Bluetooth Serial Bridge

FB100AS Bridge User Guide

Version 1.0

Firmtech

FIRMTECH Co., Ltd.

Homepage : http://www.firmtech.co.kr

Mail : contact@firmtech.co.kr

Tel : +82-31-719-4812

Fax : +82-31-719-4834

Revision History

Revision	Date	Change Descriptions
1.0	06-05-2010	- Write a draft

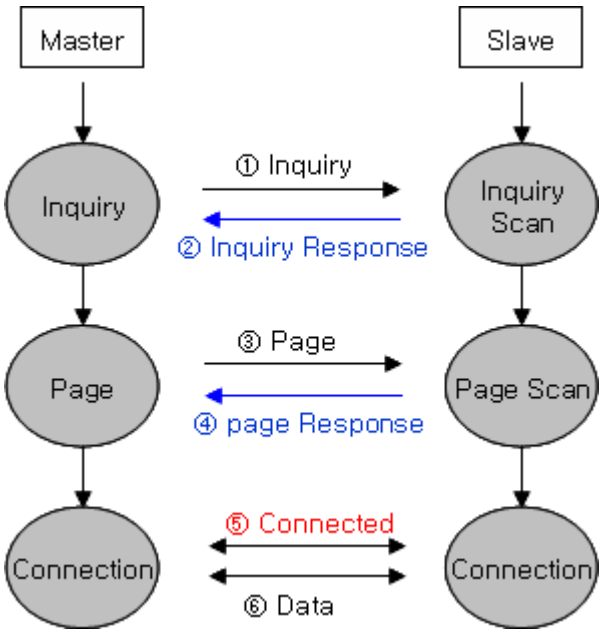
List of Content

1 What is Bluetooth?

1.1 Features of Bluetooth

- Objectives of Bluetooth : To Realize Wireless Communication for Short Distance with Low Power Consumption, High Reliability, and Low Cost.
- Frequency in Use: To Use ISM(Industrial, Scientific, Medical) Band which does not require any permission to use.
  - 2.400 – 2.4835 GHz, 79 channels
  - 2.465 – 2.4835 GHz, 23 channels (in France)
- Transmission Rate : 1Mbps ~ 3Mbps
- Transmission Output : 1mW (10m, Class2), 100mW (100m Class1)
- Network Configuration : Configured with Master and Slave relation. A Bluetooth unit shall allow simultaneous connections up to 7 devices (in case of ACL).
- Reliability : To Guarantee stable wireless communication even under severe noisy environment through adopting the technique of FHSS (Frequency Hopping Spread Spectrum).

1.2 Operation of Bluetooth



<Feature 1-1 Bluetooth Operation>

- Bluetooth operates based on the connection between "Master" and "Slave".
- Masters are simply supposed to do "Inquiry" and "Page". Slaves are supposed to do "Inquiry Scan" and "Page Scan".
- If a Master finds a Slave and so "inquiry" is successful, a Slave responds to the Master with its information.
- Interconnection between the Master and the Slave is achieved only if the information from the Slave is corresponded with the Master, and the Slave sends data to the Master.

2 Product Introduction

FB100AS Bridge is a bridge communication product for Bluetooth RS232 devices.

Main Features of FB100AS Bridge

1. Supports Bluetooth Specification 2.0
2. Bridge expansion of wireless communication network for any product supporting Bluetooth SPP
3. Simple setting of FB100AS Bridge by using DIP switches
4. Seamless connection to Bluetooth PDA, Bluetooth USB Dongle and etc.
5. Allows user to choose a power supplying method (D-Sub 9 pin Connector, USB Connector)
6. Supports function for easy Bluetooth firmware update
7. Reliable data transmission and reception

※ First time buyer of FB100AS Bridge is recommended to read contents of this manual carefully before using the product.

3 PRODUCT COMPONENTS

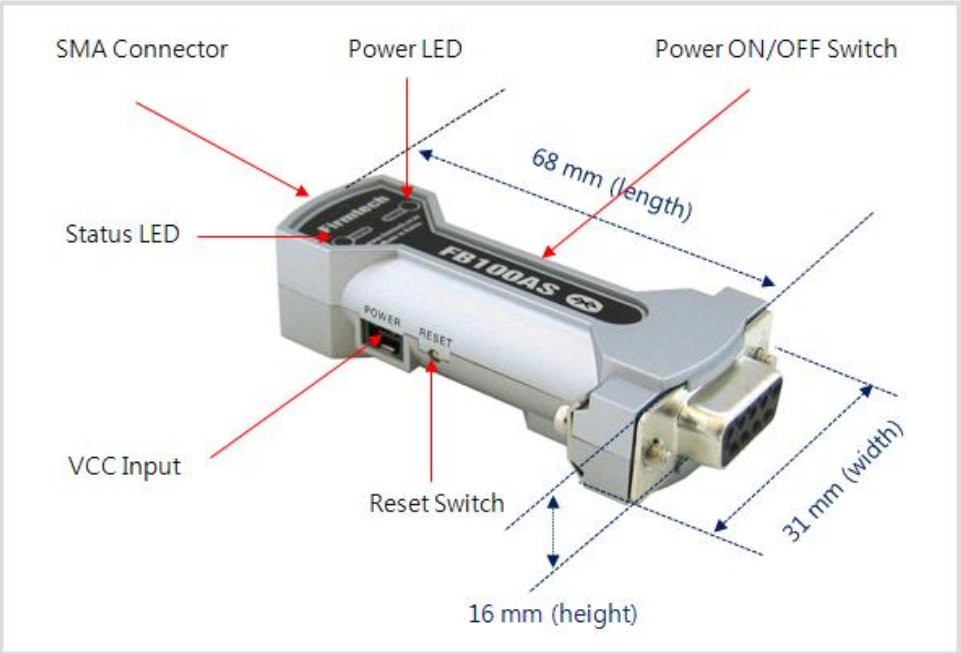
3.1 Basic Components of FB100AS Bridge

MODEL	PICTURE	Q'TY (EA)
FB100AS Bridge (RS-232 Serial Bridge)		1
FCA004DA (4dBi Dipole Antenna)		1
FCA100UC (USB Power Cable)		1
CD (Operation Manual and Test Program)		1
FCA001PO (Bracket) **(Option)**		1
FCA180SC (RS232 Serial Cable) **(Option)**		1
FCA001BR (DC Power Adapter - 5V) **(Option)**		1

<Table 3-1 Basic Components of FB100AS Bridge>

※ If you find any of above components is defective, or not included in the package, please contact the seller you purchased.

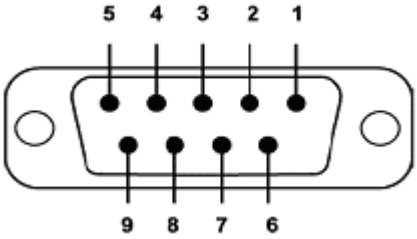
4 Product Appearance



<Figure 4-1 Details and Dimension of FB100AS>

5 Interface

5.1 FB100AS Bridge Interface



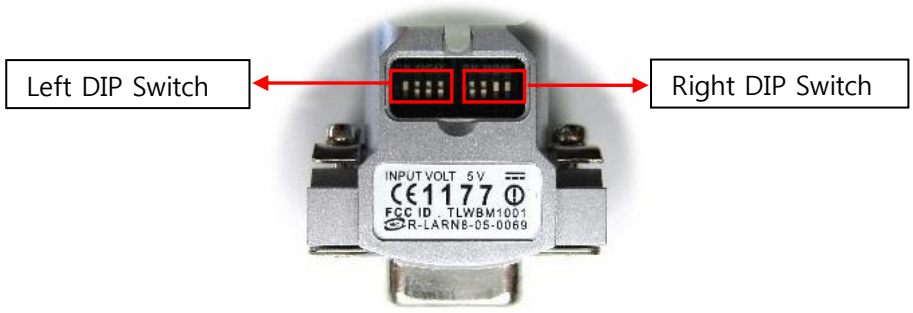
<Figure 5-1 D-SUB 9 Pin Connector>

PIN NO.	NAME OF SIGNAL	FUNTION	INPUT/OUTPUT DIRECTION
1	-	-	-
2	TX	Transfer Data Data output	Output
3	RX	Received Data Data Input	Input
4	-	-	-
5	GND	Ground	
6	-	-	-
7	-	-	-
8	-	-	-
9	VCC	Power (DC 4 ~ 12V)	Input

<Table 5-1 Features of D-SUB 9 Signals>

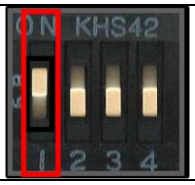
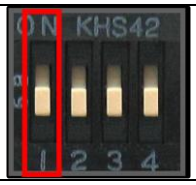
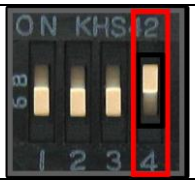
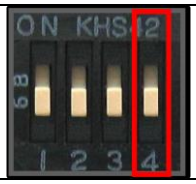
※ The power can be supplied through pin number 9.

