1. Introduction

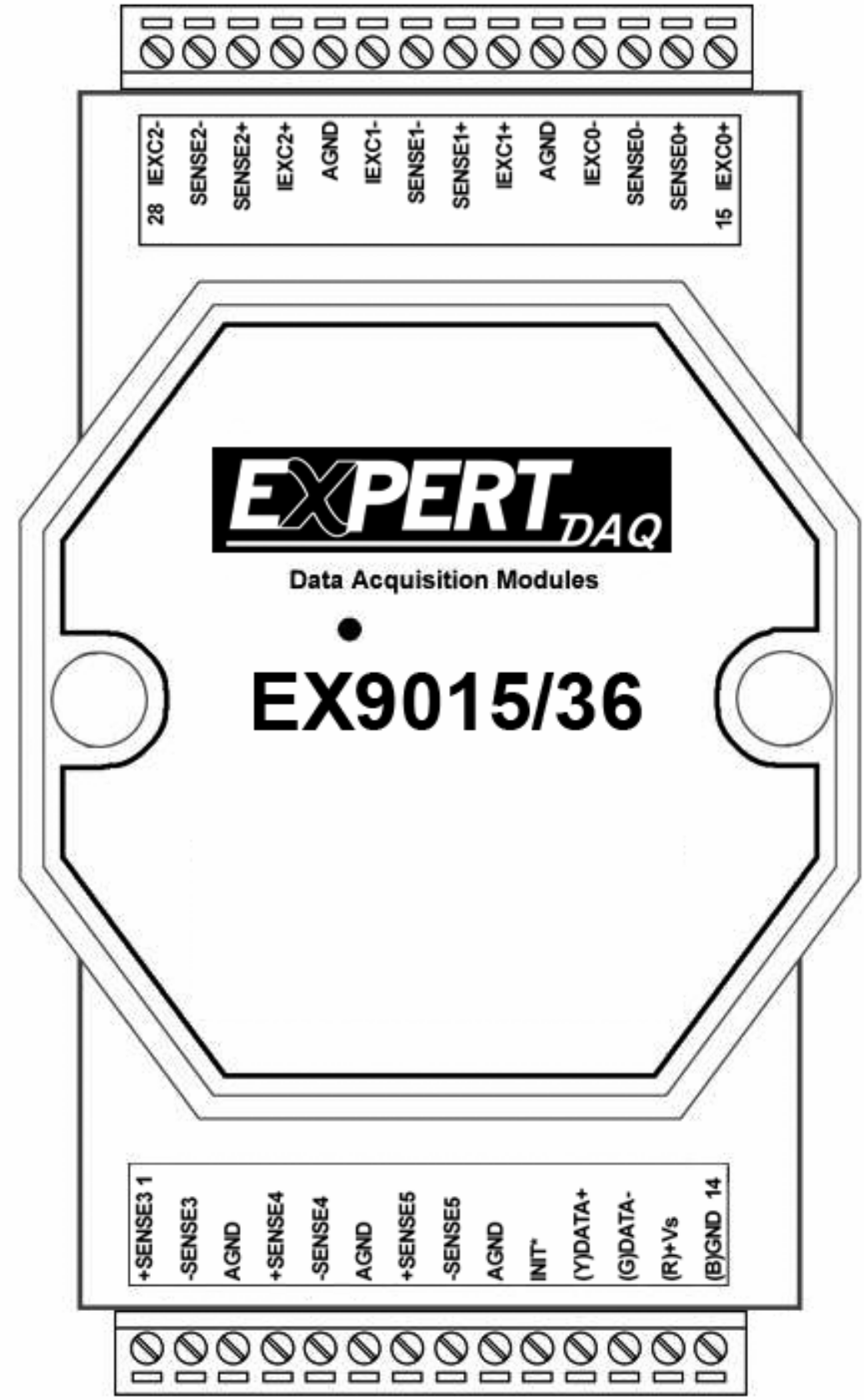
The common features of the EX-9033/33P,EX-9036/36P, EX-9015/15-M, and EX-9033-M/33P-M,EX-9036-M/36P-M modules are as follows:

1. 3000V DC inter-module isolation
2. 24-bit sigma-delta ADC to provide excellent accuracy
3. Direct RTD (resistance temperature detector) connection
4. Off-set value setting by Utility of EX-9000 for individual channel
5. Support 2/3/4 wire(see wire connection on CD of EX9000 series or topsccc.com)
6. Break line detection
7. Modbus function

