

DAM-E3039F

User's Manual



Beijing ART Technology Development Co., Ltd.

DAM-E3039F Module

Introduction

Features

8-ch thermocouple/analog input and 1-ch isolated digital output module

General

- Power Supply: unregulated +10 ~ +30 V_{DC}
- Power Consumption: 2W @ 24V_{DC}
- Support 10/100Mbps Ethernet
- Provide the default Web page or pages can be customized
- Built-in Watchdog

Analog Input:

- Channel: 8DI
- Input type: thermocouple, mV, V, mA
- Thermocouple type: J, K, T, E, R, S, B, N, C
- Sampling Frequency: 10Hz
- Resolution: 16-bit
- Accuracy: ±0.1%
- Input Impedance: 10KΩ
- Zero Drift: ±6uV/°C
- Full Scale Drift: 25ppm /°C
- CMR @ 50/60Hz: 150dB
- Isolation Voltage: 3000V
- Malfunction and Overvoltage Protection: maximum withstand ± 35V

Digital Output:

- Channel: 1
- Open-collector 30V (maximum load 100mA)
- Isolation Voltage: 3750V
- Independent channel disconnection detection function
- Programmable alarm status output

Easy to operate

DAM-E3039F utility software can help you to select input configuration, set the operating parameter for your process control needed.

Industrial Design

DAM-E3039F was designed to use in industrial environment. It can be installed in standard DIN rail inside the cabinet. And it can be powered by unregulated 10~30V_{DC} to meet the various power supplied source in field. It also withstands ambient temperature up to 60°C and resists the effects of vibration and mechanical shock.

Wiring & Installation

Power supply requirements: unregulated +10 V_{DC} ~ +30 V_{DC}. "+Vs" is a positive, and "GND" is ground. The Ethernet interface is connected to a computer switch directly via network cable. If the wiring and power is ok, then the power indicator should be stop flash and keep on. The module initialization is completed. The indicator flashes according to the transmitted data when the module is working.

DAM-E3039F

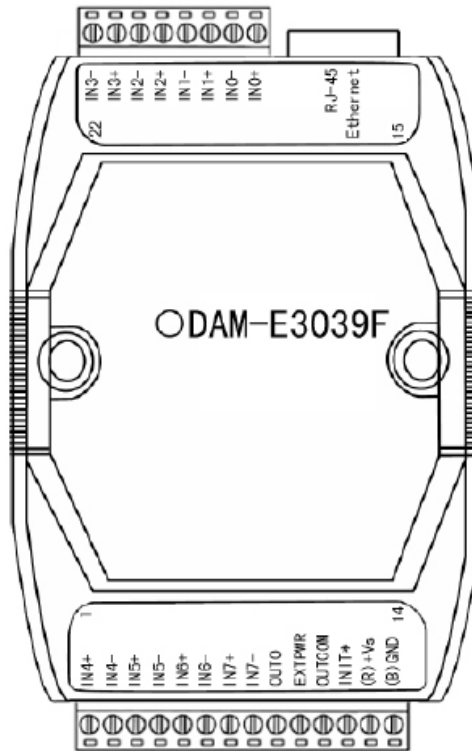


Fig.1 DAM-E3039F Drawing

DAM-E3039F can be installed in standard DIN rail inside the cabinet; it also can be installed by stacking mode.

