SYSTEMBASE

BASSO-1040DT/DIO

User Manual

Revision History

Revision Date	Document Ver.	Pages Revised	Revised/Added/Removed	Details of Revision
2021.03.08	1.0	All	-	New

CONTENTS

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).

• 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.

• This device has a potential for radio interference during use and may receive harmful interference from other devices.

• 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

Box

BASSO-1040DT/DIO (with Ejector pin)

CS-99/M

Terminal Block

5V DC Adapter
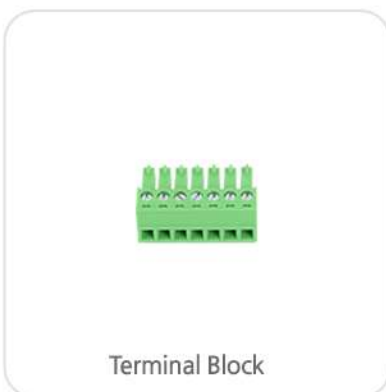
Package	Ordering Information
BASSO-1040DT/DIO, Ejector pin, Terminal Block, Adapter, CS-99/M	BASSO-1040DT/DIO

3. Product

LED

LED Name	Operation			
RDY(GRN)	Raw Data	LED 500ms flickers		
	Modbus	LED 100ms flickers		
	Setup Mode	LED flashes		
Serial TXD & RXD(RED)	LED ON when data is received/transmitted			
Digital I/O			LED "ON"	LED "OFF"
	Input	NPN	0V	VEE or OPEN
		PNP	VEE	0V or OPEN
	Output		GPIO low	GPIO high

Connector
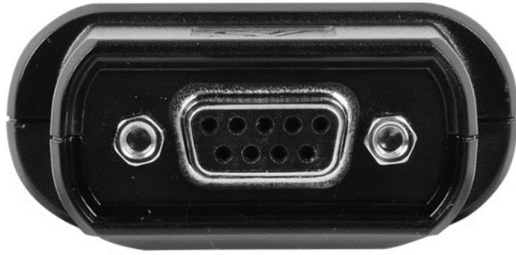
Serial Port (RS232, DCE Female)   Digital I/O Port (Terminal Block
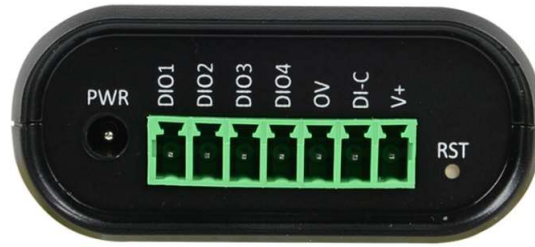
- Serial Port(RS232/RS422/RS485): Serial Port that can communicate

  (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)

- Digital I/O Port(Terminal Block): Consist of Digital Input/Output, Digital Common, External Power

  (12~24V)

Button

- Press RST buttons for less than 1 second: Enter equipment setup mode

- Press RST buttons for more than 3 seconds: Initialize Equipment to factory settings

  (Please refer to Appendix for initialized value)

4. Features

BASSO-1040DT/DIO is a converter that converts Digital I/O data to RS232, RS422 or RS485, supporting the following functions:

1) RS232/422/485 Communication Setting

Send Digital I/O data to RS232/422/485 communication according to utility communication settings.

2) Digital I/O Port Setting

BASSO-1040DT/DIO has 4ports of Digital I/O.

Users can change the I/O mode to 2xDI+2xDO or 4xDI or 4xDO by setting utility depending on environment.

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

3) Data Output Setting

User 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/DIO to the device(PC) for use data collection, and connect various sensors to the Digital I/O ports.
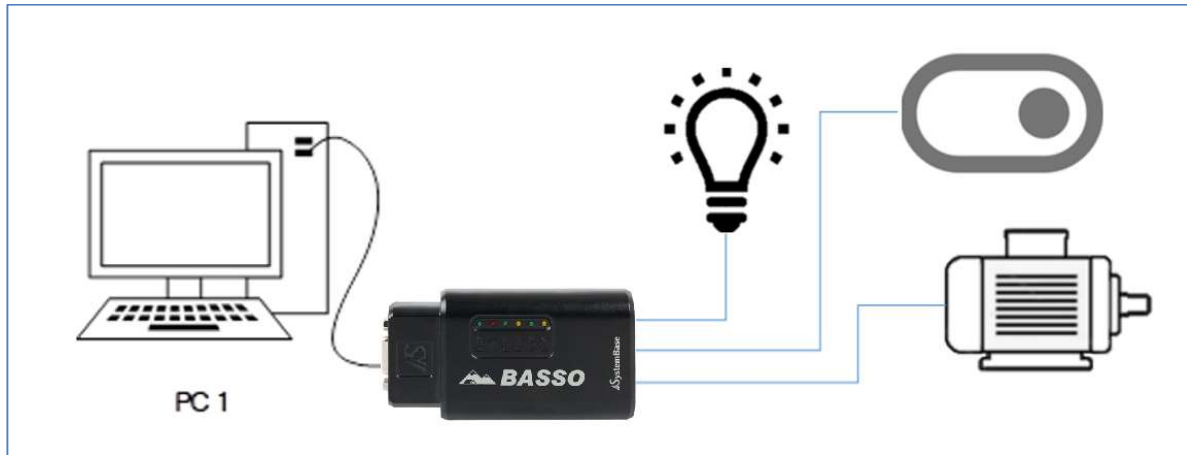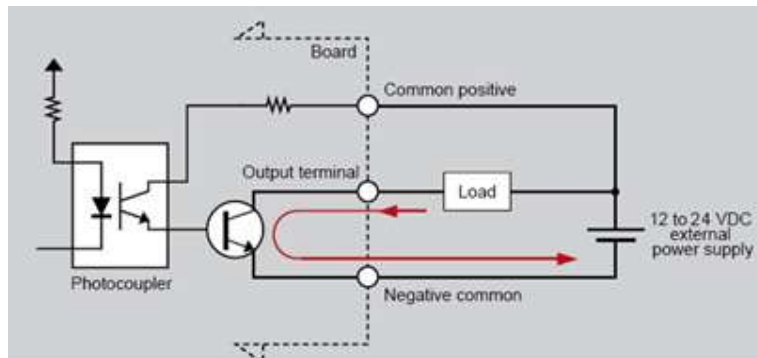

To Connect DO Sensor Device

The connection of Digital Output sensor device is Sink type.

Wiring1. Connect Sink type

DO Sensor Device Connection

Sink type means the current entering the BASSO-1040DT/DIO using external power.