The EX-9033/33-M is a 3-channel RTD input module.
The EX-9033P/33P-M is a 3-channel RTD input module with individual channel configuration.
The EX-9036/36-M is a 6-channel RTD input module.
The EX-9036P/36P-M is a 6-channel RTD input module.
with individual channel configuration.
EX-9015/15-M is a 6-channel RTD input module.
with individual channel configuration and Parity Setting.
Supported RTD types are as follows:

1. Platinum, 100 Ohms at 0°C, $\alpha = 0.00385$
2. Platinum, 100 Ohms at 0°C, $\alpha = 0.003916$
3. Platinum, 1000 Ohms at 0°C, $\alpha = 0.00385$
4. Nickel, 120 Ohms at 0°C, $\alpha = 0.00672$
5. Copper, 100 Ohms at 0°C, $\alpha = 0.00421$
6. Copper, 1000 Ohms at 0°C, $\alpha = 0.00421$
7. Copper, 100 Ohms at 25°C, $\alpha = 0.00427$
8. Copper, 50 Ohms at 0°C
9. Nickel, 100 Ohms at 0°C


28 IEXC2-
SENSE2-
SENSE2+
IEXC2+
AGND
IEXC1-
SENSE1-
SENSE1+
IEXC1+
AGND
IEXC0-
SENSE0-
SENSE0+
15 IEXC0+
EXPERT DAQ
Data Acquisition Modules
EX9033
AGND
INIT*
(Y)DATA+
(G)DATA-
(R)+Vs
(B)GND 14


28 IEXC2-
SENSE2-
SENSE2+
IEXC2+
AGND
IEXC1-
SENSE1-
SENSE1+
IEXC1+
AGND
IEXC0-
SENSE0-
SENSE0+
15 IEXC0+
EXPERT DAQ
Data Acquisition Modules
EX9015/36
+SENSE3 1
-SENSE3
AGND
+SENSE4
-SENSE4
AGND
+SENSE5
-SENSE5
AGND
INIT*
(Y)DATA+
(G)DATA-
(R)+Vs
(B)GND 14

