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RemoDAQ-8017SV/SC

User’s Manual

Beijing Gemotech Intelligent Technology Co.，Ltd

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Acknowledgments

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Additional Information and Assistance

1. Visit the **Gemotech** websites at **www. gemotech.cn** where you can find the latest information about the product.

2. Contact your distributor, sales representative, or **Gemotech** 's customer service center for technical support if you need additional assistance. Please have the following information ready before you call：

- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version，application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

Table of Contents

1 Introduction

The RemoDAQ-8000 Series is a set of intelligent sensor to computer interface modules containing built in microprocessor. They are remotely controlled through a simple set of commands issued in ASCII format and transmitted in RS-485 protocol. They provide signal conditioning, isolation, ranging, A/D and D/A conversion, data comparison, digital communication, timer/counter, wireless communication, collection AC and other functions.

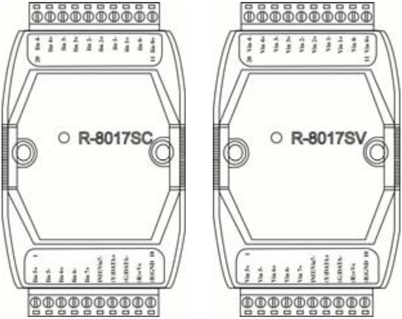
RemoDAQ-8017SV is an 8-channel voltage input module.

RemoDAQ-8017SC is an 8-channel current input module.

The common features of AI modules are given as following：

- 3000VDC Isolated analog input
- 24-bits sigma-delta ADC to provide excellent accuracy.
- Software calibration
- TVS / PTC preponderate over Voltage protect

1.1 Pin Assignment & Specifications

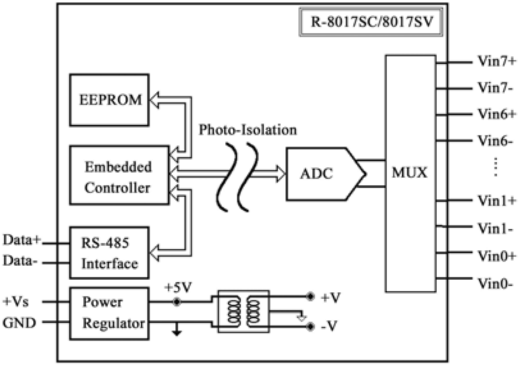


RemoDAQ-8017SC/SV Specifications：

Channel	8 differential or 6 differential and 2 single-ended.
Input type	mA(8017SC)；V(8017SV)
Input range	-20mA ~ 20mA(8017SC)；-5V~+5V(8017SV)
Output Speed (in bps) Maximum distance	RS-485 (2-wire) 1200,2400,4800,9600,19.2K,38.4K,57.6K,115.2K 4000ft. (1200m.)
Accuracy	±0.5% or better
Zero drift	20μV/°C
Span drift	25ppm/°C
Isolation voltage	3000VDC
CMR@50/60Hz	86dB
Bandwidth	15.7Hz

Conversion rate	6.8 samples/sec
Input impedance	10MΩ
Overvoltage Protection	20V$_{P-P}$
Power supply	10~30VDC
Power consumption	1.3W
Environment	Operating Temperature：-20 ~ 70° C
	Humidity：5 ~ 95%, non-condensing

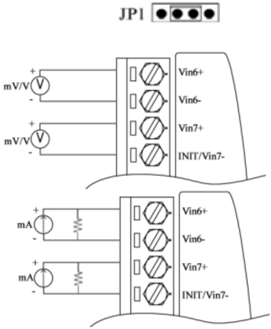
1.2 Block Diagram



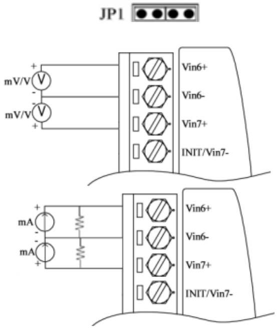
1.3 Application Wiring

RemoDAQ-8017SC/SV

AI Channel 6 and 7 Wire Connection,while the jumper JP1 setting is 8 differential mode



AI Channel 6 and 7 Wire Connection,while the jumper JP1 setting is INIT* mode



Notice：

1. RemoDAQ-8017SC measure current wire connection，please refer RemoDAQ-8017,**But** no external 125Ω resistor.
2. Because modular is internal to set signal protective circuit,under the condition that does not supply power can affect as normal signal produces,so must install and gather signal under ensuring the condition of normal power supply, and cut off or stop gathering signal before modular broken electricity.

