IO modules

IO-C-0808N
IO-C-1600N
IO-C-2820N
IO-C-2012N

User manual

Version: Dv6

Document number:0000166493

Contents

User manual

IO modules

Contents

1. VERSION OVERVIEW

Version	Date	Release	**Editor**	**Description**
Av1	2019/8/13	N	dyj	1. Initial version; Application for a PLM document number;
Av2	2019/10/18	Y	dyj	Release
Bv1	2020/1/2	N	dyj	Revision
Bv2	2020/1/19	Y	dyj	Add communication protocol update template
Cv1	2020/2/19	N	dyj	Revision
Cv2	2020/2/19	N	dyj	Revision of error pin numbers
Cv3	2020/4/20	Y	dyj	Modification of product features, product code descriptions, port parameters, parameter configuration descriptions, fuse descriptions, addition of instruction sections
Dv1	2020/5/30	N	dyj	Revision
Dv2	2020/5/30	N	dyj	Modify CAN_P to CAN_H and CAN_N to CAN_L
Dv3	2020/7/15	N	dyj	Modify pin definition
Dv4	2020/12/2	N	dyj	Modify pin definition
Dv5	2020/12/14	N	dyj	Revised description of plug-in list
Dv6	2021/1/21	Y	dyj	Revision of fuse description

2. Safety instructions

2.1. Copyright

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2.2. Preface

This manual has been verified and reviewed for accuracy. The guidance and descriptions contained in this manual are accurate for the IO-C Series IO modules at the time of publication. However, subsequent IO-C Series IO modules and their manuals are subject to change without notice. Xuzhou Mook Electro-Hydraulic Control Co.,Ltd. assumes no liability for damages arising directly or indirectly from errors, omissions or discrepancies between the product and the manual.

2.3. Marking of notices

Icon	Meaning	Detailed instructions
	DANGEROUS	It can be predicted to cause unavoidable serious injury, death or property damage
	WARNING	May result in unavoidable serious injury, death or property damage
	NOTE	This may result in minor injuries and losses
	INSTRUCTION	Non-safety-related usage guidance and information
	ANNOTATION	Additional instructions or usage recommendations

3. Introduction

3.1. Overview

The IO-C series control modules are a series of simple and easy to use general purpose IO modules developed by Xuzhou Mook Electro-Hydraulic Control Co.,Ltd. They are used for matching controllers. The compact and easy-to-install design of the products makes them suitable for quick installation in control cabinets or at the job site. This reduces the number of controllers used and also reduces the complexity and cost of wiring the system to meet customer requirements.

The modules are made of cast aluminium housing, which is robust and reliable, with excellent thermal conductivity. They are protected to IP66/67 and are suitable for use in harsh industrial environments, and the CANOPEN parameters are easy to configure and reliable.

3.2. Product features

- cast aluminium casing + aluminium plate bottom case, the series of modules are uniform in style;

- input power supply with overvoltage clamp function, the product can work normally when overvoltage protection, UBS comes with the function of restoring fuse overcurrent protection;

- XC2000 platform core processor with 80MHz main frequency;

- 832KB program space, 16KB RAM;

- 2KB FRAM ferroelectric memory;

- No software programming required.

3.2.1. **IO-C-2820N**

- 2 x CAN2.0B, 50 Kbit/s ~ 1 Mbit/s;

- 6 x VI, 0 to 5 V analogue signal inputs, 10 bits, multiplexable as current-type analogue signal inputs and highly effective switching inputs;

- 4 x PI, 1 Hz ~ 15 kHz, multiplexable as high effective switching inputs;

- 4 x RI, 0 to 20 KΩ, 10 bits, multiplexable as voltage type analogue signal input, current type analogue signal input and high effective switching input;

- 6 x DI, high-side >4V / low-side <1V software settable;

- 14 × DO, 2A high-side output, multiplexable as a high-effective switching input;

- 8 × DO, 4A high-side output, multiplexable as a high-sense switching input;

- 6 × PWM, 2A output, 10-bit current feedback, constant current control, multiplexable as a high effective switching input;

- 1 × VERF 5V/100mA.

3.2.2. **IO-C-2012N**

- 2 x CAN2.0B, 50 Kbit/s ~ 1 Mbit/s;

- 10 x VI, 0 to 5 V analogue signal input, 10 bits, multiplexable as current type analogue signal input and high effective switching input;

- 2 x PI, 1 Hz to 15 kHz, multiplexable as high effective switching inputs, software configurable;

- 10 x DO, 2A high-side output, multiplexable as a high-effective switching input;

- 6 x DO, 4A high-side outputs, multiplexable as high effective switching inputs;

- 4 × PWM, 2A output, 10-bit current feedback, constant current control, multiplexable as a high effective switching input;

- 1 × VERF 5V/100mA.

3.2.3. **IO-C-1600N**

- 1 x CAN2.0B, 50 Kbit/s ~ 1 Mbit/s;

- 2 x DO, 2A high-side outputs, multiplexable as high active switch inputs;

- 12 × DOL, 2A low-edge outputs, multiplexable as low active switching inputs;

- 2 x PWM, 2A output, 10-bit current feedback, constant current control, multiplexable as high effective switching inputs.

3.2.4. **IO-C-0808N**

- 1 x CAN2.0B, 50 Kbit/s ~ 1 Mbit/s

- 2 x VI, 0 to 5 V analogue signal input, 10 bits, multiplexable as current type analogue signal input and high effective switching input;

- 2 x PI, 1 Hz to 15 kHz, multiplexable as high effective switching inputs, software configurable;

- 4 x DI, high active >4V / low active <1V software settable;

- 7 x DO, 2A high-side output, multiplexable as high-side switch input;

- 1×PWM, 2A output, 10-bit current feedback, constant current control, multiplexable as high active switch input;

- 1× VERF 5V/100mA.

3.3. Technical data

Technical Specification	IO-C-2820N	IO-C-2012N	IO-C-1600N	IO-C-0808N
Operating temperature	-40℃~+75℃	-40℃~+75℃	-40℃~+75℃	-40℃~+75℃
Storage temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Weight	1kg	1kg	1kg	1kg
Dimension	158.6mm × 111mm × 40.4mm	158.6mm × 111mm × 40.4mm	130.6mm × 86mm × 31.5mm	130.6mm × 86mm × 31.5mm
Protection class	IP66/67	IP66/67	IP66/67	IP66/67
Supply Voltage	8~36V DC	8~36V DC	8~36V DC	8~36V DC
Static current	<100mA@24V	<100mA@24V	<100mA@24V	<100mA@24V
Processor unit	16Bit 80MHz	16Bit 80MHz	16Bit 80MHz	16Bit 80MHz
Storage	82KB SDRAM /768KB FLASH	82KB SDRAM /768KB FLASH	82KB SDRAM /768KB FLASH	82KB SDRAM /768KB FLASH
Parameter space	2KB FRAM	2KB FRAM	2KB FRAM	2KB FRAM
CAN communication	2*CAN 2.0B, 50Kbits...1Mbit/s	2*CAN 2.0B, 50Kbits...1Mbit/s	1*CAN 2.0B, 50Kbits...1Mbit/s	1*CAN 2.0B, 50Kbits...1Mbit/s
Total output port	28	20	16	8
Total input port	20	12	0	8

Environmental testing	
Low temperature test	Implementation standard:GB/T2423.01/IEC60068-2-1
High temperature tests	Implementation standard:GB/T2423.02/IEC60068-2-2
Vibration resistance testing	Implementation standard:GB/T2423.10/IEC60068-2-6 GB/T 2423.56 / IEC60068-2-64
Shock testing	Implementation standard: GB/T2423.5/IEC60068-2-27
Drop test	Implementation standard:GB/T2423.8/IEC60068-2-32
Salt spray resistance test	Implementation standard:GB/T2423.17 / IEC60068-2-11

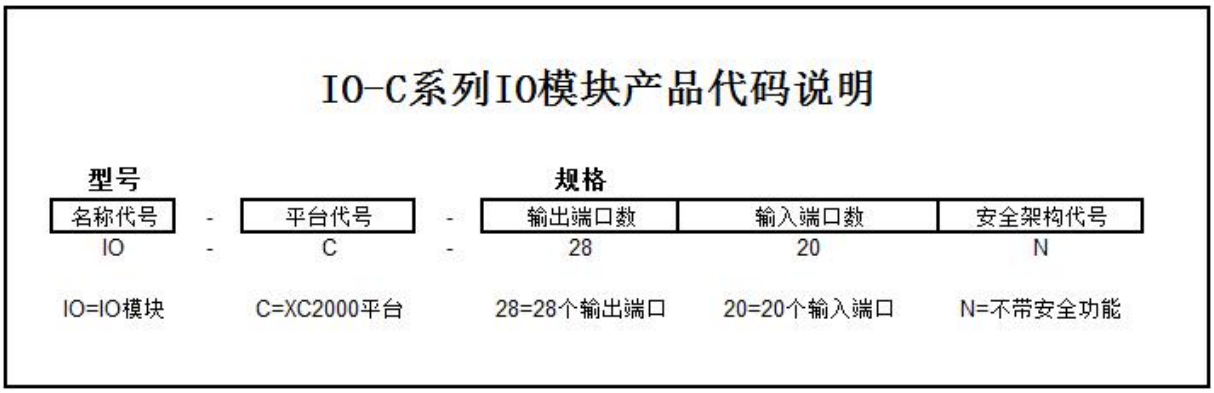
3.4. Order No.

