

# BASSO-1040DT/AI

# User Manual



## Revision History

Revision Date	Document Ver.	Pages Revised	Revised/Added/Removed	Details of Revision
2021.04.28	1.0	All	-	New
2022.01.12	1.1	23~25	Revised/Added	Serial Command
2023.01.09	1.2	27, 31	Revised/Added	RS422/485 multi-drop
2023.06.21.	1.3	26, 30	Revised	Adjust gain value range
2024.03.18.	1.4	12, 13, 25	Revised	Adjust interval value range

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Please be sure to read this manual before using and use the product safely and accurately.

- Pictures and photos in the manual may be different from the physical, and the document is subject to change without notice to improve performance. For the last information, please visit our website ([www.sysbas.com](http://www.sysbas.com)).
- To view frequently asked questions and answers, please visit our website and find Support -Technical Support -FAQ section.
- Documents can be downloaded from the product page or Download section.
- Sellers or users should be aware of the fact that this device is intended for industrial use(Class A), not for residential use.
- Warranty policy is included in the product packaging.

## 1. Before Using

### What is Converter?

Capacity of all equipment is doubled when connected to other equipment, devices, computers, etc. Therefore, communication of equipment is an important factor for both in industrial sites and end users. In order for the data to be sent and received without problems, each device participating in the communication must be able to recognize the data which is sent.

However, different equipment often cannot communicate with each other as they use different communication standards and protocols. This is similar to what happens when two people who use different languages try to communicate. In order for them to understand each other, they need an interpreter to translate between different words. Equally for equipment communication, something is needed that translates between different communication specifications and protocols, and it is the converter.

The converter allows both sides to communicate without any modification to existing communication specifications and protocols. Since there are so many kinds of communication standards and protocols, there are many kinds of converters.

### What is Serial?

RS-232 is most simple and common equipment communication standard, established by the Electronic Industries Association(EIA). It supports only 1:1 communication and normally used in a communication distance within 100m. Due to its simplicity and economical feature, it has been used in many industrial sites so far.

RS-422 and RS-485 is the interface complements the shortcoming of RS-232. RS-422 and RS-485 with four or two signal lines support long communication distance up to 1.2km as they have a stronger response to noise. They also support multi-drop method, which enables communication in a more complex and extensive environment.

## 2. Components



Package	Ordering Information
BASSO-1040DT/AI, Ejector pin, Terminal Block, Adapter, CS-99/M	BASSO-1040DT/ AI

### 3. Product



#### LED

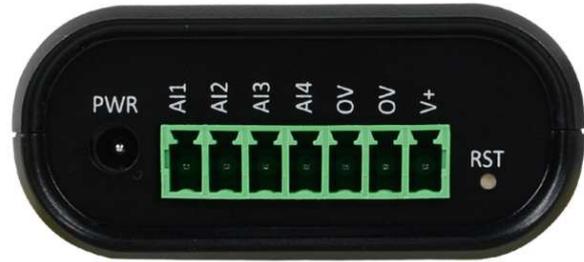


No	LED Name	Operation	
1	RDY(GRN)	Raw Data	LED 500ms flickers
		Modbus	LED 200ms flickers
		Setup Mode	LED flashes
2	SRL(RED)	LED flickers when serial data is received/transmitted	
3	Analog Input	LED flickers when AI port data is received	

## Connector



Serial Port(RS232, DCE Female)



Analog Input Port(Terminal Block)

- Serial Port(RS232/RS422/RS485): Serial Port that can communicate  
(Please refer to the APPENDIX for pin specifications)
- PWR: Connect 5V 1A DC adapter included in the package  
(Outer diameter 3.47mm, Internal diameter 1.35mm) 
- Analog Input Port(Terminal Block): Consists of Analog Input, Analog Common, External Power  
(12~24V)

## Button

- Press RST button for less than 1 second: Enters equipment setup mode
- Press RST button for more than 3 seconds: Equipment factory reset  
(Please refer to the APPENDIX for initialization values)

## 4. Features

BASSO-1040DT/AI is a converter that converts Analog Input data to RS232, RS422 or RS485, supporting the following functions:

### 1) RS232/422/485 Communication Setting

Send Analog Input data to RS232/422/485 communication according to utility communication settings.

### 2) Analog Input Port Setting

BASSO-1040DT/AI has 4ports of Analog Input.

Users can change the Input mode to Current or Voltage by setting utility depending on environment.

(Please refer to “6. Settings” for instructions on how to set up the utility)

### 3) Data Output Setting

Users can set the data format to Raw Data, Modbus Data on the utility.

### 4) Modbus

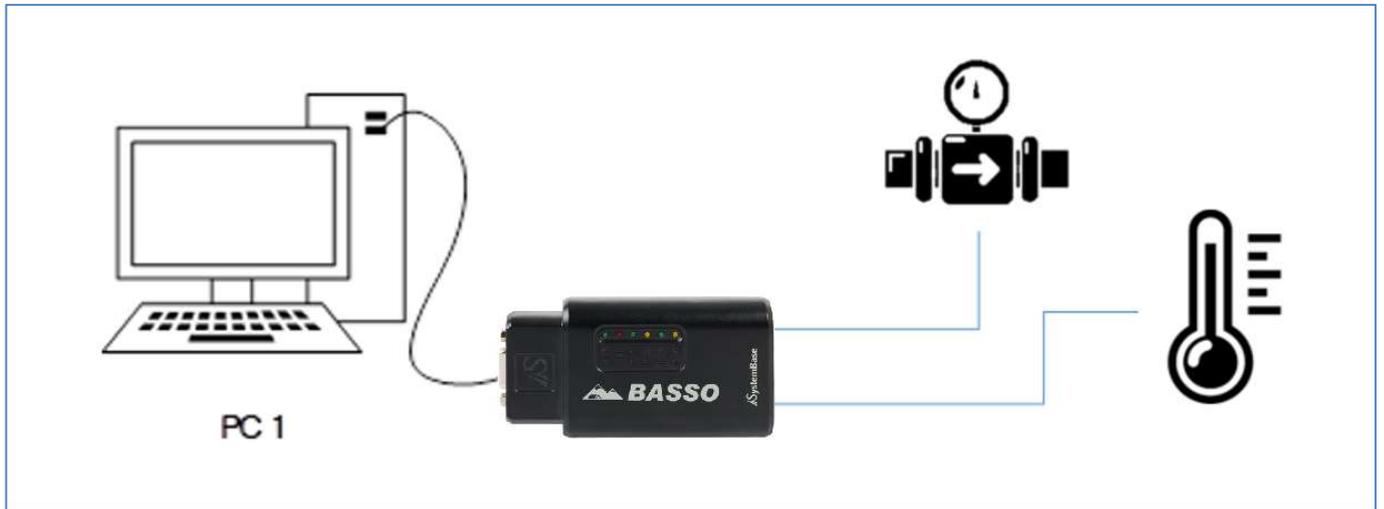
When the data format is set to Modbus Data, Modbus communication is able through the serial port.

It supports Modbus RTU/ASCII and Function 3/4/6/16.

(Please refer to “7. Modbus Map” for Modbus Register)

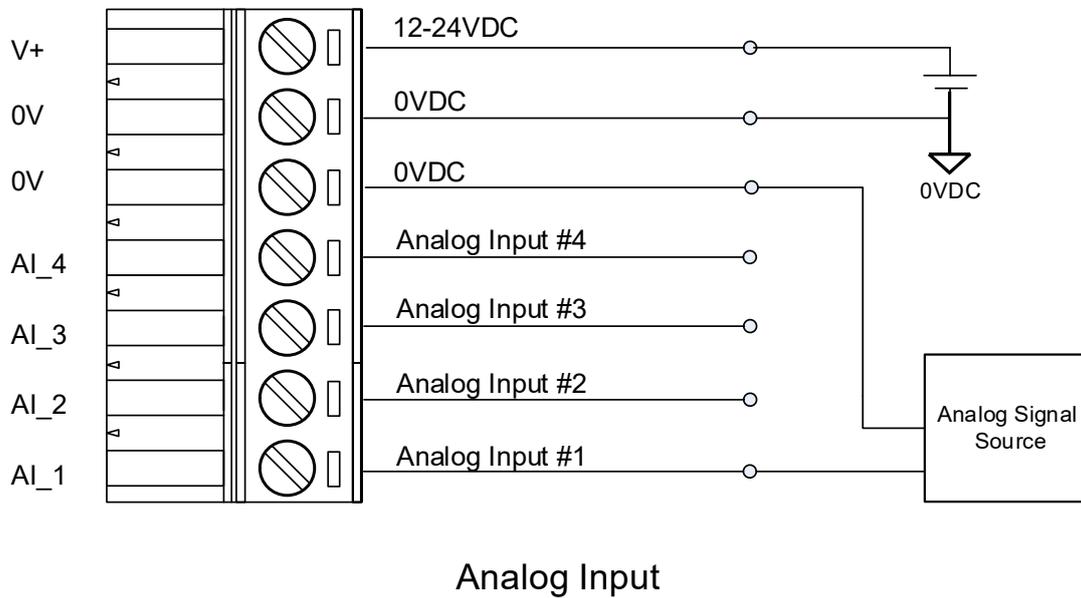
## 5. How to Use

User can collect settings and signals required for sensor operation by connecting the serial port of BASSO-1040DT/AI to the device(PC) for user data collection, and connect various sensors to the Analog Input port.



### To Connect AI Sensor Device

To connect Analog Input sensor device, connect GND of Analog signal source to 0V terminal and wire sensor data to AI port.



