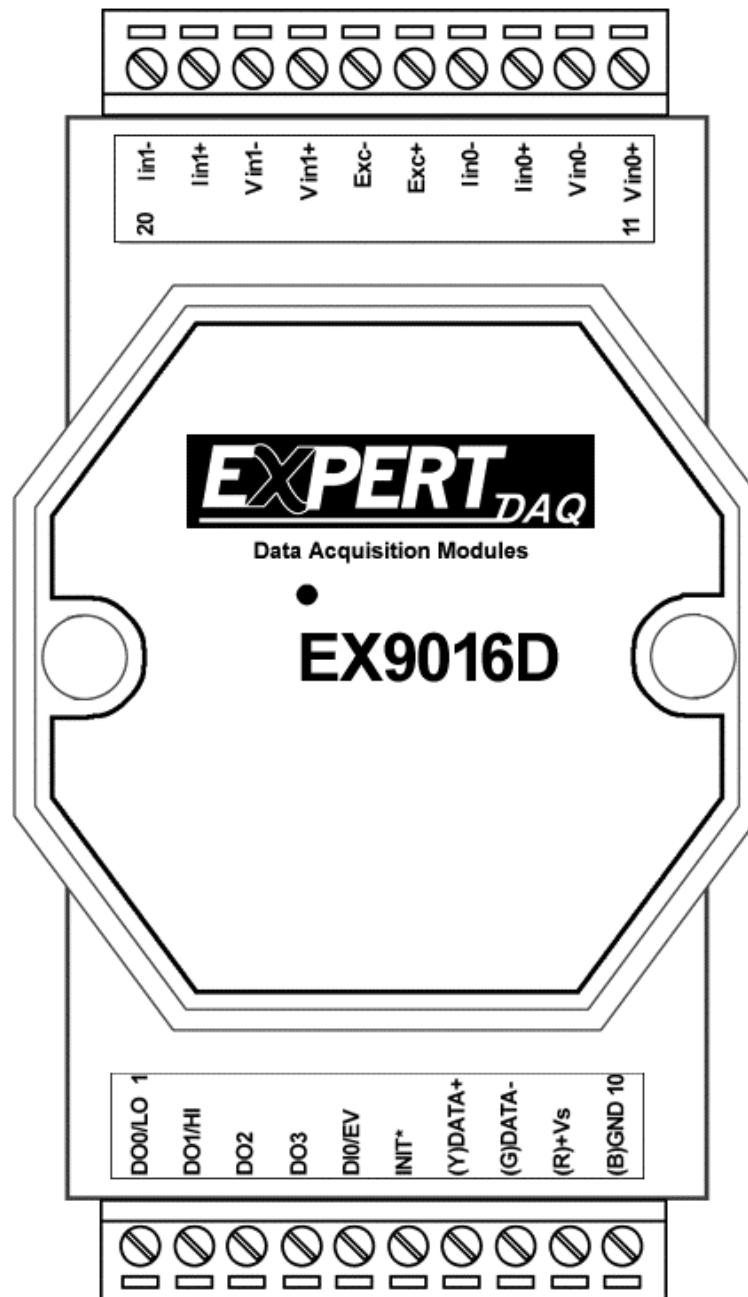


1. Introduction

The common features of the EX-9016 modules is as follows:

1. 3000 VDC isolated analog input.
2. 24-bits sigma-delta ADC to provide excellent accuracy.
3. 16-bit DAC supply excitation voltage for strain gauge.
4. Software calibration.
5. EX9016D is the EX9016 with 7-segment LED Display.