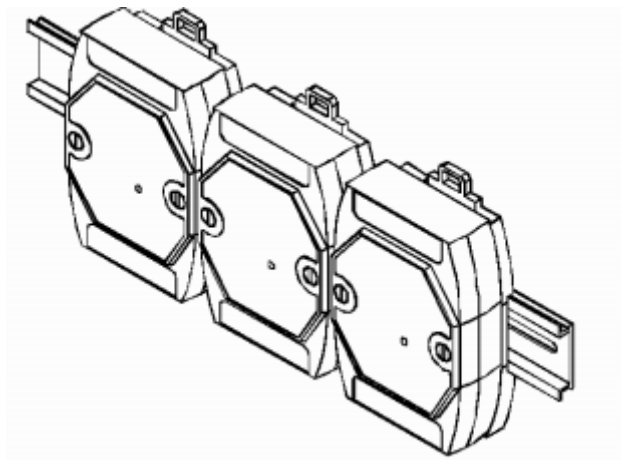


Fig.2 DAM-E3039F standard DIN installation

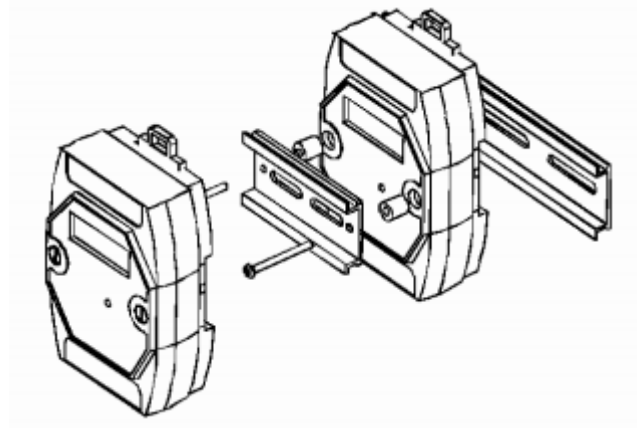


Fig.3 DAM-E3039F stack installation

Application Wiring

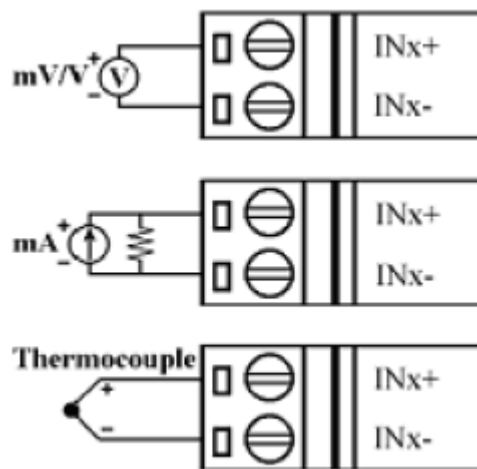


Fig.4 analog input wiring diagram

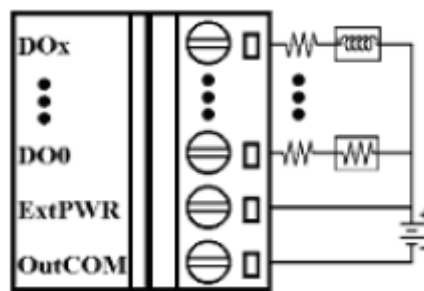


Fig.5 collector output wiring diagram

Default Setting

If the module's network configuration is wrong, or forget the last modified value, the module can be reverted to default settings. Steps: short-circuit the "INIT*" and "GND" when there is no power; power-on for 3 seconds, power off, disconnect "INIT*" and "GND". The module is reverted to the default settings.