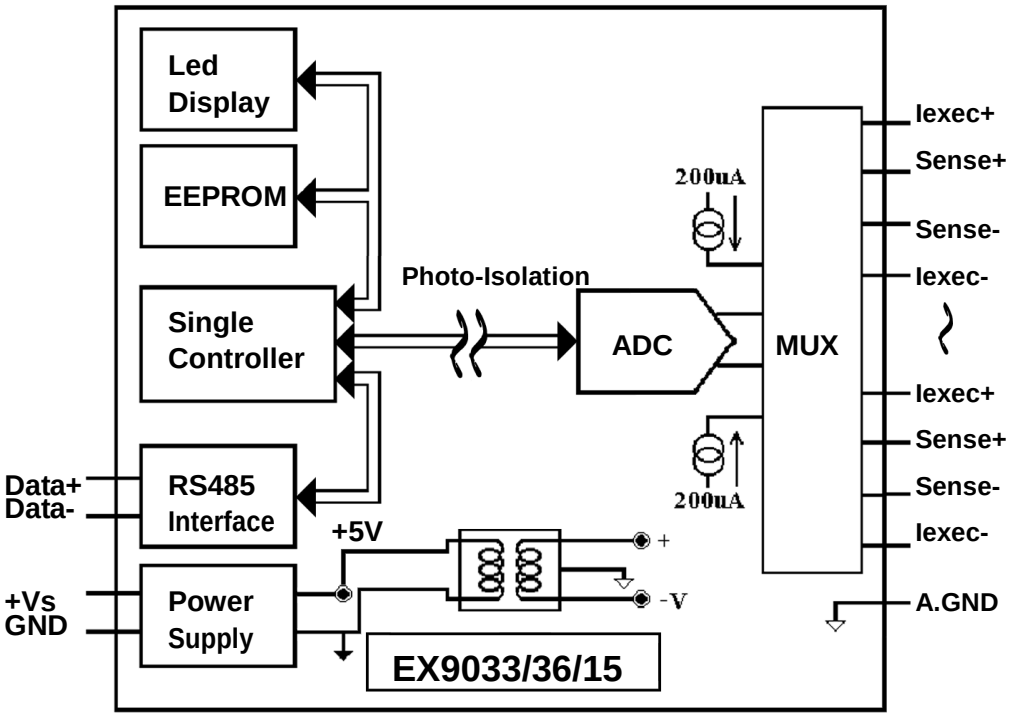
1.1 Specifications

	EX-9033/33-M **EX-9033P/33P-M**	**EX-9015/15-M** **EX-9036/36-M/36P/36P-M**
Analog Input		
Input Channels	**3**	**6**
Input Type	2/3/4-wire RTD	Channel 0~2:2/3/4-wire RTD Channel 3~5:2/3-wire RTD
RTD Type	Pt100 α = 0.00385 Pt100 α = 0.003916 Ni120 Pt1000α= 0.00385 Cu100a=0.00421 Cu100a=0.00427 Cu1000a=0.00421	Pt100 α = 0.00385 Pt100 α = 0.003916 Ni120 Pt1000 α = 0.00385 Cu100 α = 0.00421 Cu100 α = 0.00427 Cu1000 α = 0.00421
Sampling Rate	15 samples/sec	12 samples/sec
Bandwidth	15.7 Hz	5.24 Hz
Accuracy	±0.1%	±0.05%
Zero Drift	0.5 μV/°C	0.5 μV/°C
Span Drift	20 μV/°C	20 μV/°C
CMR@50/60Hz	150 dB min	150 dB min
NMR@50/60Hz	100 dB min	100 dB min
Isolation	3000 VDC	3000 VDC
Modbus RTU	EX-9033-M/33P-M	EX-9015-M/36-M/36P-M
Power		
Requirements	+10 to +30 VDC	+10 to +30 VDC
Consumption	1.0 W for	1.1 W
Temperature Range		
Operating	-25°C to +75°C	-25°C to +75°C
Storage	-30°C to +75°C	-30°C to +75°C

Notes:
1. Warm-UP for 30 minutes is recommended!