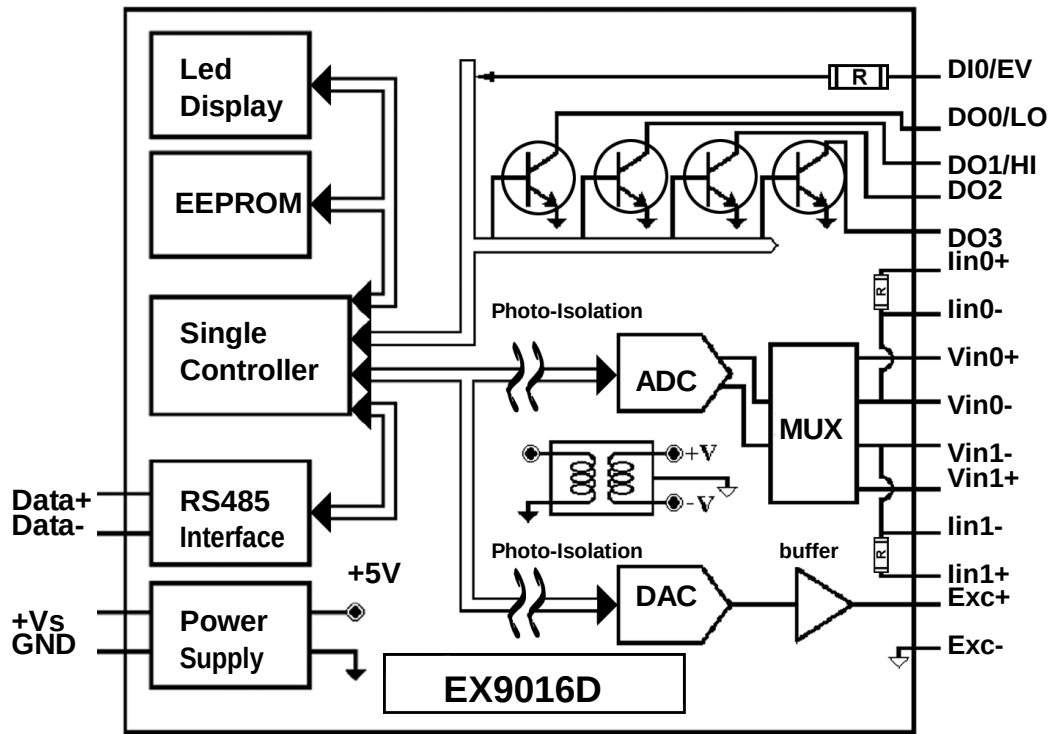
1.1 Specifications

Analog Input	
Input Channels	2
Analog Input Type	mV, V, mA
Sampling Rate	10 Samples/Second
Bandwidth	5.25Hz
Accuracy	±0.05%
Zero Drift	0.5μV/°C
Span Drift	25ppm/°C
CMR@50/60Hz	150dB
NMR@50/60Hz	100dB
Input Impedance	20M Ohms
Isolation	3000VDC
Excitation Voltage Output	
Output Channel	1
Output Range	0 to +10V
Max Output Load	40mA
Accuracy	±0.05% of FSR
Drift	±50ppm/°C
Output Impedance	12Ohms
Isolation	3000VDC
Digital Output	
Output channels	4
Output Type	Open Collector to 30V
Output Load	Sink 30mA max
Power Dissipation	300mW
Digital Input	
Input Channel	1
Digital Level 0	+1V Max
Digital Level 1	+3.5~+30V Max
Event Counter	
Max Input Frequency	50Hz
Min Pulse Width	1mS
Environment	
Power Requirement	+10 to +30 VDC
Power Consumption	2.4 W
Operating Temperature	-25°C to +75°C
Storage Temperature	-30°C to +75°C

Notes: Warm-UP for 30 minutes is recommended!

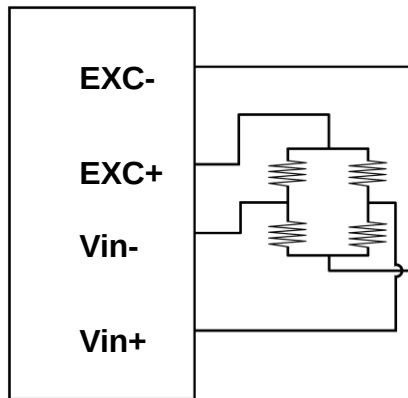
1.2 Wire connection

1.2.1 Block Diagrams

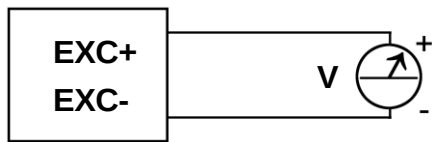


1.2.2 Wiring diagram for the EX-9016

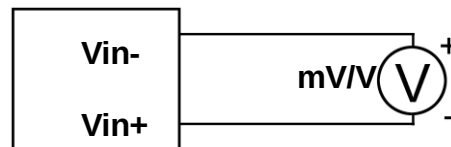
Bridge Sensor/Load Cell/Strain Gauge Wire Connection