1. IP Address: 192.168.2.80
2. Subnet Mask: 255.255.255.0
3. Default Gateway: 192.168.2.1
4. TCP Port: 502

5. HTTP Port: 80

Code configuration table

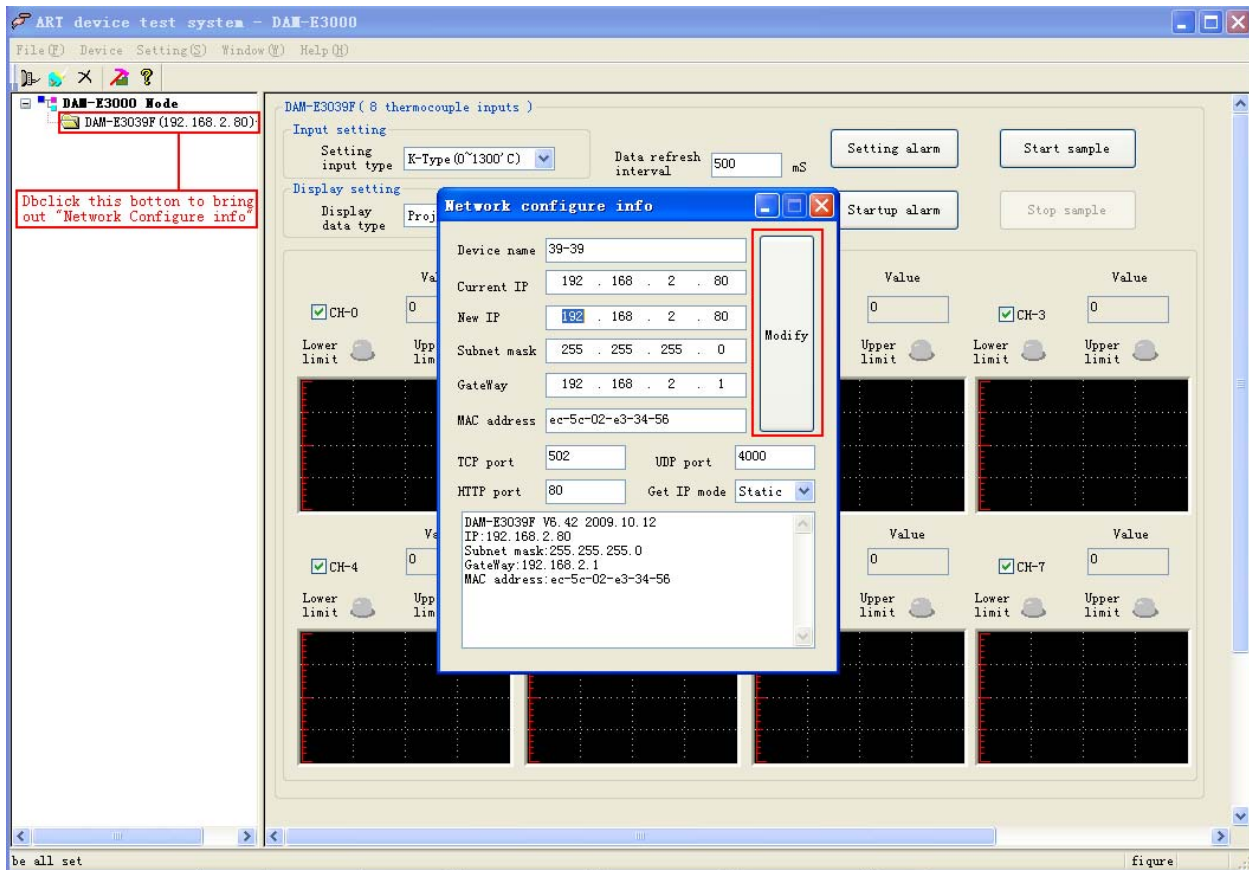
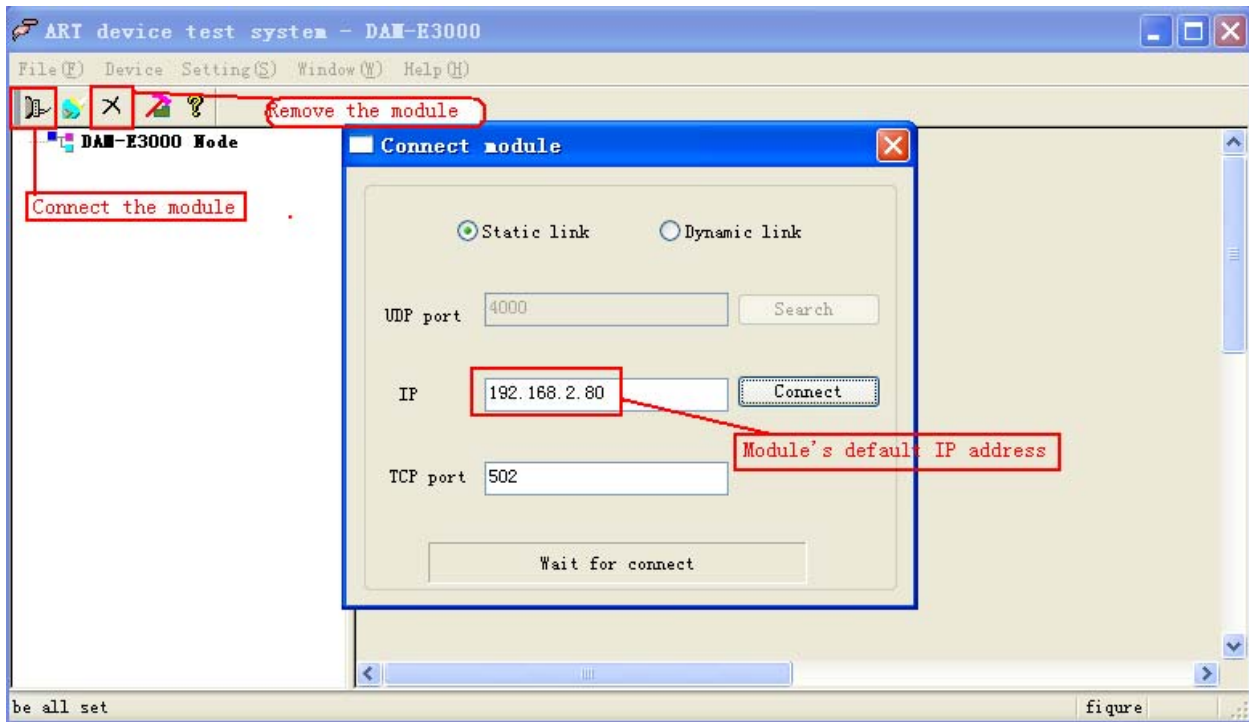
Analog Input Range Configuration Code Table