To Connect DI Sensor Device

There are two types of Digital Input: Dry Contact and Wet Contact

Dry Contact is a contact point that operates without power such as buttons or switches. Wet Contact is a contact point that requires power such as proximity sensors or motion sensors. Please check the sensor type(NPN, PNP) and refer to the wirings below.
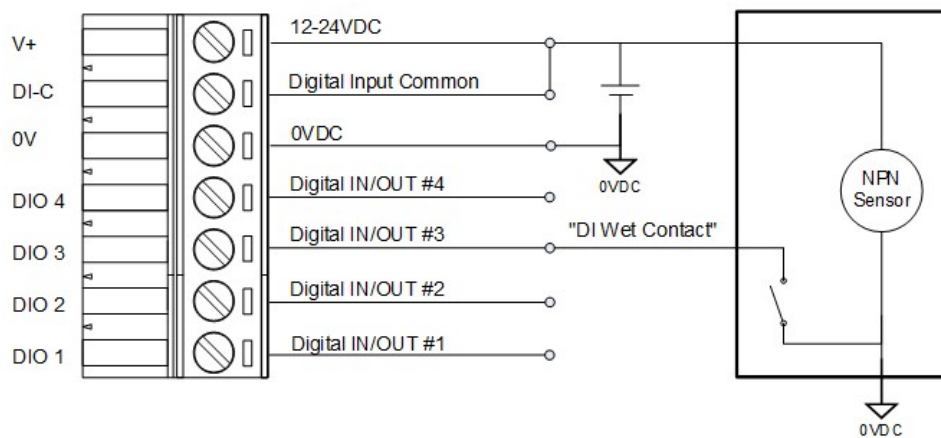
[Caution] Product can be damaged if V+ & 0V connection is reversed.
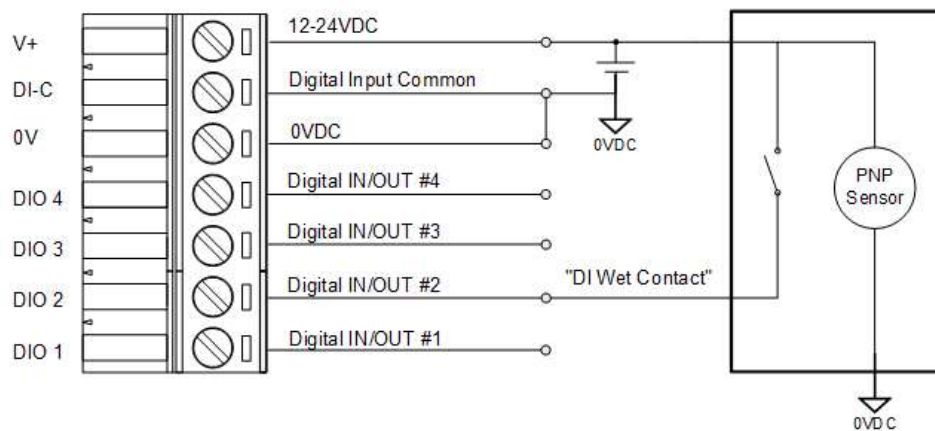
Wiring1. Digital Input Dry Contact
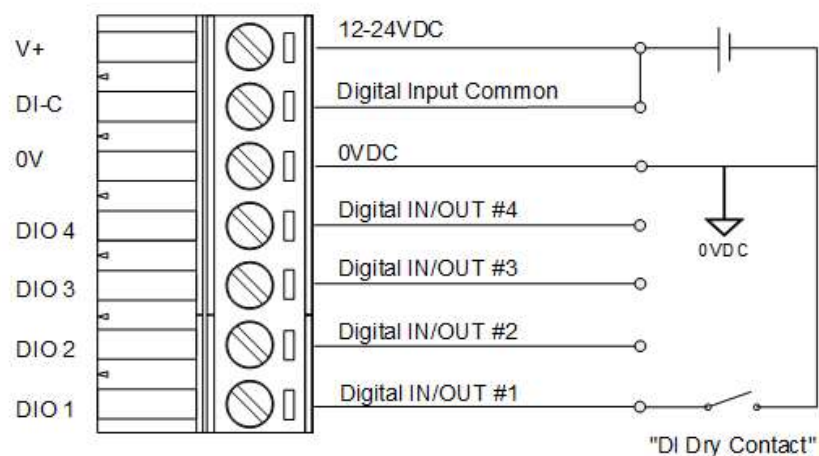
Wiring2. Digital Input Wet Contact

1) NPN Sensor Type

2) PNP Sensor Type

6. Settings

BASSO-1040DT/DIO has two kinds of setup method: 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)
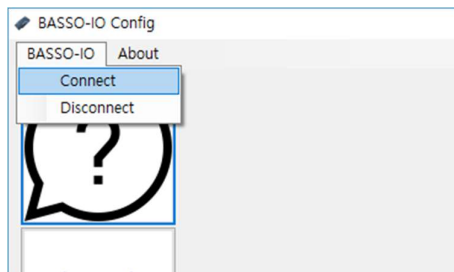
Using BASSO-IO Config

Power up the BASSO-1040DT/DIO 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.
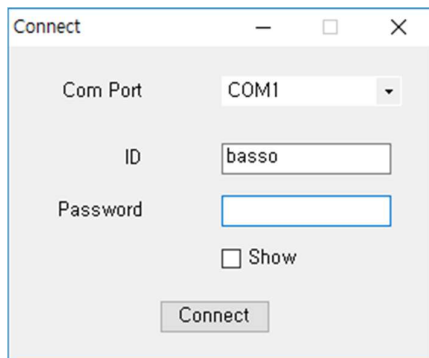
At this time, RDY LED turns on.

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/DIO is connected to your PC.

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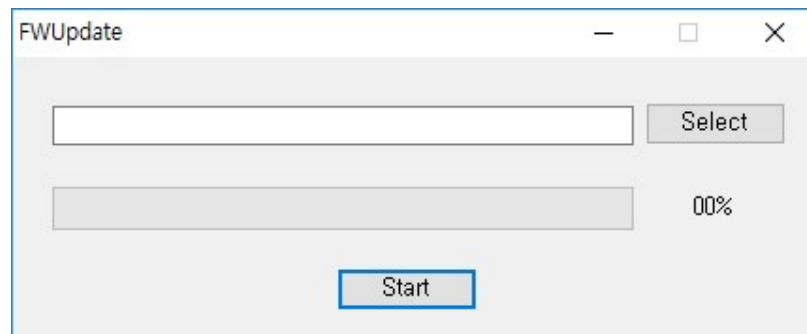
Information