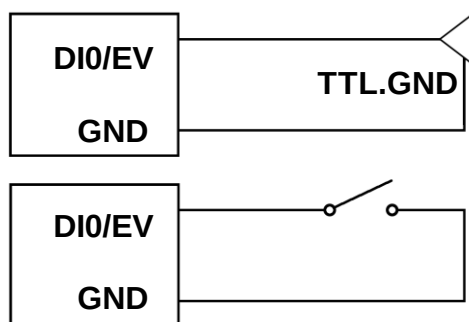
Analog Input Wire Connection:



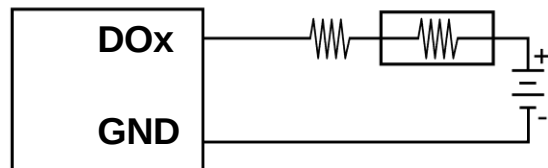
Analog Output Wire Connection:



Digital Input Wire Connection:



Digital Output Wire Connection:



1.3 Default Settings

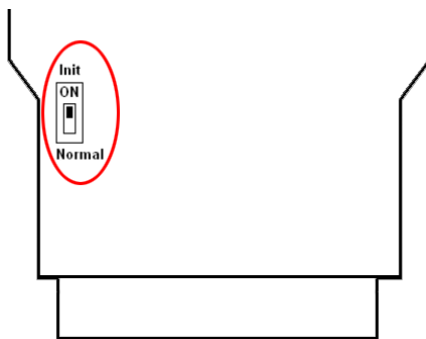
Default settings for the EX-9016 module are as follows:

- . Module Address: 01
- . Analog Input Type: Type 05, -2.5 to +2.5V
- . 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. %AANN TTCCFF when changing the Baud Rate and checksum settings. See Section 2.1 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 reset and the output is not changed.

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

Analog Input Calibration sequence:

Type code	00	01	02	03	04	05	06
Zero Input	0mV	0mV	0mV	0mV	0V	0V	0mA
Span Input	+15mV	+50mV	+100mV	+500mV	+1V	+2.5V	+20mA

1. Apply zero calibration voltage.
2. Warm up the module for at least 30 minutes.
3. Set the type code to the type you wish to calibrate.
4. Enable calibration. -> **Ref Sec.2.16**
5. Perform zero calibration command. -> **Ref Sec.2.5**
6. Apply span calibration voltage.
7. Perform span calibration command. -> **Ref Sec.2.4**
8. Repeat steps 4 to 7 three times.

Excitation Voltage Calibration sequence:

- 1 Connect voltmeter to module's excitation output pin.
- 2 Warm-Up for 30 minutes.
- 3 Output 0V. -> **Ref Sec.2.18**
- 4 Trim the output until the value in voltmeter is closest to 0V.
-> **Ref Sec.2.20**
- 5 Perform Excitation Voltage Zero Calibration. -> **Ref Sec.2.21**
- 6 Output 10V. -> **Ref Sec.2.18**
- 7 Trim the output until the value in voltmeter is closest to 10V.
-> **Ref Sec.2.20**
- 8 Perform Excitation Voltage Span Calibration. -> **Ref Sec.2.22**

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

Analog Input Type Setting (TT)

Code	Range	Format	+F.S.	Zero	-F.S.
00	-15~+15mV	Engineer unit	+15.000	+00.000	-15.000
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
01	-50~+50mV	Engineer unit	+50.000	+00.000	-50.000
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
02	-100~+100mV	Engineer unit	+100.00	+000.00	-100.00
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
03	-500~+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
04	-1~+1V	Engineer unit	+1.0000	+0.0000	-1.0000
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
05	-2.5~+2.5V	Engineer unit	+2.5000	+0.0000	-2.5000
		% of F.S.R.	+100.00	+000.00	-100.00
		2's complement	7FFF	0000	8000
06	-20~+20mA	Engineer unit	+20.000	+00.000	-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	reserved				DF	

Key	Description
DF	Data format 00: Engineering unit 01: % of FSR (full scale range) 10: 2's complement hexadecimal
CS	Checksum setting 0: Disabled 1: Enabled
FS	Filter setting 0: 60Hz rejection 1: 50Hz rejection

Note: The reserved bits should be zero.

