Serial to Wi-Fi Converter

CSW-H85F User's Manual

Version 1.0

Sollae Systems Co., Ltd.

http://www.ezTCP.com

To all residents of the European Union

Important environmental information about this product

This symbol on this unit or the package indicates that disposal of this unit after its lifecycle could harm the environment. Do not dispose of the unit as unsorted municipal waste; it should be brought to a specialized company for recycling. It is your responsibility to return this unit to your local recycling service. Respect your local environmental regulation. If in doubt, contact your local waste disposal authorities

FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement

This equipment complies with FCC RF Radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements RF de la FCC établies pour un environnement non contrôlé. Cet appareil et son antenne ne doivent pas être co-localisés ou fonctionner en conjonction avec une autre antenne ou transmetteur.

Cet équipement doit être installé et utilisé avec une distance minimale de 20 centimètres entre le radiateur et votre corps.

Contents

1 Overview

1.1 Overview

Including a PC, almost all communication devices are using serial communication. Devices transmit and receive data in bit order in the serial communication which is quite simple to implement but has weaknesses such as short distance and hard maintenance.

CSW-H85F is a converter enables serial devices to support TCP/IP communication through wireless LAN. CSW-H85F carries out the converting process for users to get to the network using TCP/IP protocol.

1.2 Features

- Connect serial devices to IEEE 802.11b/g wireless LAN
- RS232/RS422/RS485 Interface
- RP-SMA Male connector for an external antenna
- Stable embedded TCP/IP stack
- Easy configuration program (ezManager)

1.3 Application Examples

- 1:1 network with a PC

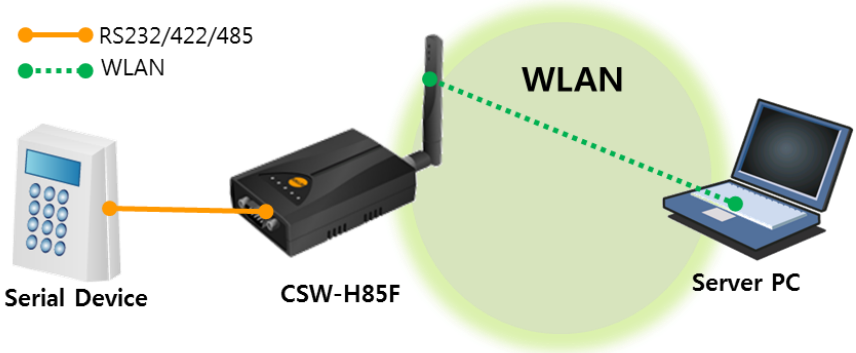


Figure 1-1 1:1 network with a PC

- 1:1 network with a PC through an AP

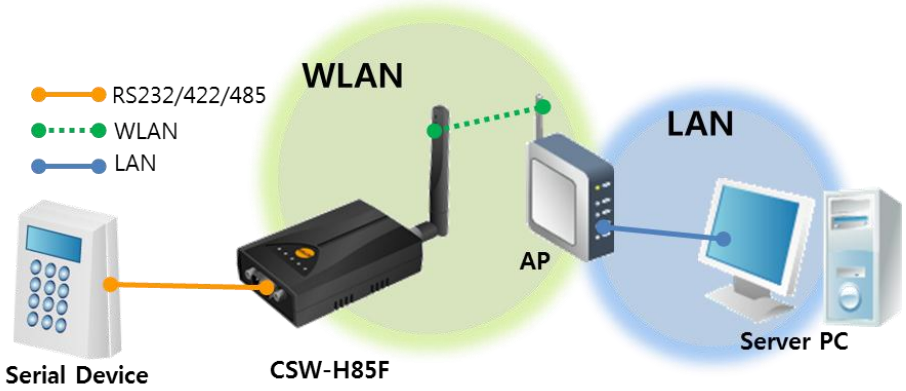


Figure 1-2 1:1 network with a PC through an AP

- Internet connection with a xDSL/cable modem

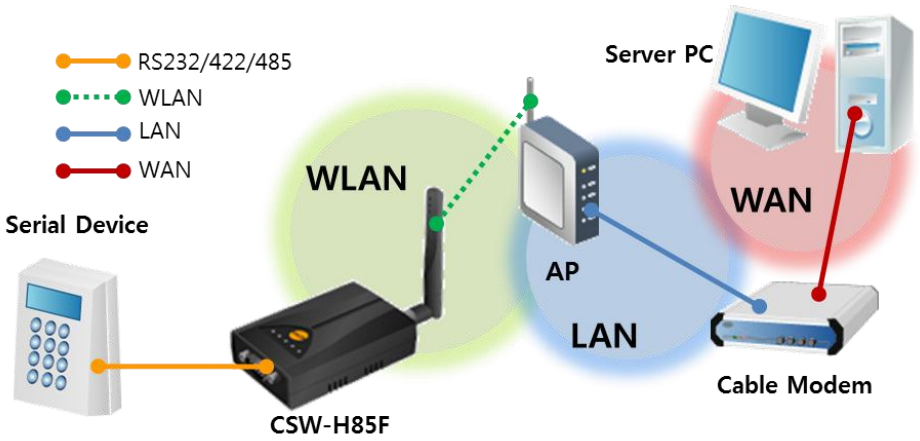


Figure 1-3 Internet connection with an xDSL/cable modem

1.4 Components

Table 1-1 components

Option	Name	Description	Picture
Basic	Product's body	without antenna	
	Warranty	-	
Option	5V Power adapter	DC 5V/1A	
	1.5m Serial cable	RS232 crossover cable	
	CD	Manual, Utilities and etc.	
	bracket	for fixing a product's body	
	mounter	for mounting on Din-Rail (Bracket is required.)	

1.5 Specification

1.5.1 Hardware

Table 1-2 hardware specification

Power	Input Voltage	DC 5V (±0.5V)
	Current	typically 260mA
Dimension	88.5㎜ x 57㎜ x 23㎜ (without an antenna)	
Weight	About 64g (without antenna)	
CPU	ARM7 Core	
Serial Port	Serial	1 x RS232 / 422 / 485 (Baud Rate: 300 ~ 230,400 bps)
	WLAN	2dBi external antenna (IEEE 802.11b/g) with RP-SMA Male interface
Temperature	Operating: -10 ~ 70℃ / Storage: -40 ~ 85℃	
RoHS	RoHS Compliant	

1.5.2 Software

Table 1-3 software specification

Protocol	TCP, UDP, IP, ICMP, ARP, TELNET, DHCP, DNS lookup, DDNS, Telnet COM Port Control Option(RFC2217), WEP, WPA PSK, WPA2 PSK	
Operation mode	Normal	For Normal Data Communication
	ISP	For Upgrading F/W
	Serial Configuration	For Configuration via Serial
Communication mode	TCP Server	TCP Passive Connection
	TCP Client	TCP Active Connection
	AT Command	TCP Passive / Active Connection
	UDP	UDP – No Connection
Major Utilities	ezManager	Configuration Utility for MS Windows (Supports Downloading F/W)
	ezVSP	Serial to TCP/IP Virtual driver for MS Windows

1.6 Dimension

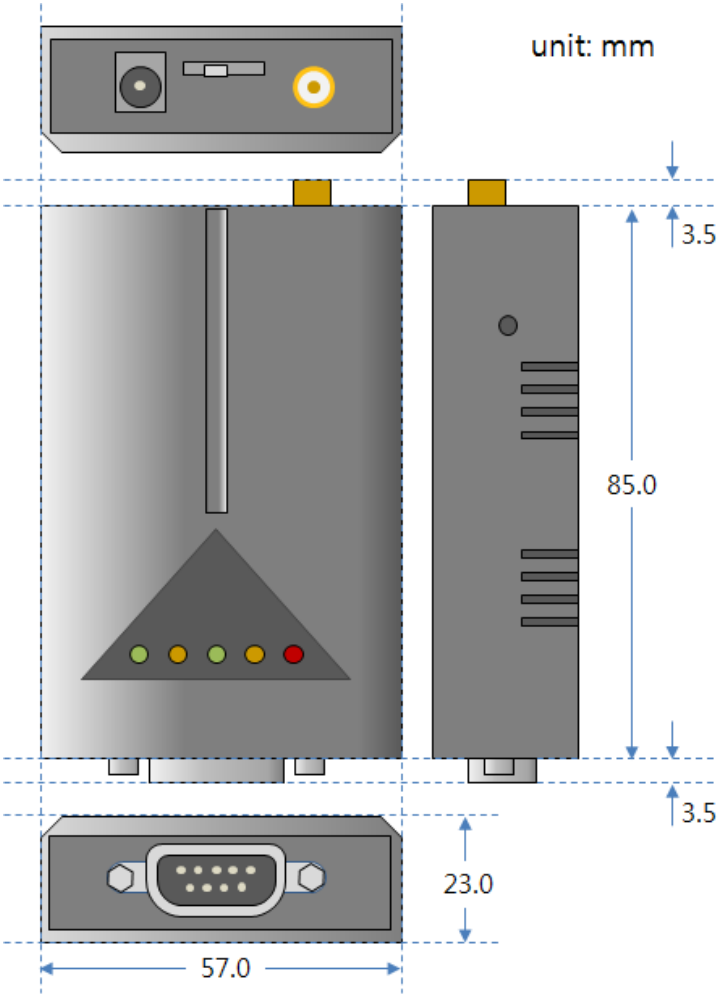


Figure 1-4 dimension

☞ ***According to conditions of products, dimensions might be differed with the above figure.***

1.7 Interface

1.7.1 Pannel Layout

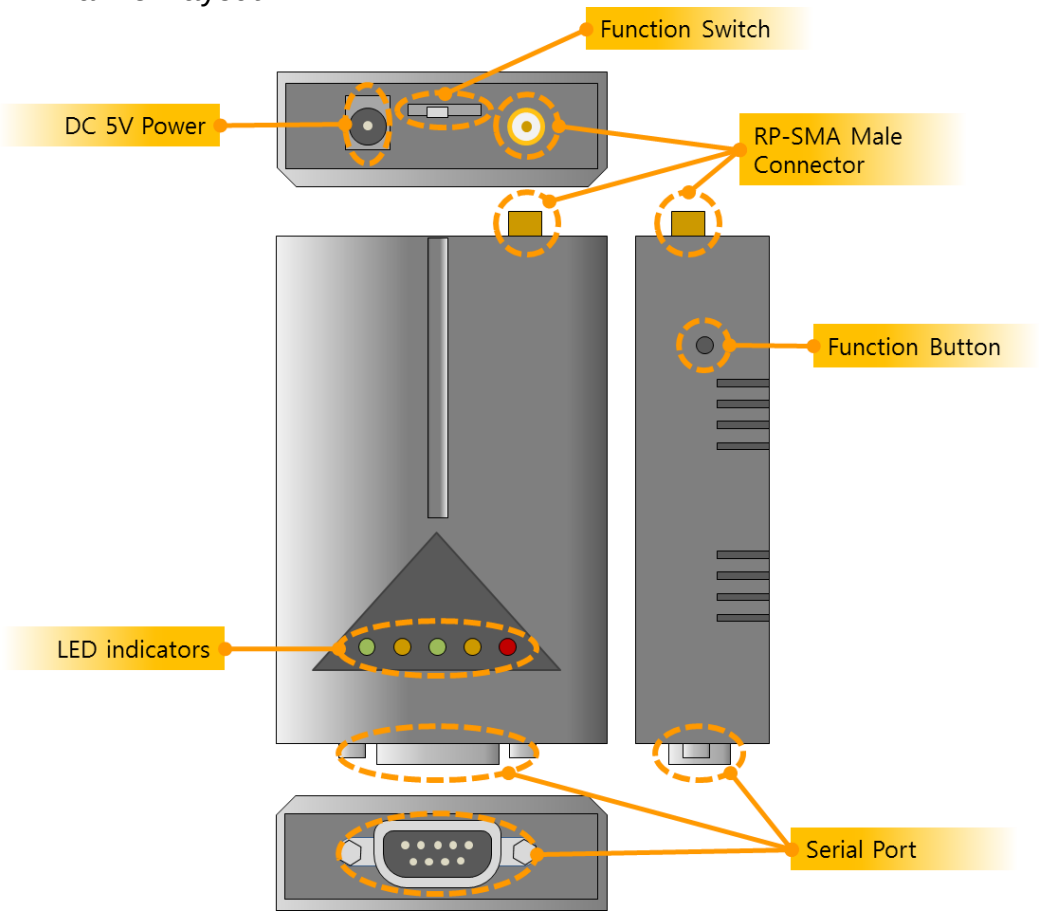


Figure 1-5 panel layout

1.7.2 Wireless LAN Interface

CSW-H85F embeds wireless LAN module. RP-SMA Male jack is interfaced for an external antenna.

1.7.3 Serial Interface

CSW-H85F has D-SUB 9 pin Male connector for connecting serial devices.

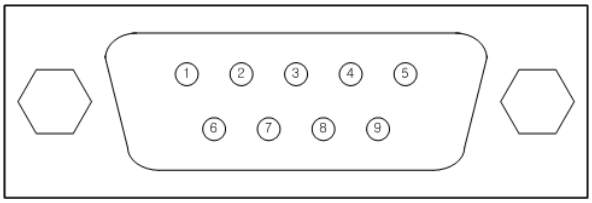


Figure 1-6 D-SUB 9 pin Male connector

- Pin Assignment in RS232

Table 1-4 pin assignment in RS232

Number	Name	Description	level	type	Etc.
1	DCD	Data Carrier Detect	RS232	IN	N/C
2	RXD	Receive Data	RS232	IN	mandatory
3	TXD	Transmit Data	RS232	OUT	mandatory
4	DTR	Data Terminal Ready (always output active signal)	RS232	OUT	optional
5	GND	Ground	Ground	-	mandatory
6	DSR	Data Set Ready	RS232	IN	optional
7	RTS	Request To Send	RS232	OUT	optional
8	CTS	Clear To Send	RS232	IN	optional
9	RI	Ring Indicator	RS232	IN	N/C

☞ ***N/C: Not Connected***

- Pin Assignment in RS422

Table 1-5 pin assignment in RS422

Number	Name	Description	level	type	Etc.
9	TX +	Transmit Data +	RS422	OUT	mandatory
1	TX -	Transmit Data -	RS422	OUT	mandatory
4	RX +	Receive Data +	RS422	IN	mandatory
3	RX -	Receive Data -	RS422	IN	mandatory

- Pin Assignment in RS485

Table 1-6 pin assignment in RS485

Number	Name	Description	level	type	Etc.
9	TRX +	Data +	RS485	IN/OUT	mandatory
1	TRX -	Data -	RS485	IN/OUT	mandatory

1.7.4 Power

Supplying DC5V is required and the specification is as follows:

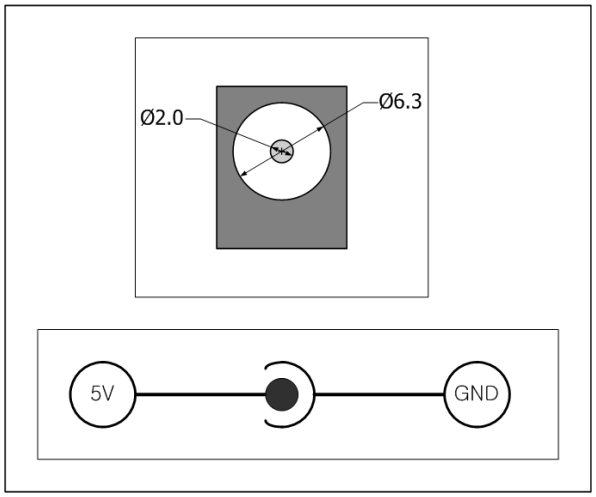


Figure 1-7 power connector

1.8 ETC.

1.8.1 LED indicators

There are 5 LED indicators on the top panel. Operations of the indicators are as follows:

Table 1-7 led indicators

Mode	Name	Color	Status	Description
Common	PWR	Red	On	Supplying the power
Normal mode	RXD	Yellow	Blinks	Receiving data from the WLAN
	TXD	Green	Blinks	Sending data to the WLAN
	STS	Yellow	Blinks in every second	Obtaining an IP address
			Blinks 4 times at once	Without obtaining an IP address under DHCP or PPPoE network
			On	Establishing TCP connection
	LINK	Green	On	Connecting to the WLAN
ISP mode	STS	Yellow	Off	Operating in ISP mode
Serial Configuration mode	STS	Yellow	Blinks simultaneously	Operating in Serial Configuration mode
	LINK	Green		
	RXD	Yellow		
	TXD	Green		

☞ ***See operations of LED indicators in the case of using LQ indication function in chapter 7.4.1.***

1.8.2 Function button

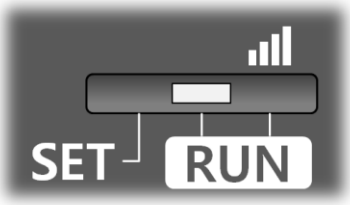
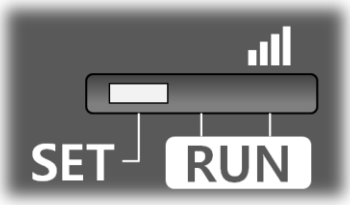
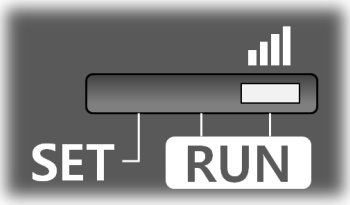
There is a function button on the side. If you use this button you can change the operation mode of CSW-H85F to ISP or Serial Configuration mode. And the PC free options can be implemented by this button.

