Analog signal isolated acquisition A/D converter ISOAD02/04/08/10/16

Features:

●Low cost, small size modular design
●Voltage, current, and thermal resistance signal isolation acquisition and conversion, RS-485/232 output
●Measurement accuracy is better than 0.05%, nonlinearity is better than 0.05%

●Programmable calibration module accuracy
●Isolated withstand voltage 3000VDC between signal input / output
●Power supply range: 24VDC
●High reliability, easy programming, easy to install and route

●User programmable module address, baud rate, etc.

●Support Modbus RTU communication protocol

Typical application:

●Signal measurement, monitoring and control

●Intelligent building control, security engineering and other application systems
●RS-232/485 bus industrial automation control system
●Industrial field signal isolation and long-line transmission

●Equipment operation monitoring
●Sensor signal measurement
●Acquisition and recording of industrial site data
●Medical and industrial product development
●Other current and voltage signal acquisition

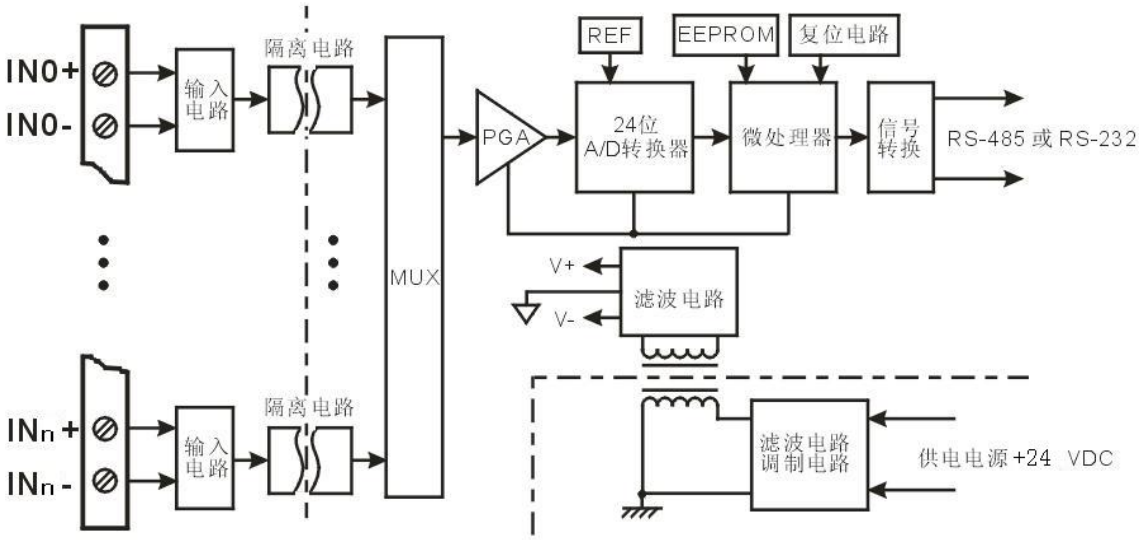
Productin description:

ISOAD series products realize signal safety isolation and high-precision digital acquisition and transmission between sensor and host. They are widely used in RS-232/485 bus industrial automation control system, 4-20mA / 0-5V signal measurement / Pt100 and other thermal resistance measurement. Monitoring and control, small signal measurement and remote monitoring of industrial field signal isolation and long-line transmission. Software configuration allows access to a wide range of sensor types, including current output, voltage output, and thermocouples.

The product includes power isolation, signal isolation, linearization, A/D conversion and RS-485 serial communication and other functional modules. Each serial port can connect up to 256 ISOAD series modules. The communication mode adopts ASCII code character communication protocol or MODBUS RTU communication protocol. The instruction set is compatible with ADAM module. The baud rate can be set by the user and can be linked with other manufacturers' control modules. On the same RS-485 bus, it is convenient for host programming.

The ISOAD series products are intelligent monitoring and control systems based on single-chip microcomputers. All user-set calibration values, addresses, baud rates, data formats, checksum status and other configuration information are stored in the non-volatile memory EEPROM.

ISOAD series products are designed and manufactured according to industry standards. The signal input/output is isolated, can withstand 3000VDC isolation voltage, strong anti-interference ability and high reliability. Wide operating temperature range - 45 ° C ~ +80 ° C.



Picture1 ISOAD Product block diagra

ISOAD Function introduce:

ISOAD signal isolation acquisition module that can be used to measure up to 16 isolated/non-isolated current or voltage signals.

1、Analog signal input

The Maximum channels is 16 channels, 24-bit acquisition accuracy per channel, All channels are calibrated before leaving the factory. When in use, users can also easily program their own calibration.

Please refer to the product selection for the specific current or voltage input range. All channel input signal types and ranges are the same, both voltage or current type.

2、Protocol

Communication Interface: 1 standard RS-485 communication interface or 1 standard RS-232 communication interface, only one way at the same time.

Communication protocol: Supports two protocols, special ASCII character communication protocol and standard MODBUS RTU communication protocol, programmable setting. It can realize network communication with PLC, RTU or computer monitoring system of various brands.

Data format: 10 bits. 1 start bit, 8 data bits, 1 stop bit.

Checksum and check: You can set the checksum as needed.

Communication address: (0～255)

Port rate: (300、600、1200、2400、4800、9600、19200、38400、57600、115200bps) User settable; RS-485

In the mode, it is connected by twisted-pair shielded cable, and the longest communication distance is up to 1200 meters.

Communication interface with high anti-interference design, ±15KV ESD protection, communication response time is less than 100Ms/channel.

