

Remote I/O Controller

CIE-H12G User Manual

Version 1.2

Sollae Systems Co., Ltd.

<https://www.ezTCP.com>



This symbol, found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, household waste disposal service or the retail store where you purchased this product.

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1 Overview

1.1 Overview

CIE-H12G provides the functionality of remotely monitoring sensors such as temperature, humidity, and pressure, as well as controlling power supplies remotely. CIE-H12G detects ON/OFF by receiving digital output from sensors and controls an output port through remote requests. It supports Modbus/TCP, HTTP, and macro functions for input/output control.

1.2 Main Features

- 2 digital input ports (dry contact and wet contact)
- 1 digital output port (relay interface)
- Support Modbus/TCP for I/O control function
- Support HTTP for I/O control function
- Provide custom web page function
- Support macro function for output control
- Support for IPv6 (IPv4/IPv6 dual stack)

1.3 Application Examples

- 1:1 Connection with a remote host (HMI)

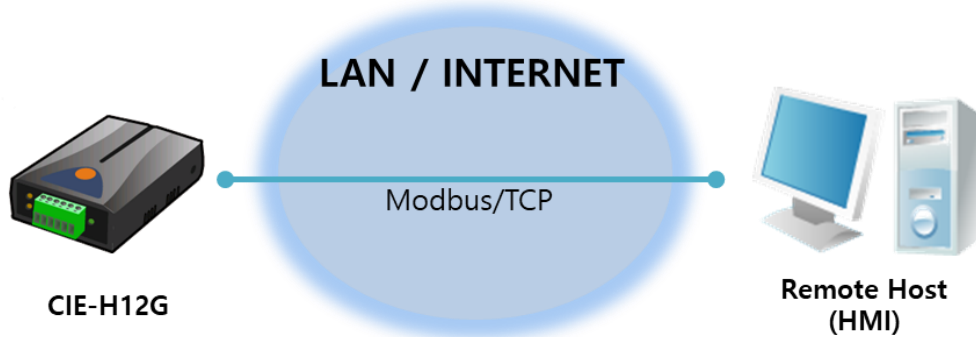


Figure 1-1 1:1 Connection with a remote host (HMI)

- 1:N Connection with a remote host (Web)

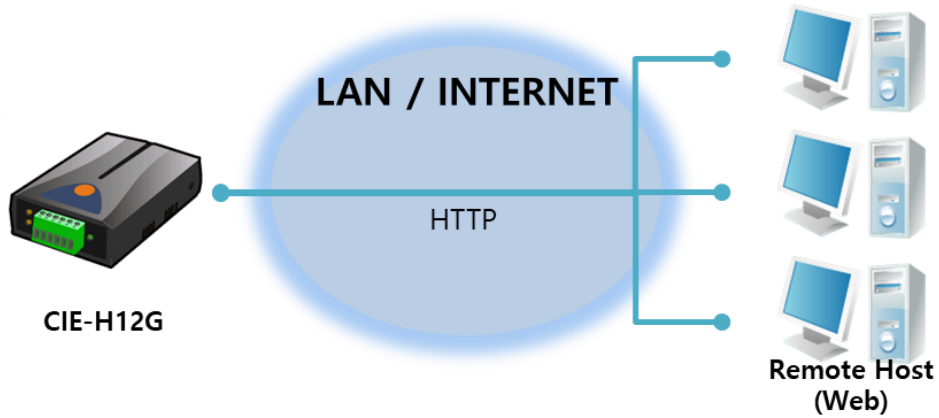


Figure 1-2 1:N Connection with a remote host (Web)

- Internet switch

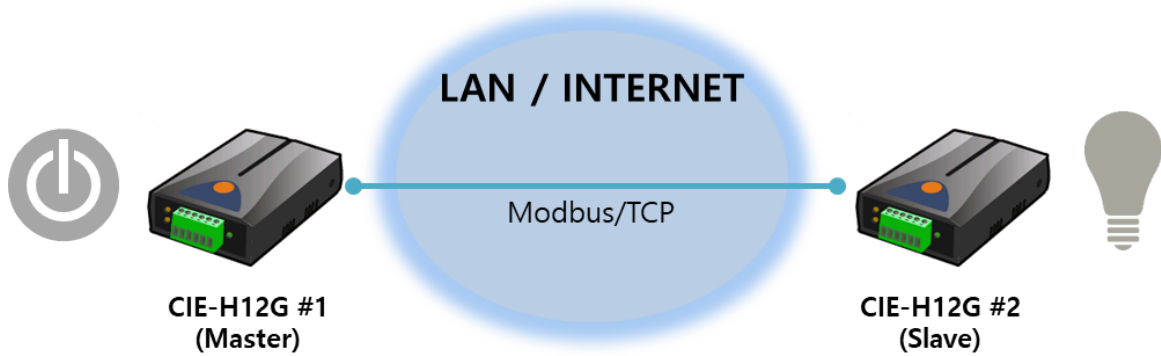


Figure 1-3 Internet switch

1.4 Specification

1.4.1 H/W specification

Power	Input Power	DC 5V (±10%)
	Current Consumption	160mA typical
Size	96mm x 57mm x 24mm	
Weight	Approximately 68g	
Interfaces	Digital Input	2 Digital input ports (Dry contact / wet contact)
	Digital Output	1 Digital output port with relays
	Ethernet	RJ45
Network	Ethernet 10Base-T or 100Base-TX (Auto-Sensing) Auto MDI/MDIX(Cable Auto-sensing)	
Temperature	Operate / Storage: -40 ~ 85°C	
Certification	KC, CE	
Environment	Follows Europe RoHS Directive	

Table 1-1 H/W specification

1.4.2 S/W specification

Protocol	TCP, UDP, ICMP, IPv4/IPv6 dual stack, ICMPv6/TCPv6/UDPv6, ARP, DHCP, DNS, DDNS, Modbus/TCP, HTTP, TELNET	
Operation mode	Normal	Normal communication mode
	ISP	F/W upgrade
Communication Mode	I/O server	Modbus/TCP – Slave/Master, Passive/Active Web Browser(HTTP), Macro(Stand-alone), Serialized Modbus/TCP
Programs	ezManager	Configuration program via LAN
	ModMap	Modbus/TCP Application for Windows

Table 1-2 S/W specification

1.5 Interface

1.5.1 Input Ports

CIE-H12G has two input ports and the each has different type with the other. The one is a “DRY CONTACT” type and the other one is a “WET CONTACT.”

- DRY IN: a non-voltage contact type

The DRY IN port is an input port with a non-voltage contact type. This port detects ON/OFF based on whether there is a short circuit or an open circuit between the terminals. If there is a short circuit, the input is judged as ON, and if there is an open circuit, the input is judged as OFF.