6 Features of Dip Switch



<Figure 6-1 FB100AS Bridge Dip Switch View>

6.1 Left DIP Switch

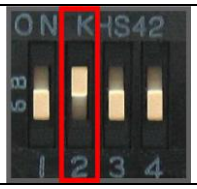
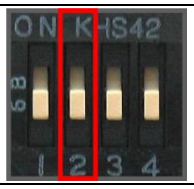
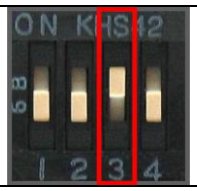
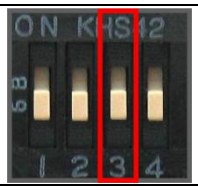
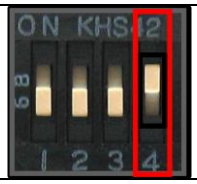
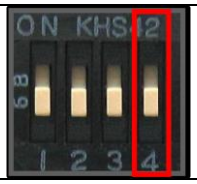
SW	FEATURES	ON	OFF	BASIC SET
1	Selectable Power Supply			ON
		D-SUB Power Supply or USB Power Supply	USB Power Supply	
2	None	-	-	OFF
3	None	-	-	OFF
4	Environment Setting (PC Configuration Select)			OFF
		PC Configuration Mode	Operation Mode	

<Table 6-1 Features of Left DIP Switch>

Note :

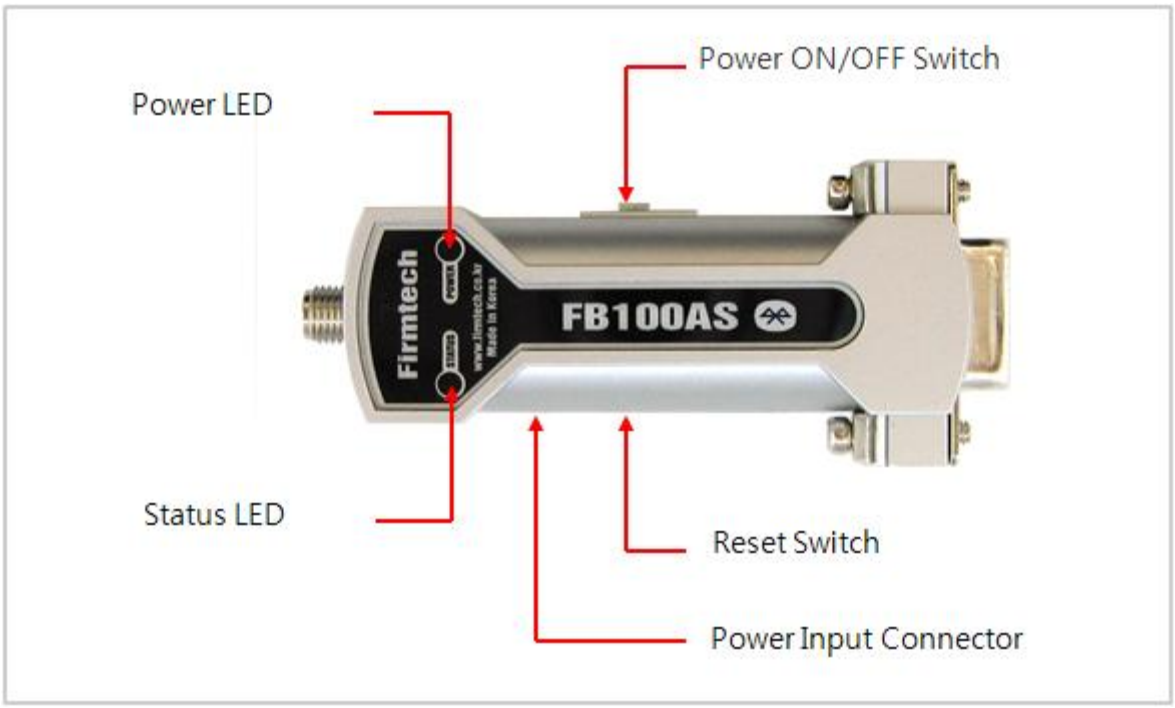
If you push a Reset Switch when a Dip Switch is turned ON in a PC Configuration Mode, the products return to the status of FATORY RESET.

6.2 Right Dip Switch

SW	FEATURES	ON	OFF	BASIC SET
1	None	-	-	OFF
2	Operation Mode			OFF
		OP_MODE1	OP_MODE0	
3	Connection Mode			OFF
		CNT_MODE1	CNT_MODE0	
4	Remote Control			OFF
		Remote Control Mode	Normal Mode	

<Table 6-2 Features of Right DIP Switch>

7 Power Indicator LED / Status LED



<Figure 7-1 Appearance of FB100AS>

FB100AS has a red Power LED and green and red Status LED. Please, refer to the following description.

LED 구분	State	Description
Power Indicator LED (Power LED)	Power Input	The Red Light Turns on
Status Indicator LED (Status LED)	Connecting to Bluetooth	Green LED is Flickering
	Connected to Bluetooth	Green LED turned on
	PC Configuration	Red LED is Flickering

<Table 7-1 Operation Check by LED Status>

Note :

If you a Reset Switch when a red Status LED flickers in a PC configuration Mode, the products return to the status of FACTORY RESET.

8 Performance of Product

No.	Part		Specification
1	Bluetooth Spec.		Bluetooth Specification 2.0 Support
2	Communication distance		100 M
3	Frequency Range		2.4 GHz ISM Band
4	Sensitivity		-83dBm (Typical)
5	Transmit Power		11 dBm(Typical)
6	Size		66 x 31 mm
7	Support Bluetooth Profile		SPP (Serial Port Profile)
8	Input Power		4 ~ 12V
9	Current Consumption		100 mA (Max)
10	Temperature	Operating	-20℃ ~ 50℃
		Limit Operating	-30℃ ~ 80℃
11	Antenna		4 dBi
12	Interface		9 pin D-SUB Female (RS232)

<Table 8-1 Performance of FB100AS Bridge>

9 Current Consumption

STATUS		Current Consumption (mA)		
		MIN	MIN	MIN
Standby		24	30	**27**
Inquiry scan & page scan (Slave)		24	66	**46**
Page scan (Slave)		24	33	**28**
Inquiry (Master)		77	86	**82**
Connected	**Slave**	39	45	**43**
	Master	27	33	**29**
Data transmission	**Slave**	51	57	**54**
	Master	48	57	**52**
Data reception	**Slave**	48	54	**50**
	Master	45	54	**49**
Data transmission / reception	**Slave**	51	57	**54**
	Master	51	60	**55**

<Table 9-1 Current Consumption of FB100AS Bridge>

TEST CONDITIONS

Baud rate : 9600 bps, Input Voltage : DC 5V

The power consumption is subject to change depending on the transmission rate and volume of data.

10 Initial Set Value of Products

The product has the initial Set Value as shown on the <Table 10-1>.

Please be sure to identify the initial Set Value, before you begin to use.

TYPE	Set Values
Authentication	Enable
Encryption	Enable
Uart (baud rate-data bit-parity bit-stop bit)	9600-8-N-1
Pin code	BTWIN
Local Name	BT-bridge
Target Master BD Address	000000000000
Target Slave BD Address	000000000000
Flow Control	Enable
Remote Control ID	Admin
Remote Control PW	BTWIN

<Table 10-1 Initial Set Values of FB100AS Bridge>

Note :

Please refer to 12 PC Configuration for details on changing the setting.

11 How To Connect The FB100AS Bridge?

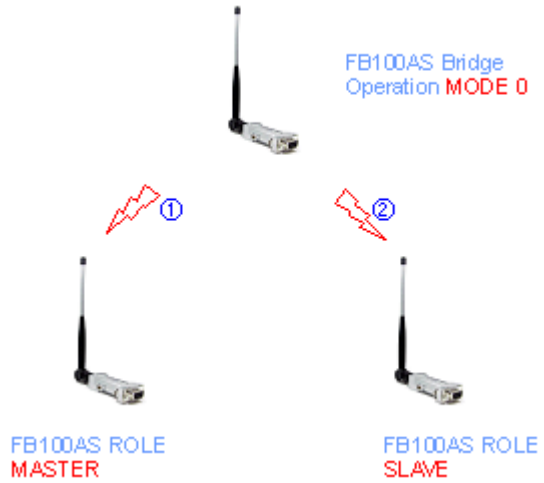
What is the operating mode? An underlying premise for Bluetooth communication is that if a device on one end has a MASTER role, another device on the other end has to have a SLAVE role.
Operation modes enables user to select the role of a desired Bluetooth device to be connected to the FB100AS Bridge.