No.	Order number	Model number	Type of connector
1	224521	IO-C-0808N	33pin
2	224522	IO-C-1600N	33pin
3	224613	IO-C-2820N	64pin
4	224614	IO-C-2012N	64pin

33pin

64pin

3.5. Product code description



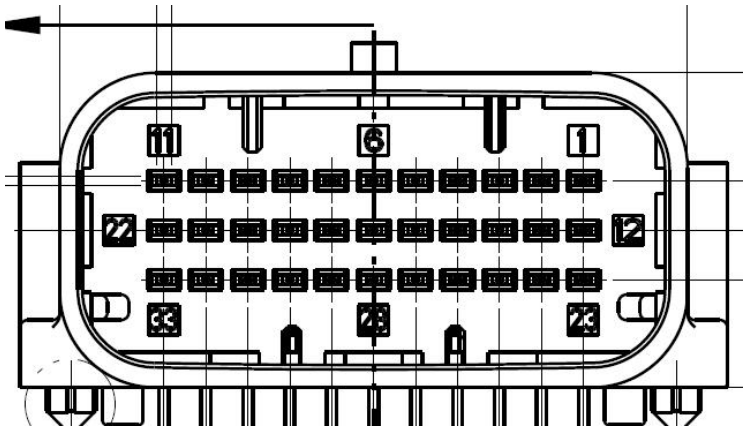
4. I/O Types

4.1. Electrical connections

No.	Connectors	Model	Application products
1	Connectors 33pin	AMP2209129	IO-C-0808N,IO-C-1600N
2	Connectors 64pin	AMP 1554458	IO-C-2820N,IO-C-2012N

4.2. Connector and Pins

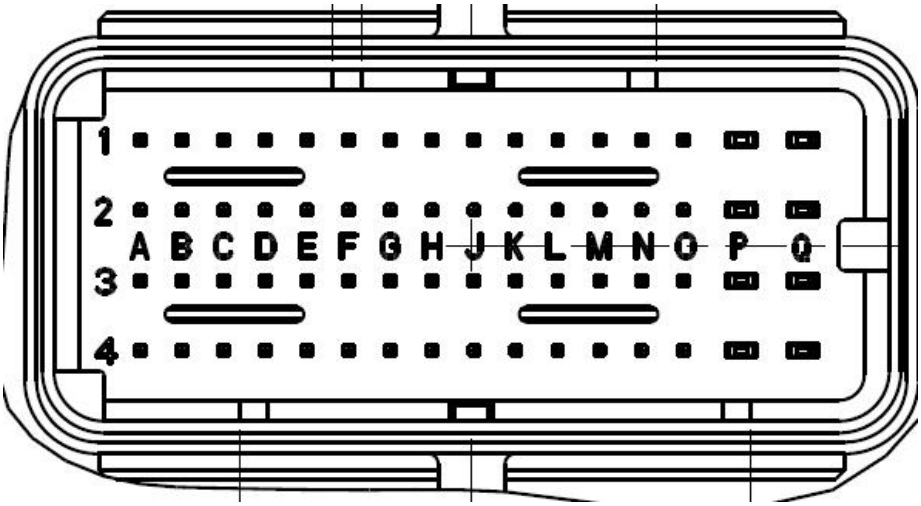
4.2.1. Connector (33pin)



IO-C-0808N			IO-C-1600N	
PIN	Port Function	Function	Port Function	Function
1	UBP	Power supply	UBP	Power supply
2	UBP	Power supply	UBP	Power supply
3	PWM1/DOH1/DIH1	PWM output	PWM1/DOH1/DIH1	PWM output
4	DOH2/DIH2	2A high-side switch output	PWM2/DOH2/DIH2	PWM output
5	DOH3/DIH3	2A high-side switch output	DOH3/DIH3	2A high-side switch output
6	DOH4/DIH4	2A high-side switch output	DOH4/DIH4	2A high-side switch output
7	DOH5/DIH5	2A high-side switch output	DOL1/DIL1	2A low-side switch output
8	DOH6/DIH6	2A high-side switch output	DOL2/DIL2	2A low-side switch output
9	DOH7/DIH7	2A high-side switch output	DOL3/DIL3	2A low-side switch output
10	DOH8/DIH8	2A high-side switch output	DOL4/DIL4	2A low-side switch output
11	-	-	DOL5/DIL5	2A low-side switch output
12	UBP	Power supply	UBP	Power supply
13	UBP	Power supply	UBP	Power supply
14	PI1/DIH9	Frequency input	-	-
15	PI2/DIH10	Frequency input	-	-
16	DIH11/DIL11	High effective switching inputs	DOL6/DIL6	2A low-side switching output

17	DIH12/DIL12	High effective switching inputs	DOL7/DIL7	2A low-side switching output
18	DIH13/DIL13	High effective switching inputs	DOL8/DIL8	2A low-side switching output
19	DIH14/DIL14	High effective switching inputs	DOL9/DIL9	2A low-side switching output
20	AI1/DIH15	AI_VI/CI Analogue input	DOL10/DIL10	2A low-side switching output
21	AI2/DIH16	AI_VI/CI Analogue input	DOL11/DIL11	2A low-side switching output
22	-	-	DOL12/DIL12	2A low-side switching output
23	GND	Ground	GND	Ground
24	GND	Ground	GND	Ground
25	CAN_H	CAN_H	CAN_H	CAN_H
26	CAN_L	CAN_L	CAN_L	CAN_L
27	+5V	Sensor power supplies	-	-
28	GND	Sensor ground	-	-
29	-	-	-	-
30	-	-	GND	Ground
31	-	-	GND	Ground
32	-	-	GND	Ground
33	-	-	GND	Ground

4.2.2. **Connector (64pin)**



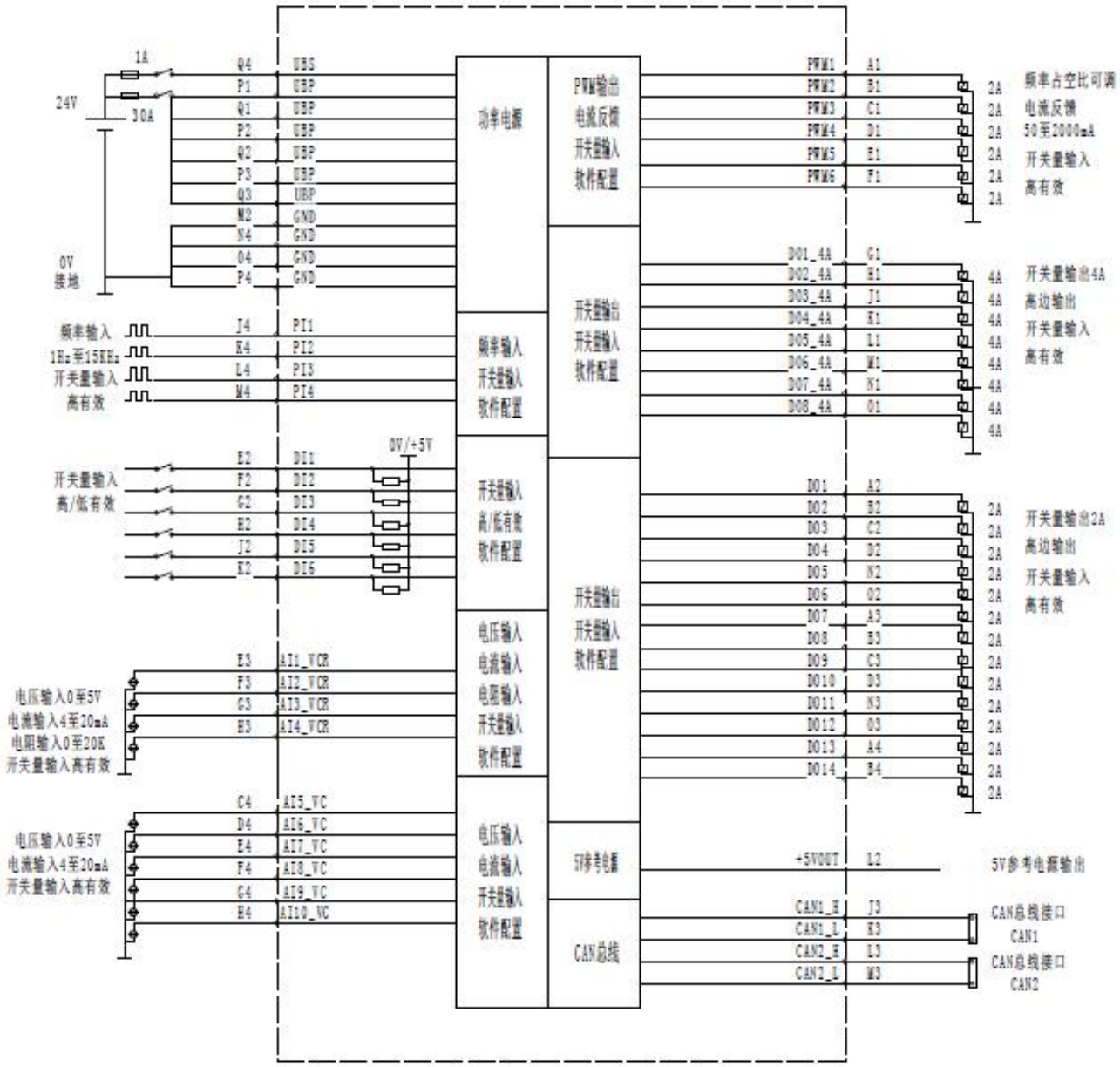
IO-C-2820N			IO-C-2012N	
PIN	**Port Function**	**Function**	**Port Function**	**Function**
A1	PWM1/DIH7 /DOH23	PWM output	-	-
B1	PWM2/DIH8 /DOH24	PWM output	-	-
C1	PWM3/DIH9 /DOH25	PWM output	PWM3/DIH9 /DOH25	PWM output
D1	PWM4/DIH10 /DOH26	PWM output	PWM4/DIH10 /DOH26	PWM output
E1	PWM5/DIH11 /DOH27	PWM output	PWM5/DIH11 /DOH27	PWM output

F1	PWM6/DIH12 /DOH28	PWM output	PWM6/DIH12 /DOH28	PWM output
G1	DOH15/DIH27	4A high-side switching output	DOH15/DIH27	4A high-side switching output
H1	DOH16/DIH28	4A high-side switching output	DOH16/DIH28	4A high-side switching output
J1	DOH17/DIH29	4A high-side switching output	DOH17/DIH29	4A high-side switching output
K1	DOH18/DIH30	4A high-side switching output	DOH18/DIH30	4A high-side switching output
L1	DOH19/DIH31	4A high-side switching output	DOH19/DIH31	4A high-side switching output
M1	DOH20/DIH32	4A high-side switching output	DOH20/DIH32	4A high-side switching output
N1	DOH21/DIH33	4A high-side switching output	DOH21/DIH33	4A high-side switch output port, used as 2A high-side switch output
O1	DOH22/DIH34	4A high-side switching output	DOH22/DIH34	4A high-side switch output port, used as 2A high-side switch output
P1	UBP	Power supply +24V	UBP	Power supply +24V
Q1	UBP	Power supply +24V	UBP	Power supply +24V
A2	DOH1/DIH13	2A high-side switching output	DOH1/DIH13	2A high-side switching output
B2	DOH2/DIH14	2A high-side switching output	DOH2/DIH14	2A high-side switching output
C2	DOH3/DIH15	2A high-side switching output	-	-
D2	DOH4/DIH16	2A high-side switching output	-	-
E2	DIH1/DIL1	High effective switching inputs	-	-
F2	DIH2/DIL2	High effective switching inputs	-	-
G2	DIH3/DIL3	High effective switching inputs	-	-
H2	DIH4/DIL4	High effective switching inputs	-	-
J2	DIH5/DIL5	High effective switching inputs	-	-
K2	DIH6/DIL6	High effective switching inputs	-	-
L2	+5VOUT	5V output	+5VOUT	5V output
M2	GND	Ground	GND	Ground
N2	DOH5/DIH17	2A high-side switching output	-	-
O2	DOH6/DIH18	2A high-side switching output	-	-
P2	UBP	Power supply +24V	UBP	Power supply +24V
Q2	UBP	Power supply +24V	UBP	Power supply +24V
A3	DOH7/DIH19	2A high-side switching output	DOH7/DIH19	2A high-side switching output
B3	DOH8/DIH20	2A high-side switching output	DOH8/DIH20	2A high-side switching output
C3	DOH9/DIH21	2A high-side switching output	DOH9/DIH21	2A high-side switching output
D3	DOH10/DIH22	2A high-side switching	DOH10/DIH22	2A high-side switching