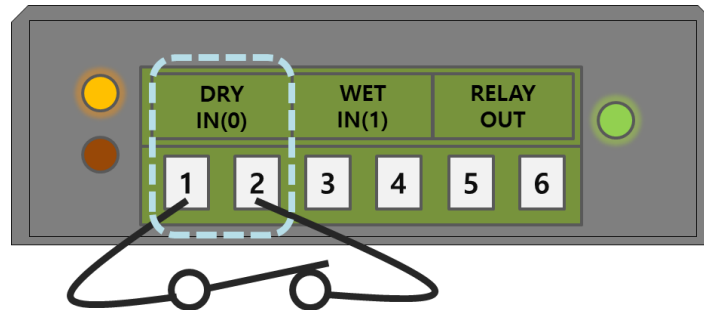


Figure 1-4 the DRI IN port

The ON/OFF determination conditions for the DRY IN port are as follows:

Division	State	Value
Short circuit	HIGH (ON)	1
Open circuit	LOW (OFF)	0

Table 1-3 the DRY IN port

- WET IN: a wet voltage contact type

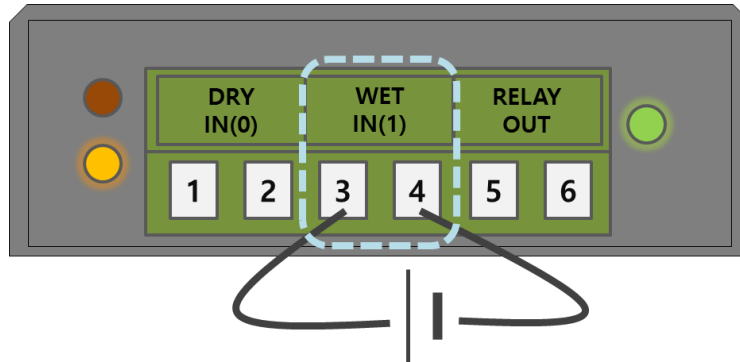


Figure 1-5 the WET IN port

The WET IN port is an input port with a wet voltage contact method. The port is insulated through a photocoupler and detects ON/OFF through DC voltage input. Each port automatically detects polarity.

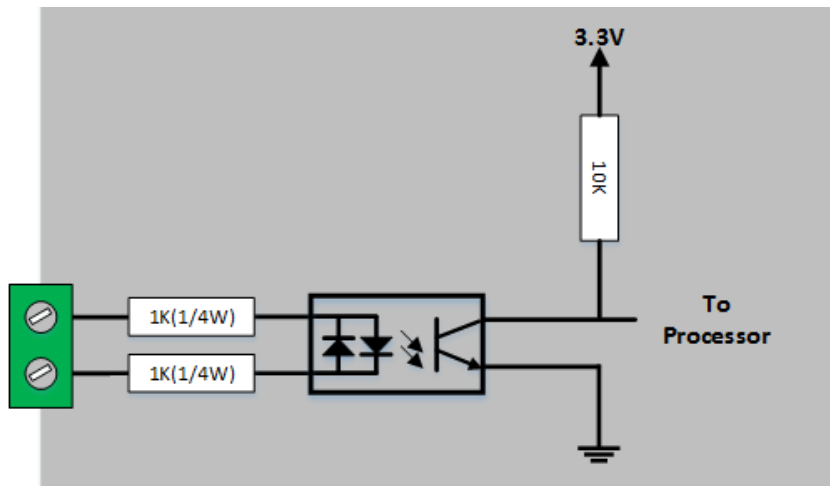


Figure 1-6 a circuit of the WET IN port

The maximum input voltage for the WET IN port is DC 24V, and the ON/OFF determination conditions are as follows:

Voltage Condition(DC)	State	Value
4.5V ~ 24V	HIGH (ON)	1
1.2V ~ 4.5V	Undefined	
0V ~ 1.2V	LOW (OFF)	0

Table 1-4 Conditions for determining ON/OFF of input ports

☞ *The input port is interfaced with a 5mm terminal block. Thus, use a (-) shaped screwdriver to connect it with the user device.*

1.5.2 An Output Port

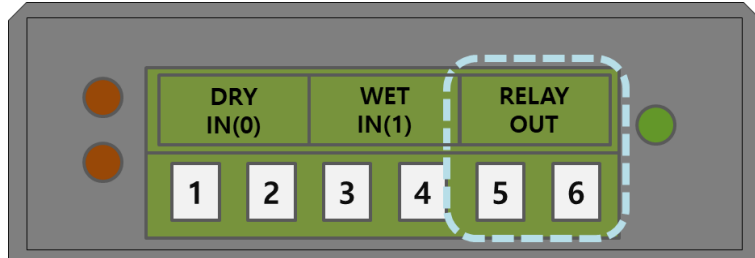


Figure 1-7 an output port

An output port of CIE-H12G is interfaced to a NO (Normal Open) type relay.

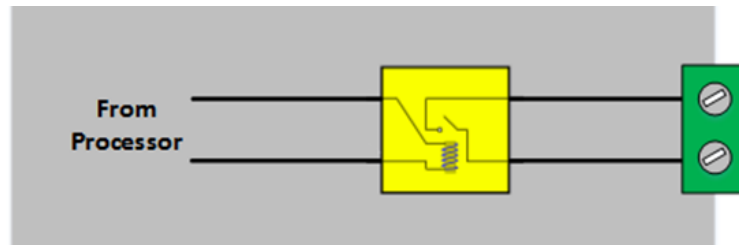


Figure 1-8 a circuit diagram of the output port

The operations of an output port are as follows:

Value	Relay contact
0	OFF (open)
1	ON (short)

Table 1-5 Operations of an output port

The maximum allowable current according to the voltage condition of the output port is as follows.

Voltage Condition	Allowable current
DC 28V	5A

Table 1-6 The maximum allowable current

- ☞ *The maximum allowable current is for resistive loads. It is recommended to design about 10 ~ 20% of the maximum allowable current for capacitive loads such as SMPS and inductive loads such as motors.*
- ☞ *Use a (-) shaped screwdriver to connect it with users' devices since the output port is interfaced with a 5mm terminal block.*

1.5.3 Ethernet Interface

The Ethernet port of CIE-H12G is support 10M/100Mbps and users can use both 1:1 cable and crossover cable. There is a built in RJ45 connector for interfacing Ethernet and its specifications are as follows:

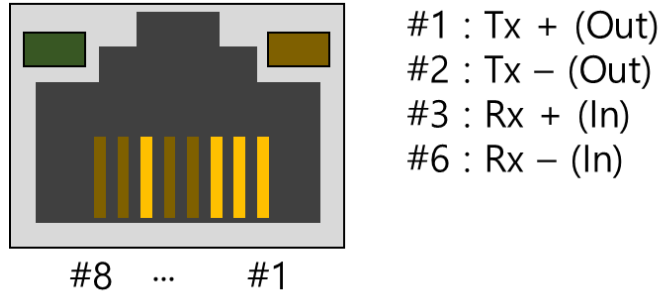


Figure 1-9 Ethernet connector

1.5.4 Power

CIE-H12G can be powered by DC 5V source via power jack. The specifications of the power jack are as follows:

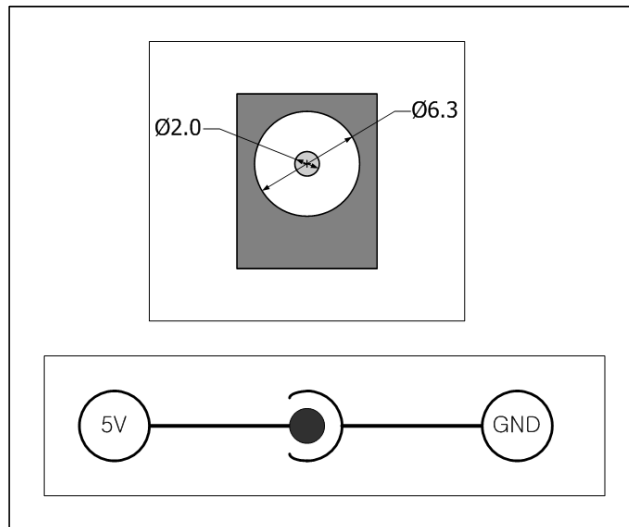


Figure 1-10 power jack

1.5.5 System LED

CIE-H12G has 4 LEDs to indicate the current system status. Each LED represents the following status:

place	name	color	LED status	description
RJ45	STS	Yellow	blinks in every second	assigned an IP address
			blinks 4 times at once	without being assigned an IP address by DHCP
			On	establishing a TCP connection
			Off	operating for the ISP mode
	LINK	Green	On	establishing a connection on a network
			blinks	transferring or receiving network data
Front panel	DI	Yellow	On	when input ports' signal is ON
	DO	Green	On	when the output port's signal is ON

Table 1-7 system LED

1.5.6 ISP Switch

There is an ISP switch on the side of the product. You can use this switch to operate the CIE-H12G in ISP mode or serial configuration mode. Additionally, this switch is used to reset the environmental values of the product.

2 Installation and Test

2.1 Installation

connect the Ethernet port to your PC directly or through a switching hub.



Figure 2-1 Installation

2.1.1 Setting Network Aera

This step is for setting both CIE-H12G and your PC to be located on the same network to establish a TCP connection.

- Setting of the PC

Set the IP address to the Ethernet adapter of the PC connected to the product as follows.

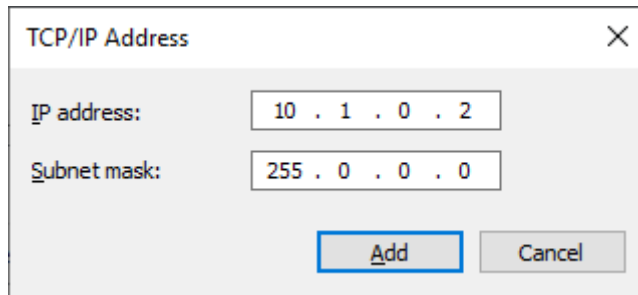


Figure 2-2 Setting an IP address of the PC

- Setting of CIE-H12G

CIE-H12G uses ezManager as it's a configuration program. The Simple Test is performed with the environmental variables of CIE-H12G set to their default values. The main environmental variables and their default values of CIE-H12G are as follows:

Parameters		Default Values
Network	Local IP Address	10.1.0.1
	Subnet Mask	255.0.0.0
I/O Port	Web (HTTP)	Checked
	Web (HTTP) Port	80
	Modbus/TCP	Checked
	Master/Slave	Slave
	Connection Mode	Passive Connection
	Multiple Connection	1
	Local Port	502
Option	Telnet	Checked
	IP Address Search	Checked

Table 2-1 default values of some major parameters

2.2 Simple Test

2.2.1 Modbus/TCP

This is a test for monitoring and controlling with Modbus/TCP. This test uses the Modbus/TCP program in ezManager.

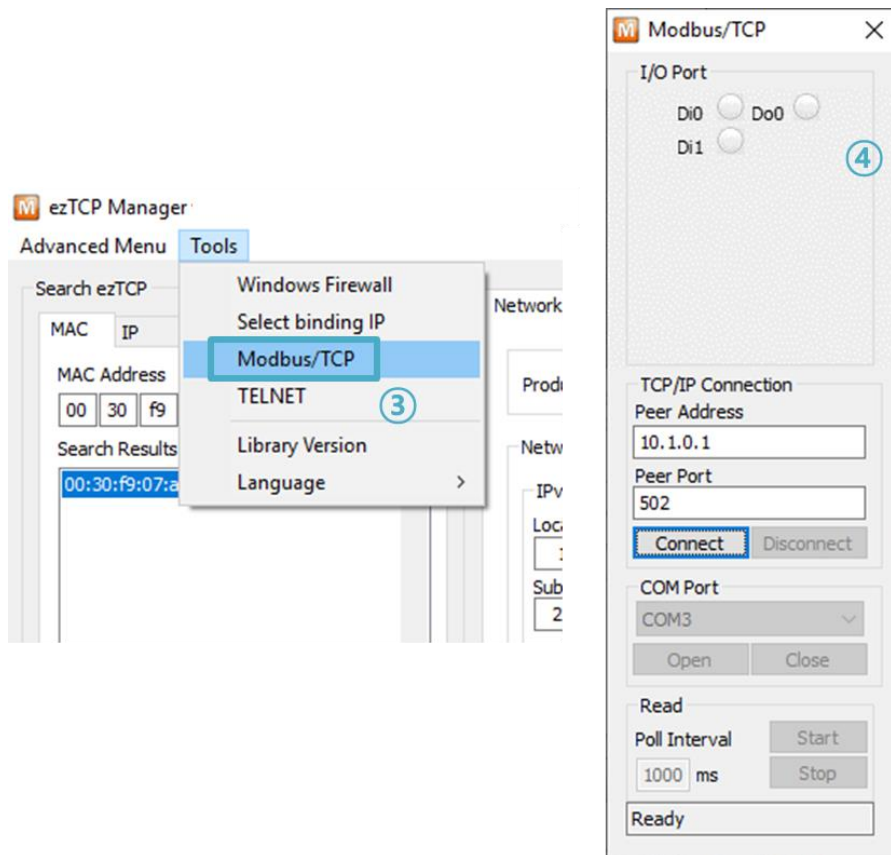


Figure 2-3 Modbus/TCP test program

- ① Search the connected CIE-H12G with [Search All] button.
- ② Select a MAC address of searched product on the [search result].
- ③ Click the [Tools] - [Modbus/TCP] button.
- ④ The test program will appear on the right side of the ezManager.