## 6. Settings

BASSO-1040DT/AI has two kinds of setup methods: Using BASSO-IO Config Utility program, Using Modbus (Please note that the setup method using Modbus is available when the data format is operating as Modbus)

### Using BASSO-IO Config

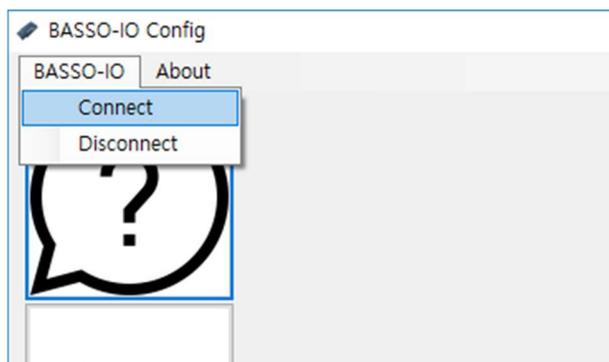
Power up the BASSO-1040DT/AI and connect it to RS232 serial communication port(COM port) on your PC. Press the RST(Reset) switch for less than 1 second to operate in setup mode.

At this time, RDY LED turns on.

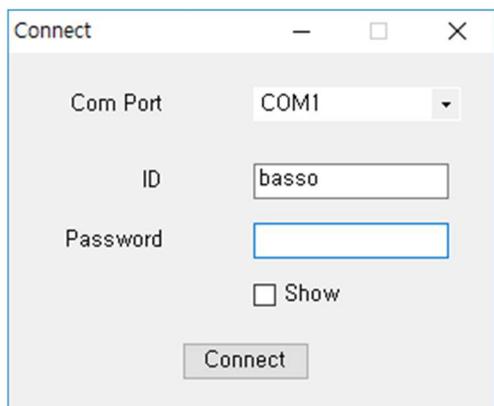
Run the BASSO-IO Config utility.



Select the BASSO-IO → Connect menu in the top as shown below.



Specify the COM port to which the BASSO-1040DT/AI is connected to your PC.

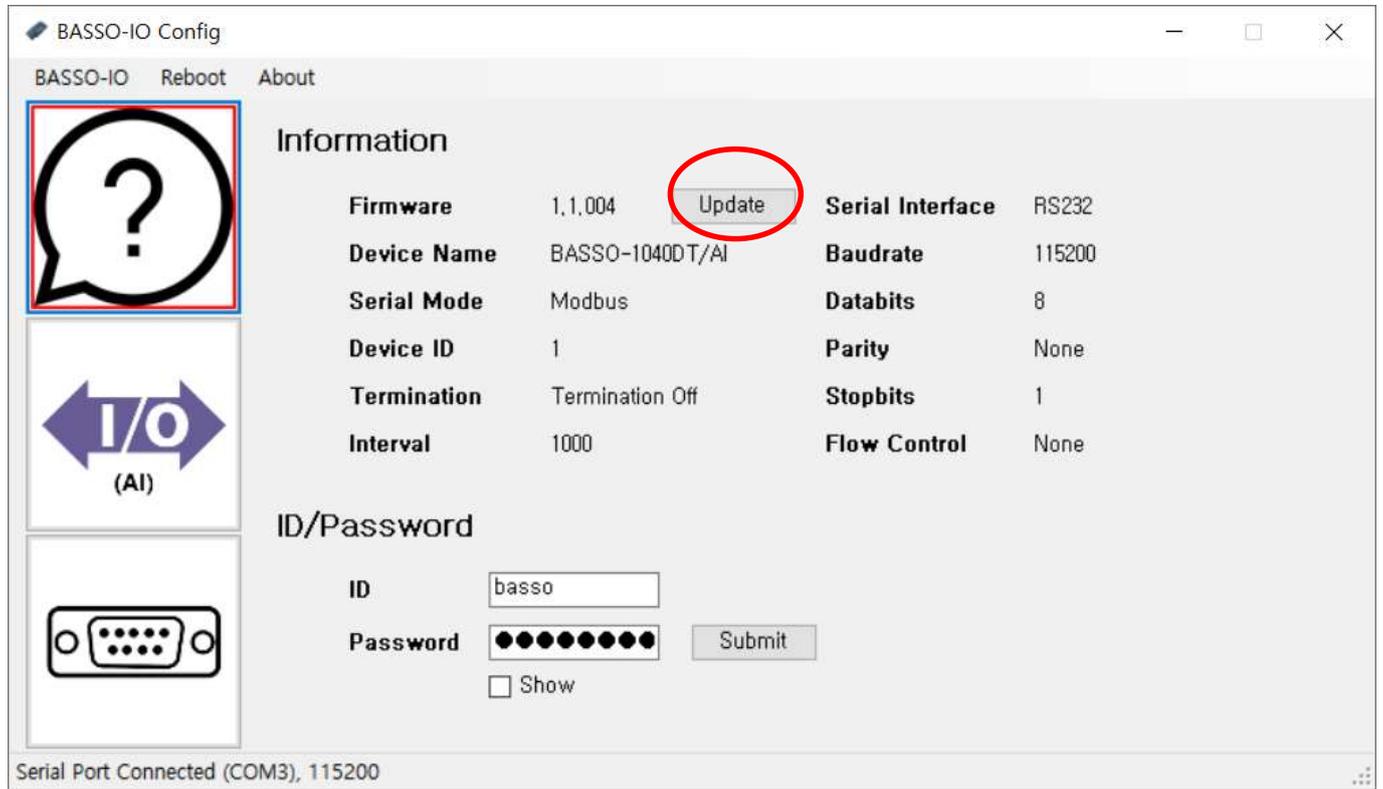


At this time, the initial value of the access ID/Password is "basso/99999999" (basso as a lowercase character).

### Information

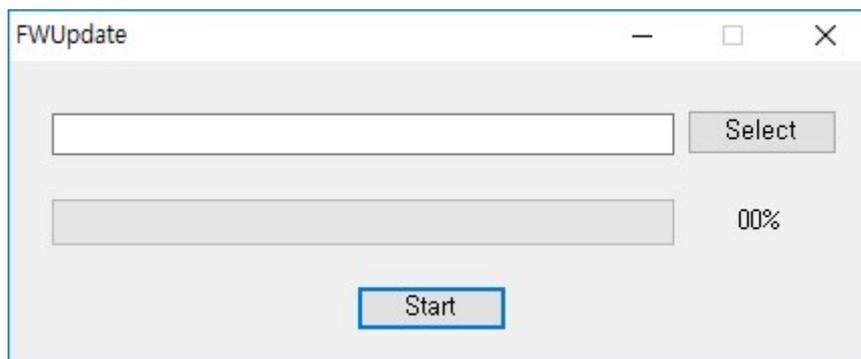
The Information menu outputs the basic setup information of BASSO-1040DT/AI.

In addition to the basic information output, you can also do the firmware update and change the connection ID/PW of BASSO-1040DT/AI.



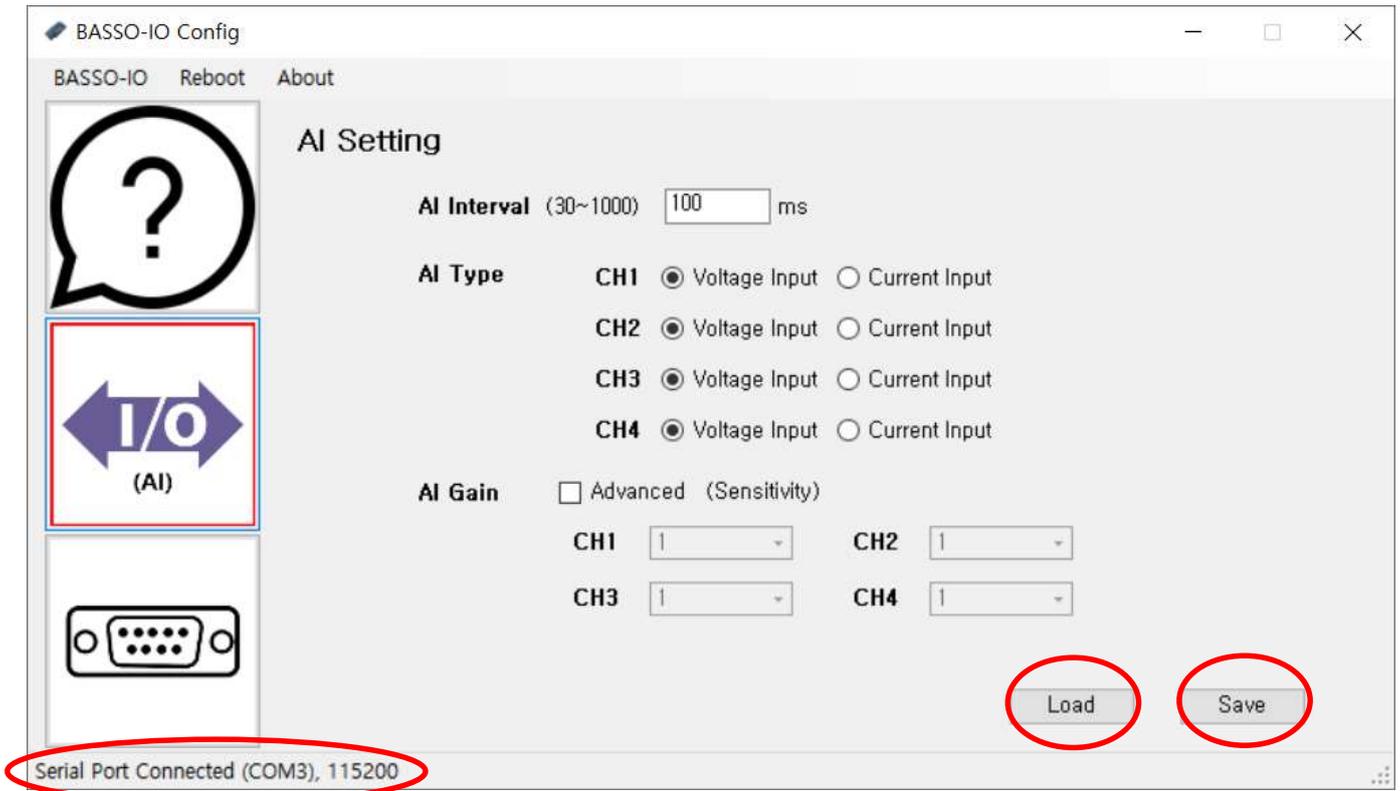
The [Update] button is a button for Firmware Update of BASSO-1040DT/AI.