※ The explanation below shows how to connect FB100AS (Serial Adapter) devices developed by Firmtech to the FB100AS Bridge (Serial Bridge). All products in the explanation are assumed to be in the initial setting (factory default setting).
If you want to make a connection to a product from other companies, please refer to the product manual from the company.

11.1 Operation MODE 0

In the Operation MODE 0, connections to FB100AS Bridge can be made when the role of one connecting Bluetooth device (FB100AS) is set as MASTER and the role of the other Bluetooth device is set as SLAVE.

11.1.1 Connecting One FB100AS Bridge with Two FB100AS devices



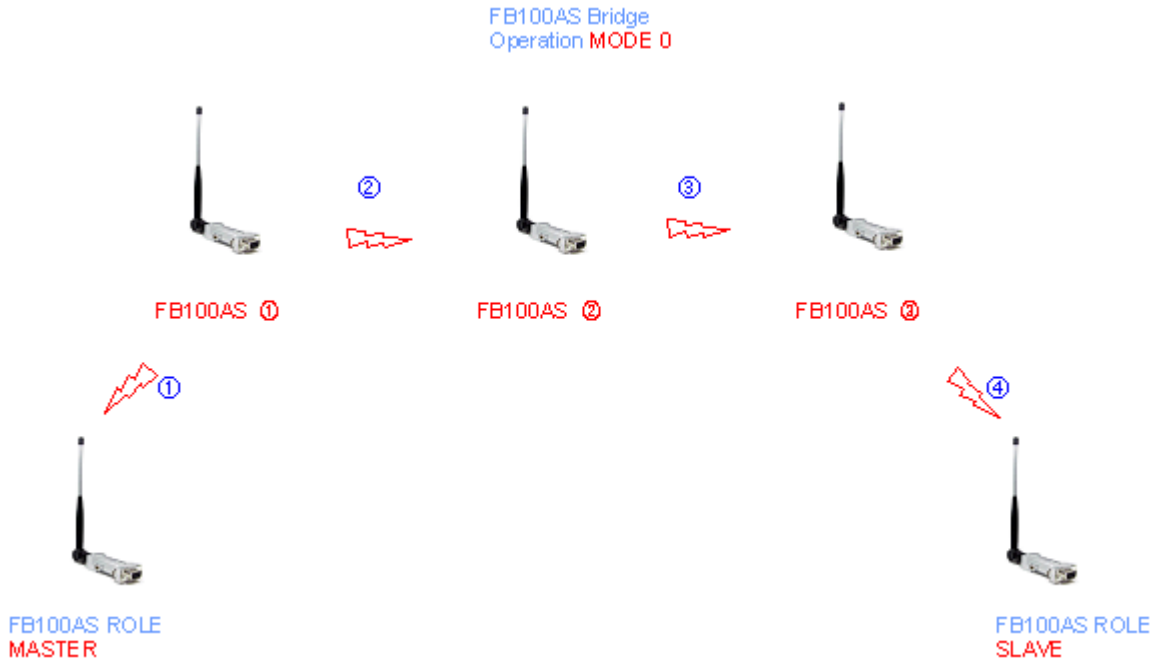
< Figure 11-1 Connection type in the Operation MODE 0>

(1) Set the PIN Code of one Bluetooth device (FB100AS) to be connected to the FB100AS Bridge as "BTWIN".
(2) Set all FUNCTION SWITCHES of the FB100AS Bridge to Default ("OFF").
(3) Turn on the power of the FB100AS device whose ROLE is set as MASTER.
(4) Turn on the power supply of the FB100AS Bridge.
(5) When the connection is made to the MASTER FB100AS while the green LED on the FB100AS Bridge blinks, the green LED on the FB100AS is on. (The LED of the FB100AS Bridge still blinks.)
(6) Turn on the power of the FB100AS device whose ROLE is set as SLAVE.

(7) The blinking green LED on the FB100AS Bridge is changed to 'ON' state after the connection is made to the SLAVE FB100AS. (Connection completed)

11.1.2 Connecting More Than Two FB100AS Bridges with Two FB100AS devices

※ Please note that the **First Target** in the below explanation refers to the device connected to the Bridge device and the Second Target refers to the secondarily connected device that is also finally connected to the Bridge device.



< Figure 11-2 Process of connection to multiple FB100AS Bridges>

(1) Set the PIN Code of one Bluetooth device (FB100AS) to be connected to the FB100AS Bridge as "BTWIN".
(2) First, turn on the power of the FB100AS Bridge ①.
(3) Turn on the power of the FB100AS device whose ROLE is set as MASTER.
(4) When connection is made between the FB100AS Bridge ① and the FB100AS(First Target) whose power is on in the step (2) (The status display LED on the FB100AS is ON), turn on the power of the FB100AS Bridge ②.
(5) When connection is made between the Second Target of FB100AS Bridge ① and the First Target of FB100AS Bridge ②, the green LED on the FB100AS Bridge ① is on. (And the green LED on the FB100AS Bridge ② blinks).
(6) When connection to the First Target of FB100AS Bridge ② is made, turn on the power of the FB100AS Bridge ③.
(7) When connection is made between the Second Target of FB100AS Bridge ② and the First Target of FB100AS Bridge ③ is completed, the green LED on the FB100AS Bridge ② is on. (And the green LED on the FB100AS Bridge ③ blinks).

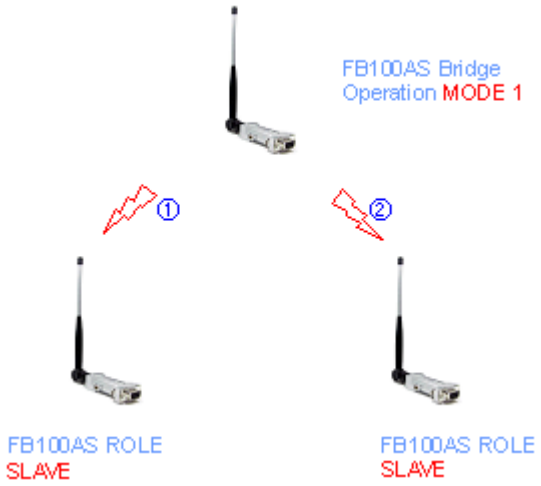
(8) When the connection to the First Target of FB100AS Bridge ③ is made, turn on the power of the FB100AS (Second) device whose ROLE is set as SLAVE.

(9) When the green LED of the FB100AS Bridge ③ is changed to "ON" state from blinking, it means all connections are made.

(10) Now you can start data communication between the FB100AS (MASTER) and the FB100AS (SLAVE).

11.2 Operation Mode 1

In the Operation MODE 1, connection can be made when the ROLE of both Bluetooth devices (FB100AS) to be connected to the FB100AS Bridge is set as SLAVE, but in this MODE, you can not connect to the multiple FB00AS Bridges. The MODE1 has an advantage in that it operates more stably and has a shorter connection time. However, the remote control mode is not supported in this mode.



< Figure 11-3 Connection type in the Operation MODE 1>

(1) Set the PIN Code of one Bluetooth device (FB100AS) to be connected to the FB100AS Bridge as "BTWIN".

(2) Turn on the power of the two FB100AS devices.

(3) Turn on the power of the FB100AS Bridge.

(4) When connection is made to the FB100AS Bridge, the green LED on it is on.

(5) The power supply order is needed only for the first time connection. From the next time, each device keeps trying connection to the previous connected device until it is made regardless of the order of power supply.

NOTE : If any connection among connected devices to the Bridge is off, a Soft Reset is made to the Bridge and it tries connections from the first.

12 How To Use the GUI Program?

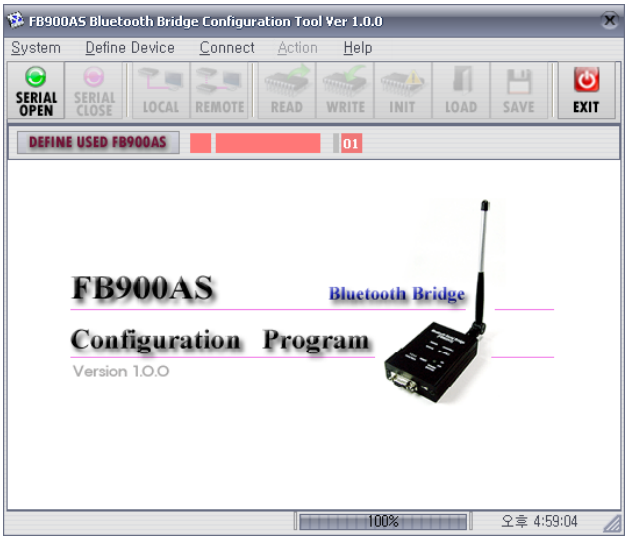
You can easily set up or change parameters of the FB100AS by using the FB100AS Bridge GUI Program provided by us and control the FB100AS Bridge remotely by using the FB100AS (Serial Adapter) connected to the FB100AS Bridge.

