CK-1021 CK-1041
CK-1101 CK-1121

誠控電子

DataSheet

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Summarize◆

DAM module is a new generation modular data collector based on embedded system. It adopts standard DIN35 rail installation method, which is easy to install on site and flexible to use; it can cope with various on-site applications. The module is equipped with an RS485 interface, which can communicate with a PC or PLC alone, or can be used in a network with multiple 485 modules.

CK-1xx1 load cell transmitter can collect up to 12-ch bridge load cells; the module adopts high-performance 24-bit AD chip, and the collection measurement accuracy is ±0.1%. It is suitable for collecting industrial field load cell signals.

CK-1xx1 adopts advanced magnetic technology to effectively ensure the reliability and safety of data collection.

Product characters◆

◆Embedded real-time operating system
◆Input channel: up to 12 four-wire load cells
◆Input sensitivity: 0.4mV/V~6mV/V
◆AD conversion resolution: 24 bits
◆Measurement accuracy: ±0.1% (typ.)
◆Conversion rate: 10 times/second (per channel)
◆Wide power supply range: DC 9～30V
◆Sensor excitation voltage: 5V
◆Address/baud rate can be configured by user
◆Support Modbus RTU protocol
◆Support CK-ASCII protocol
◆Support module to actively send data mode
◆±15KV ESD protection
◆Three-terminal isolation withstand voltage: ≥1500V DC between power/communication/analog input
◆Working temperature range: -40℃～80℃
◆Industrial grade ABS plastic housing, standard DIN35 rail installation

Applications◆

new retail terminal
Smart Logistics
automated factory
Material testing machine
Electronic platform scales, floor scales
Remote monitoring and data collection
Industrial Field Control
Warehousing and Monitoring
Packaging and Material Transfer
electronics manufacturing

Functional configuration◆

Model	CK-1021	CK-1041	CK-1101	CK-1121
Lode cell	2-ch	4-ch	10-ch	12-ch
RS485	Yes	Yes	Yes	Yes
RS232	Yes	Yes	No	No

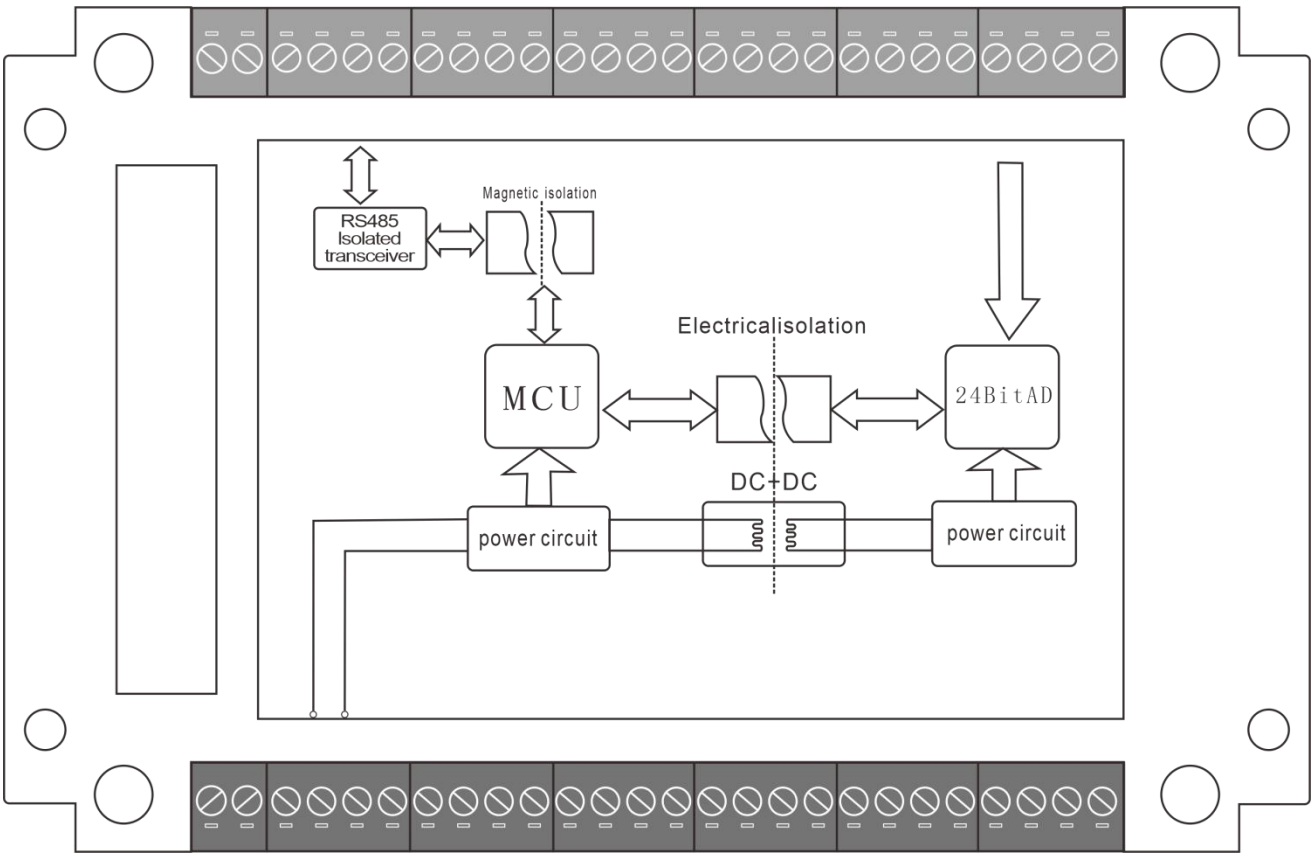
CONTENT

1 CK-1xx1 Introduction

CK-1xx1 is a load cell transmitter equipped with up to 12-ch 24-bit bridge weighing input . It is suitable for collecting industrial field load cell signals.

CK-1xx1 Module physical map

1.1 The working principle of the module



CK-1xx1Working principle block diagram

1.2 Isolation of Input and Output

The product is designed for industrial applications: through DC-DC conversion, the power supply of the measurement circuit and the main control circuit is isolated; at the same time, the control unit and the signal acquisition unit use magnetic isolation technology to achieve electrical isolation, effectively ensuring the reliability and safety of data acquisition.

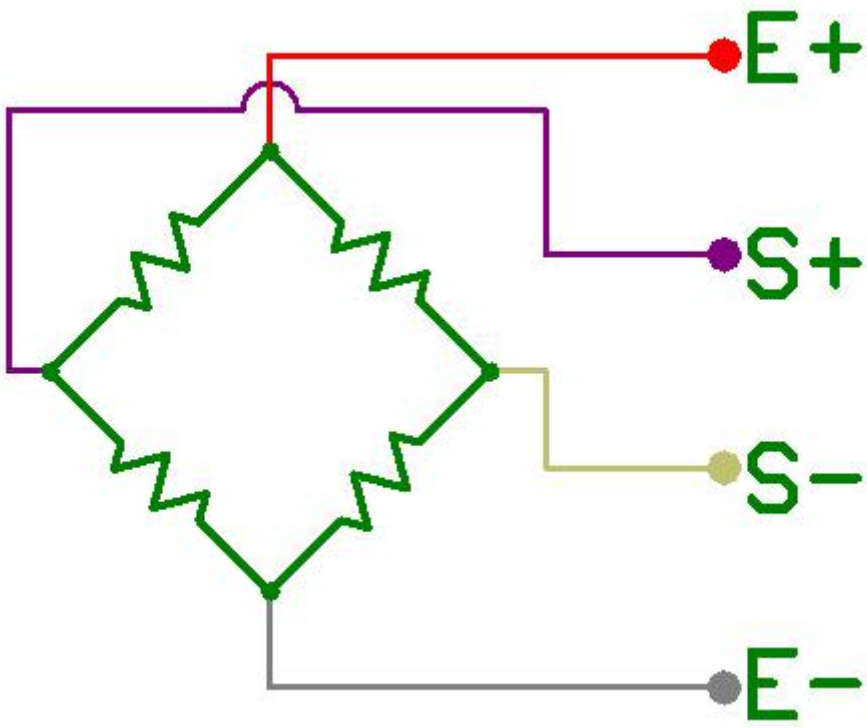
1.3 Surge Protection

The module is equipped with a transient suppression circuit, which can effectively suppress surge pulses and protect the module to work reliably in harsh environments.