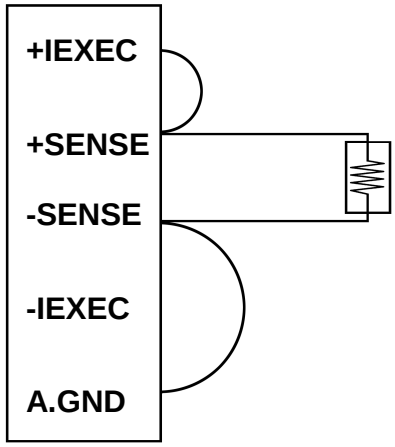
1.2 Wire connection

1.2.1 Block Diagrams

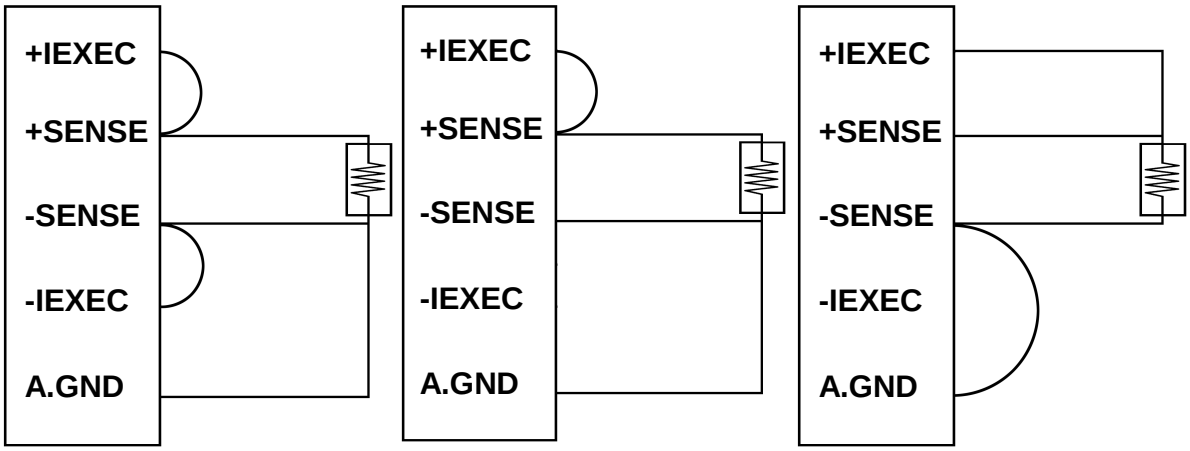


1.2.2 Wiring diagram for the EX-9033/36/33P/36P/15 (CH0~CH2)

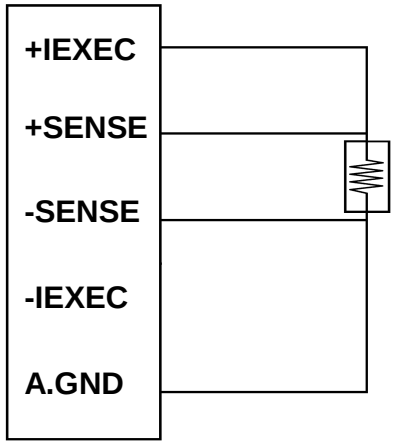
2-wire RTD connection



3-wire RTD connection

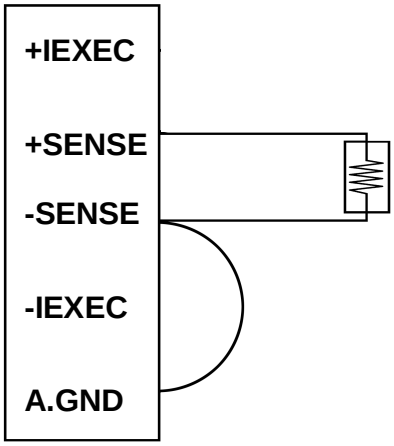


4-wire RTD connection

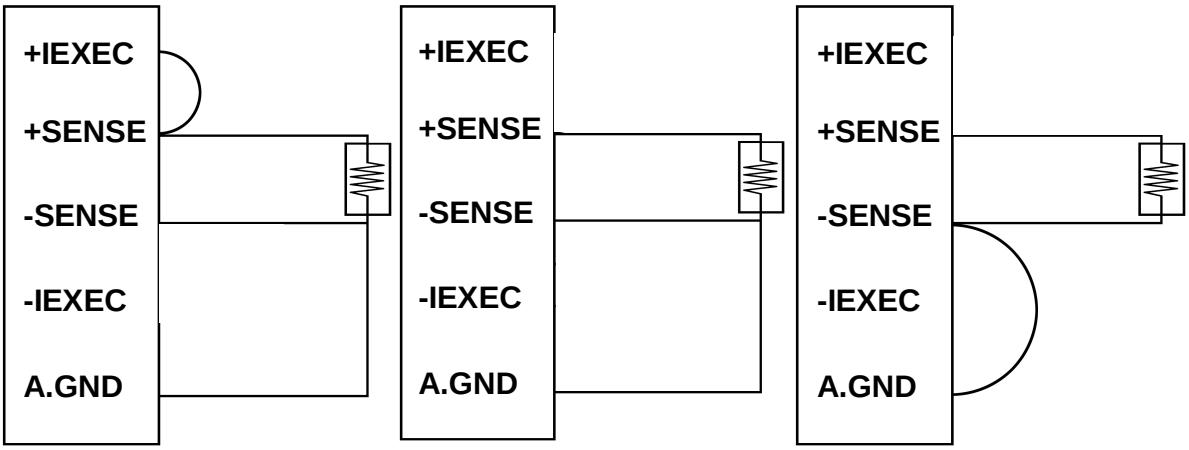


1.2.3 Wiring diagram for the EX-9036/36P/15 (CH3~CH5)

2-wire RTD connection



3-wire RTD connection



Note: Please ignore the +IEXEC & -IEXEC of 2/3 wire RTD connection during select CH3~CH5 of EX9036/15

1.2.4 Wiring Recommendations

1.For the EX-9033/36 and EX-9033P/36P/15,the wires of a channel should be shielded and the shielding should be connected to the A.GND terminal of the channel.
2.For RS-485, use insulated and twisted pair 24 AWG wire, e.g. Belden 9841.
3.Use 26-12 AWG wire for signal connections.

1.3 Default Settings

Default settings for the EX-9033/33P/36/36P & EX9015 modules are as follows:

. Module Address: 01
. RTD Type: Type 20, Pt100, -100°C to 100°C
. Baud Rate: 9600 bps
. Checksum disabled
. Engineering unit format
. Filter set at 60Hz rejection

Default settings for the EX-9033-M/33P-M/36-M/36P-M & EX9015-M modules are as follows:

. Protocol: Modbus RTU
. Module Address: 01
. RTD Type: Type 20, Pt100, -100°C to 100°C
. Baud Rate: 9600 bps
. Filter set at 60Hz rejection

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

Calibration sequence:
1. Install zero calibration resistor.
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.
5. Perform zero calibration command.
6. Install span calibration resistor.
7. Perform span calibration command.
8. Repeat steps 4 to 7 three times.