12.1 User Environment Setup (PC Configuration) Using BTConfig Tool

(1) Connect the FB100AS Bridge to a PC (DTE).

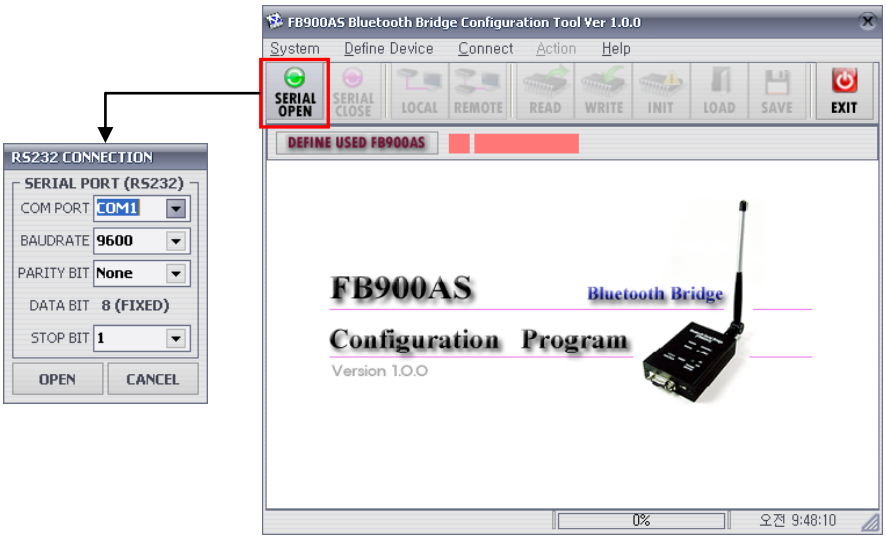
(2) Set the FB100AS Bridge to PC Configuration Mode and turn on the power (Left DIP Switch #4 should be ON).

(3) When you run the installed the FB100AS Bridge GUI program, you will see a screen as below.



< Figure 12-1 Initial screen of the Configuration Tool Program >

(4) On the Main Program Screen, click on the SERIAL OPEN button (or follow Menu : Connect – SERIAL PORT OPEN) to see the Serial Setup Screen as below.



< Figure 12-2 Screen for serial connection >

(5) Set the serial setting of the FB100AS Bridge as below and click on the OPEN button.

Part	Baud Rate	Data Bit	Parity Bit	Stop Bit
Setting	9600 bps	8 bit	None	1

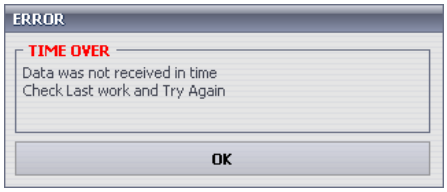
<Table 12-1 Basic serial setting values of the Bridge >

< Figure 12-4 Serial connection in the Configuration Tool >

(6) After the SERIAL PORT OPEN is clicked, the SERIAL CLOSE button and the LOCAL button are activated. Then, click on the LOCAL button.

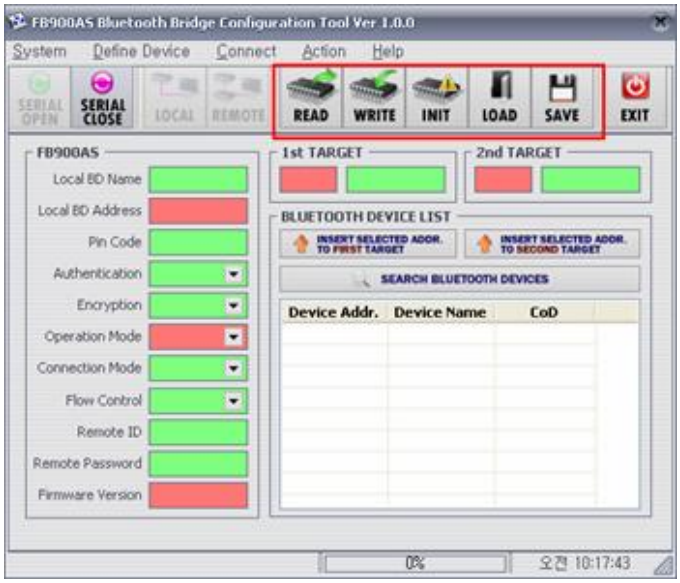
(When you make a connection using the LOCAL button, you may ignore the DEFINE USED FB900AS button.)

During the connection using the LOCAL button, if no response is received within a preset time after the command is sent to the FB100AS, the following error message is displayed to show that the connection has not been made.



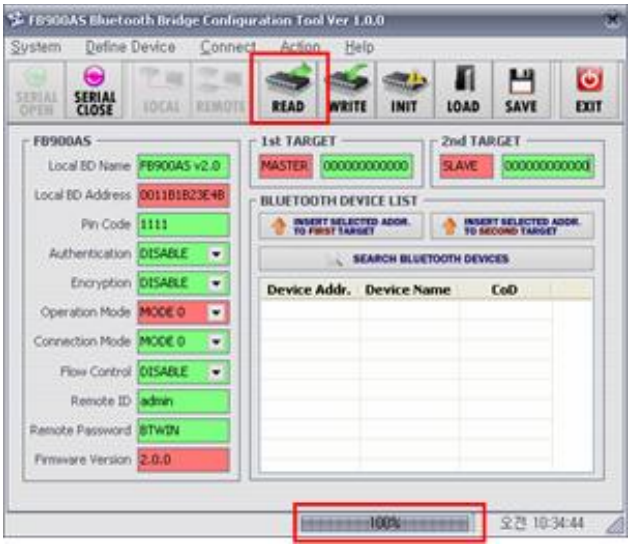
< Figure 12-5 LOCAL No response error message display during the LOCAL connection >

(7) When the LOCAL connection is made successfully, you can see the Parameter Window and command buttons for reading, setup, initialization and etc. (**READ, WRITE, INIT, LOAD, SAVE**) are activated.



< Figure 12-6 Window for user set up and reading of the FB100AS Bridge parameters after the Serial Connection is made.>

(8) First, you can read and check the parameters of the FB100AS Bridge by pressing the READ button.



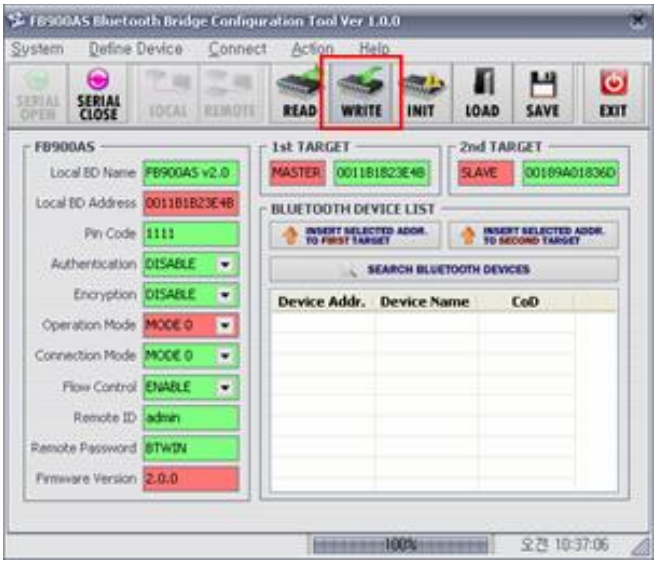
< Figure 12-7 Reading parameters of FB100AS Bridge>

You can check the progress of the READ operation on the Progress Bar located at the bottom of the program screen. If there is no response or an error occurs, an error message like below pops up.

< Figure 12-8 Error message screen for no response to the READ operation of FB100AS Bridge parameters>

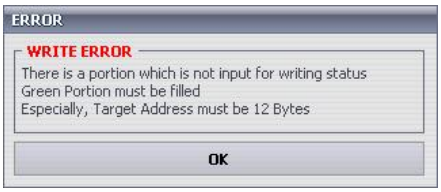
(9) You can set up parameter values of the FB100AS Bridge changed or currently set by pressing the **WRITE** button.

The green colored areas show parameters that can be changed. If there is no parameter value or the input Target Address value has less than twelve digits, an error message is displayed.