2 Load cell input

The CK-1xx1 modules are configured with up to 12-ch bridge load cell inputs. The analog output is 5V excitation voltage, and the sensor does not need external excitation.

2.1 Load cell input wiring



CK-1xx1Analog input wiring diagram

The load cell input is Wheatstone bridge input, and the wiring method is:

Sensor Pin Definition	Corresponding module terminal definition
Power+	E+
Power -	E-
Signal+	S+
Signal-	S-

The excitation voltage required by the sensor is provided by the E+, E- terminals.

2.2 Sensor input data format

2.2.1 CK-ASCII Data Format

When using the CK-ASCII command to read the module data, the module directly returns the conversion result in ASCII code. The returned result starts with ">", and uses <\r\n>end. The unit of the returned data is the range unit used when the user calibrates. For example, the maximum range of the sensor calibrated by the user is 1000g, and the unit returned by the module is grams. The number of decimal places of the returned data can be set by the user, after setting, the number of decimal places will not be adjusted due to the size of the measurement value.

2.2.2 Modbus-RTU Data Format

0x01EBDEC0 ÷ 10000 = 32235200 ÷ 10000 = 3223.52kg

The sampled value of each channel is represented by 2 modbus input holding registers combined into a signed 32-bit integer representation, using an integer to represent a fixed-point decimal with 4 decimal points, that is, the modbus read result divided by 10000 is the actual sample value of the channel .

For example: the maximum range of the analog input channel 0 calibration of the module is 5000kg, and the input value of the channel 0 read by the Modbus protocol is 0x01EBDEC0, then the actual acquisition value of the analog input channel 0 of the module is calculated as follows:

0x01EBDEC0 ÷ 10000 = 32235200 ÷ 10000 = 3223.52kg

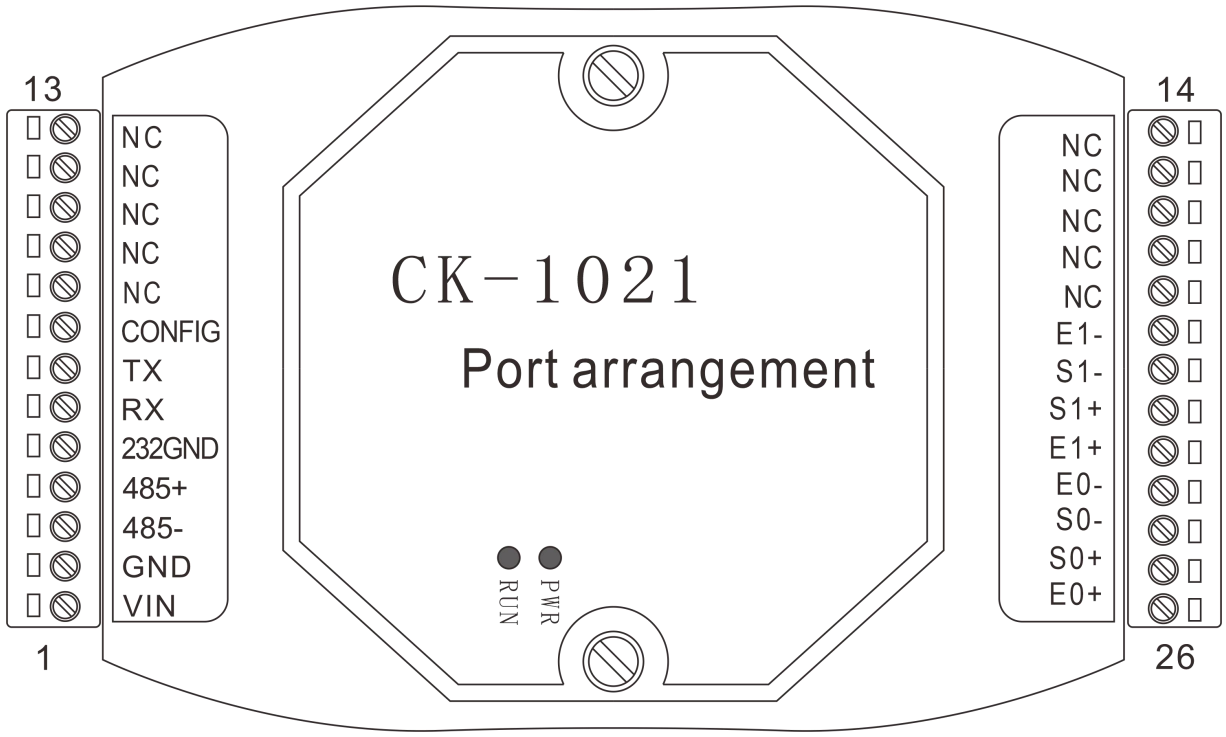
Bit31	Bit30~Bit0
sign bit	data bit

Analog input Modbus 32-bit data format

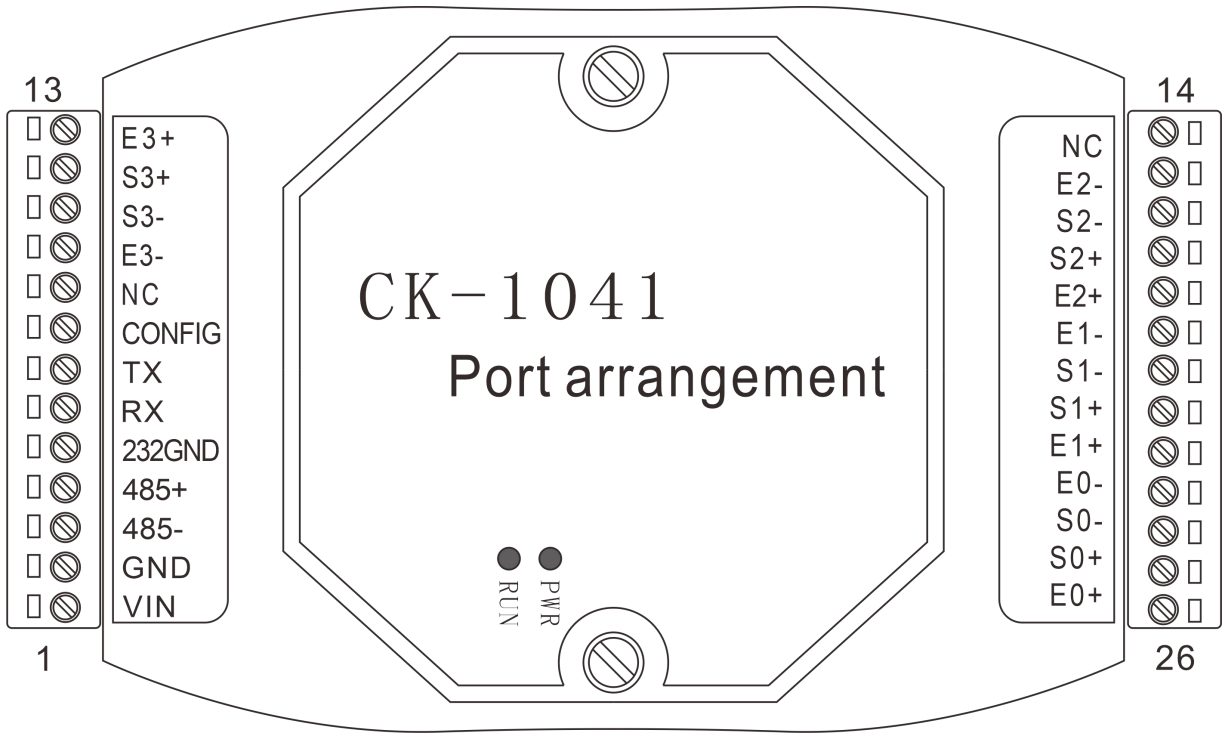
Definition of sign bit: =1: the measured value is negative; =0: the measured value is positive.