		output		output
E3	AI1/DIH35	AI_CI/VI/RI analogue inputs	AI1/DIH35	AI_CI/VI analogue input
F3	AI2/DIH36	AI_CI/VI/RI analogue inputs	AI2/DIH36	AI_CI/VI analogue input
G3	AI3/DIH37	AI_CI/VI/RI analogue inputs	AI3/DIH37	AI_CI/VI analogue input
H3	AI4/DIH38	AI_CI/VI/RI analogue inputs	AI4/DIH38	AI_CI/VI analogue input
J3	CAN1_H	CAN1_H	CAN1_H	CAN1_H
K3	CAN1_L	CAN1_L	CAN1_L	CAN1_L
L3	CAN2_H	CAN2_H	CAN2_H	CAN2_H
M3	CAN2_L	CAN2_L	CAN2_L	CAN2_L
N3	DOH11/DIH23	2A high-side switching output	-	-
O3	DOH12/DIH24	2A high-side switching output	-	-
P3	UBP	Power supply +24V	UBP	Power supply +24V
Q3	UBP	Power supply +24V	UBP	Power supply +24V
A4	DOH13/DIH25	2A high-side switching output	DO13_2A	High-side switching output
B4	DOH14DIH26	2A high-side switching output	DO14_2A	High-side switching output
C4	AI5/DIH39	AI_VI/CI analogue input	AI5/DIH39	AI_VI/CI analogue input
D4	AI6/DIH40	AI_VI/CI analogue input	AI6/DIH40	AI_VI/CI analogue input
E4	AI7/DIH41	AI_VI/CI analogue input	AI7/DIH41	AI_VI/CI analogue input
F4	AI8/DIH42	AI_VI/CI analogue input	AI8/DIH42	AI_VI/CI analogue input
G4	AI9/DIH43	AI_VI/CI analogue input	AI9/DIH43	AI_VI/CI analogue input
H4	AI10/DIH44	AI_VI/CI analogue input	AI10/DIH44	AI_VI/CI analogue input
J4	PI1/DIH45	Frequency input	PI1/DIH45	Frequency input
K4	PI2/DIH46	Frequency input	PI2/DIH46	Frequency input
L4	PI3/DIH47	Frequency input	-	-
M4	PI4/DIH48	Frequency input	-	-
N4	GND	Ground	GND	Ground
O4	GND	Ground	GND	Ground
P4	GND	Ground	GND	Ground
Q4	UBS	System power supply +24V	UBS	System power supply +24V

4.3. Wiring schematic diagram

4.3.1. **IO-C-2820N**



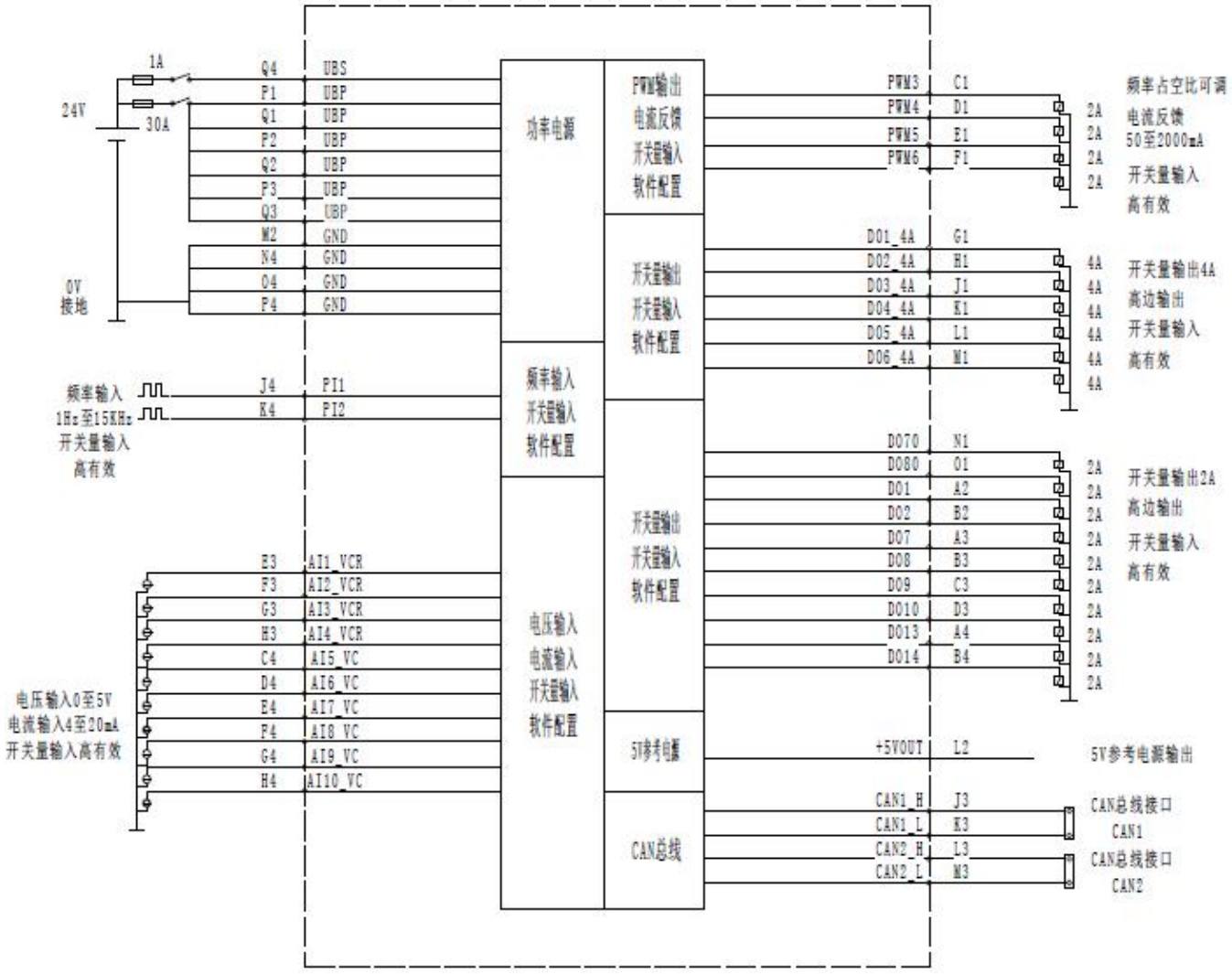
- Fuse selection instructions:

The rated output current of the IO module is 30A, a fuse less than or equal to 30A should be used. The fuse calculation formula is as follows

Fuse rated current = (number of PWM channels x actual PWM load current + number of 2A switching output channels x actual 2A switching load current + number of 4A switching output channels x actual 4A switching load current) x K. K is the selection factor, range: 1.5~2.5.

For example, if you choose 2-way 2A PWM with 2A load current, 4-way 2A switch output with 1A load current, 2-way 4A switch output with 2A load current, the recommended fuse rating is: (2×2+4×1+2×2)×2=24A. 24A is less than 30A, so it is recommended to use a fuse with 24A rated current.

4.3.2. **IO-C-2012N**



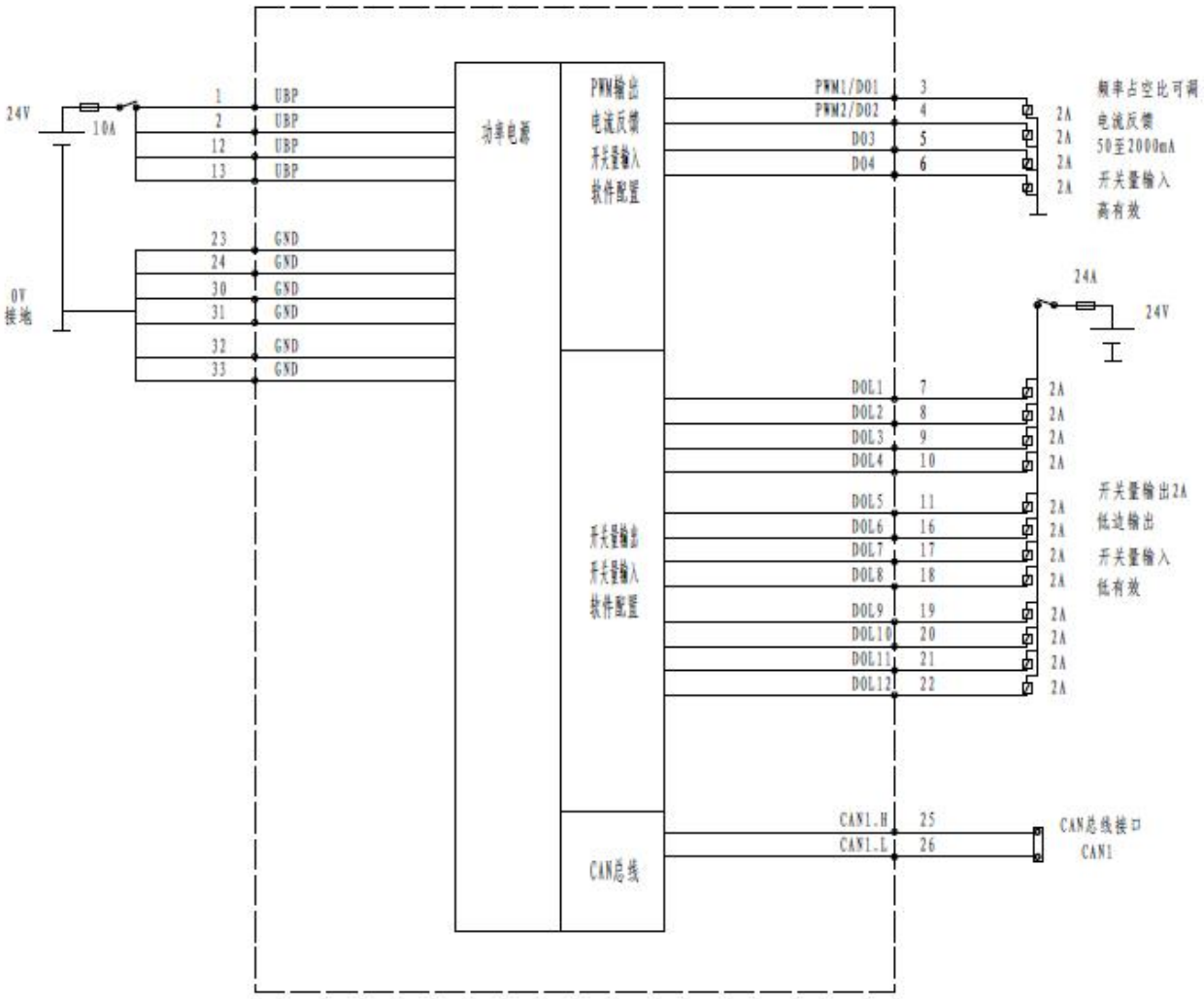
- Fuse selection instructions:

Please use the appropriate fuse for the specific port! The rated output current of the controller is 30A, a fuse less than or equal to 30A should be used. The fuse calculation formula is

Fuse rated current = (number of PWM channels x PWM actual load current + number of 2A switching output channels x 2A switching actual load current + number of 4A switching output channels x 4A switching actual load current) x K. K is the selection factor, range: 1.5~2.5.

