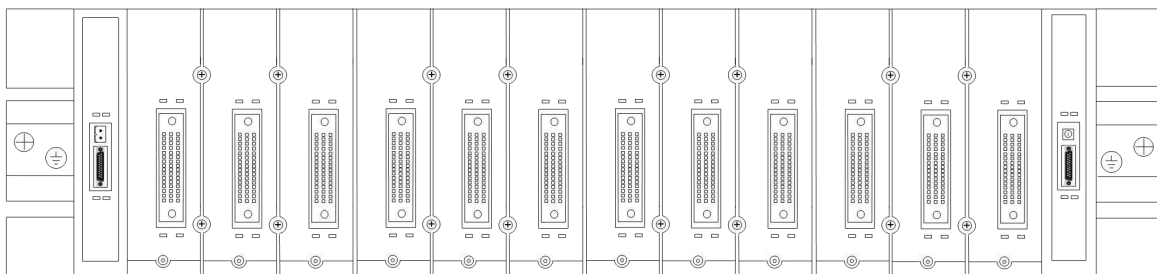
NA400 PLC backplane has four different types: six-slot, nine-slota and twelve-slot. The number of backplane should be chosen according to the number of I/O modules calculated.



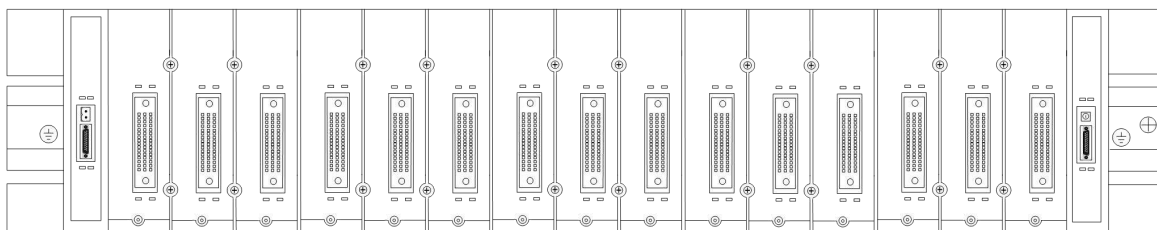
6-slot



9-slot



12-slot



15-slot

8.3.2 Main features of backplane

- **Configuration:** There must be a main backplane when we design a system. The backplane on which the CPU module is mounted is regarded as the main backplane. Expansion backplanes (15 at most) are needed when there are many modules. All backplanes are connected by bus expansion cable.
- **Slot:** A backplane offers 6 ~ 15 slots with standard width. Each module occupies one slot.
- **Backplane address:** There is a rotary switch on each backplane used to set its address as 0 ~ 15 .



- **Module address:** Module address is decided by the module's backplane address and slot number. The slot number of each backplane is 1 ~ 15 in turn from left to right. The formula of calculating module address is:

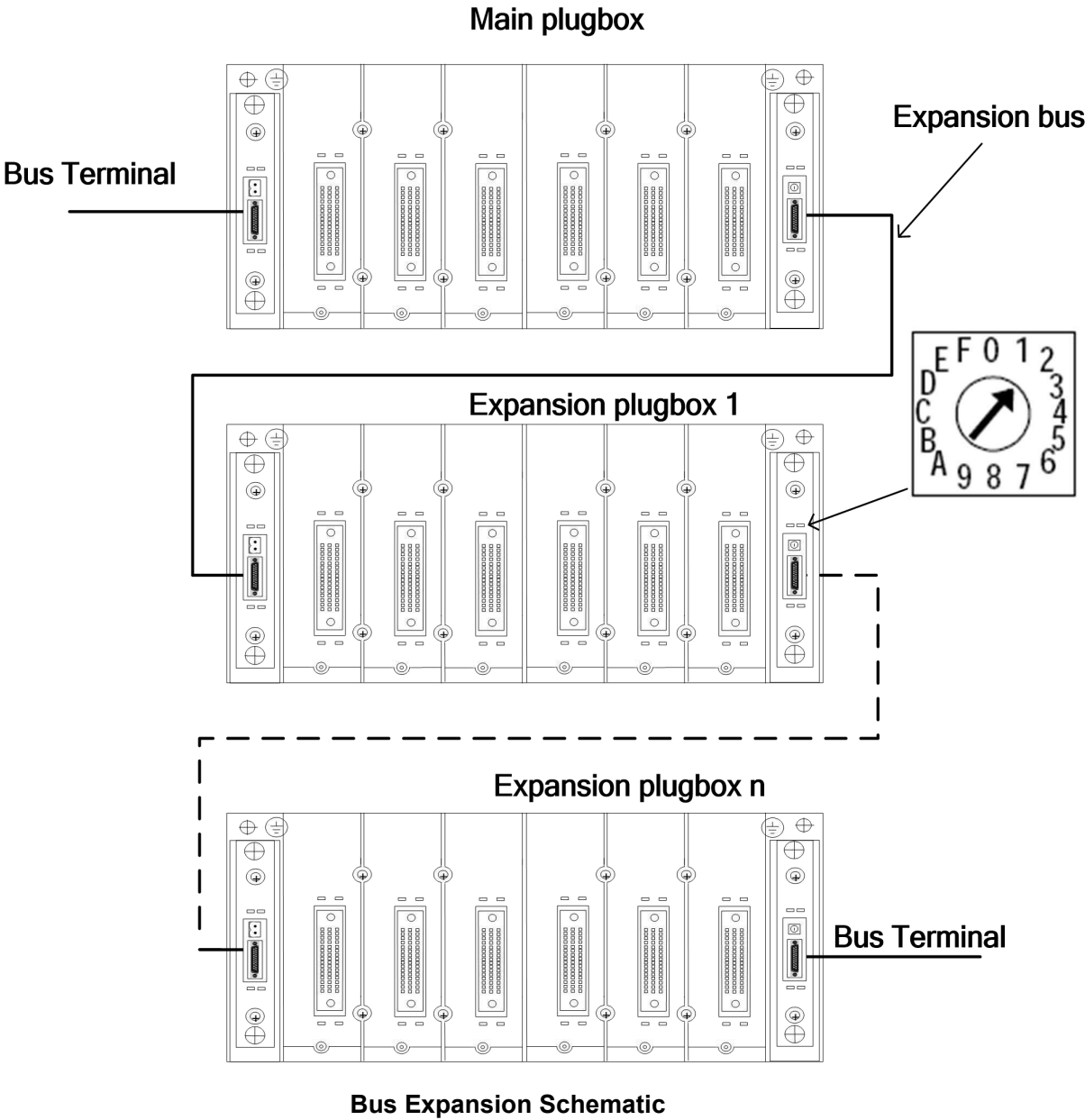
$$\text{Module address} = \text{Backplane address} \times 15 + \text{slot number}$$