Input Type	Input Range	Code
mV、V	$\pm 15\text{mV}$	01
	$\pm 50\text{mV}$	02
	$\pm 100\text{mV}$	03
	$\pm 150\text{mV}$	04
	$\pm 500\text{mV}$	05
	$\pm 1\text{V}$	06
	$\pm 2.5\text{V}$	07
mA	$\pm 20\text{mA}$	0A

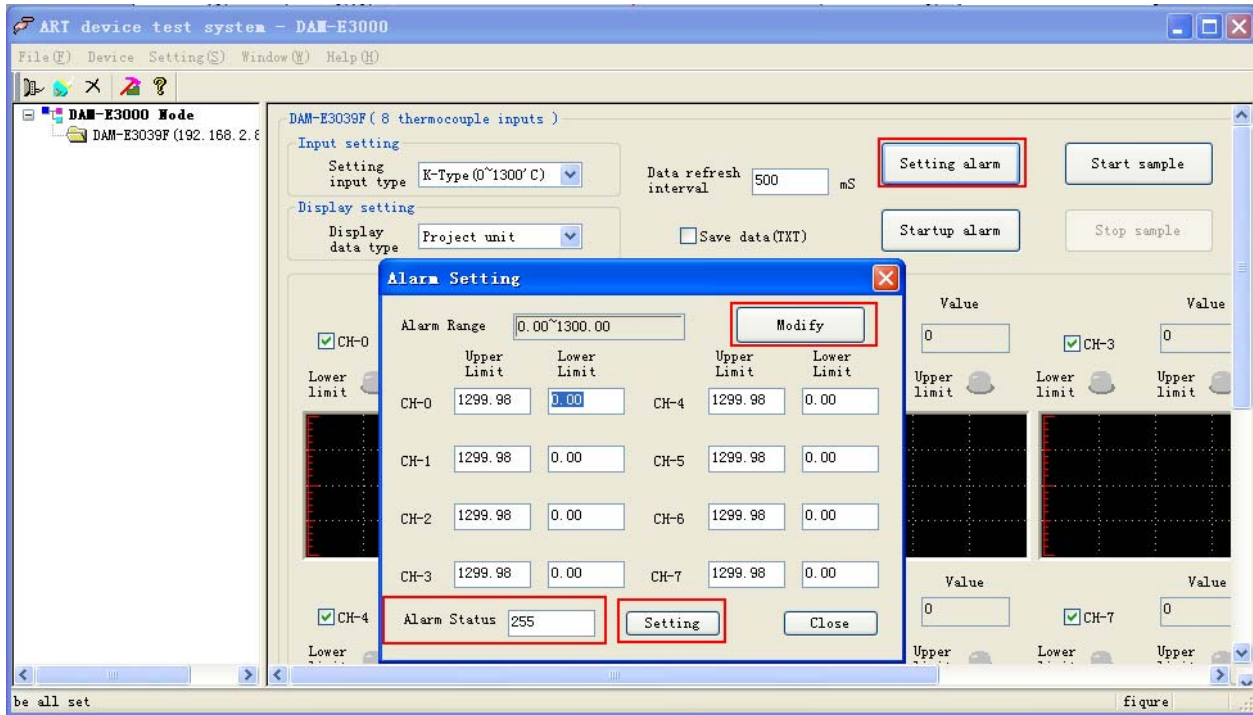
Input Type	Input Range	Typical Accuracy ($^{\circ}\text{C}$)	Maximum Error ($^{\circ}\text{C}$)	Code (Decimal)
J	$0\sim 1200^{\circ}\text{C}$	± 1.0	± 1.2	10
K	$0\sim 1300^{\circ}\text{C}$	± 0.5	± 1.0	11
T	$-200\sim 400^{\circ}\text{C}$	± 0.5	± 1.0	12
E	$0\sim 1000^{\circ}\text{C}$	± 0.5	± 1.0	13
R	$500\sim 1700^{\circ}\text{C}$	± 1.0	± 1.5	14
S	$500\sim 1768^{\circ}\text{C}$	± 1.5	± 2.5	15
B	$500\sim 1800^{\circ}\text{C}$	± 1.5	± 2.5	16
N	$0\sim 1300^{\circ}\text{C}$	± 0.5	± 1.0	17
C	$0\sim 2090^{\circ}\text{C}$	± 1.5	± 2.5	18

Operation Interface

Click the “DAME3000” in “ART Data Acquisition Measurement Suite “ to open the device test system of DAM-E3000 Modules. Set the module’s IP to its default IP and connect the module.



Click "Setting alarm" to bring out "Alarm Setting" box, users can modify the alarm upper and lower limit and the alarm status.