2 Command

Command Format : **(Leading)(Address)(Command)[CHK](cr)**

Response Format : **(Leading)(Address)(Data)[CHK](cr)**

[CHK] 2-character checksum

(cr) end-of-command character, character return(0x0D)

General Command Sets			
Command	Response	Description	Section
%AANNTTCCFF	!AA	Set Module Configuration	Sec.2.1
#AA	>(Data)	Read Analog Input	Sec.2.2
\$AA0	!AA	Perform Span Calibration	Sec.2.3
\$AA1	!AA	Perform Zero Calibration	Sec.2.4
\$AA2	!AANNTTCCFF	Read Configuration	Sec.2.5
\$AA3	!AAN	Read Channel Select	Sec.2.6
\$AA3N	!AA	Set Channel Select	Sec.2.7
\$AA8	!AAV	Read LED Configuration	Sec.2.8
\$AA8V	!AA	Set LED Configuration	Sec.2.9
\$AA9(Data)	!AA	Set LED Data	Sec.2.10
\$AAF	!AA(Data)	Read Firmware Version	Sec.2.11
\$AAM	!AA(Data)	Read Module Name	Sec.2.12
~AAO(Data)	!AA	Set Module Name	Sec.2.13
~AAEV	!AA	Enable/Disable Calibration	Sec.2.14

Excitation Voltage Command Sets			
Command	Response	Description	Section
\$AA6	!AA(Data)	Get Excitation Voltage Output Value	Sec.2.15
\$AA7(Data)	!AA	Excitation Voltage Output	Sec.2.16
\$AAS	!AA	Start-Up Voltage Output Configuration	Sec.2.17
\$AAEVV	!AA	Excitation Voltage Trim Calibration	Sec.2.18
\$AAA	!AA	Excitation Voltage Zero Calibration	Sec.2.19
\$AAB	!AA	Excitation Voltage Span Calibration	Sec.2.20

Digital Input/Output, Alarm and Event Counter Command Sets			
Command	Response	Description	Section
@AADI	!AASOOII	Read Digital I/O and Alarm Status	Sec.2.21
@AADO(Data)	!AA	Set Digital Output	Sec.2.22
@AAEAT	!AA	Enable Alarm	Sec.2.23
@AAHI(Data)	!AA	Set High Alarm	Sec.2.24
@AALO(Data)	!AA	Set Low alarm	Sec.2.25
@AADA	!AA	Disable Alarm	Sec.2.26
@AACA	!AA	Clear Latch Alarm	Sec.2.27
@AARH	!AA(Data)	Read High Alarm	Sec.2.28
@AARL	!AA(Data)	Read Low Alarm	Sec.2.29
@AARE	!AA(Data)	Read Event Counter	Sec.2.30
@ACE	!AA	Clear Event Counter	Sec.2.31

Host Watchdog Related Command Sets			
Command	Response	Description	Section
~**	No response	Host OK	Sec.2.32
~AA0	!AASS	Read Module Status	Sec.2.33
~AA1	!AA	Reset Module Status	Sec.2.34
~AA2	!AATT	Read Host Watchdog Timeout Interval	Sec.2.35
~AA3ETT	!AA	Set Host Watchdog Timeout Interval	Sec.2.36
~AA4	!AAPPSS	Read PowerOn Value and Safe Value	Sec.2.37
~AA5PPSS	!AA	Set PowerOn Value and Safe Value	Sec.2.38

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: %0203050602 Receive: !02

Set module address **02** to **03**.

Input type code=**05** (-2.5~+2.5V) 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

Example :

Command: #04 Receive:>+10.234

Read address 04 for getting data is +10.234.

2.3 \$AA0

Description: Perform Span Calibration

Syntax: \$AA0[CHK](cr)

\$ delimiter character

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

0 command for performing span calibration

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example :

Command : \$010 Receive : !01

Perform address 01 span calibration, return success.

Command : \$020 Receive : ?02

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

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

2.4 \$AA1

Description: Perform Zero Calibration

Syntax: \$AA1[CHK](cr)

\$ delimiter character

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

1 command for performing zero calibration

Response: Valid Command: **!AA**

Invalid Command: ?AA

Example:

Command: \$011 Receive: !01

Perform address 01 zero calibration, return success.