Figure 1-8 function button

1.8.3 Function Switch

There is a function switch on the rear side. You can change the operation mode to serial configuration mode or use the LQ indication function with this switch.

Table 1-8 use of function switch

Mode	Setting
Normal mode	
Serial Configuration mode	
LQ indication in Normal mode	

2 Installation and Test

2.1 Background knowledge of WLAN

CSW-H85F supports IEEE802.11b/g. IEEE 802.11 is also called Wi-Fi and has two network topologies and those are Infrastructure and Ad-hoc mode. CSW-H85F also supports WEP, WPA-PSK and WPA2-PSK for security.

2.1.1 Topology

- Infrastructure mode

  In this mode, every wireless LAN station communicates through an Access Point (AP) so that all stations can be connected to Ethernet, because AP is able to interface witch both wireless LAN and wired LAN (Ethernet).

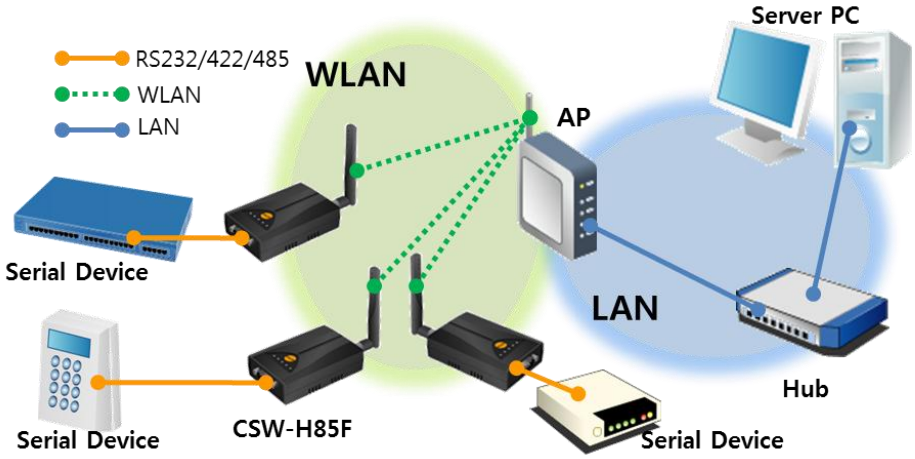


Figure 2-1 infrastructure mode

- Ad-hoc mode

  Wireless LAN stations communicate each other without an AP in this mode. Therefore, you can easily make this network. It is suitable for the situation when there is no wired LAN requirement on a small-scale network. Usually, it is called peer-to-peer mode.

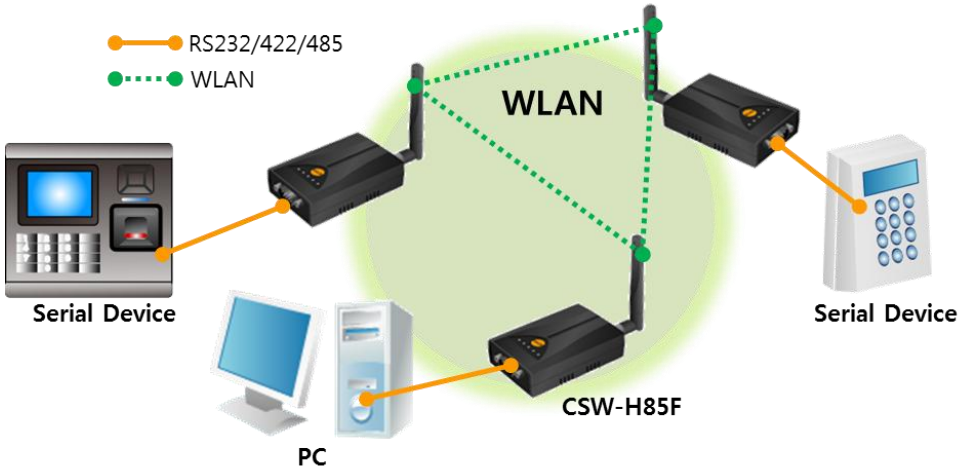


Figure 2-2 Ad-hoc mode

2.1.2 Key terms

- SSID(Service Set Identifier)

  It is a name to identify the particular wireless LAN. So every single station should have the same SSID to communicate in the network. In the case of infrastructure mode, you have to set the same SSID with the AP to CSW-H85F. Otherwise, it won't communicate at all. The maximum length of this parameter is 31 bytes and the default is "sollae".

- Channel

  Wireless LAN stations communicate through the ISM (Industrial, Scientific, and Medical) band which has the range of frequencies around 2.4GHz. IEEE 802.11 specification divides this band into 14 channels every 5MHz. If you install more than one wireless network in the same area, the channels should be apart more than 4 channels to avoid interferences.

2.1.3 Authentication and Security

- Authentication

  A wireless LAN station should get authentication from the AP in the infrastructure network. There are two methods for the authentication, Open system and the Shared key.

- WEP (Wired Equivalent Privacy)

  The WEP is a secure protocol for wireless LAN. You need to set 64 bit or 128 bit key. You can use both hexadecimal and ASCII code for this.

- WPA (Wi-Fi Protected Access)

  WPA is a security standard for users of devices equipped with Wi-Fi wireless connection. It is an improvement on and is expected to replace the original Wi-Fi security standard, Wired Equivalent Privacy (WEP). There are two modes about the user authentication in WPA security. One is Enterprise which has an authentication server and the other is PSK (Pre-Shared Key) which doesn't have any servers. CSW-H85F supports WPA-PSK.

- WPA2

  To final security of Wireless LAN, IEEE 802.11i which is a standard about Wireless LAN has suggested the Counter Mode with Cipher Block Changing Message Authentication Code Protocol (CCMP) for replacing the TKIP. CCMP uses Advanced Encryption Standard (AES). WPA 2 adopts AES. WPA 2 has also both Enterprise and PSK mode. CSW-H85F supports WPA 2-PSK.

☞ ***CSW-H85F supports WEP, WPA-PSK and WPA2-PSK***

2.2 Installation

The following instruction is written based on use of evaluation board for CSW-H85F.

Before testing CSW-H85F, connect the serial port to your PC. And then, make wireless LAN link between the PC and CSW-H85F using an AP or wireless LAN adaptor.

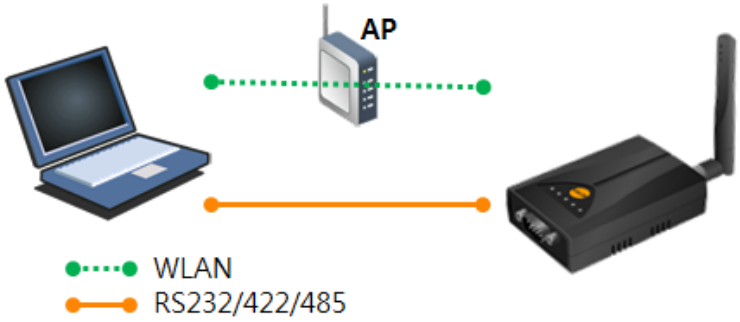


Figure 2-3 WLAN and RS232 connection using a laptop

2.2.1 Making Wireless LAN link

Wireless LAN link is not automatically established when you connect the AP or wireless LAN adapter to your PC. Wireless LAN parameters should be configured on CSW-H85F. Follow the steps below if you are a beginner.

- Supplying Power
  Supply power to the board.
- Change the mode to [Serial Configuration mode]
  Connect and disconnect the ISP# pin to GND between 20ms and 1 sec.
- Reading environmental parameters
  Run ezManager and open the COM port. And then, press the [Read] button.

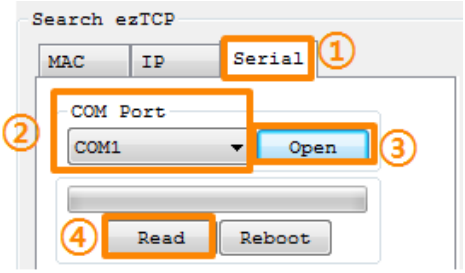


Figure 2-4 reading environmental parameters

☞ ***You can download the latest version of ezManager on [Download] >> [Utility] >> [ezManager] introduction pages of our website.***

- Configuring Wireless LAN Parameters

  Move to the [Wireless LAN] tab, set the same SSID and security options to the AP. If you want to know how to set or figure the AP's value out, please ask the manufacturer.

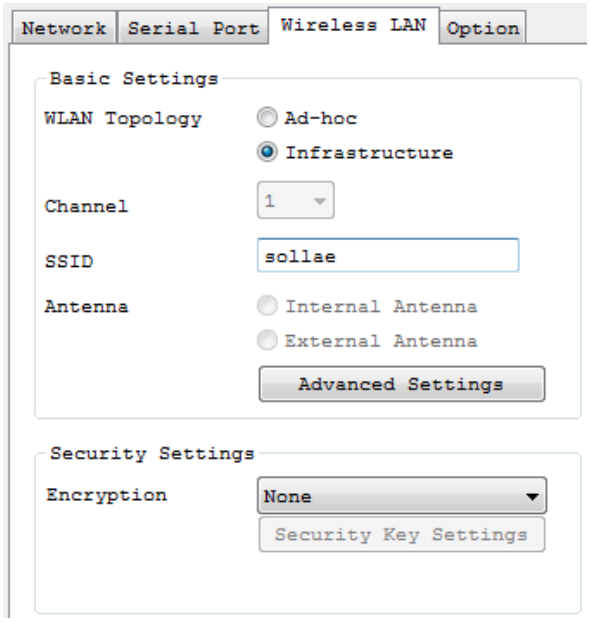


Figure 2-5 an example for setting WLAN parameters

☞ ***If you want to build up Ad-hoc network, choose [Ad-hoc] in [WLAN Topology] tab and set a value in [SSID] tab. Search the wireless network on your PC and try connecting your PC to the network.***

2.2.2 Setting Network Area

These steps are for setting both CSW-H85F and your PC to be located in the same network. Only if they are in the same network, the TCP connection between them can be established.

- Setting PC

  Add or change the IP address of the network adapter on your PC like following.

  Get into the menu of [Windows Control Panel] >> [Network Connections] >> [Properties of the Network Adapter – with right click of your mouse]. Then, you can see the properties of [Internet Protocol (TCP/IP)]. Here, press the [Advanced] button for adding an IP Address like the figure below.

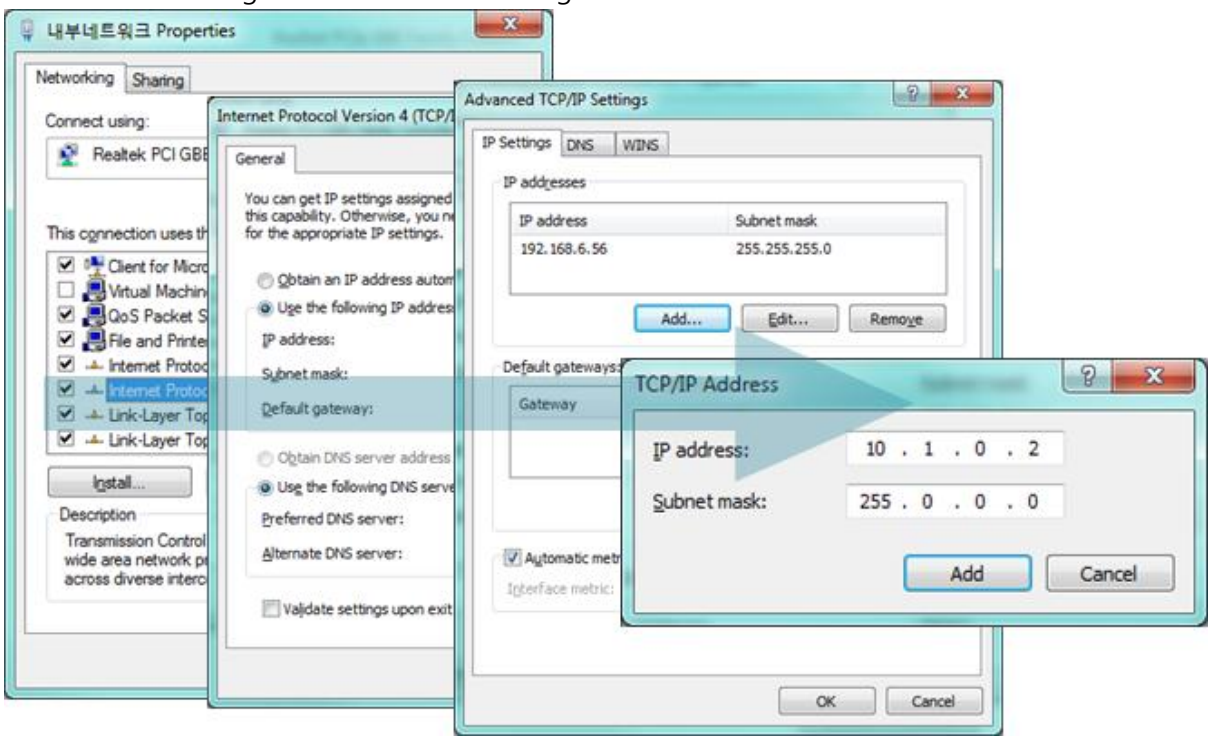


Figure 2-6 setting PC

- Setting CSW-H85F

  CSW-H85F uses ezManager as its configuration tool which is software operating on MS Windows. This program is easy to use and doesn't need installation. For setting CSW-H85F, search your CSW-H85F via serial port first. All the values of parameters are set with the factory default. To apply CSW-H85F to your system, setting proper values is required. Default values of major parameters are listed on table below. Keeping these values without any changes are highly recommended for the simple test.