3 Port Information

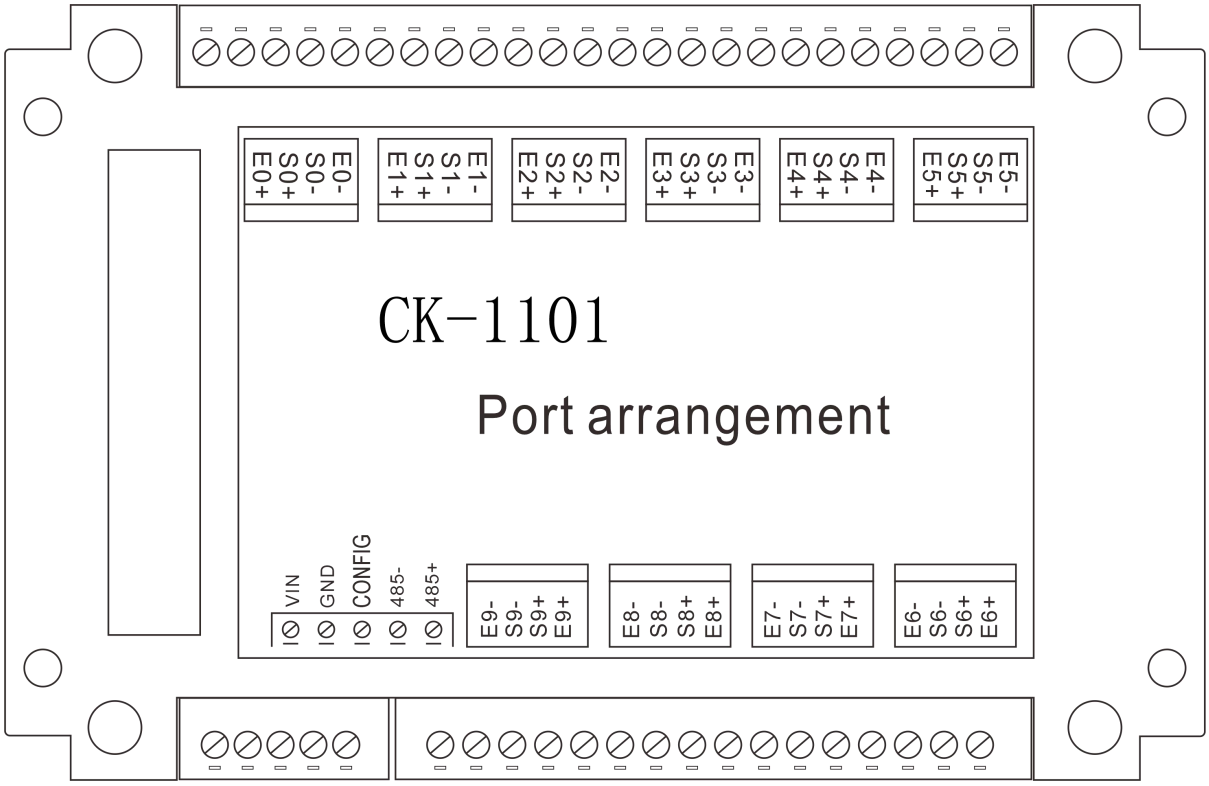
3.1 CK-1101 Port Arrangement



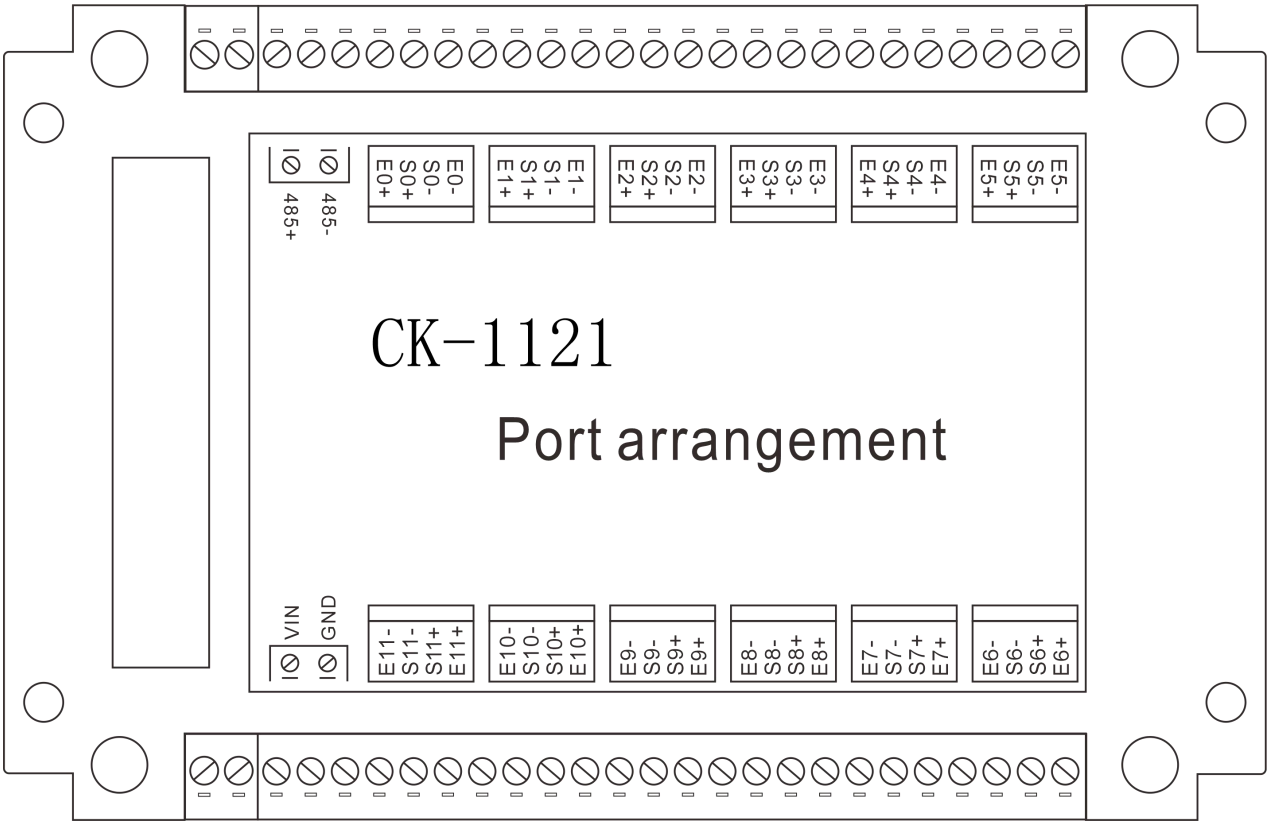
CK-1021Module Port Location Diagram



CK-1041 Module Port Location Diagram



CK-1101 Module Port Location Diagram



CK-1121 Module Port Location Diagram

3.2 CK-1XX1 Port Description

CK-1xx1 Module Port Location Diagram

whether to include ports				Port Mark	Port Function
CK-1021	CK-1041	CK-1101	CK-1121		
√	√	√	√	VIN	Power input+
√	√	√	√	GND	Power Ground
√	√	√	√	CONFIG	Configuration Port
√	√	√	√	B	RS485 signal input-
√	√	√	√	A	RS485 signal input+
√	√	-	-	GND-ISO	RS232 Ground
√	√	-	-	RX	RS232 receive port
√	√	-	-	TX	RS232 send port
√	√	√	√	E0+	Channel 0 Excitation Power Out+
√	√	√	√	S0+	Channel 0 signal input+
√	√	√	√	S0-	Channel 0 signal input-
√	√	√	√	E0-	Channel 0 Excitation Power Out-
√	√	√	√	E1+	Channel 1 Excitation Power Out+
√	√	√	√	S1+	Channel 1 signal inpu t+
√	√	√	√	S1-	Channel 1 signal input-
√	√	√	√	E1-	Channel 1 Excitation Power Out-
-	√	√	√	E2+	Channel 2 Excitation Power Out+
-	√	√	√	S2+	Channel 2 signal input-
-	√	√	√	S2-	Channel 0 signal input+
-	√	√	√	E2-	Channel 2 Excitation Power Out-
-	√	√	√	E3+	Channel 3 Excitation Power Out+
-	√	√	√	S3+	Channel 3 signal input+
-	√	√	√	S3-	Channel 0 signal input-