Command: \$021 Receive: ?02

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

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

2.5 \$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 the module

CC baud Rate code of the module

FF data format, checksum settings and filter
settings of the module

Example:

Command: \$012

Receive: !01200600

Read the configuration of module 01.

Note: check configuration Tables

2.6 \$AA3

Description: Read Channel Select.

Syntax: \$AA3[CHK](cr)

\$ delimiter character

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

3 command for read channel select

Response: Valid Command: **!AAN**

 Invalid Command: **?AA**

N Channel selected. The analog input command is
 applied to the channel N

Example:

Command: \$013

Receive: !010

Read address 01 channel select, return channel 0 is select.

2.7 \$AA3N

Description: Set Channel Select.

Syntax: \$AA3N[CHK](cr)

\$ delimiter character

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

3 command for read channel select

N channel N is select

Response: Valid Command: **!AAN**

Invalid Command: **?AA**

Example:

Command: \$0131

Receive: !01

Set address 01 channel select 1, return success.

2.8 \$AA8 (for EX9016D only)

Description: Read LED Configuration

Syntax: \$AA8[CHK](cr)

\$ delimiter character

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

8 command for read LED configuration

Response: Valid Command: **!AAV**

 Invalid Command: **?AA**

V LED configuration

 1=module control, 2=host control

Example:

Command: \$ 018

Receive: !011

Read address 01 LED configuration, return module control.

Command: \$ 018

Receive: !010

Read address 01 LED configuration, return host control.

2.9 \$AA8V (for EX9016D only)

Description: Set LED Configuration

Syntax:\$AA8V[CHK](cr)

\$ delimiter character

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

8 command for read LED configuration

V 1=Set LED to module, 2=Set LED to host

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command: \$ 0182 Receive: !011

Set address 01 LED to host control, return success.

Command: \$ 0181 Receive: !010

Set address 01 LED to module control, return success.

2.10 \$AA9(Data) (for EX9016D only)

Description: Set LED Configuration

Syntax: \$AA9(data)[CHK](cr)

\$ delimiter character

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

9 command for setting LED data

(Data) data display on the LED, range from -19999. to +19999.

The data need sign, 5 digits and decimal point.

Response: Valid Command: !AA

Invalid Command: ?AA

Example:

Command: \$ 019+123.45

Receive: !011

Set address 01 LED data to +123.45, return success.

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 : !0120061012

Read address 01 firmware version, return version 20061012

2.12 \$AAM

Description: Read Module Name

Syntax: \$AAM[CHK](cr)

\$ delimiter character

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

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

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

Invalid Command: **?AA**

(Data) Name of module

Example:

Command: \$01M

Receive: !019016

Read address 01 module name, return name 9016

Command: \$03M

Receive: !039016D

Read address 03 module name, return name 9016D

2.13 ~AAO(Data)

Description: Set Module Name

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

~ delimiter character

AA address of reading/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: ~0109016

Receive: !01

Set address 01 module name to 9016, return success.

Command: \$01M

Receive: !019016

Read address 01 module name, return name 9016.

2.14 ~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 : \$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.

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

2.15 \$AA6

Description: Get Excitation Voltage Value

Syntax: \$AA6[CHK](cr)

\$ delimiter character

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

6 command for read excitation voltage value

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

Invalid Command: **?AA**

(Data) excitation voltage value, engineer unit format

Example:

Command: \$ 017+01.234 Receive: !01

Set address 01 excitation +01.234, return success.

Command: \$ 016 Receive: !01+01.234

Read address 01 excitation voltage, return +01.234V.

2.16 \$AA7(Data)

Description: Excitation Voltage Output

Syntax:\$AA7(Data)[CHK](cr)

\$ delimiter character

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

7 command for setting excitation voltage

(Data) excitation voltage value, engineer unit format

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command: \$ 017+01.234 Receive: !01

Set address 01 excitation +01.234, return success.

Command: \$ 016 Receive: !01+01.234

Read address 01 excitation voltage, return +01.234V.