Notes:
1. Use the 2-wire RTD connection to connect the calibration resistor.
2. For the EX-9033/36,connect the calibration resistor to channel 0.
3. For the EX-9015, EX-9033P/36P each channel should be calibrated separately and only the channel being calibrated should be enabled during calibration.
4. Calibration resistors are shown on the follows.
5. The EX-9000 series modules must be switched to the Normal protocol mode before calibrating.

Calibration resistor types used by the EX-9033/33M/36/36M and EX-9033P/33PM/36P/36PM and EX9015/15M:

Type	Zero Calibration Resistor	Span Calibration Resistor
20	0 Ohms	320 Ohms
2A/2D	0 Ohms	3000 Ohms

Types 21/22/23/24/25/26/27/28/29/2B/2C/2E/2F/80/81/82/83 same as type 20

1.5 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

RTD Type Setting (TT)

Type Code	Temperature Sensor Type	Temperature Range °C
20	Platinum 100, α= 0.00385	-100 ~ 100
21	Platinum 100, α= 0.00385	0 ~ 100
22	Platinum 100, α= 0.00385	0 ~ 200
23	Platinum 100, α= 0.00385	0 ~ 600
24	Platinum 100, α= 0.003916	-100 ~ 100
25	Platinum 100, α= 0.003916	0 ~ 100
26	Platinum 100, α= 0.003916	0 ~ 200
27	Platinum 100, α= 0.003916	0 ~ 600
28	Nickel 120	-80 ~ 100
29	Nickel 120	0 ~ 100
2A	Platinum 1000, α= 0.00385	-200 ~ 600
2B	Cu 100 @ 0°C,α= 0.00421	-20 ~ 150
2C	Cu 100 @ 25°C,α= 0.00427	0 ~ 200
2D	Cu 1000 @ 0°C,α= 0.00421	-20 ~ 150
2E	Platinum 100, α= 0.00385	-200 ~ 200
2F	Platinum 100, α= 0.003916	-200 ~ 200
80	Platinum 100, α= 0.00385	-200 ~ 600
81	Platinum 100, α= 0.003916	-200 ~ 600
82	Cu 50 @ 0°C	-50 ~ 150
83	Nickel 100	-60 ~ 180

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 11: Ohms
CS	Checksum setting 0: Disabled 1: Enabled
FS	Filter setting 0: 60Hz rejection

Note: The reserved bits should be zero.

.

RTD Type and Data Format Table

Type Code	RTD Type	Data Format	+F.S.	-F.S.
20	Platinum 100 α = 0.00385 -100 ~ 100°C	Engineering unit	+100.00	-100.00
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
		Ohms	+138.50	+060.60
21	Platinum 100 α = 0.00385 0 ~ 100°C	Engineering unit	+100.00	+000.00
		% of FSR	+100.00	+100.00
		2's comp HEX	7FFF	0000
		Ohms	+138.50	+100.00
22	Platinum 100 α = 0.00385 0 ~ 200°C	Engineering unit	+200.00	+000.00
		% of FSR	+100.00	+000.00
		2's comp HEX	7FFF	0000
		Ohms	+175.84	+100.00
23	Platinum 100 α = 0.00385 0 ~ 600°C	Engineering unit	+600.00	+000.00
		% of FSR	+100.00	+000.00
		2's comp HEX	7FFF	0000
		Ohms	+313.59	+100.00
24	Platinum 100 α = 0.003916 -100 ~ 100°C	Engineering unit	+100.00	-1000.00
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
		Ohms	+139.16	+060.60
25	Platinum 100 α = 0.003916 0 ~ 100°C	Engineering unit	+100.00	+000.00
		% of FSR	+100.00	+000.00
		2's comp HEX	7FFF	0000
		Ohms	+139.16	+100.00
26	Platinum 100 α = 0.003916 0 ~ 200°C	Engineering unit	+200.00	+000.00
		% of FSR	+100.00	+000.00
		2's comp HEX	7FFF	0000
		Ohms	+177.14	+100.00
27	Platinum 100 α = 0.003916 0 ~ 600°C	Engineering unit	+600.00	+000.00
		% of FSR	+100.00	+000.00
		2's comp HEX	7FFF	0000
		Ohms	+317.28	+100.00
28	Nickel 120 -80 ~ 100°C	Engineering unit	+100.00	-080.00
		% of FSR	+100.00	-080.00
		2's comp HEX	7FFF	999A
		Ohms	+200.64	+066.60
29	Nickel 120 0 ~ 100°C	Engineering unit	+100.00	+000.00
		% of FSR	+100.00	+000.00
		2's comp HEX	7FFF	0000
		Ohms	+200.64	+120.60