< Figure 12-9 Setup of FB100AS Bridge parameters >

You can check the progress of the WRITE operation on the Progress Bar located at the bottom of the program screen.



< Figure 12-10 Error message for wrong set value>

This error message appears when there's an unfilled data or the input Target Address has less than twelve digits.

< Figure 12-11 Error message showing the Target Address value is not a HEXA number>

This error message appears when the input Target Address value is not a HEXA number.

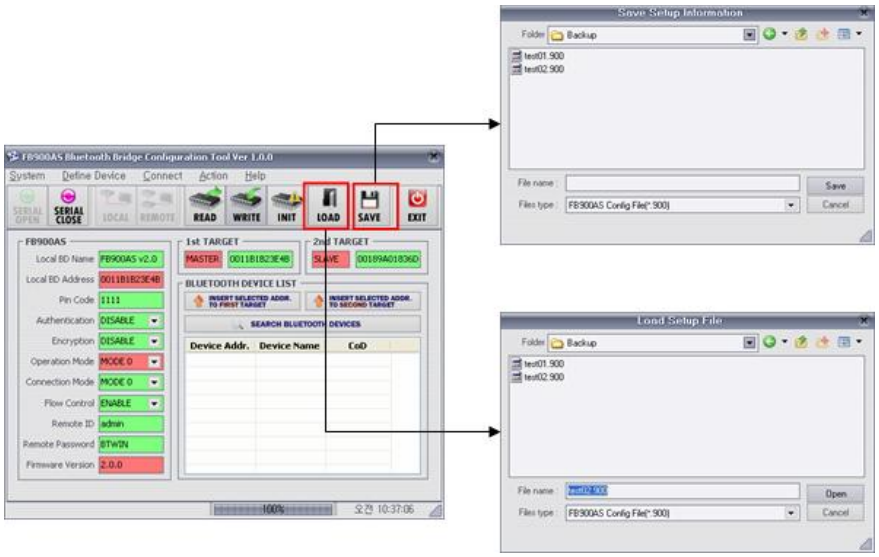
< Figure 12-12 Error message showing that there is no response received.>

The above error message appears when there is no response in a certain preset time during when the setup data is written to the FB100AS Bridge.

(10) You can save the FB100AS Bridge's parameters displayed on the screen or set up again using the

WRITE button after re-loading them by pressing the **LOAD / SAVE** buttons. (Saved file extension name : *.900)

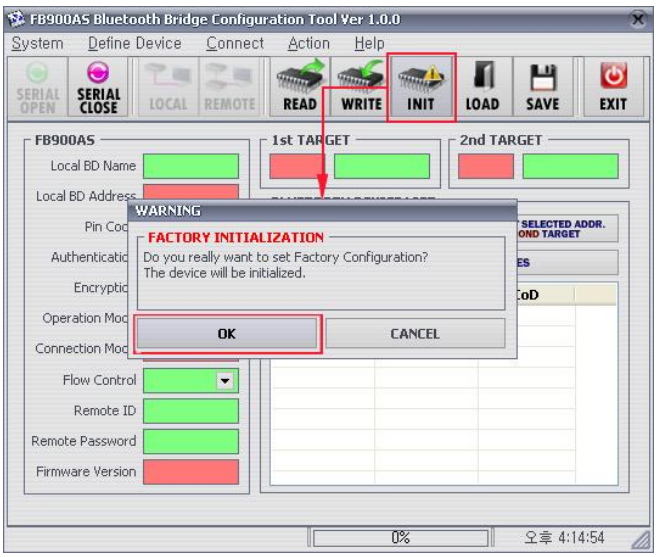
This function is convenient since user does not need to write down set parameters but can save them in files for easy management.



< Figure 12-13 Saving and loading of set parameters>

(11) You can initialize the product to the Factory Setting by pressing the **INIT** button.

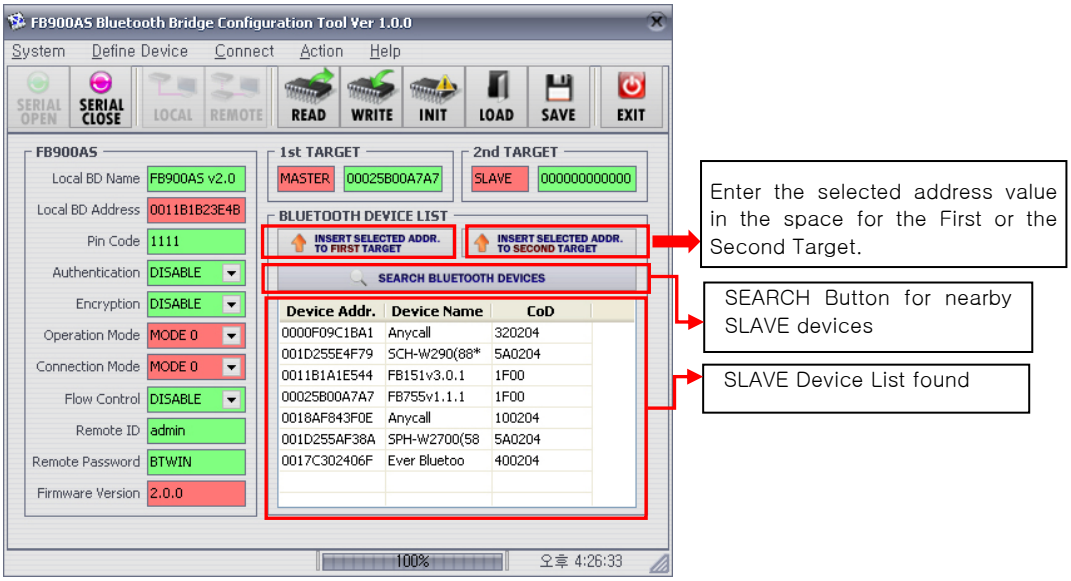
When user opts to initialize the product after seeing the Factory Initialization Alert message, then the GUI program will return to the initial screen as the "AF&F" command is sent to the FB100AS Bridge.



< Figure 12-14 Factory Initialization of the FB100AS Bridge>

(12) As the FB100AS Bridge operates in the MASTER mode, you can search nearby SLAVE devices and enter address values of found devices as Target Address values. First, search nearby SLAVE devices by clicking the **SEARCH BLUETOOTH DEVICES**. After the search is done, you can enter address values of found devices as Target Address values by using the two buttons (**INSERT SELECTED ADDR. TO FIRST TARGET/ INSERT SELECTED ADDR. SECOND TARGET**).

(Note : You can WRITE the address after the setup of the FB100AS Bridge TARGET.)



< Figure 12-15 Searching nearby SLAVE devices>

12.2 Remote Control Using the GUI Program

This mode is used for user convenience when it is hard to move the FB100AS Bridge after installation or when you want to replace a connected Bluetooth device or when you lost it.

To use the Remote Control function, you have to set the **RIGHT FUNCTION SWITCH #4** to "ON" before installing the FB100AS Bridge.

There is around ten seconds of more time lag in average needed for a remote connection than for a normal connection.

You can control the FB100AS Bridge on the GUI program remotely using the FB100AS after the Remote Control Mode (Right DIP Switch #4 ON) is set.

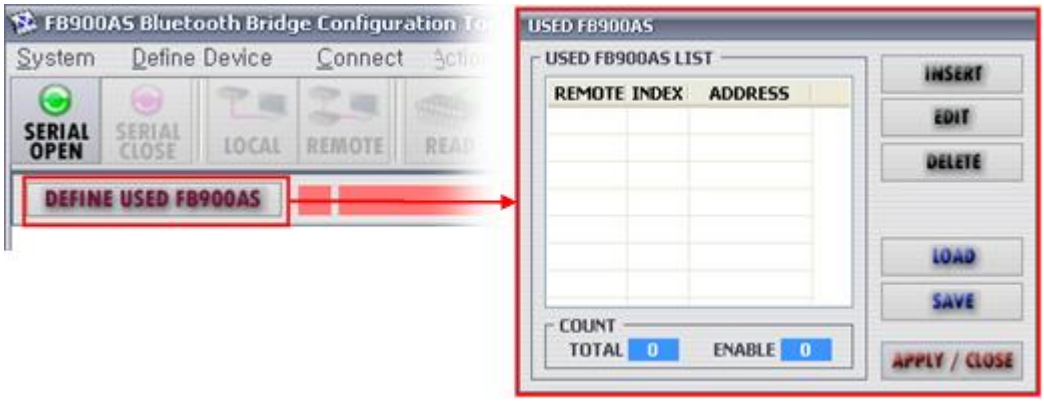
(1) First, set the PIN Code of the Bluetooth device (First Target – Role : Master) to be connected to the FB100AS Bridge as "BTWIN" and enter the address value of the FB100AS Bridge as the connecting address.