1.4 Default Setting

- Address：01
- Baudrate：9600 bps
- Analog output type：

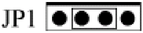
  RemoDAQ-8017SC：-20mA~+20mA

  RemoDAQ-8017SV：-10V~+10V
- 60Hz filter rejection, Checksum disable, engineering unit format
- Set as 6 differential and 2 single-ended mode

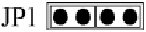
1.5 Jumper Setting

Jumper JP1 for select the pin INIT*/Vin 7-

Select 8-diff mode，the pin INIT*/Vin7- is set to Vin7-



Select INIT* mode，the pin INIT*/Vin7- is set to INIT*



1.6 Calibration

What do you need to do calibration?

1. One 5 1/2 digital multimeter.
2. A voltage calibrator or very stable and noise free DC voltage generator.
3. A precision resistance decade box or discrete resistors.
4. RemoDAQ-8000 Utility

RemoDAQ-8017SV：

Type code：09
Zero input：0V
Span input：5V

RemoDAQ-8017SC：

Type code：0D
Zero input：0mA
Span input：20mA

Notice：

1. Apply power to the module and let it warm up for about 30 minutes
2. Connect calibration voltage(or current) signal to module’s input.
   For RemoDAQ-8017SC/SV connect to channel 0.

Calibrate for RemoDAQ-8017SC

1. Setting type to 0D
2. Enable calibration
3. Apply zero calibration voltage
4. Perform $AA4+VV command，until 0
5. Perform zero calibration command
6. Apply span calibration voltage
7. Perform $AA3V.VVVV command，until 20mA
8. Perform span calibration command
9. Repeat step 2 to step 8 three times.

Calibrate for RemoDAQ-8017SV

1. Setting type to 09
2. Enable calibration

3. Apply zero calibration voltage
4. Perform $AA4+VV command，until 0
5. Perform zero calibration command
6. Apply span calibration voltage
7. Perform $AA3V.VVVV command，until 5V
8. Perform span calibration command
9. Repeat step 2 to step 8 three times.

1.7 Install List

Baudrate Setting (CC)

Code	03	04	05	06	07	08	09	0A
Baudrate	1200	2400	4800	9600	19200	38400	57600	115200

Analog Input Type Setting (TT)

RemoDAQ-8017SC：

Code	09
Min	-5V
Max	+5V

RemoDAQ-8017SV：

Code	0D
Min	-20mA
Max	+20mA

Data format setting（FF）

7	6	5	4	3	2	1	0
*1	*2	0				*3	

*****1：0=60Hz Restrain   1=50Hz Restrain

*****2：Checksum：0=Disabled　1=Enable

*3：00 = Engineering unit Format
　　01 = Percent Format
　　10 = 2’s Complement HEX Format

Analog Input Type And Data Format Table

Code	**Input span**	**Data format**	**+F.S.**	**Zero**	**-F.S**
09	+5V~+5V	Project Unit	+5.000	+00.000	-5.000
		%（FSR）	+100.000	+000.00	-100.00
		2’s Complement HEX	7FFF	0000	8000
0D	-20mA~+20mA	Project Unit	+20.000	+0.0000	-20.000
		%（FSR）	+100.000	+000.00	-100.00
		2’s Complement HEX	7FFF	0000	8000

2 Initialization & Installation

2.1 Installation Guideline

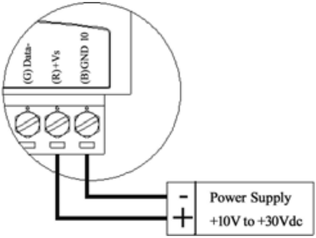


Figure 2-1 Power Supply Connections

We advise that the following standard colors (as indicated on the modules) be used for power lines：

+Vs (R)	Red
GND (B)	Black

We advice that the following standard colors (as indicated on the modules) be used for the communication lines：

DATA+ (Y)	Yellow
DATA- (G)	Green

2.2 Software Installation

1. If you have already installed “RemoDAQ-8000 Utility” then skip other steps.
2. Backup your software diskette.
3. Insert “RemoDAQ-8000 Utility” disc into CD-ROM：
4. Change drive to the path of CD-ROM. For example,

your drive of CD-ROM is F：then change the drive to F：

5. Find the setup of "RemoDAQ-8000 Utility" and run it.

6. Please follow the steps of setup program then you can successfully install the RemoDAQ-8000 Utility.

2.3 Basic configuration and hook-up

Before placing a module in an existing network, the module should be configured.Though all modules are initially configured at the factory, it is recommended to check that the baud rate is set correctly.