3、Anti-interfe

The module has a transient suppression diode inside, which can effectively suppress various surge pulses and protect the module. Embedded digital filtering can well suppress power frequency interference from the power grid.rence

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Model Selection:

ISOAD □ ___	A(Z)	U(A/Z) □	-	232/485
	A: normal type Z: Thermal resistane	Input voltage or current signal value		
02:2 channesls	type	**U1:** 0-5V	**A1:** 0-1mA	**W1:** -20 - 100℃
04:4 channes	Z1: Pt100	**U2:** 0-10V	**A2:** 0-10mA	**W2:** 0 - 100℃
	Z2: Pt100			
08:8 channels	0	**U3:** 0-75mV	**A3:** 0-20mA	**W3:** 0 - 150℃
10:10 channels	Z3: Cu 100	**U4:** 0-2.5V	**A4:** 4-20mA	**W4:** 0 - 200℃
16:16 channels	Z4: Cu 50	**U5:** 0-±5V	**A5:** 0-±1mA	**W5:** 0 - 400℃
		U6: 0-±10V	**A6:** 0-±10mA	**W8:** customized
		U7: 0-±100mV	**A7:** 0-±20mA	
		U8: customized	**A8:** customized	

Note: The user can select the RS-485 output or the RS-232 output via the port jumper on the rear of the product. Thermal resistance products up to 10 channels.

1. Selection example **ISOAD16 A A4-485** Indicates 4-20mA signal input, output is RS-485 interface

2. Selection examle **ISOAD10 Z1 W2-232** Indicates Pt100 RTD signal input, range 0 - 100 ° C, output is RS-232 interface

ISOAD General parameters:

(typical @ +25℃, Vs 为+24VDC)

Input type:current input/ voltage input

Input type: Current input/voltage input

Acuur degre: @ +25℃ Table 1 shows

Nonlinearit: @ +25℃ Table 1 shows

Input offset: ±0.1 uA/℃

Temperature drift: ±15 ppm/℃ (±30 ppm/℃, Max)

Input resistance: 50Ω (4-20mA/0-20mA/0-±20mA current input)

100Ω (0-10mA/0-±10mA current input)

1KΩ (0-1mA/0-±1mA current input)

大于 1MΩ(voltage input)

bandwidth: -3 dB 10 Hz

Conversion rate: 50Hz

Sps

Common mode rejection (CMR): 120 dB (1kΩ Source Imbalance @ 50/60 Hz)

Norm suppression (NMR): 60 dB (1kΩ Source Imbalance @ 50/60 Hz)

Input protection: overvoltage protection, overcurrent protection

Communication	protocol RS-485 or RS-232	Dedicated ASCII character protocol and standard MODBUS RTU communication protocol
	Baud rate (300、600、1200、2400、4800、9600、19200、38400、57600、115200bps) Software selectable	
	Address (0～255) Software selectable	

Communication response time: up to 100 ms per channel at 9600 baud rate

Working power supply: +24VDC+-10%, Internal anti-reverse and overvoltage protection circuit is less than 8W

Power consumption: 8W

Working temperature: - 45 ~ +80 ° C

Working humidity: 10 ~ 90% (no condensation)

Storage temperature: - 45 ~ +80 ° C

Storage humidity: 10 ~ 95% (no condensation)

Isolation withstand voltage: between input/output: 3KVDC, 1 minute, leakage current 1mA

The output is shared with the power supply.

Impact voltage: 3KVAC, 1.2/50us (peak)

Dimensions: 158*87.5*59mm

ISOAD16 accuracy and nonlinearity parameters: @+25° C +24VDC

Input Range Description	Accuracy (Typical)	Accuracy (Maximum)	Nonlinearity (Maximum)	Noise (Peak-to-Peak)
Current or voltage	±0.02 % FS	±0.05 % FS	±0.05 % FS	±0.01 % FS

Table 1 ISOAD16 measurement accuracy and nonlinearity

Product real picture:

ISOAD02/04/08/10/16

Pin description:

ISOAD10-Z Thermal resistance type

Pin	Name	description	pin	name	description
1	PW-	Negative power	22	CH2A	Input channel 2 positive terminal
2	PW+	Positive terminal	23	CH2B	Input channel 2 negative terminal
3	CH15-	Ground wire	24	CH2B	Input channel 2 negative terminal
4	CH9A	Input channel 9 positive end	25	CH3A	Input channel 3 positive end
5	CH9B	Input channel 9 negative terminal	26	CH3B	Input channel 3 negative terminal
6	CH9B	Input channel 9 negative terminal	27	CH3B	Input channel 3 negative terminal
7	RS-232	RS-232 port	28	CH4A	Input channel 4 positive end
8	T/R	TXD/RXD LED	29	CH4B	Input channel 4 negative terminal
9	PWR	PWR LED	30	CH4B	Input channel 4 negative terminal
10	CONFIG	Initial state setting	31	CH5A	Input channel 5 positive end
11	GND	Output ground	32	CH5B	Input channel 5 negative terminal
12	485GND	RS-485 Shield ground	33	CH5B	Input channel 5 negative terminal
13	485+	RS-485 Positive signal	34	CH6A	Input channel 6 positive end
14	485-	RS-485 Negative signal	35	CH6B	Input channel 6 negative terminal
15	NC	Empty foot	36	CH6B	Input channel 6 negative terminal
16	CH0A	Input channel 0 positive terminal	37	CH7A	Input channel 7 negative terminal
17	CH0B	Input channel 0 negative terminal	38	CH7B	Input channel 7 negative terminal
18	CH0B	Input channel 0 negative terminal	39	CH7B	Input channel 7 negative terminal
19	CH1A	Input channel 1 positive end	40	CH8A	Input channel 8 positive end
20	CH1B	Input channel 1 negative terminal	41	CH8B	Input channel 8 negative terminal
21	CH1B	Input channel 1 negative terminal	42	CH8B	Input channel 8 negative terminal