-	√	√	√	E3-	Channel 3 Excitation Power Out-
-	√	√	√	E4+	Channel 4 Excitation Power Out+
-	√	√	√	S4+	Channel 4 signal input+
-	√	√	√	S4-	Channel 0 signal input-
-	√	√	√	E4-	Channel 4 Excitation Power Out-
-	-	√	√	E5+	Channel 5 Excitation Power Out+
-	-	√	√	S5+	Channel 5 signal input+
-	-	√	√	S5-	Channel 5 signal input-
-	-	√	√	E5-	Channel 5 Excitation Power Out-
-	-	√	√	E6+	Channel 6 Excitation Power Out+
-	-	√	√	S6+	Channel 6 signal input+
-	-	√	√	S6-	Channel 0 signal input-
-	-	√	√	E6-	Channel 6 Excitation Power Out-
-	-	√	√	E7+	Channel 7 Excitation Power Out+
-	-	√	√	S7+	Channel 7 signal input+
-	-	√	√	S7-	Channel 0 signal input-
-	-	√	√	E7-	Channel 7 Excitation Power Out-
-	-	√	√	E8+	Channel 8 Excitation Power Out+
-	-	√	√	S8+	Channel 8 signal input+
-	-	√	√	S8-	Channel 0 signal input-
-	-	√	√	E8-	Channel 8 Excitation Power Out-
-	-	√	√	E9+	Channel 9 Excitation Power Out+
-	-	√	√	S9+	Channel 9 signal input+
-	-	√	√	S9-	Channel 0 signal input-
-	-	√	√	E9-	Channel 9 Excitation Power Out-
-	-	-	√	E10+	Channel 10 Excitation Power Out+
-	-	-	√	S10+	Channel 10 signal input+
-	-	-	√	S10-	Channel 10 signal input-
-	-	-	√	E10-	Channel 10 Excitation Power Out-

-	-	-	√	E11+	Channel 11 Excitation Power Out+
-	-	-	√	S11+	Channel 11 signal input+
-	-	-	√	S11-	Channel 11 signal input-
-	-	-	√	E11-	Channel 11 Excitation Power Out-

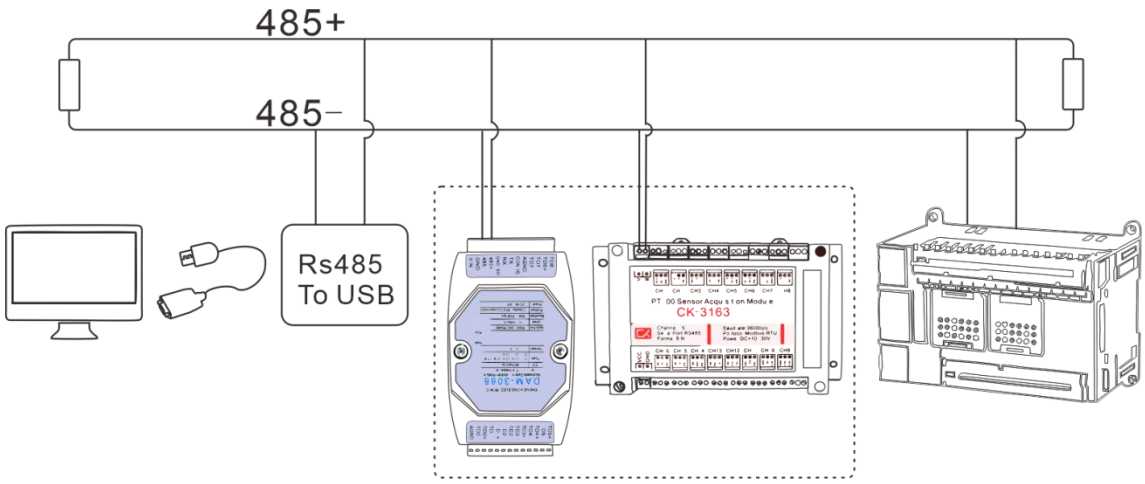
4 Communication

4.1 Communication Port

CK-1xx1 is equipped with 1 channel RS485; RS485 can be connected to PLC or other hosts individually, or it can be connected to PLC or other hosts after networking with multiple modules.

4.1.1 RS485 Wiring

The RS485 of DAM system module is standard RS485 interface.

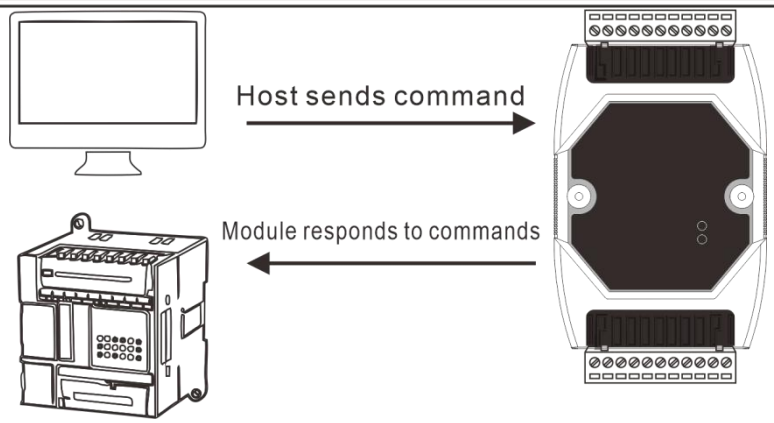


Schematic diagram of network connection between DAM module and other devices through RS485 interface

4.2 Communication Mode

4.2.1 Master-Slave Mode

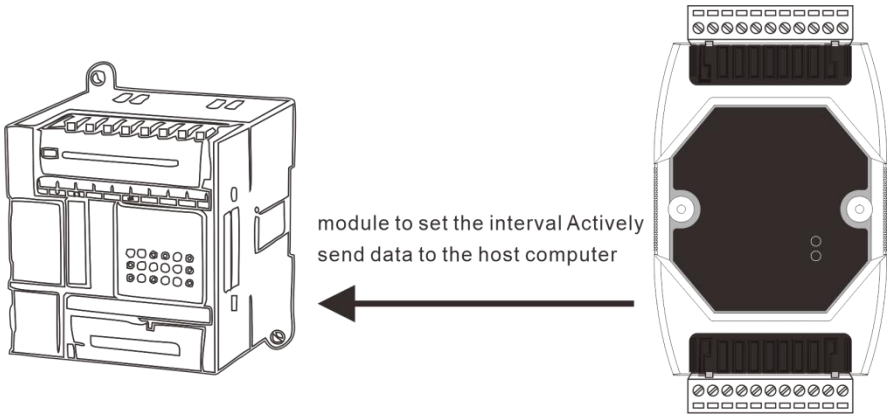
The communication mode of CK-1xx1 module is usually master-slave mode (one-question-one-answer mode); the host sends commands to the module through the communication interface, and the module responds accordingly after receiving the correct command.



Master-slave mode

4.2.2 Active mode

CK-1xx1 can also set the module to active mode (the module actively sends data to the host) through commands, the time interval can be set by the user, and the time range of actively sending data is: 100 ~ 999999mS. This mode cannot be applied to multi-module networking, otherwise it will cause bus conflict.



Active mode

4.3 Communication Parameters

4.3.1 Communication Address

The communication address range of CK-1xx1 module is 01~FC(1~252), and the module address is factory set to 01; the communication address of the module can be modified by the user through commands according to the needs of the site. For the specific method, please refer to the corresponding commands.