Communication Protocol

At present, Ethernet Distributed Acquisition Modules of our company use MODBUS TCP mode. Supported function codes include the following categories:

- 01 READ COIL STATUS
- 02 READ INPUT STATUS
- 03 READ HOLDING REGISTERS
- 04 READ INPUT REGISTERS
- 05 FORCE SINGLE COIL
- 06 PRESET SINGLE REGISTER
- 15 FORCE MULTIPLE COILS
- 16 FORCE MULTIPLE REGISTERS
- 20 READ FILE RECORD
- 21 WRITE FILE RECORD

Address Mapping Table

Read Relay Status

Function Code: 01

Description : Read the status of the output relay

Data Description:

Address	Description	Note
00001	Ch01(For Switch Output Current Status)	1 for H Level,0 for L level
Reservation		
00033	Ch01(For Switch Output Power-on Status)	1 for H Level,0 for L level

Reservation		
00065	Ch01(For Switch Output Safe Status)	1 for H Level,0 for L level
Reservation		

Request

Domain Name	Byte	Value
Function Code	1 byte	0×01
Start Address	2 bytes	0×0000 to 0×FFFF
Read Amount	2 bytes	1 to 2000 (0×7D0)

Response

Domain Name	Byte	Value
Function Code	1 byte	0×01
Byte Count	1 byte	N= (Read Amount+7)/8
Coil Status	n bytes	

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×02+0×80
Error Count	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data (hex)	Domain Name	Data (hex)
Function Code	01	Function Code	01
Start Address H (byte)	00	Byte Count	03
Start Address L (byte)	13	27(h)~20 status	CD
Read Amount H (byte)	00	35(h)~28 status	6B
Read Amount L (byte)	13	38(h)~36 status	05

Read Holding Register

Function Code: 03

Note: Read the holding register value

Data Description:

Address	Description	Note
40001	Ch01 Pulse Output L Level	16 bits
40002	Ch01 Pulse Output H level	16 bits
Reservation		
40065	Ch01 Switch Pulse Count L	16 bits
40066	Ch01 Switch Pulse Count H	16 bits
Reservation		
40129	For Pulse Output Enable Register	Set bit: Enabled; Space: Disabled
Reservation		
40257	For Ch1 Analog Input Mode	bit07--bit00 sample range code; bit15--bit08 clear to 0. For the low-speed analog acquisition modules, the range of each channel should be the same, so just set the range of Ch1 is OK.
40258	For Ch2 Analog Input Mode	
40259	For Ch3 Analog Input Mode	
40260	For Ch4 Analog Input Mode	
40261	For Ch5 Analog Input Mode	

40262	For Ch6 Analog Input Mode	
40263	For Ch7 Analog Input Mode	
40264	For Ch8 Analog Input Mode	
Reservation		
40273	For Ch1 Analog Alarm Level	Normal Status: 0x0000 Lower Limit Alarm: 0x0001 Upper Limit Alarm: 0x0002 All the analog channels share one alarm output, so just set Ch1 is OK.
40274	For Ch2 Analog Alarm Level	
40275	For Ch3 Analog Alarm Level	
40276	For Ch4 Analog Alarm Level	
40277	For Ch5 Analog Alarm Level	
40278	For Ch6 Analog Alarm Level	
40279	For Ch7 Analog Alarm Level	
40280	For Ch8 Analog Alarm Level	
Reservation		
40289	For Ch1 Lower Limit Alarm Value L	16 bits
40290	For Ch1 Lower Limit Alarm Value H	16 bits
40291	For Ch2 Lower Limit Alarm Value L	16 bits
40292	For Ch2 Lower Limit Alarm Value H	16 bits
40293	For Ch3 Lower Limit Alarm Value L	16 bits
40294	For Ch3 Lower Limit Alarm Value H	16 bits
40295	For Ch4 Lower Limit Alarm Value L	16 bits
40296	For Ch4 Lower Limit Alarm Value H	16 bits
40297	For Ch5 Lower Limit Alarm Value L	16 bits
40298	For Ch5 Lower Limit Alarm Value H	16 bits
40299	For Ch6 Lower Limit Alarm Value L	16 bits
40300	For Ch6 Lower Limit Alarm Value H	16 bits
40301	For Ch7 Lower Limit Alarm Value L	16 bits
40302	For Ch7 Lower Limit Alarm Value H	16 bits
40303	For Ch8 Lower Limit Alarm Value L	16 bits
40304	For Ch8 Lower Limit Alarm Value H	16 bits
Reservation		
40321	For Ch1 Upper Limit Alarm Value L	16 bits
40322	For Ch1 Upper Limit Alarm Value H	16 bits
40323	For Ch2 Upper Limit Alarm Value L	16 bits
40324	For Ch2 Upper Limit Alarm Value H	16 bits
40325	For Ch3 Upper Limit Alarm Value L	16 bits
40326	For Ch3 Upper Limit Alarm Value H	16 bits
40327	For Ch4 Upper Limit Alarm Value L	16 bits
40328	For Ch4 Upper Limit Alarm Value H	16 bits
40329	For Ch5 Upper Limit Alarm Value L	16 bits
40330	For Ch5 Upper Limit Alarm Value H	16 bits
40331	For Ch6 Upper Limit Alarm Value L	16 bits
40332	For Ch6 Upper Limit Alarm Value H	16 bits
40333	For Ch7 Upper Limit Alarm Value L	16 bits
40334	For Ch7 Upper Limit Alarm Value H	16 bits