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

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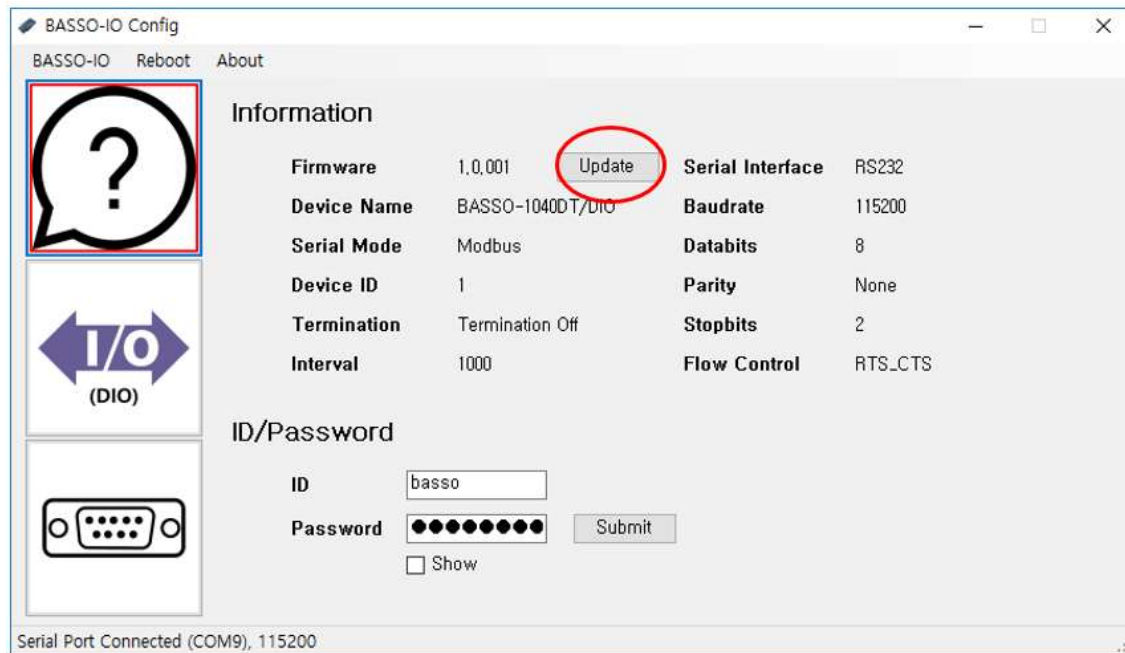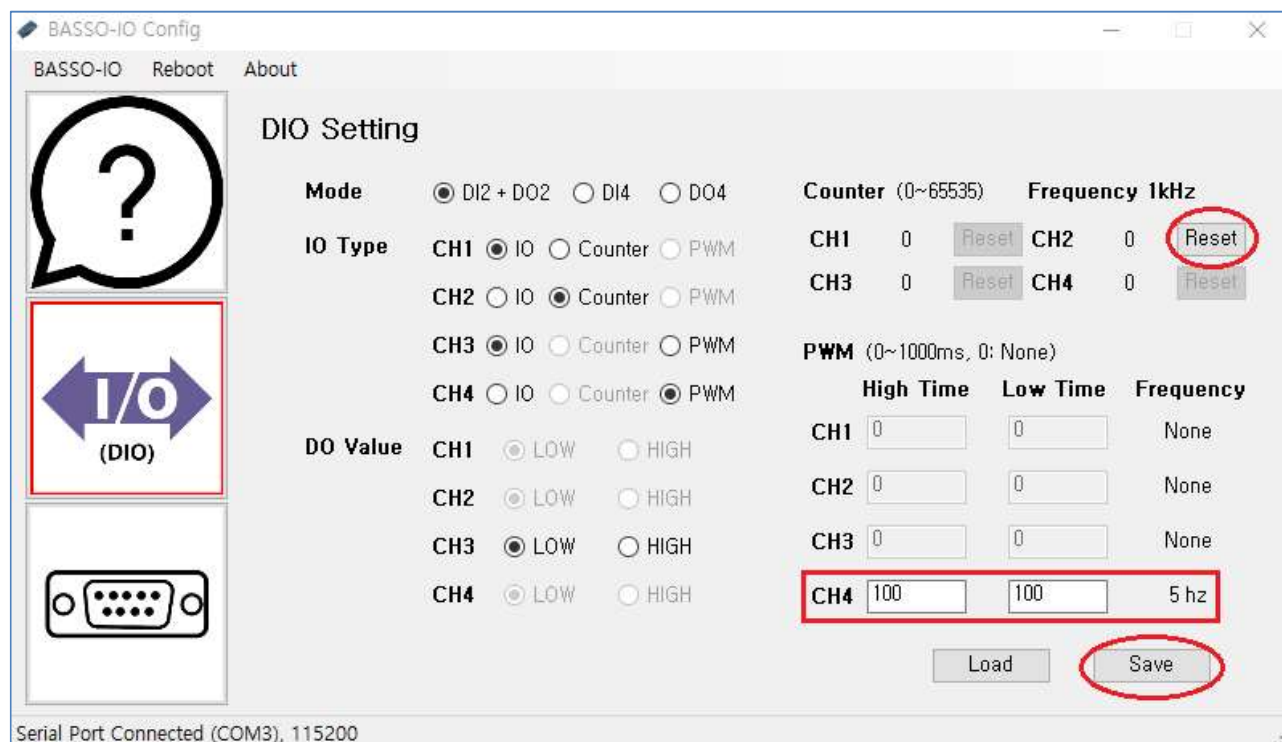

The [Update] button is a button for Firmware Update of BASSO-1040DT/DIO.

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

IO Port(DIO) Setting

You can make digital I/O-related settings for BASSO-1040DT/DIO in the IO Port(DIO) Setting menu.

You can Reset the Counter value when setting the [IO Type-Counter].

* Counter value is maintained only when entering setup mode and re-operating by Reboot.

* Counter value is initialized when BASO-1040DT/DIO is ON/OFF with power adapter.

You can set the PWM Time value for the channel when you set the [IO Type-PWM].

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 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 DIO setup information.

Serial Setting

You can set the settings for the serial port of BASSO-1040DT/DIO 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/DIO, press the [Reboot] button to restart BASSO-1040DT/DIO to change to Operation Mode.

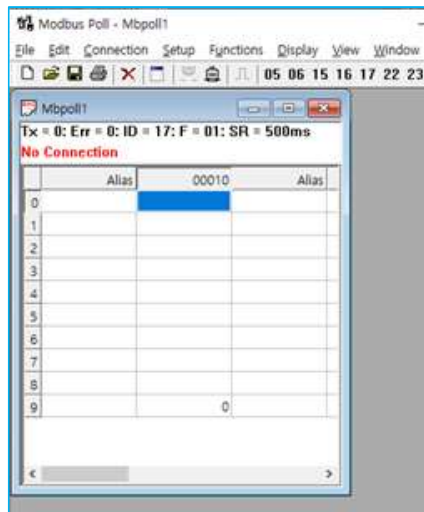| Click [Reboot]	Reboot Succeed
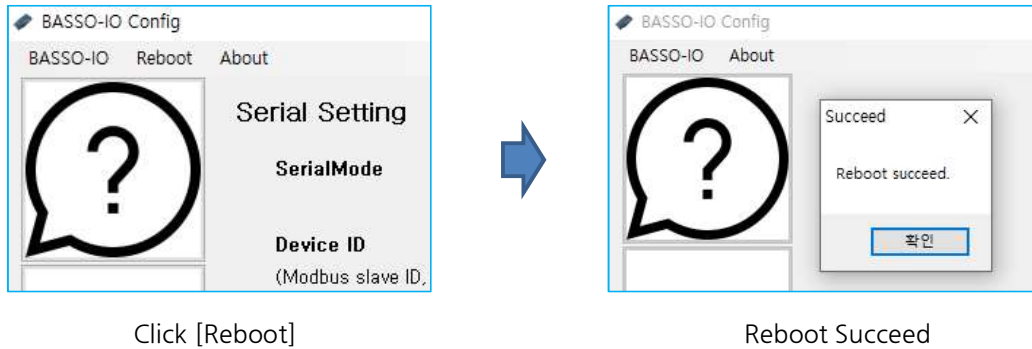
Using Modbus (Function 6/16)

When in MODBUS data output mode, the RDY(green) LED flashes at 100ms. Run Modbus Poll.