4.3.2 Communication Baud Rate

CK-1xx1 module RS485 supports baud rate: 1200bps, 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps; the communication rate of the module can be modified by the user through commands according to the needs of the site.

4.4 Communication Protocol

4.4.1 CK-ASCII Protocol

DAM module supports CK-ASCII protocol, users can easily read measurement data and configure module parameters through simple ASCII commands, such as address (0x01~0xFC), baud rate (1200bps, 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps), checksum status, channel on or off, etc. When conditions permit, the user can also perform field calibration of the module through ASCII commands.

4.4.2 Modbus RTU Protocol

The module supports the industry standard Modbus RTU protocol, and can work in the Modbus slave state. It can communicate with various brands of PLC, touch screen, industrial computer and PC. The Modbus commands supported by CK-1xx1 are as follows:

Serial No.	Command (HEX)	Function	Remark
1	03	Read module AD conversion result and module information	
2	06	Write channel configuration single register	
3	10	Continuously write channels to configure multiple registers	

The DAM module MODBUS address allocation table is as follows:

Command（HEX）	Register Address（HEX）	Corresponding PLC Address（DEC）	Data Explanation
03	0000	40001	Read module model
03	0001	40002	Read analog input channel switch

Command（HEX）	Register Address（HEX）	Corresponding PLC Address（DEC）	Data Explanation
03	2000	48193	Read module model
03	2001	48194	Read analog input channel switch
03	2002	48195	Read channel 0 conversion result bit31~16
03	2003	48196	Read channel 0 conversion result bit15~0
03	2004	48197	Read channel 1conversion result bit31~16
03	2005	48198	Read channel 1 conversion result bit15~0
03	2006	48199	Read channel 2 conversion result bit31~16
03	2007	48200	Read channel 2 conversion result bit15~0
03	2008	48201	Read channel 3 conversion result bit31~16
03	2009	48202	Read channel 3 conversion result bit15~0
03	200A	48203	Read channel 4 conversion result bit31~16
03	200B	48204	Read channel 4 conversion result bit15~0
03	200C	48205	Read channel 5 conversion result bit31~16
03	200D	48206	Read channel 5 conversion result bit15~0
03	200E	48207	Read channel 6 conversion result bit31~16
03	200F	48208	Read channel 6 conversion result bit15~0
03	2010	48209	Read channel 7 conversion result bit31~16
03	2011	48210	Read channel 7 conversion result bit15~0
03	2012	48211	Read channel 8 conversion result bit31~16
03	2013	48212	Read channel 8 conversion result bit15~0
03	2014	48213	Read channel 9 conversion result bit31~16
03	2015	48214	Read channel 9 conversion result bit15~0
03	2016	48215	Read channel 10 conversion result bit31~16
03	2017	48216	Read channel 10 conversion result bit15~0
03	2018	48217	Read channel 11 conversion result bit31~16
03	2019	48218	Read channel 11 conversion result bit15~0

Command（HEX）	Register Address（HEX）	Corresponding PLC Address（DEC）	Data Explanation
03/06/10	2202	48707	Read and write channel 0 no-load calibration bit31~16
03/06/10	2203	48708	Read and write channel 0 no-load calibration bit15~0
03/06/10	2204	48709	Read and write channel 1 no-load calibration bit31~16
03/06/10	2205	48710	Read and write channel 1 no-load calibration bit15~0
03/06/10	2206	48711	Read and write channel 2 no-load calibration bit31~16
03/06/10	2207	48712	Read and write channel 2 no-load calibration bit15~0
03/06/10	2208	48713	Read and write channel 3 no-load calibration bit31~16
03/06/10	2209	48714	Read and write channel 3 no-load calibration bit15~0
03/06/10	220A	48715	Read and write channel 4 no-load calibration bit31~16
03/06/10	220B	48716	Read and write channel 4 no-load calibration bit15~0
03/06/10	220C	48717	Read and write channel 5 no-load calibration bit31~16
03/06/10	220D	48718	Read and write channel 5 no-load calibration bit15~0
03/06/10	220E	48719	Read and write channel 6 no-load calibration bit31~16
03/06/10	220F	48720	Read and write channel 6 no-load calibration bit15~0
03/06/10	2210	48721	Read and write channel 7 no-load calibration bit31~16
03/06/10	2211	48722	Read and write channel 7 no-load calibration bit15~0
03/06/10	2212	48723	Read and write channel 8 no-load calibration bit31~16
03/06/10	2213	48724	Read and write channel 8 no-load calibration bit15~0
03/06/10	2214	48725	Read and write channel 9 no-load calibration

Command（HEX）	Register Address（HEX）	Corresponding PLC Address（DEC）	Data Explanation
			bit31~16
03/06/10	2215	48726	Read and write channel 9 no-load calibration bit15~0
03/06/10	2216	48727	Read and write channel 10 no-load calibration bit31~16
03/06/10	2217	48728	Read and write channel 10 no-load calibration bit15~0
03/06/10	2218	48729	Read and write channel 11 no-load calibration bit31~16
03/06/10	2219	48730	Read and write channel 11 no-load calibration bit15~0
03/06/10	2402	49219	Read and write channel 0 full load calibration bit31~16
03/06/10	2403	49220	Read and write channel 0 full load calibration bit15~0
03/06/10	2404	49221	Read and write channel 1 full load calibration bit31~16
03/06/10	2405	49222	Read and write channel 1 full load calibration bit15~0
03/06/10	2406	49223	Read and write channel 2 full load calibration bit31~16
03/06/10	2407	49224	Read and write channel 2 full load calibration bit15~0
03/06/10	2408	49225	Read and write channel 3 full load calibration bit31~16
03/06/10	2409	49226	Read and write channel 3 full load calibration bit15~0
03/06/10	240A	49227	Read and write channel 4 full load calibration bit31~16
03/06/10	240B	49228	Read and write channel 4 full load calibration bit15~0
03/06/10	240C	49229	Read and write channel 5 full load calibration bit31~16
03/06/10	240D	49230	Read and write channel 5 full load calibration bit15~0
03/06/10	240E	49231	Read and write channel 6 full load calibration bit31~16

Command（HEX）	Register Address（HEX）	Corresponding PLC Address（DEC）	Data Explanation
03/06/10	240F	49232	Read and write channel 6 full load calibration bit15~0
03/06/10	2410	49233	Read and write channel 7 full load calibration bit31~16
03/06/10	2411	49234	Read and write channel 7 full load calibration bit15~0
03/06/10	2412	49235	Read and write channel 8 full load calibration bit31~16
03/06/10	2413	49236	Read and write channel 8 full load calibration bit15~0
03/06/10	2414	49237	Read and write channel 9 full load calibration bit31~16
03/06/10	2415	49238	Read and write channel 9 full load calibration bit15~0
03/06/10	2416	49239	Read and write channel 10 full load calibration bit31~16
03/06/10	2417	49240	Read and write channel 10 full load calibration bit15~0
03/06/10	2418	49241	Read and write channel 11 full load calibration bit31~16
03/06/10	2419	49242	Read and write channel 11 full load calibration bit15~0
03/06/10	2442	49283	Read and write channel 0 sensor sensitivity bit31~16
03/06/10	2443	49284	Read and write channel 0 sensor sensitivity bit15~0
03/06/10	2444	49285	Read and write channel 1 sensor sensitivity bit31~16
03/06/10	2445	49286	Read and write channel 1 sensor sensitivity bit15~0
03/06/10	2446	49287	Read and write channel 2 sensor sensitivity bit31~16
03/06/10	2447	49288	Read and write channel 2 sensor sensitivity bit15~0
03/06/10	2448	49289	Read and write channel 3 sensor sensitivity bit31~16
03/06/10	2449	49290	Read and write channel 3 sensor sensitivity bit15~0
03/06/10	244A	49291	Read and write channel 4 sensor sensitivity