Default Factory Settings

Baud rate：9600 Bit/sec.

Address：01 (hexadecimal)

Checksum：disable

The basic hook-up for module configuration is shown below.

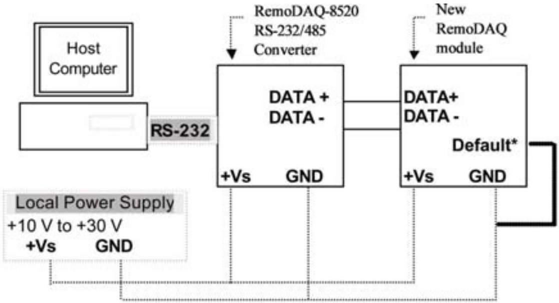


Figure 2-2 Layout for Initialization the RemoDAQ module

The following items are required to configure a module：a RemoDAQ converter module, a personal computer with RS-232 port (baudrate set to 9600) and theRemoDAQ utility software.

Configuration with the RemoDAQ Utility Software

The easiest way to configure the RemoDAQ module is by using the RemoDAQ utility software：an easy-to-use menu-structured program will guide you through every step of the configuration.

Configuration with the RemoDAQ command set

RemoDAQ modules can also be configured by issuing direct commands from a terminal emulation program within what is part of the RemoDAQ utility software.

The following example guides you through the setup of an analog input module. Assume that RemoDAQ-8017SV still has its default settings (baud rate 9600 and address 01h). Before the module is reconfigured, it is first requested to send its default settings.

To change the configuration setting of the analog input module, the following command is issued：

```
%01070D0600(cr)
   % = change configuration
   01 = target module at address 00 to：
   07 = change address to 07 hexadecimal
   0D = set input range to Type 0D
   06 = set baud rate to 9600
   00 = set integration time to 50 ms (60 Hz)
        disable checksum
```

set data format to engineering units

(See Chapter 3, Command Set for a full description of the syntax of the configuration command for module)

When the module received the configuration command it will respond with its new address：!07(cr)

NOTICE： *All reconfiguration except changing of baud rate and checksum values can be done dynamically, i.e. the modules need not to be reset. When changing the baud rate or checksum, these changes should be made for all connected devices. After reconfiguration, all modules should be powered down and powered up to force a reboot and let the changes take effect.*

2.4 Baudrate and Checksum

RemoDAQ modules contain EEPROMs to store configuration information and calibration constants. The EEPROM replaces the usual array of switches and ports required to specify baudrate, input/output range etc.

All of the RemoDAQ modules can be configured remotely through their communication ports, without having to physically alter port or switch settings.

Forcing the module in the INIT* state does not change any parameters in the module's EEPROM. When the module is in the INIT* state with its INIT* and GND terminals shorted, all configuration settings can be changed and the module will respond to all other commands normally.

Changing Baud rate and Checksum

Baud rate and checksum settings have several things in common：

- They should be the same for all modules and host computer.
- Their setting can only be changed by putting a module in the INIT* state.
- Changed settings can only take effect after a module is rebooted

To alter baudrate or checksum settings you must perform the following steps：

- Power on all components except the RemoDAQ Module.
- Power the RemoDAQ module on while shorting the INIT* and GND terminals
- Wait at least 7 seconds to let self calibration and ranging take effect.
- Configure the checksum status and/or the baud rate.
- Switch the power to the RemoDAQ Module OFF.
- Remove the grounding of the INIT* terminal and power the module on.
- Wait at least 7 seconds to let self calibration and ranging take effect.
- Check the settings (If the baud rate has changed, the settings on the host computer should be changed accordingly.)

3 Command Set

Introduction

To avoid communication conflicts when several devices try to send data at the same time, all actions are instigated by the host computer. The basic form is a command/response protocol with the host initiating the sequence.