Type Code	RTD Type	Data Format	+F.S.	-F.S.
2A	Platinum 1000 α = 0.00385 -200 ~ 600°C	Engineering unit	+600.00	-200.00
		% of FSR	+100.00	-033.33
		2's comp HEX	7FFF	D556
		Ohms	+3137.1	+0185.2
2B	Cu 100 α = 0.00421 -20 ~ 150°C	Engineering unit	+150.00	-020.00
		% of FSR	+100.00	-013.33
		2's comp HEX	7FFF	EEEF
		Ohms	+163.17	+091.56
2C	Cu 100 α = 0.00427 0 ~ 200°C	Engineering unit	+200.00	+000.00
		% of FSR	+100.00	+000.00
		2's comp HEX	7FFF	0000
		Ohms	+167.75	+090.34
2D	Cu 100 α = 0.00421 -20 ~ 150°C	Engineering unit	+150.00	-020.00
		% of FSR	+100.00	-013.33
		2's comp HEX	7FFF	EEEF
		Ohms	+1631.7	+0915.6
2E	Platinum 100 α = 0.00385 -200 ~ 200°C	Engineering unit	+200.00	-200.00
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
		Ohms	+175.84	+018.49
2F	Platinum 100 α = 0.003916 -200 ~ 200°C	Engineering unit	+200.00	-200.00
		% of FSR	+100.00	-100.00
		2's comp HEX	7FFF	8000
		Ohms	+177.14	+017.14
80	Platinum 100 α = 0.00385 -200 ~ 600°C	Engineering unit	+600.00	-200.00
		% of FSR	+100.00	-033.33
		2's comp HEX	7FFF	D556
		Ohms	+313.59	+018.49
81	Platinum 100 α = 0.003916 -200 ~ 600°C	Engineering unit	+600.00	-200.00
		% of FSR	+100.00	-033.33
		2's comp HEX	7FFF	D556
		Ohms	+317.28	+017.14
82	Cu 50 -50 ~ 150°C	Engineering unit	+150.00	-050.00
		% of FSR	+100.00	-033.33
		2's comp HEX	7FFF	D556
		Ohms	+082.13	+039.24
83	Nickel 100 -60 ~ 180°C	Engineering unit	+180.00	-060.00
		% of FSR	+100.00	-033.33
		2's comp HEX	7FFF	D556
		Ohms	+223.10	+069.50

RTD Over Range/Under Range Reading

	Over Range	Under Range
Engineering Unit	+9999.9	-9999.9
% of FSR	+999.99	-999.99
2's Complement HEX	7FFF	8000

RTD Over Range/Under Range Reading for the EX-9015M and EX-9033M/33PM/36M with Modbus RTU Protocol

Over Range	Under Range
7FFFh	8000h

2.1 %AANNTTCCFF

Description: Set Module Configuration of an analog input Module.

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	new type code for EX9033/33M/36/36M parity type of EX9015/15M

00	**No parity**
10	**Even parity**
11	**Odd parity**

EX9033P/33PM/36P/36PM fix to **00**

EX9033P/33PM/36P/36PM/15/15M are use the $AA7CiRrr to set the type of each channel.(P28)

CC	baud rate code, The INIT* terminal must be connected to GND terminal in order to change Baud Rates.(P10)
FF	used to set the data format, checksum, and filter settings. The INIT* terminal must be connected to GND terminal in order to change the checksum setting. (P11)

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

Example:

Command :%0102240600 Receive:!02
Set module address 01 to 02, return Success.

2.2 #**

Description: Synchronized Sampling

Syntax: #[CHK](cr)**

delimiter character

** synchronized sampling command

Response: No response

Example:

Command: #** No response

Send synchronized sampling command to all modules.

Command: $014 Receive:

>011+051.23+041.53+072.34

Read synchronized data from address 01, return S=1, first read and data is +051.23+041.53+072.34

Command: $014 Receive:

>010+051.23+041.53+072.34

Read synchronized data from address 02, return S=0, have readed and data is +051.23+041.53+072.34

2.3 #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 EX9033/36/15, 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

The module address 04 is EX9036/15. Read address 04 for getting data of all 6 channels.