● Modbus/TCP test

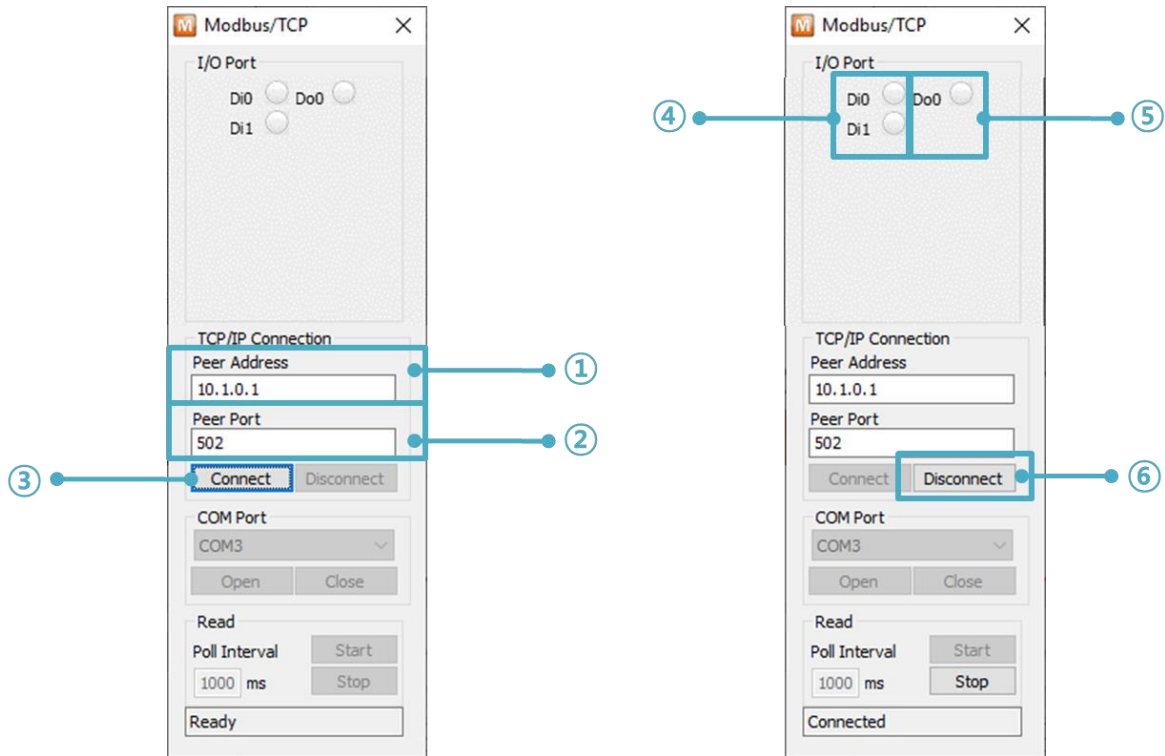


Figure 2-4 Modbus/TCP test

- ① Input the IP address of CIE-H12G
- ② Input the local port for Modbus/TCP of CIE-H12G
- ③ Connect by pressing [Connect] button
- ④ Under the connection, check if the Di LEDs are turned on or off with signal input
- ⑤ Check if Do LEDs are turned on or off with clicking the LEDs
- ⑥ Click the [Disconnect] button after the test is completed

2.2.2 HTTP Test with a WEB browser

This is for testing the operation of the I/O ports of CIE-H12G via HTTP. The test was implemented on a WEB browser.

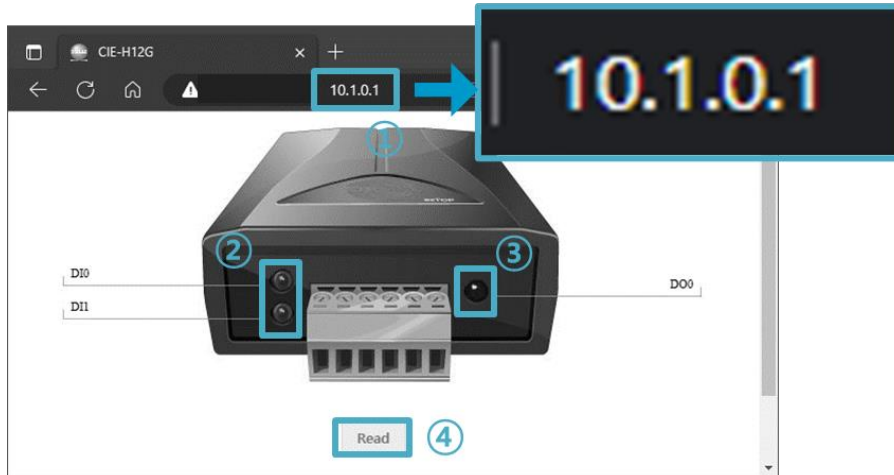


Figure 2-5 HTTP test

- ① Input the IP address of your CIE-H12G on the address field (default: 10.1.0.1).
- ② Check if the DI LEDs are turned on or off with HIGH signal.
- ③ Check if the D0 LED is turned on or off with clicking the LED.
- ④ Press the [Reload] button to update the status.

● The way to control the output port manually

Division	On/Off		Pulse
Parameter	oi (Lower case, i is port number)		pi (Lower case, i is port number)
Value	ON	OFF	Time (ms)
	1	0	1~10000
Example	http://10.1.0.1/index.html?o0=1		http://10.1.0.1/index.html?p0=1000

Table 2-2 The way to control an output port manually

3 Configuration

3.1 Configuration with ezManager

3.1.1 Configuration via LAN

- Checklists

Make sure of the connection between your PC and CIE-H12G via Ethernet. If they are in the same network, [MAC Address search] button can be used. Otherwise, only [IP Address search] is allowed to use.

- Procedures

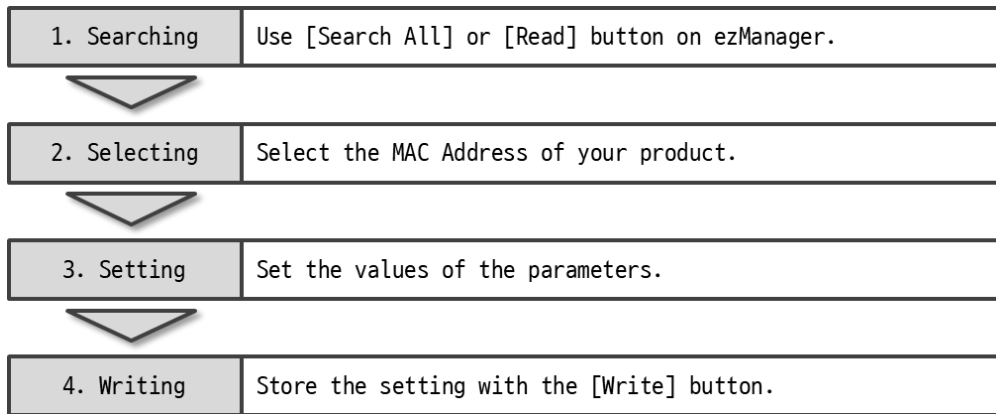


Figure 3-1 Configuration via LAN

4 Operation Modes

4.1 Operation Modes

Each of three operation modes are designed for specific purposes, and those are as follows:

- Normal mode
This mode is for normal data communication. Configuring parameters is also available in this mode.
- Serial configuration mode
CIE-H12G does not provide configuration function in serial setting mode.
- ISP mode
This mode is for changing firmware. In addition, you can set environmental parameters even though the security options are activated. You can also reset the security options.