Read/Write Definition

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

- Slave ID: Enter the Slave ID set in BASSO-1040DT/DIO.

- Function: Select 03 Read Holding Registers(**4x**). The DIO 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.
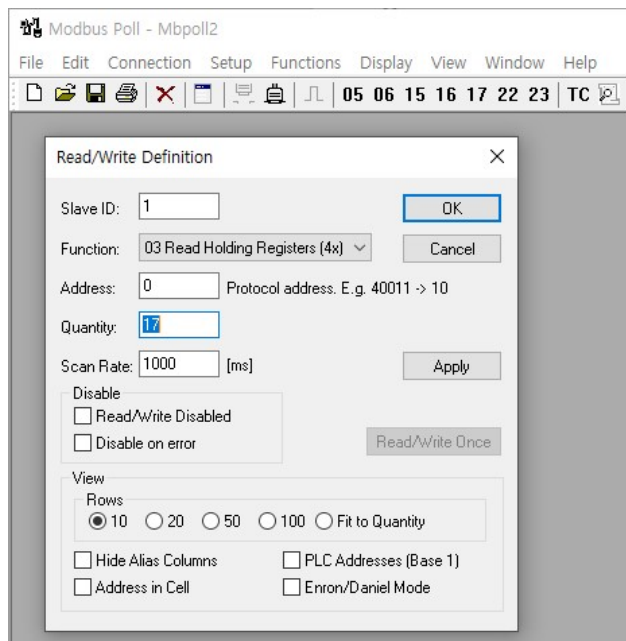
Connection Setup

Select Connection → Connect from the menu to set up a Modbus connection.
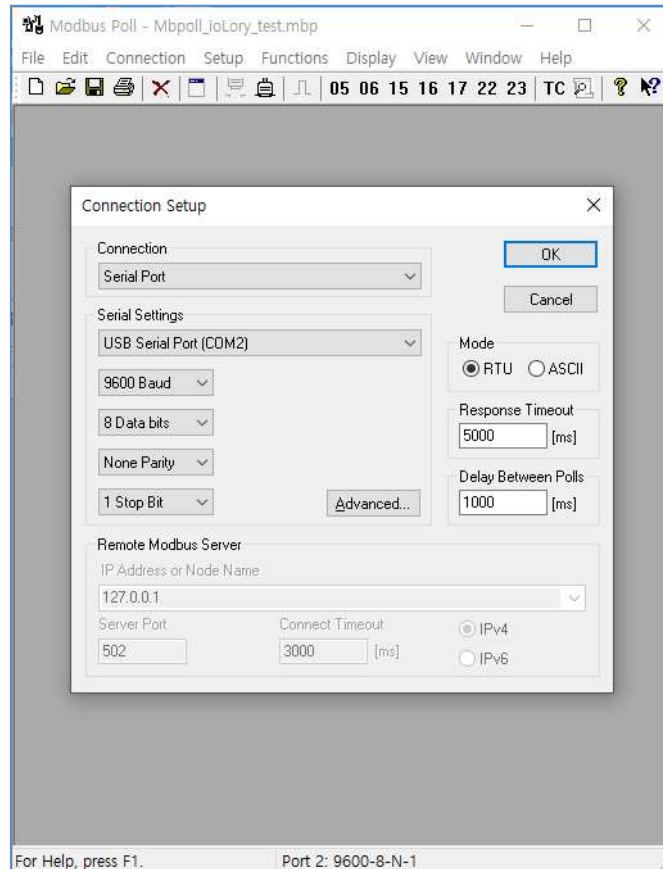
- For Connection, select the Comport connected with the BASSO-1040DT/DIO and synchronize the Serial Settings values bellows such as Baud Rate, Data bits, Parity and Stop bit with BASSO-1040DT/DIO settings.

- 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 I/O Port of BASSO-1040DT/DIO as below:

(If you type Alias, it will be easier to check)
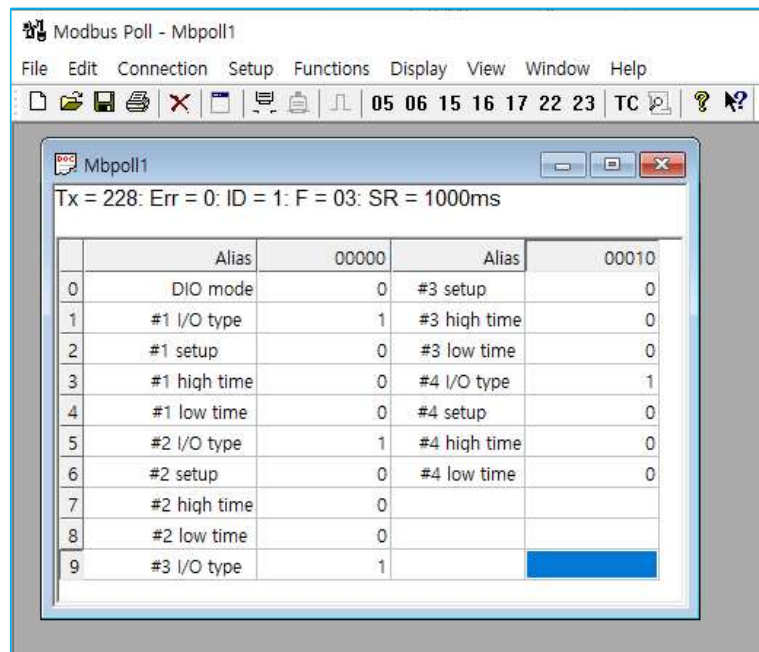
Control I/O Port

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; RO) register value of Slave ID 17 as '1'.
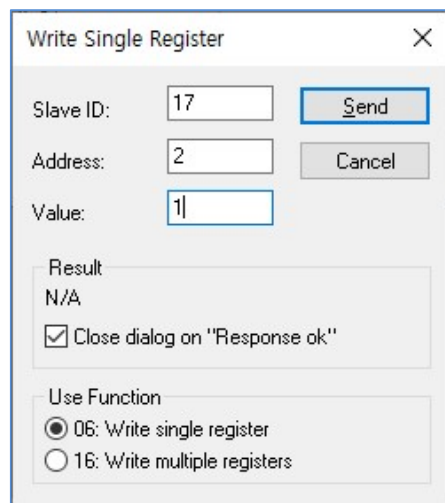
Select Function → 16: Write Multiple Registers from the menu, enter Slave ID, Address, Quantity, Value and

press the [Send] button to send the command to that Slave ID.