8.3.3 Bus Expansion

In the multi-backplane(module backplane) system, a bus expansion cable is used to connect these backplanes. One side of the cable connects to the downward connector of bus interface in upper backplane, another side connects to upwards connector of bus interface in lower backplane, and the last expansion backplane only connect with the upper. The interface of the main backplane and the last expansion backplane that connects downward should be mounted with a bus terminal adapter.

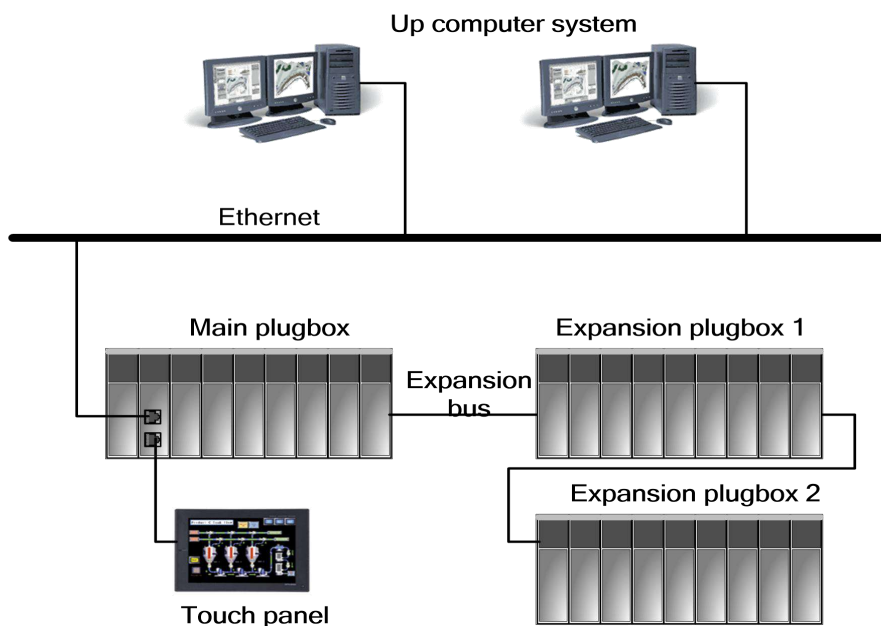
Table 3 Related Accessories:

Order No.	Accessories	Remarks
400BKM4010601	6-slot backplane	
400BKM4010901	9-slot backplane	
400BKM4011201	12-slot backplane	
400BKM4011501	15-slot backplane	
400CNL4010102	Bus Expanding Cable, 1m	
400CNL4010202	Bus Expanding Cable, 2m	
400CNL4010302	Bus Expanding Cable, 3m	Length of cable can be customized
400NUL4010101	Null module	One module occupies one slot
400BUS4010101	Bus terminal adapter	two for every system



8.4 Configuration examples as follows:

8.4.1 Single CPU configuration



Single CPU Configuration

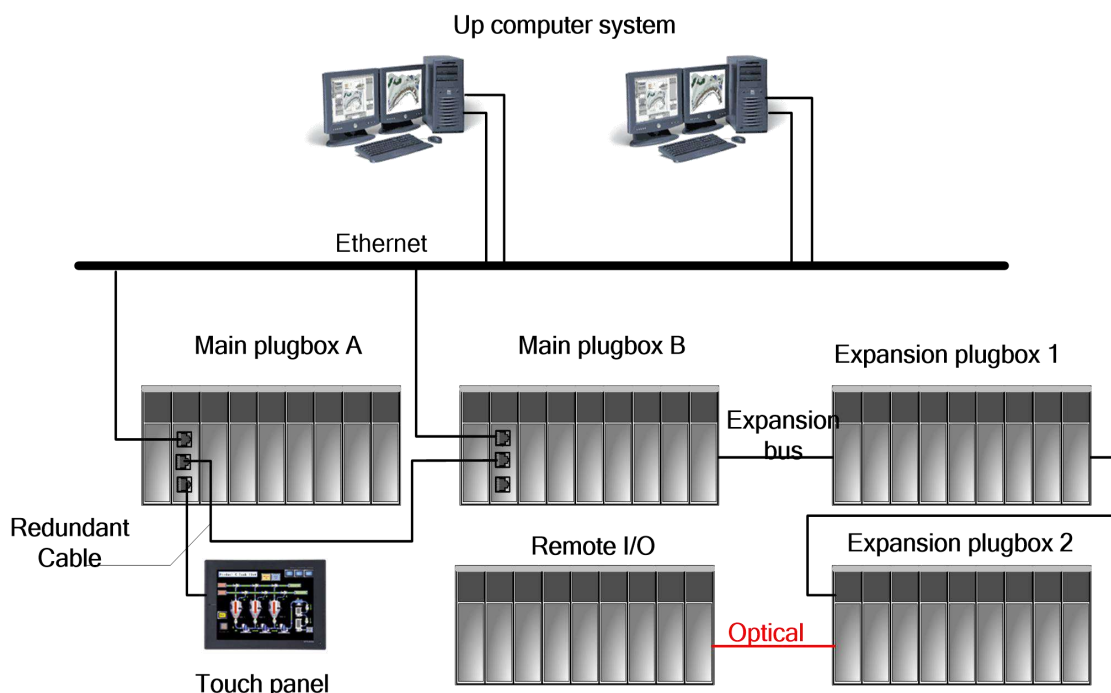
Single CPU Configuration Description:

- **Connection between plant control system and NA400 PLC:** Optical cables (or twisted-pair cables) are used to connect plant control computer with the Ethernet interface of CPU module in main backplane, so that the plant control system and NA400 PLC are connected through Ethernet, as shown in the above figures.
- **Backplanes Connection:** All backplanes are connected with each other by bus extension cable. One side of the cable connects to the downward connector of bus interface in upper backplane, another side connects to upwards connector of bus

interface in lower backplane as shown in the figure, and the last expansion backplane only connect with the upper. The interface of the main backplane and the last expansion backplane that connects downward should be mounted with a bus terminal adapter.

- **Connection with the touch panel:** Shielded cable will be used to connect the serial port on CPU and the serial port on the touch panel. Every CPU has two RS232 serial ports to communicate with multiple external devices.

8.4.2 Dual CPU Configuration



Option 1 of Dual CPU

- **The connection between PC System and NA400 PLC:** Optical cable (or twisted-pair cable) is used to connect PC system with the Ethernet interface of CPU module in main backplane, so that so that the PC system and NA400 PLC are connected through

Ethernet, as shown in the above figures.

- **The connection of dual CPU module:** In Option 1, two redundant CPU modules are mounted respectively in main backplane A and main backplane B, and are connected through redundant interfaces with redundant cables. In Option 2, two redundant CPU modules are mounted in the same main backplane, and are connected through redundant interfaces with redundant cables, so that the dual-CPU redundant system comes into being, as shown in the above figure.
- **Backplanes Connection:** All backplanes are connected with each other by bus expansion cable. One side of the cable connects to the downward connector of bus interface in upper backplane , another side connects to upwards connector of bus interface in lower backplane as shown in the figure, and the last expansion backplane only connect with the upper. The interface of the main backplane and the last expansion backplane that connects downward should be mounted with a bus terminal adapter.
- **Connection between backplane and remote I/O or other intelligent devices:** Optical cable is used to connect backplanes with remote I/O and intelligent devices. Fiber optic converters are used at both sides' interfaces, as shown with the red line in the above drawing.
- **Connection with the touch panel:** Shielded cable will be used to connect the serial port on CPU and the serial port on the touch panel. Every CPU has two RS232 serial ports to communicate with multiple external devices.

9. General Development Description of SOE connect

9.1 Module Name and Module Type

SOE connect line CNL401-GPS

9.2 Order Number

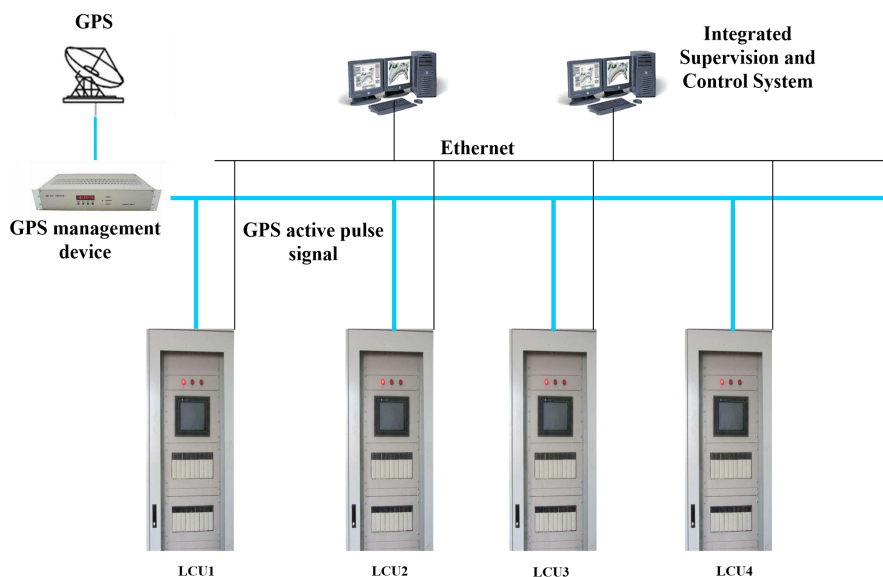
400CNL401GPS

9.3 Basic Features

Used for SOE.

9.4 Connect Introduction

9.1 NA400 PLC SOE system diagram



NA400PLC SOE system contains at least three parts: GPS management device,NA400 modules related of SOE,Host station.NA400 modules related of SOE system contains power supply module, CPU module, the SOE module and module backplane.