4.2 How to enter each mode

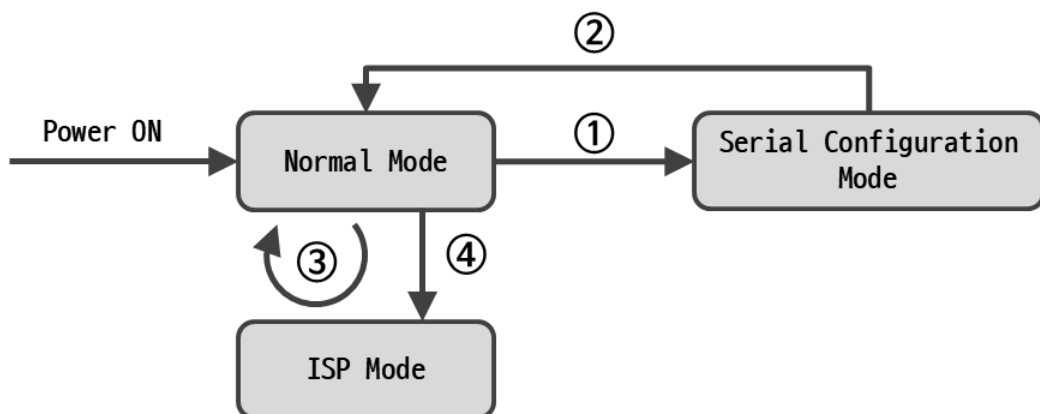


Figure 4-1 How to enter each mode

- ① Push the ISP button less than 1 second.
- ② Reset
- ③ Transfer a firmware via ezManager
- ④ Push the function button over than 1 second.

4.3 Normal Mode

In the normal mode, there are three types of I/O control methods.

- I/O control methods

Methods	Descriptions
Modbus/TCP	Monitor/Control the I/O ports via Modbus/TCP
Macro	Control the Output ports via Macro function
Web(HTTP)	Monitor/Control the I/O ports via HTTP

Table 4-1 I/O control methods

4.4 Serial Configuration mode

4.4.1 Factory Reset

When entering the serial configuration mode, you can perform the factory reset function to reset the environmental values of the product to the factory default settings.

4.5 ISP mode

4.5.1 Configuring Parameters

In ISP mode, you can also configure the environmental variables just like in normal mode. In particular, the product access restriction feature is disabled in ISP mode. Therefore, it is possible to perform the configuration even in situations where the product cannot be searched in normal mode due to product access restrictions. Additionally, in ISP mode, even if a password is set, the password will not be verified during configuration. Therefore, it can be used to recover the password if it is forgotten.

4.5.2 Changing Firmware

When entering ISP mode, you can change the firmware of the product via LAN.

5 I/O Control

5.1 MODBUS/TCP

CIE-H12G supports Modbus/TCP as the default protocol for I/O control.

5.1.1 Related Parameters

Parameter	Description
Modbus/TCP	Using Modbus/TCP for controlling I/O ports of CIE-H12G.
Slave	The slave responses by queries from the Master
Master	The Master sends queries to the slaves
Poll Interval	the period for sending queries (Unit: ms, Minimum value: 10)
Unit ID	ID for identifying the device or the pair of devices.
Input Port Base Address	Initial address of the input ports
Output Port Base Address	Initial address of the output port
Passive Connection	waiting for accepting a Modbus/TCP connection
Active Connection	requesting a Modbus/TCP connection
Multiple Connection	The numbers for multiple Modbus/TCP connections.
Control Method of (FC XX)	Control method for the output port of the slave (Single / Multiple)
Control Method of (AND/OR)	Control method for the output port of the master (AND / OR)
Peer Address	Peer's IP address when CIE-H12G performs active connections.
Peer Port	Peer's port when CIE-H12G performs active connections.
Local port	CIE-H12G's local port when CIE-H12G performs passive connections.
Input Change Notification	A function for immediate notification of changing the IP address.
Initialize the output port state	The Output port will be changed to the [Initial State] when Modbus/TCP is disconnected. (Upper version 1.5A)
Macro	Applying macro function on the output port
Initial State	Output port value when CIE-H12G boots up.

Table 5-1 Related parameters

5.1.2 Modbus/TCP Slave Mode

According to the standard Modbus/TCP, users can use a Modbus/TCP manager to control and monitor their I/O devices. You can set CIE-H12G to the [Slave] item to [Slave] mode. The [Passive] connection is recommended in this mode and the [Peer Port] should be 502.

Modbus/TCP Mode	Slave
TCP Connection	Passive
TCP Port	502

Table 5-2 values for standard Modbus/TCP

Configure the proper values of [Unit ID], [Input Port Base Address], and [Output Port Base Address]

5.1.3 Modbus/TCP Master Mode

In this mode, CIE-H12G operates as a Modbus/TCP master. As a master CIE-H12G transmits its input information to the slave and outputs the slave's input value to its output port after reading the value periodically.

☞ *The master mode is intended to be used only in Internet switch configurations.*

5.1.4 TCP Connection Modes

In the standard of Modbus TCP, the master program makes a connection to the slave using port number 502. However, sometimes Modbus/TCP devices try connecting to the master actively. For this case, CIE-H12G supports the active connection mode.

The passive connection	<ul style="list-style-type: none"> - Standard Modbus/TCP. - Remote host connects to CIE-H12G. - Port number that is used for communication must be designated. - Depending on the setting of multiple connections, up to 8 hosts can be connected simultaneously.
The active connection	<ul style="list-style-type: none"> - CIE-H12G tries to establish a connection to the remote host. - The IP address (or host name) and port number of the remote host is required.

Table 5-3 TCP connection modes

5.1.5 Initial Output Value

The initial value of CIE-H12G's output port can be configured. The output port is set to ON or OFF according to the value of [Initial State] at the boot time.

5.1.6 Write Pulse

By using the FC105, you can give the signal of pulse type to the output port. This means the output signal is kept during the specific time configured by users.

5.1.7 Communication with HMI

In case of communication HMI with CIE-H12G, please refer to the address table below.

- Examples of HMI address references

Port	Unit	R/W	Function Code	Address (Device)	Address (HMI)
Input	word	R	03	0	40001
			04		30001
Output		R	03	8	40009
		W	06, 16		
Input #0	bit	R	02	0	10001
			03	0	40001.0
			04		30001.0
Input #1		R	02	1	10002
			03	0	40001.1
			04		30001.1
Output #0		R	01	8	00009
		W	05, 15, 105		
		R	03	8	40009.0
	W	06, 16			

Table 5-4 Examples of HMI address references

5.2 Macro Mode

This mode lets users set the values of the output port with simple macros. Since CIE-H12G reflects the values according to the macro expressions which are configured by users in advance, it is useful to make a specific device operate automatically using signals from various sensors. Check [Macro] options on ezManager to activate this mode.