The example below means you will enter the #40001~40002(DIO mode, #1 I/O type) 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.
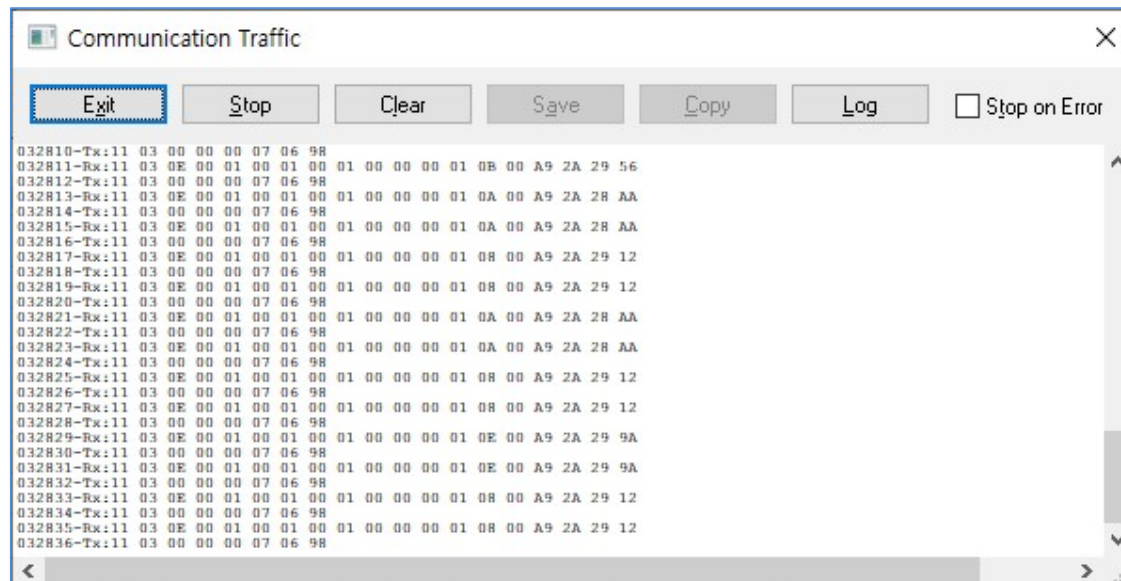
Check Modbus Data (Function 4)

You can view the Digital Input/Output 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/DIO

Register Map.

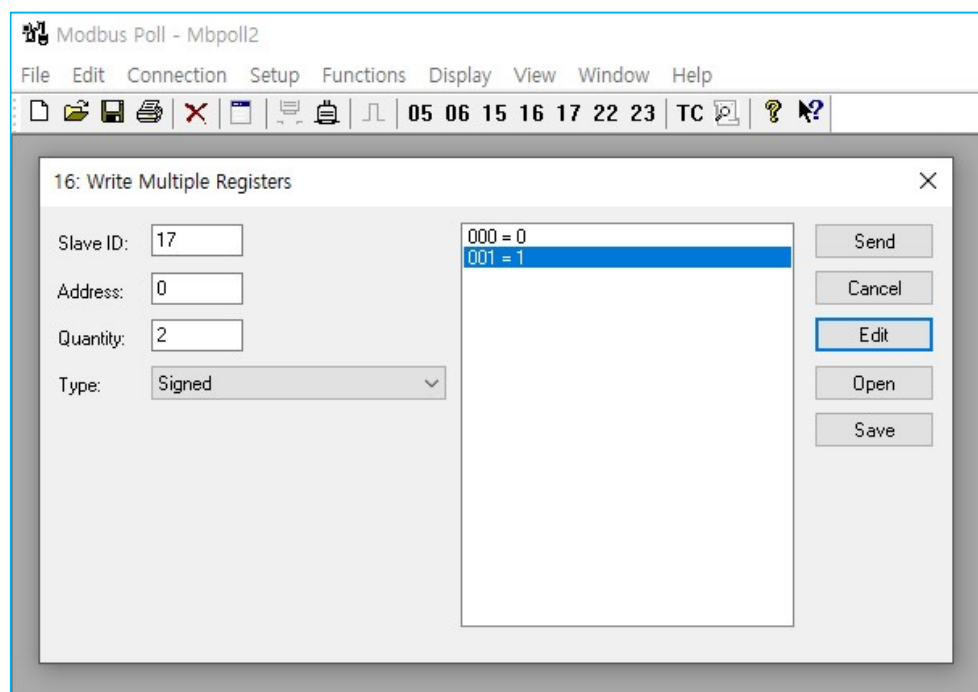 - Slave ID: Enter the Slave ID set in BASSO-1040DT/DIO.

  - Function: Select 04 Read Input Registers (**3x**). The DIO 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.
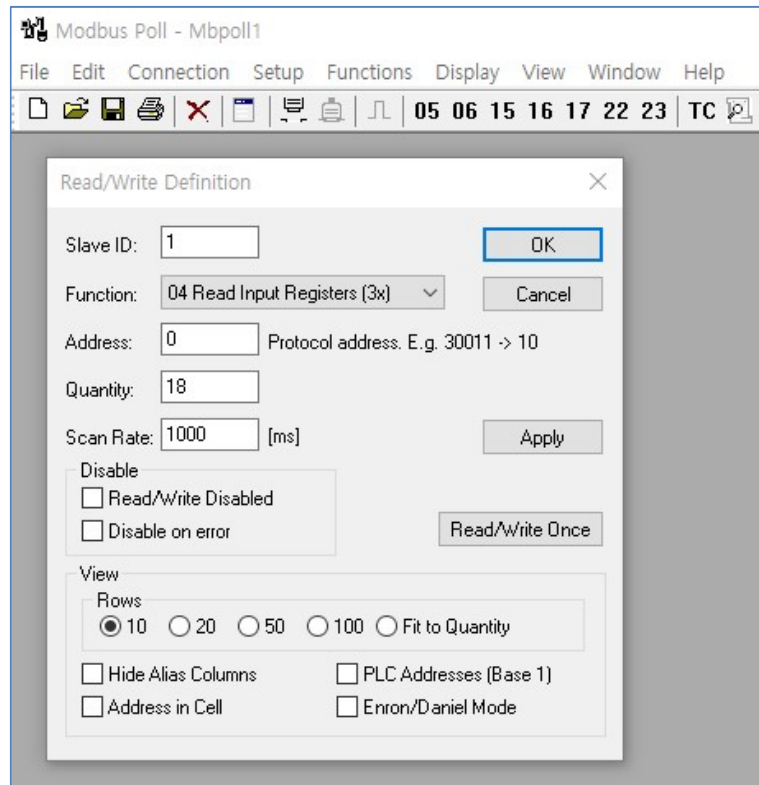
Connection Setup

