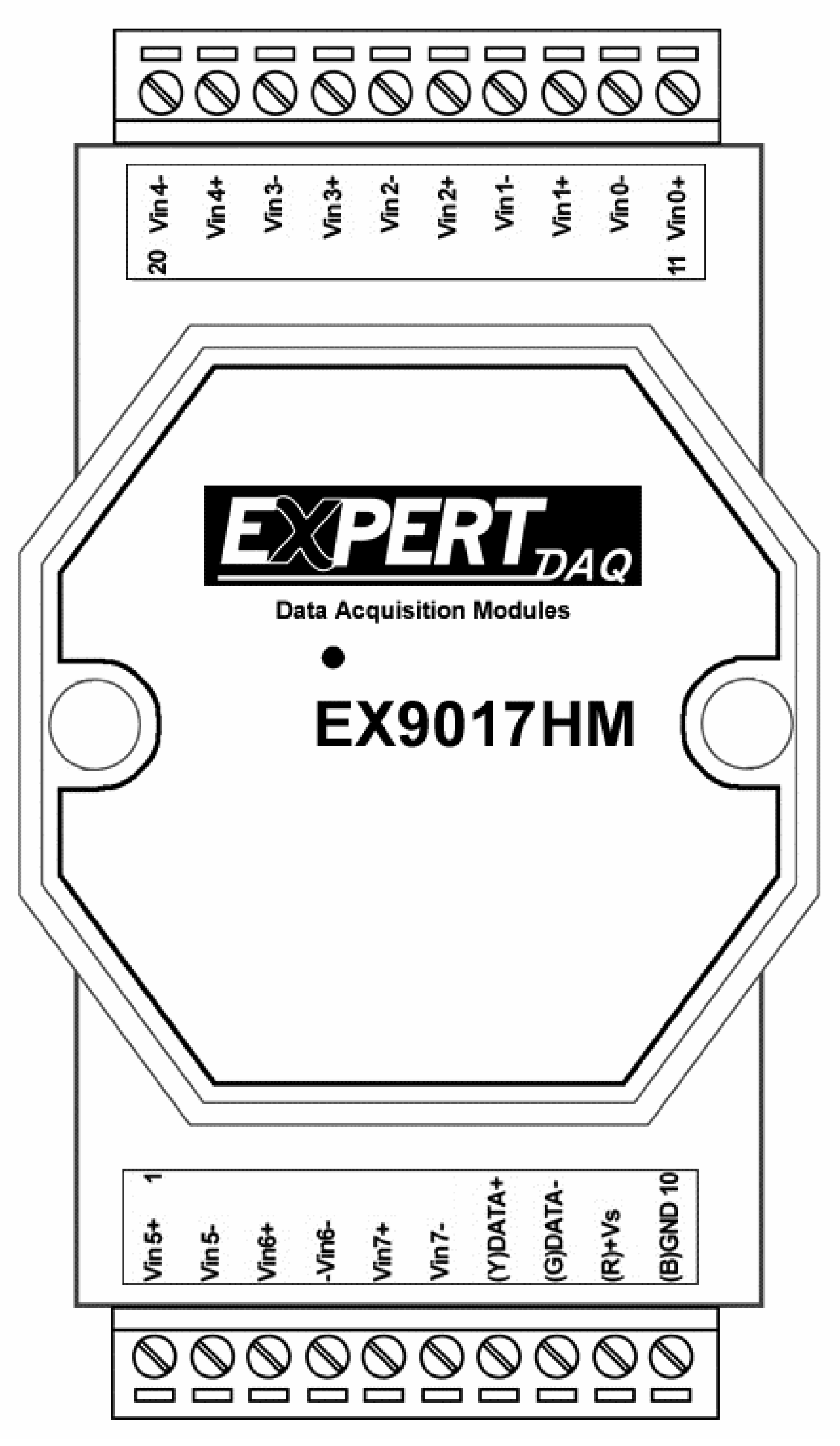
1.1 Introduction

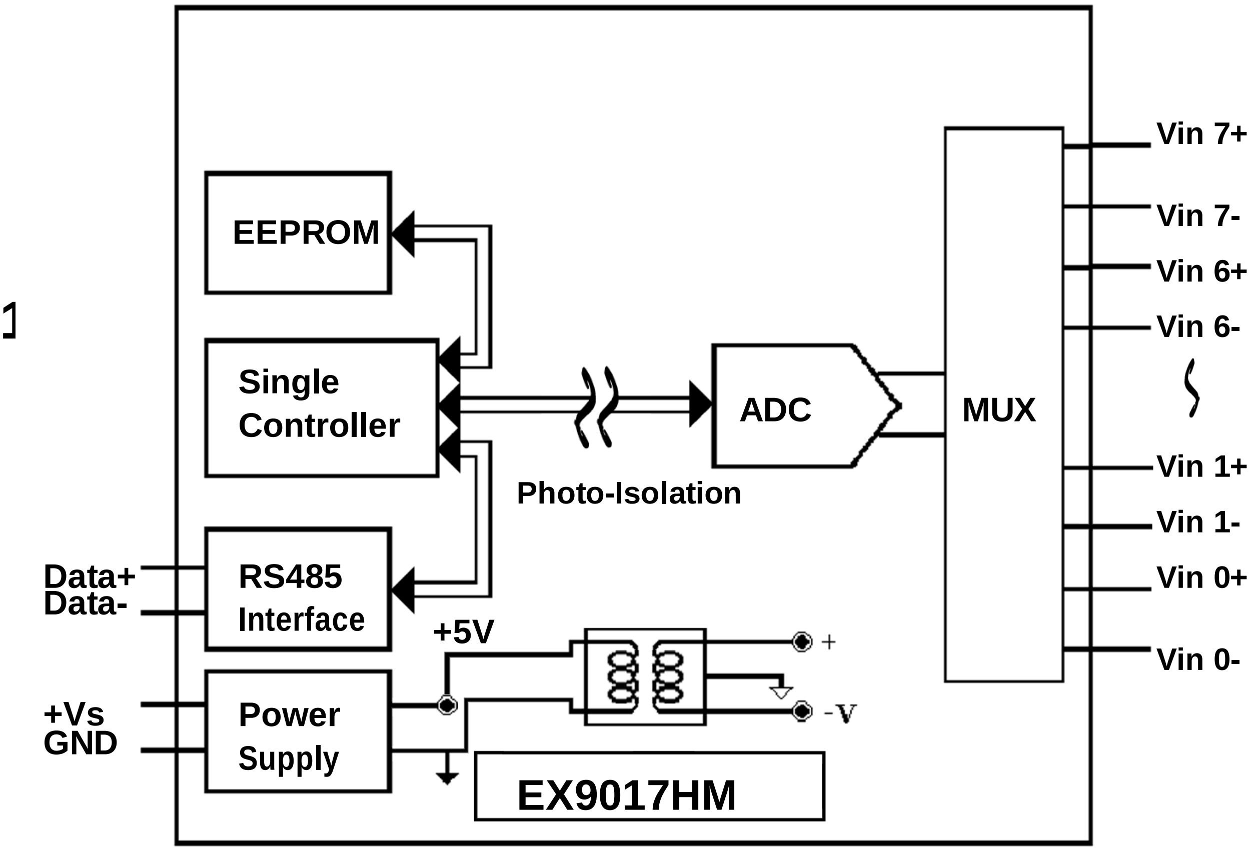
EX9017H-M is a analog input module with 8 input channels.
Eight channels are differential type and individual channel configuration support .

Specifications:
Interface: RS-485, 2 wires
Speed (bps): 1200, 2400, 4800, 9600, 19.2K, 38.4K , 115.2K
Analog Input type: Differential input
Support individual channel configuration
Analog Channels Numbers: 8
Analog Resolution: 16/12(fast mode) bits
Unit Conversion: mV, V or mA
Voltage range: +/-10V,+/-5V,+/-1V,+/-500mV,+/-150mV,+/-20mA
Sampling Rate :10/ 50(fast mode) Samples/Second
Bandwidth : 15.7 Hz
Accuracy : ±0.1%
Zero Drift : 0.5µV/°C
Span Drift : 25ppm/°C
CMR@50/60Hz : 150dB
NMR@50/60Hz : 100dB
Input Impedance : 20M Ohms
Current Measurement: ±20mA **(with external 125 ohm resistor)**
Power supply: +10V to +30V

1.2 Wire connection



1.2.1 Block Diagrams



1.3 Default Settings

Default settings for the EX-9017H-M modules are as follows:

. Module Address: 01

. Protocol: Modbus RTU

. Analog Input Type: type 08 (-10 ~ +10V)