9.2 How to check SOE system clock

For users, NA400CPU's clock can be considered as the SOE system clock.

- 1、 Host station check NA400CPU's clock through ethernet.
- 2、 GPS management device send 1PPM signal to the NA400 backplane which has a CPU, and the CPU get the 1PPM signal to check SOE system clock.

9.3 GPS management device must have the following characteristics

GPS management device should have one 1PPM signal output .

Each NA400 backplane which has a CPU need connect one 1PPM signal independently.

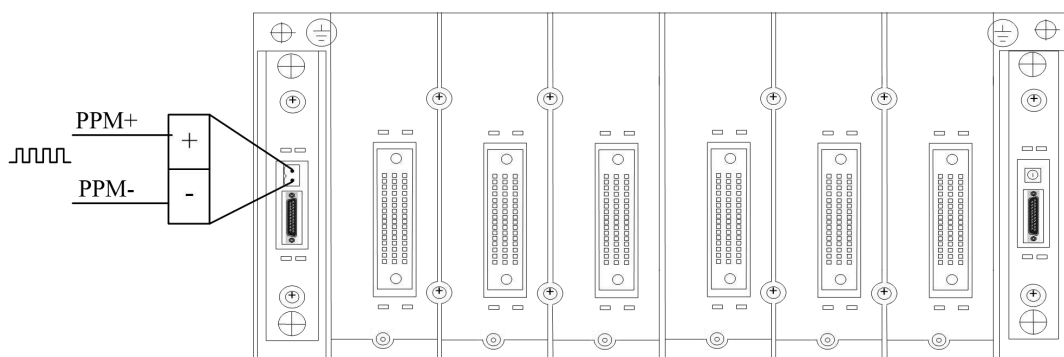
1PPM Signal type: active or passive (empty contacts)

1PPM Signal voltage: DC 24V (18V--30V)

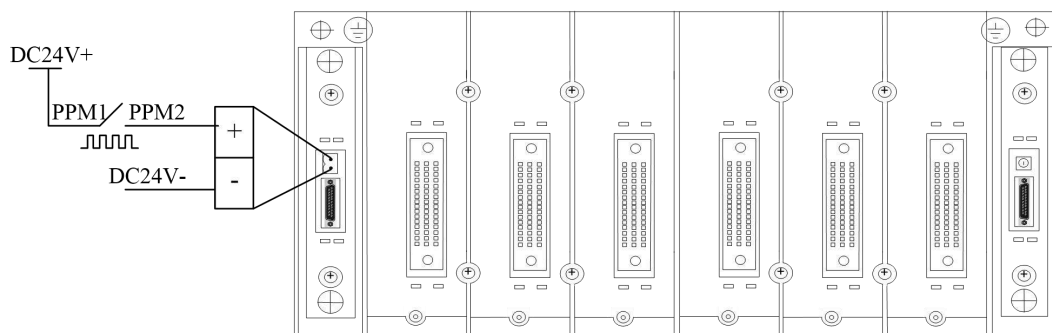
1PPM Signal current(when "1"):5mA--50mA

1PPM signal Pulse width :20ms-200ms

9.4 Schematic of GPS 1PPM Signal wiring



Active GPS signal (DC24V)



Passive GPS signal (DC24V)