ISOAD16A 电流电压类型

pin	name	description	pin	name	description
1	PW-	Negative power supply	23	CH4+	Input channel 4 positive end
2	PW+	Positive terminal	24	CH4-	Input channel 4 negative terminal
3	CH15-	Input channel 15 negative terminal	25	CH5+	Input channel 5 positive end
4	CH15+	Input channel 15 positive end	26	CH5-	Input channel 5 negative terminal

5	CH14-	Input channel 14 negative terminal	27	CH6+	Input channel 6 positive end
6	CH14+	Input channel 14 positive end	28	CH6-	Input channel 6 negative terminal
7	RS-232	RS-232 port	29	CH7+	Input channel 7 positive end
8	T/R	TXD/RXD LED	30	CH7-	Input channel 7 negative terminal
9	PWR	PWR LED	31	CH8+	Input channel 8 positive end
10	CONFIG	Initial state setting	32	CH8-	Input channel 8 negative terminal
11	GND	Output ground	33	CH9+	Input channel 9 positive end
12	485GND	RS-485 Shield ground	34	CH9-	Input channel 9 negative terminal
13	485+	RS-485 Positive signal	35	CH10+	Input channel 10 positive end
14	485-	RS-485 Negative signal	36	CH10-	Input channel 10 negative terminal
15	CH1-	Input channel 1 negative terminal	37	CH11+	Input channel 11 positive end
16	CH1+	Input channel 1 positive end	38	CH11-	Input channel 11 negative terminal
17	CH0-	Input channel 0 negative terminal	39	CH12+	Input channel 12 positive end
18	CH0+	Input channel 0 positive terminal	40	CH12-	Input channel 12 negative terminal
19	CH2+	Input channel 2 positive terminal	41	CH13+	Input channel 13 positive end
20	CH2-	Input channel 2 negative terminal	42	CH13-	Input channel 13 negative terminal
21	CH3+	Input channel 3 positive end			
22	CH3-	Input channel 3 negative terminal			

Remark: If the number of channels N of the selected product is less than 16 channels, the available channels are channel 0 ~ channel (N-1), and the terminals of channel N ~ channel 15 are not electrically connected to the inside of the product, which is an invalid channel. . Thermal resistance products are up to 10 channels.

Application wiring diagram:

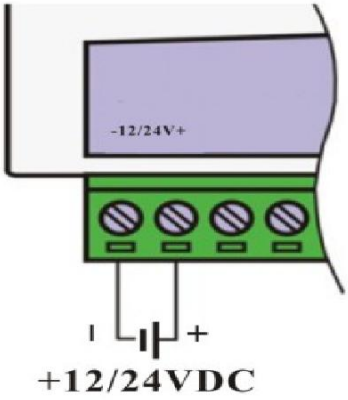


Figure 2 ISOAD16 module power supply wiring diagram

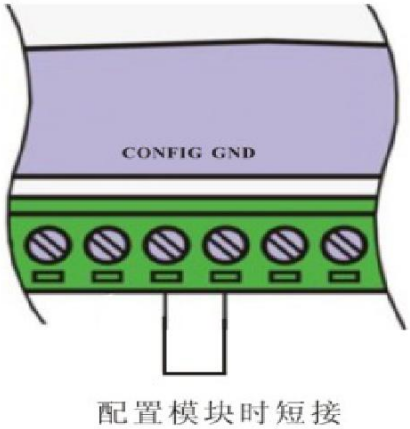


Figure 3 ISOAD16 module enters the configuration state wiring diagram

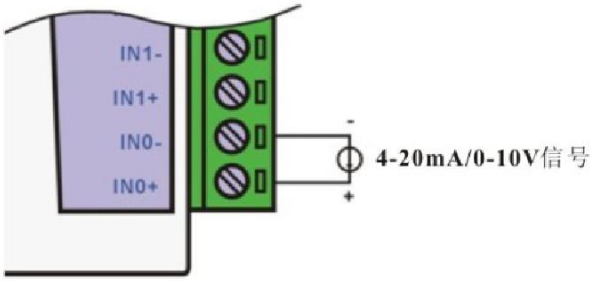


Figure 4 ISOAD16 module signal input wiring diagram

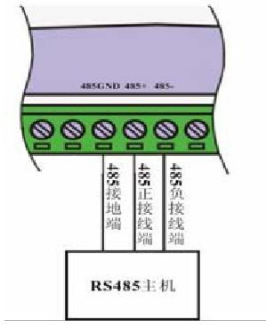


Figure 5 ISOAD16 module RS-485 interface wiring diagram

Initialize the ISOAD16 module:

When accessing an RS-232/RS-485 network, the ISOAD16 module must be assigned a unique address code with a hexadecimal number between 00 and FF. The initial setup of the module factory is as follows:

The address code is 01
Baud rate 9600 bps
Prohibit checksum
ASCII character communication protocol

Since the address codes of the new modules are all the same, if the network is directly configured without configuration, the addresses of the modules will conflict, so when setting up the system, the address of each module must be reconfigured. You can modify the module address by configuring the command after connecting the ISOAD16 module power cable and the RS-232/RS485 communication cable. At the same time, the baud rate, checksum status, and communication protocol can also be adjusted according to user requirements. Before modifying the baud rate, checksum status, and communication protocol, the module must first enter the configuration state, otherwise it cannot be modified.

How to get the module into the configuration state:

The ISOAD16 module has a pin labeled CONFIG. Short-circuit the CONFIG pin to the ground (GND pin), then turn on the power, and the module enters the configuration state. In this state, the module is configured as follows:

The address code is 00
Baud rate 9600 bps
Prohibit checksum

At this time, you can modify the module's baud rate, checksum status and other parameters through configuration commands, or you can select the communication protocol by setting the module's communication protocol command. When you are not sure about the specific configuration of a module, you can also configure the jumper to make the module enter the configuration state and then reconfigure the module. If the user needs to set the module to the MODBUS RTU communication protocol, please see the instructions in the MODBUS Communication Protocol chapter.