Select Connection → Connect from the menu to proceed with Modbus connection setup.
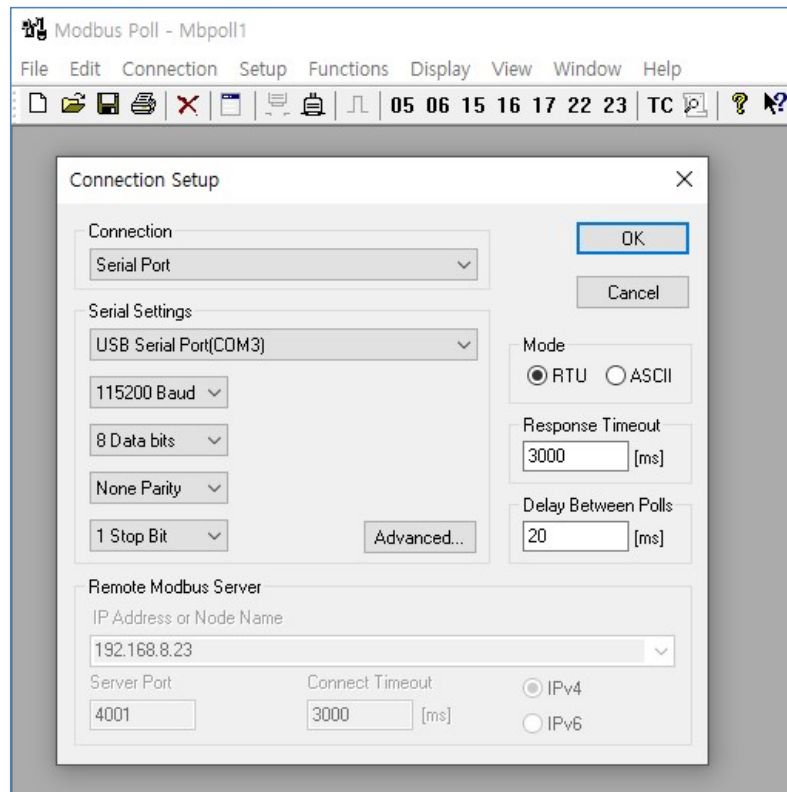
 - For Connection, select the Comport connected with the BASSO-1040DT/DIO and synchronize the Serial Settings values bellows such as Baud Rate, Data bits, Parity and Stop bit with BASSO-1040DT/DIO settings.

- 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/DIO as shown below:

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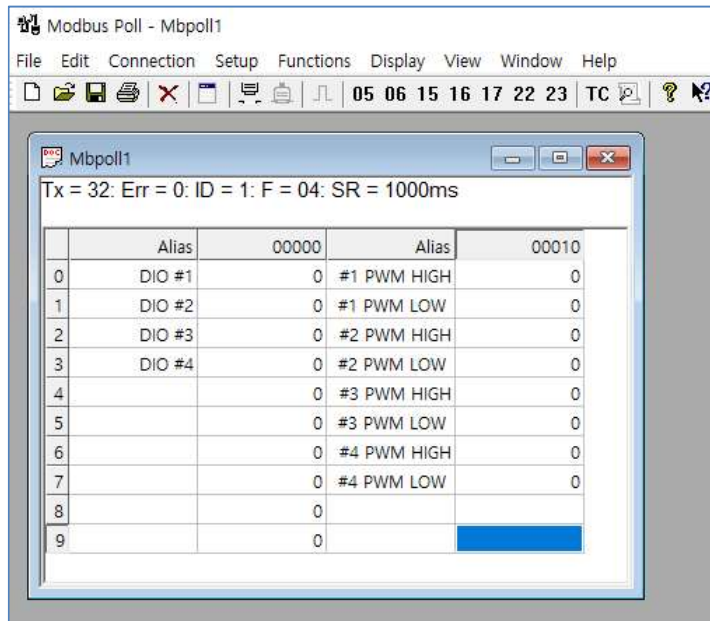
Raw Data

Check the data through Serial Port in the Raw Data output mode of BASSO-1040DT/DIO.
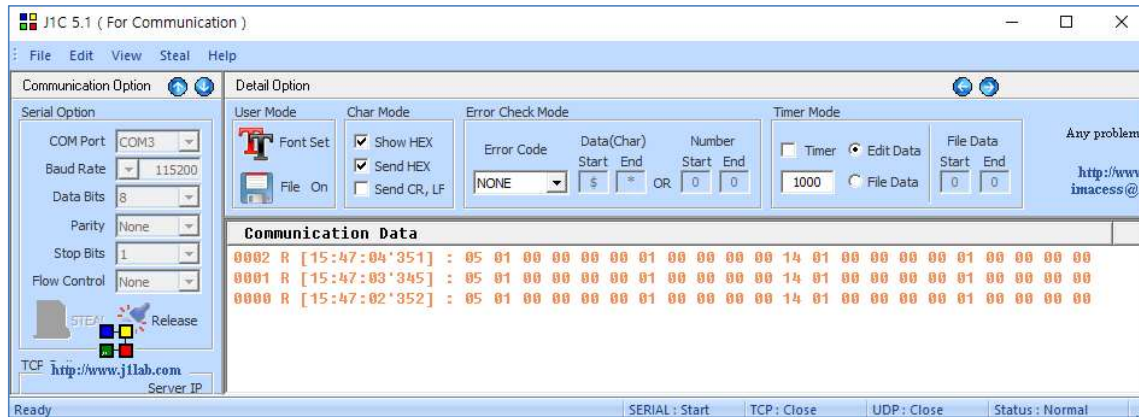
For DO ports, you can see that 11bytes of data are sent periodically.

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

When converting the received 11bytes to the HEX value and view them,
⟨*Packet Sample*⟩

14 01 00 00 00 00 01 00 00 00 00

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

01: Do#3 Port Type(Output/PWM)

00 00 00 00: Do#3 Port Status

01: Do#4 Port Type(Output/PWM)

00 00 00 00: Do#4 Port Status

Port Table Number	Port Table Name
0x04	DO (#1,#2)
0x05	DI (#1,#2)
0x14	DO (#3,#4)
0x15	DI (#3,#4)

〈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.

Raw Data – DO Control

You can control the status of the DO(Digital Output), which is the Output port of BASSO-1040DT/DIO.

By passing control commands to BASSO-1040DT/DIO through serial, you can control DIO.

The structure(protocol) of the control command consists of 3bytes, and the details are as follows:

Number	Content	Remarks
1	Port Table Number(0x0)	0x04: DO
2	Port Number(0x01 ~0x04)	0x01: Port 1 0x02: Port 2 0x03: Port 3 0x04: Port 4
3	Status value to change(0x00 또는 0x01)	0x00: LOW 0x01: HIGH

The 3bytes to be transferred must be converted to the HEX value.