9.5SOE connect line CNL401-GPS



Figure1. Outlook of line

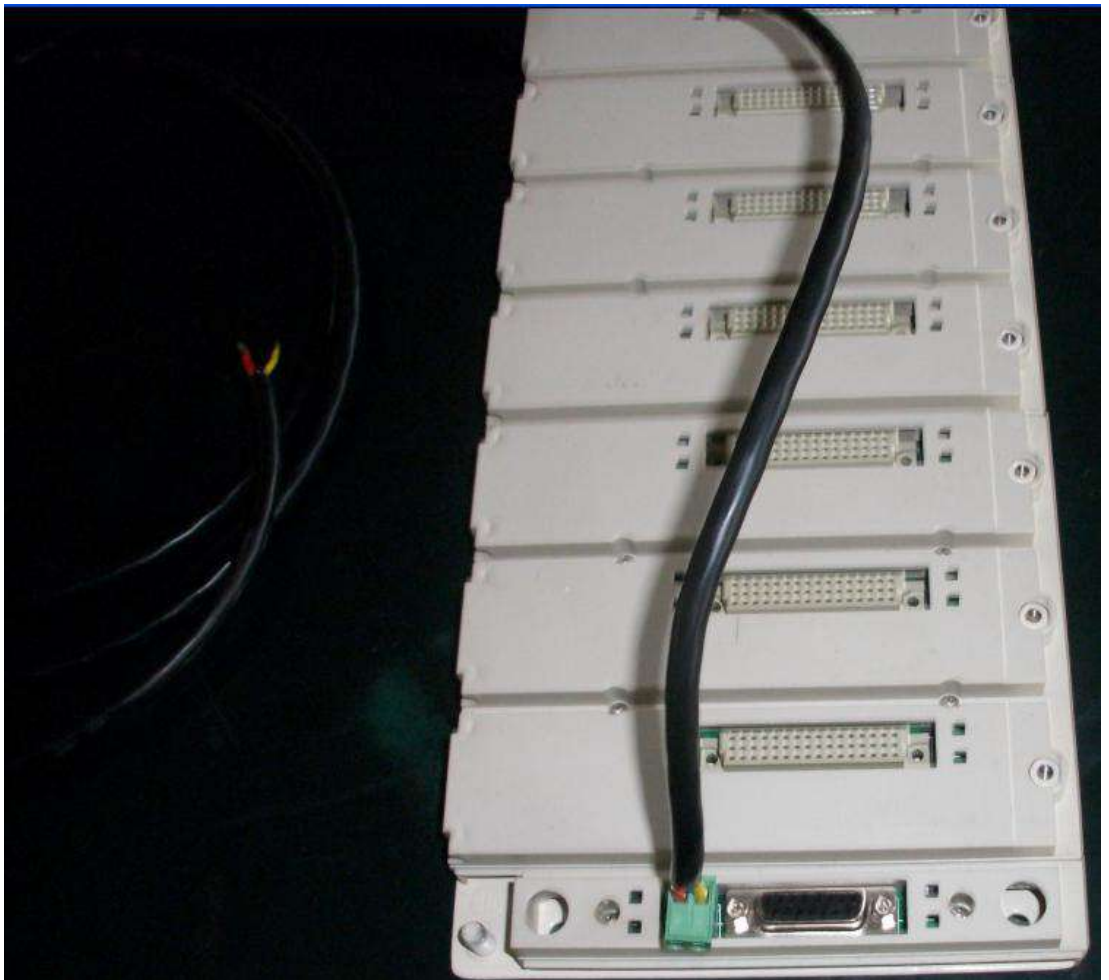


Figure2 How to connect to backplane

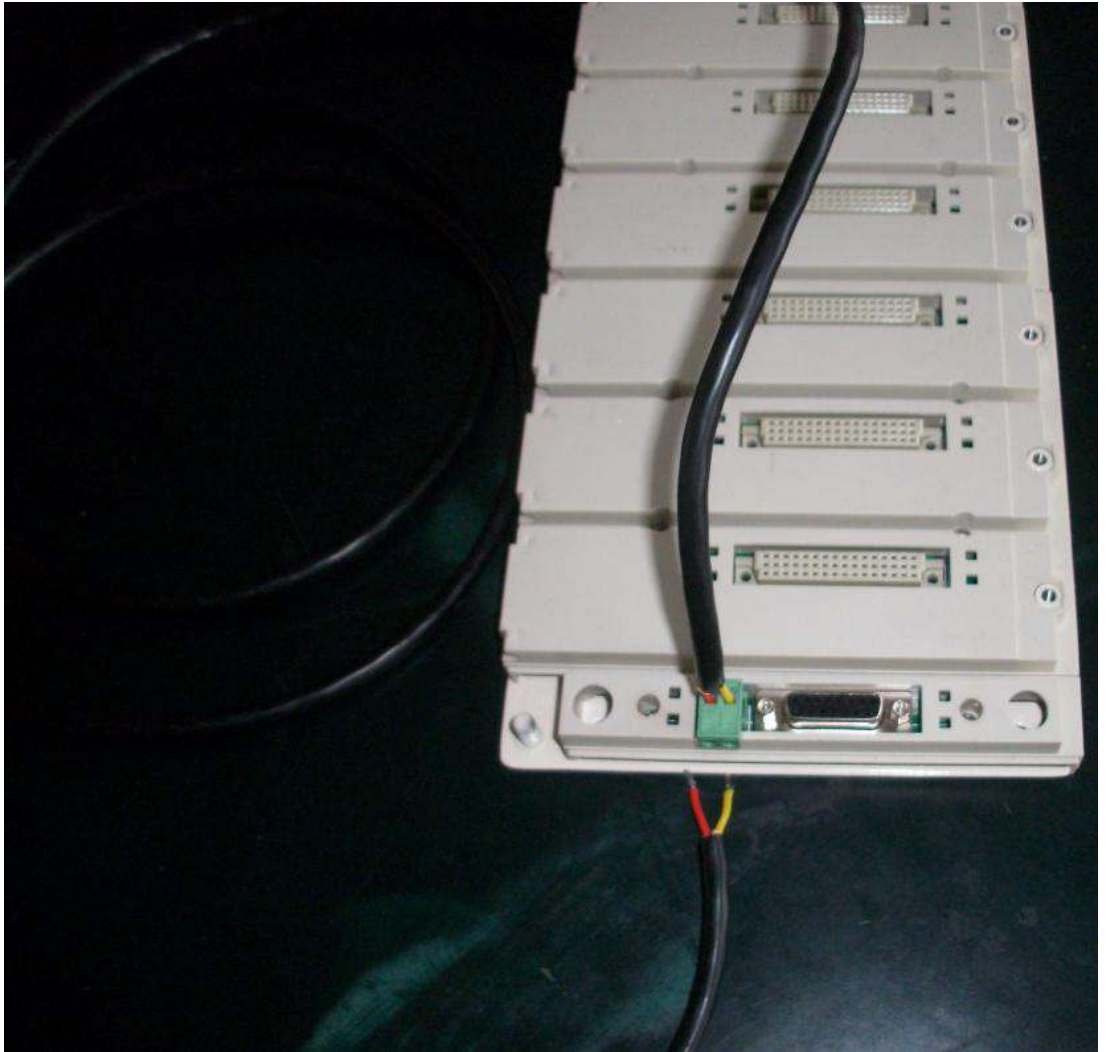


Figure3 Compare two ends of this line

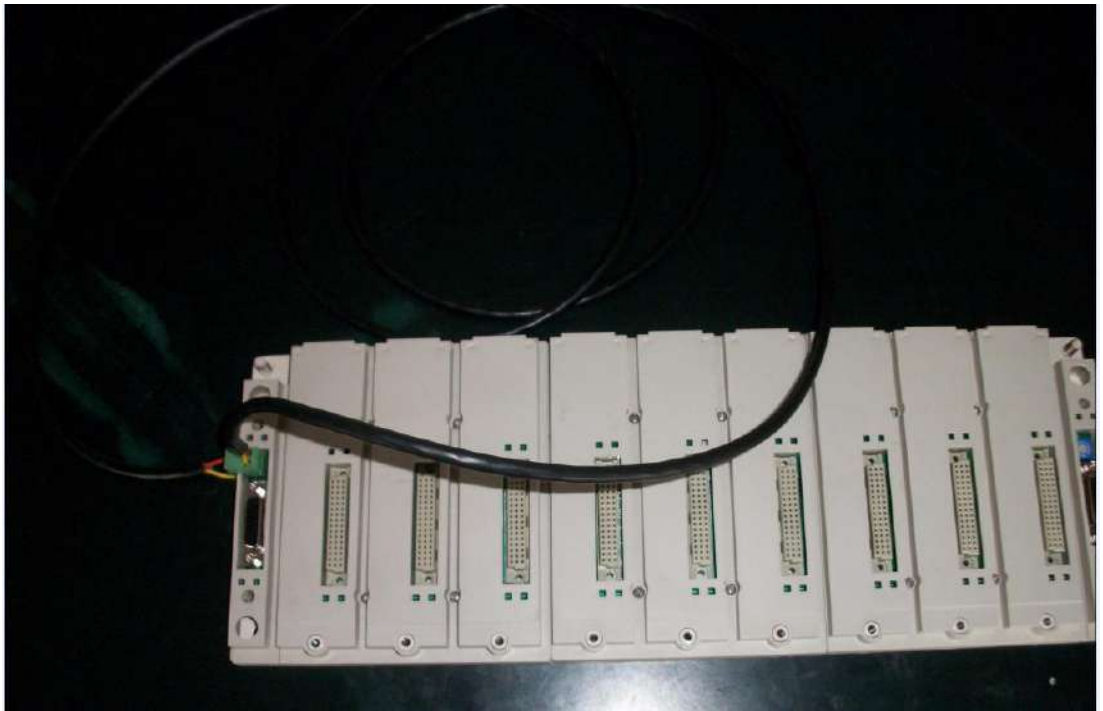


Figure4 Front look

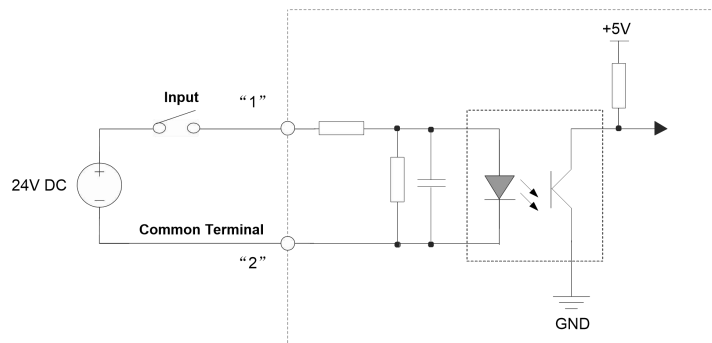


Figure5 Diagram of Interface

If you connect like Figure2 , the red line correspond to "1", the yellow line correspond to "2". "1" always connect the Sub-synchronous electric signal which output from GPS (DC "+"). "2" always connect common terminal (DC "-").

10 Hardware Mounting

□ Synopsis

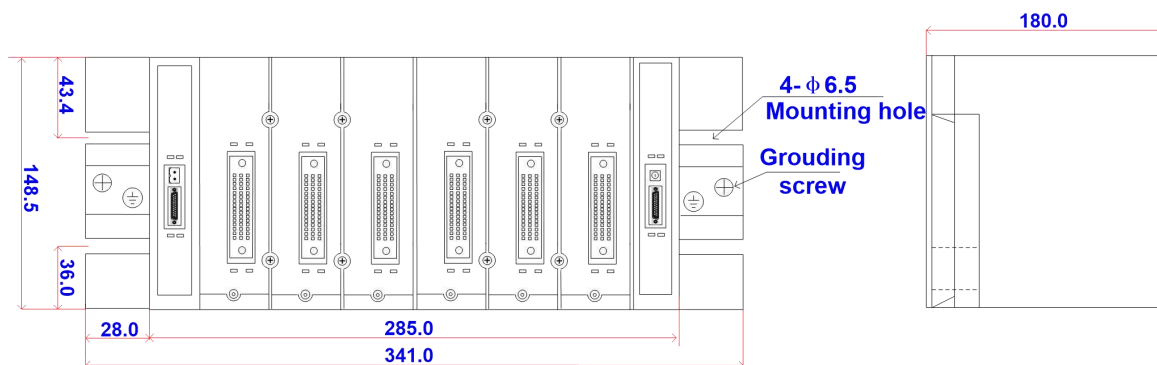
CPU module, power supply module and I/O module of NA400 PLC are always fixed to the backplanes, and the backplanes are fixed to the cabinets. This chapter introduces the installation size of holes and the right way to fix modules and backplanes.