ISOAD16 ASCII code character command set:

The command consists of a series of ASCII characters, such as the command start identifier, address, command keyword, command parameters, optional checksum, and command end. Identifier (cr). The host operates only one ISO AD16 module at a time, except for the synchronous command with the wildcard address "**".

Command format: (Leading Code)(Addr)(Command)[data][checksum](cr)

(Leading code)	Command start identifier。such as %,$,#,@,...等。	1-character
(Addr)	The address of the module, if not specified below, the value range is from 00～FF (Hexadecimal)。	2-character
(Command)	Command keyword.	1-character
[data]	Command parameters.	Variable length
[checksum]	Checksum, an optional parameter, is required only if checksum is enabled.	2-character
(cr)	Command end identifier. (cr) is the carriage return terminator, and the ASCII value is 0x0D.	1-character

The checksum is used to check if the host and module communicate correctly. When the checksum is enabled, both the command and the response must be appended with the checksum [Checksum] parameter. It occupies 2 characters. The checksum character is placed after the command or response character, before the carriage return.

Calculation method: two characters, hexadecimal number, which is the sum of the ASCII code values of the previously sent characters, and then obtained by the hexadecimal number 0xFF.

Checksum function application example:

When the checksum is disabled, the command and response are as follows (Note: The following are the commands and responses configured by the query module)

User command $002(cr)

Module response !00020600 (cr)

When the checksum is enabled, the command responds as follows

User command $002B6 (cr)

Module response !00020600 A9 (cr)

Above B6 and A9 are checksums, calculated as follows

'$' = 0x24 '0' = 0x30 '2' = 0x32

B6=(0x24+0x30+0x30+0x32) AND 0xFF

'!' = 0x21 '0' = 0x30 '2' = 0x32 '6' = 0x36

A9=(0x21+0x30+0x30+0x30+0x32+0x30+0x36+0x30+0x30) AND 0xFF

Common analog input module commands:

1, read the data command of all channel analog input module

2, read the data command of the single channel analog input module

3, configuration module command

4, read the configuration status command

5, offset calibration command

6, gain calibration command

7, linear calibration command

8, set the channel open / close command

9, read channel switch status command

10, read the module name command

Command response:

The response message depends on a variety of commands. The response is also composed of several characters, including the first code, the variable, and the end identifier. There are two types of first codes for the response signal, '!' or '>' for valid commands and '?' for invalid. By checking the response message, you can monitor whether the command is valid.

Note: 1. Make sure the address is correct. If the address is wrong, the module will not respond.

2. The order must be in uppercase letters.

1、Read all channels to collect data commands

Command function: Read back the data collected by all channels in the currently configured data format.
Command syntax: #AA(cr)
Parameter description: #Delimiter.
AA Target module address, ranging from 00 to FF (hexadecimal).
(Cr) Terminator, the host computer enter key (0DH).

Response grammar: >(data)(cr) The command is valid.
?AA(cr) The command is invalid or illegal.
Parameter
Description: > Delimiter。
(data) Represents all channel data read back. The data format can be engineering units, percentage of FSR, hexadecimal complement or ohms.
See Section 3 of the Command Set for detailed setup instructions. Please refer to the section "Input Range and Output Data Format" for the data format.
(cr) End character, the host computer enter key (0DH).
Other notes: If the address is wrong or the communication is faulty, the target module does not respond.
If a channel has been closed, the read data is displayed as 0.

Application example: user command #23(cr)
Module response >+04.765+04.756+04.632+04.000+05.001+06.000+……+16.000(cr)
Description: Enter on the address 23H module (data format is engineering unit):
Channel 0: +04.765mA Channel 1: +04.756mA Channel 2: +04.632mA Channel 3: +04.000mA
Channel 4: +05.001mA Channel 5: +06.000mA Channel 6-14: (omitted here) Channel 15: +16.000mA

2、Read single channel acquisition data command

Command function: Read back the data collected by a single channel in the currently configured data format.
Command syntax: #AANN(cr)
Parameter description: #Delimiter.
AA target module address, ranging from 00 to FF (hexadecimal).
NN channel number, ranging from 0 to 15 (decimal), greater than 15 is invalid.
(cr) Terminator, the host computer enter key (0DH).
Response syntax: The >(data)(cr) command is valid.

?AA(cr) The command is invalid or illegal.
Parameter description: > Delimiter.
(data) Represents all channel data read back. The data format can be an engineering unit, a percentage of FSR, a hexadecimal complement, or ohms。See Section 3 of the Command Set for detailed setup instructions. Please refer to the section "Input Range and Output Data Format" for the data format.
(cr) End character, the host computer enter key (0DH).
Other notes: If the address is wrong or the communication is faulty, the target module does not respond.
If a channel has been closed, the read data is displayed as 0.
Application example: user command #2300(cr)
Module response >+04.765 (cr)
Description: Enter on the address 23H module (data format is engineering unit):
Channel 0: +04.765mA

3、Configuration module command

Command function: set the target module address, communication protocol, baud rate, data format, checksum. The configuration information is stored in the non-volatile memory EEPROM.

Command syntax: %AANNTTBBFF(cr)
Parameter Description: % Delimiter。
AA AA The current address of the target module, ranging from 00 to FF (hexadecimal).
NN The new address of the target module, ranging from 00 to FF (hexadecimal).
TT type encoding, the ISOAD16 product must be set to 00.
BB baud rate code, hexadecimal.