Press the button, select the firmware file and proceed the update.



## IO Port(AI) Setting

You can make Analog Input-related settings for BASSO-1040DT/AI in the IO Port(AI) Setting menu.



By setting [AI Interval], you can set the Analog Input measurement cycle.

By setting [AI Type], you can select the measurement mode of the channel to Voltage Input or Current Input functions.

By setting [AI Gain-Advanced], it outputs a Warning! pop-up window.

You can check the fine measurements by adjusting the Gain of the channel.

IF the measure value x Gain exceeds 10v or 20mA, it outputs to 10V or 20mA.

Click the [Load] button to show the status of the currently set value.

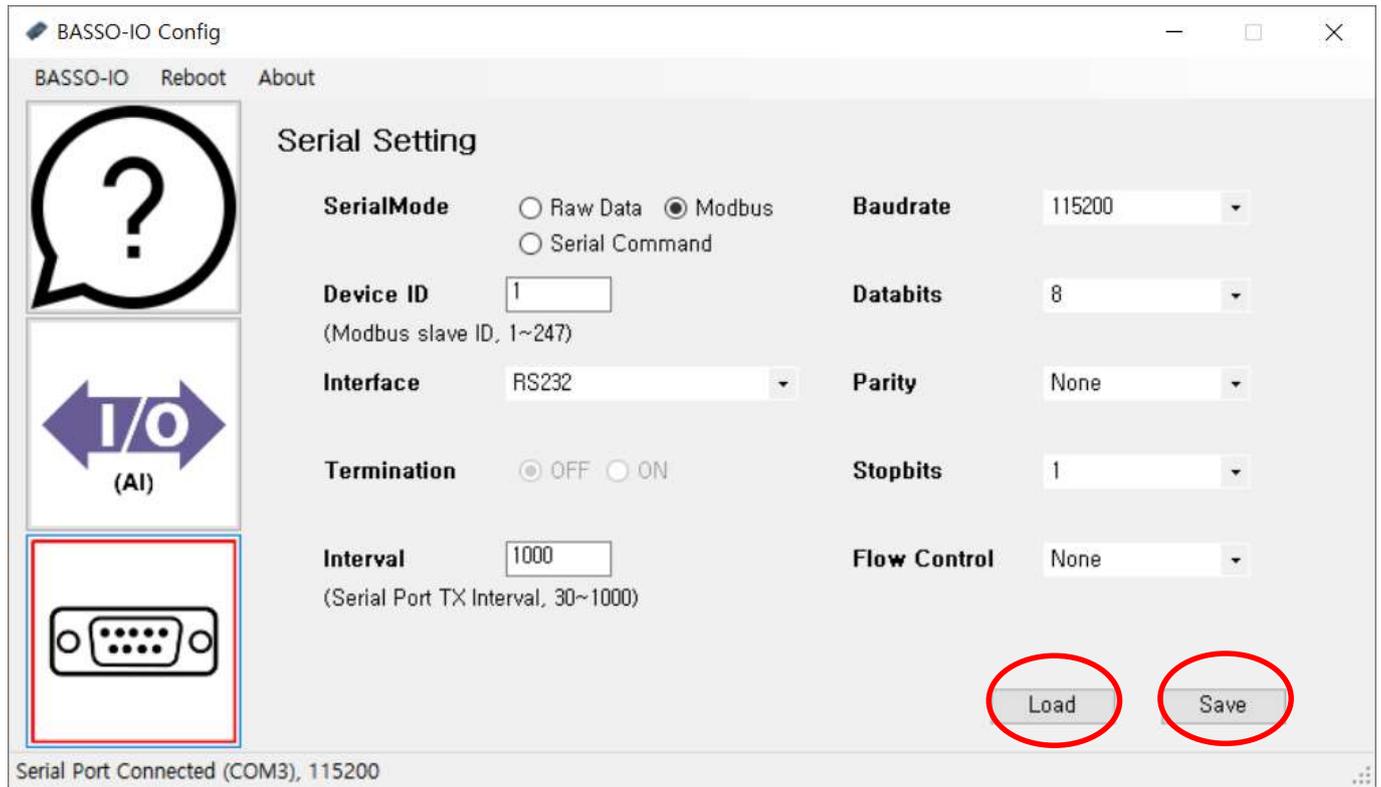
Click the [Save] button to save the setting values of the changes you made.

After changing the settings, make sure to press the [Save] button and check that the changed values are reflected in the actual equipment. If you want to check the set value after reconnecting, you can check it through the [Load] button. If you force the program to exit without saving changes, the changed values will not be saved.

**\*Please refer to APPENDIX 4. Setup Utility for detailed AI setup information.**

## Serial Setting

You can set the settings for the serial port of BASSO-1040DT/AI in the Serial Setting menu.



Click the [Load] button to see the status of the current set values.

Click the [Save] button to save the setting values of the changes made.

After changing the settings, make sure to press the [Save] button and check that the changed values are reflected in the actual equipment. If you want to check the reset value after reconnecting, you can check it through the [Load] button. If you force the program to exit without saving changes, the changed values will not be saved.

\* Please refer to APPENDIX 4. Setup Utility for detailed serial setup information.

## Reboot

After setting up BASSO-1040DT/AI, press the [Reboot] button to restart BASSO-1040DT/AI to change to Operation Mode.



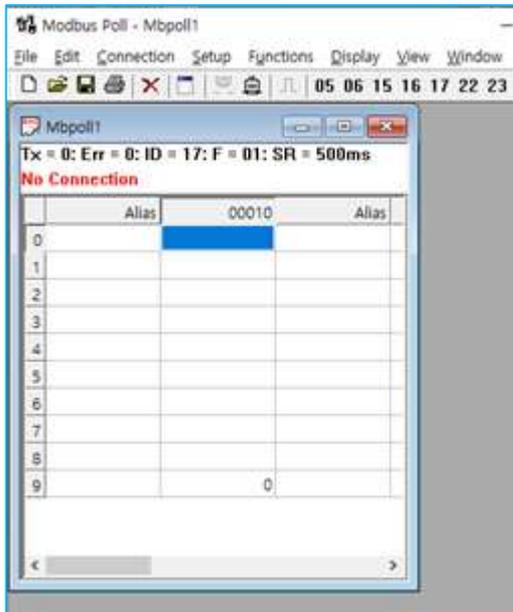
Click [Reboot]



Reboot Succeed

## Using Modbus (Function 6/16)

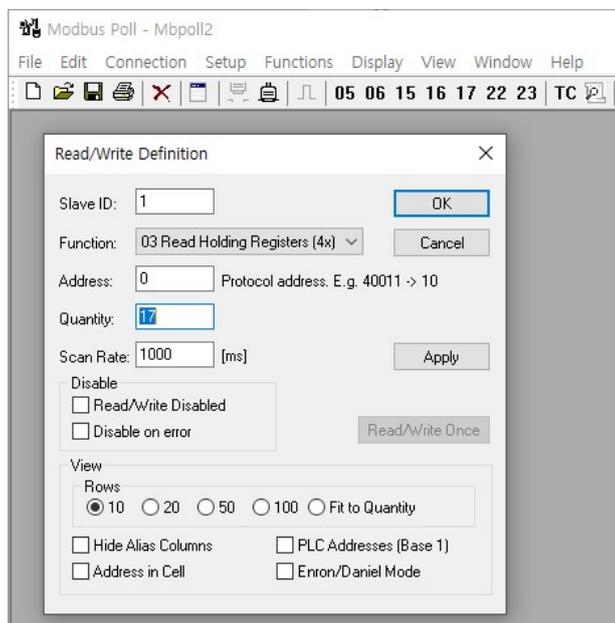
When in MODBUS data output mode, the RDY(green) LED flashes at 200ms. Run Modbus Poll.



## Read/Write Definition

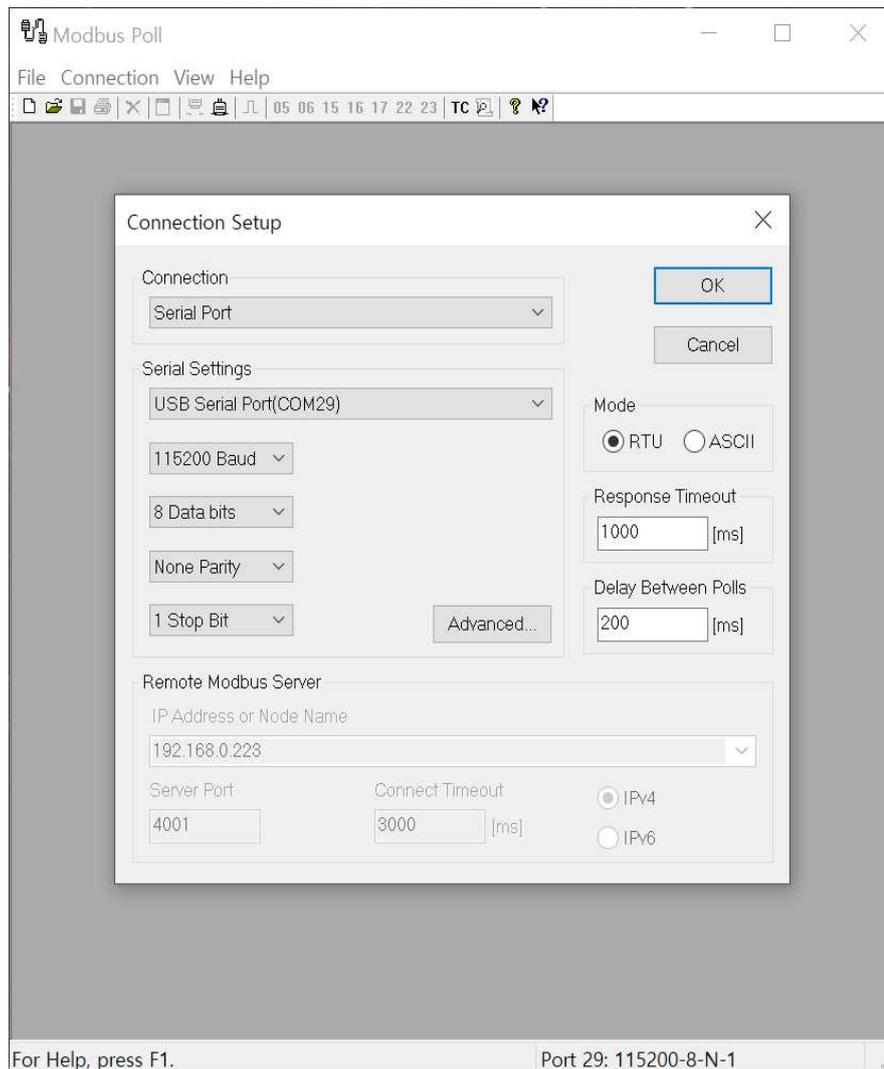
Select Setup → Read/Write Definition from the menu and enter the values referring to BASSO-1040DT/AI Register Map.