□ Content

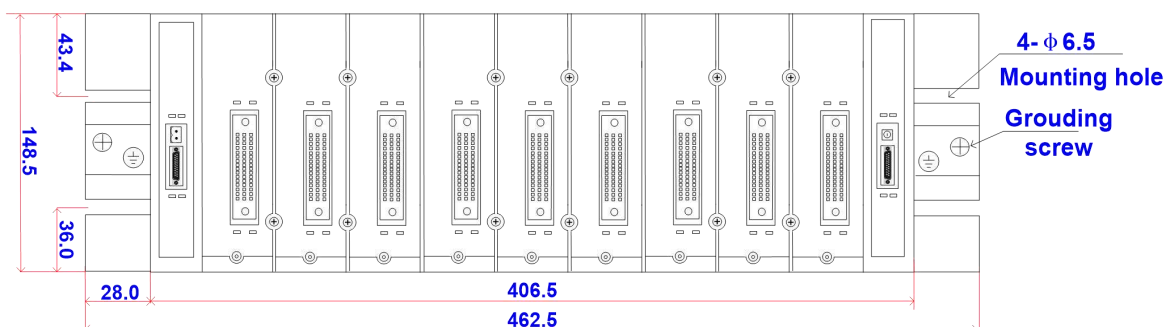
Section	Content
10.1	The Mounting of Module Backplane
10.2	The Mounting of Module

10.1 The Mounting of Module Backplane

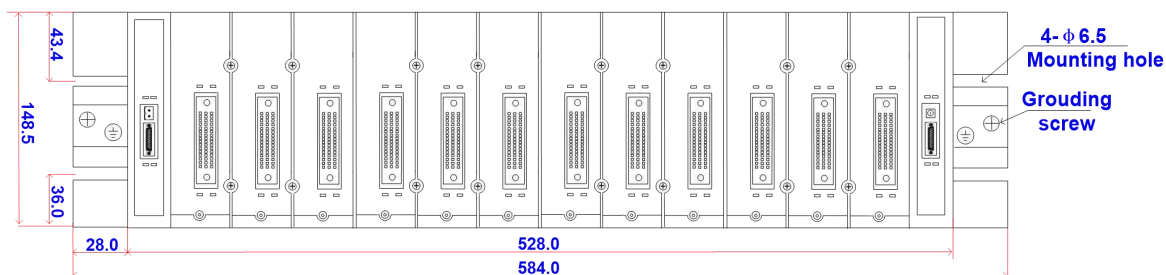
The module backplane can be mounted in a cabinet. The mounting holes on the backplane are used to fix the module backplane. The mounting size of 6-slot, 9-slot and 12-slot module backplanes are shown in the following figures (unit mm):



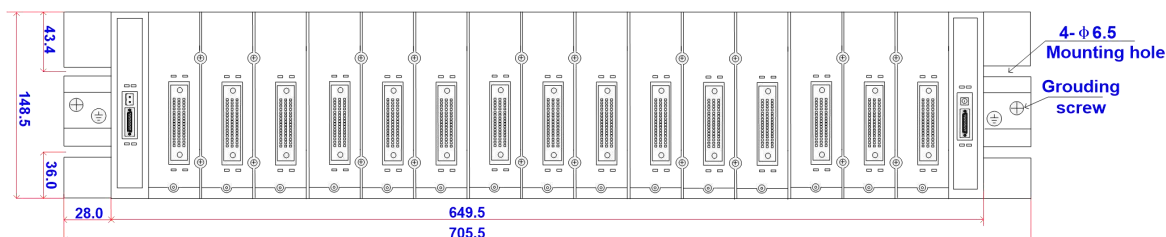
Hole dimension on 6-slot backplane



Hole dimension on 9-slot backplane



Hole dimension on 12-slot backplane



Hole dimension on 15-slot backplane

10.2 Mounting of the module

■ Mounting position of the module

NA400 intelligent PLC has no restrictions in the mounting slots for the different types of modules. Based on the real application requirements, users can set module type for each slot in the NAPro software. All modules, including power supply module and CPU module, can

be mounted in any slot position.

■ Confirmation of the module type

Before mounting, please ensure that the module type is the same with the slot module type in the database configuration.