Command（HEX）	Register Address（HEX）	Corresponding PLC Address（DEC）	Data Explanation
			bit31~16
03/06/10	244B	49292	Read and write channel 4 sensor sensitivity bit15~0 Read and write channel 4 sensor sensitivity bit15~0
03/06/10	244C	49293	Read and write channel 5 sensor sensitivity bit31~16
03/06/10	244D	49294	Read and write channel 5 sensor sensitivity bit15~0
03/06/10	244E	49295	Read and write channel 6 sensor sensitivity bit31~16
03/06/10	244F	49296	Read and write channel 6 sensor sensitivity bit15~0
03/06/10	2450	49297	Read and write channel 7 sensor sensitivity bit31~16
03/06/10	2451	49298	Read and write channel 7 sensor sensitivity bit15~0
03/06/10	2452	49299	Read and write channel 8 sensor sensitivity bit31~16
03/06/10	2453	49300	Read and write channel 8 sensor sensitivity bit15~0
03/06/10	2454	49301	Read and write channel 9 sensor sensitivity bit31~16
03/06/10	2455	49302	Read and write channel 9 sensor sensitivity bit15~0
03/06/10	2456	49303	Read and write channel 10 sensor sensitivity bit31~16
03/06/10	2457	49304	Read and write channel 10 sensor sensitivity bit15~0
03/06/10	2458	49305	Read and write channel 11 sensor sensitivity bit31~16
03/06/10	2459	49306	Read and write channel 11 sensor sensitivity bit15~0
03/06/10	2482	49347	Read and write channel 0 sensor range bit31~16
03/06/10	2483	49348	Read and write channel 0 sensor range bit15~0
03/06/10	2484	49349	Read and write channel 1 sensor range bit31~16
03/06/10	2485	49350	Read and write channel 1 sensor range bit15~0
03/06/10	2486	49351	Read and write channel 2 sensor range bit31~16

Command（HEX）	Register Address（HEX）	Corresponding PLC Address（DEC）	Data Explanation
03/06/10	2487	49352	Read and write channel 2 sensor range bit15~0
03/06/10	2488	49353	Read and write channel 3 sensor range bit31~16
03/06/10	2489	49354	Read and write channel 3 sensor range bit15~0
03/06/10	248A	49355	Read and write channel 4 sensor range bit31~16
03/06/10	248B	49356	Read and write channel 4 sensor range bit15~0
03/06/10	248C	49357	Read and write channel 5 sensor range bit31~16
03/06/10	248D	49358	Read and write channel 5 sensor range bit15~0
03/06/10	248E	49359	Read and write channel 6 sensor range bit31~16
03/06/10	248F	49360	Read and write channel 6 sensor range bit15~0
03/06/10	2490	49361	Read and write channel 7 sensor range bit31~16
03/06/10	2491	49362	Read and write channel 7 sensor range bit15~0
03/06/10	2492	49363	Read and write channel 8 sensor range bit31~16
03/06/10	2493	49364	Read and write channel 8 sensor range bit15~0
03/06/10	2494	49365	Read and write channel 9 sensor range bit31~16
03/06/10	2495	49366	Read and write channel 9 sensor range bit15~0
03/06/10	2496	49367	Read and write channel 10 sensor range bit31~16
03/06/10	2497	49368	Read and write channel 10 sensor range bit15~0
03/06/10	2498	49369	Read and write channel 11 sensor range bit31~16
03/06/10	2499	49370	Read and write channel 11 sensor range bit15~0

5 CK-ASCII command set

Module ASCII commands are divided into Common commands and configuration commands. There are usually two types of Common commands: (1) module data or information read, (2) module analog or digital output; configuration commands are usually commands to change module parameters.

5.1 Common Commands

5.1.1 List of Common Commands

Serial NO.	Function	Command	Remark
1	Read all channel data command	#aa<\r\n>	
2	Read Single Channel Data Command	#aan<\r\n>	
8	Set the read data command to return the decimal point position	#aaSUDC *<\r\n>	MODBUS-RTUOnly valid for ASCII, does not affect MODBUS-RTU
9	Read and write no-load calibration	#aaSUZC *<\r\n>	
10	Read and write full load calibration	#aaSUGC *<\r\n>	
11	Read and write sensor sensitivity	#aaSUSC *<\r\n>	
12	Read and write sensor rated range	#aaSURC *<\r\n>	

5.1.2 Command of read analog input

5.1.2.1 Command of read all channel data

Command Format	#aa<\r\n>	
Command length	5 characters	
command	Aa	The hexadecimal address of the module, the address range is 01～F7

explanation	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A
Application notice	aa must be 2 bit, such as #01<\r\n> cannot be written as #1<\r\n>	

e.g.:

Command	**Command explanation**
#01<\r\n>	Read all channel AD data whose module address is 01
#F1<\r\n>	Read all channel AD data whose module address is F1

5.1.2.2 Read Single Channel Data Command

command format	#aan<\r\n>	
command length	6 characters	
command explanation	Aa	The hexadecimal address of the module, the address range is 01～FF
	N	the number of module channels, the channel range is 0～F
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A
Application notice	aa must be 2 digits, such as #01<\r\n> cannot be written as #1<\r\n> n can only be 1 bit, the number of channels is counted from 0, not from 1	

E.g>:

command	**command explanation**
#011<\r\n>	Read the AD data of the first channel whose module address is 01
#F12<\r\n>	Read the AD data of the second channel whose module address is F1

5.1.2.3 Set the read data command to return the decimal point position

command format	#aaSUDC *<\r\n>	
command length	When setting one channel: 11 bytes When setting N channels: 11+2×N bytes	
command explanation	aa	The hexadecimal address of the module, the address range is 01～FF
	SUD	Command Keyword
	C	The channel being set: 0: 0th channel 1: 1st channel ... E: Channel 14 F: 15th channel S: All channels
	*	Set the position of the decimal point: 0: no decimal point 1-4 represent 1-4 decimal places respectively When setting a single channel, you need to fill in one data; when setting all channels, you need to fill in the data of all channels in turn, and separate the channels with a space.
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A

Application Notice	

Command Return

Return Format	!aaxxxx <\r\n>	
Data length	9	
Data Explanation	s	! :execution succeed ?: Execution failed
	aa	The hexadecimal address of the module, the address range is 01～FF
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A

5.1.2.4 Read and write no-load calibration

command format	#aaSUZC *<\r\n>	
command length	at least 11 characters	
command explanation	aa	The hexadecimal address of the module, the address range is 01～FF
	SUZ	Command Keyword
	C	The channel being set: 0: 0th channel 1: 1st channel ... E: Channel 14 F: 15th channel

		S: All channels
	*	Read: 1 question mark (?), only one question mark is required for a single channel or multiple channels. When writing: ‘C’: Clear the no-load calibration set by the user, the system defaults to 0. ‘:’ colon: automatic calibration according to the current weighing, only one colon is required for a single channel or multiple channels. (At this time, the load cell should be kept empty.) Number: Set the calibration number directly. When setting a single channel, you need to fill in one data; when setting all channels, you need to fill in the data of all channels in turn, and separate the channels with a space.
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A
Application Notice	The sensor load is empty time calibration	

Command Return

Return Format	!aaxxxx <\r\n>	
Data length	9 characters	
Data Explanation	s	! :execution succeed ?: Execution failed
	aa	The hexadecimal address of the module, the address range is 01～FF
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A

E.G:

Send Command	**Command Explanation**
#01SUZ0 ?<\r\n>	Read 0 channel no-load standard customization
#01SUZS ?<\r\n>	Read all channel no-load standard customization
#01SUZ0 :<\r\n>	Automatically calibrate channel 0 no-load weighing according to the current load
#01SUZS :<\r\n>	Automatically calibrate the no-load weighing of all channels according to the current load

5.1.2.5 Read and write full calibration

command format	#aaSUGC *<\r\n>	
command length	at least 11 characters	
command explanation	aa	The hexadecimal address of the module, the address range is 01～FF
	SUZ	Command Keyword
	C	The channel being set: 0: 0th channel 1: 1st channel ... E: Channel 14 F: 15th channel S: All channels
	*	Read: 1 question mark (?), only one question mark is required for a single channel or multiple channels. When writing:

		‘C’: Clear the full load calibration set by the user, the system defaults to 1. Numeric: The weight of the current external load. The module automatically calculates the calibration value using the current external load. Reading this value does not read the payload value entered by the user, just a value associated with the user input. When setting a single channel, you need to fill in one data; when setting all channels, you need to fill in the data of all channels in turn, and separate the channels with a space.
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A
Application notice	The sensor is calibrated after placing the rated load.	