Baud rate code	Baud rate
01	300 baud
02	600 baud
03	1200 baud
04	2400 baud
05	4800 baud
06	9600 baud
07	19200 baud
08	38400 baud
09	57600 baud
0A	115200 baud

Rate Code

FF data format, checksum, specific bit representation of hexadecimal numbers. Note that bits2 to bits5 must be set to zero.

Bit7	Bit 6	Bit 5	Bit 4	Bit 3	Bit2	Bit 1	Bit 0

tab 4 Data format, checksum code

Bit7: Reserved bit, must be set to zero
Bit6: Checksum status, 0: forbidden; 1: for allow
Bit5-bit2: No, it must be set to zero.
Bit1-bit0: Data format
bit。
00: Engineering unit (Engineering Units)
01: Percentage of full scale (% of FSR)
10: 16 Binary complement (Twos complement)

(cr) End character, the host computer enter key (0DH).

Response grammar: **!AA(cr)** The command is valid.
?AA(cr) The command is invalid or illegal, or the configuration jumper is not installed before changing the baud rate or checksum.

Parameter Description:
! A delimiter indicating that the command is valid.
? A delimiter indicating that the command is invalid.
AA Target module address
(cr) End character, the host computer enter key (0DH).

Other instructions: To configure the module, you must first install the configuration jumper and power it on again to bring the module into the configuration state. At this time, the current address of the module is AA=00H.
If the address is incorrect or the communication is faulty, the target module does not respond.

Application examples: User command **%0011000600(cr)**
Module response **!11(cr)**

Explanation: **%** Delimiter.
0 The current address of the module is 00H.
11 The new module address is 11H (hexadecimal).
0 type code, ISOAD16 product must be set to 00.
6 indicates a baud rate of 9600 baud.
0 means the data format is an engineering unit and the checksum is prohibited.

4、Set communication protocol commands

Command function: Set the communication protocol of the target module to ASCII character communication protocol or Modbus RTU protocol.

Command grammer: **$AAPV(cr)**

parameter description: **$** Delimiter。
AA Target module address, ranging from 00 to FF (hexadecimal).
P Set the communication protocol command keyword.
V protocol code, which can be 0 or 1.
0: ASCII code character communication protocol

1: Modbus RTU protocol

(cr) End character, the host computer enter key (0DH).

Response grammar: !AA(cr) The command is valid.

?AA(cr) Invalid or illegal operation

Parameter Description: ! A delimiter indicating that the command is valid.

? A delimiter indicating that the command is invalid.

AA target module address.

(cr) End character, the host computer enter key (0DH).

Other notes: If the address is wrong or the communication error, the target module does not respond.

Setting communication protocol commands must be valid in the configuration state.

Application examples 1: User command $00P1(cr)

Model response !00 (cr)

Description: Set the communication protocol to Modbus RTU protocol.

Application examples 2: User command $00P0(cr)

Module response !00 (cr)

Description: Set the communication protocol to ASCII character communication protocol.

5、Read configuration status command

Command function: Read the target module configuration.

Command syntax: $AA2(cr)

Parameter Description: $ Delimiter.

AA Target module address, ranging from 00 to FF (hexadecimal).

2 Read configuration status command keyword

(cr) End character, the host computer enter key (0DH).

Response grammar: ! AABBTTCCFF(cr) The command is valid.

?AA(cr) Invalid or illegal operation。

Parameter Description: ! Delimiter。

AA,BB Target module address。

TT stands for type coding。

cc stands for baud rate coding. See Table 3

FF see table 4

(cr) End character, the host computer enter key (0DH).

Other notes: If the address is wrong or the communication is faulty, the target module does not respond.

Application examples: User command $302(cr)

Module response !30000600(cr)

Description: ! Delimiter.

30 The current address of the module is 30H.

0 means the input type code.

6 indicates a baud rate of 9600 baud.

0 means the data format is an engineering unit and the checksum is prohibited.

6、Offset calibration command

Command function: Calibrate the offset of the target module channel N.

Command syntax: $AA0NN(cr)

Parameter description: $ delimiter.

AA Target module address, ranging from 00 to FF (hexadecimal).

0 offset calibration command keyword.

NN channel number, ranging from 0 to 15 (decimal), greater than 15 is invalid. (cr) Terminator, the host computer enter key (0DH).

Response syntax: !AA(cr) command is valid.

?AA(cr) command is invalid or illegal.

Parameter description: ! Delimiter, indicating that the command is valid.

The delimiter indicates that the command is invalid.

AA target module address

(cr) terminator, host computer enter key (0DH)。

Other instructions: The product has been calibrated at the factory and can be used directly by the user.
When calibrating an analog input module, calibrate the gain after calibrating the offset command. When calibrating, the analog input module needs to be connected to the appropriate input signal on the channel to be calibrated. Different input ranges require different input voltages or currents. See the Calibration Module section for specific calibration methods.

If the address is incorrect or the communication is faulty, the target module does not respond.
Application example: User command $23000(cr)
Module response !23(cr)

Description: Offset calibration for channel 0 of address 23H module.

7、gain calibration command

Command function: Calibrate the gain of the target module channel N.
Command syntax: $AA1NN(cr)
Parameter description: $ delimiter.
AA target module address, ranging from 00 to FF (hexadecimal).
1 gain calibration command keyword.
NN channel number, ranging from 0 to 15 (decimal), greater than 15 is invalid.
(cr) Terminator, the host computer enter key (0DH).
Response syntax: The !AA(cr) command is valid.
The ?AA(cr) command is invalid or illegal.
Parameter description: ! Delimiter, indicating that the command is valid.
The delimiter indicates that the command is invalid.
AA target module address
(cr) Terminator, the host computer enter key (0DH).