Table 2-1 default values of major parameters

Name		Default values
Network	Local IP Address	10.1.0.1
	Subnet Mask	255.0.0.0
Option	TELNET	Checked
	IP Address Search	Checked
Serial Port (COM1)	Serial Type	RS232
	Baud Rate	19,200bps
	Parity	NONE
	Data Bits	8
	Stop Bit	1
	Flow Control	NONE
	Communication mode	TCP Server
	Local Port	1470
WLAN	Topology	Infrastructure (Ad-hoc: If necessary)
	SSID	sollae
	Security Settings	NONE

2.3 Simple Test

If you press the [Simple Test] button, the test program will be shown on your screen.

- Connecting to the CSW-H85F via LAN

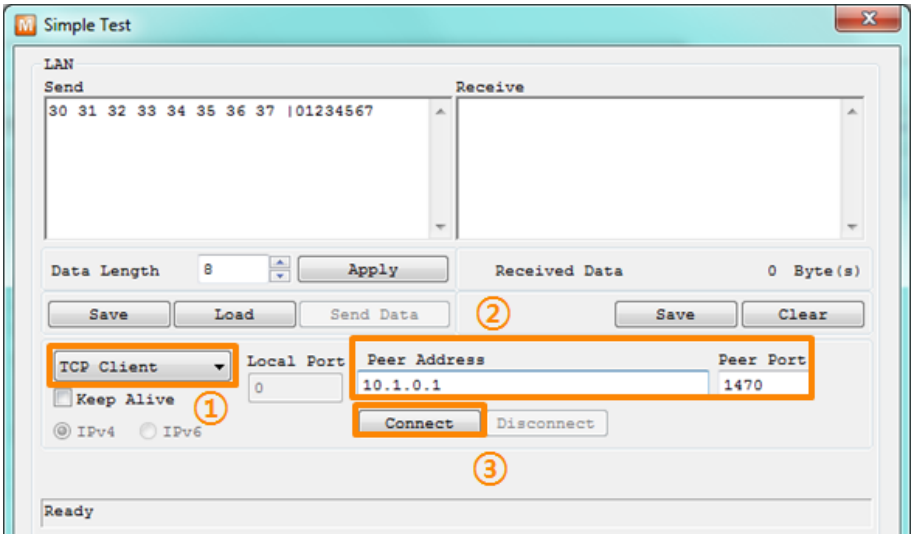


Figure 2-7 settings for TCP connection

① Select [TCP Client]

② Input correct IP address and port number of CSW-H85F

③ Click the [Connect] button. (In the case of TCP Server, it will be [Listen] button)

- Opening RS232 Port

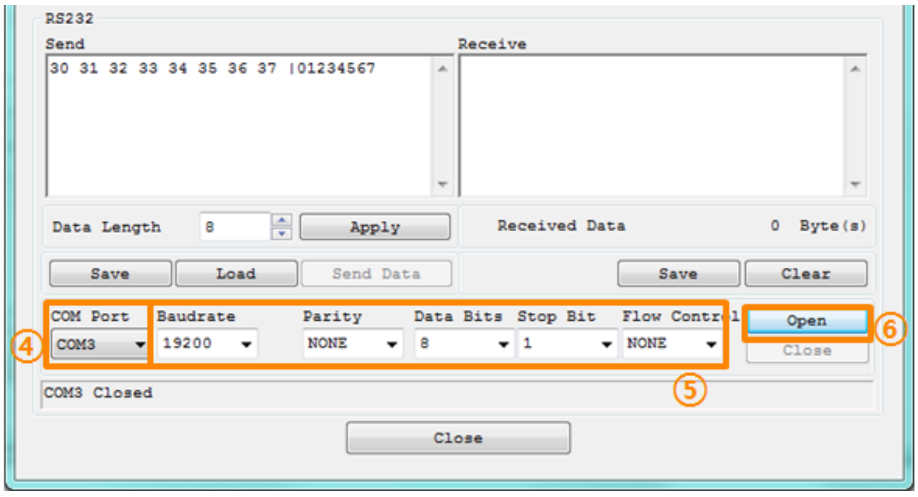


Figure 2-8 opening COM Port

④ Select COM port which the CSW-H85F is connected to

⑤ Make sure that all the parameters are the same with CSW-H85F

⑥ Press the [Open] button

- Confirm the TCP Connection and COM port status

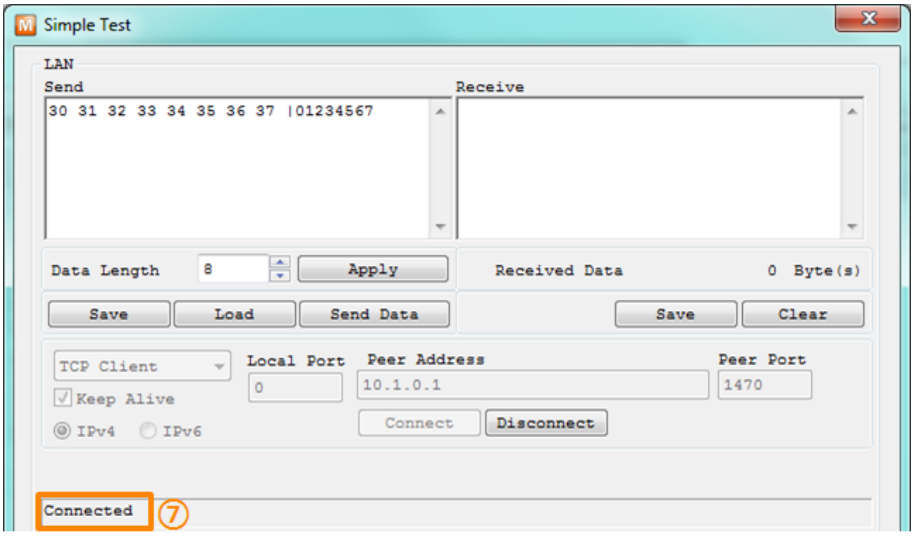


Figure 2-9 TCP Connected message

⑦ Check the message if the TCP connection has been established well

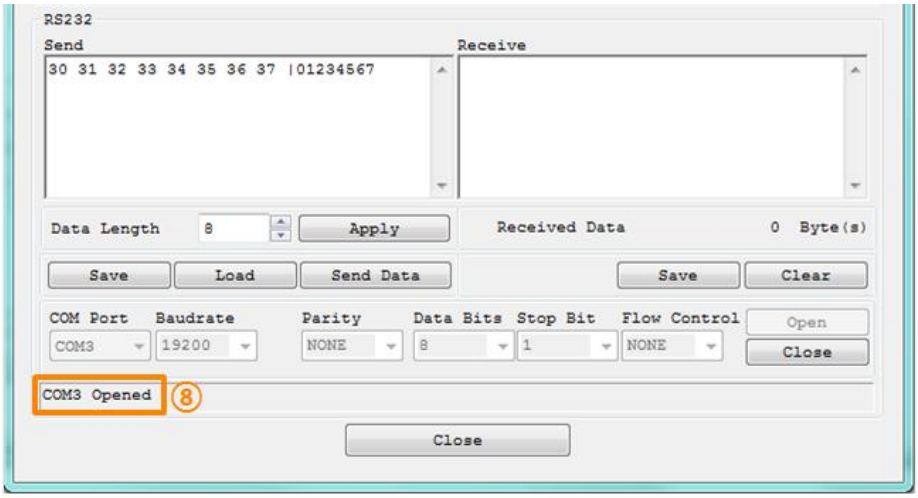


Figure 2-10 COM Port open message

⑧ Check the message if the COM port has been opened

- Data transmission test

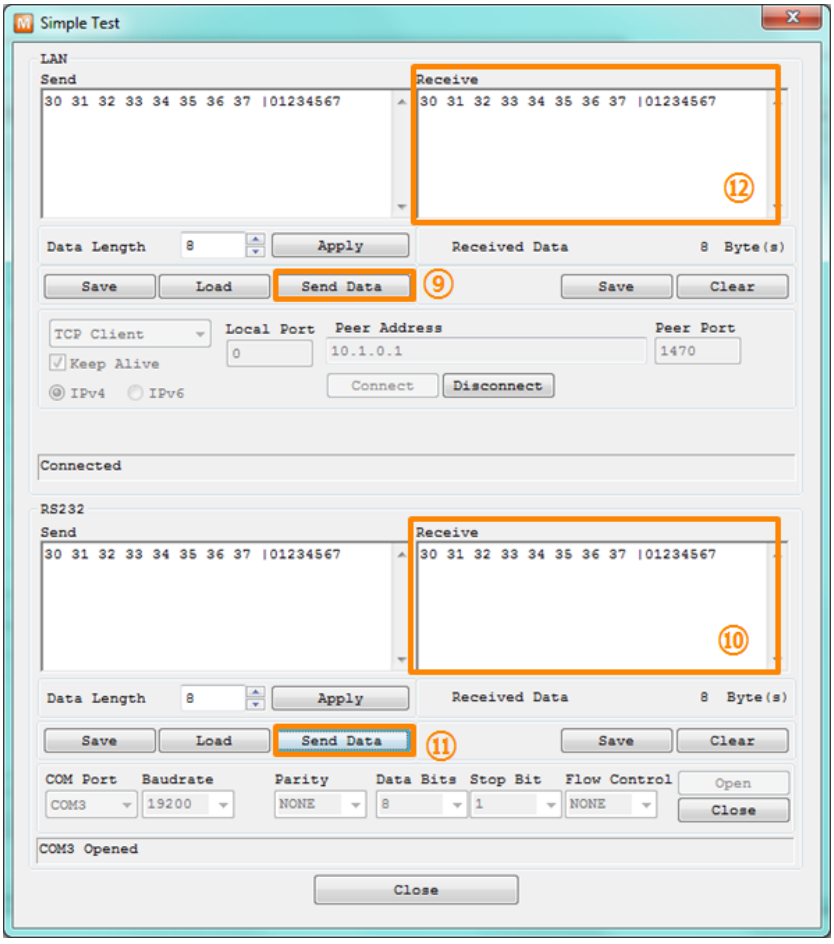


Figure 2-11 successful data transmission

⑨ Click [Send data] on the LAN part

⑩ Check the data from ⑨ has been shown

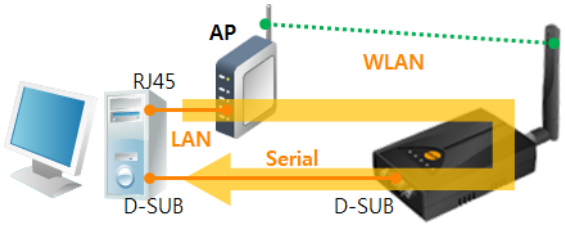


Figure 2-12 WLAN → RS232

⑪ Press [Send data] on the RS232 part

⑫ Check the data from ⑪ has been received

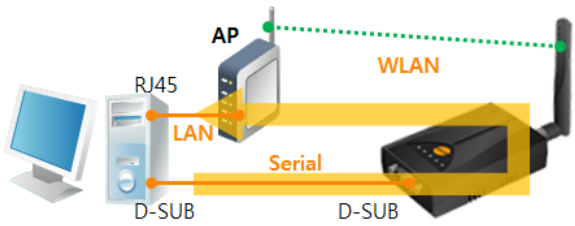


Figure 2-13 RS232 → WLAN

3 Configuration

3.1 Configuration with ezManager

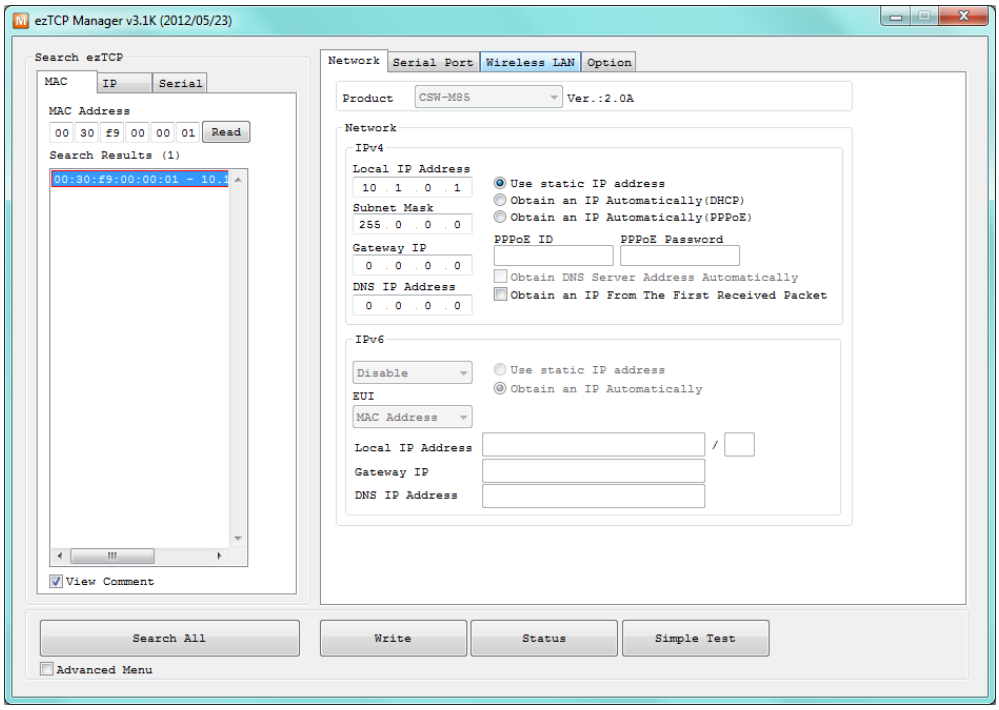


Figure 3-1 initial appearance of ezManager

3.1.1 Configuration via WLAN

- Checklists

  Make sure the WLAN connection between your PC and CSW-H85F. If they are on the same network, [MAC Address search] can be used. Otherwise, only [IP Address search] is allowed to use.

- Procedures

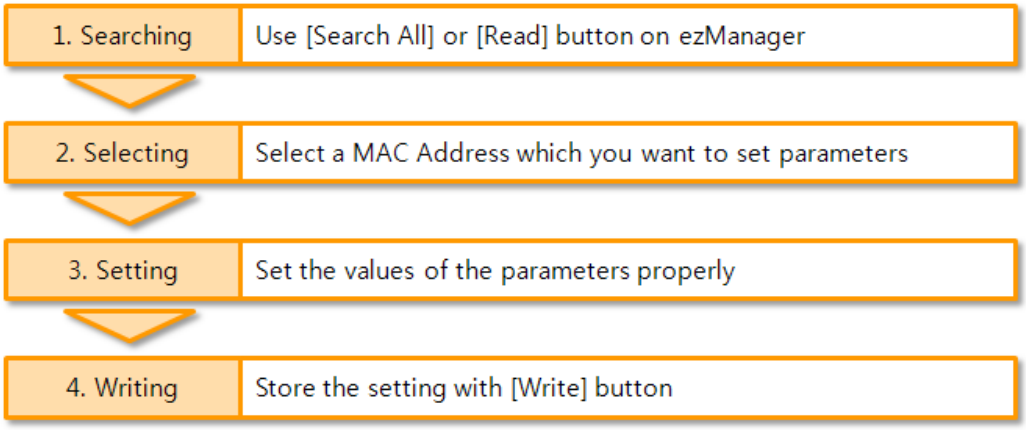


Figure 3-2 procedures for configuration via WLAN

3.1.2 Configuration via Serial

- Checklists

  Make sure the connection between your PC and CSW-H85F using RS232 cross cable. To use this, CSW-H85F has to be operating in the [Serial Configuration] mode. By connecting the ISP# pin to GND shortly (between 20ms and 1 sec), you can set the mode to [Serial Configuration] mode. After this step, read the setting via [Serial] tab on ezManager.