- Slave ID: Enter the Slave ID set in BASSO-1040DT/AI.
- Function: Select 03 Read Holding Registers(4x). The AI port has a registry of 40001 to 40017.
- Address: Enter '0' for the start Address.
- Quantity: Enter '17' for the number of register to be read.
- Set the remaining settings to the Default value.



## Connection Setup

Select Connection → Connect from the menu to set up a Modbus connection.

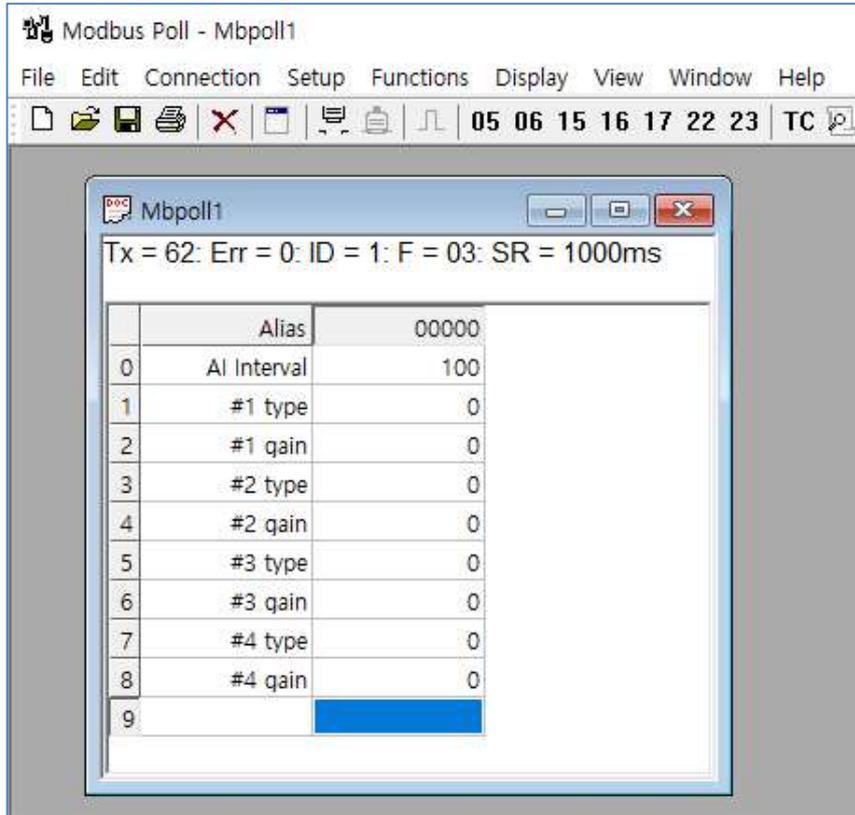


- For Connection, select the Comport connected with the BASSO-1040DT/AI and synchronize the Serial Settings values bellows such as Baud Rate, Data bits, Parity and Stop bit with BASSO-1040DT/ AI settings.
- Select Modbus Mode. (RTU/ASCII)
- Set Response Timeout and press [OK] button to attempt connection when setup is complete.

### Check Communication and Status Values

When Modbus communication is normal, you can check the setup information of each Input Port of BASSO-1040DT/AI as below:

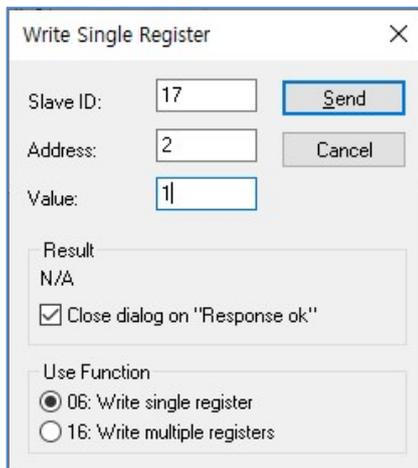
(If you type Alias, it will be easier to check)



### Control Input Port

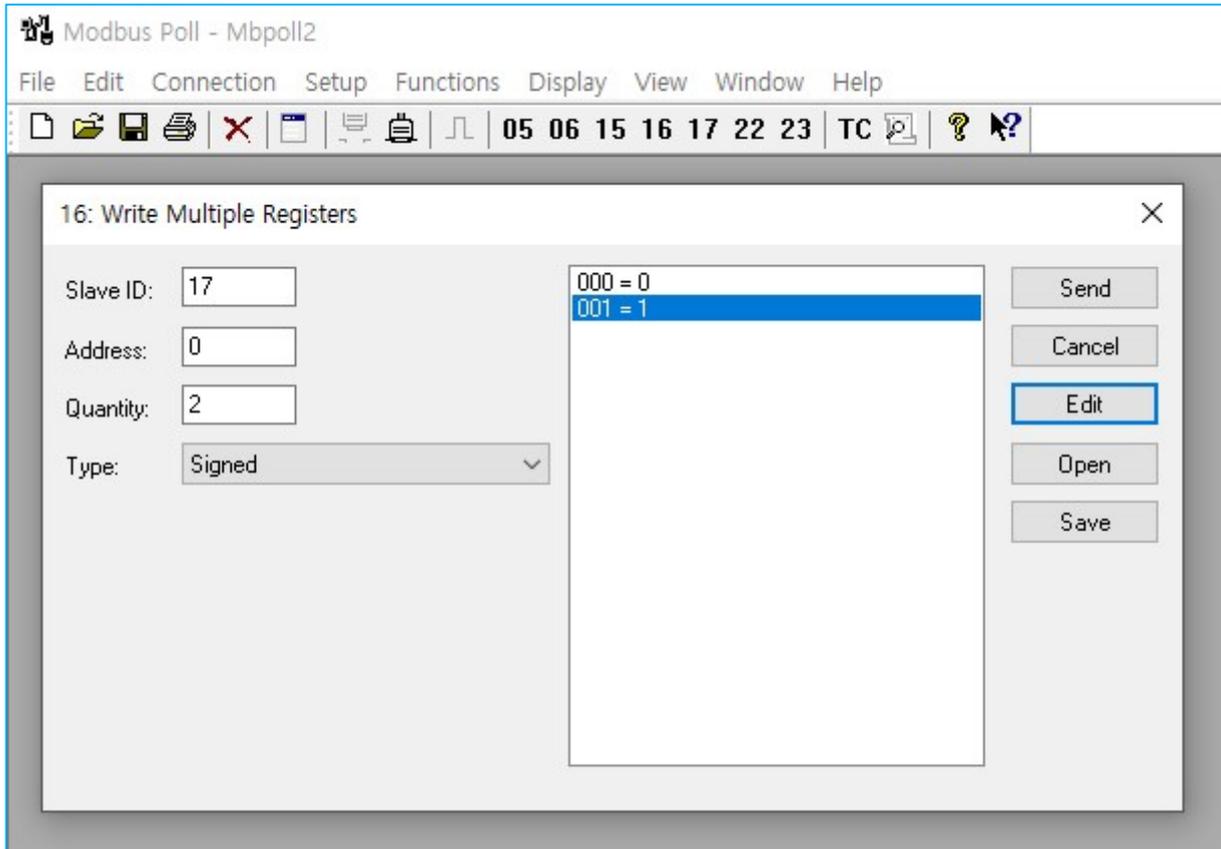
Select Function → 06: Write Single Register from the menu, enter Slave ID, Address, Value and press the [Send] button to send the command to that Slave Id.

The example below means that you will enter the #40003 (Address 2; #1 gain) register value of Slave ID 17 as '1'.



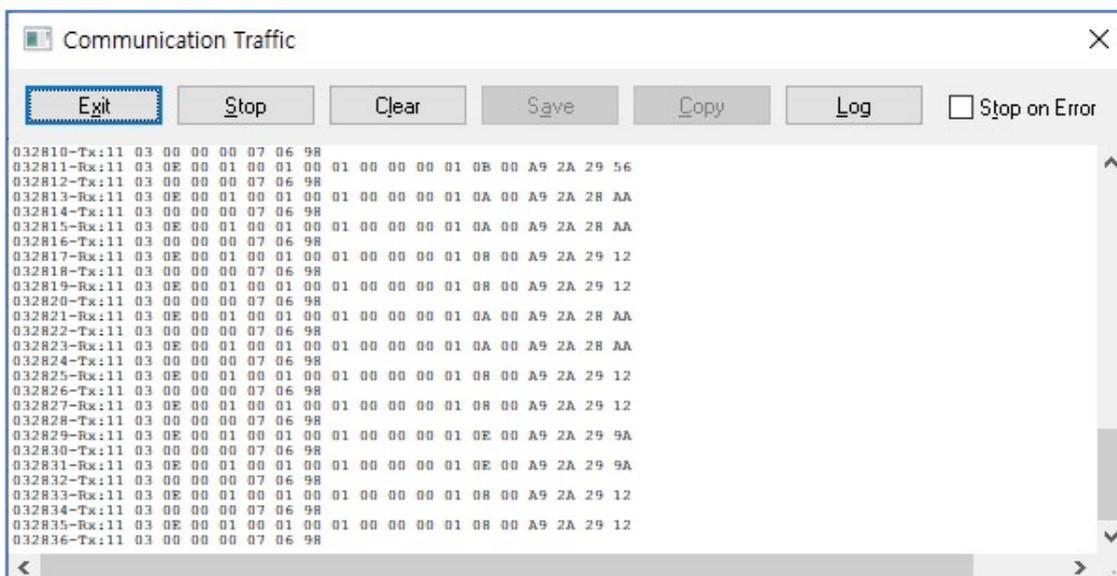
Select Function → 16: Write Multiple Registers from the menu, enter Slave ID, Address, Quantity, Value and press the [Send] button to send the command to that Slave ID.