An examples of a control request(transmission) packet are as follows:

0x040x01 0x01 //DO Port1 ON

0x040x02 0x00 //DO Port2 OFF
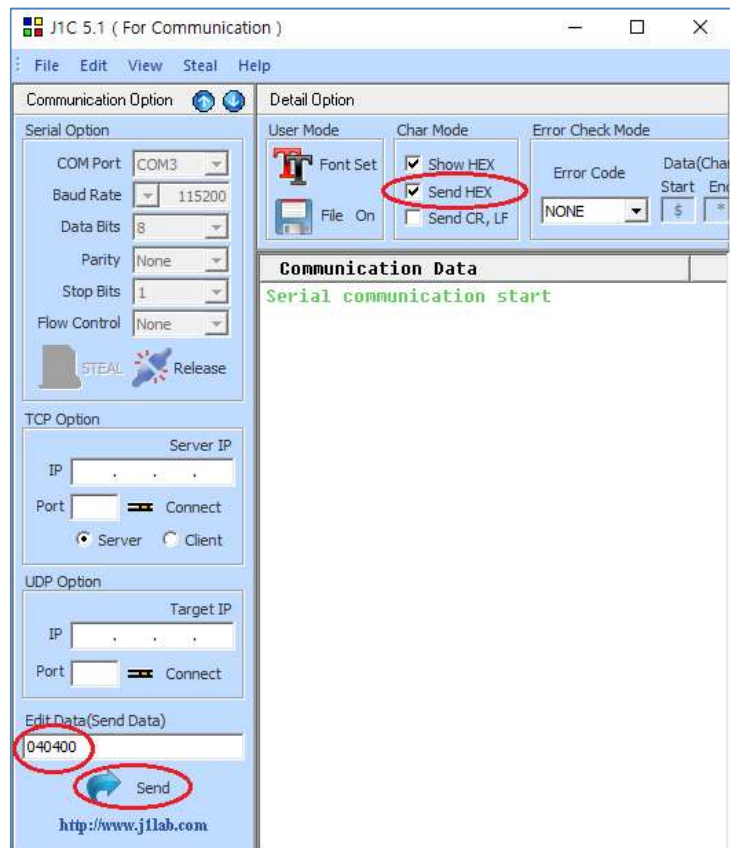
The input value is converted to the HEX value and sent.

(This is a screen with an example of a J1C program)

7. MODBUS MAP

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

[Function 03: Read Holding Registers]			
Register	Setting	Value	Settings
0	DIO mode	0~2	DI*2+DO*2=0, DI*4=1, DO*4=2
1	DIO 1channel I/O type	1~3	IO=1, Counter=2, PWM=3
2	DIO 1channel setup	0~65535	Low=0, High=1, Counter=1~65535
3	DIO 1channel setup high time	0~1000	PWM=1~1000, None=0
4	DIO 1channel setup low time	0~1000	PWM=1~1000, None=0
5	DIO 2channel I/O type	1~3	IO=1, Counter=2, PWM=3
6	DIO 2channel setup	0~65535	Low=0, High=1, Counter=1~65535
7	DIO 2channel setup high time	0~1000	PWM=1~1000, None=0
8	DIO 2channel setup low time	0~1000	PWM=1~1000, None=0
9	DIO 3channel I/O type	1~3	IO=1, Counter=2, PWM=3
10	DIO 3channel setup	0~65535	Low=0, High=1, Counter=1~65535
11	DIO 3channel setup high time	0~1000	PWM=1~1000, None=0
12	DIO 3channel setup low time	0~1000	PWM=1~1000, None=0
13	DIO 4channel I/O type	1~3	IO=1, Counter=2, PWM=3
14	DIO 4channel setup	0~65535	Low=0, High=1, Counter=1~65535
15	DIO 4channel setup high time	0~1000	PWM=1~1000, None=0
16	DIO 4channel setup low time	0~1000	PWM=1~1000, None=0

[Function 04: Read Input Registers]			
Register	Setting	Value	Settings
0	DIO 1ch data	0~65535	Low=0, High=1, Counter=1~65535
1	DIO 2ch data	0~65535	Low=0, High=1, Counter=1~65535
2	DIO 3ch data	0~65535	Low=0, High=1, Counter=1~65535
3	DIO 4ch data	0~65535	Low=0, High=1, Counter=1~65535
10	1channel pwm high time	0~1000	PWM=1~1000, None=0
11	1channel pwm low time	0~1000	PWM=1~1000, None=0
12	2channel pwm high time	0~1000	PWM=1~1000, None=0
13	2channel pwm low time	0~1000	PWM=1~1000, None=0
14	3channel pwm high time	0~1000	PWM=1~1000, None=0
15	3channel pwm low time	0~1000	PWM=1~1000, None=0
16	4channel pwm high time	0~1000	PWM=1~1000, None=0
17	4channel pwm low time	0~1000	PWM=1~1000, None=0

[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. ±15kV
Digital Input/Output	I/O Select	2xDI+2xDO or 4xDI or 4xDO Selectable(by software)
	Digital Input	4 channels (Dry & Wet Contact)
	Digital Input Mode	DI or Event Counter (1kHz)
	Digital Output	4 channels (Sink)
	Digital Output Mode	DO or Pulse Output (500Hz)
	Output Current Rating	500mA per Channel
	Isolation	1500Vrms for 1minute
	Power	12 ~ 24V (Terminal Block)
Hardware	Power	5 ~ 24V (DC-Jack) - —(●)— + (Outer diameter 3.47mm, Internal diameter 1.35mm)
	LED	RDY(Green), SRL(Red), DIO1&3(Green), DIO2&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℃ (-40 ~ 185℉)
	Storage Temperature	-40 ~ 85℃ (-40 ~ 185℉)
	Humidity	5~90% Non-condensing
Ordering information		BASSO-1040DT/DIO