Command Return:

Return Format	!aaxxxx <\r\n>	
Data length	9	
Data explanation	s	! :execution succeed ?: Execution failed
	aa	The hexadecimal address of the module, the address range is 01～FF
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A

E.g.:

Send Command	**Command Explanation**
#01SUG0 ?<\r\n>	Read 0 channel full load standard customization
#01SUGS ?<\r\n>	Read all channels fully loaded standard customization

#01SUG0 1000<\r\n>	According to the load 1000 automatic calibration channel 0 full load weighing
#01SUGS 1000 1000 1000 1000 1000 1000 1000 1000 2000 2000<\r\n>	The no-load weighing of all channels is automatically calibrated according to the current load. The sensor has a total of 10 channels, the current load of the first 8 channels is 1000, and the current load of the last 2 channels is 2000.

5.1.2.6 Read and write sensor sensitivity

command format	#aaSUSC *<\r\n>	
command length	at least 11 characters	
command explanation	aa	The hexadecimal address of the module, the address range is 01～FF
	SUS	command keyword
	C	The channel being set: 0: 0th channel 1: 1st channel ... E: Channel 14 F: 15th channel S: All channels
	*	Read: 1 question mark (?), only one question mark is required for a single channel or multiple channels. When writing: ‘C’: Clear the sensitivity value set by the user, the system defaults to 1. Numeric: Set the sensitivity value of the sensor.

		When setting a single channel, you need to fill in one data; when setting all channels, you need to fill in the data of all channels in turn, and separate the channels with a space.
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A
Application notice	Fill in the sensitivity value on the sensor manufacturer's calibration certificate, in millivolts, and the system defaults to 1mv/V. When applying the rated load to the sensor for calibration, this item does not need to be filled in. For details, see the chapters related to sensor calibration.	

Command Return:

Return Format	!aaxxxx <\r\n>	
Data length	9 characters	
Data Explanation	s	! :execution succeed ?: Execution failed
	aa	The hexadecimal address of the module, the address range is 01～FF
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A

5.1.2.10 Read and write rated range of sensor

command format	#aaSURC *<\r\n>	
command length	At least 11 characters	
command	aa	The hexadecimal address of the module, the address range is 01～FF

explanation	SUR	Command Keyword
	C	The channel being set: 0: 0th channel 1: 1st channel ... E: Channel 14 F: 15th channel S: All channels
	*	Read: 1 question mark (?), only one question mark is required for a single channel or multiple channels. When writing: ‘C’: Clear the range value set by the user, the system defaults to 1 Number: Set the range value of the sensor. When setting a single channel, you need to fill in one data; when setting all channels, you need to fill in the data of all channels in turn, and separate the channels with a space.
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A
Application notice	Fill in the range value on the sensor manufacturer's calibration certificate, the system defaults to 1. When applying the rated load to the sensor for calibration, this item does not need to be filled in. For details, please refer to the relevant chapters on sensor calibration.	

Command Return:

Return Format	!aaxxxx <\r\n>
Data length	9 characters

Data explanation	s	! :execution succeed ?: Execution failed
	aa	The hexadecimal address of the module, the address range is 01～FF
	<\r\n>	Line feed and carriage return, the command ends, the hexadecimal number corresponding to its ASCII code is 0x0D 0x0A

6 Sensor Calibration

The load cell acquisition module needs to calibrate the external sensor before use.

The module has two calibration methods, the first is to calibrate the sensitivity and range on the sensor calibration certificate, and the second is to calibrate the no-load and full-load values of the sensor under two load conditions: no-load and full-load. When the user performs calibration, he can choose one method to calibrate.

Take the MODBUS protocol as an example to illustrate the sensor calibration method.

6.1 The first calibration method

6.1.1 Setting the sensitivity

Query the sensor calibration certificate to obtain the sensor sensitivity, multiply the sensitivity by 10000 and write it to the corresponding MODBUS register.

6.1.2 Setting the range

Query the sensor calibration certificate to obtain the sensor range, multiply the range by 10000 and write it to the corresponding MODBUS register

6.1.3 Calibration example

Assume that the calibration certificate of the sensor connected to channel 0 shows that the sensitivity of the sensor is 0.8151mV/V and the range is 80KN.

① To set the sensitivity, write 8151 (0x1FD7) to the 0x2442, 0x2443 registers.

Command: 01 10 24 42 00 02 04 00 00 1F D7 95 29

② Set the range, and write 800000 (0xC3500) to the 0x2482, 0x2483 registers.

Command: 01 10 24 82 00 02 04 00 0C 35 00 06 44

③ Calibration is completed.

6.2 The second calibration method

6.2.1 No-load calibration

①Confirm that the sensor load is no-load before calibration.

②Write 0x7735 9400 to the no-load calibration register of the corresponding sensor channel.

0x7735 9400 is a specific flag: used to instruct the sensor to automatically calculate the no-load calibration value.

6.2.2 Full load calibration

①Confirm that the sensor no-load calibration has been completed before calibration.

②Confirm that the sensor load is full load before calibration, and record the full load value as x.

③Write an integer value of x×10000 to the full-load calibration register of the corresponding sensor channel, and the value should not be greater than 999,999,999.

For example: the full load sensor load is 2000g, then write 2000*10000 = 20000000. Note that x cannot be 0.

6.2.3 Clear calibration value

Write 0x7735 9500 to the no-load calibration register to clear the no-load calibration value set by the user.

Write 0x7735 9500 to the full-load calibration register to clear the full-load calibration value set by the user.

6.2.4 Calibration example

①Sensor channel 0 does not place heavy objects and is in an unloaded state.

②Query the MODBUS address allocation table and find that the no-load calibration register of sensor 0 is 0x2202, 0x2203.

Continuously write function code 0x10 to 0x2202, 0x2203 and write 0x7735 9400 respectively.

MODBUS communication command: 01 10 22 02 00 02 04 77 35 94 00 97 AD

③The sensor is put into the standard load of 200kg.

④ Query the MODBUS address allocation table and find that the full-load calibration register of sensor 0 is 0x2402, 0x2403.

The standard load put in is 200kg, then 200*10000 = 2000000 = 0x1E8480

Continuously write function codes 0x2402 and 0x2403 into 0x001E 8480 respectively.

MODBUS communication command: 01 10 24 02 00 02 04 00 1E 84 80 DB D1

⑤ Calibration has been completed.

7 Electrical parameters

Unless otherwise specified, the electrical parameters of the CK-1xx1 data acquisition module are the values when Tamb=25℃.