(The existing First and Second Target devices have to be powered off. – This power-off setting is assumed in consideration of a product malfunction or other reasons. If they are powered on, the connection is made to the First Target device.)

After the above setup is done, turn off the power of the First Target device and proceed to the next step.

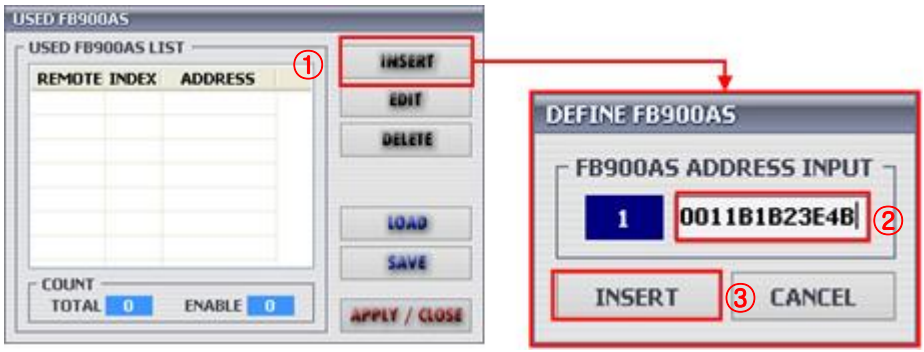
The power of the First Target will be turned on after opening of the SERIAL PORT.

(2) Run the GUI program and open the FB100AS Bridge List Window by clicking the DEFINE USED FB900AS button (or select Define Device on the Menu) before you click on the SERIAL OPEN button.



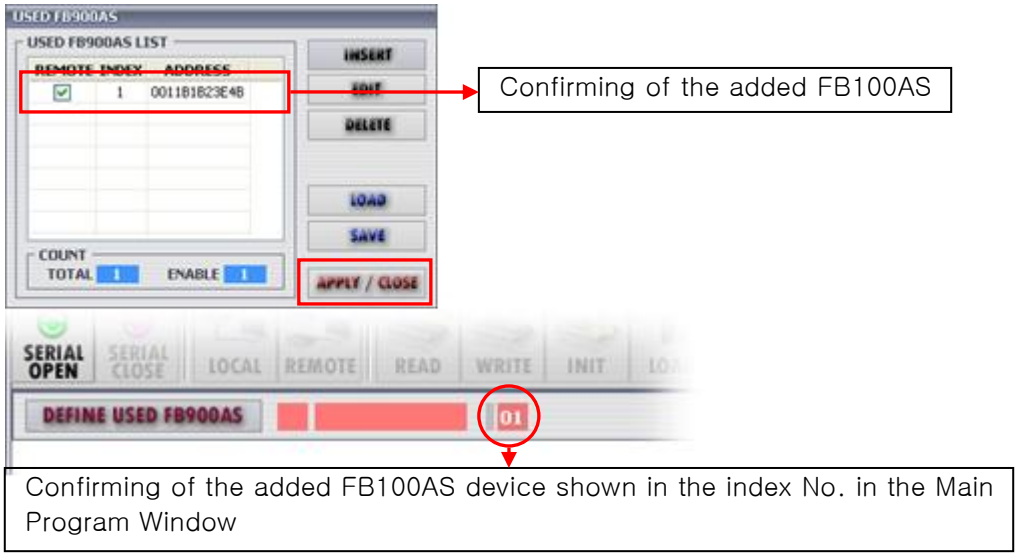
< Figure 12-16 FB100AS Bridge device definition>

(3) Open the FB100AS Bridge Adding Window by clicking the INSERT button on the LIST window, enter the FB100AS Bridge's address value to be connected and add it by clicking the INSERT button. (You have to know the LOCAL address of the FB100AS Bridge in advance.)



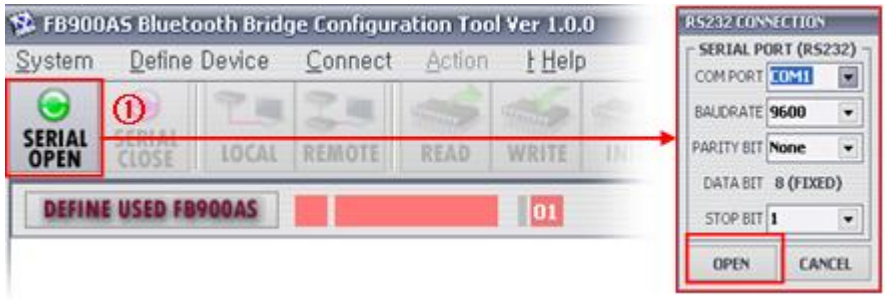
< Figure 12-17 Adding devices on the FB100AS Bridge List>

(4) After checking that the FB100AS Bridge is added on the FB100AS Bridge List Window, press the APPLY/CLOSE button to close the window, then you will see the device is added to the Main Program Window.



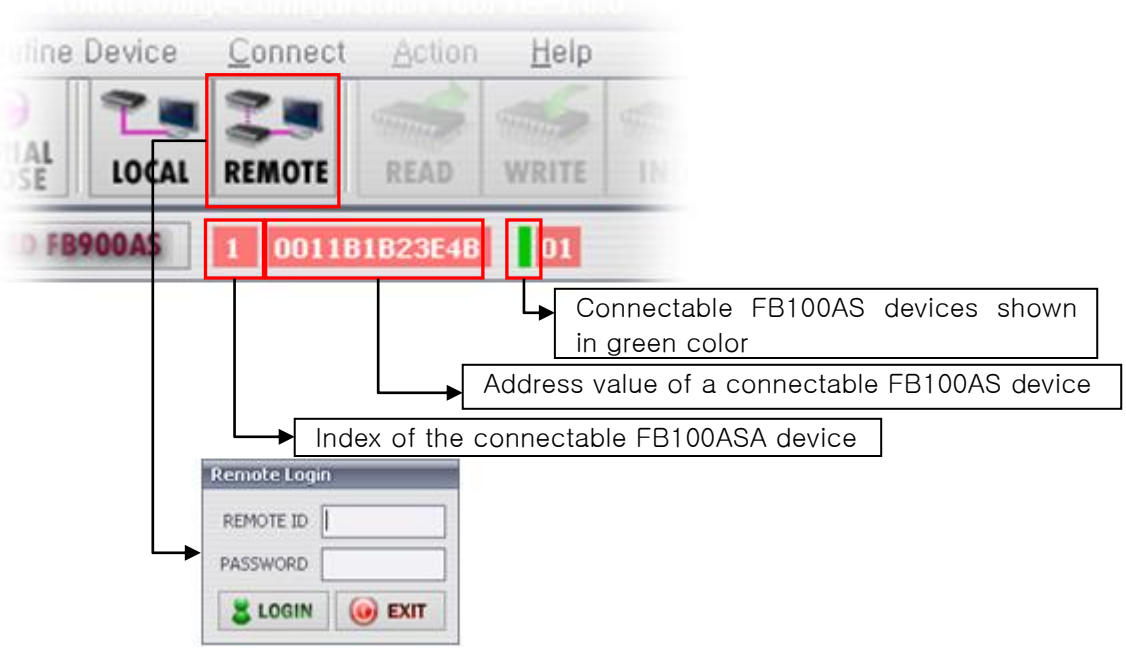
< Figure 12-18 Confirming the addition of the FB100AS Bridge device on the list>

(5) Open the set serial parameters of the **First Target Device (ex.FB100AS)** by pressing the SERIAL OPEN button in the Main Program Window.



< Figure 12-19 SERIAL connection>

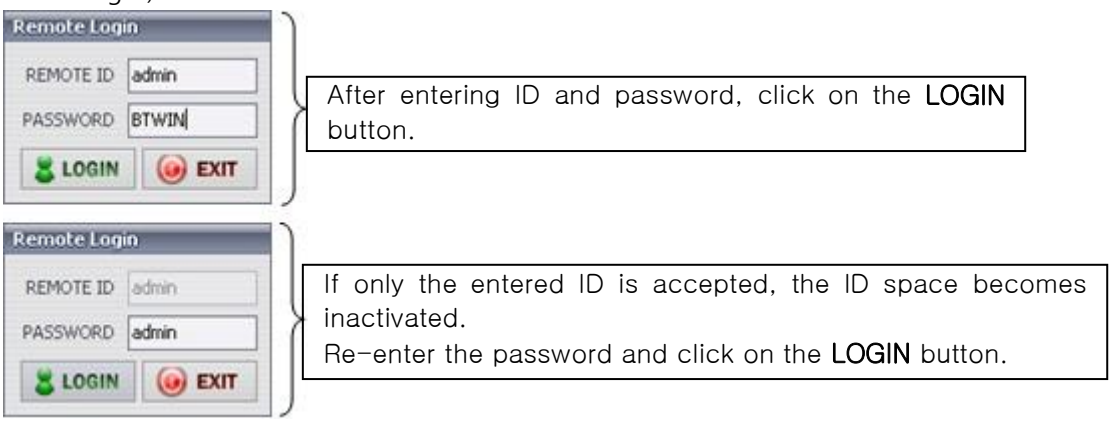
(6) When you turn on the power of the First Target device, the INDEX and the address value of the FB100AS Bridge device that can be connected are displayed after connection is made to the FB100AS Bridge, then color of the INDEX number display area is changed to green and the REMOTE button becomes activated.
When you press the REMOTE button at this time, the REMOTE Login Window pops up.