The example below means you will enter the #40001~40002(#1 type, #1 gain) register value of Slave ID 17 as '0', '1' each.



### Debug Communication Status

You can check the transmitted/received packets by selecting Display → Communication from the menu.



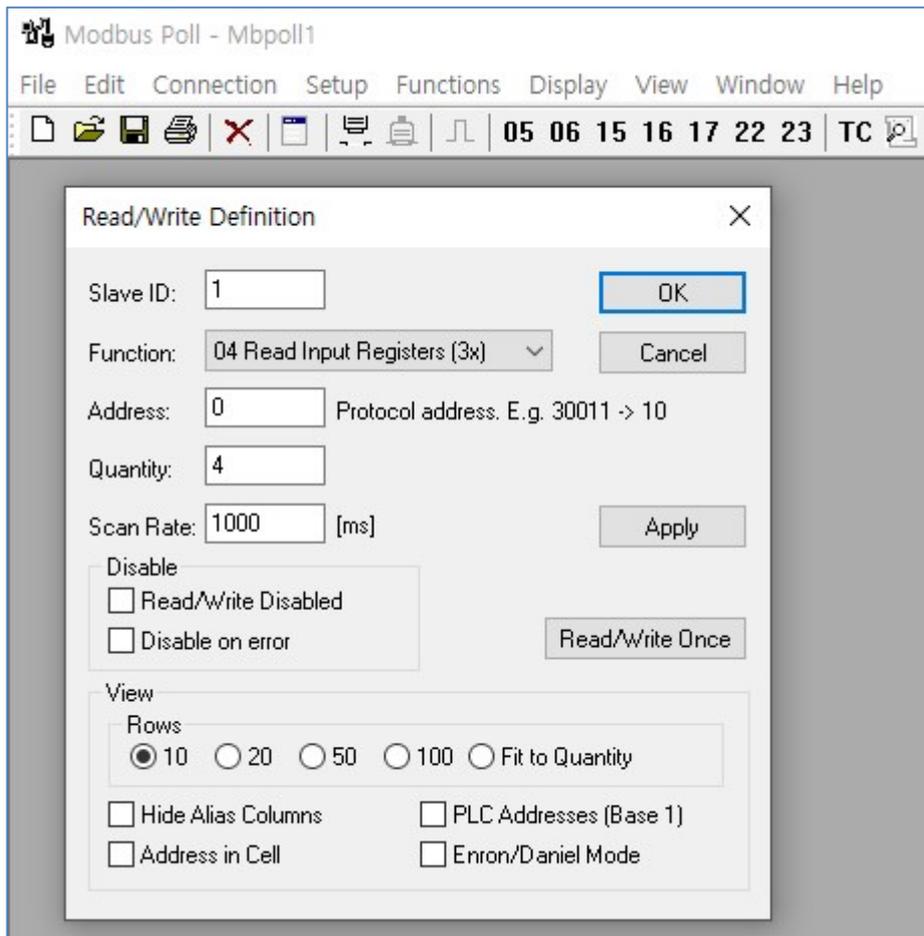
## Check Modbus Data (Function 4)

You can view the AI data with Function 4(Read Input Registers) in Modbus.

### Read/Write Definition

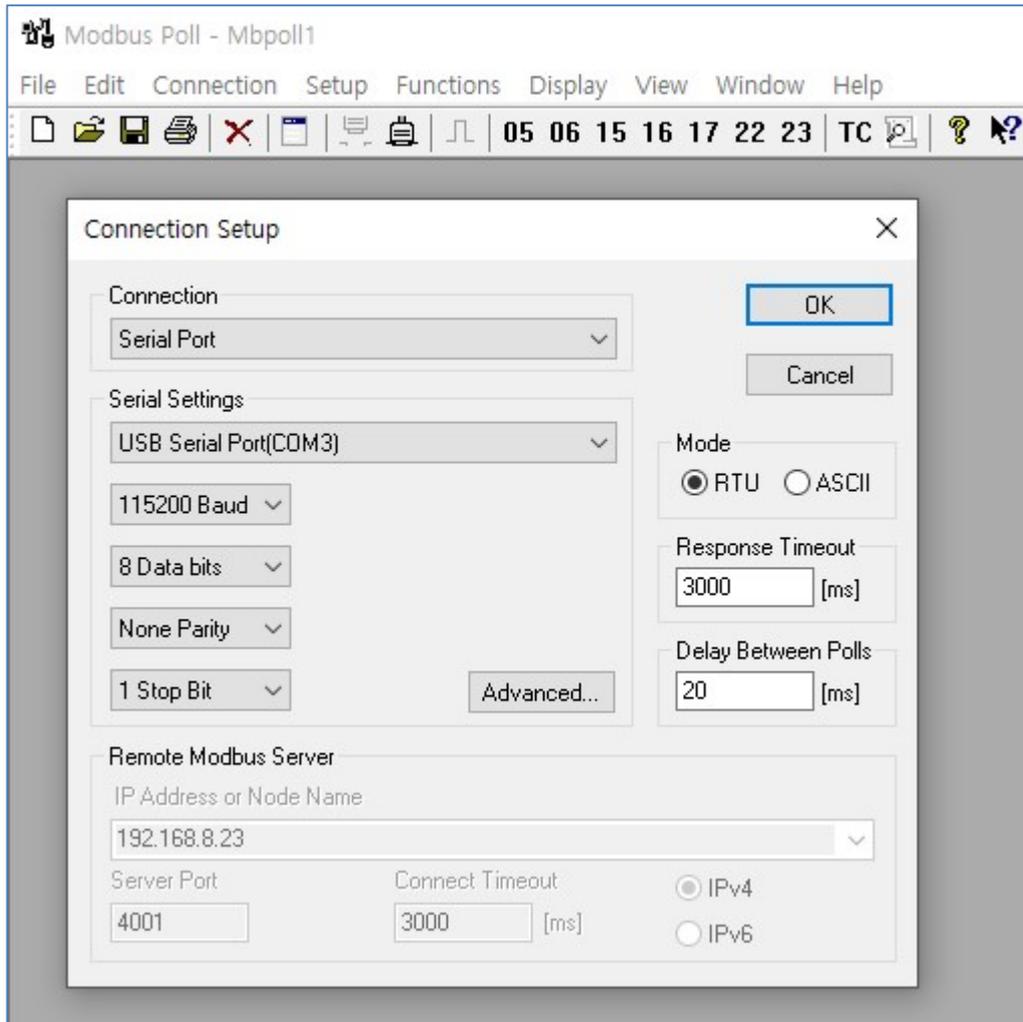
Select Setup → Read/Write Definition from the menu and enter the values referring to BASSO-1040DT/AI Register Map.

- Slave ID: Enter the Slave ID set in BASSO-1040DT/AI.
- Function: Select 04 Read Input Registers (3x). The AI port has a registry of 30001 to 30018.
- Address: Enter '0' for the start Address.
- Quantity: Enter '18' for the number of register to be read.
- Set the remaining settings to the Default value.



## Connection Setup

Select Connection → Connect from the menu to proceed with Modbus connection setup.



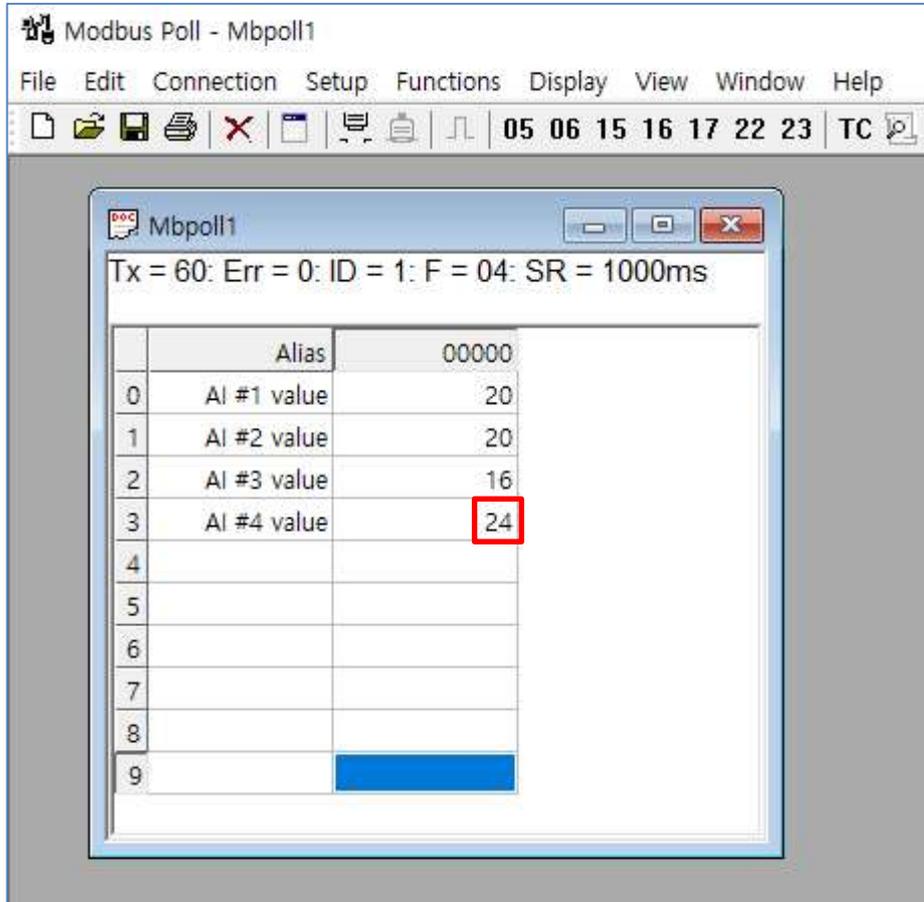
- For Connection, select the Comport connected with the BASSO-1040DT/AI and synchronize the Serial Settings values bellows such as Baud Rate, Data bits, Parity and Stop bit with BASSO-1040DT/AI settings.
- Select Modbus Mode. (RTU/ASCII)
- Set Response Timeout and press [OK] button to attempt connection when setup is complete.