. Baud Rate: 9600 bps

. Checksum disabled

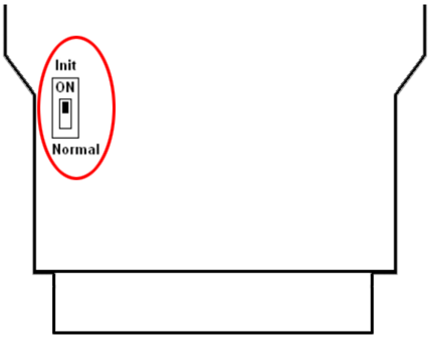
. Engineering unit format

. Filter set at 60Hz rejection

1.4 INIT* Mode Operation

Each EX9000 module has a build-in EEPROM to store configuration information such as address, type, baudrate and other information. Sometimes, user may forget the configuration of the module. Therefore, the EX9000 have a special mode named "INIT* mode" to help user to resolve the problem. The "INIT* mode" is setting as Address=00, Budrate=9600bps, no Checksum .

Originally, the INIT* mode is accessed by connecting the INIT* terminal to the GND terminal. New EX9000 modules have the INIT* switch located on the rear side of the module to allow easier access to the INIT* mode. For these modules, INIT* mode is accessed by sliding the INIT* switch to the Init position as shown below.



To enable INIT* mode, please following these steps:
Step1. Power off the module
Step2. Connect the INIT* pin with the GND pin.
(or sliding the INIT* switch to the Init* ON position)
Step3. Power on
Step4. Send command $002 (cr) in 9600bps to read the
Configuration stored in the module's EEPROM.

There are commands that require the module to be in INIT* mode. They are:
1. %AANNTTCCFF when changing the Baud Rate and checksum settings. See Section 2.1 for details.
2. $AAPN, See Section 2.14 for details.

1.5 Module Status for DIO, AIO

Power On Reset or **Module Watchdog Reset** will let all output goto **Power On Value**. And the module may accept the host's command to change the output value.

Host Watchdog Timeout will let all output goto **Safe Value**. The module's status(read by command~AA0) will be 04, and the output command will be ignored.

1.6 Dual Watchdog Operation for DIO, AIO

Dual Watchdog=Module Watchdog + Host Watchdog

The Module Watchdog is a hardware reset circuit to monitor the module's operating status. While working in harsh or noisy environment, the module may be down by the external signal. The circuit may let the module to work continues and never halt.

The Host Watchdog is a software function to monitor the host's operating status. Its purpose is to prevent the network from communication problem or host halt. When the timeout interval expired, the module will turn all outputs to predefined Safe Value. This can prevent the controlled target from unexpected situation.

The EX9000 module with Dual Watchdog may let the control system more reliable and stable.

1.7 Reset Status

The Reset Status is set while the module power on or reset by module watchdog and is cleared while the command read Reset Status ($AA5) applied. This is useful for user to check the module's working status. When the Reset Status is set means the module is reset and the output may be changed to the PowerOn Value. When the Reset Status is clear means the module is not rested and the output is not changed.

1.8 Calibration(Warning: Please don't calibrate before you really understand.)

Set the module of data format to which you wish to calibration first.
Protocol: ASCII mode.
Address: 01
Input type: which type you wish to calibration
Filter: which rejection you wish to calibration

Perform Zero Calibration:
1. Send the command “$01501” to **CH0 enable, CH1~7 disable.**
2. Apply zero voltage/current to module’s **channel 0** (Vin0+ to Vin0-)
3. Send the command “~01E1” to enable calibration.
4. Send the command “$011” to perform zero calibration.

Perform Span Calibration:
1. Send the command “$01502” to **CH1 enable, CH0 & 2~7 disable.**
2. Apply Span voltage/current to module’s **channel 1**

Type code	08	09	0A	0B	0C	0D
Span	+10V	+5V	+1V	+500mV	+150mV	+20mA

3. Send the command “~01E1” to enable calibration.
4. Send the command “**~01CALS00550000**” to perform span calibration.
5. Send the command “#011” to check the CH0 input value is correct.
   If the value is over the signal, decrease the value “550000”.
   If the value is less the signal, increase the value “550000”.
   The value should between **500000~5B0000**, Hexadecimal format.

Note: While calibrate type of current, need connect external shunt resistor, 125ohms, 0.1% to channel1.