For example, if you choose 2-way 2A PWM with 2A load current, 4-way 2A switch output with 1A load current, 2-way 4A switch output with 2A load current, the recommended fuse rating is: (2×2+4×1+2×2)×2=24A. 24A is less than 30A, so it is recommended to use a fuse with 24A rated current.

4.3.3. **IO-C-1600N**



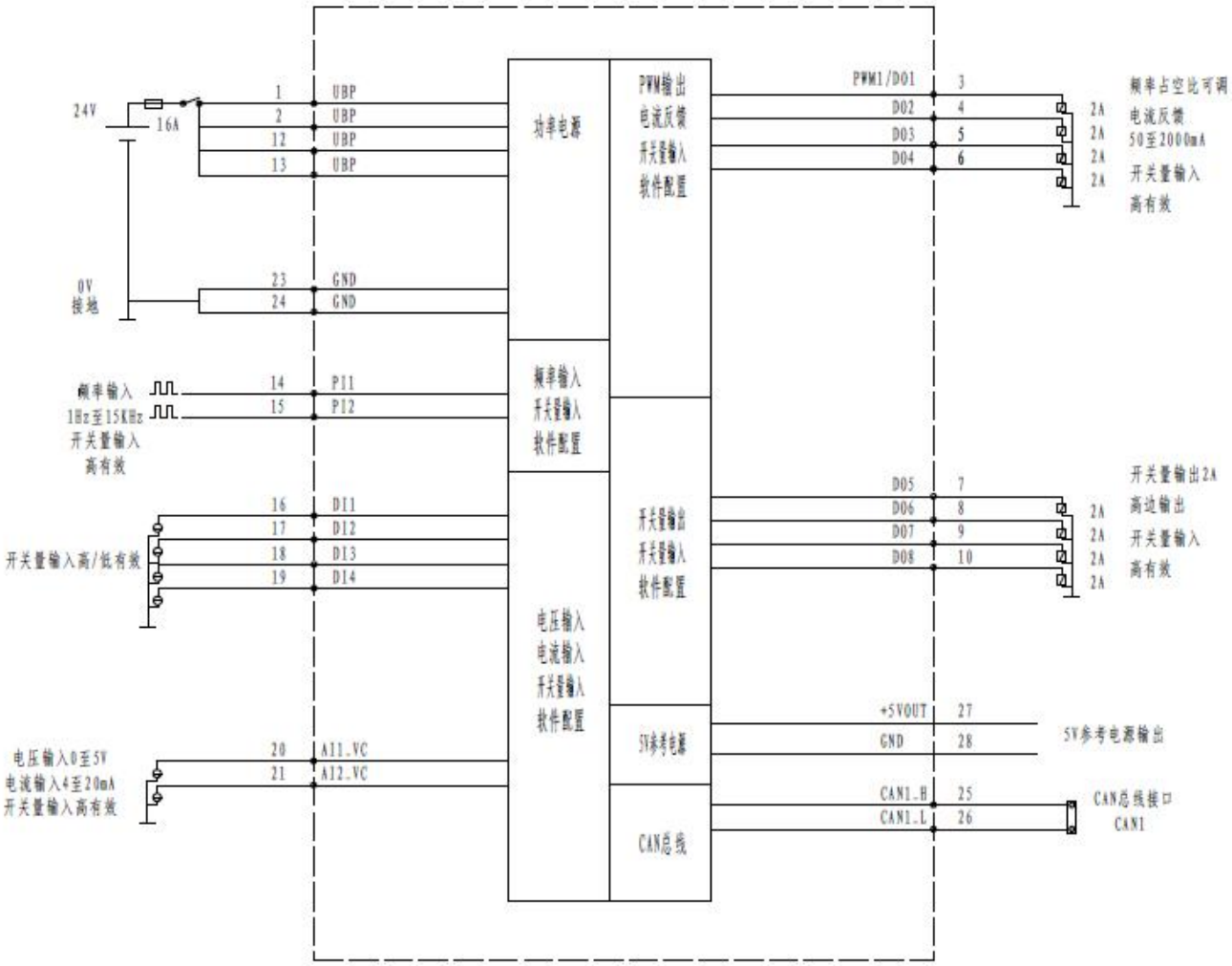
- Fuse selection instructions:

Please use the appropriate fuse for the specific port! The rated output current of the controller is 30A, a fuse less than or equal to 30A should be used. The fuse calculation formula is

Fuse rated current = (number of PWM channels x actual PWM load current + number of switching output channels x actual switching load current) x K. K is the selection factor, range: 1.5~2.5.

For example, if you choose 1 channel PWM with 2A load current and 4 channels switching output with 1A load current, the recommended fuse rating is: (1×2+4×1)×2=12A. 12A is less than 30A, so it is recommended to use a fuse with 12A rating.

4.3.4. **IO-C-0808N**



- Fuse selection instructions:

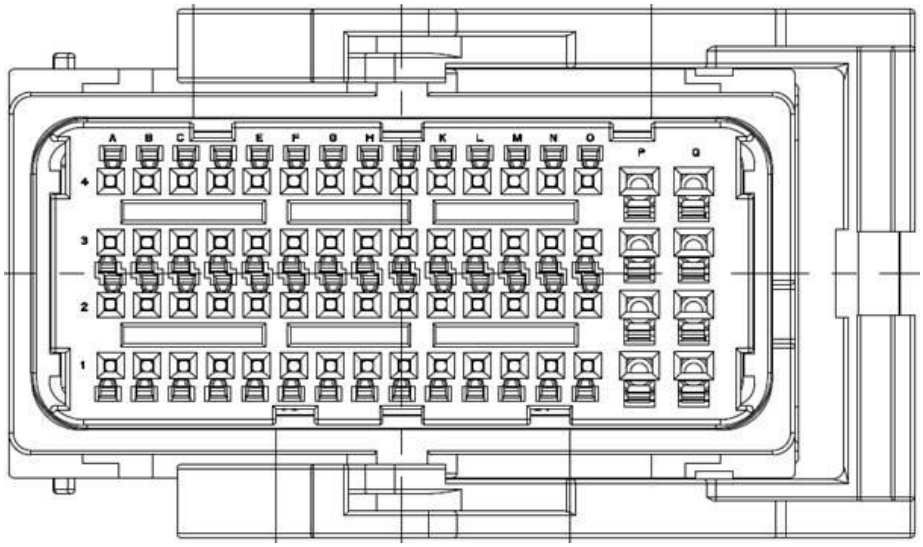
Please use the appropriate fuse for the specific port! The rated output current of the controller is 30A, a fuse less than or equal to 30A should be used. The fuse calculation formula is

Fuse rated current = (number of PWM channels x actual PWM load current + number of switching output channels x actual switching load current) x K. K is the selection factor, range: 1.5~2.5.

For example, if you choose 1 channel PWM with 2A load current and 4 channels switching output with 1A load current, the recommended fuse rating is: (1×2+4×1)×2=16A. 12A is less than 30A, so it is recommended to use a fuse with 12A rating.

4.4. To the list of plug-ins

4.4.1. Connector (64pin)



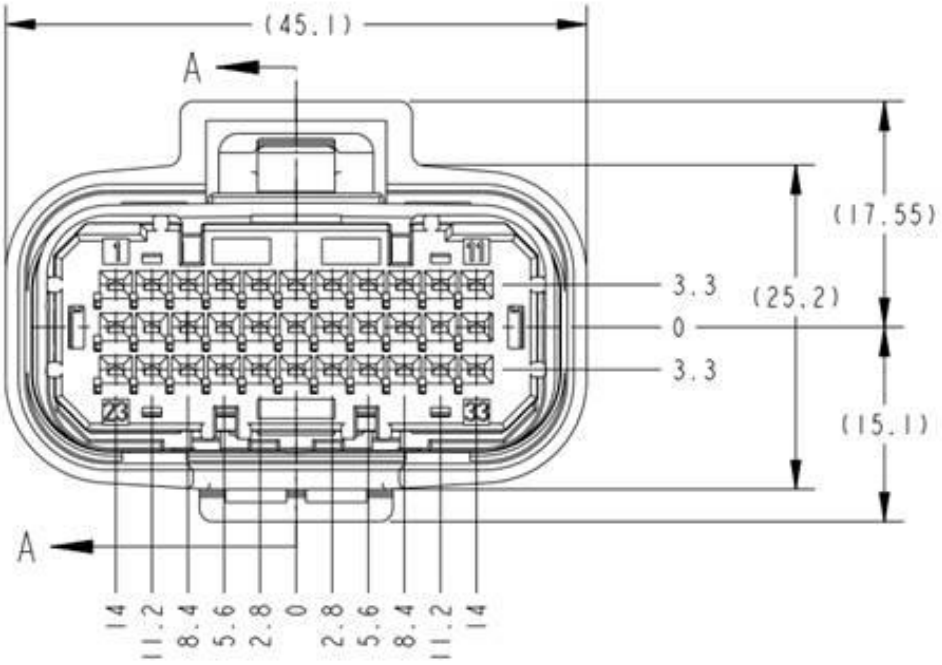
- IO-C-2820N Mating Connector:

No.	Name of related accessories	Material No.	Model	Amount	Notes
1	64-hole plug	508982	2050036-1	1	
2	Large Terminals	508983	638652-1	8	
3	Small terminals	508984	968221-1	56	
4	Large blind plug	508985	1670108-1	0	Up to 8, for use with large terminals
5	Small blind plug	508981	1394871-1	0	max. 56, for use with small terminals

- IO-C-2012N Mating Connector:

No.	Name of related accessories	Material No.	Model	Amount	Notes
1	64-hole plug	508982	2050036-1	1	
2	Large Terminals	508983	638652-1	8	
3	Small terminals	508984	968221-1	56	16 of these pins are not used
4	Large blind plug	508985	1670108-1	0	Up to 8, for use with large terminals
5	Small blind plug	508981	1394871-1	16	Up to 56, for use with small terminals

4.4.2. **Connector (33 pin)**



➢ IO-C-0808N Mating Connector:

No.	Name of related accessories	Material No.	Model	Amount	Notes
1	Thirty-three pole hole type plugs	508777	1554461-1	1	
2	Blind plug	508776	1981562-1	7	max. 33, for use with terminals
3	Hole terminal (large)	508778	1939351-1	6	max. 6, for use with blind plugs
4	Hole terminal (small)	508779	1554723-1	20	max. 27, for use with blind plugs