When modules are not transmitting they are in listen mode. The host issues a command to a module with a specified address and waits a certain amount of time for the module to respond. If no response arrives, a timeout aborts the sequence and returns control to the host.

Changing RemoDAQ’s configuration might require the module to perform auto calibration before changes can take effect. Especially when changing the range, the module has to perform all stages of auto calibration that it also performs when booted. When this process is under way, the module does not respond to any other commands.

The command set includes the exact delays that might occur when modules are reconfigured.

Syntax

[delimiter character][address][command][data][checksum]
[carriage return]

Every command begins with a delimiter character. There are four valid characters：a dollar sign $, a pound sign #, a percentage sign % and an at sign @.

The delimiter character is followed by a two-character address (hexadecimal) that specifies the target module. The actual two-character command follows the address. Depending on the command, an optional data segment follows the command string. An optional two character checksum may be appended to the total string. Every command is terminated by a carriage return (cr).

Calculate Checksum：

1. Calculate ASCII sum of all characters of command(or response) string except the character return(cr).
2. Mask the sum of string with 0ffh.

Example：

Command string：$012(cr)

Sum of string=‘$’+‘0’+‘1’+‘2’=24h+30h+31h+32h=B7h

The checksum is B7h，and [CHK] = “B7”

Command string with checksum：$012B7(cr)

Response string：!01200600(cr)

Sum of string：‘!’+‘0’+‘1’+‘2’+‘0’+‘0’+‘6’+‘0’+‘0’
=1h+30h+31h+32h+30h+30h+36h+30h+30h=1AAh

The checksum is AAh，and [CHK] = “AA”

Response string with checksum：!01200600AA(cr)

General Command Sets			
Command Syntax	**Command Name**	**Command Description**	**Notes**
%AANNTTCCFF	Configuration	Sets the address,input range, baudrate,dataformat,checksum status	3.1
#AA	Analog data in	Return the input value from the module in the currently configured data format	3.2
#AAN	Analog data in	Return the input value from the module channels N in the currently configured data format	3.3
$AA0	Span calibration	Calibrates an AI module to correct for gain errors	3.4
$AA1	Zero Calibration	Calibrates an AI module to correct for gain errors	3.5
$AA2	Configuration status	Return the configuration parameters for the module	3.6
$AA5VV	Enable/Disable channels for multiplexing	Enable or disable the individual channels	3.7
$AA6	Read channel status	Get the enable/disable status of all channels	3.8
$AA3V.VVVV	Set span coefficient	Return correct or error	3.9
$AA4±VV	Set zero excursion	Return correct or error	3.10
$AAA	Read 8 channels input value	Return the input value from the module 8 channels in the currently configured data format	3.11
$AAF	Read firmware version	Return the firmware version code	3.12
$AAM	Read module name	Return the module name	3.13
~AAO(data)	Set module name	Return correct or error	3.14
~AAEV	Enable/Disable calibration	Return correct or error	3.15

3.1 %AANNTTCCFF

Name：Configuration

Description：Sets address, type code, baudrate, data format

Syntax：%AANNTTCCFF(cr)

% delimiter character.

AA address of setting module (00-FF)

NN New address (00-FF)

TT New type

CC New baudrate

FF New data format

When changing baudrate or checksum, we should INIT* termination land.

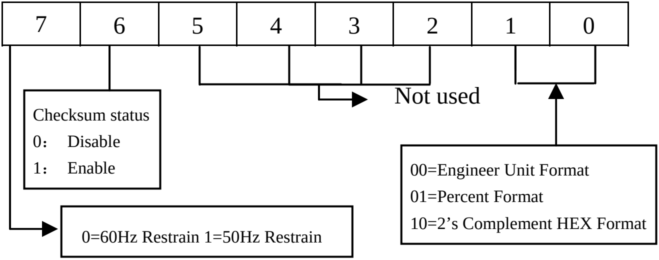


Figure 3-1 Data format setting of AI modules

Response：!AA(cr) if the command was valid.

?AA(cr) if an invalid operation was entered. If the INIT* terminal was not grounded when attempting to change baud rate or checksum settings.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of setting module (00-FF)

(cr) is the terminating character, carriage return (0Dh)

Example：

Command：%0102090600(cr) Response：!02(cr)

Change address from 01 to 02,an input range ±5V, baud rate 9600, integration time 50 ms (60 Hz), engineering units data format and no checksum checking or generation.