1.9 Configuration Tables

Baud Rate Setting (CC)

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

Sensor Type & V/I Range Setting (TT)

Code	Range	Format	+F.S.	Zero	-F.S.
08	-10V ~ +10V	Engineer unit	+10.000	+00.000	-10.000
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
09	-5V ~ +5V	Engineer unit	+50.000	+05.000	-05.000
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
0A	-1V ~ +1V	Engineer unit	+1.0000	+000.00	-1.0000
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
0B	-500mV ~ +500mV	Engineer unit	+500.00	+000.00	-500.00
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
0C	-150mV ~ +150mV	Engineer unit	+150.00	+0.0000	-150.00
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
0D	-20mA ~ +20mA	Engineer unit	+20.000	+0.0000	-20.000
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000

Data Format Setting (FF)

7	6	5	4	3	2	1	0
FS	CS	MS	reserved			DF	

Key	Description
DF	Data format 00: Engineering unit 01: % of FSR (full scale range) 10: 2’s complement hexadecimal
MS	Mode setting 0: normal mode (16bit) 1: fast mode (12bit)
CS	Checksum (CRC in Modbus) setting 0: Disabled 1: Enabled
FS	Filter setting 0: 60Hz rejection 1: 50Hz rejection

Note: The reserved bits should be zero.

2.0 Command set

2.1 %AANNTTCCFF

Description: Set Module Configuration.

Syntax: %AANNTTCCFF[CHK](cr)

%	a delimiter character
AA	address of setting/response module(00 to FF)
NN	new address for setting/response module(00 to FF)
TT	represents the type code. Type code determines the input range. If **TT=FF** the type of all channels keep no change.
CC	new baudrate for setting module.
FF	new data format for setting module.

IF the configuration with new baudrate or new checksum setting, before using this command, the rear slide switch must be in the ON(INIT*) position. The new setting is saved in the EEPROM and will be effective after the next power-on reset.

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command: %0203080602 Receive: !02

Set module address **02** to **03**.
Input type code=**08** (-10~+10V) for all channels
Baudrate=**06** (9600)
Dataformat=**02** (2’s complement hexadecimal)

2.2 #AA

Description: Read Analog Input

Syntax: #AA[CHK](cr)

#   delimiter character

AA   address of reading/response module(00 to FF)

Response: Valid Command: >(Data)

(Data) analog input value for its format while use #AA command to EX-9018BL/9019, the data is the combination for each channel respectively.

Example :

Command: #04

Receive:>+051.23+041.53+072.34-023.56+100.00-051.33+066.46+074.22

The module address 04 is EX-9018BL/9019. Read address 04 for getting data of all 8 channels.

2.3 #AAN

Description : Read Analog Input from channel N

Syntax : #AAN[CHK](cr)

#	delimiter character
AA	address of reading/response module(00 to FF)
N	channel to read, from 0 to 7

Response: Valid Command: >(Data)

Invalid Command: ?AA

(Data) analog input value for its format

Example :

Command : #032 Receive : >+025.13

Read address 03 channel 2, get data successfully.

Command : #029 Receive : ?02

Read address 02 channel 9, return error channel number.

2.4 $AA0

Description: Perform Span Calibration

Syntax: **$AA0[CHK](cr)**

$ delimiter character

AA address of setting/response module (00 to FF)

0 command for performing zero calibration

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example :

Command : $010 Receive : !01

Perform address 01 zero calibration on channel 0, return success.

Command : $020 Receive : ?02

Perform address 02 zero calibration on channel 2 , return not enable calibration before perform calibration command.

Warning: Please don't calibrate before you really understand.

2.5 $AA1

Description: Perform Zero Calibration

Syntax: $AA1[CHK](cr)

$ delimiter character

AA address of setting/response module (00 to FF)

1 command for performing span calibration

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command: $011 Receive: !01

Perform address 01 span calibration on channel 0, return success.

Command: $021 Receive: ?02

Perform address 02 span calibration on channel 2, return not enable calibration before perform calibration command.

Warning: Please don't calibrate before you really understand.

2.6 $AA2

Description: Read configuration.

Syntax: $AA2[CHK](cr)

$	delimiter character
AA	address of reading/response module (00 to FF)
2	command for read configuration

Response:	Valid Command:	**!AATTCCFF**
	Invalid Command:	**?AA**

TT	type code of module
CC	baudrate code of module
FF	data format of module

Example:

Command: $012 Receive: !01400600

Read the configuration of module 01, input range of -2.5~+2.5V, baudrate 9600, no checksum.

Note: check configuration Tables

2.7 $AA5VV

Description: Set Channel Enable

Syntax: $AA5VV[CHK](cr)

$	delimiter character
AA	address of setting/response module (00 to FF)
5	command for set channel enable
VV	are two hexadecimal values. The values are interpreted by the module as two binary words (4-bit). The first word represents the status of channel 4~7, and the second word represents the status of channel 0~3. Value 0 means the channel is disabled, value 1 means the channel is enabled.