- Procedures

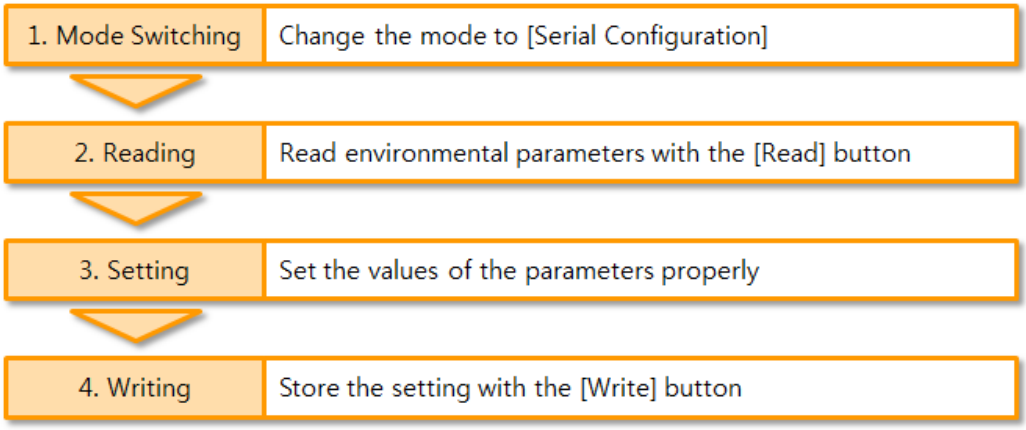


Figure 3-3 configuration procedures via Serial

- Step 2, Reading

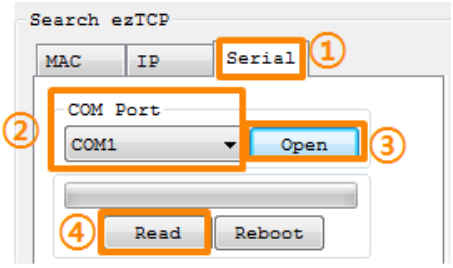


Figure 3-4 reading procedure via serial

① Choose the [Serial] tab

② Select the COM port which the H85 is connected with

③ Open the COM port with the [Open] button

④ Read the setting with [Read] button

3.2 AT command

In the AT command mode, you can change some parameters through the serial port.

- Checklists

  Make sure the connection between your PC and CSW-H85F using RS232 cross cable (In the case of using EVB). To use this mode, CSW-H85F has to be set to [AT command] mode of the [Communication mode]. This can be configured by ezManager.

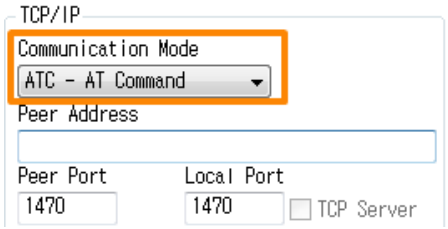


Figure 3-5 setting the communication mode to the AT command

- Procedures

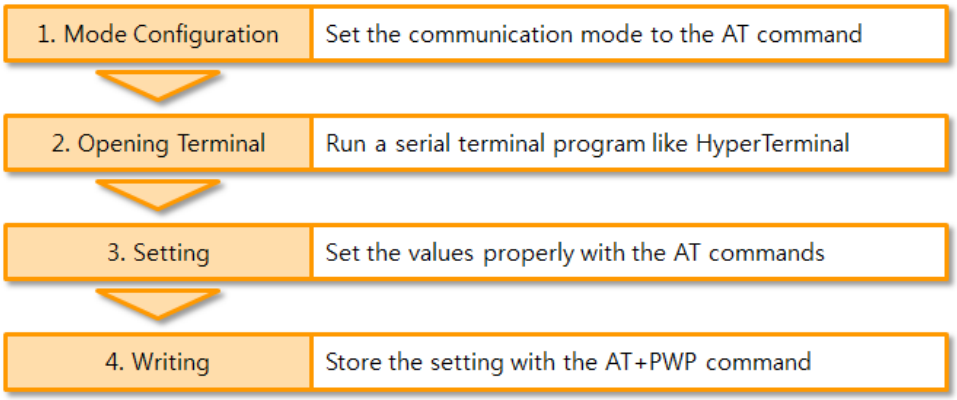


Figure 3-6 configuration procedures with AT command

Table 3-1 parameters which are available on AT command

Division	Available parameters
IP Address related items	Local IP Address, DHCP, Subnet Mask, Gateway IP Address, DNS IP Address and etc.
TCP connection related items	Local Port, Peer Address (IP Address or Host name), Peer Port and etc.
WLAN related items	Topology, SSID, WEP, WPA-PSK, WPA2-PSK and etc.
Option	ESC code sending option, timeout and etc.

☞ ***Including the above items, all parameters can be set by ezManager.***

4 Operation Modes

4.1 What is the Operation Mode?

Each of three operation modes is defined for specific purpose as follows:

- Normal mode
  This mode is for normal data communication and there are 4 different connection modes. Configuring parameters is also available in this mode.
- Serial Configuration mode
  This mode is for configuring environmental parameters through the serial port.
- ISP mode
  This mode is only for changing firmware.

4.2 Changing modes

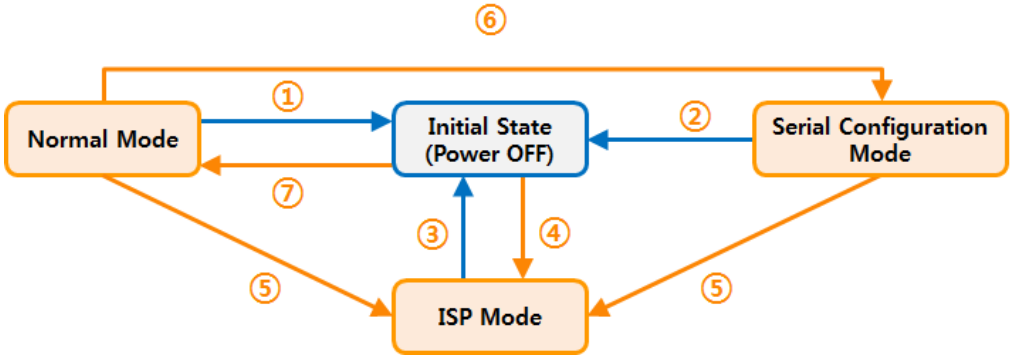


Figure 4-1 diagram for changing modes

① Reset (Power off)
② Reset or input "g 0" command
③ Reset (After transmitting firmware, H85 will be automatically reset)
④ Reset pushing the function button
⑤ Push the function button for a while (over 1 sec)
⑥ Push the function button for a moment (less than 1 sec)
⑦ Turn the power on

4.3 Comparison with each mode

The table below shows comparison of each mode in serial port operation.

Table 4-1 comparison of each mode

Name	Serial port
Normal	configured value
Serial Configuration	115,200/N/8/1
ISP	115,200/N/8/1

4.4 Normal Mode

In normal mode, there are four connection types to communicate with a remote host.

Table 4-2 comparison of four communication modes

Mode	Protocol	Connection	Requirements about Modifying S/W of serial devices	Serial configuration	Topology
TCP Server	TCP	Passive	N/A	N/A	1:1
TCP Client		Active	N/A	N/A	1:1
AT Command		Both	Required	Available	1:1
UDP	UDP	-	N/A	N/A	N:M

☞ ***N/A: Not Applicable or Not Available.***

TCP is one of the protocol types, which has a process of a connection. Basically, the TCP connection has to be one-to-one. The part who tries making a connection is called TCP Client, and the other part is called TCP Server. On the other hand, UDP has no connection process, so that each of UDP hosts can transmit and receive data from multiple hosts.

4.5 Serial Configuration Mode

4.5.1 Configuring Parameters

This is a mode for setting environmental parameters through the serial port. If you cannot use the WLAN, this mode is only way to configure the parameters. Click the [Read] button on the [Serial] tab of ezManager after entering this mode.

☞ ***If you want more information about the serial configuration protocol, please refer to the [Serial Management Protocol] document in [Download] >> [Technical documents] >> [Basic and Common part] category of our web site.***

4.5.2 Revoking Serurity Options

CSW-H85F offers restriction for security like filtering with password or MAC and IP address. In the serial configuration mode, you can revoke all of these options. When you forgot the password, enter this mode to change or delete it.

4.6 ISP Mode

4.6.1 Upgrading Firmware

ISP mode is for upgrading firmware, implemented via the serial port.

5 Communication Modes

5.1 TCP Server

In this mode CSW-H85F listens to a request of TCP connection from remote hosts. Once a host tries connecting to CSW-H85F, it accepts a connection. After the connection is established, CSW-H85F converts the raw data from the serial port to TCP/IP data and sends it to the network and vice versa.

5.1.1 Key parameters

- Local Port
  This is a server's port number which is used in the TCP connection.
- Event Byte
  With setting event bytes, you can handle the serial data of the serial buffer before a TCP connection is established.

Table 5-1 Event Byte

Value	Description
0	CSW-H85F doesn't send the data
Otherwise (512 or under)	CSW-H85F sends the data right after a connection is established. 512 or under bytes are strongly recommended.

- Timeout
  If there is no transmission of data for amount of the time the connection would be terminated.
- Notify IP Change
  This function is for notifying information about changed IP addresses to a management server. Not only can the TCP/UDP protocol be used, but Dynamic Domain Name Service (DDNS).
- Access restriction
  Users can block TCP connections from unauthorized hosts by using this option. Both IP and MAC address are available.

5.1.2 Examples

- A situation that [Event Byte] is set to 0.

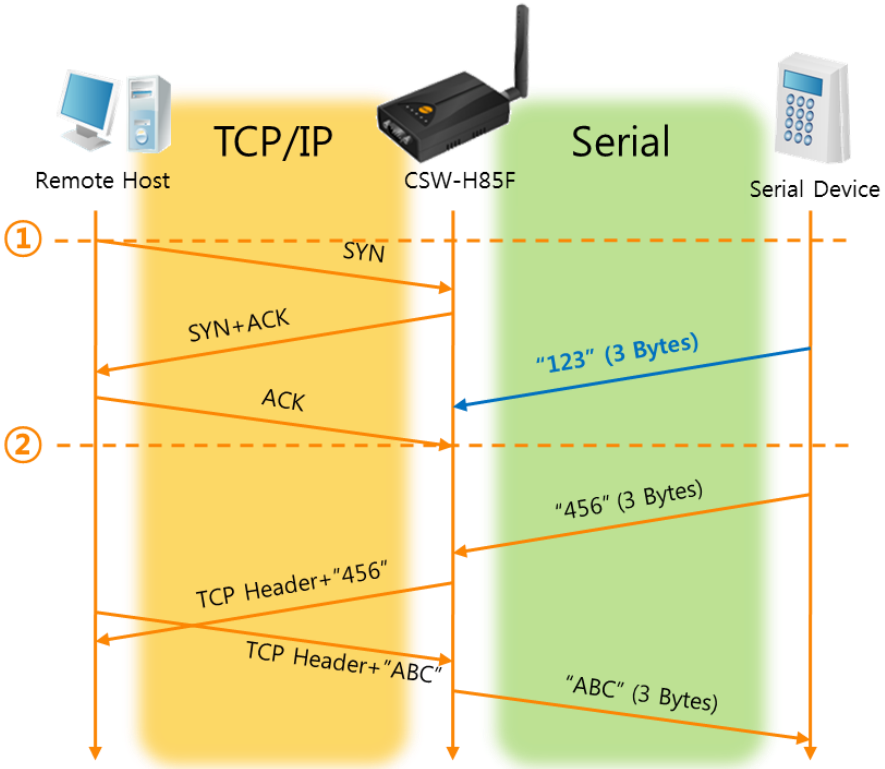


Figure 5-1 time chart

Table 5-2 states of each point

Points	States
~	H85 is listening to connection requests
①	Remote host has sent a connection request (SYN) segment
~	Processes of the connection
②	The connection has been established
~	Data communication is implemented on both sides

Look at the blue arrow. The data "123" from the serial port has been sent before establishing a connection. In this case, the data would not be sent because of the [Event Byte] is set to 0.

- A situation that [Event Byte] is set to 1

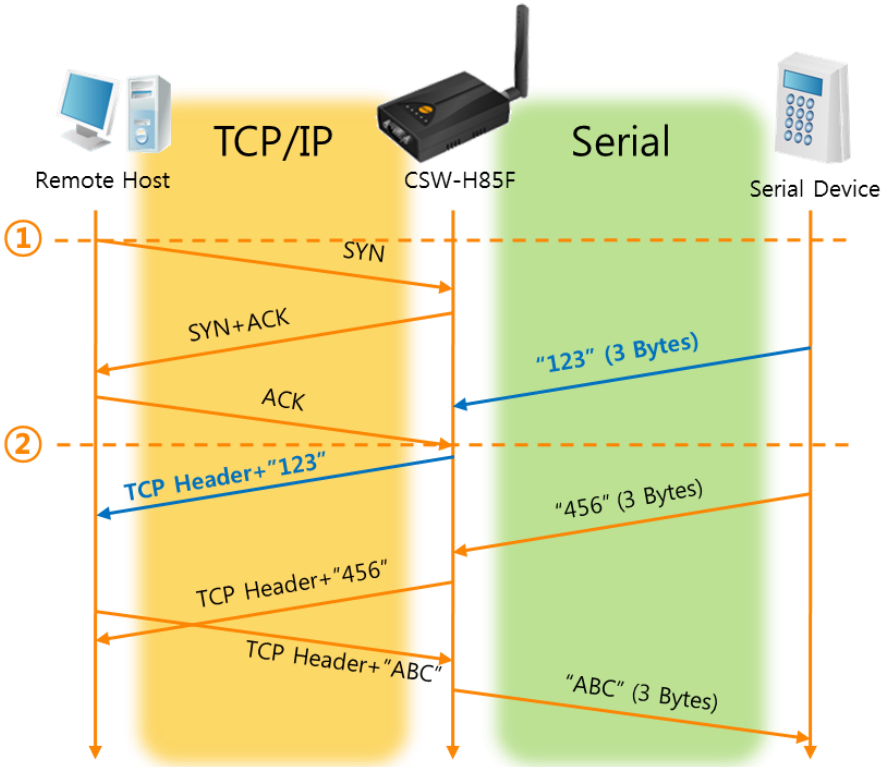


Figure 5-2 time chart

Table 5-3 states of each point

Points	States
~	H85 is listening to connection requests
①	Remote host has sent a connection request (SYN) segment
~	Processes of the connection
②	The connection has been established
~	Data communication is implemented on both sides

As you can see, the data "123" has been sent right after establishing a connection because the value of [Event Byte] had been set to 1.