The response indicates that the command was received.

Table 3-1 Input Rang Codes (Type Code)

RemoDAQ-8017SC：

Code	09
Min	-5V
Max	+5V

RemoDAQ-8017SV：

Code	0D
Min	-20mA
Max	+20mA

Table 3-2 Baudrate Code

Code	03	04	05	06	07	08	09	0A
Baudrate	1200	2400	4800	9600	19200	38400	57600	115200

3.2 #AA

Name：Analog Data In

Description：Command will return the input value from module in the currently configured data format.

Syntax #AA(cr)

# delimiter character.

AA address of reading module(00~FF)

(cr) is the terminating character, carriage return (0Dh).

Response：>(data)(cr)

Syntax error or communication error may get no response.

> delimiter character.

data AI input value,the data is the combination for each channel respectively

Example：

Command：#01 Response：>4C534C0000000000000
0000000000000

Read analog input value at address 01, return values of 8 channels

3.3 #AAN

Name： Analog Data From channel N

Description： The command will return the input value from one of the 8 channels of a specified (AA) module in the currently configured data format.

Syntax： #AAN(cr)

# delimiter character.

AA address of reading module(00~FF)

N channel (0~7)

(cr) is the terminating character, carriage return (0Dh).

Response： >(data)(cr)

Syntax error or communication error may get no response.

> delimiter character.

data AI input value.(For data formats, refer *sec*.1.7).

Example：

Command：#32 Response：>+02.455

Read address 03 and channel 2, return +02.455

3.4 $AA0

Name： Span Calibration

Description： Calibrates module to correct for gain errors.

Syntax： $AA0 (cr)

$ delimiter character.

AA address of the module that is to be calibrated(00~FF)

0 span calibration command.

(cr) the terminating character, carriage return (0Dh).

Response： !AA(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)

In order to successfully calibrate an analog input module’s input range, a proper calibration input signal should be connected to the analog input module before and during the calibration.

Example：

Command：$010 Response：!01

Span calibration of address 01,return success.

Command：$020 Response：?02

Span calibration of address 02,return the calibration is not enable before span calibration command.

3.5 $AA1

Name： Zero Calibration

Description： Calibrates module to correct for gain errors.

Syntax： $AA1 (cr)

$ delimiter character.

AA address of the module that is to be calibrated(00~FF)

1 zero calibration command.

(cr) the terminating character, carriage return (0Dh).

Response： !AA(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)

In order to successfully calibrate an analog input module’s input range, a proper calibration input signal should be connected to the analog input module before and during the calibration.

Example：

Command：$011 Response：!01

Zero calibration of address 01,return success

Command：$021 Response：?02

Zero calibration of address 02,return the calibration is not enable before span calibration command.

3.6 $AA2

Name： Configuration Status

Description： The command requests the return of the configuration data from the analog input module at address AA.

Syntax： $AA2(cr)

$ delimiter character.

AA address of reading module(00~FF)

2 the Configuration Status command.

(cr) the terminating character, carriage return (0Dh).

Response： !AATTCCFF(cr) if the command is valid.

?AA(cr)if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of module(00~FF)

TT represents the type code.

CC represents the baud rate code.

FF data format

(Also see the %AANNTTCCFF configuration command)

Example：

Command：$012 Response：!01090600

Read address 01 configuration,return success

3.7 $AA5VV

Name： Enable/disable channels for multiplexing

Description： Enables/disables multiplexing simultaneously for separate channels of a specified input module

Syntax： $AA5VV(cr)

$ is a delimiter character.

AA address of reading module(00~FF)

5 is the enable/disable channels command.

VV channel enable/disable,00 is all disabled and FF is all enable

(cr) is the terminating character, carriage return (0Dh).

Response： !AA(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)

Example：

Command：$0155A Receive：!01

Set address 01 to enable channel 1，3，4，6 and disable channel 0，2，5，7，return success.

3.8 $AA6

Name： Read Channel Status

Description： Asks a specified input module to return the status of all channels.

Syntax： $AA6 (cr)

$ is a delimiter character.

AA address of reading module(00~FF)

6 is the read channel status command.

(cr) is the terminating character, carriage return (0Dh).

Response： !AAVV(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)

VV channel enable/disable,00 is all disabled and FF is all enable

Example：

Command：$016 Receive：!01A5

Read address 01 channel status，return channel 0，2，5，7 are enabled and channel 1，3，4，6 are disabled.