2.4 #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 3/6

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.

2.5 $AA0 (For EX9033/33M/36/36M)

Description: Perform Zero 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: Pls don't calibrate before you really understand.

2.6 $AA1 (For EX9033/33M/36/36M)

Description: Perform Span 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: Pls don't calibrate before you really understand.

2.7 $AA0Ci
(For EX9033P/33PM/15/15M/36P/36PM)

Description: Perform zero calibration on the specified channel.

Syntax:$AA0Ci[CHK](cr)

$ delimiter character
AA address of setting/response module (00 to FF)
0 command for the zero calibration
Ci specifies the channel to be calibrated
(EX9033P/33PM: i=0~2, EX9036P/15/15M: i=0~5)

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

Example:

Command :$010C0 Receive : !01
Perform address 01 zero calibration on channel 0, return success.
Command : $020C2 Receive : ?02
Perform address 02 zero calibration on channel 2, return not enable calibration before perform calibration command.

Note: This command must be sent before the “span calibration” command, $AA1Ci, is used.

2.8 $AA1Ci
(For EX9033P/33PM/15/15M/36P/36PM)

Description: Perform span calibration on the specified channel.

Syntax:$AA1Ci[CHK](cr)

$ delimiter character
AA address of setting/response module (00 to FF)
1 command for performing span calibration
Ci specifies the channel to be calibrated
(EX9033P/33PM: i=0~2, EX9036P/15/15M: i=0~5)

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

Example:

Command: $011C0 Receive: !01
Perform address 01 span calibration on channel 0, return success.
Command: $021C2 Receive: ?02
Perform address 02 span calibration on channel 2, return not enable calibration before perform calibration command.

2.9 $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

2.10 $AA4

Description: Reads the synchronized data

Syntax:$AA4[CHK](cr)

$ delimiter character

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

4 command to read the synchronized data

Response: Valid Command: **>AAS(Data)**

Invalid Command: **?AA**

S status of synchronized data, 1=first read, 0=been readed

(Data) synchronized value

Example:

Command: $014 Receive: ?01

Read address 01 synchronized data, return no data available.

Command: #** Receive: no response

Send synchronized sampling to all modules.

Command: $014

Receive:>011+051.23+041.53+072.34

Read address 01 synchronized data, return S=1, first read, and synchronized data +025.56

2.11 $AA5

Description: Read Reset Status

Syntax:$AA5[CHK](cr)

$ delimiter character

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

5 command for read reset status

Response: Valid Command: **!AAS**

Invalid Command: **?AA**

S reset status, 1=the module is been reset, 0=the module is not been rested

Example:

Command: $ 015 Receive: !011

Read address 01 reset status, return module is been reset

Command: $ 015 Receive: !010

Read address 01 reset status, return no reset occurred.

2.12 $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 channel enable/disable, 00 is all disabled and FF is all 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 0,2,5 return success.

Command : $016 Receive : !012A

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

2.13 $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 channel enable/disable, 00 is all disabled and FF is all enabled.

Example:

Command :$0152A Receive : !01

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

Command : $016 Receive : !012A

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

2.14 $AA7CiRrr
(For EX9033P/33PM/15/15M/36P/36PM)

Description: Sets the type code of a channel.

Syntax:$AA7CiRrr[CHK](cr)

$ delimiter character
AA address of setting/response module(00 to FF)
7 set the channel range code
Ci i specifies the input channel to be set
(EX9033P/33PM: i=0~2, EX9036P/15/15M: i=0~5)
Rrr rr represents the type code of the channel to be set.

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

Example:

Command: $017C0R20 Receive: !01
Sets the type code for channel 0 of module 01 to be 20 (PT100, -100 ~ +100°C) and the module returns a valid response.

Command: $027C5R28 Receive: !02
Sets the type code for channel 5 of module 02 to be 28 (Ni120, -80 ~ +100°C) 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.

2.15 $AA8Ci
(ForEX9033P/33PM/15/15M/36P/36PM)

Description: Reads the type code information of a channel.