- A situation that [Timeout] is set to 5

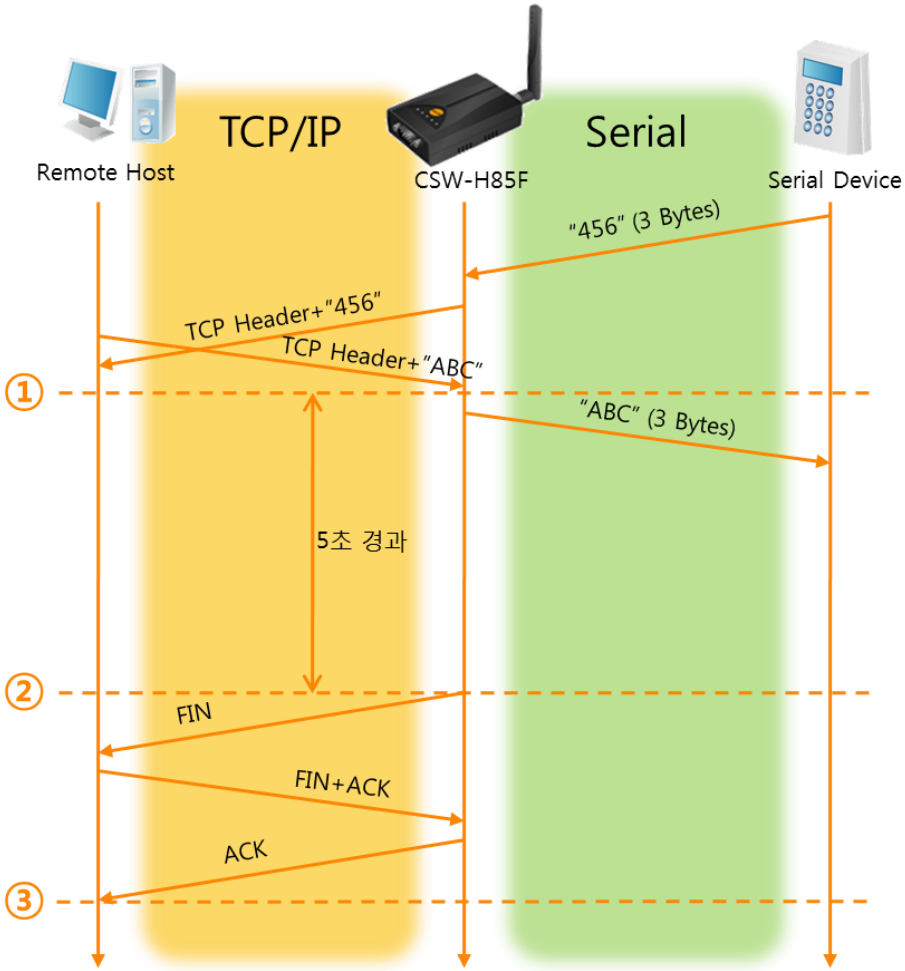


Figure 5-3 time chart

Table 5-4 states of each point

Points	States
~	Data communication on both sides
①	The last segment has arrived at the H85
~	for 5 seconds, no data communication
②	H85 has sent disconnection request (FIN) to a remote host
~	Processes of the disconnection
③	The connection has been terminated
~	H85 is listening to connection requests

5.2 TCP Client

In this mode, CSW-H85F sends request segments to a TCP server with information of [Peer Address] and [Peer Port]. Once a host is listening, the connection will be established. After then, CSW-H85F converts the raw data from the serial port to TCP/IP data and sends them to the network and vice versa.

5.2.1 Key parameters

- Peer Address

  This item is an address of TCP server.

- Peer Port

  [Peer Port] is the port number of TCP server.

- Event Byte

  This item can decide the point of time to send the connection request parameter.

  Table 5-5 the operation of Event Byte 1

Value	The point of time to send request segment
0	right after H85 boots up
Otherwise (512 or under)	right after the bytes set to [Event Byte] have been received from the serial port 512 or under bytes are strongly recommended.

  In addition, you can handle the serial data before a TCP connection is established with this parameter.

  Table 5-6 the operation of Event Byte 2

Value	Description
0	CSW-H85F doesn't send the data
Otherwise (512 or under)	CSW-H85F sends the data right after a connection is established. 512 or under bytes are strongly recommended.

- Timeout

  If there is no transmission of data for amount of the time the connection would be terminated.

- TCP Server

  This check option enables you to get to the TCP server / client mode. In this mode, CSW-H85F can be operated as a TCP server or client without changing its setting.

- DNS IP Address

  [DNS IP Address] is needed when you use host name instead of the IP address.

5.2.2 Examples

- A situation that [Event Byte] is set to 0

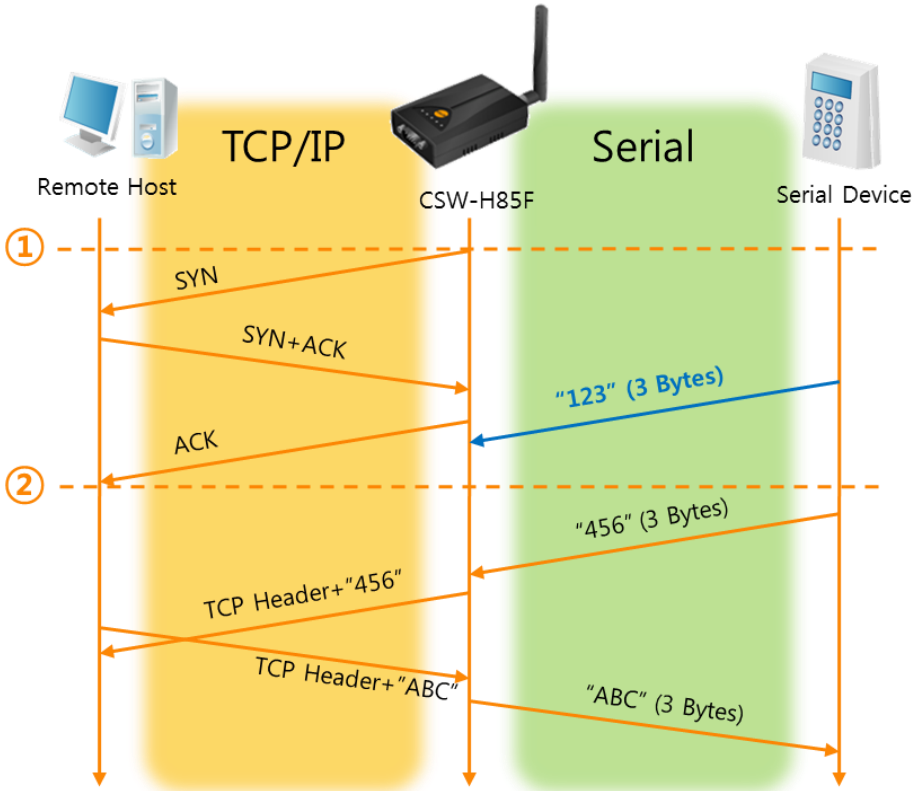


Figure 5-4 time chart

Table 5-7 states of each point

Points	States
~	Power has not been supplied yet.
①	H85 sends connection request segment right after it boots up.
~	processes of TCP connection
②	The connection has been established.
~	data communication on both sides

Look at the blue arrow. The data "123" from the serial port had sent before establishing a connection. In this case, the data would not be sent because of the [Event Byte] is set to 0.

- A situation that [Event Byte] is set to 5

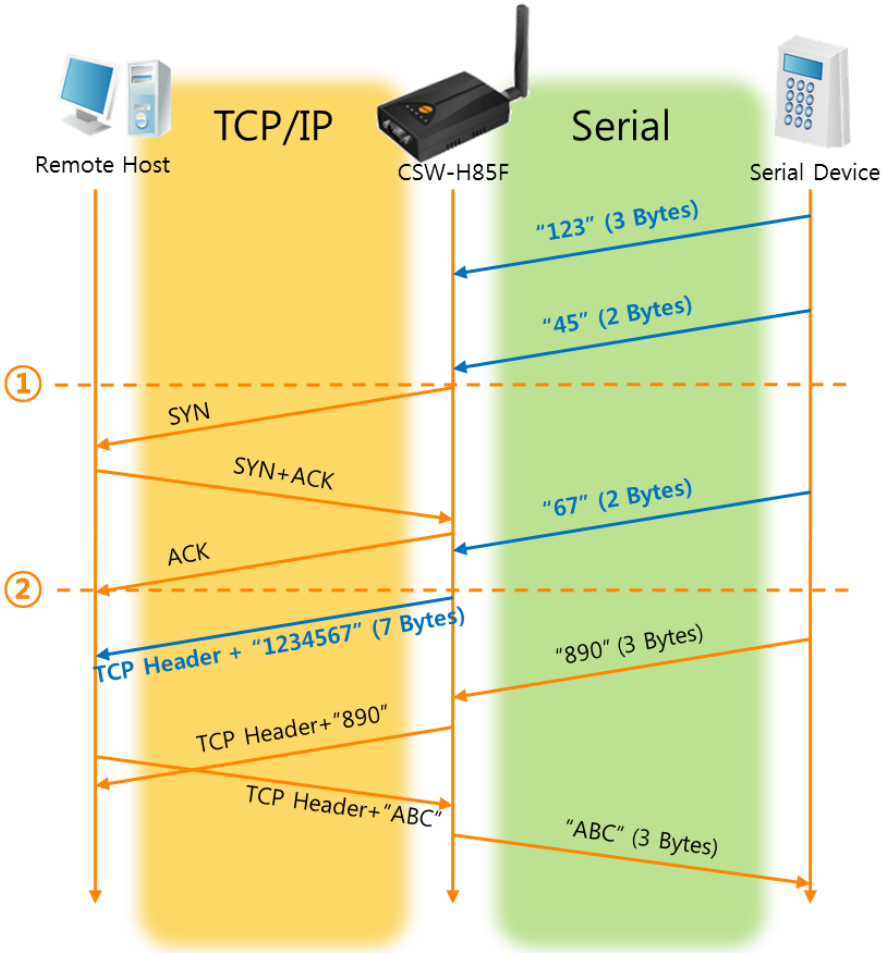


Figure 5-5 time chart

Table 5-8 states of each point

Points	States
~	H85 is receiving data from its serial port.
①	H85 sends connection request segment right after receiving 5 bytes.
~	processes of the TCP connection
②	The connection has been established.
~	The data "1234567" has been transmitted to the remote host.

As you can see, CSW-H85F sends request segment right after the serial data has been 5 bytes. Even though they arrived before the connection, the data "123", "45" and "67" was transmitted to the remote host because the [Event Byte] is set to 5.

5.3 AT Command

In AT command mode you can control CSW-H85F with AT command like controlling modem. Active and passive TCP connections are available but UDP is not. And you are allowed to configure some environmental parameters with extended commands.

5.3.1 Key parameters

The configuration should be implemented via the serial port.

Table 5-9 some of extended AT commands for configuration

Commands	Description	Examples
+PLIP	Local IP Address	at+plip=10.1.0.1<CR>
+PLP	Local Port	at+plp=1470<CR>
+PRIP	Peer IP Address	at+prip=10.1.0.2<CR>
+PRP	Peer Port	at+prp=1470<CR>
+PDC	DHCP	at+pdc=1<CR>
+PTO	Timeout	at+pto=10<CR>
+WCCT	WLAN Topology	at+wcct=1<CR>
+WSSID	SSID	at+wssid="sollae"<CR>
+PWP	Store setting	at+pwp<CR>
+PRST	Reboot	at+prst<CR>

- Related items with IP Address and Local Port
  Local port can be set as well as IP address related parameters like IP Address, Subnet Mask and Gateway IP Address.
- Peer Address / Peer Port
  IP address and local port of a remote host are can be set.
- Type of assigning IP address: Manual, DHCP
  Not only are manual setting available, also automatic assigning protocol (DHCP).
- WLAN parameters
  WLAN Topology, SSID and antenna can be configured by the above commands.
- Others
  Some of options including [Timeout] can be configured in this mode

☞ ***If you want more information about the ATC mode, please refer to the [ATC mode] document in [Download] >> [Technical documents] >> [Basic and Common part] category of our web site.***

5.3.2 Examples

- TCP Server – setting parameters and passive connection

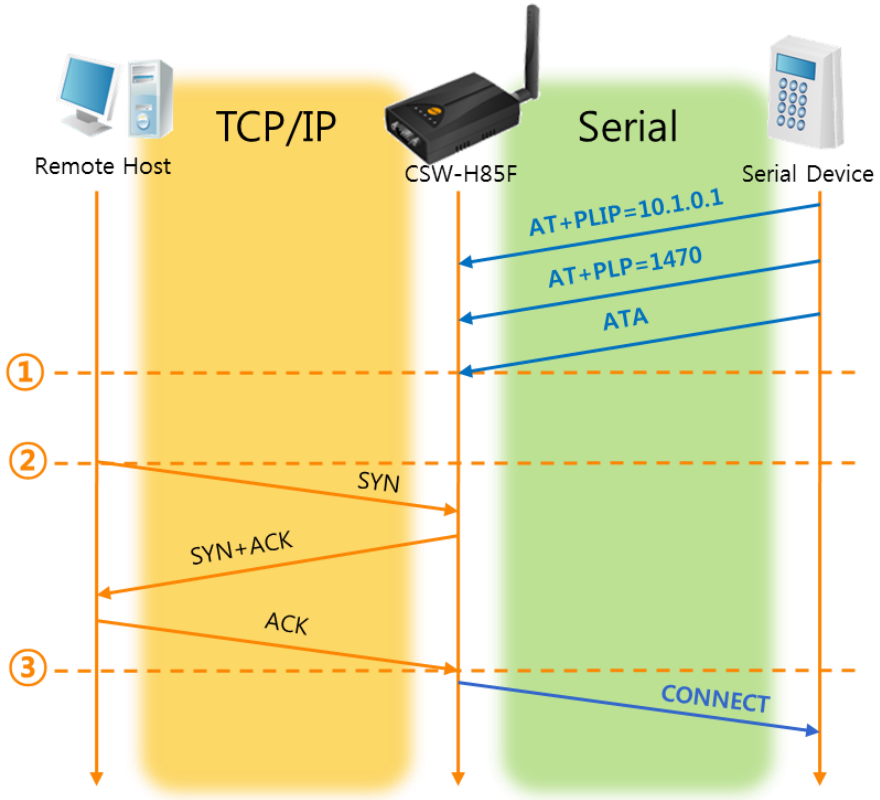


Figure 5-6 time chart

Table 5-10 states of each points

Points	States
~	configuring parameters with AT commands
①	ATA command has arrived.
~	H85 is listening to TCP connection requests.
②	A remote host has sent SYN segment to H85.
~	processes of TCP connection
③	TCP connection has been established.
~	CSW-H85F sends "CONNECT" message to the serial port.