40335	For Ch8 Upper Limit Alarm Value L	16 bits
40336	For Ch8 Upper Limit Alarm Value H	16 bits
Reservation		
40513	For Watchdog Control Register	bit0: 1 for enabled; 0 for disabled bit1: 0 for normal, 1 for overflow bit2: 0 for normal, 1 for reset
40514	For Watchdog Overflow Register	Watchdog Overtime Constant
40515	For Watchdog Reset Registered	0x55AA
Reservation		

Request

Domain Name	Byte	Value
Function Code	1 byte	0×03
Start Address	2 bytes	0×0000 to 0×FFFF
Read Amount	2 bytes	1 to 125 (0×7D)

Response

Domain Name	Byte	Value
Function Code	1 byte	0×03
Byte Count	1 byte	2n
Input State	2n bytes	

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×03+0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data (hex)	Domain Name	Data (hex)
Function Code	03	Function Code	03
Start Address H (byte)	00	Byte Count	02
Start Address L (byte)	08	Input Registers High	00
Read Amount H (byte)	00	Input Register Low	0A
Read Amount L (byte)	01		

Note 1: The unit of the pulse output level width: millisecond

The unit of the watchdog timer length: millisecond

Note 2: When power on, the highest bit of the watchdog control register is 1, can be done to do determine whether the module is rested or not.

Read Input Register

Function Code: 04

Description : Read input data

Data Description:

Address	Description	Note
30257	For Ch1 Analog Input Value L	16 bits
30258	For Ch1 Analog Input Value H	16 bits

30259	For Ch2 Analog Input Value L	16 bits
30260	For Ch2 Analog Input Value H	16 bits
30261	For Ch3 Analog Input Value L	16 bits
30262	For Ch3 Analog Input Value H	16 bits
30263	For Ch4 Analog Input Value L	16 bits
30264	For Ch4 Analog Input Value H	16 bits
30265	For Ch5 Analog Input Value L	16 bits
30266	For Ch5 Analog Input Value H	16 bits
30267	For Ch6 Analog Input Value L	16 bits
30268	For Ch6 Analog Input Value H	16 bits
30269	For Ch7 Analog Input Value L	16 bits
30270	For Ch7 Analog Input Value H	16 bits
30271	For Ch8 Analog Input Value L	16 bits
30272	For Ch8 Analog Input Value H	16 bits
Reservation		
30289	For Ch1 Alarm Status	0 for normal, 1 for lower limit, 2 for upper limit
30290	For Ch2 Alarm Status	0 for normal, 1 for lower limit, 2 for upper limit
30291	For Ch3 Alarm Status	0 for normal, 1 for lower limit, 2 for upper limit
30292	For Ch4 Alarm Status	0 for normal, 1 for lower limit, 2 for upper limit
30293	For Ch5 Alarm Status	0 for normal, 1 for lower limit, 2 for upper limit
30294	For Ch6 Alarm Status	0 for normal, 1 for lower limit, 2 for upper limit
30295	For Ch7 Alarm Status	0 for normal, 1 for lower limit, 2 for upper limit
30296	For Ch8 Alarm Status	0 for normal, 1 for lower limit, 2 for upper limit
Reservation		

Request

Domain Name	Byte	Value
Function Code	1 byte	0×04
Start Address	2 bytes	0×0000 to 0×FFFF
Read Amount	2 bytes	1 to 125 (0×7D)

Response

Domain Name	Byte	Value
Function Code	1 byte	0×04
Byte Count	1 byte	2n
Input State	2n bytes	

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×04+0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data (hex)	Domain Name	Data (hex)
Function Code	04	Function Code	04
Start Address H (byte)	00	Byte Count	02
Start Address L (byte)	08	Input Register H (9)	00
Read Amount H (byte)	00	Input Register L (9)	0A
Read Amount L (byte)	01		