2.17 \$AAS

Description: Start-Up Voltage Output Configuration

Syntax: \$AAS(Data)[CHK](cr)

\$ delimiter character

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

S command for setting Start-Up Voltage

Response: Valid Command: !AA

Invalid Command: ?AA

Example:

Command: \$ 017+01.234 Receive: !01

Set address 01 excitation +01.234, return success.

Command: \$ 01S Receive: !01

Read address 01 Start-Up Voltage, return success. The module's Start-Up Voltage is +01.234V now.

2.18 \$AAEVV

Description: Excitation Voltage Trim Calibration

Syntax: \$AAEVV[CHK](cr)

\$ delimiter character

AA address of setting module(00 to FF)

E command for performing trim calibration

VV 2's complement hexadecimal to trim the analog output

1 count about 0.2mV

01 to 7F: increase analog output 1 to 127 counts

FF to 80: decrease analog output 1 to 128 counts

Response: Valid Command: !AA

Invalid Command: ?AA

Example:

Command: \$01E03

Receive: !01

Trim address 01 excitation voltage +0.6mV, return success.

2.19 \$AAA

Description: Excitation Voltage Zero Calibration

Syntax: \$AAA[CHK](cr)

\$ delimiter character

AA address of setting module(00 to FF)

A command for excitation voltage zero calibration

Response: Valid Command: !AA

Invalid Command: ?AA

Example:

Command: \$017+00.000

Receive: !01

Set address 01 excitation 0V, return success.

Command: \$01A

Receive: !01

Perform address 01 zero calibration, return success.

2.20 \$AAB

Description: Excitation Voltage Span Calibration

Syntax: \$AAB[CHK](cr)

\$ delimiter character

AA address of setting module(00 to FF)

B command for excitation voltage span calibration

Response: Valid Command: !AA

Invalid Command: ?AA

Example:

Command: \$017+10.000

Receive: !01

Set address 01 excitation 10V, return success.

Command: \$01B

Receive: !01

Perform address 01 span calibration, return success.

2.21 @AADI

Description: Read Digital I/O and Alarm Status

Syntax: @AADI[CHK](cr)

@ delimiter character

AA address of setting module(00 to FF)

DI command for read digital input and alarm status

Response: Valid Command: !AASOOII

Invalid Command: ?AA

S alarm enable status, 0=alarm disable

1=momentary alarm enable

2=latch alarm enabled

OO digital output status

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
DO0	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
DO1	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On
DO2	Off	Off	Off	Off	On	On	On	On	Off	Off	Off	Off	On	On	On	On
DO3	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On

II digital input status, 00=input low level

01=input high level

Example:

Command: @01DI

Receive: !0100001

Read address 01 digital input, return alarm disable, digital output all off, and digital input high level.

.

2.22 @AADO(Data)

Description: Set Digital Output

Syntax:@AADO(Data)[CHK](cr)

@ delimiter character

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

DO command for setting digital output

(Data) output value

	DO	DO1	DO2	DO3
00	Off	Off		
01	On	Off		
02	Off	On		
03	On	On		
10			Off	Off
11			On	Off
12			Off	On
13			On	On

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command: @01DO00

Receive: !01

Set address 01 digital output 00, return success.

2.23 @AAEAT

Description: Enable Alarm

Syntax:@AAEAT[CHK](cr)

@ delimiter character

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

EA command for enable alarm.

T alarm type, M=momentary alarm, L=latch alarm.

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command: @01EAM

Receive: !011

Set address 01 enable momentary alarm, return success.

2.24 @AAHI(Data)

Description: Set High Alarm

Syntax:@AAHI(Data)[CHK](cr)

@ delimiter character

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

HI command for setting high alarm value

(Data) high alarm values, data format is in engineer unit format.

Response: Valid Command: **!AA**

Invalid Command: **?AA**

(Data) high alarm value in engineer unit format

Example:

Command: @01HI+1.2345

Receive: !01

Set address 01 high alarm +1.2345, return success.

2.25 @AALO(Data)

Description: Set Low Alarm

Syntax:@AALO(Data)[CHK](cr)

@ delimiter character

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

LO command for setting high alarm value

(Data) low alarm values, data format is in engineer unit format.

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command: @01LO-1.2345

Receive: !01

Set address 01 low alarm -1.2345, return success.