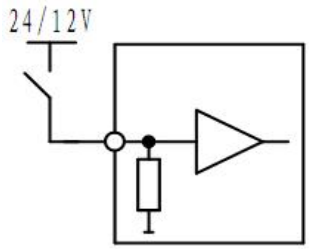
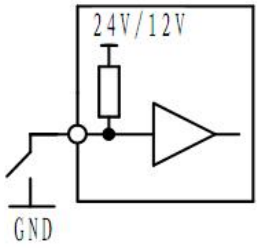
➢ IO-C-1600N Mating Connector:

No.	Name of related accessories	Material No.	Model	Amount	Notes
1	Thirty-three pole hole type plugs	508777	1554461-1	1	
2	Blind plug	508776	1981562-1	5	max. 33, for use with terminals
3	Hole terminal (large)	508778	1939351-1	6	max. 6, for use with blind plugs
4	Hole terminal (small)	508779	1554723-1	22	max. 27, for use with blind plugs

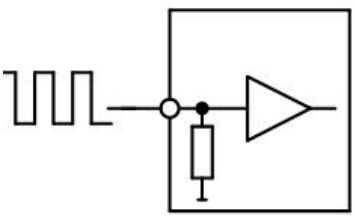
4.5. Specification of Inputs and Outputs

Port Name	Number of ports			
	IO-C-0808N	IO-C-1600N	IO-C-2820N	IO-C-2012N
DIH/DIL	4	-	6	-
PI/DIH	2	-	4	2
CI/VI/RI/DIH	-	-	4	-
VI/CI/DIH	2	-	6	10
PWM/DIH/DOH	1	2	6	4
DOH/DIH（2A）	7	2	14	10
DOH/DIH（4A）	-	-	8	6
DOL/DIL	-	12	-	-

4.5.1. DI

DIH/DIL	Functional description
Diagram	 
Signal type	Default is DIH, can be reused as DIL
Maximum input voltage	36 V
Threshold voltage	Min high logic level > 4 V judged high Max. low logic level <1 V judged as low
Input Internal Resistance	IO-C-2820N,IO-C-2012N:6.8kΩ; IO-C-1600N,IO-C-0808N:88kΩ
Port Diagnostics	Only the IO-C-0808N IO module supports this port diagnostic: Short to power Short-circuit to ground

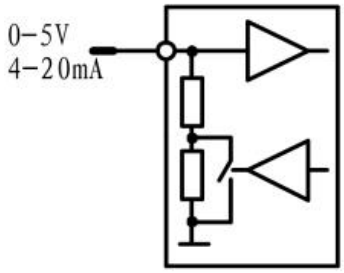
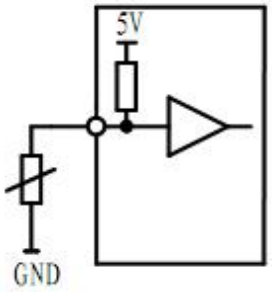
4.5.2. PI

PI/DIH	Functional description
Diagram	
Signal type	Default is PI, can be reused as DIH
Maximum input voltage	36 V
Threshold voltage	0~3V, software settable, default 0.5V; multiplexed as DIH, higher than 4V judged as high
Input internal resistance	IO-C-2820N,IO-C-2012N:6.8kΩ; IO-C-1600N,IO-C-0808N:68kΩ

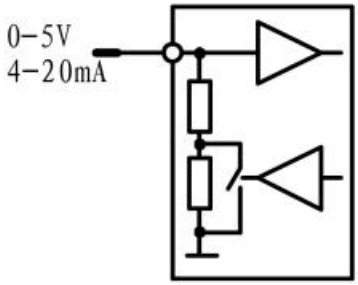
Input frequency	1Hz~15kHz

4.5.3. AI

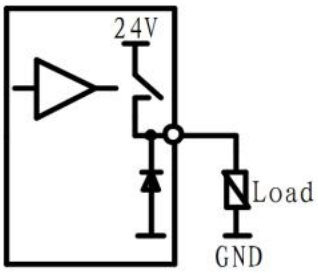
- CI/VI/RI/DIH:

CI/VI/RI/DIH	Functional description		
Diagram			
Signal type	Default is CI, can be reused as VI or RI or DIH		
Input Range	Current type: 4~20mA	Voltage type: 0~5V	Resistance type: 0~20kΩ
Input impedance	200Ω	100kΩ	100kΩ
Maximum Input Voltage	36 V		
Threshold voltage	Multiplexed to DIH, judged high above 4V		
Resolution	10bit		
Port Diagnostics	Short circuit to earth		

- VI/CI/DIH:

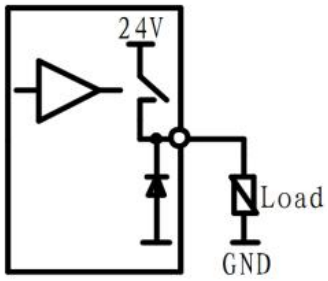
VI/CI/DIH	Functional description	
Diagram		
Signal type	Default is VI, can be reused as CI or DIH	
Input Range	Current type: 4~20mA	Voltage type: 0~5V
Input Impedance	200Ω	IO-C-0808N:68kΩ IO-C-2012N and IO-C-2820N:100kΩ
Threshold voltage	Multiplexed to DIH, judged high above 4V	
Maximum Input Voltage	36V	
Resolution	10bit	
Port Diagnostics	Short circuit to earth	

4.5.4. **PWM**

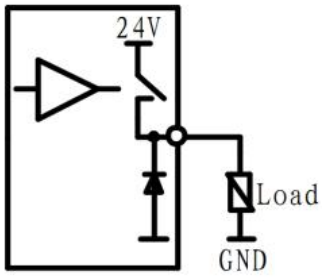
PWM/DIH/DOH	Functional description
Diagram	
Signal type	Default is PWM, can be multiplexed to DIH or DOH
Drive capability	2A@24V
Duty cycle	0…100%
Current feedback range	50~2000mA
Current sampling accuracy	10bit
Frequency range	4~1kHz
Port diagnostics	The following diagnostic functions are implemented when configured as output ports: Short-circuit to power supply; Short circuit to ground (resistance to ground < 6 Ω); Load overrun; Disconnection (current <10mA)

4.5.5. **DO**

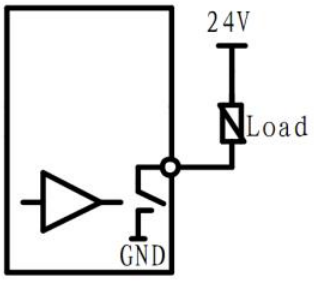
- DOH/DIH（2A）:

DOH/DIH	Functional description
Diagram	
Signal type	Default is DOH, can be reused as DIH
Switching voltage	UBP
Maximum current	2A@24V
Continuity Diode	Available
Port Diagnostics	The following diagnostic functions are implemented when configured as an output port: Short circuit to ground with port short circuit protection, including direct and gradual short circuits; disconnection of wires

- DOH/DIH（4A）：

DOH/DIH	Functional description
Diagram	
Signal type	Default is DOH, can be reused as DIH
Switching voltage	UBP
Maximum current	4A@24V
Continuity Diode	Available
Port Diagnostics	The following diagnostic functions are implemented when configured as an output port: Short-circuit to ground with port short-circuit protection, including direct disconnection and gradual short-circuit; disconnection of wires

- DOL/DIL:

DOL/DIL	Functional description
Diagram	
Signal type	Default is DOL, can be reused as DIL
Maximum current	2A@24V
Continuity diode	Available

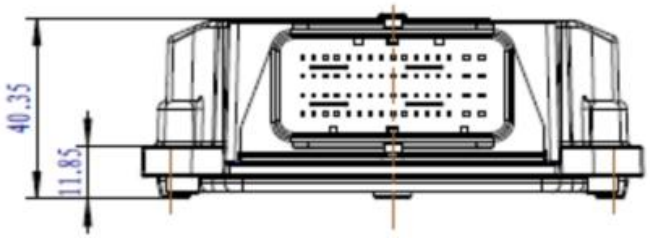
5. Installation instructions

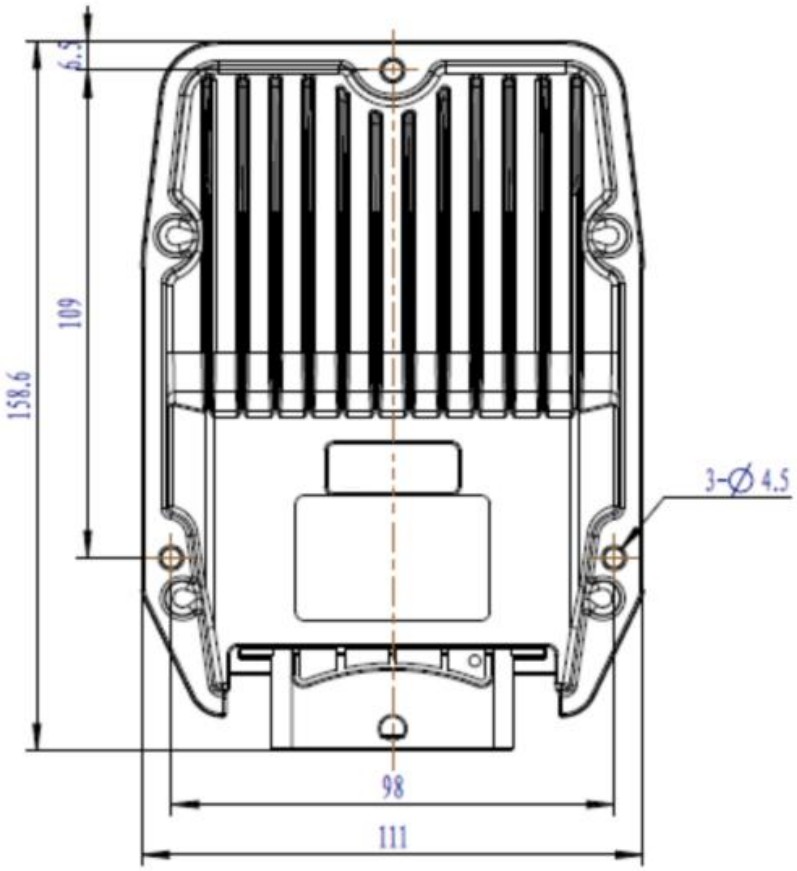
5.1. Pre-Installation Check

Before installation, please check that the power supply and wiring are complete and that the product is in good condition and free from bumps.