7.1 Module parameters

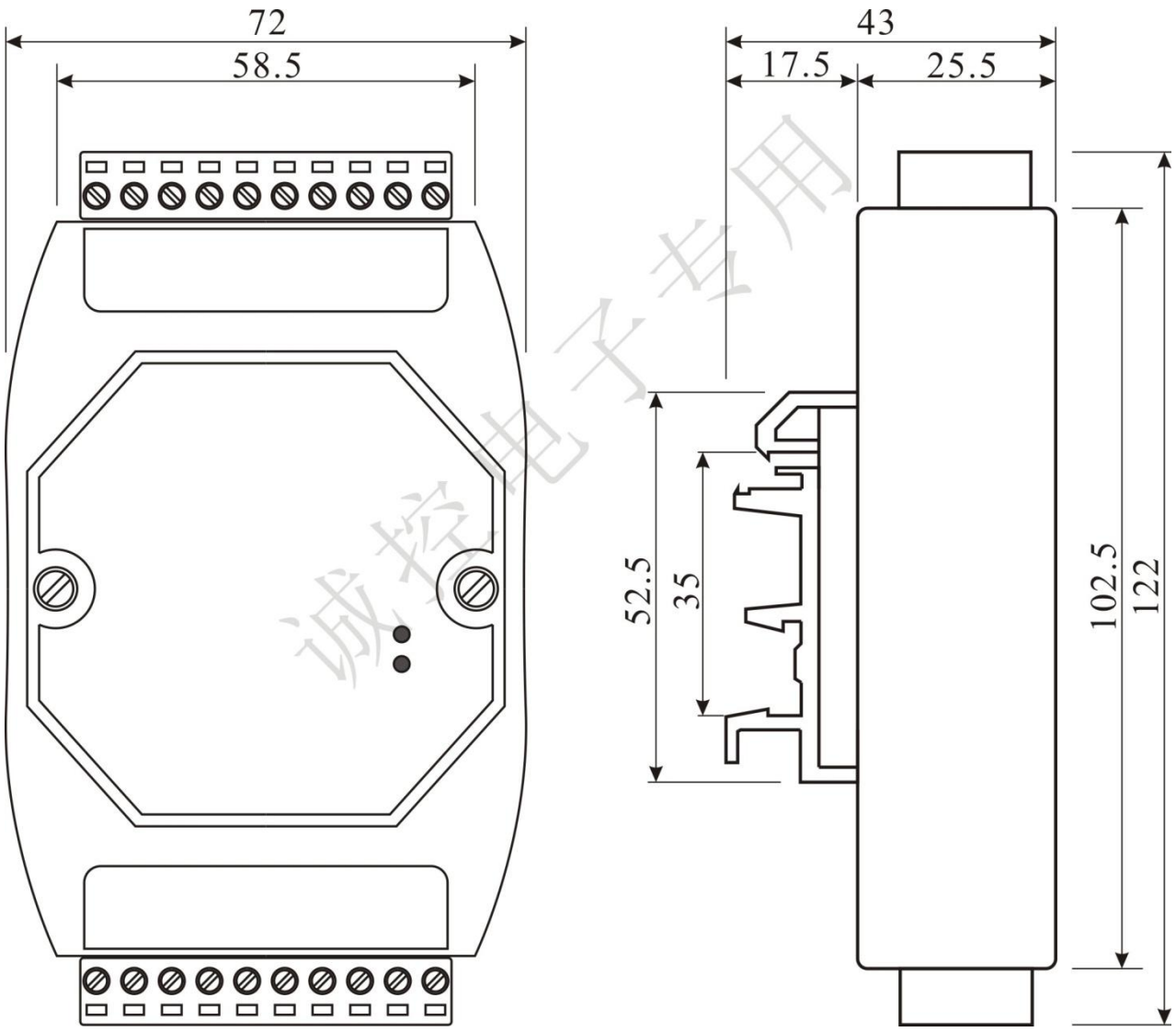
Parameter	Min	Typ	Max	Unit
Power Supply	+9	---	+30	V
Watchdog Period		1		S
Input Protect		100/60		mA/V

7.2 Analog input parameters

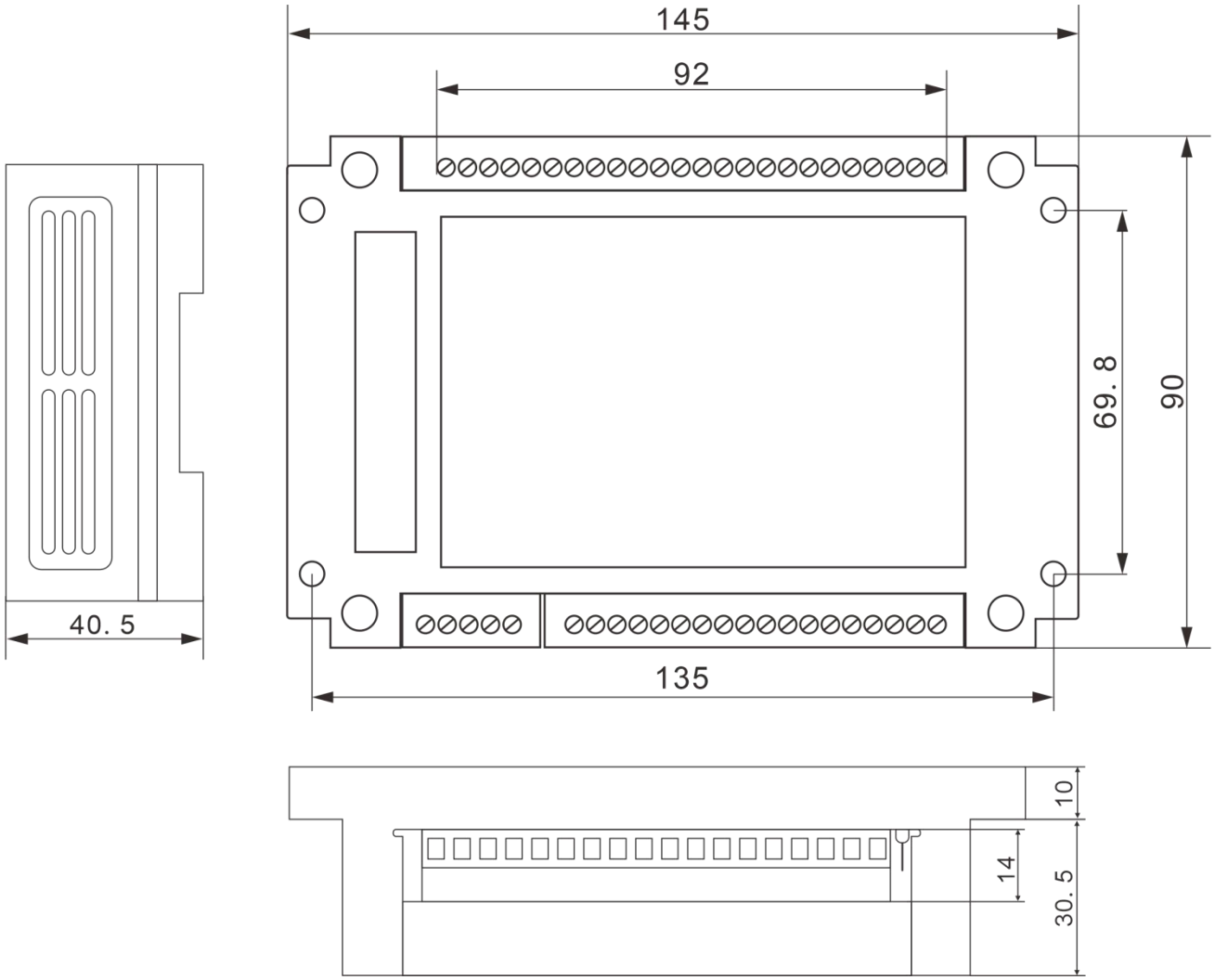
Parameter	Min	Typ	Max	Unit
Resolution		24		bit
Accuracy		±0.1		% of SFR
Zero Drift	-50		+50	uV/℃
Temperature Coefficient			±50	ppm/℃
Differential Nonlinearity			±1	LSB
Isolation Voltage			1500	Vdc
Load Impedance		2M		Ω

8 Mechanical Specifications

8.1 Mechanical Dimensions



CK-1021 CK-1041 Dimension



CK-1101 CK-1121 Dimension

8.2 Installation method

CK-1xx1 supports DIN35 rail installation, users can easily install the module on the rail or remove it, providing help for industrial field application and installation.

9 Three guarantees and maintenance instructions

Within five years from the date of sale, if the product is damaged or the product quality is lower than the technical specifications under the conditions of compliance with storage, transportation and use requirements, the user can return to the factory for free maintenance. If the damage is caused by violating the operating regulations and requirements, the device fee and maintenance fee shall be paid.

10 Disclaimer

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