Write Single Relay

Function Code: 05

Request

Domain Name	Byte	Value
Function Code	1 byte	0×05
Address Setting	2 bytes	0×0000 to 0×FFFF
Content Setting	2 bytes	0x0000 or 0xFF00 0x0000 release relay 0xFF00 engage relay

Response

Domain Name	Byte	Value
Function Code	1 byte	0x05
Address Setting	2 bytes	0x0000 to 0xFFFF
Content Setting	2 bytes	0x0000 or 0xFF00

Exception

Domain Name	Byte	Value
Function Code	1byte	0x05+0x80
Error Code	1byte	0x1 or 0x2

Example

Request		Response	
Domain Name	Data (hex)	Domain Name	Data (hex)
Function Code	05	Function Code	05
Set Address H (byte)	00	Set Address H (byte)	00
Set Address L (byte)	05	Set Address L (byte)	05
Set Content H (byte)	FF	Set Content H (byte)	FF
Set Content L (byte)	00	Set Content L (byte)	00

Set Single Holding Registers

Function Code: 06

Request

Domain Name	Byte	Value
Function Code	1 byte	0×06
Setting Address	2 bytes	0×0000 to 0×FFFF
Setting Content	2 bytes	0×0000 to 0×FFFF

Response

Domain Name	Byte	Value
Function Code	1 byte	0×06
Address Setting	2 bytes	0×0000 to 0×FFFF
Content Setting	2 bytes	0×0000 to 0×FFFF

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×06+0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data(hex)	Domain Name	Data(hex)
Function Code	06	Function Code	06
Set Address High (byte)	00	Set Address High (byte)	00
Set Address Low (byte)	08	Set Address Low (byte)	08
Set Content High (byte)	00	Set Content High (byte)	00
Set Content Low (byte)	19	Set Content Low (byte)	19

Set Multiple Relay

Function Code: 0F

Request

Domain Name	Byte	Value
Function Code	1 byte	0×0F
Start Address Setting	2 bytes	0×0000 to 0×FFFF
Length Setting	2 bytes	0×0000 to 0×07B0
Byte count	1 byte	n
Content Setting	n bytes	

Response

Domain Name	Byte	Value
Function Code	1 byte	0×0F
Start Address Setting	2 bytes	0×0000 to 0×FFFF
Length Setting	2 bytes	0×0000 to 0×07B0

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×0F+0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data(hex)	Domain Name	Data(hex)
Function Code	0F	Function Code	0F

Set Address High (byte)	00	Set Address High (byte)	00
Set Address Low (byte)	13	Set Address Low (byte)	13
Set Amount High (byte)	00	Set Amount High (byte)	00
Set Amount Low (byte)	0A	Set Amount Low (byte)	0A
Byte count	02		
Set Content High (byte)	CD		
Set Content Low (byte)	01		

Set Multiple Holding Registers

Function Code: 10

Request

Domain Name	Byte	Value
Function Code	1 byte	0×10
Start Address Setting	2 bytes	0×0000 to 0×FFFF
Length Setting	2 bytes	0×0000 to 0×07B0
Byte count	1 byte	2n
Content Setting	2n bytes	

Response

Domain Name	Byte	Value
Function Code	1 byte	0×10
Start Address Setting	2 bytes	0×0000 to 0×FFFF
Length Setting	2 bytes	0×0000 to 0×07B0

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×10+ 0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Module address	Data(hex)	Module address	Data(hex)
Function Code	10	Function Code	10
Set Address High (byte)	00	Set Address High (byte)	00
Set Address Low (byte)	01	Set Address Low (byte)	01
Set Amount High(byte)	00	Set Amount High(byte)	00
Set Amount Low (byte)	02	Set Amount Low (byte)	02
Byte count	04		
Set Content High (byte)	00		
Set Content Low (byte)	0A		
Set Content High (byte)	01		
Set Content Low (byte)	02		

Read File Record

Function Code: 14/06

Read file record: in MODBUS, file is considered to be 16-bit array, addressing according to address. Read file: set the

start address and read length and change the Start Address and Read Length can traverse the entire file. The file does not have a name, it has number only. You can only read and write one file at one time.

Request

Domain Name	Byte	Value
Function Code	1 byte	0×14
Byte Count	1 byte	0×07 to 0×F5
Sub Function Code	1byte	0×06
File Number	2 bytes	0x0000 to 0xFFFF
Record Number	2 bytes	0x0000 to 0x270F
Read Length	2 bytes	n
Sub Function Code	1 byte	0x06
.....	