☞ *If a port is set to Macro mode, it cannot be controlled through HTTP or Modbus/TCP.*

5.2.1 Operators

The equation used in the Macro mode is Boolean algebra. In this case, the AND, OR, NOT are used as operators. Parenthesis may also be used. The operators are executed in order of precedence: parenthesis > NOT > AND > OR. Each operator is represented by the following symbols.

Name		Description
Parenthesis	()	Since calculations within the parenthesis have the highest priority, they will be calculated first. Nested parentheses are allowed.
NOT	/	An operand that follows a NOT operator is toggled. (If an operand is 0, it will be changed to 1. If it is 1, it will be changed to 0.)
AND	*	If both operand values surrounding an AND operator are 1, the result value will be 1. Otherwise, the result will be 0.
OR	+	If both operand values surrounding an OR operator are 0, the result value will be 0. Otherwise, the result will be 1.

Table 5-5 Operators

5.2.2 Operands

Operands used in macro mode are each input port. Each input port is designated with $i0 \sim i3$ symbol based on their sequence. Since operands are case-insensitive, they can also be written as $I0 \sim I3$.

☞ *The output port could not be used as an operand.*

5.2.3 Examples of Equations

Here are some examples. In the expressions, spaces between the two operands will be ignored.

Port	Equations	Description
Do0-(A)	$i0 + i1$	Perform bit OR $i0$ and $i1$.
Do0-(B)	$/(i0 * i1)$	Perform bit AND $i0$ and $i1$. Then, toggle the result.

Table 5-6 examples of equations

The following is the output values coming out as a result of expressions of input values.

Input ports		Output port	
$i0$	$i1$	Do0-(A)	Do0-(B)
0	0	0	1
0	1	1	1
1	0	1	1
1	1	1	0

Table 5-7 truth table of the examples

5.3 Web (HTTP)

After starting the web browser, type CIE-H12G's IP address after typing http:// in the address bar to connect to CIE-H12G

If a password for CIE-H12G is set, the following window will be popped up.

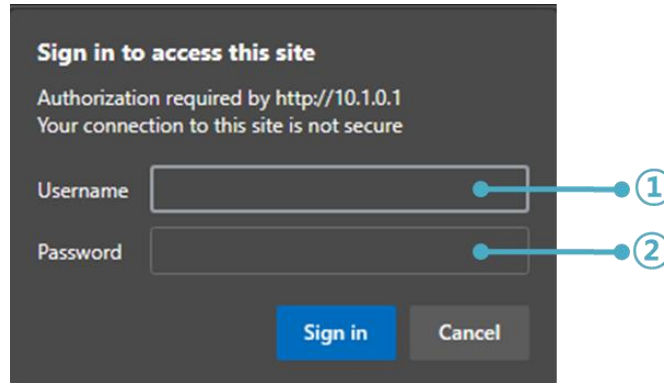


Figure 5-1 authentication with a password

- ① [User name] is not required.
- ② [Password] should be the same with a password which is set through the ezManager.

5.3.1 Changing port number for HTTP

In case you cannot use the port number 80(default port number for HTTP) because the ISP (Internet Service Provider) blocks the port, you can change that port number.

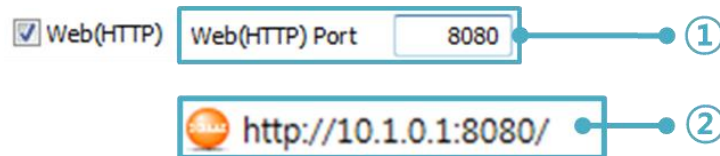


Figure 5-2 changing port number for HTTP

- ① Change HTTP port number on CIE-H12G via ezManager.
- ② Enter the port number including ':' (colon) after the IP address.

5.3.2 Changing a web page

The CIE-H12G provides changing a web page function. Users can modify or create new web pages for the CIE-H12G, instead of using the default web page, as long as they know simple script syntax. Our website provides various web page samples in different formats to use in creating user's own web page.

☞ Please refer to the [Upload Users' Homepage] document on our website for details.

6 Management

6.1 Changing Firmware

6.1.1 Firmware

Firmware is a type of software for operation of CIE-H12G. If there are needs for adding function or fixing bugs, the firmware is modified and released. We recommend that users keep use the latest released firmware.

6.1.2 Processes

- Downloading the latest released firmware
Download the newest firmware file. We update our homepage when a new firmware is released. You can find it on our website.
- Entering ISP mode
Enter ISP mode to download firmware file to CIE-H12G.
- Run a TFTP client and ready to send the F/W file
Run a TFTP client program. ezManager is equipped the client program. Click the [Change F/W / HTML] button.

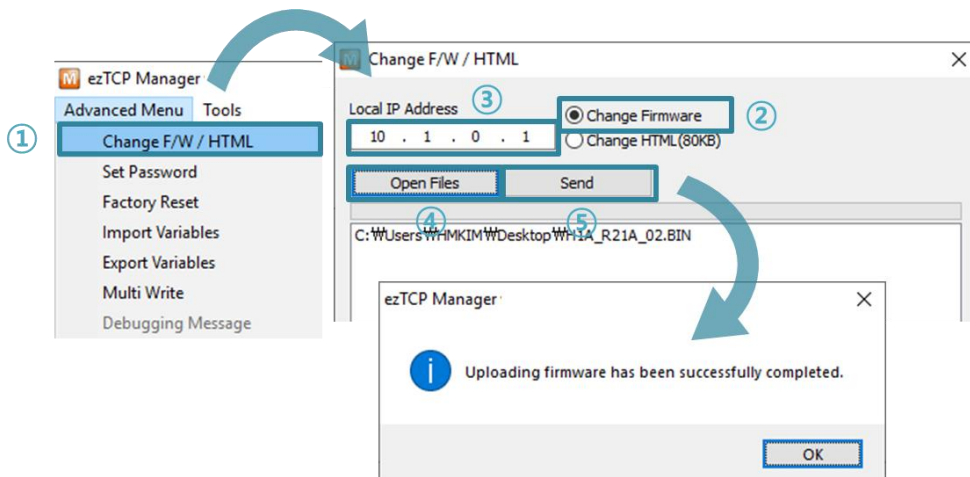


Figure 6-1 changing Firmware

- ① Click the [Advanced Menu] > [Change F/W / HTML].
- ② Select the [Change Firmware] radio button.
- ③ Input the IP address of CIE-H12G to the [Local IP Address] box.
- ④ Press the [Open Files] button and choose the firmware file.
- ⑤ Click the [Send] button
- ⑥ Confirm the completed message

6.2 Changing a Web page

CIE-H12G comes with a default web page stored when it leaves the factory. Follow the steps below to change the web page to a another one.

6.2.1 Processes

- Creating a web page / Downloading a sample web page
Create a new web page or download a sample web page on our web site.
- Searching your product by ezManager
Search your product by ezManager
- Running a TFTP client and Sending files
Run a TFTP client to send files of a web page. The TFTP client will be popped up when you click the [Advanced Menu] > [Change F/W / HTML] on ezManager.