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command :$0152A Receive : !01

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

Command : $016 Receive : !012A

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

2.8 $AA6

Description: Read Channel Status

Syntax: **$AA6[CHK](cr)**

$	delimiter character
AA	address of reading/response module (00 to FF)
6	command for read channel status

Response: Valid Command: **!AAVV**

Invalid Command: **?AA**

VV are two hexadecimal values. The values are interpreted by the module as two binary words (4-bit). The first word represents the status of channel 4~7, and the second word represents the status of channel 0~3. Value 0 means the channel is disabled, value 1 means the channel is enabled.

Example:

Command :$0152A Receive : !01

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

Command : $016 Receive : !012A

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

2.9 $AA7CiRrr

Description: Sets the type code of a channel individually.

Syntax: $AA7CiRrr[CHK](cr)

$	delimiter character
AA	address of setting/response module(00 to FF)
7C	the set channel type command
i	channel number
R	the set channel type command
rr	channel type code

Response: Valid comma nd: **!AA**

Invalid command: **?AA**

Example:

Command: $017C3R08 Receive: !01

Sets the type code for channel 3 of module 01 to be 08 (-10~+10V) and the module returns a valid response.

Command: $037C1R40 Receive: ?03

Sets the type code for channel 1 of module 03 to be 40. The module returns an invalid response because the type code is invalid.

2.10 $AA8Ci

Description: Reads the type code information of a channel.

Syntax: $AA8Ci[CHK](cr)

$	delimiter character
AA	address of reading/response module(00 to FF)
8C	read channel type command
i	channel number

Response: Valid command: **!AACiRrr**

Invalid command: **?AA**

i	channel numbers(0~7)
rr	type of channel i

Example:

Command: $018C0 Receive: !01C0R03

Reads the type(input range) of channel 0 of module 01 to be 03 (-10~+10V).

2.11 $AAF

Description: Read Firmware Version

Syntax: $AAF[CHK](cr)

$ delimiter character

AA address of reading/response module(00 to FF)

F command for read firmware version

Response: Valid command: **!AA(Data)**

Invalid command: **?AA**

(Data) Firmware version of module

Example:

Command : $01F Receive : !01M6.92

Read address 01 firmware version, return version M6.92

2.12 $AAM

Description: Read Module Name

Syntax: $AAM[CHK](cr)

$	delimiter character
AA	address of reading/response module(00 to FF)
M	command for read module name

Response: Valid command: **!AA(Data)**

Invalid command: **?AA**

(Data) Name of module

Example:

Command : $01M Receive : !019017H-M

Read address 01 module name, return name 9017H-M.

2.13 $AAP

Description: Read protocol information of Module

Syntax: $AAP[CHK](cr)

$ delimiter character

AA address of reading/response module(00 to FF)

P command for read protocol information of module

Response: Valid command: **!AAS**

Invalid command: **?AA**

S The protocol supported by the module

0: the protocol set in EEPROM is Normal mode

1: the protocol set in EEPROM is ModbusRTU mode

Example:

Command: $01P Response: !010

Reads the communication protocol of module 01 and returns a response of 0 meaning the protocol that will be used at the next power on reset is normal mode.

Command: $01P1 Response: !01

Sets the communication protocol of module 01 to Modbus RTU and returns a valid response. And the next power on reset is in ModbusRTU mode.

2.14 $AAPN

Description: Set the protocol information of Module

Syntax: $AAPN[CHK](cr)

$ delimiter character

AA address of reading/response module(00 to FF)

P command for read protocol information of module

N The protocol supported by the module

0: the protocol set in EEPROM is Normal mode

1: the protocol set in EEPROM is ModbusRTU mode

Response: Valid command: **!AA**

Invalid command: **?AA**

Example:

Command: $01P1 Response: !01

Sets the communication protocol of module 01 to Modbus RTU and returns a valid response. And the next power on reset is in ModbusRTU mode.

2.15 ~AAEV

Description: Enable/Disable Calibration

Syntax: ~AAEV[CHK](CR)

~ delimiter character

AA address of setting/response module (00 to FF)

E command for enable/disable calibration

V 1=Enable/0=Disable calibration

Response:	Valid Command:	**!AA**
	Invalid Command:	**?AA**

Example:

Command : $011	Receive: ?01

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

Command : ~01E1	Receive: !01

Set address 01 to enable calibration, return success.