2. Dimension
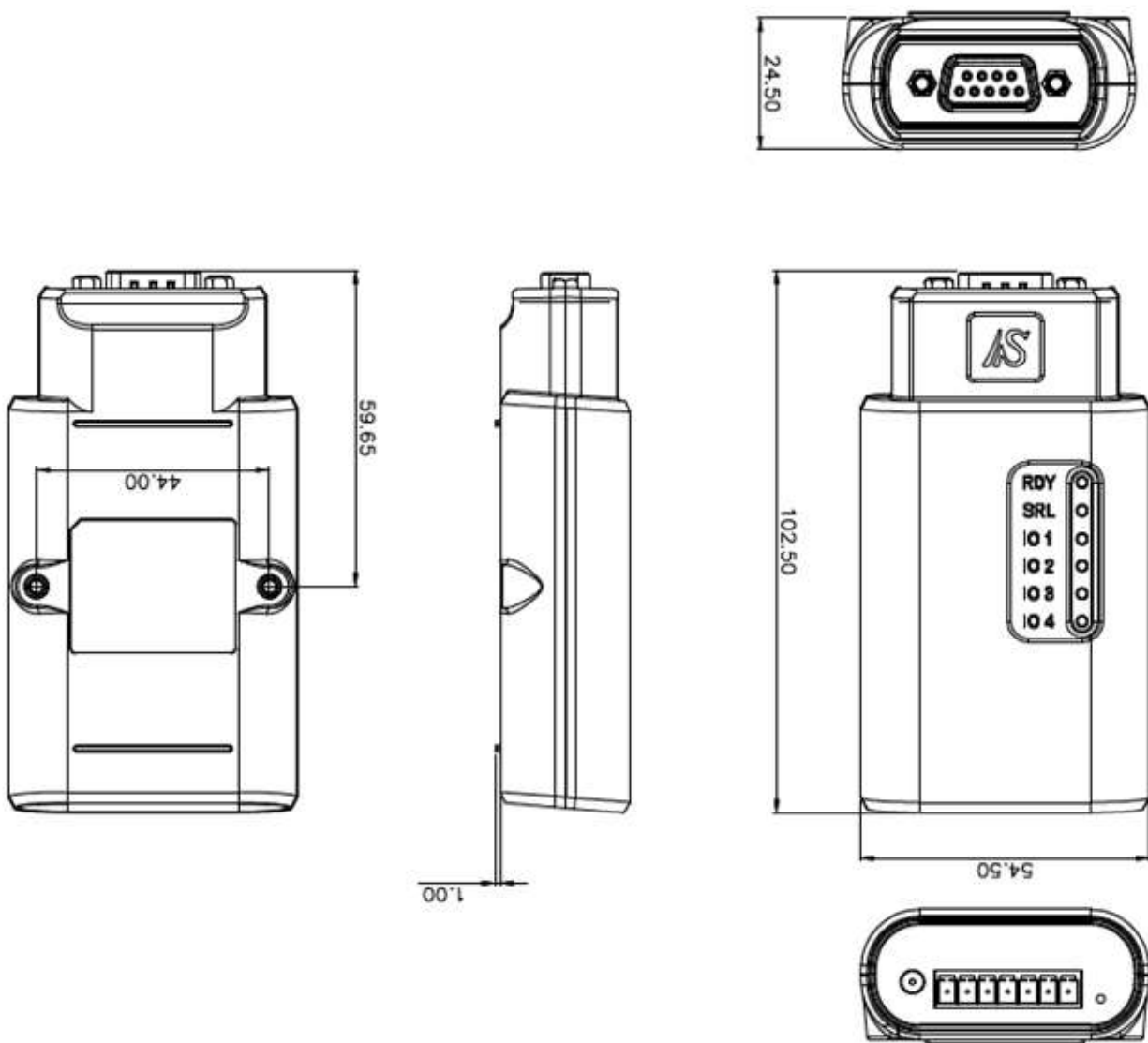
(unit: mm)

3. Serial Port Pin

SERIAL
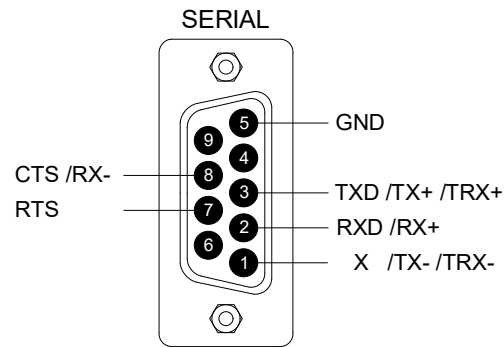
DB9 Female DCE

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.

V+ : Field Power 12-24VDC

DI-C : Digital Input Common

0V : Field Ground

DIO4 : Digital I/O Channel 4

DIO3 : Digital I/O Channel 3

DIO2 : Digital I/O Channel 2

DIO1 : Digital I/O Channel 1
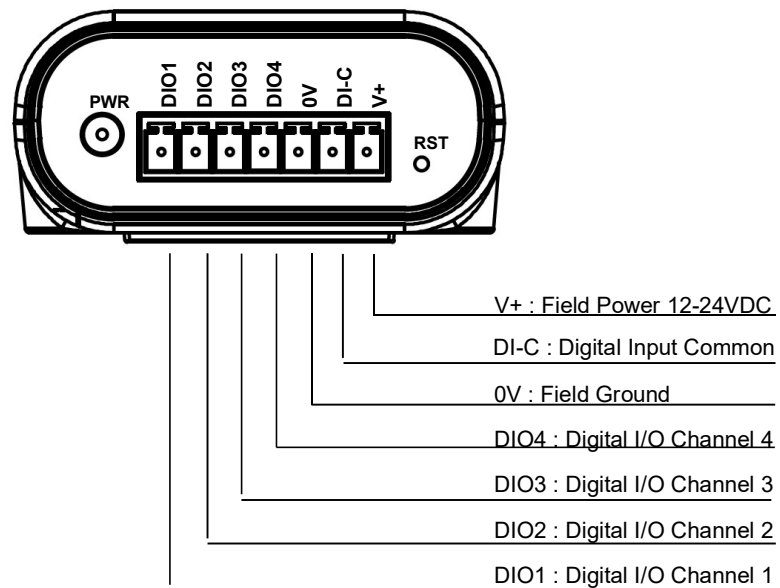
4. Setup Utility

The main menus of IO Port (DIO) Setup are as follows:

Menu	Default	Description
Mode	DI2+DO2	You can change the IO settings of port. **DI2+DO2** Specify the IP port of the equipment as DI 2 channels and DO 2 channels. **DI4** Specify the IP port of the equipment as DI 4 channels. **DO4** Specify the IP port of the equipment as DO 4 channels.
IO Type	IO	You can change the type of each IO port by channel. **IO** Run the channel in IO mode. When the channel's mode is DI, it operates in Input mode. When the channel's mode is DO, it operates in Output mode. This can be specified if the channel's mode is DI. Run the channel in Counter mode. **Counter** This can be set if the channel's mode is DI. Run the channel in Counter mode. **PWM** This can be set if the channel's mode is DO. Run the channel in PWM mode.
DO Value	LOW	If each channel is DO Output, set the LOW/HIGH mode.
Counter	-	If each channel is a DI Counter, you can check the Counter value of the port or reset it to 0.
PWM HIGH Time	0	If each channel is DO PWM, you can set the HIGH Time.
PWM LOW Time	0	If each channel is DO PWM, you can set the LOW Time.

The main menus of Serial Setup are as follows:

Menu	Default	Description
Serial Mode	Modbus	Specify the operating mode of the serial port. **Raw Data** Set the serial port to act as Raw Data type. **Modbus** Set the serial port to act as Modbus 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. (5, 6, 7, 8)
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-BASSO1040DTDIO

6. Copyright

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