☞ ***Some of the response messages from the serial port of CSW-H85F are omitted on above figure.***

- TCP Client - setting parameters and active connection

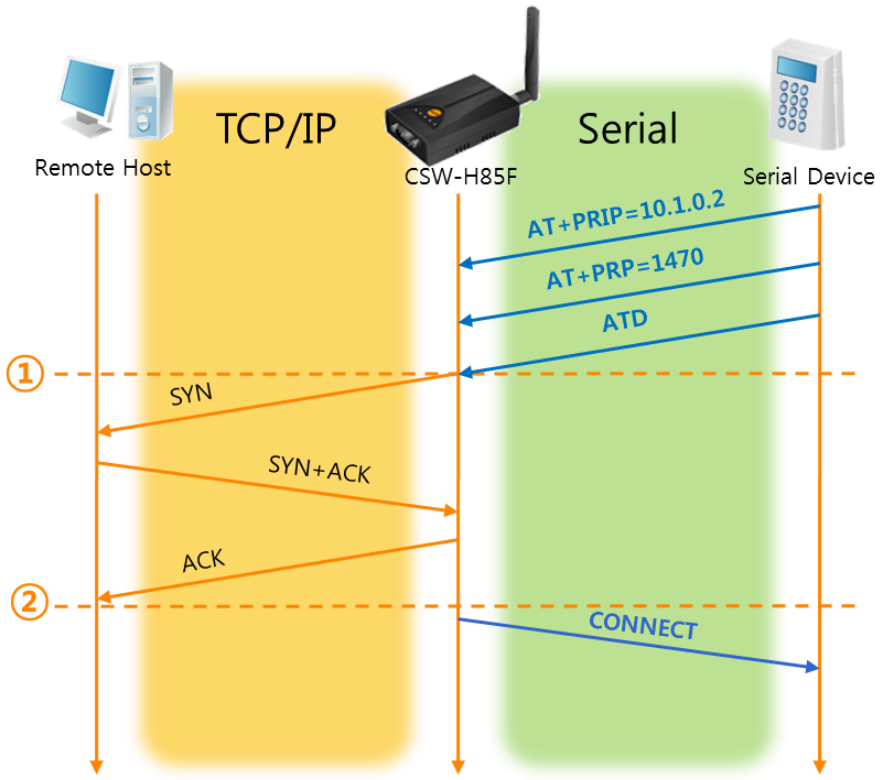


Figure 5-7 time chart

Table 5-11 states of each point

Points	States
~	configuring parameters with AT commands
①	H85 has sent a TCP connection request with the ATD command.
~	processes of TCP connection
②	TCP connection has been established.
~	CSW-H85F sends "CONNECT" message to the serial port.

- Termination of online status – entering the AT command mode

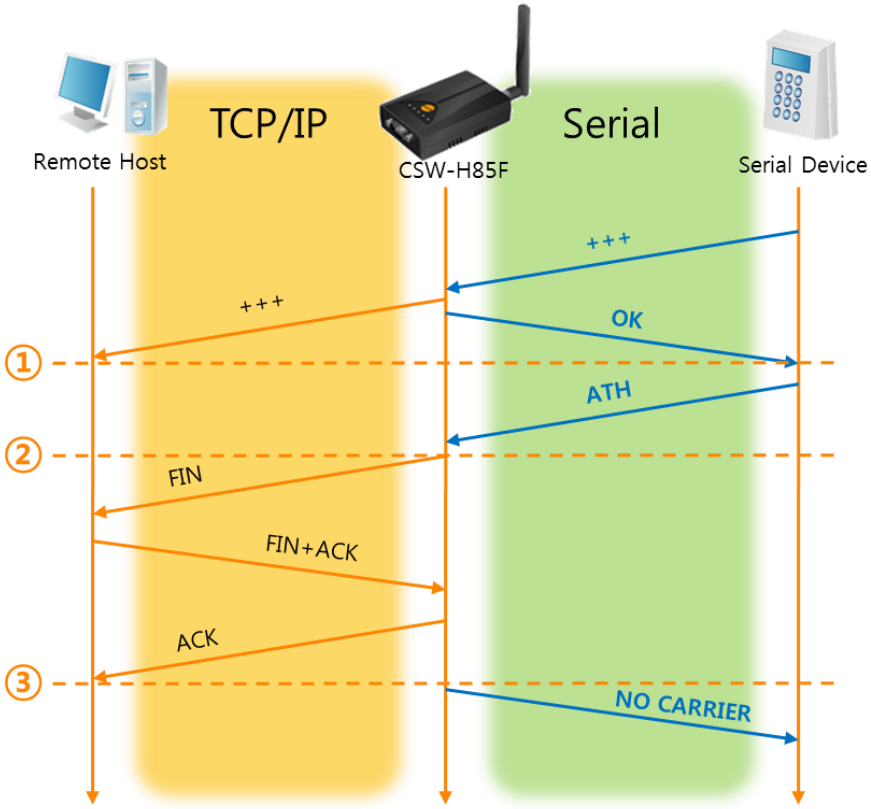


Figure 5-8 time chart

Table 5-12 states of each point

Points	States
~	TCP connection is on-line.
①	The mode has changed to "command mode" after receiving "+++".
~	command mode (TCP connection is off-line)
②	H85 has sent FIN segment right after the "ATH" has arrived.
~	processes of TCP disconnection
③	TCP connection has been terminated
~	H85 sends "NO CARRIER" with disconnection.

CSW-H85F changes the mode to AT command, when receiving "+++". In this state, the communication with remote host is not possible because H85 processes only AT commands. Whenever you want to go back to on-line state, just give "ATO" command.

5.4 UDP

UDP has no processes of connection. In this mode, data is sent in block units. Therefore, data that comes through CSW-H85F's serial port is collected in block units to send it elsewhere.

5.4.1 Key parameters

- Event Byte

  [Event Byte] means the size of a block in UDP mode. Its unit is byte. If the data in configured size of the [Event Byte] has come into the serial port, CSW-H85F sends them as one block to the network. The maximum value could be 1460 bytes.

- Data Frame

  [Data Frame] means the time for gathering data to make one block. Its unit is 10ms. If there are no data from the serial devices during the [Data Frame] time, CSW-H85F sends and receives data in the buffer as one block to the network.

☞ ***Once one of the two parameters is sufficient, event byte and data frame, UDP packet block will be transmitted.***

- Dynamic update of Peer host

  If users set the value of [Peer Address] and [Peer Port] to 0, [dynamic update of peer host] function is activated. By using this function, CSW-H85F can communicate to multiple hosts without additional setting.

5.4.2 Examples

- Event Byte: 5 bytes / Data Frame: 1sec

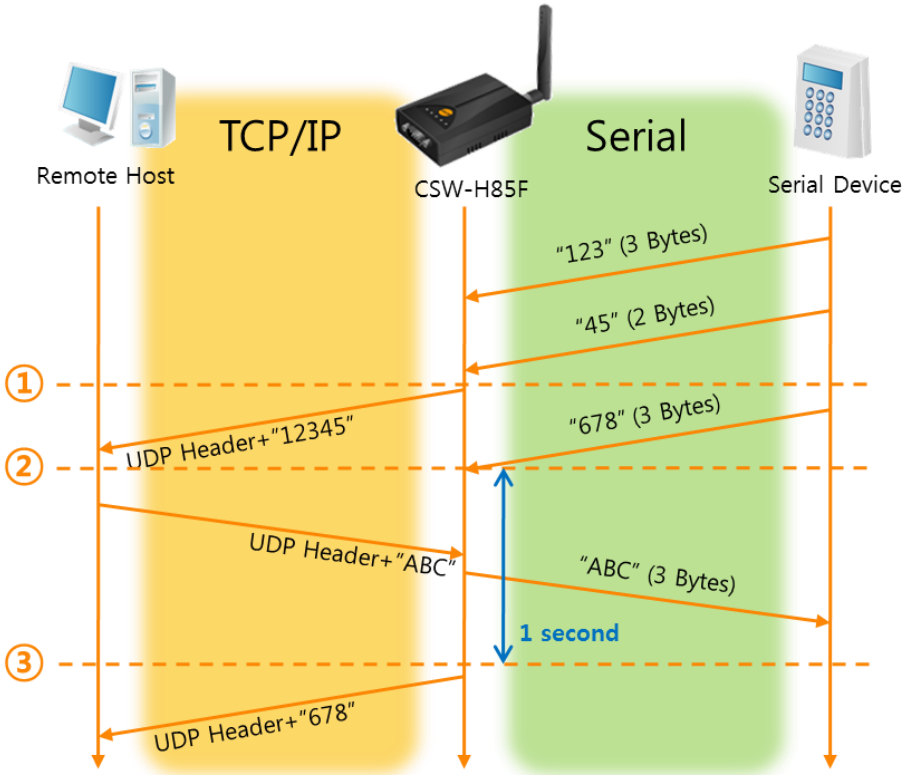


Figure 5-9 time chart

Table 5-13 states of each point

Points	States
~	H85 is receiving data from the serial port
①	H85 has sent 5 bytes as one block based on the [Event byte].
~	Serial device is sending data "678".
②	The data "678" has arrived.
~	H85 sends data from the remote host to the serial device
③	1 second has passed.
~	H85 sends data "678" as one block based on the [Data frame].

- Dynamic Update of Peer host

  This is a function that CSW-H85F automatically sets its peer host with information of the last packet received from network. The source address of the packet is set to the peer host.

Table 5-14 setting for [dynamic update of peer host] function

Parameters	Values
Peer Address	0 (None)
Peer Port	0

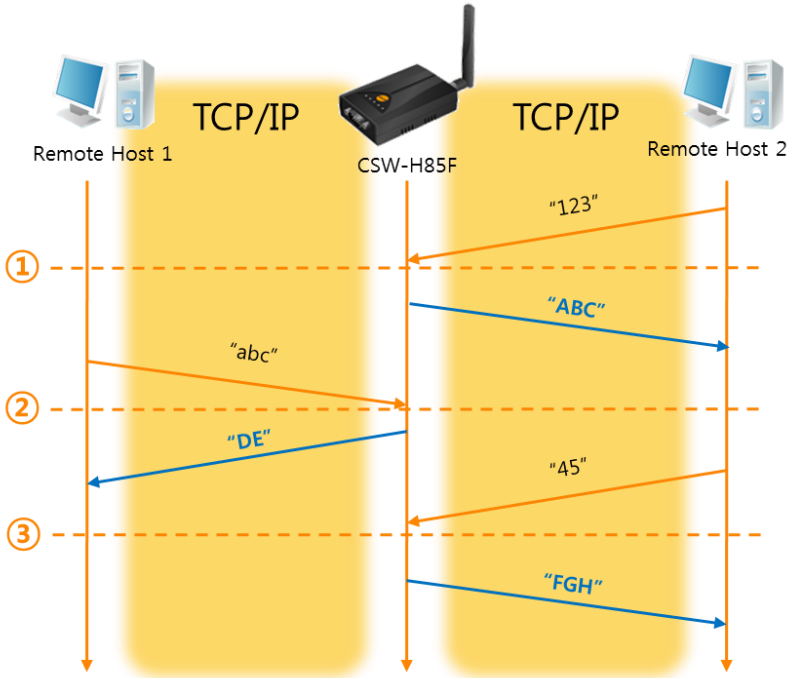


Figure 5-10 time chart

Table 5-15 states of each point

Points	States
~	Sending any UDP data to the network is impossible.
①	UDP data has arrived from Remote Host 2.
~	Send UDP data to Remote Host 2.
②	UDP data has arrived from Remote Host 1.
~	Send UDP data to Remote Host 1.
③	UDP data has arrived from Remote Host 2.
~	Send UDP data to Remote Host 2.

☞ ***The data "ABC", "DE", "FGH" are from the serial port of CSW-H85F in the above figure.***

6 System Management

6.1 Upgrading Firmware

6.1.1 Firmware

Firmware is a type of software for operation of CSW-H85F. If there are needs for adding functions or fixing bugs, the firmware can be modified and released. That is why we always recommend using the latest firmware.

6.1.2 Processes

- Downloading the latest firmware
  Download the latest firmware file. We upload it on our homepage if a new one is released.
- Connecting the serial ports
  Connect serial port of CSW-H85F to the PC's COM port with RS232 cross cable.
- Run the program for sending the F/W file
  Run the program on the ezManager, by clicking the [Change F/W / HTML] button.

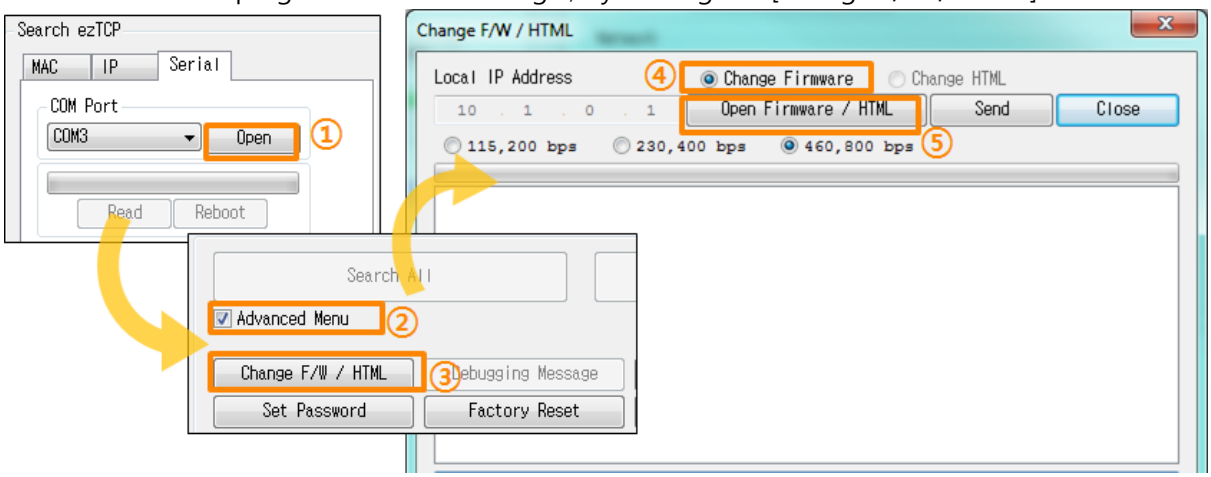


Figure 6-1 running the program for sending F/W file

① Press the [Open] button after selecting the COM port.
② Click the [Advanced Menu] check box.
③ Press the [Change F/W / HTML] button to run the program.
④ Check the [Change Firmware] radio button.
⑤ Press the [Open Firmware / HTML] button and choose the firmware file.