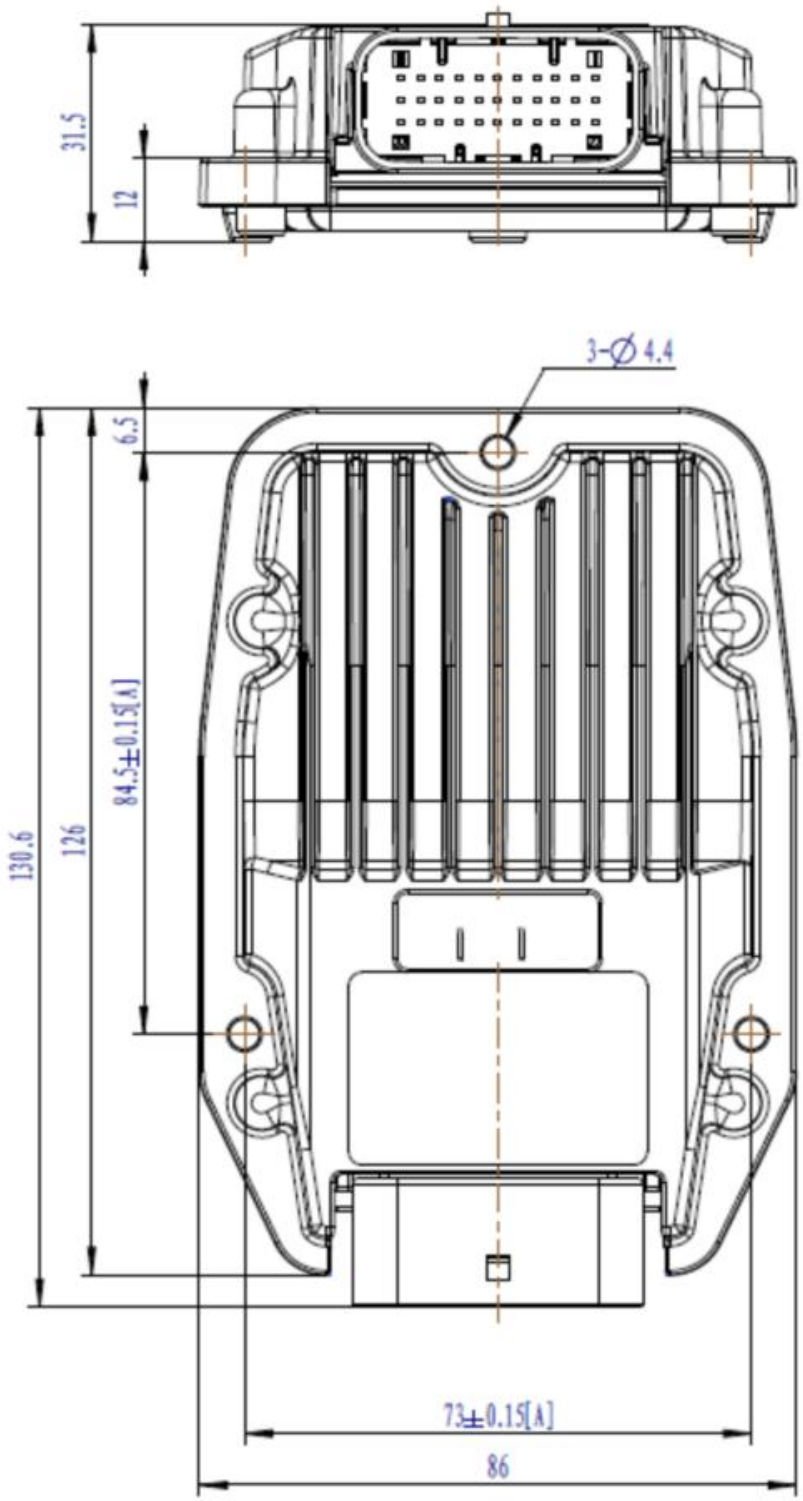
5.2. Physical Dimensions

5.2.1. IO-C-2820N and IO-C-2012N





5.2.2. **IO-C-0808N and IO-C-1600N**



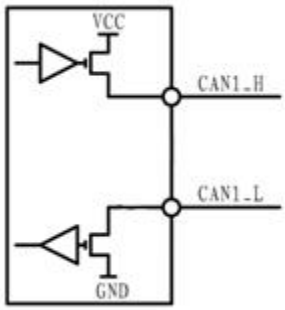
5.3. Mounting Option

- The IO-C series IO modules are all mounted using 3 x M4 screws.

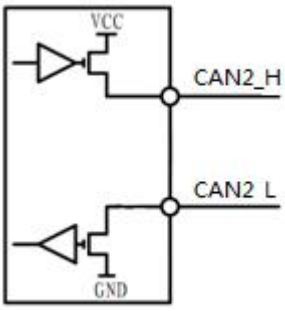
6. Communication ports

6.1. CAN

6.1.1. **CAN1**

CAN1	Functional description
Diagram	
Baud rate range	50K,100K,125K,250K,500K,1Mbit/s
Default Baud Rate	125Kbit/s
Communication Protocol	CAN2.0B
Port Protection	CAN1_H and CAN1_L are short-circuit protected against UB and GND respectively
Termination resistance	No built-in termination resistor

6.1.2. **CAN2**

CAN2	Functional description
Diagram	
Baud rate range	50K,100K,125K,250K,500K,1Mbit/s
Default Baud Rate	125Kbit/s
Communication Protocol	CAN2.0B
Port Protection	CAN2_H and CAN2_L are short-circuit protected against UB and GND respectively
Termination resistance	No built-in termination resistor

7. Parameter configuration description

The IO-C series IO modules can be configured by connecting the IO module to a PC via a CAN device and using the "IO-2820/1600/0808" software on the PC.

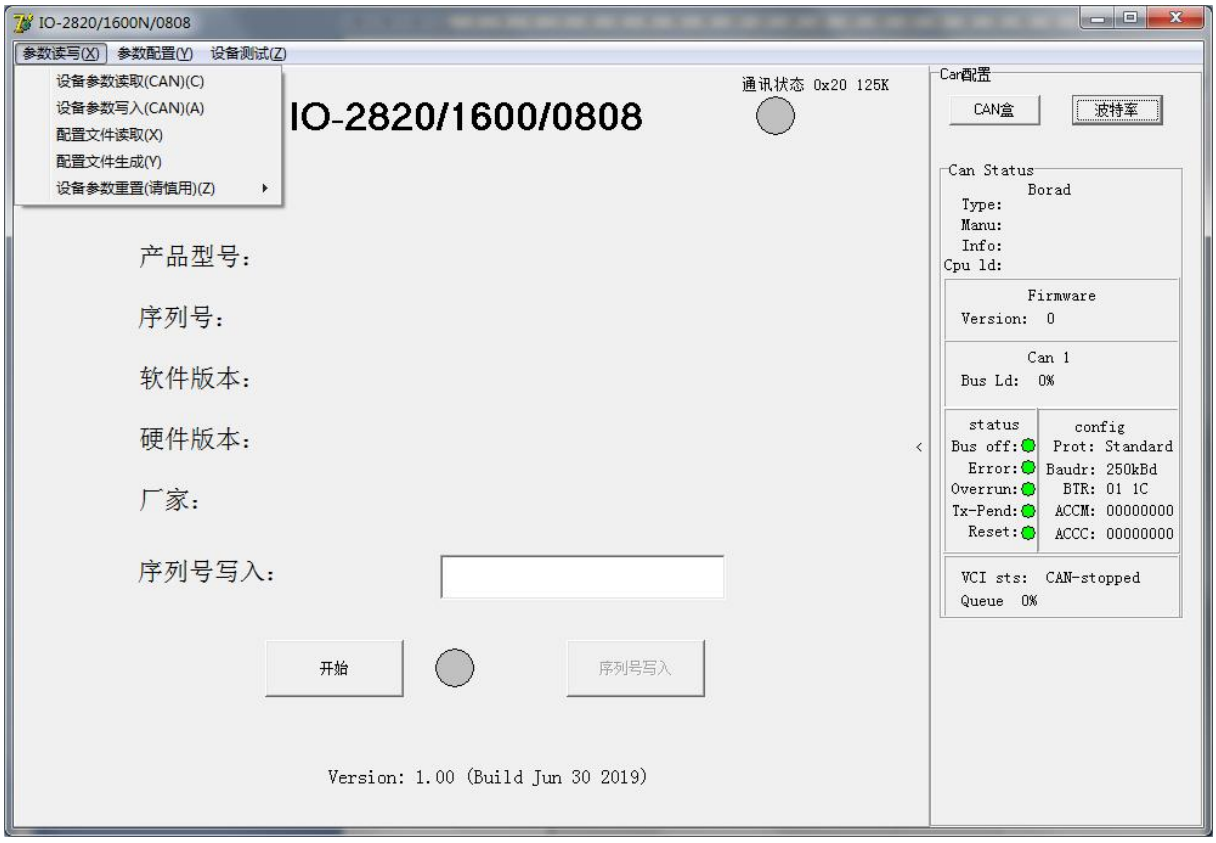
Default node number of the series: 0x20, default baud rate: 125Kbit/s.

7.1. Establishing communication

After connecting the IO module to the PC, select the CAN device via the "CAN box" on the right side of the software interface and the current baud rate of the IO module via the "Baud rate".

7.2. Product information reading

Click on "Read and write parameters" in the top left corner and select "Read device parameters" to obtain the product model, serial number, software version, hardware version, manufacturer's information, etc. The serial number writing interface allows you to write serial numbers for the production phase.



7.3. Communication parameters configuration

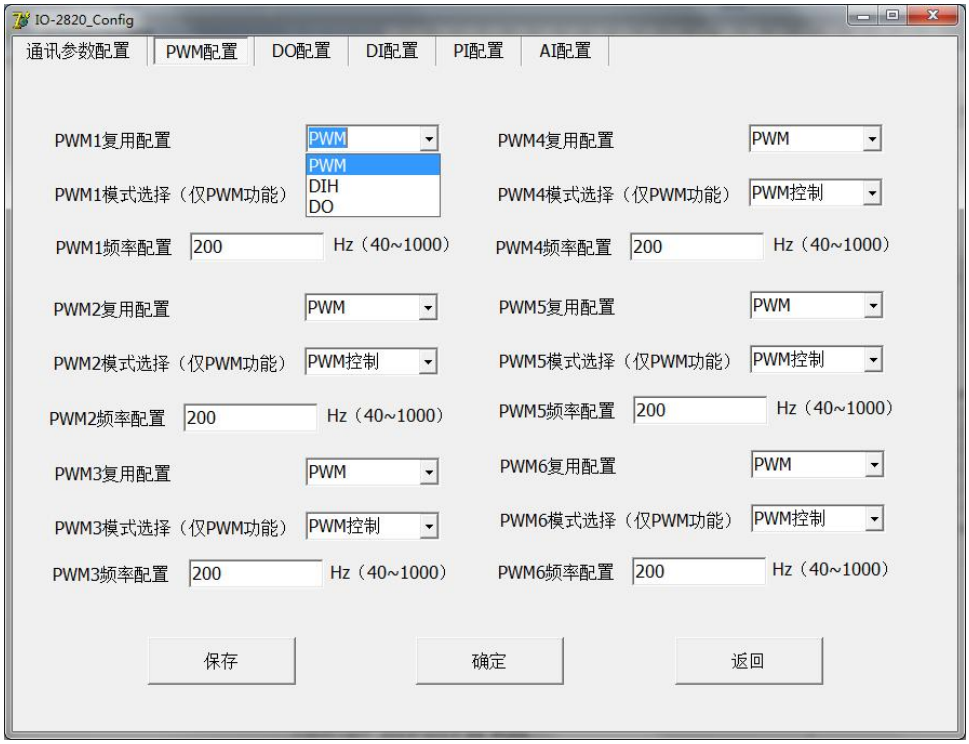
Click on "Parameter configuration" and select the corresponding IO module option (IO-C-2820N and IO-C-2012N IO modules use the same parameter configuration option: IO-2820):

Click on "Communication Parameters Configuration" to bring up the communication parameters configuration screen, where you can modify the heartbeat, node number, baud rate and PDO parameter information. Please note that multiple PDO settings can be switched from the PDO selection box. The cycle time is configured in ms.