Command: $011	Receive: !01

Preform address 01 zero calibration, return success.

Warning: Please don't calibrate before you really understand.

2.16 ~AAO(Data)

Description: Set Module Name

Syntax: ~AAO(Data)[CHK](cr)

~	delimiter character
AA	address of setting/response module(00 to FF)
O	command for set module name
(Data)	new name for module, max 6 characters

Response: Valid command: **!AA**

Invalid command: **?AA**

Example:

Command:~01O9019HM Receive :!01

Set address 01 module name 9019HM, return success.

2.17 ~**

Description: Host OK.

Host send this command to all modules for send the information "Host OK"

Syntax: ~[CHK](cr)**

~ delimiter character

** command for all modules

Response: No response.

Example:

Command: ~** No response

2.18 ~AA0

Description: Read Module Host Watchdog Status.

Syntax: ~AA0[CHK](cr)

~ delimiter character

AA address of reading/response module(00 to FF)

0 command for read module status

Response: Valid command: **!AASS**

Invalid command: **?AA**

SS module status, 00= host watchdog is disabled & host watchdog timeout status is clear, 80= host watchdog is enabled & host watchdog timeout status is clear. 84= host watchdog is enabled & host watchdog timeout status is set . The status will store into EEPROM and only may reset by the command~AA1.

SS	Host watchdog	Host watchdog timeout status
00	Disable	Clear
80	Enable	Clear
84	Enable	Set

2.19 ~AA1

Description: Reset Module Host Watchdog Status.

Syntax: ~AA1[CHK](cr)

~ delimiter character

AA address of setting/response module(00 to FF)

1 command for reset module status

Response: Valid command: **!AA**

Invalid command: **?AA**

2.20 ~AA2

Description: Read Host Watchdog Timeout Value

Syntax: ~AA2[CHK](cr)

~ delimiter character

AA address of reading/response module(00 to FF)

2 command for read host watchdog timeout value

Response: Valid command : **!AAEVV**

Invalid command: **?AA**

E host watchdog enable status, 1=Enable, 0=Disable

VV timeout value in HEX format, each count is 0.1 second

01=0.1 second and FF=25.5 seconds

2.21 ~AA3EVV

Description: Set Host Watchdog Timeout Value

Syntax: ~AA3EVV[CHK](cr)

~	delimiter character
AA	address of setting/response module(00 to FF)
3	command for set host watchdog timeout value
E	1=Enable/0=Disable host watchdog
VV	timeout value, from 01 to FF, each for 0.1 second

Response: Valid command: **!AA**
Invalid command: **?AA**

Example:

Command : ~010 Receive : !0100

Read address 01 modules status, return host watchdog timeout status is clear.

Command : ~013164 Receive : !01

Set address 01 host watchdog timeout value 10.0 seconds and enable host watchdog, return success.

Command : ~012 Receive : !01164

Read address 01 host watchdog timeout value, return that host watchdog is enabled, and time interval is 10.0 seconds.

Command : ~** No response

Reset the host watchdog timer.

Wait for about 10 seconds and don't send command~**, the LED of module will go to flash. The flash LED indicates the host watchdog timeout status is set.

Command : ~010 Receive : !0104

Read address 01 module status, return host watchdog timeout status is set.

Command : ~012 Receive : !01064

Read address 01 host watchdog timeout value, return that host watchdog is disabled, and time interval is 10.0 seconds.

Command : ~011 Receive : !01

Reset address 01 host watchdog timeout status, return success And the LED of this module stop flash.

Command : ~010 Receive : !0100

Read address 01 module status, return host watchdog timeout status is clear.

2.22 ~AAM

Description: Read the data format in Modbus mode

Syntax: ~AAM[CHK](cr)

~ delimiter character

AA address of setting/response module(00 to FF)

M command for read the data format in Modbus mode

Response: Valid command: **!AAS**

Invalid command: **?AA**

S 0=Engineer unit

1=2’s complement hexadecimal

Example:

Command:~01M Receive :!010

Read address 01 module status, return the dataformat in modbus mode is engineer unit.

2.23 ~AAMS

Description: Set the data format in Modbus mode

Syntax: ~AAMV[CHK](cr)

~	delimiter character
AA	address of setting/response module(00 to FF)
M	command for set the data format in Modbus mode
S	**0=Engineer unit**
	1=2’s complement hexadecimal

Response: Valid command: **!AA**

Invalid command: **?AA**

Example:

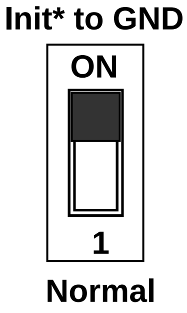
Command:~01M1 Receive :!01

Set address 01 dataformat in modbus mode is 2’s complement hexadecimal, return success.