- Checking firmware file and Sending

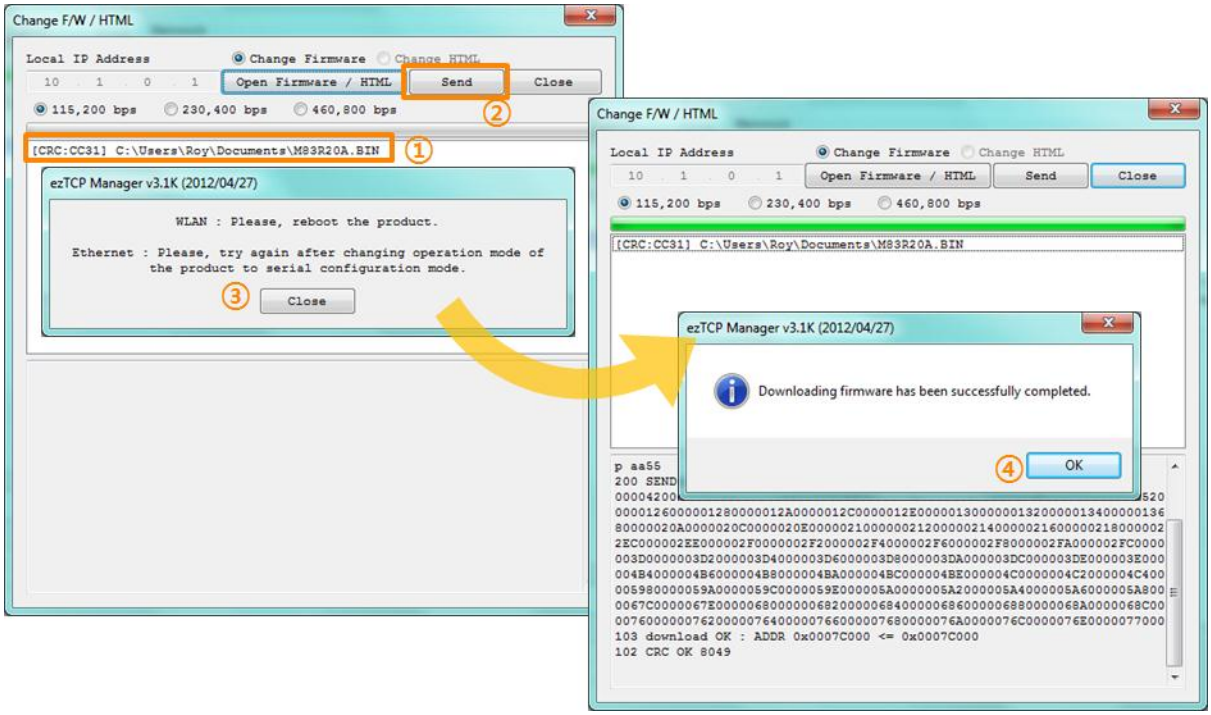


Figure 6-2 sending firmware file

① Check if the name and path of the firmware file are correct.

② Click the [Send] button.

③ Request for reboot message will appear. After reboot, the program will send the file automatically.

④ Confirm the completed message.

6.2 Status Monitoring

6.2.1 TELNET

When the [TELNET] option is activated, you can remotely log in to CSW-H85F. If a password is set, users should input the password. After then, messages from CSW-H85F will appear like the following figure.

```
CSW-H85 Management Console v2.0A Sollae Systems
lsh>
```

Figure 6-3 log in to CSW-H85F via TELNET

Following commands help you check states of CSW-H85F

Table 6-1 commands for checking states

Command	Option	Description	Usage
st	net	Network Status	lsh>st net
	sio	Serial Port Status	lsh>st sio
	uptime	System Uptime	lsh>st uptime
sc	[OP1][OP2]	Session Close	lsh>sc com1 close

- st net

  This command is for displaying current network states of all sessions.

```
lsh>st net
proto  name       local address           peer address       sendq    state
-----  ------ ---------------------- ---------------------- -----  -----------
TCP       tty          10.1.0.1(   23)        10.6.0.56(58989)   219 ESTABLISHED
TCP      com1           0.0.0.0( 1470)          0.0.0.0(    0)     0 LISTEN
lsh>
```

Figure 6-4 "st net" command

- st sio

  This command is for displaying the number of bytes of the serial port.

```
lsh>st sio
port fmax rbmax rxbuf txbuf  rx_count   tx_count
---- ---- ----- ----- ----- ---------- ----------
com1    0     0     0     0          0          0
lsh>
```

Figure 6-5 "st sio" command

- st uptime

  This command is for showing system uptime since H85 has booted up.

Figure 6-6 "st uptime" command

- sc

  This command is for disconnecting one of the current sessions. Input session name to [OP1] and "close" command to [OP2].

Figure 6-7 "sc" command

6.2.2 Status Window of ezManager

Status of CSW-H85F can be monitored by the [Status] button on ezManager. By using the [Refresh Every 1 Second] option in the window, the status will be automatically updated in every second.

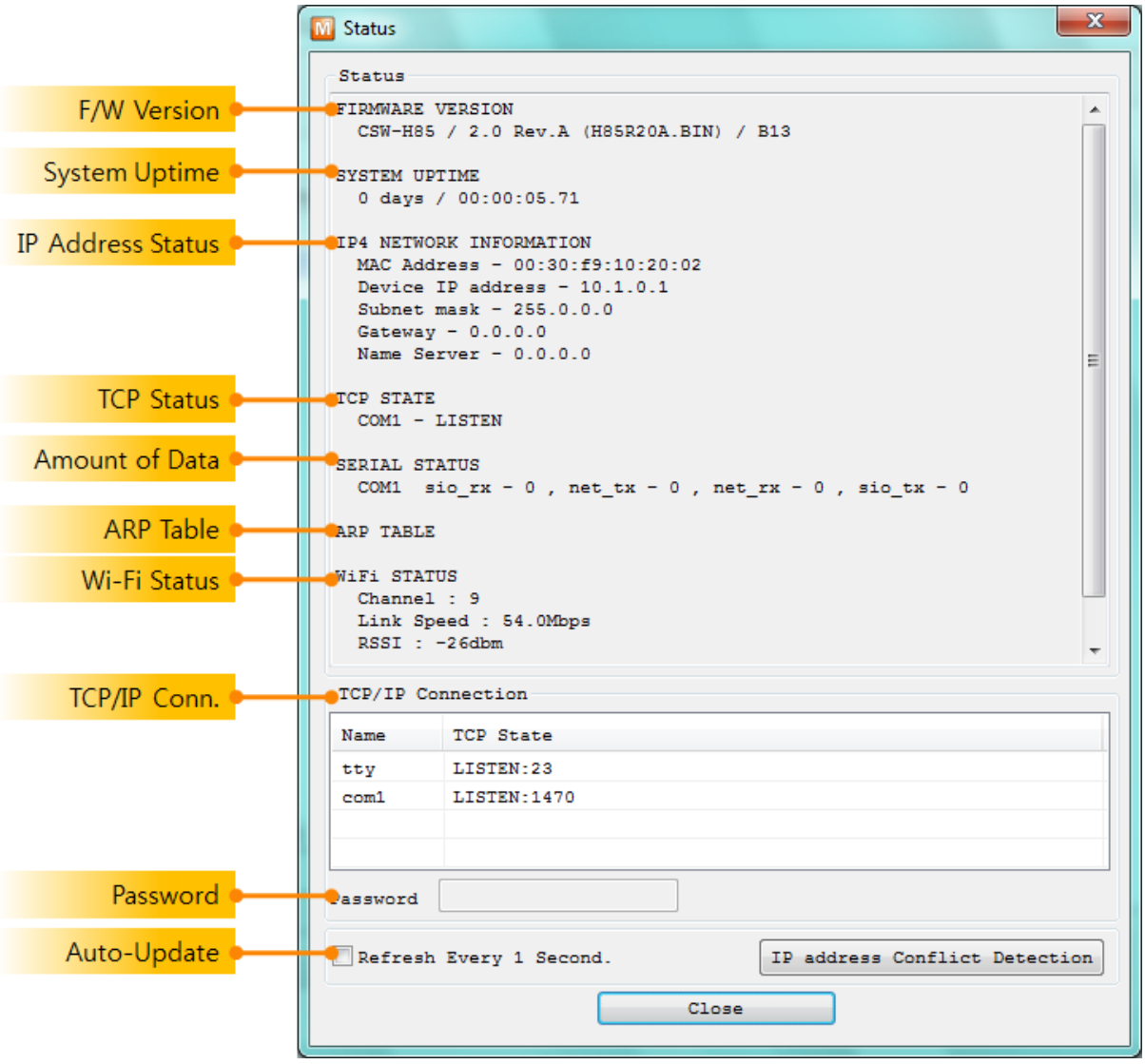


Figure 6-8 status window of ezManager

- FIRMWARE VERSION

  The name of model and the version of firmware are displayed here.

- SYSTEM UPTIME

  Amount of operating time since CSW-H85F has booted up is displayed.

- IP4 NETWORK INFORMATION

  All information about related items with the IP Address is shown here. It works even if the IP address is assigned by DHCP

- TCP STATE

  TCP status of each port is shown in this section.

Table 6-2 TCP STATE

Message	Description
LISTEN	The session is waiting for TCP connection.
CLOSE	TCP connection is closed.
SYN_SENT	The session is sending "SYN" segment to a TCP server.
ESTABLISHED	TCP connection is established.
N/A	in UDP mode

- Amount of data

  Amount of data in each buffer is displayed. The unit is byte.

Table 6-3 SERIAL STATUS

Buffer	Description
sio_rx	The number of data which is received from the COM port
net_tx	The number of data which is sent to the remote host
net_rx	The number of data which is received from the remote host
sio_tx	The number of data which is sent to the COM port

- ARP Table

  This part shows ARP table on CSW-H85F. When TCP connection is established or UDP data communication is performed, the information of IP and MAC address is automatically registered in the table. This information lasts for 1 minute so when 50 seconds have passed, CSW-H85F starts broadcasting the ARP packet in every second. If there is no response until the time is 0, the information is removed. Otherwise, the time is updated 60 seconds again.

- Wi-Fi Status

  Status of Wireless LAN Channel is displayed.

Table 6-4 Wi-Fi status

Item	Description
Channel	Current channel (Frequency band)
Link Speed	Maximum data rate of the link (Unit: Mbps)
RSSI	Received Signal Strength Indication (Unit: dBm)
RSNA	N/A

- TCP/IP Connection
  The same information with [TCP STATE] is displayed with IP address and port number. A difference from [TCP STATE] is that users can terminate TCP connection. When right click on a session, a small pop-up window is created.
- Password
  This text box is activated when CSW-H85F has a password. If you want to close TCP connection on [TCP/IP Connection] list, input the password first.
- Refresh Every 1 Second.
  If this option is checked, ezManager sends queries in every second.
- IP Address Conflict Detection
  By clicking this button, you can find devices which have the same IP address of yours in a network.

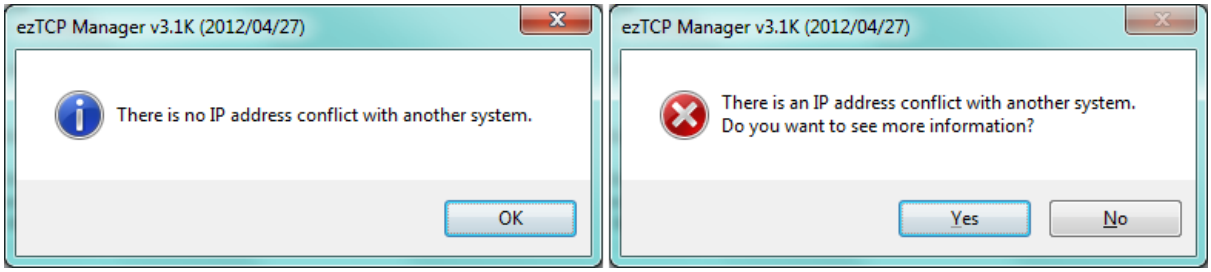


Figure 6-9 IP address conflict detection

7 Additional Functions

7.1 Security

7.1.1 Access Restriction (ezTCP Firewall)

On the [Option] tab of ezManager, users can set access restriction function with MAC and IP address.

- Allowed MAC Address

  If this option has a valid value, the device which has the MAC address is only permitted to access.

- Allowed IP Address

  This is for qualifying hosts with IP address or range of IP addresses. The range is defined by multiplying [IP address] and [Network Mask] in bit unit.

- Examples

Table 7-1 examples of defining allowed IP range

IP Address	Network Mask	Allowed IP Address Range
10.1.0.1	255.0.0.0	10.1.0.1 ~ 10.255.255.254
10.1.0.1	255.255.255.0	10.1.0.1 ~ 10.1.0.254
192.168.1.4	255.255.255.255	192.168.1.4

- Apply to ezManager

  [Apply to ezManager] is for applying above two restrictions to ezManager functions like [Search], [Read], [Write] and etc.

7.1.2 Setting Password

A password can be used for protecting CSW-H85F from TELNET login or changing environmental parameters by hosts which are not qualified. The maximum length is 8 bytes of alphabet or number.

☞ ***When you want to revoke all of these restrictions, operate CSW-H85F as the serial configuration mode.***

7.1.3 Using WEP

- Configuration of the Access Point

  Set the related parameters on the AP first. If you do not know how to set AP's parameters, please refer to the manual or ask the manufacturer.

- Choosing Authentication and Encryption Methods.

  Select WEP on the panel.

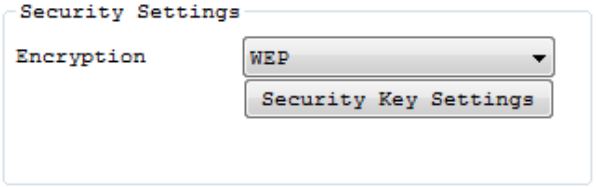


Figure 7-1 security settings

Table 7-2 available values

Parameter	Available Values
Encryption	None / WEP / WPA PSK
Authentication	Automatically selected

- Setting WEP key

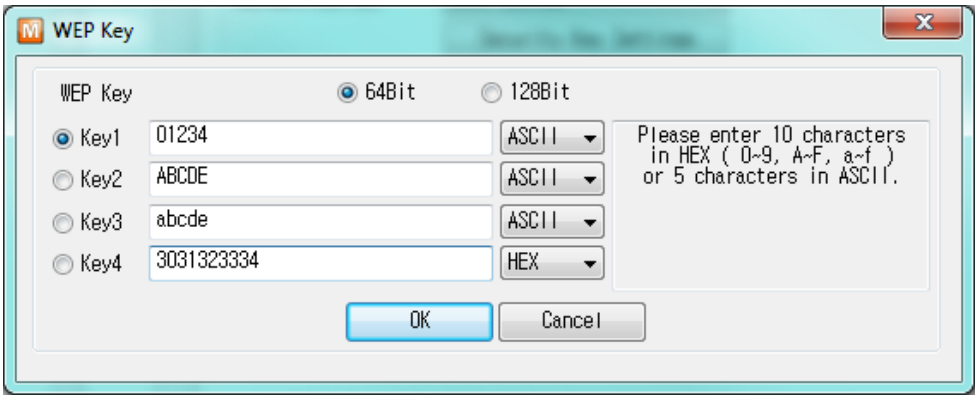


Figure 7-2 an example of setting WEP Key

Table 7-3 available values

Parameter		Available Values	
Key Index		Key 1 ~ 4	
Length		64 bits	128 bits
Type	ASCII code	5-digits	13-digits
	Hexadecimal	10-digits	26-digits

7.1.4 Using WPA

- Configuration of the Access Point

  Set the WPA-PSK or WPA2-PSK and related parameters with it on your AP first. If you do not know how to set AP's parameters, please refer to the manual or ask the manufacturer.

- Choosing Authentication and Encryption Methods.

  Select WPA PSK on the panel.