### Check Communication and Verify Data

When Modbus communication is normal, you can check each port data of BASSO-1040DT/AI as shown below:

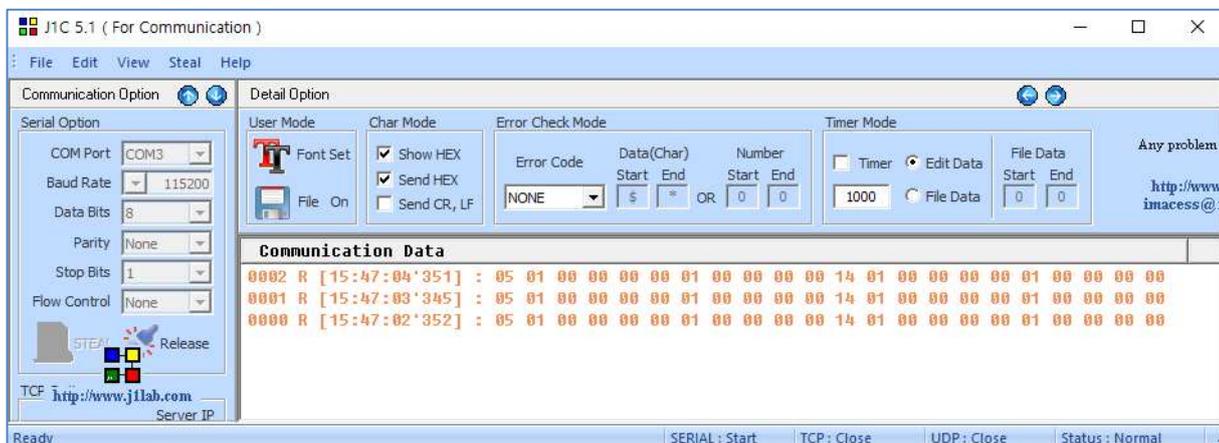
(If you type Alias, it will be easier to check)

AI data values are output in mV. (8421 = 8421mV) (24 = 24mV)



### Raw Data

Check the data through Serial Port in the Raw Data output mode of BASSO-1040DT/AI.



For Input port, you can see that 9bytes of data are sent periodically.

Users can show the status value in their own application with this value.

When converting the received 9bytes to the HEX value and view them,  
< Packet Sample >

**06 14 00 13 00 12 00 18 00**

06: Port Table Number (Refer to the table below)

14 00: AI#1 Port measured value

13 00: AI#2 Port measured value

12 00: AI#3 Port measured value

18 00: AI#4 Port measured value

Port Table Number	Port Table Name
0x06	AI

<Table: Port Table Number>

※Note

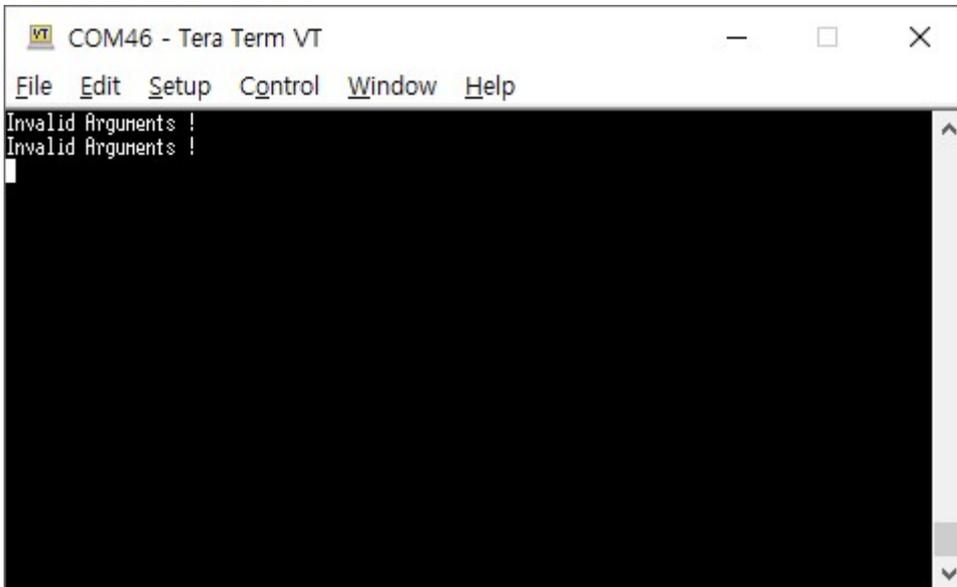
You cannot check the Hex value in TeraTerm(a common communication emulator).  
You must use a serial communications program with Hex View enabled.  
The above example is a convertible J1C program.

## Serial Command

Check the data through the serial port in the serial command output mode of BASSO-1040DT/AI.

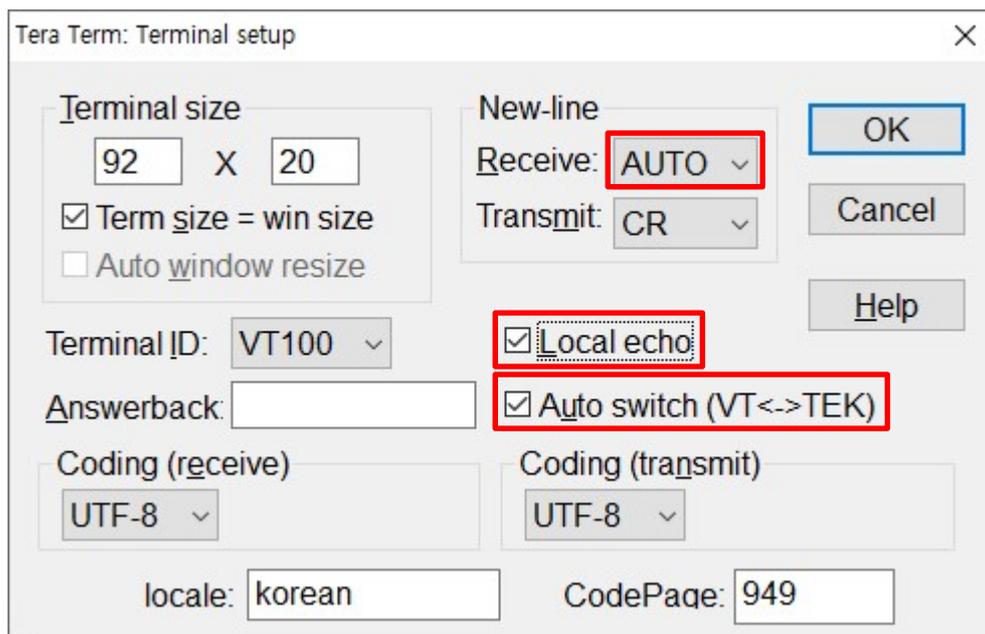
After executing TeraTerm, press the “Enter key” on the keyboard to check “Invalid Arguments !” as shown below.

Check if it is operating in Serial Command mode.

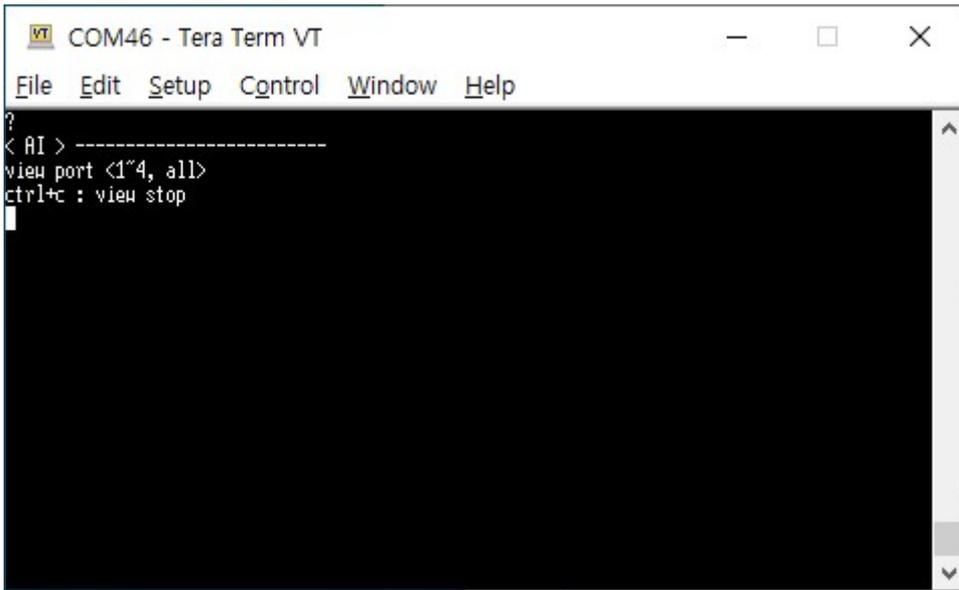


※ Serial Command operates normally only when Field Power and Field Ground of the Analog Input port (terminal block) are connected.

In order to check the value entered with the keyboard in TeraTerm, click Terminal in Setup among the menu items to make detailed settings.