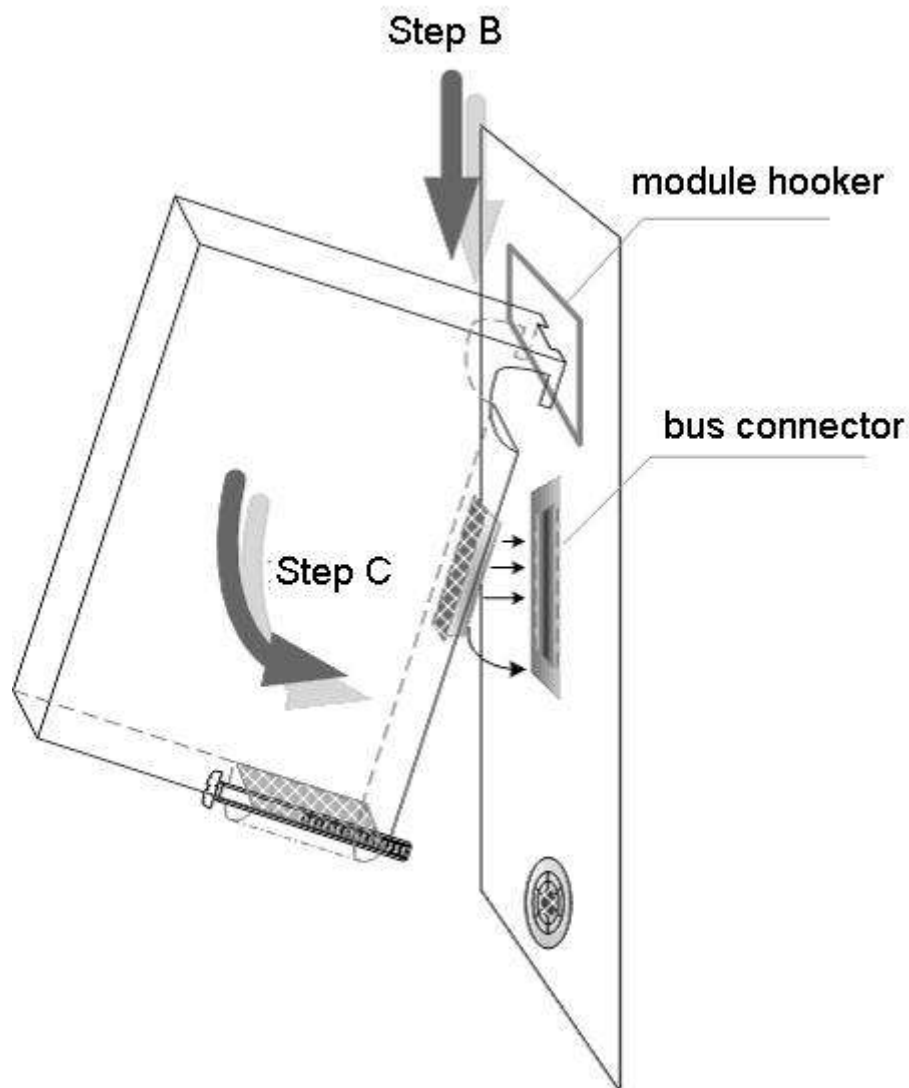
■ Mounting of Module

Step A:

Please place the module along the vertical direction of the backplane, and make sure that module hooks are plugged into mounting holes of the backplane. Please pay attention to make sure that both two module hooks have been plugged correctly into mounting holes of the backplane; otherwise it is possible to make damage to modules in the next mounting steps.

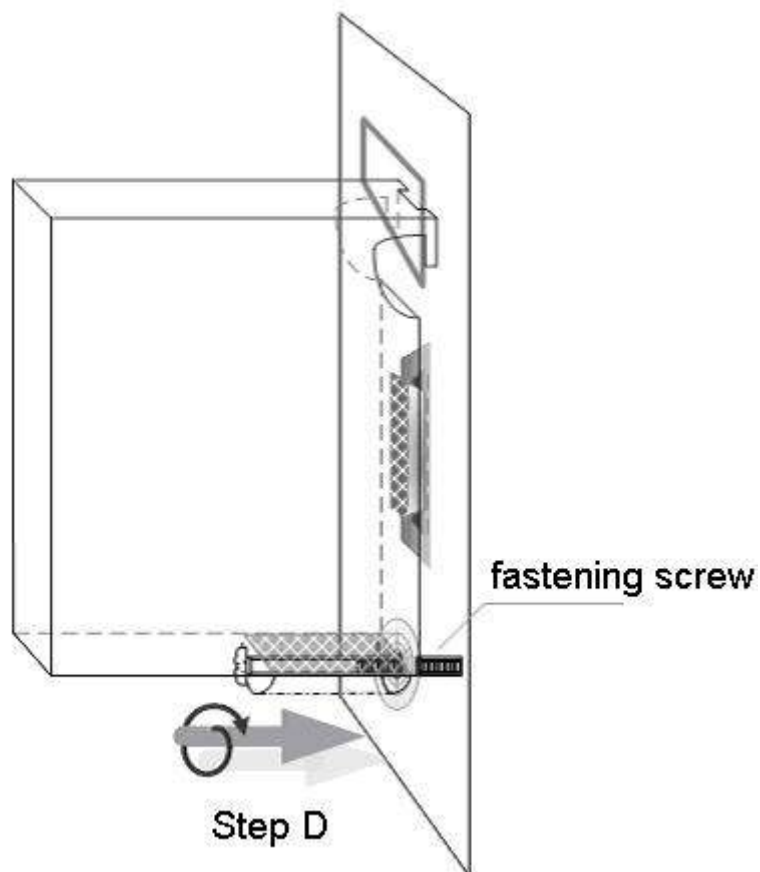
Step B:

Move down the module along the parallel direction of the module backplane. Make the module hooks go just right into the mounting holes of the module backplane. Please pay attention that the installation place must be in position. Move down the module hook until the inner edge of the module hook close to the down edge of the mounting holes.



Step C:

Push lightly along the direction as shown in the above figure, and the module can be inserted into the socket. If you feel strong resisting force, it shows that the mutual position of the plug and socket isn't correct. At this time, you should repeat above steps to adjust the position of the module. Please make sure not to use strong forces, otherwise it is possible to damage the module.



Step D:

Tighten the fastening screw.

11 Accessories

Related accessories of NA400 PLC that need to order separately are listed as below:

NA400 PLC Accessories	Description	Order no
6-slot backplane		BKM401-0601
9-slot backplane		BKM401-0901
12-slot backplane		BKM401-1201
15-slot backplane		BKM401-1501
Terminal Connector	Commonly used for all modules	CNE401-0101
Communication Expanding Cable, the length is 1.0m.	Used with communication module. Choose the length according to the practical application	CNL401-0101
Communication Expanding Cable, the length is 2.0m.		CNL401-0201
Communication Expanding Cable, the length is 3.0m.		CNL401-0301
Bus expansion cable, the length is 1.0m	Choose the length according to the practical application	CNL401-0102
Bus expansion cable, the length is 2.0m		CNL401-0202
Bus expansion cable, the length is 3.0m		CNL401-0302
Null module	The dimensions similar to DI,DO,AI modules	NUL401-0101
Bus terminal adapter	The head and tail backplane of every PLC require one respectively, total two adapters are needed.	BUS401-0101
Connector of PROFIBUS-DP Slave	Made in Germany	DP401-0104

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