Syntax:$AA8Ci[CHK](cr)

$ delimiter character
AA address of reading/response module(00 to FF)
8 read the type code of a channel
Ci specifies which channel to be access for the type code
(EX9033P/33PM: i=0~2, EX9036PM/15/15M: i=0~5)

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

Ci specifies which channel to be access for the type code
(EX9033P/33PM: i=0~2, EX9036P/15/15M: i=0~5)
Rrr rr repesents the type code of the channel to be read

Example:

Command: $018C0 Receive: !01C0R20
Reads the type(input range) of channel 0 of module 01 to be 20 (PT100, -100 ~ +100°C).

2.16 $AAB

Description: Diagnoses the analog inputs for over-range, under-range,and wire opening conditions.

Syntax:$AAB[CHK](cr)

$ delimiter character

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

B diagnose the analog inputs

Response: Valid command: **!AANN**

Invalid command: **?AA**

NN represents the diagnostic results of all the analog input channels (00 to FF) where bit 0 relat to channel 0, bit 1 relat to channel 1, etc. When the bit is 1 and the channel is enabled and it is in either overrange,under-range or wire opening condition. If the bit is 0 and the channel is disabled or normal.

Example:

Command: $01B Receive: !0101

Diagnoses the analog inputs of module 01. The module returns a valid response that channel 0 is in either over-range, under-range or wire opening condition.

2.17 $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 : !01P1.1

Read address 01 firmware version, return version P1.1.

Command : $01F Receive : !01M1.1

Read address 01 firmware version, return version M1.1

2.18 $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 : !019033
Read address 01 module name, return name 9033.
Command : $03M Receive : !039036
Read address 03 module name, return name 9036

2.19 $AAP
(For EX9033M/33PM/15M/36M/36PM)

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

10: the protocol set in EEPROM is Normal mode

11: the protocol set in EEPROM is ModbusRTU mode

Example:

Command: $01P Response: !0110

Reads the communication protocol of module 01 and returns a response of 10 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.

2.20 $AAPN
(For EX9033M/33PM/15M/36M/36PM)

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.

2.21 $AAS0 (For EX9015/15M)

Description: Perform an internal calibration

Syntax:$AAS0[CHK](cr)

$ delimiter character

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

S0 perform the internal calibration

Response: Valid command: **!AA**

Invalid command: **?AA**

Example:

Command: $01S0 Receive: !01

Perform an internal calibration on module 01 and returns a valid response.

2.22 $AAS1 (For EX9015/15M)

Description: Reload the factory default calibration parameters,including the internal calibration parameters.

Syntax:$AAS1[CHK](cr)

$ delimiter character

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

S1 reload the factory default and internal calibration parameters

Response: Valid command: **!AA**

Invalid command: **?AA**

Example:

Command: $01S1 Receive: !01

Reload the factory default calibration parameters for module 01 and returns a valid response.

2.23 ~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

Preform address 01 span calibration, return success.

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

2.24 ~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:~01O9033 Receive :!01

Set address 01 module name 9033, return success.

Command : $01M Receive : !019033

Read address 01 module name, return name 9033.

2.25 ~**

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

2.26 ~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 that based on host watchdog is disabled if SS is 10 or 14 that based on host watchdog is enabled. The status will store into EEPROM and only may reset by the command~AA1.

2.27 ~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**

2.28 ~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

2.29 ~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.

EX9033M/33PM/36M/36PM/15M Quick Start

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

2. **Using INIT pin to contact with GND pin then Power On will enter Normal mode.**

3. **Command: $00P0 is set EX9036-M to Normal mode after Repower On. On normal mode, user can set other setting like address, Baudrate, ….. (Please check the EX9000 user manual).**

4. **Command: $AAP1 is set to MODBUS mode after Repower On .**

5. **Under Normal mode that Command: $AAP can check which mode it is after Repower On .**
   response:
   !AA10 = Normal
   !AA11 = MODBUS

6. **04(0x4) READ INPUT CHANNELS**

This function code is used to read from 1 to 3(EX9033M/33PM), 1 to 6(EX9015M/36M/36PM) continuous analog input channels.

Request

00	Address	1Byte	1 to 247
01	Function code	1Byete	0x04
02-03	Starting channel	2 Bytes	0 to 2 for reading analog inputs (**EX9033M/33PM**) 0 to 5 for reading analog inputs (**EX9015M/36M/36PM**)
04-05	Number of input Channels(N)	2Bytes	1 to 6;(Starting channel+N)<=3 (**EX9033M/33PM**) 1 to 6;(Starting channel+N)<=6 (**EX9015M/36M/36PM**) 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 mumber of bytes receuved