Other instructions: The product has been calibrated at the factory and can be used directly by the user.
When calibrating an analog input module, first calibrate the offset and then calibrate the gain.
When calibrating, the analog input module needs to be connected to the appropriate input signal on the channel to be calibrated. Different input ranges require different input voltages or currents. See the Calibration Module section for specific calibration methods.
If the address is incorrect or the communication is faulty, the target module does not respond.

Application example: User command $23103(cr)
Module response !23(cr)
Description: Gain calibration for channel 3 of the Address 23H module.

8, linear calibration command

Command function: Linear calibration of the target module input channel.

Command syntax: @AANNBB(cr)

Parameter description: @ delimiter.

AA Target module address, ranging from 00 to FF (hexadecimal).

NN module channel number, ranging from 00 to 15 (decimal).

BB standard input current and voltage value

(cr) Terminator, the host computer enter key (0DH).

Response syntax: ?AA(cr) command is invalid or illegal

! The AANN@Pn ok(cr) command is valid. .

Parameter description: ! Delimiter, indicating that the command is valid.

? indicates that the command is invalid.

AA target module address.

Response syntax: ?AA(cr) command is invalid or illegal
! The AANN@Pn ok(cr) command is valid. .
Parameter description: ! Delimiter, indicating that the command is valid.
?The delimiter indicates that the command is invalid.
AA target module address.
NN module channel number.
@Pn ok Pn=P0-P8 , which stands for 9 calibration points, ok means that this point has been successfully calibrated, and END means the calibration is completed.
(cr) Terminator, the host computer enter key (0DH).
Other instructions: The product has been calibrated at the factory and can be used directly by the user.

If the address is incorrect or the communication is faulty, the target module does not respond.

The calibration process and command response are as follows (take the 0-20 mA current type as an example):

1. Calibration point 0, adjust the input current to 0mA, enter the command @AANN00(cr), and the module responds to $AANN@P0 ok

2. Calibration point 1, adjust the input current to 1mA, enter the command @AANN01(cr), and the module responds to $AANN@P1 ok

3. Calibration point 2, adjust the input current to 2mA, enter the command @AANN02(cr), and the module responds to $AANN@P2 ok

4. Calibration point 3, adjust the input current to 3mA, enter the command @AANN03(cr), and the module responds to $AANN@P3 ok

5. .....

6. Calibration point 7, adjust the input current to 15mA, enter the command @AANN15(cr), and the module responds to $AANN@P7 ok

7. Calibration point 8, adjust the input current to 20mA, enter the command @AANN20(cr), and the module responds with $AANN@P8 ok END

9, set the channel open / close command

Command function: Turn on/off one or more data acquisition channels of the target module.

Command syntax: $AA5VVVV(cr)

Parameter description: $ delimiter.

AA Target module address, ranging from 00 to FF (hexadecimal).

5 Set channel on/off command keyword VVVV Four hexadecimal numbers

VVVV four hexadecimal numbers

The 3~0 bits of the first hexadecimal number correspond to the 15~12 channel.

The second hexadecimal number corresponds to the 3~0 bit. The 11~8 channel corresponds to the third hexadecimal number.

The 3~0 bits of the binary bit represent the 7~4 channel.

The 3~0 bits of the corresponding hexadecimal digit represent the 3~0 channel.

The bit value is 0: the channel

bit value is off 1: the channel is turned on.

(cr) Terminator, the host computer enter key (0DH).

Response syntax: The !AA(cr) command is valid.

?AA(cr) command is invalid or illegal

Parameter description: ! Delimiter, indicating that the command is valid.

? indicates that the command is invalid.

AA target module address.

(cr) Terminator, the host computer enter key (0DH).

Other notes: If the address is wrong or the communication is faulty, the target module does not respond.

Application example: User command $0853748 (cr)

Module response !08 (cr)

Description: Set the channel value to 0x3748.

3 is 0011, which means that channels 13 and 12 are enabled, and channels 15 and 14 are disabled.

7 is 0111, which means that channels 10, 9, and 8, are enabled.

4 is 0100, which means that channel 6 is enabled, and channels 7, 5, and 4 are disabled.

8 is 1000, which means that channel 3 is enabled and channels 2, 1, and 0 are disabled.

10, read channel switch status command

Command function: Read the target module channel switch status.

Command syntax: $AA6(cr)

Parameter description: $ delimiter.

AA Target module address, ranging from 00 to FF (hexadecimal).

6 read channel status command keyword

(cr) Terminator, the host computer enter key (0DH).

Response syntax: The !AAVVVV(cr) command is valid.

?AA(cr) command is invalid or illegal

Parameter description: ! Delimiter, indicating that the command is valid.

? indicates that the command is invalid.

AA target module address.

VVVV Four hexadecimal numbers, the parameter meaning is the same as setting the channel on/off command.

(cr) Terminator, the host computer enter key (0DH).

Other notes: If the address is wrong or the communication is faulty, the target module does not respond.

Application example: User command $186 (cr)

Module response !18FFFF (cr)

Description: The current channel status value is 0xFFFF.

0xFFFF is 1111 1111 1111 1111, which means that all channels of the module with address 18H are enabled.

11, read the module name command

Command function: Read the target module name.

Command syntax: $AAM(cr)

Parameter description: $ delimiter.

AA Target module address, ranging from 00 to FF (hexadecimal).

M read module name command keyword

(cr) Terminator, the host computer enter key (0DH).

Response syntax: The !AA(ModuleName)(cr) command is valid.

?AA(cr) command is invalid or illegal

Parameter description: ! Delimiter, indicating that the command is valid.

? The delimiter indicates that the command is invalid.

AA target module address.

(ModuleName) module name can be ISOAD16, ISOAD08, etc.