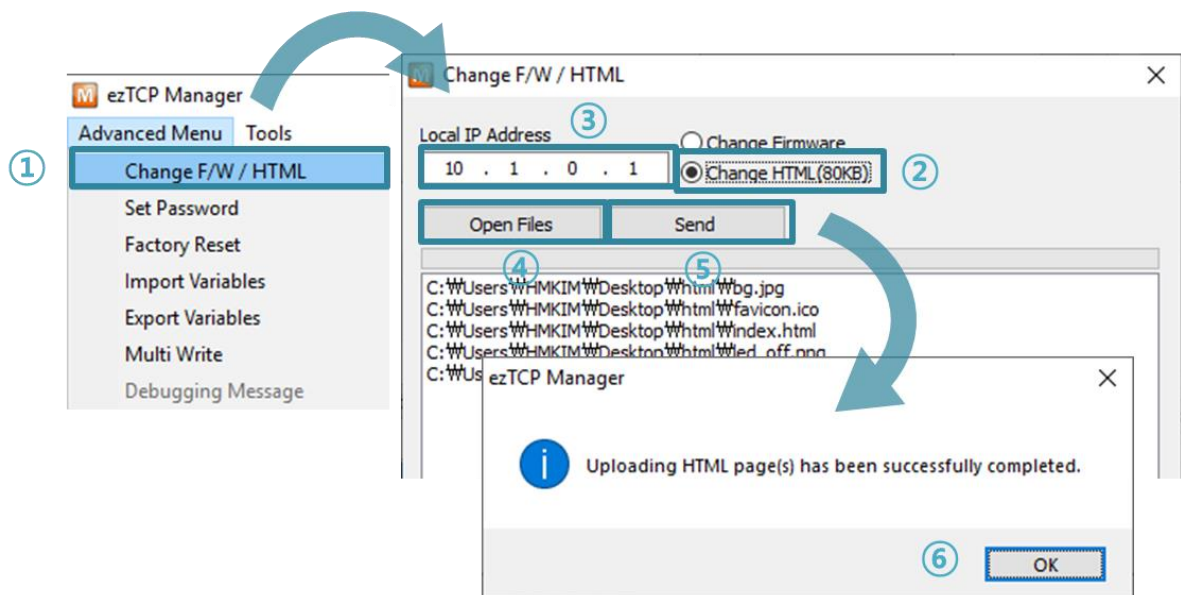


Figure 6-2 changing a web page

- ① Click [Advanced Menu] – [Change F/W /HTML] menu to run TFTP client.
- ② Select the [Change HTML] radio button.
- ③ Input the IP address of CIE-H12G to the [Local IP Address] text box.
- ④ Press the [Open Files] button and choose the HTML files.
- ⑤ Click the [Send] button.
- ⑥ Confirm the completed message.

☞ *The size of web page files is limited to less than 96KB.*

6.3 Status Monitoring

6.3.1 Using TELNET

If the [TELNET] function in the [Option] tab of ezManager is enabled, users can log in to the CIE-H12G via Telnet. The login password used is the password set in the product, and if no password is set, the default password is 'sollae'.

```
CIE-H12G Management Console v1.0A Sollae Systems
lsh>
```

Figure 6-3 TELNET log in

- TELNET commands

Command	option	description	usage
st	net	IPv4 network status	lsh>st net
	net6	IPv6 network status	lsh>st net6
	uptime	System uptime	lsh>st uptime
sc	[OP1][OP2]	Session control	lsh>sc com1 close
exit		Termination of telnet session	lsh>exit

Table 6-1 TELNET commands

- st net

This command shows session information of IPv4 network.

```
CIE-H12G Management Console v1.0A Sollae Systems
lsh>st net
proto name      local address      peer address      sendq      state
-----
TCP   tty           10.1.0.1( 23)     10.11.0.67(50904) 219  ESTABLISHED
TCP   http7         0.0.0.0( 80)     0.0.0.0( 0)      0  LISTEN
TCP   http6         0.0.0.0( 80)     0.0.0.0( 0)      0  LISTEN
TCP   http5         0.0.0.0( 80)     0.0.0.0( 0)      0  LISTEN
TCP   http4         0.0.0.0( 80)     0.0.0.0( 0)      0  LISTEN
TCP   http3         0.0.0.0( 80)     0.0.0.0( 0)      0  LISTEN
TCP   http2         0.0.0.0( 80)     0.0.0.0( 0)      0  LISTEN
TCP   http1         0.0.0.0( 80)     0.0.0.0( 0)      0  LISTEN
TCP   mbus0         0.0.0.0( 502)    0.0.0.0( 0)      0  LISTEN
lsh>
```

Figure 6-4 st net

- st net6

This command shows session information of IPv6 network.

```
lsh>st net6
proto name          local/peer address      sendq      state
-----
TCP6   tty             fe80::230:f9ff:fe12:1002( 23)  127        ESTABLISHED
                fe80::f965:11c7:ea03:9987(55717)
lsh>
```

Figure 6-5 st net6

- st uptime

This command shows your device's uptime.

```
lsh>st uptime
00:05:19.16 up 0 days
lsh>
```

Figure 6-6 st uptime

- sc

This command closes a session. [OP1] represents the name of session and [OP2] represents the action. The "close" (lower-case letters) is the only action for [OP2] for now.

```
lsh>sc com1 close
com1: closed
lsh>
```

Figure 6-7 sc

- exit

This command terminates the telnet session.

```
lsh>exit
```

Figure 6-8 exit

6.3.2 Using ezManager

Status of CIE-H12G can be monitored by [Status] button on ezManager. By using the [Refresh Every 1 Second] option in the status window, the status is automatically updated in every second.