Figure 7-3 security settings

- Setting WPA Key

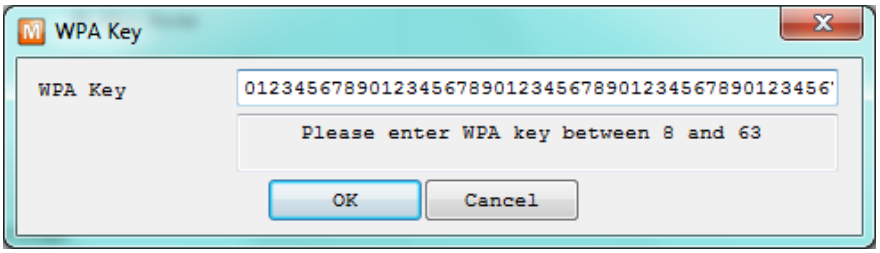


Figure 7-4 an example of setting WPA key

Table 7-4 available values

Parameter	Available Values
Authentication	Automatically selected
Encryption	Automatically selected
Length	8~63 digits

7.1.5 Advanced Settings

You can configure advanced settings for WLAN with this button. We recommend using the default values if you don't have any problem with it.

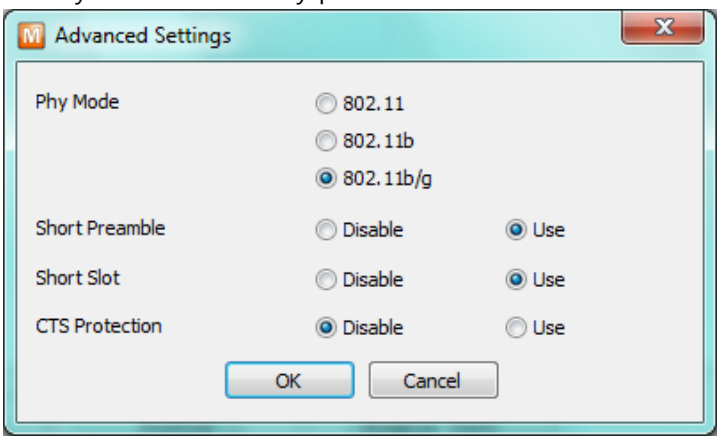


Figure 7-5 Advanced Settings

- PHY Mode

  You have three options for PHY mode. Those are 802.11 mode, 802.11b mode and 802.11b/g mode.

- Short Preamble

  Using this option, you can expect a slight improvement in WLAN performances under good condition of WLAN environment. If you are in bad condition, you had batter to disable this option.

- Short Slot

  Using this option, you can expect some improvement in WLAN performances. If you are in bad condition of WLAN environment, you had batter to disable this option.

- CTS Protection

  Using this option, you can expect some improvement in WLAN performances under WLAN environment that both 802.11b and 11g devices are.

7.2 Option Tab Functions

7.2.1 Notify IP Change

CSW-H85F can be a TCP server even though its IP address is automatically assigned. Using [Notify IP Change] function, H85 sends its IP address to the specific server. There are 3 types for this service, DDNS, TCP and UDP.

- Dynamic Domain Name Service (DDNS)
  CSW-H85F supports DDNS service offered by DynDNS. Therefore, you have to make an account and create host names on the website of DynDNS before you use.

☞ ***All about service usage of an account could be changed according to the policy of DynDNS.***

☞ ***Homepage of DynDNS: http://dyn.com/dns/***

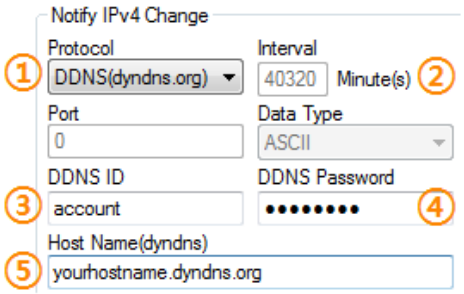


Figure 7-6 setting DDNS

① Select the [DDNS(dyndns.org)]
② 40,320 is a fixed value
③ Input the ID of DDNS account
④ Input the password of the account
⑤ Input a host name which you create on your account

- TCP/UDP
  In case you have an own server and want to manage the information about changed IP addresses, you are allowed to use TCP/UDP. Not only can you set the [Interval], but also use both ASCII and hexadecimal in [Data Type].

☞ ***For more information about this, please refer to the "IP Change Notification(DDNS)" on the [Download] >> [Technical Document] menu of our web site.***

7.2.2 Sending MAC Address

[Sending MAC Address] is a function that the CSW-H85F sends its MAC address to the remote host right after a connection. By using this function, a server can identify multiple devices with the information.

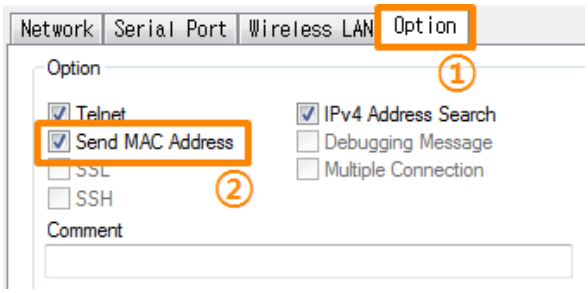


Figure 7-7 setting of Sending MAC Address function

① Move to the [Option] tab

② Check the [Send MAC Address] option

7.3 Serial Port Tab Functions

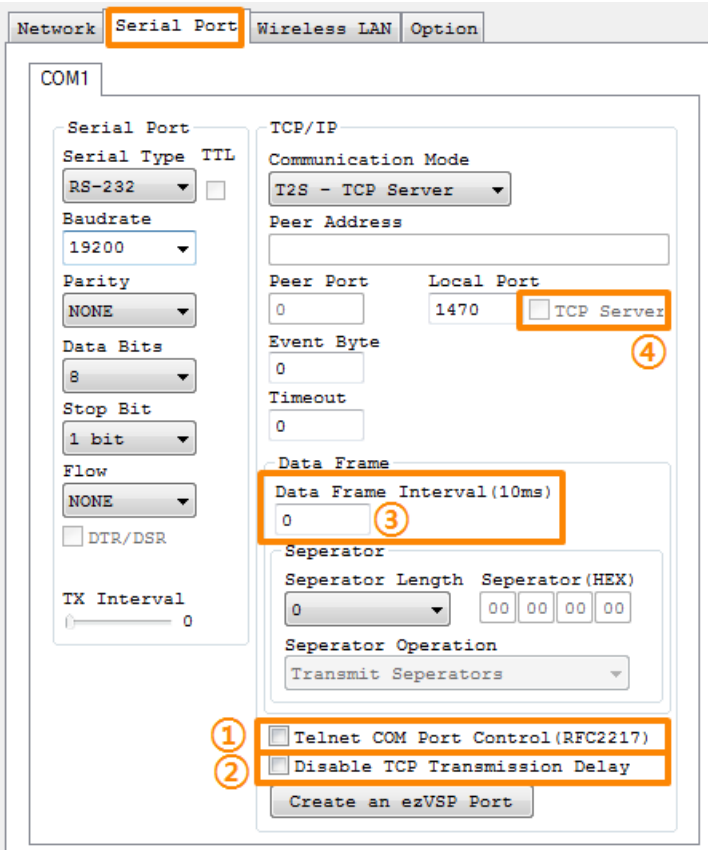


Figure 7-8 setting of TELNET COM Port Control option

7.3.1 TELNET COM port Control Option (RFC 2217) - ①

This option is for sending and receiving serial port states between two devices. Users can send and receive control signals such as RTS/CTS when the states are changed.

7.3.2 Disable TCP Transmission Delay - ②

If you use this option, CSW-H85F sends the data from the serial port to Ethernet as quickly as possible.

7.3.3 Data Frame Interval - ③

Before sending data from the serial port to Ethernet, ezTCP gathers data in the buffer. If there is no data during the time configured in the [Data Frame Interval], ezTCP will send data to the network. In case the value is set to 0, data will be sent immediately. The unit is 10ms and this is operated more accurately by checking [Disable TCP Transmission Delay] option.

☞ ***The [Separator] function is currently not available***

7.3.4 TCP Server / Client mode - ④

This mode is available on TCP client mode only. In this mode, you don't need to change the mode for switching active or passive TCP connection. Note that the [Event Byte] option should be set to more than 1.

☞ ***If you want to get more information about the above functions, refer to the technical documents on [Download] >> [Technical documents] page at our web site.***

7.4 Additional Functions

7.4.1 LQ Indication

CSW-H85F indicates 4 levels of Received Signal Strength Indicator (RSSI), measured from product side, with LED indicators.

- Using LINK Quality Indication

  Establishing a wireless network, locate the function switch to the right. (LQ indication function)

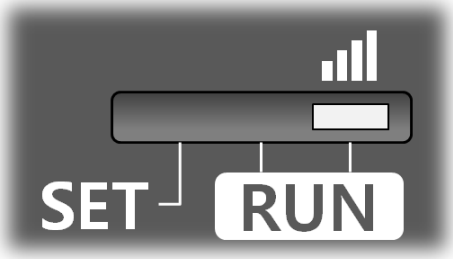


Figure 7-9 setting of LQ indication function

Using this function, CSW-H85F indicates the RSSI by using 4 LED indicators which are listed on the table below.

Table 7-5 4 states of LQ indication

Division	STS	LINK	RXD	TXD
RSSI < -70dBm	ON	OFF	OFF	OFF
-60dBm < RSSI ≤ -70dBm	ON	ON	OFF	OFF
-50dBm < RSSI ≤ -60dBm	ON	ON	ON	OFF
-50dBm < RSSI	ON	ON	ON	ON

☞ ***Higher values of RSSI represent higher qualities of the wireless signal.***

7.4.2 Factory Reset

It is a function physically initializes all the values. Users can set customized default for the factory reset. However, if you don't set the default, it will be initialized to the factory default.

- Using Factory Reset
  ① Move the function switch to the left. (SET)

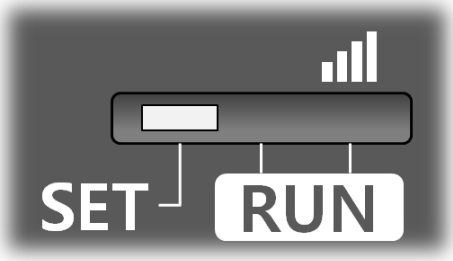


Figure 7-10 setting of serial configuration mode

  ② Push the function button over 5 seconds.
  ③ Factory Reset will be automatically implemented to default values.
  ④ Reboot

- Setting custom default values
  ① Change the mode to Serial Configuration
  ② Save custom default values by ezManager or serial configuration commands
  ③ Input the command below

b	<SPACE>	3c5a	<CR>

  ④ After that, current values in the SRAM will be used for Factory Reset.

☞ ***After you use a custom default value set, Factory reset function uses not the factory default but custom default. Because of this, you had batter to use this command carefully.***

8 Checklist in Trouble

When you are in trouble with CSW-H85F, make sure all the following first.

8.1 Searching problem with ezManager

- Confirming configuration utility
  CSW-H85F should be configured by ezManager.
- Stopping Firewall operation
  A firewall on personal computer or network can block broadcast packets. Stop all the firewalls before searching CSW-H85F

☞ ***Most of vaccine applications have firewall functions so it can cause some trouble to search CSW-H85F. Stop these programs before searching.***

- Stable supply of the power
  Check if the power is supplied continually.
- Connection with the wireless network
  Check if the wireless link is established. After confirming that the status of LINK LED is ON, check the list of wireless LAN devices on the management page of the AP.

☞ ***After booting up, establishing a wireless link could take some time (a few dozens of seconds) according to the network condition.***

- Connection with the network
  Make sure that the network connection between the PC and AP including Ethernet cable. In this step, we recommend you to connect the AP with your PC directly or in the same network hub.
- Checking options of restriction
  In case that access restriction is activated, the communication with ezManager would be impossible. When you are in this situation, make CSW-H85F operate in the serial configuration mode to revoke the restriction.

8.2 Connection Problem over TCP/IP

- Connection with the wireless network
  Check if the wireless link is fine.

- Checking parameters related with TCP/IP
  When CSW-H85F has a private IP address, an IP address of a PC and H85 needs to be on the same network. Check if the IP address and local port number are correct. In the case of a fixed IP address related items such as subnet mask, gateway IP address and DNS IP address should be configured.

Table 8-1 major parameters related with TCP/IP

TCP Server side	TCP Client side
Local IP Address, Local Port, Subnet Mask, Gateway IP Address, DNS IP Address, DDNS option, and etc.	Local IP Address, Peer Address, Peer Port, Subnet Mask, Gateway IP Address, DNS IP Address, and etc.

- PING Test
  Confirm the connection over the network by PING test. If the CSW-H85F doesn't send any reply from the request, check the network environment.

- Network Firewall
  In the case of networks which need strong security, the access may be denied by their firewall. Under this circumstance, consult the network administrator to release ports which will be used. (Ex: TCP 1470, UDP 50005)

- Operation Mode
  TCP connection will not be established when CSW-H85F is operating in the ISP or Serial Configuration mode.

- Communication Mode
  To make TCP connection, both a server and client should exist. If there are only servers or clients, TCP connection cannot be established.

- ezTCP Firewall
  When you set the ezTCP firewall with MAC and IP address, all hosts cannot be reachable except for the hosts have the allowed MAC and IP address. Inactivate the option or check the setting is correct for allowing specific hosts to access.

- Checking the TCP status
  Basically, TCP is a protocol connected one to one. Because of this, if a device is TCP on-line state, other requests are denied. If you are in this situation, check the network status by connecting on TELNET or using ezManager.

8.3 Data Communication Problem on the Serial Port

- Connection of Pins

  Check if the each connection of pins is right. Refer to the chapter 1.7.3 to find out the pin assignment. In the case of using a cable, you should choose the right type of cable which is suitable for the device.

- Setting parameters

  Check if all the serial port parameters like Baud Rate, Data bit, Stop bit and Parity are properly set.

☞ ***Please contact us if you have any questions about above steps or our products.***

9 Technical Support, Warranty, and Precaution

9.1 Technical Support

If you have any question regarding operation of the product, visit Customer Support FAQ corner and the message board on Sollae Systems' web site or send us an email at the following address:

- Website Address for Customer Support: http://www.eztcp.com/en/support/
- E-mail: support@eztcp.com

9.2 Warranty

9.2.1 Refund

Upon the customer's request to refund the product within two weeks after purchase, Sollae Systems will refund the product.

9.2.2 Free Repair Services

For product failures occurring within two years after purchase, Sollae Systems provides free repair services or exchange the product. However, if the product failure is due to user's fault, repair service fees will be charged or the product will be replaced at user's expense.

9.2.3 Charged Repair Services

For product failures occurring after the warranty period (two years) or resulting from user's fault, repair service fees will be charged and the product will be replaced at user's expense.

9.3 Precaution

- Sollae Systems is not responsible for product failures occurring due to user's alternation of the product.
- Specifications of the product are subject to change without prior notice for performance improvement.
- Sollae Systems does not guarantee successful operation of the product if the product was used under conditions deviating from the product specifications.
- Reverse engineering of firmware and applications provided by Sollae Systems is prohibited.
- Use of firmware and applications provided by Sollae Systems for purposes other than those for which they were designed is prohibited.
- Do not use the product in an extremely cold or hot place or in a place where vibration is severe.
- Do not use the product in an environment in which humidity is high or a lot of oil exists.
- Do not use the product where there is caustic or combustible gas.
- Sollae Systems does not guarantee normal operation of the product under the conditions a lot of noise exists.
- Do not use the product for a purpose that requires exceptional quality and reliability relating to user's injuries or accidents – aerospace, aviation, health care, nuclear power, transportation, and safety purposes.
- Sollae Systems is not responsible for any accident or damage occurring while using the product.

10 Revision History

Date	Version	Description	Author
2012.07.24	1.0	○ Initial release	Roy LEE