< Figure 12-20 Connection made by the Remote Control>

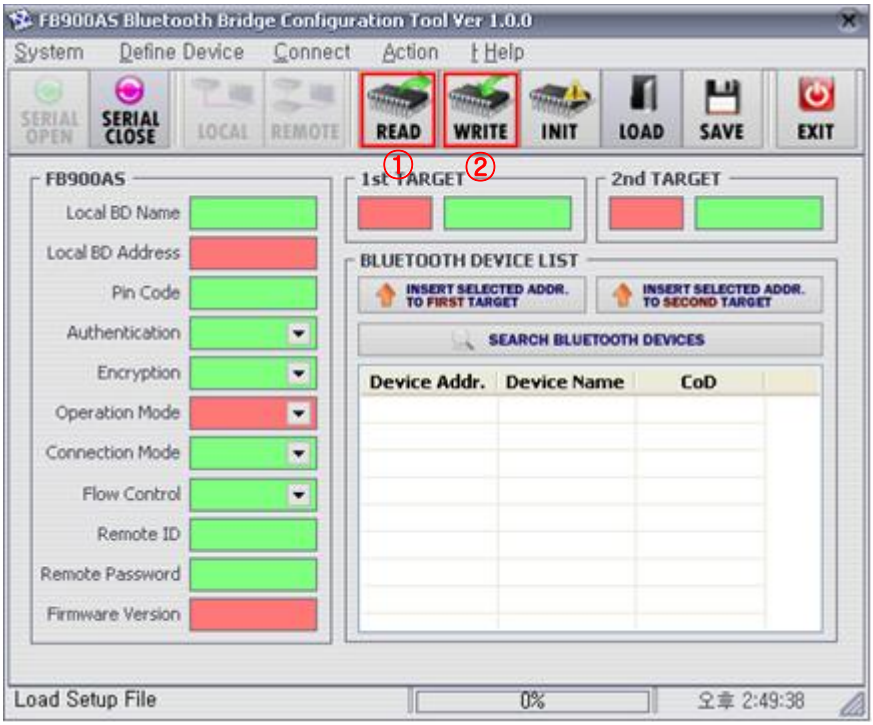
If no ID or password is not entered or wrong ID or password is entered within about one minute after the Login Window pops up, the Login Window will be closed automatically and you have to start login again.
The FB100AS Bridge is restarted at this time as well.

(7) Enter "admin" and "BTWIN" (basic setting of FB100AS Bridge) for ID and password and click the **LOGIN** button. (If ID and password have been changed arbitrarily, you have to enter the changed one for login.)



< Figure 12-21 Remote Control Login Window>

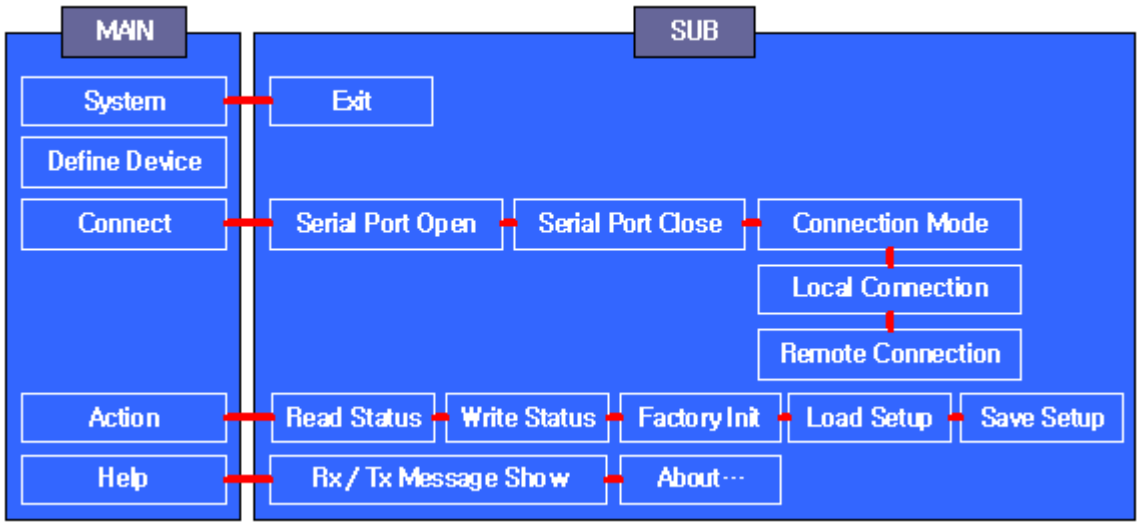
(8) Once you are successful in the Remote Login, you can set up or change the setting of the FB100AS Bridge in the same way as in the LOCAL operation.
READ the setting first before you change it and press the WRITE button.



< Figure 12-22 Reading and setup of FB100AS Bridge parameters remotely>

※ You have to press the SERIAL CLOSE button or the EXIT button after completing the setup change to see the FB100AS Bridge re-starts and operates under the changed setting.

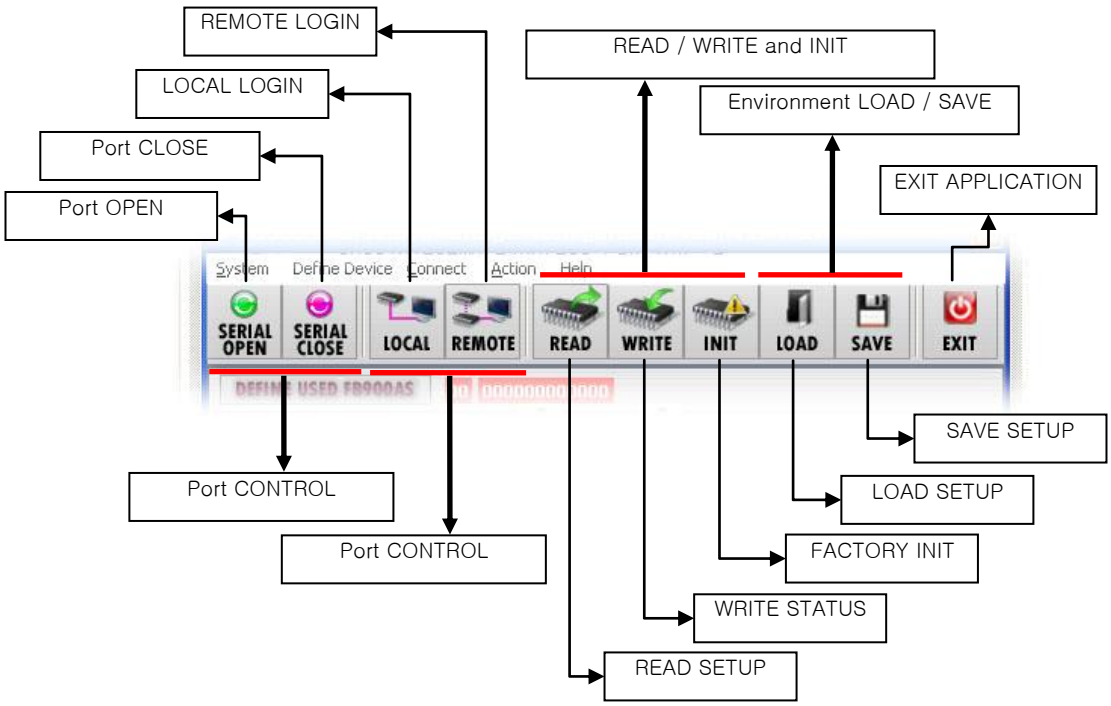
12.2 GUI Menu Map



< Figure 12-23 GUI program menus>

The above MENU is activated or inactivated according to the current status of the FB100AS Bridge GUI program.