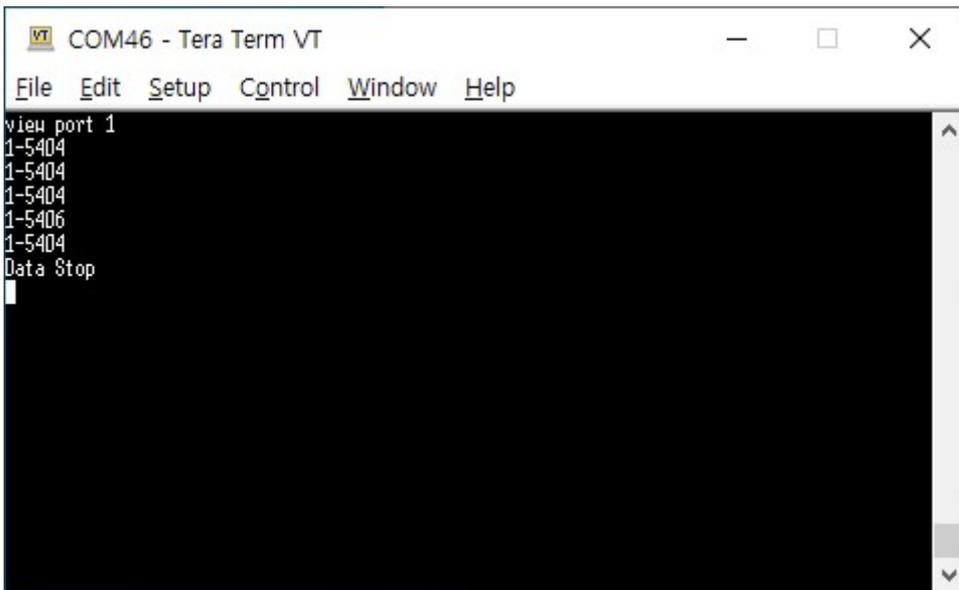


You can check the command by typing '?' in the terminal window.



```
COM46 - Tera Term VT
File Edit Setup Control Window Help
?
< AI > -----
view port <1~4, all>
ctrl+c : view stop
```

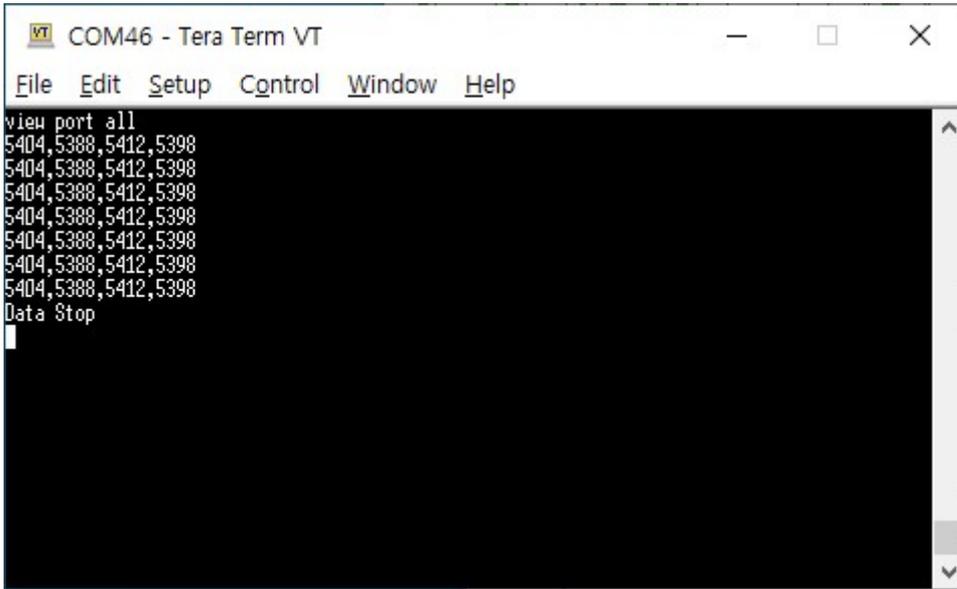
If you input “view port 1” in the terminal window, the data for Analog Input port 1 is continuously output.  
Entering Ctrl+c on the keyboard stops data output.



```
COM46 - Tera Term VT
File Edit Setup Control Window Help
view port 1
1-5404
1-5404
1-5404
1-5404
1-5406
1-5404
Data Stop
```

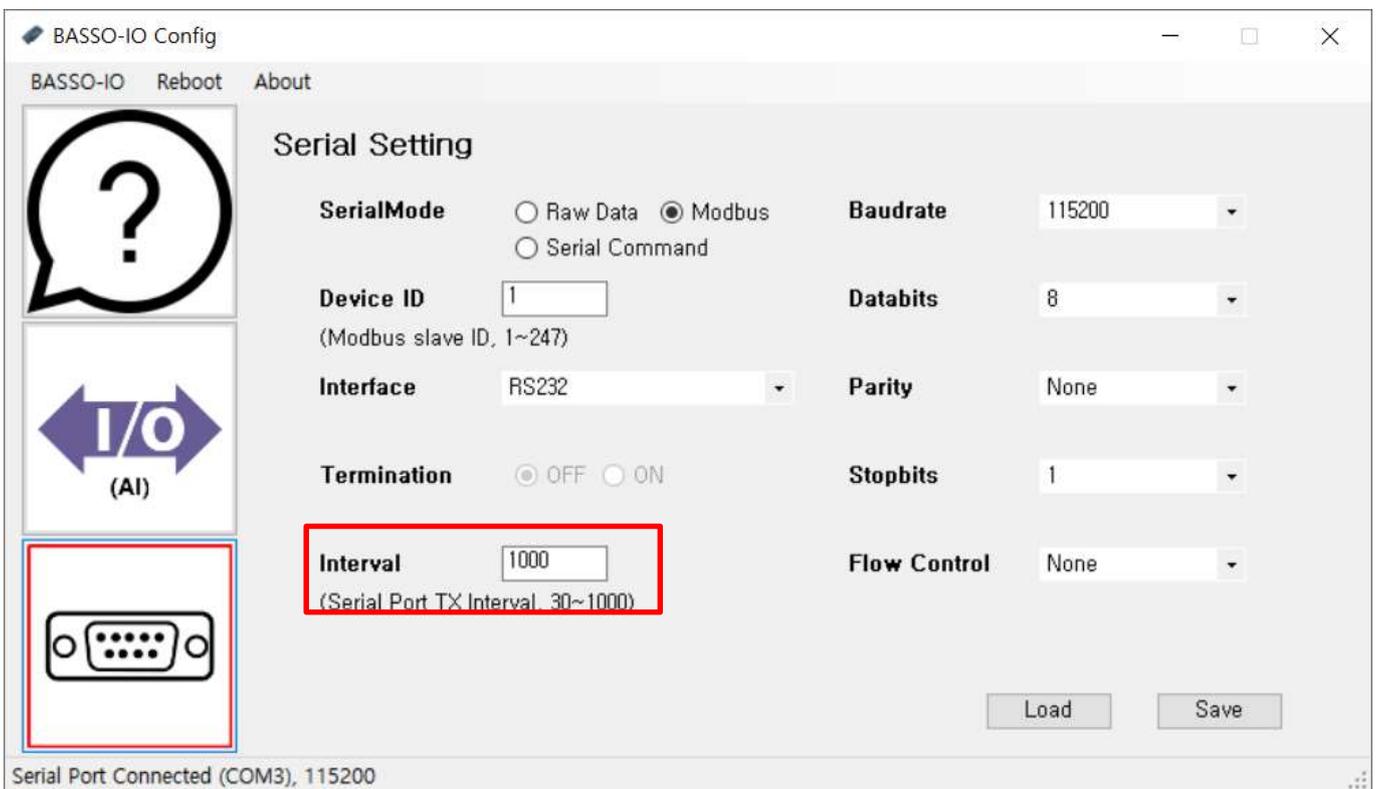
- Data output “1-5404” indicates data 5404 of port 1.

If “view port all” is entered in the terminal window, the data for Analog Input ports 1 to 4 are continuously output.



- Separate each port with ‘,’ in data output. (port1, port2, port3, port4)

The data output cycle is output according to the interval of Serial Setting in setting mode.



## 7. MODBUS MAP

The supported Modbus Function and Modbus Registers for BASSO-1040DT/AI can be found in the table below.

[Function 03 : Read Holding Registers]			
Register	Setting	Value	Settings
0	AI Interval	30~1000	AI data collecting cycle
1	AI 1channel type	0~1	Voltage Input=0, Current Input=1
2	AI 1channel gain	0~3	Gain=0~3(1/2/4/8)
3	AI 2channel type	0~1	Voltage Input=0, Current Input=1
4	AI 2channel gain	0~3	Gain=0~3(1/2/4/8)
5	AI 3channel type	0~1	Voltage Input=0, Current Input=1
6	AI 3channel gain	0~3	Gain=0~3(1/2/4/8)
7	AI 4channel type	0~1	Voltage Input=0, Current Input=1
8	AI 4channel gain	0~3	Gain=0~3(1/2/4/8)

[Function 04 : Read Input Registers]			
Register	Setting	Value	Settings
0	AI 1ch data	0~65535	Channel1 Input V/I conversion data
1	AI 2ch data	0~65535	Channel2 Input V/I conversion data
2	AI 3ch data	0~65535	Channel3 Input V/I conversion data
3	AI 4ch data	0~65535	Channel4 Input V/I conversion data

[Function 06 : Write Single Register]
[Function 16 : Write Multiple Registers]