3.9 $AA3V.VVVV

Name：Set Span Coefficient

Syntax：$AA3V.VVVV(cr)

$ delimiter character.

AA address of reading module(00~FF)

3 the set each channel span coefficient command.

V.VVVV coefficient，0.5000 ~ 1.0000

(cr) is the terminating character, carriage return (0Dh).

Response：!AA(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)

Example：

Command：$0130.9999 Response：!01

Set address 01 coefficient 0.9999,return success

3.10 $AA4±VV

Name： Set Zero Excursion

Description： Enables/disables the individual channel

Syntax： $AA4±VV(cr)

$ delimiter character.
AA address of setting module(00~FF)
4 the set zero excursion command.
± excursion direction
VV excursion value (bit)
(cr) is the terminating character, carriage return (0Dh).

Response： !AA(cr) if the command is valid.
?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.
? command is invalid.
AA address of response module(00~FF)

Example：

Command：$0140+02 Response：!01

Set address 01 zero excursion value +2,return success.

3.11 $AAA

Name：Read 8 channel data

Description：Command will return the input value from module in the currently configured data format.

Syntax：$AAA(cr)

# delimiter character.

AA address of reading module(00~FF)

A the read 8 channel data command

(cr) is the terminating character, carriage return (0Dh).

Response： >(data1)…(data8)(cr) if the command was valid.
?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

> command is valid.

? command is invalid.

AA address of the module (00~FF)

(Data1)..(Data8) 8 channel analog input data，in format 2’s complement HEX.

Example：

Command：$01A Response：>011021031025445E0128EFEE2389DEDF

Read address 01 8-channel analog input data，return success.

3.12 $AAF

Name： Read Firmware Version

Description： The command requests the module at address AA to return the version code of its firmware.

Syntax： $AAF (cr)

$　delimiter character.

AA address of reading module(00~FF)

F identifies the version command.

(cr) is the terminating character, carriage return (ODh)

Response： !AA(data)(cr) if the command is valid.
?AA (cr) if an invalid command was issued.

Syntax error or communication error may get no response.

!　command is valid.

?　command is invalid.

AA address of response module(00~FF)

Data is the version code of the module’s firmware.

Example：

Command：$01F　Receive：!01050101

Read address 01 firmware version，return version 050101

Command：$02F　Receive：!01040101

Read address 02 firmware version，return version 040101

3.13 $AAM

Name： Read Module Name

Description： The command requests the module at address AA to return its name.

Syntax： $AAM (cr)

$ delimiter character.

AA address of reading module(00~FF)

M the Read Module Name command.

(cr) is the terminating character, carriage return (ODh)

Response： !AA(data)(cr) if the command is valid.

?AA(cr) if an invalid command was issued.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of response module(00~FF)

data the name of the module

Example：

Command：$01M Receive：!018017SC

Read address 01 module name，return name 8017SC.

3.14 ~AAO(Data)

Name：Set Module Name

Description：Set the module name and return success or error.

Syntax：~AAO(Data) (cr)

$　delimiter character.

AA address of setting module(00~FF)

O　Set Module Name command.

Data new name for module，max 6 characters

(cr) is the terminating character, carriage return (ODh)

Response：!AA(cr) if the command is valid.

?AA(cr) if an invalid command was issued.

Syntax error or communication error may get no response.

!　command is valid.

?　command is invalid.

AA address of response module(00~FF)

Example：

Command：~01O8017SC　Receive：!01

Set address 01 module name to 8017SC，return success.

Command：$01M　　　Receive：!018017SC

Read address 01 module name，return 8017SC.

3.15 ~AAEV

Name：Enable/Disable Calibration

Syntax：~AAEV (cr)

$ delimiter character.

AA address of reading module(00~FF)

E Enable/Disable calibration command.

V 1=Enable 0=Disable

(cr) is the terminating character, carriage return (ODh)

Response：!AA(cr) if the command is valid.

?AA(cr) if an invalid command was issued.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of response module(00~FF)

Example：

Command：$010 Receive：?01

Perform address 01 span calibration，return the command is invalid before enable calibration.

Command：~01E1 Receive：!01

Set address 01 to enable calibration，return success.

Command：$010 Receive：!01

Perform address 01 span calibration，return success.