Note
(1) Before using this software to configure, please make sure to read a configuration file or read the parameters from the device before configuring! (2) After each page has been configured, please make sure to click the Save button to save it, other buttons will not save the configuration data!

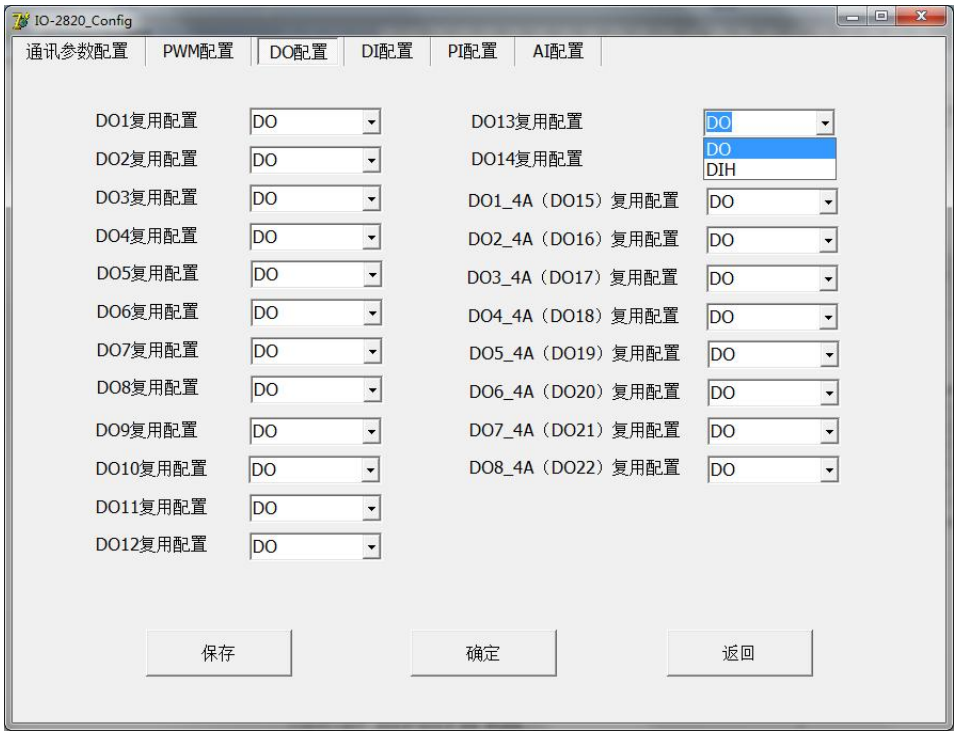
7.3.1. PWM configuration

The PWM configuration interface allows you to configure the multiplexing function of the PWM channels, the control mode of the PWM and the output frequency of the PWM.



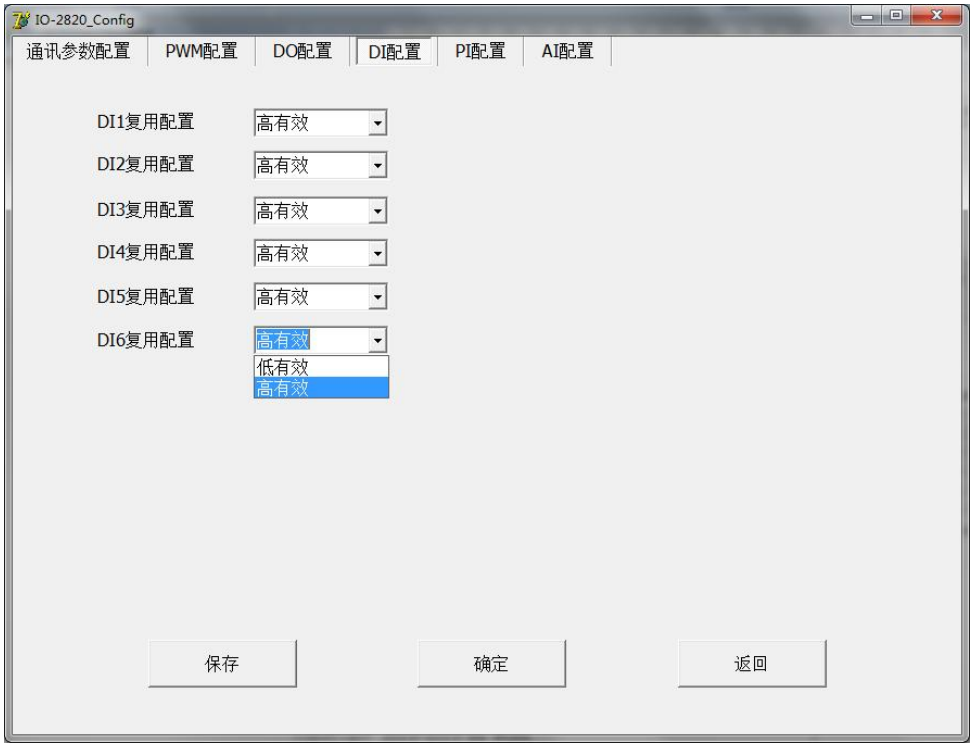
7.3.2. DO configuration

The DO configuration interface allows you to configure the DO channel multiplexing function, which can be multiplexed to DIH.



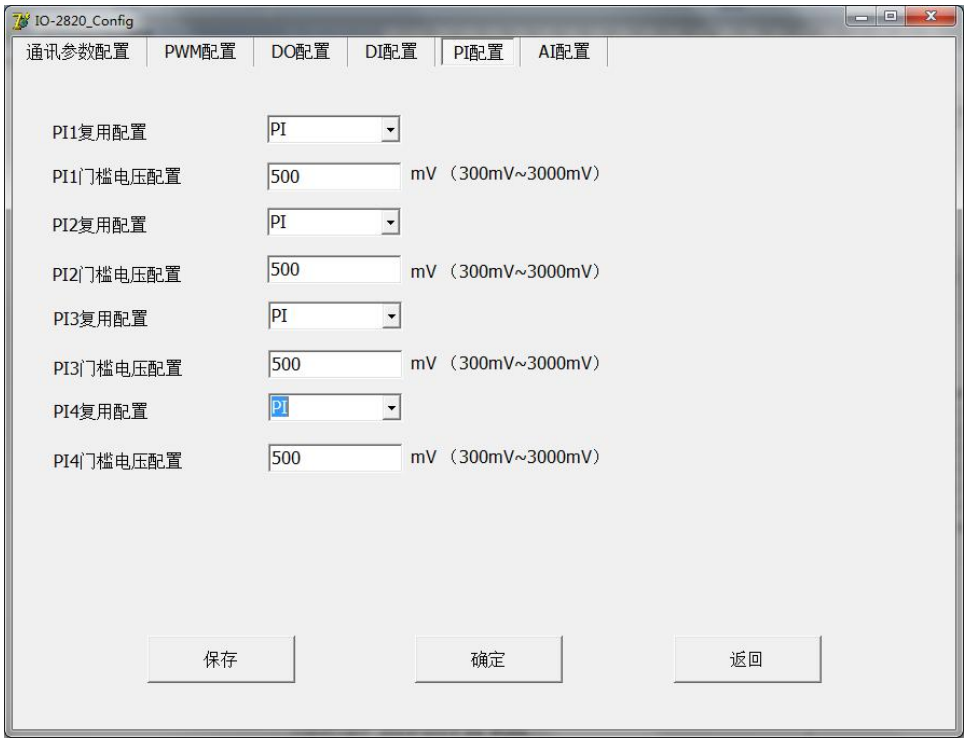
7.3.3. DI configuration

The DI configuration screen allows you to configure the DI channels as high active and low active.



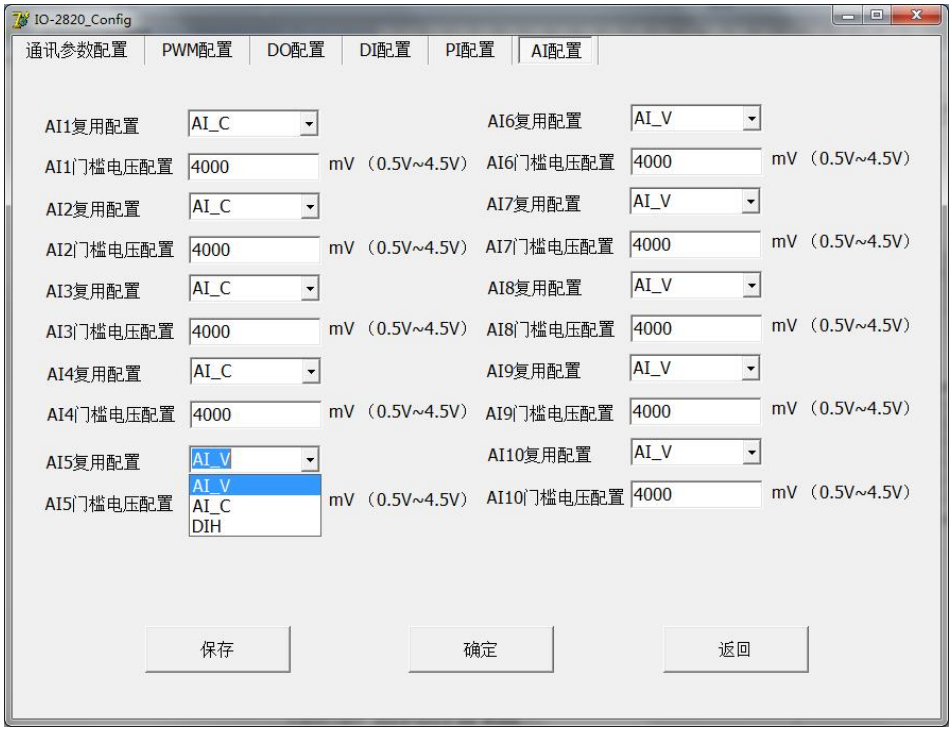
7.3.4. PI configuration

The PI configuration interface allows you to configure the multiplexing function of the PI channels and the threshold voltage of the PI can be configured. Please note that the threshold voltage is in mV and the range is 300~3000mV.