(cr) Terminator, the host computer enter key (0DH).

Other notes: If the address is wrong or the communication is faulty, the target module does not respond.

Application example: User command $08M(cr)

Module response !08ISOAD16 (cr)

Note: The module with address 08H is named ISOAD16.

Input range and output data format:

This module supports three data output formats under the ASCII character communication protocol:
00: Engineering Units
01: percentage of full scale (% of FSR)
10:16 complement (Twos complement)
Application examples:

1. The input range is A4: 4~20mA, when the input is 4 mA:

	User Command #0100(cr)
Engineering Unit	Module Response >+04.000(cr)
Percentage of full scale	Module response >+020.00(cr)
Hexadecimal complement	module response >199999(cr)

2. The input range is U1: 0~5V, when the input is 3V:

	User Command #0100(cr)
Engineering Unit	Module Response >+3.0000(cr)
Percentage of full scale	Module response >+060.00(cr)
Hexadecimal complement	code response >4CCCCC(cr)

3. The thermal resistance type selects the output of the engineering unit output equal to the percentage of the full scale. The actual data needs to be calculated according to the read data. The formula is as follows: actual data = read data * coefficient + offset; coefficient and offset vary with different ranges, Examples are as follows:

Model W1, range -20 – 100°C; coefficient = 1.2, offset = -20; actual data = read data * 1.2-20

Model W2, range 0 – 100°C; coefficient = 1.0, offset = 0; actual data = read data

Model W3, range 0 – 150°C; coefficient = 1.5, offset = 0; actual data = read data * 1.5 model W4, range 0 – 200 ° C; coefficient = 2.0, offset = 0; actual data = read data *2 model W5, range 0 – 400 °C; coefficient = 4.0, offset = 0; actual data = read data * 4

The following table lists the input ranges and output data formats for the various types of parameter modules. In the first column, the parameter An/Un represents the module with the suffix An/Un.

Various module input ranges	Data Format	Positive full scale	Zero	Negative full scale	Resolution Display
A1: 0-1mA A5: 0-±1mA	Engineering unit	+1.0000	±0.0000	-1.0000	0.1uA
	Percentage of full scale	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFFFF	000000	800000	1LSB
A2: 0-10mA A6: 0-±10mA	Engineering unit	+10.000	±00.000	-10.000	1uA
	Percentage of full scale	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFFFF	000000	800000	1LSB
A3: 0-20mA A4: 4-20mA A7: 0-±20mA	Engineering unit	+20.000	±00.000	-20.000	1uA
	Percentage of full scale	+100.00	±000.00	-100.00	0.01%
	Hexadecimal	7FFFFF	000000	800000	1LSB

	complement				
U1：0-5V U5：0-±5V	Engineering unit	+5.0000	±0.0000	-5.0000	100uV
	Percentage of full scale	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFFFF	000000	800000	1LSB
U2：0-10V U6：0-±10V	Engineering unit	+10.000	±00.000	-10.000	1mV
	Percentage of full scale	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFFFF	000000	800000	1LSB
U3：0-75mV	Engineering unit	+75.000	±00.000	-75.000	1uV
	Percentage of full scale	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFFFF	000000	800000	1LSB
U4：0-2.5V	Engineering unit	+2.5000	±0.0000	-2.5000	100uV
	Percentage of full scale	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFFFF	000000	800000	1LSB
U7：0-100mV	Engineering unit	+100.00	±000.00	-100.00	10uV
	Percentage of full scale	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFFFF	000000	800000	1LSB
A8：用户自定义 U8：用户自定义	Engineering unit	+100.00	±000.00	-100.00	0.01%
	Percentage of full scale	+100.00	±000.00	-100.00	0.01%
	Hexadecimal complement	7FFFFF	000000	800000	1LSB

table 5 Input range and data format

Modbus RTU Protocol:

The factory default protocol of the module is ASCII character communication protocol. If you need to set the module to Modbus RTU communication protocol, please follow the steps below:

1. Short the CONFIG pin (pin 3) and the GND pin (pin 4).

2. Connect the power cable and communication interface cable correctly.

3. When the power is turned on, the module automatically enters the configuration state, the communication address is 00, and the baud rate is 9600.

4. Wait 5 seconds for the module to initialize.

5. Send the command $00P1(cr) to check the response. If it is !00 (cr), the Modbus RTU communication protocol is set successfully.

6. If the address is the original default 00, it must be modified to an address other than 00. The Modbus RTU communication protocol does not support the module read and write operations of address 00.

7. Turn off the power and disconnect the CONFIG pin from the GND pin.

8. The module has been successfully set to Modbus RTU communication protocol mode, the address is 01, and the baud rate is 9600.

9. Only one data output format and two bytes, hexadecimal complement are supported under the Modbus RTU communication protocol.

RTU Mode register description:

address 4X	Data contents	feature	Parameter description
40001	IN0	Read only	0th channel measurement, two bytes, hexadecimal complement
40002	IN1	Read only	Channel 1 measurement, same as above
40003	IN2	Read only	Channel 2 measurement ibid.
40004	IN3	Read only	Channel 3 measurement, ibid.
40005	IN4	Read only	Channel 4 measurement, ibid.
40006	IN5	Read only	Channel 5 measurement ibid.
400xx	…	Read only	Measurement value of channel XX ibid.
40015	IN14	Read only	14th channel measurement ibid.
40016	IN15	Read only	Channel 15 measured value ibid.
40211	Model name	Read only	high: 0xAD low: 0x16
40221	Channel switch	read/write	high: channel switch (0xFF) low: channel switch (0xFF), 1=open, 0=close

table 6 Modbus RTU Register description

Module calibration and linear calibration:

The product has been calibrated and calibrated at the factory, and can be used directly by the user.