### Class A equipment

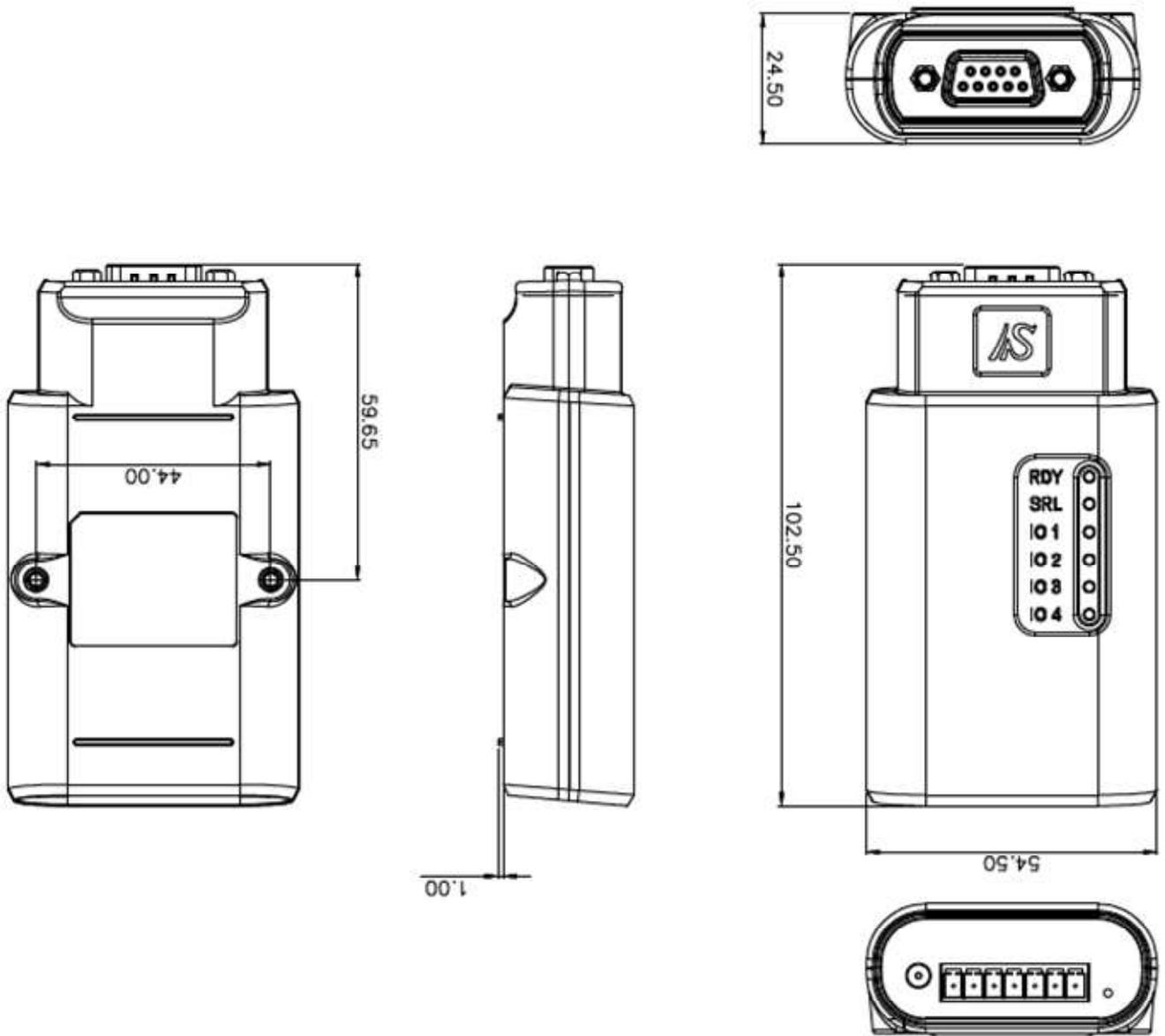
Sellers or users should be aware of the fact that this device is intended for industrial use(Class A), not for residential use.

## ----- APPENDIX -----

### 1. Specification

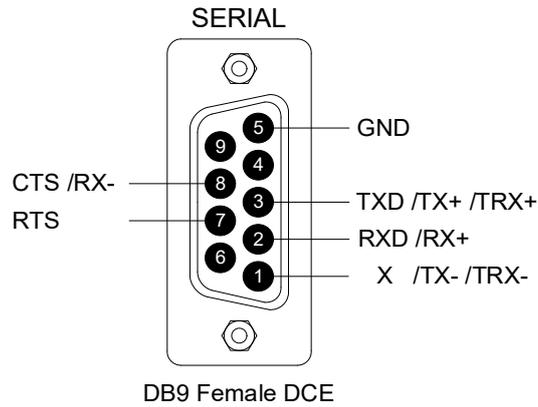
Serial	Interface	RS232 or RS422 or RS485 Selectable (by software)
	Serial Port	DCE(DB9 Female)
	Signals	RS232: TXD, RXD, RTS, CTS
		RS422: TXD+, TXD-, RXD+, RXD-
		RS485: TRXD+, TRXD-
	Data bit	8
	Stop bit	1, 2
	Baud Rate	Max. 921.6Kbps
Protection	Max. $\pm 15\text{kV}$	
Analog Input	Analog I Input	4 (Single Ended)
	Resolution	16 bits
	Sampling Rate	100Hz
	Analog Input Mode	Configurable as 4/20mA or 0-10VDC (by software)
	Input Voltage Range	0(2) ~ 10V
	Input Current Range	0(4) ~ 20mA
	Power	12 ~ 24V (Terminal Block)
Hardware	Power	5 ~ 24V (DC-Jack) (Outer: 3.47mm, Internal: 1.35mm) 
	LED	RDY(Green), SRL(Red), AI1/3(Green), AI2/4(Yellow)
	Dimension (W x L x H)	102.5 x 54.5 x 24.5mm (4.04 x 2.15 x 0.97in)
	Weight	68g (2.4oz)
	Operating Temperature	-40 ~ 85°C (-40 ~ 185°F)
	Storage Temperature	-40 ~ 85°C (-40 ~ 185°F)
	Humidity	5~90% Non-condensing
Ordering information		BASSO-1040DT/AI

## 2. Dimension



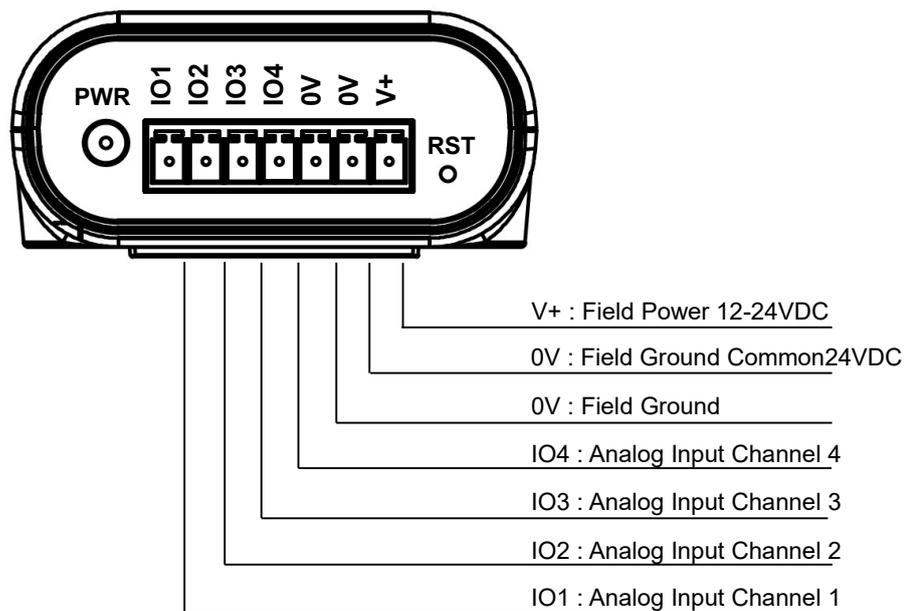
unit: mm

### 3. Serial Port Pin



DB9 PIN No.	RS232	RS422	RS485
1	-	TX-	TRx-
2	RXD	RX+	-
3	TXD	TX+	TRx+
5	GND	-	-
7	RTS	-	-
8	CTS	RX-	-

**[Caution]** RS232 port is Data Communications Equipment (DCE) mode, so must be connected to DTE ports such as PCs as direct cable.



## 4. Setup Utility

The main menus of AI Port Setup are as follows:

Menu	Default	Description
AI Type	Voltage Input	<p>You can change the type of each Input port by channel.</p> <p><b>Voltage Input</b> Run the channel in Voltage Input mode. Values between 0 ~ 10V can be measured.</p> <p><b>Current Input</b> Run the channel in Current Input mode. Values between 4 ~ 20mA can be measured.</p>
AI Gain	1	<p>You can set the Gain value of each channel. ("1", "2", "4", "8")</p> <p>* It is recommended to use this option when you want to measure a minute value of 1V (or 2mA) or less.</p> <p>* The maximum value that can be read when adjusting each gain cannot exceed 10V (or 40mA). Please be careful when using.</p>

The main menus of Serial Setup are as follows:

Menu	Default	Description
Serial Mode	Modbus	Specify the operating mode of the serial port. <b>Raw Data</b> Set the serial port to act as Raw Data type. <b>Modbus</b> Set the serial port to act as Modbus type. <b>Serial Command</b> Set the serial port to act as Serial Command type.
Device ID	1	Specify the ID of the equipment when operating in Modbus mode.
Interface	RS232	Set the interface for the serial port. Select one of the RS232, RS422, and RS485NE(Non-Echo) modes.
Termination	OFF	Select whether to set termination resistance.
Interval	1000	Set the output interval of Raw Data.
BaudRate	115200	Set the communication speed of the serial port. ("300", "600", "1200", "2400", "4800", "9600", "14400", "19200", "28800", "38400", "57600", "115200", "230400", "460800", "921600")
Data Bits	8	Set the number of bits that make up the byte.
Parity	None	Set the parity check method. (None, Odd, Even)
Stop Bits	1	Set the number of stop bits. (1, 2)
Flow Control	None	Set the flow control method. (None, RTS, CTS, RTS_CTS)

## 5. Certification

- KC

Number: R-R-STB-BASSO1040DTAI

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