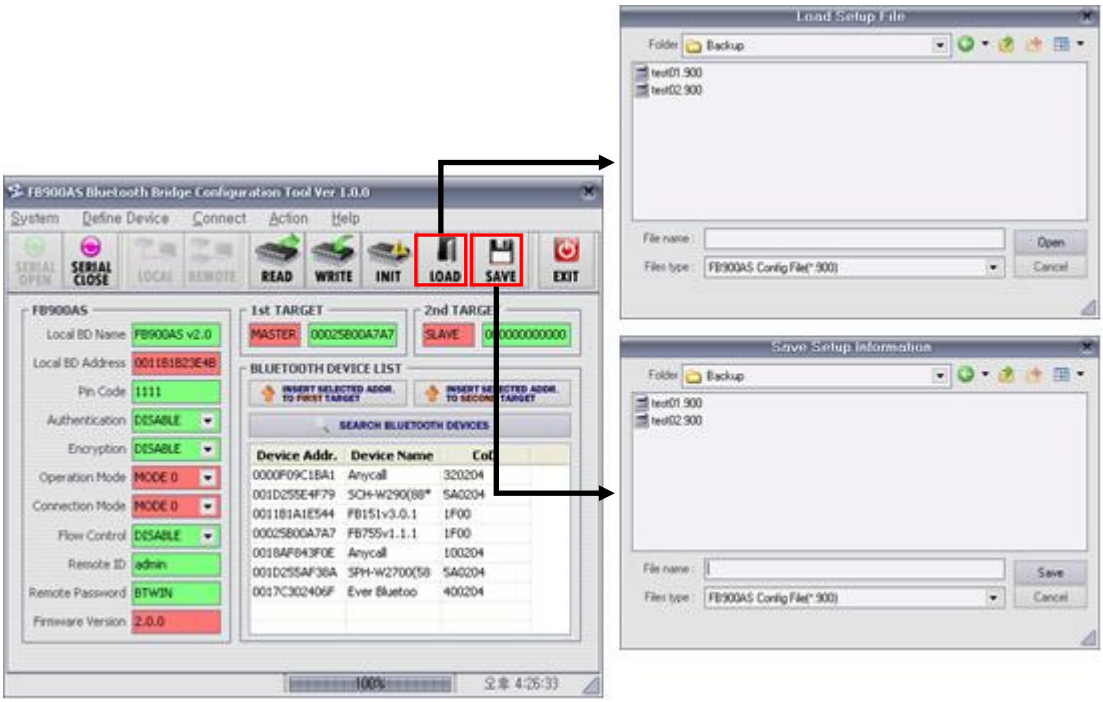
12.4 GUI Buttons



<Figure 12-24 GUI Program Tool Bar>

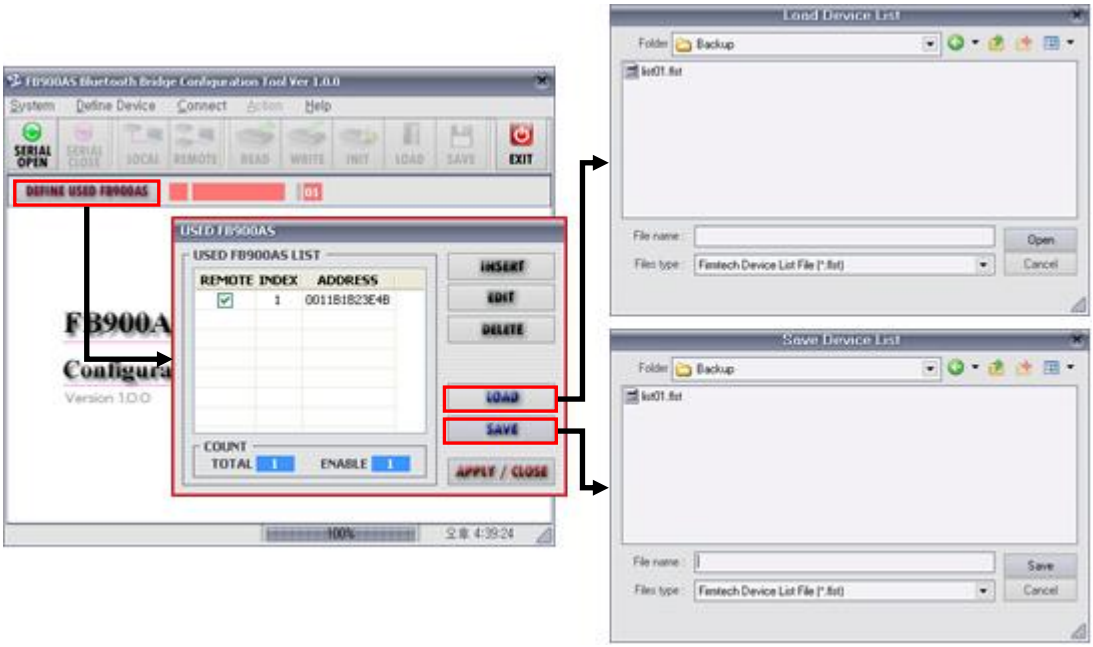
12.5 Saving and Reading of the GUI Settings

- Saving and reading of the FB100AS Bridge settings – File extension name : *.900



<Figure 12-25 Saving and reading of the FB100AS Bridge settings>

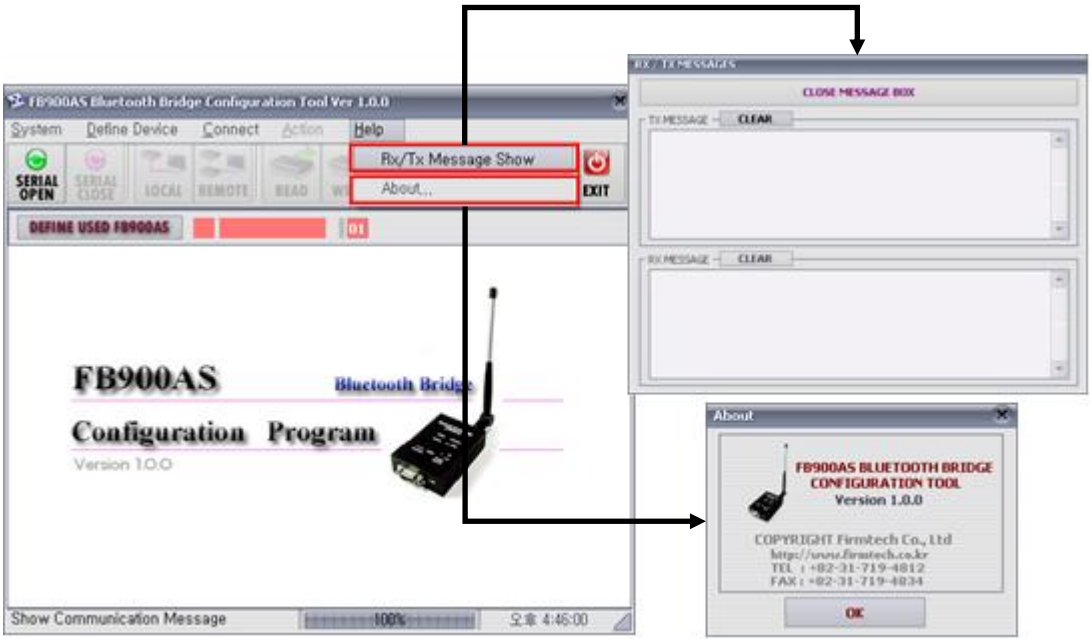
- Saving and opening FB100AS Bridge list – File extension name : *.flst



<그림 12-26 Saving and reading of the FB100AS Bridge List>

12.6 TX / RX Message Viewer

You can see messages sent and received by clicking [Help] – [Rx/Tx Message Show] on the MENU.



<Figure 12-27 Message Viewer for sent/received messages and checking of the program version>

13 Approval Information

13.1 KCC

13.2 FCC compliance Information – FB100AS

This device complies with part 15 of FCC Rules.
Operation is subject to the following two conditions:

1. This device may not cause harmful interference received.
2. This device must accept any interference received.

Including interference that may cause undesired operation.

FCC WARNING

This equipment may generate or use radio frequency energy. Changes or modifications to this Equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the Federal Communication Commission(FCC) rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and , if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures. Reorient or relocate the receiving antenna. Increase the separation between the equipment and the receiver. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected Consult the dealer or an experienced radio/television technician for help.

A separation between the user's the antenna be at least 20cm and a prohibition that it can not Be co-located with other transmitter.
To satisfy FCC exterior labeling requirements, the following text must be placed on the exterior of the end product.

13.3 CE – FB100AS

Hereby, FIRMTECH Co., Ltd, declares that this FB100AS is in compliance with the essential

requirements and other relevant provisions of directive 1999/5/EC.

13.4 TELEC – FB100AS

13.5 SIG