EX-9017H-M Modbus Quick Start

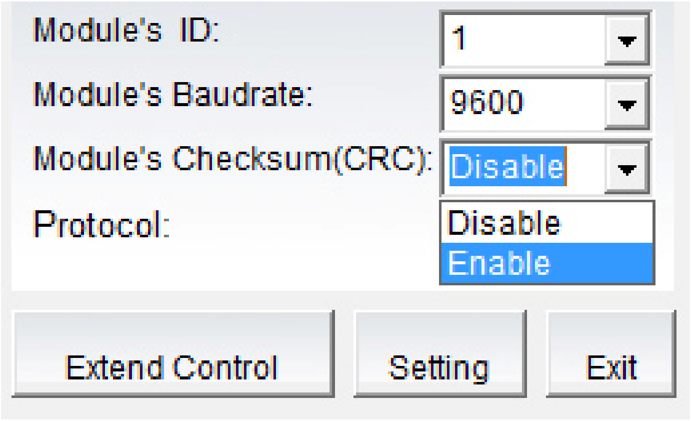
1. The default setting is MODBUS mode after Power On.

2. Sliding the INIT* switch to the Init(ON) position of rear side then Power On will enter INIT* mode (use ASCII command).



3. On ASCII command mode, user can set other setting like Address, Baudrate, …by use ASCII command or EX-9000 utility (Please check the EX-9000 user manual).

Note: If your application need with CRC check in modbus mode, please set the module to checksum(CRC) enable.



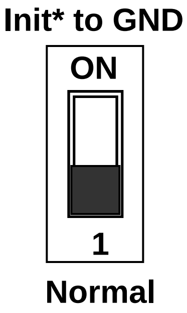
Module's ID: 1

Module's Baudrate: 9600

Module's Checksum(CRC): Disable

Protocol:

4. After change the setting finish, Sliding the INIT* switch to the Normal(1) position of rear side, the new setting will be effective after the next power-on reset.



This function code is used to read from 1 to 8 continuous analog input channels.

Request

00	Address	1Byte	1 to 247
01	Function code	1Byete	0x04
02-03	Starting channel	2 Bytes	0 to 7 for reading analog inputs
04-05	Number of input Channels(N)	2Bytes	1 to 8;(Starting channel+N)<=8 for reading analog inputs

Response

00	Address	1Byte	1 to 247
01	Function code	1Byete	0x04
02	Byte count	1 Byte	2 x N
03~	Data of input channels	2 x N Bytes	

Error Response

00	Address	1Byte	1 to 247
01	Function code	1Byete	0x84
	Exception code	1 Byte	02:starting channel out of range 03:(starting channel+number of input channels) out of range, incorrect number of bytes received

01(0x01) Read WDT timeout status

Request

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x01
02~03	Starting channel	2 Bytes	0x010D
04~05	Read WDT timeout status	2 Bytes	0x0001

Response

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x01
02	Byte count	1 Byte	1
03	Read WDT timeout status	1 Byte	0x00 The WDT timeout status is clear 0x01 The WDT timeout status is enable

Error Response

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x81
02	Exception code	1 Byte	Refer to the Modbus standard for more details.

03(0x03) Read WDT timeout Value

Request

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x03
02~03	Starting channel	2 Bytes	0x01E8
04~05	Read WDT timeout value	2 Bytes	0x0001

Response

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x03
02	Byte count	1 Byte	2
03~	Read WDT timeout value	**1** Byte	0x0000~0x00FF WDT timeout value, 0~255, in 0.1 second

Error Response

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x83
02	Exception code	1 Byte	Refer to the Modbus standard for more details.