The user can also recalibrate the module, including offset calibration and gain calibration. When calibrating, the module needs to input the appropriate signal, and different input ranges require different input signals.

In addition, linear calibration can be performed again to improve the measurement accuracy of the full range. The calibration point of each channel is from P0 to P8, a total of nine.

To improve calibration and calibration accuracy, the following equipment is recommended for calibration and calibration:

In order to improve calibration and calibration accuracy, the following equipment is recommended for calibration and calibration:
1. A DC voltage/current signal source with stable output and low noise
2. A 5-bit or higher-precision voltage/current measuring instrument monitors the accuracy of the input signal

Calibration process

1. Select the default input channel 0 and connect the corresponding input signal according to the input range of the module.
The zero point is calibrated when 0 is input, and the full scale is calibrated at 100% of the input full scale. For example, when 4-20mA input, when zero is calibrated
Enter 0mA and enter 20mA when calibrating full scale. For example, when inputting 0-5V, input 0V when calibrating the zero point and 5V when calibrating the full scale.
2. Input the zero signal to the channel that the analog input module needs to calibrate, usually 0mA or 0V.
3. After the signal is stable, send the offset calibration command $AA0NN to the analog input module, where AA is the address and NN is the channel number.
4. Enter 100% of the full-scale current or voltage signal for the channel that the analog input module needs to calibrate.
5. After the signal is stable, send the gain calibration $AA1NN command to the analog input module.
6. Calibration complete

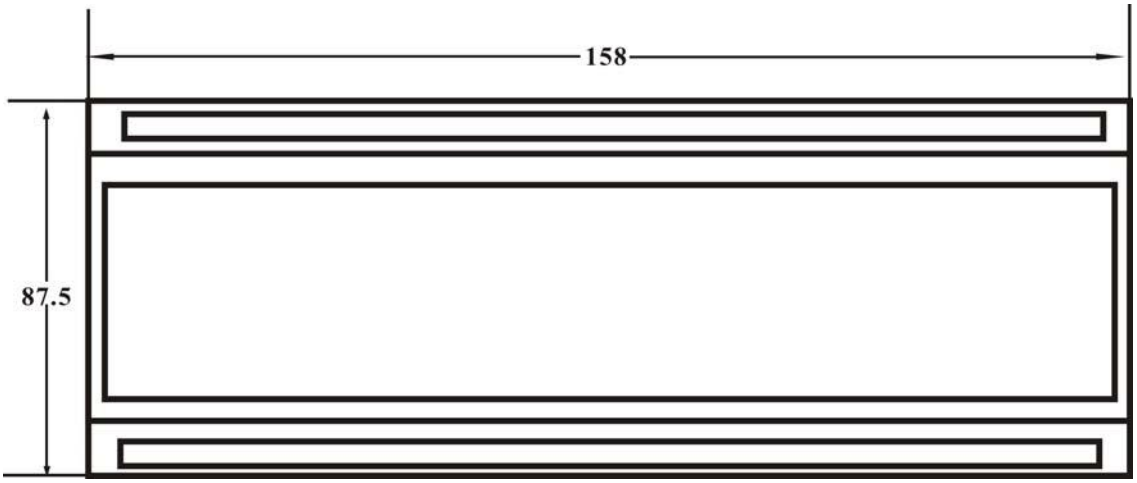
The calibration process and command response are as follows (take ISOAD16-A4 module (4-20mA) as an example)
1. Calibration point 0, adjust the input current to 0mA, enter the command @AANN00(cr), and the module responds to $AANN@P0 ok
2. Calibration point 1, adjust the input current to 1mA, enter the command @AANN01(cr), and the module responds to $AANN@P1 ok
3. Calibration point 2, adjust the input current to 2mA, enter the command @AANN02(cr), and the module responds to $AANN@P2 ok
4. Calibration point 3, adjust the input current to 3mA, enter the command @AANN03(cr), and the module responds to $AANN@P3 ok
5. .....

6. Calibration point 7, adjust the input current to 15mA, enter the command @AANN15(cr), and the module responds to $AANN@P7 ok

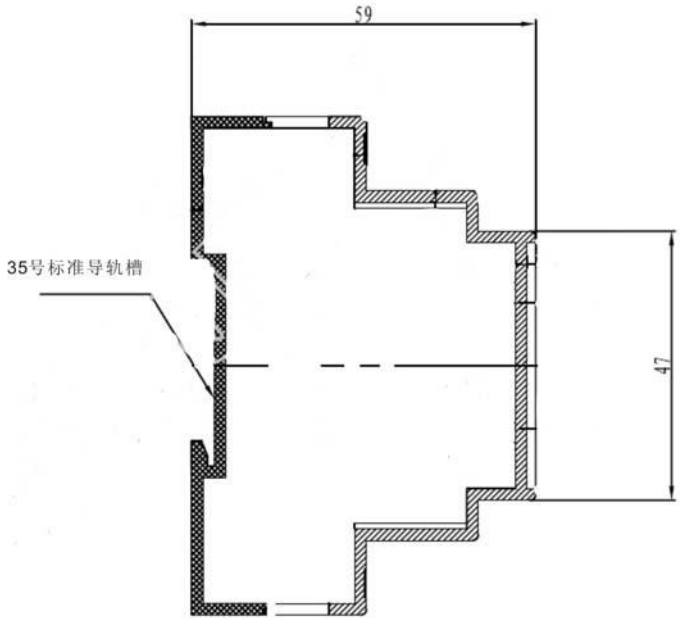
7. Calibration point 8, adjust the input current to 20mA, enter the command @AANN20(cr), and the module responds with $AANN@P8 ok END

size: (unit: mm)

ISOAD-16A 为 158*87.5*59mm



top view



Side view