2.26 @AADA

Description: Disable Alarm

Syntax:@AADA(Data)[CHK](cr)

@ delimiter character

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

DA command for disable alarm

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command: @01DA

Receive: !01

Disable address 01 alarm, return success.

2.27 @AACA

Description: Clear Latch Alarm

Syntax: @AACCA[CHK](cr)

@ delimiter character

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

CA command for clear latch alarm

Response: Valid Command: **!AA**

Invalid Command: **?AA**

Example:

Command: @01DI Receive: !0120101

Read address 01 digital input, return latch alarm mode, low alarm active.

Command: @01CA Receive: !01

Clear address 01 latch alarm, return success.

Command: @01DI Receive: !0120001

Read address 01 digital input, return latch alarm mode, no alarm active.

2.28 @AARH

Description: Read High Alarm

Syntax:@AARH[CHK](cr)

@ delimiter character

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

RH command for reading high alarm

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

Invalid Command: **?AA**

(Data) high alarm value in engineer unit format

Example:

Command: @01RH

Receive: !01+1.2345

Read address 01 high alarm, return +1.2345.

2.29 @AARL

Description: Read Low Alarm

Syntax:@AARL[CHK](cr)

@ delimiter character

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

RL command for reading low alarm

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

Invalid Command: **?AA**

(Data) low alarm value in engineer unit format

Example:

Command: @01RL

Receive: !01-1.2345

Read address 01 low alarm, return -1.2345.

2.30 @AARE

Description: Read Event Counter

Syntax:@AARE[CHK](cr)

@ delimiter character

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

RE command for reading event counter

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

Invalid Command: **?AA**

(Data) event counter value, from 00000 to 65535.

Example:

Command: @01RE

Receive: !0112345

Read address 01 event counter, return 12345.

2.31 @AACE

Description: Clear Event Counter

Syntax:@AACE[CHK](cr)

@ delimiter character

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

CE command for clear event counter

Response: Valid Command: !AA

Invalid Command: ?AA

(Data) event counter value, from 00000 to 65535.

Example:

Command: @01RE Receive: !0112345

Read address 01 event counter, return 12345.

Command: @01CE Receive: !01

Clear address 01 event counter, return success.

Command: @01RE Receive: !0100000

Read address 01 event counter, return 0

2.32 ~**

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

2.33 ~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 timeout status is clear,04=host watchdog timeout status is set. The status will store into EEPROM and only may reset by the command~AA1.

2.34 ~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**

2.35 ~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

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.

3.37 ~AA4

Description: Read PowerOn Value and Safe Value

Syntax: ~AA4[CHK](cr)

~ delimiter character

AA address of setting module(00 to FF)

4 command for reading PowerOn Value and Safe Value

Response: Valid Command: **!AAPPSS**

Invalid Command: **?AA**

PP PowerOn Value, refer table for data format

SS Safe Value, refer table for data format

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
DO0	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
DO1	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On
DO2	Off	Off	Off	Off	On	On	On	On	Off	Off	Off	Off	On	On	On	On
DO3	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On

Example:

Command: ~015FF03

Receive: !01

Set address 01 PowerOn Value is DO0 to DO3 on, Safe Value is DO0, DO1 on, DO2, DO3 off return success.

Command: ~014

Receive: !01FF03

Read address 01 PowerOn Value is DO0 to DO3 on, Safe Value is DO0, DO1 on, DO2, DO3 off.

3.38 ~AA5PPSS

Description: Set PowerOn Value and Safe Value

Syntax: ~AA5PPSS[CHK](cr)

~ delimiter character

AA address of setting module(00 to FF)

5 command for reading PowerOn Value and Safe Value

PP PowerOn Value, refer table for data format

SS Safe Value, refer table for data format

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
DO0	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
DO1	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On
DO2	Off	Off	Off	Off	On	On	On	On	Off	Off	Off	Off	On	On	On	On
DO3	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On

Response: Valid Command: !**AA**

Invalid Command: ?**AA**

Example:

Command: ~015FF03

Receive: !01

Set address 01 PowerOn Value is DO0 to DO3 on, Safe Value is DO0, DO1 on, DO2, DO3 off return success.

Command: ~014

Receive: !01FF03

Read address 01 PowerOn Value is DO0 to DO3 on, Safe Value is DO0, DO1 on, DO2, DO3 off.