Response

Domain Name	Byte	Value
Function Code	1 byte	0×14
Byte Count	1 byte	0x07 to 0xF5
Sub Function Byte Count	1 byte	0x07 to 0xF5
Sub Function Code	1 byte	0x06
Data	2n bytes	

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×14+ 0×80
Error Code	1byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data(hex)	Domain Name	Data(hex)
Function Code	14	Function Code	14
Byte Count	07	Byte Count	06
Sub Function Code	06	Respond Count	05
File Number High (byte)	00	Sub Function Code	06
File Number Low(byte)	04	Record Data High(byte)	0D
Record Number High(byte)	00	Record Date Low(byte)	FE
Record Number Low(byte)	01	Record Data High(byte)	00
Read Length High(byte)	00	Record Date Low(byte)	20
Read Length Low(byte)	02		

Write File Record

Function Code: 15/06

Request

Domain Name	Byte	Value
Function Code	1 byte	0×15
Byte Count	1 byte	0×07 to 0×F5

Sub Function Code	1 byte	0×06
File Number	2 bytes	0x0000 to 0xFFFF
Record Number	2 bytes	0x0000 to 0x270F
Read Length	2 bytes	n
Data	2n bytes	
.....		

Response

Domain Name	Byte	Value
Function Code	1 byte	0×15
Byte Count	1 byte	0x07 to 0xF5
Sub Function Code	1 byte	0x06
File Number	2 bytes	0x0000 to 0xFFFF
Record Number	2 bytes	0x0000 to 0x270F
Write Length	2 bytes	n
Data	2n bytes	

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×15+ 0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data(hex)	Domain Name	Data(hex)
Function Code	15	Function Code	15
Byte Count	0B	Byte Count	0B
Sub Function Code	06	Sub Function Code	06
File Number High (byte)	00	File Number High (byte)	00
File Number Low(byte)	04	File Number Low (byte)	04
Record Number High(byte)	00	Record Number High(byte)	00
Record Number Low(byte)	01	Record Number Low(byte)	01
Read Length High(byte)	00	Write Length High(byte)	00
Read Length Low(byte)	02	Write Length Low(byte)	02
Write Data	4 bytes	Write Data	4 bytes

EEPROM assignment

```
//file 0
#define MODULE_NET_ADDR          0x0000
#define MODULE_VER_ADDR          0x0020
#define ADC_ZERO_ADDR            0x0080
#define ADC_SLOPE_ADDR           0x0084
//file 1
#define NET_CONFIG_ADDR          0x0000
//file 2
```



```
#define DIG_POWER_ADDR          0x0000
#define DIG_SAFE_ADDR          0x0004
//file 3
#define ADC_CONTRL_ADDR        0x0000
#define ADC_LIMITL_ADDR       0x0020
#define ADC_LIMITU_ADDR       0x0060
#define ADC_ALARM_ADDR        0x00A0
//file 4 to file 7
.....
```

Note:

EEPROM is 8kbyte capacity, divide to 8 file blocks, every block 1kbyte.

1. MODULE_NET_ADDR

Restore to factory defaults network configuration parameter.

Byte	4	4	4	6
Content	IP Address	Default Gateway	Subnet Mask	MAC Address

2. MODULE_VER_ADDR

Module Version Information:

Byte	42byte		
Content	DAM-E3039F	V6.20	2006.09.01 ID:DAME123456

3. ADC_ZERO_ADDR

Analog input zero-point calibration factor, 4 bytes float. Calibrate method: function code is 3 and calibrates register address is from 432772 to 432773. Change the register to complete zero-point calibration. Note: the changes can not be saved to EEPROM, so it is necessary to clear the write-protect of file 0 via function code 3, address 432769. Then write zero-point calibration data to file 0, address ADC_ZERO_ADDR.

4. ADC_SLOPE_ADDR

Analog input slope calibration factor, 4 bytes. Calibrate method: function code is 3 and calibrates register address is from 432770 to 432771. The same method as zero-point calibration.

5. NET_CONFIG_ADDR

Network configuration parameter, call table 1 for structures.

6. DIG_POWER_ADDR

Digital output power-on value, 2 bytes.

7. DIG_SAFE_ADDR

Digital output safe value, 2 bytes.

8. ADC_CONTRL_ADDR

Analog input control register, 2 bytes, high byte is 0.

9. ADC_LIMIT_ADDR

Analog lower limit alarm value, 4 bytes float per channel.

10. ADC_LIMITU_ADDR

Analog upper limit alarm value, 4 bytes float per channel.

11. ADC_ALARM_ADDR

Analog alarm level status.