03(0x03) Send Host OK

Request

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x03
02~03	Starting channel	2 Bytes	0x3038
04~05	Send Host OK	2 Bytes	0x0000

No Response

04(0x04) Send Host OK

Request

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x04
02~03	Starting channel	2 Bytes	0x3038
04~05	Send Host OK	2 Bytes	0x0000

No Response

05(0x05) Set WDT timeout /Clear WDT timeout status

Request

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x05
02~03	WDT timeout	2 Bytes	0x0104 Set WDT timeout enable/disable 0x010D Clear WDT timeout status
04~05	WDT timeout	2 Bytes	0xFF00 for WDT timeout enable 0x0000 for WDT timeout disable 0xFF00 for Clear WDT timeout status

Response

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x05
02~03	WDT timeout	2 Bytes	The value is the same as byte 02 and 03 of the Request
04~05	WDT timeout	2 Bytes	The value is the same as byte 04 and 05 of the Request

Error Response

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x85
02	Exception code	1 Byte	Refer to the Modbus standard for more details.

06(0x06) Set WDT timeout Value

Request

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x06
02~03	Starting channel	2 Bytes	0x01E8
04~05	WDT timeout value	2 Bytes	0x0000~0x00FF WDT timeout value, 0~255, in 0.1 second

Response

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x06
02~03	WDT timeout value	2 Bytes	The value is the same as byte 02 and 03 of the Request
04~05	WDT timeout value	2 Bytes	The value is the same as byte 04 and 05 of the Request

Error Response

00	Address	1 Byte	1-247
01	Function code	1 Byte	0x86
02	Exception code	1 Byte	Refer to the Modbus standard for more details.

Modbus Mapping Table:

Input register addresses are available for MODBUS function code 0x04				
Address	Hex	Channel	Content	Attribute
30001	0H	0	Analog input Value	Read
30002	1H	1	Analog input Value	Read
30003	2H	2	Analog input Value	Read
30004	3H	3	Analog input Value	Read
30005	4H	4	Analog input Value	Read
30006	5H	5	Analog input Value	Read
30007	6H	6	Analog input Value	Read
30008	7H	7	Analog input Value	Read

Holding register addresses are available for MODBUS function code 0x03, 0x06, 0x10				
Address	Hex	Channel	Content	Attribute
40001	0H	0	Analog input Value	Read
40002	1H	1	Analog input Value	Read
40003	2H	2	Analog input Value	Read
40004	3H	3	Analog input Value	Read
40005	4H	4	Analog input Value	Read
40006	5H	5	Analog input Value	Read
40007	6H	6	Analog input Value	Read
40008	7H	7	Analog input Value	Read

MODBUS Engineering Data Format Table

Type Code	Input Type	Min.	Max.	Formula
08	-10V ~ +10V	-10000	10000	Volt=(Modbus data)/1000
09	-5V ~ +5mV	-5000	5000	Volt=(Modbus data)/1000
0A	-1V ~ +1V	-10000	10000	Volt=(Modbus data)/10000
0B	-500mV ~ +500mV	-5000	5000	Volt=(Modbus data)/10
0C	--150mV ~ +150mV	-15000	15000	Volt=(Modbus data)/100
0D	--20mA ~ +20mA	-20000	20000	Current=(Modbus data)/1000

Example: Assume type of channel is +/-10V and MODBUS data=0x2030(Hex)=8240(Dec)
The voltage of channel is 8240/1000=8.24V

Example: Assume type of channel is +/-500mV and MODBUS data=0xEF1B(Hex)=-4325(Dec)
The voltage of channel is -4235/10=423.5mV

Example: Assume type of channel is +/-20mA and MODBUS data=0x3B84(Hex)=15236(Dec)
The current of channel is 15236/1000=15.236mA

MODBUS Hex 2's complement Data Format Table

Type Code	Input Type	Min.	Max.	Formula
08	-10V ~ +10V	8000	7FFF	Volt=(MODBUS data *10)/32767
09	-5V ~ +5mV	8000	7FFF	Volt=(MODBUS data *5)/32767
0A	-1V ~ +1V	8000	7FFF	Volt=(MODBUS data *1)/32767
0B	-500mV ~ +500mV	8000	7FFF	Volt=(MODBUS data *500)/32767
0C	--150mV ~ +150mV	8000	7FFF	Volt=(MODBUS data *150)/32767
0D	--20mA ~ +20mA	8000	7FFF	Current=(MODBUS data *20)/32767

Example: Assume type of channel is +/-10V and MODBUS data=0x2030(Hex)=8240(Dec)
The voltage of channel is (8240*10)/32767=2.514V

Example: Assume type of channel 1 is +/-500mV and MODBUS data=0xEF1B(Hex)=-4325(Dec)
The voltage of channel is (-4235*500)/32767=-64.622mV

Example: Assume type of channel 1 is +/-20mA and MODBUS data=0x3B84(Hex)=15236(Dec)
The current of channel is (15236*20)/32767=9.299mA