7.3.5. **AI configuration**

The AI configuration interface allows you to configure the multiplexing function of the AI channels. You can configure the threshold voltage of the AI, which is the threshold voltage used when multiplexing to a high effective DI. The threshold voltage can be modified from 0.5 to 4.5 V. The modification unit is mV.



7.4. Device parameter writing

Click on "Read and Write" in the main menu and select "Write Device Parameters" to write the configured port parameters to the IO module. After reading and writing the parameters, an indication box will pop up, please wait patiently for the process.

The host computer can also produce configuration files based on the parameters for transmission. The interface for the upper computer to obtain the parameters is available in the form of files and CAN.

8. Instructions for use

8.1. Start-up commands

The use of the IO module requires a start-up command to be received after power-up in order to operate, the start-up command is:

COB-ID	BYTE0	BYTE1
00	01	00

8.2. Online heartbeat

The connected device must send a heartbeat message before the IO board output can be controlled via CANOpen. The requirements for sending a heartbeat are as follows:

COB-ID	BYTE0

0x701+node_id	5

Requirement for a transmission period of less than 1000ms;

(b) The host heartbeat is valid after the host has sent the start command;

IO will switch off the current output or invalidate the output control if the heartbeat is not monitored. Output signals include PWM, DO and AO outputs.

8.3. Heartbeat messages

Heartbeat messages are sent periodically after initialization is complete.

COB-ID	BYTE0
0x700+node_id	Node states

Node states definition:

5:Normal mode；

127:Preparation mode；

After the CAN initialisation is complete, Node states = 5 and it automatically enters normal mode and starts sending PDO counts.

8.4. PDO messages

8.4.1. IO-C-2820N and IO-C-2012N

Send									
COB-ID	**Data description**	**BYTE 0**	**BYTE 1**	**BYTE 2**	**BYTE 3**	**BYTE 4**	**BYTE 5**	**BYTE 6**	**BYTE 7**
0x180+id	Diagnostic data	DOH1~4 Diagnosis	DOH5~8 Diagnosis	DOH9~12Diagnosis	DOH13~16Diagnosis	DOH17~20Diagnosis	DOH21~22,PWM1~2Diagnosis	PWM3~6Diagnosis	AI1~4 Diagnosis
0x1C0+id	DI status 1 channel per 1 bit	DI1~DI8	DI9~DI16	DI17~DI24	DI25~DI32	DI33~DI40	DI41~DI48	AI5~8 Diagnosis	AI9~10 Diagnosis
0x280+id	Frequency value Unit 1Hz	PI1 lower 8 bits	PI1 high 8 bits	PI2 lower 8 bits	PI2 high 8 bits	PI3 lower 8 bits	PI3 high 8 bits	PI4 lower 8 bits	PI4 high 8 bits
0x2C0+id	Feedback current (in mA)	PWM1 low 8 bits	PWM1 high 8 bits	PWM2 low 8 bits	PWM2 high 8-bit	PWM3 low 8 bits	PWM3 high 8-bit	PWM4 low 8 bits	PWM4 high 8-bit
0x380+id	Feedback current (in mA)	PWM5 low 8 bits	PWM5 high 8-bit	PWM6 low 8 bits	PWM6 high 8-bit	-	-	-	-
0x3C0+id	AI Analogue Input Voltage (mV).	AI1 low 8 bits	AI1 high 8 bits	AI2 low 8 bits	AI2 high 8 bits	AI3 low 8 bits	AI3 high 8 bits	AI4 low 8 bits	AI4 high 8 bits

	Current (uA) Resistance (Ω)								
0x480+id	AI Analogue Input Voltage (mV). Current (uA) Resistance (Ω)	AI5 low 8 bits	AI5 high 8 bits	AI6 low 8 bits	AI6 high 8 bits	AI7 low 8 bits	AI7 high 8 bits	AI8 low 8 bits	AI8 high 8 bits
0x4C0+id	AI Analogue Input Voltage (mV). Current (uA) Resistance (Ω)	AI9 low 8 bits	AI9 high 8 bits	AI10 low 8 bits	AI10 high 8 bits				
Receiving									
COB-ID	**Data description**	**BYTE 0**	**BYTE 1**	**BYTE 2**	**BYTE 3**	**BYTE 4**	**BYTE 5**	**BYTE 6**	**BYTE 7**
0x200+id	DO output is 1 way per bit	DOH1 ~8	DOH9 ~16	DOH17 ~24	DOH25 ~28	-	-	-	-
0x300+id	PWM duty cycle or current control duty cycle range: 0~9999; current unit 1mA	PWM1 duty cycle low 8 bits/ Current control low 8 bits	PWM1 duty cycle high 8 bits/ Current control high 8 bits	PWM2 duty cycle low 8-bit/ Current control low 8 bits	PWM2 Duty Cycle High 8-bit/ Current control high 8 bits	PWM3 Duty Cycle Low 8-bit/ Current control low 8 bits	PWM3 Duty Cycle High 8-bit/ Current control high 8 bits	PWM4 Duty Cycle Low 8-bit/ Current control low 8 bits	PWM4 Duty Cycle High 8-bit/ Current control high 8 bits
0x400+id	PWM duty cycle or current control duty cycle range: 0~9999; current unit 1mA	PWM5 Duty Cycle Low 8-bit/ Current control low 8 bits	PWM5 Duty Cycle High 8-bit/ Current control high 8 bits	PWM6 Duty Cycle Low 8-bit/ Current control low 8 bits	PWM6 Duty Cycle High 8-bit/ Current control high 8 bits	-	-	-	-

8.4.2. **IO-C-1600N**

Sending									
COB-ID	**Data description**	**BYTE 0**	**BYTE 1**	**BYTE 2**	**BYTE 3**	**BYTE 4**	**BYTE 5**	**BYTE 6**	**BYTE 7**
0x180+id	DO diagnostics every 2 bits for 1 channel	DOH1 ~DOH 4	-		-	-	-	-	-

0x1C0+id	DI status 1 channel per 1 bit	DIH1~ DIH4, DIL1~ DIL4	DIL5~ DIL12	-	-	-	-	-	-
0x2C0+id	Feedback current in mA	PWM1 low 8 bits	PWM1 high 8 bits	PWM2 low 8 bits	PWM2 high 8-bit	-	-	-	-
0x380+id	Feedback current Unit AD	PWM1 low 8 bits	PWM1 high 8 bits	PWM2 low 8 bits	PWM2 high 8 bits	-	-	-	-
0x480+id	System voltage monitoring Unit mV	System voltage low 8 bits	System voltage high 8 bits	-	-	-	-	-	-
0x4C0+id	System runtime In seconds	Run time low 8 bits	Run time low 16 bits	Running time high 24 digits	Runtime high 32 bits		-	-	-
Receiving									
COB-ID	**Data description**	**BYTE 0**	**BYTE 1**	**BYTE 2**	**BYTE 3**	**BYTE 4**	**BYTE 5**	**BYTE 6**	**BYTE 7**
0x200+id	DO output 1 way per bit	DOH1 ~ DOH4 DOL1 ~ DOL4	DOL5 ~ DOL12	-	-	-	-	-	-
0x300+id	PWM duty cycle or current control duty cycle range: 0~9999. Current unit 1mA	PWM1 duty cycle low 8 bits/ Current control low 8 bits	PWM1 duty cycle high 8 bits/ Current control high 8 bits	PWM2 duty cycle low 8-bit/ Current control low 8 bits	PWM2 Duty Cycle High 8-bit/ Current control high 8 bits	-	-	-	-

8.4.3. **IO-C-0808N**

Sending									
COB-ID	**Data description**	**BYTE 0**	**BYTE 1**	**BYTE 2**	**BYTE 3**	**BYTE 4**	**BYTE 5**	**BYTE 6**	**BYTE 7**
0x180+id	Diagnostic data DO diagnostics 1 channel per 2 bits, DI diagnostics 1 channel per 4 bits	DOH1 ~DOH 4	DOH5 ~DOH 8	-	-	DIH11/ DIL11 DIH12/ DIL12	DIH13/ DIL13 DIH14/ DIL14	-	-
0x1C0+id	DI status detection	DIH1~ DIH8	DIH9 DIH10	-	-	-	-	-	-

	is 1 channel per 1 bit. 1 is high; 0 is low or suspended		DIH15 DIH16						
0x280+id	Frequency value in 1Hz	PI1 low 8 bits	PI1 high 8 bits	PI2 low 8 bits	PI2 high 8 bits	-	-	-	-
0x2C0+id	Feedback current in mA	PWM1 low 8 bits	PWM1 high 8 bits	-	-	-	-	-	-
0x380+id	Feedback current Unit AD	PWM1 low 8 bits	PWM1 high 8 bits	-	-	-	-	-	-
0x3C0+id	AI Analogue Acquisition Voltage (mV), Current (uA)	AI1 low 8 bits	AI1 high 8 bits	AI2 low 8 bits	AI2 high 8-bit	-	-	-	-
0x480+id	System voltage monitoring Unit mV	System voltage low 8 bits	System voltage high 8 bits	-	-	-	-	-	-
0x4C0+id	System runtime in s	Run time lower 8 bits	Run time low 16 bits	Run time high 24 bits	Runtime high 32 bits		-	-	-
Receiving									
COB-ID	**Data description**	**BYTE 0**	**BYTE 1**	**BYTE 2**	**BYTE 3**	**BYTE 4**	**BYTE 5**	**BYTE 6**	**BYTE 7**
0x200+id	DO output 1 way per bit	DOH1 ~DOH 8	-	-	-	-	-	-	-
0x300+id	PWM duty cycle or current control duty cycle range: 0~9999. Current unit 1mA	Duty cycle low 8 bits/ Current control low 8 bits	Duty cycle high 8-bit/ Current control high 8 bits	-	-	-	-	-	-
0x500+id	AO Output Unit 1mV	AO1 low 8 bits	AO1 high 8 bits	AO2 low 8 bits	AO2 high 8 bits	-	-	-	-

9. Common Troubleshooting

9.1. Hardware failures and solutions

number	questions	solution
1	The port has no output when powered on	First check whether the power supply is normal, if the power supply is normal, please contact our service staff to communicate and solve.
2	The port does not collect a signal after power-on	First check whether the signal voltage is normal, if it is normal, please contact our service staff to communicate and solve.
3	CAN communication failure after power-on	First of all, check whether the external CAN cable is connected correctly, if the connection is normal, please contact our service staff to solve the problem.

9.2. Software failures and solutions

number	questions	solution
1	Parameters stored in ferroelectricity can change under special conditions	Add dual backup logic, store parameters across zones, and add independent checks for each zone.
2	Output port malfunction or uncontrolled	For misoperation, the program internally determines that if the DO port is multiplexed to DI afterwards, the DO output function is restricted. To address the problem of uncontrolled operation, add an online heartbeat to limit the output function if the online heartbeat is not received for more than 2 seconds. If the online heartbeat is received again, the output function is restored.