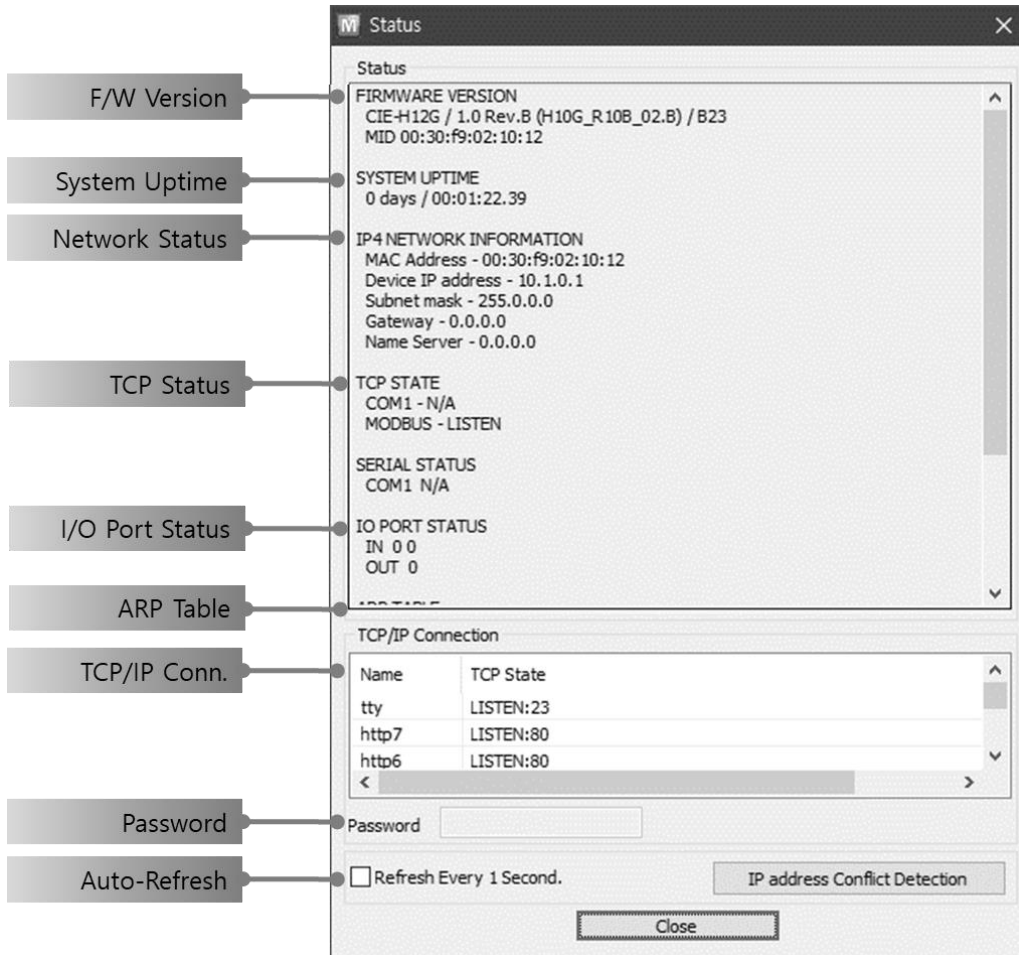


Figure 6-9 Status window of ezManager

- **FIRMWARE VERSION**
This shows the name of model, the version of firmware and the MAC address.
- **SYSTEM UPTIME**
This shows the device's uptime.
- **IP4 NETWORK INFORMATION**
All information about related items with IPv4 Address is shown here.
- **IP6 NETWORK INFORMATION**
All information about related items with IPv6 Address is shown here. This item is activated when the IPv6 is enabled.

- TCP STATE

TCP status of each port is shown this section.

Message	Description
LISTEN	listening TCP connection
CLOSE	TCP connection is closed
SYN_SENT	Send "SYN" segment to make TCP connection
ESTABLISHED	When TCP connection is established
N/A	In UDP mode

Table 6-2 TCP STATE

- I/O PORT STATUS

This represents I/O ports' status. '1' means HIGH(ON) and '0' means LOW(OFF).

- ARP/ND CACHE TABLE

This part shows ARP table on CIE-H12G. When TCP connection is established or UDP data communication is performed, the information of IP and MAC address is automatically stored in the ARP table. This information is held for 1 minute. When 50 seconds is passed, CIE-H12G starts broadcasting the ARP packet again. If there is no response until the time is 0, the information is removed. If there is response, the time is updated 60 seconds again.

In IPv6 case, it shows ND cache list. User can check by the ND cache messages. The messages are as follows.

Status	Description
INCOMPLETE	This means the device is standing by after it sends the request message, Neighbor Solicitation, to MAC and link local address of an opponent in the initial communication.
REACHABLE	This means the device has information about the opponent after it sends Neighbor Solicitation, and receives Neighbor Advertisement.
STALE	The device will change into STALE state after some time later reaching REACHABLE.
DELAY	The device will change into DELAY state if there is no response to Neighbor Solicitation. In this case, CIE-H12G will not be able to communicate with the device.
PROBE	CIE-H12G will resend the request message to the device in DELAY state. CIE-H12G will keep sending Neighbor Solicitation until it replies.

Table 6-3 5 States displayed on ND Cache table

- TCP/IP Connection

In this section, the same information with TCP STATE is displayed with IP address and port number. A difference 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 CIE-H12G has a password. If users want to close TCP connection with right click of mouse on the session, this password has to be correctly filled.

- Refresh Every 1 Second.

If this option is checked, ezManager send query in every second.

- IP address Conflict Detection

By clicking this button, you can find devices which have the same IP address to yours on the network.



Figure 6-10 Without IP address conflict detection

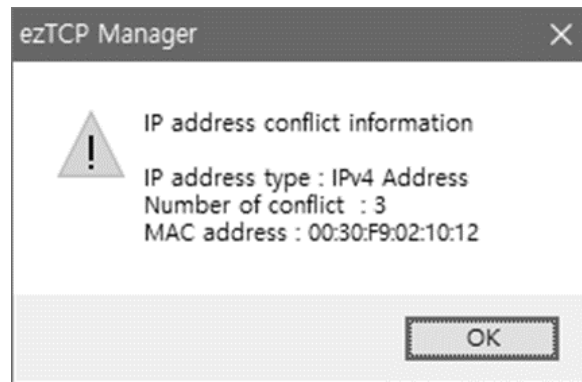


Figure 6-11 IP address conflict detection

6.4 Factory Reset

Performing factory reset restores all setting values except for a password to the factory default. How to perform the factory reset is as follows.

- Entering to Serial configuration mode
Press the ISP button shortly (less than 1 second) and release it. STS, RXD and TXD LED blink simultaneously in this state.
- Performing factory reset
When you press and hold the ISP switch on the product for more than 10 seconds in serial configuration mode, the STS and LED turn off and then turn on. After the STS LED is turned on, release the ISP switch after about 3 seconds.
- Power on the device to enter normal mode.
After performing factory reset, the product will operate in serial configuration mode again. Therefore, please power off and then power on the device to enter normal mode.

7 Additional Functions

7.1 General

7.1.1 ezTCP Firewall

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

- Allowed MAC Address

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

- Allowed IP Address

This is to define hosts with IP address or range of IP address allowed to access. The range is defined by multiplying [IP address] and [Network Mask] in bit unit.

- Examples of IPv4

IPv4 Address	Network Mask	Allowed 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

Table 7-1 examples of IPv4

- Apply to ezManager

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

- Examples of IPv6

IPv6 Address	Prefix	Allowed Address Range
2001:DB8::100	64	2001:DB8::1 ~ 2001:DB8::FFFF:FFFF:FFFF:FFFF
2001:DB8::100	128	2001:DB8::100

Table 7-2 examples of IPv6

7.1.2 Setting Password

A password can be used for protecting CIE-H12G 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 CIE-H12G as ISP mode. In the mode, all restrictions are removable and communication with ezManager is revoked.*

7.1.3 Notify IPv4 Change

CIE-H12G can be TCP server even though it assigned IP address automatically. Using [Notify IP Change] function, CIE-H12G sends its IP address with the host name to the designed server. There are 3 types- DDNS, TCP and UDP- for this service.

- Dynamic Domain Name Service (DDNS)

CIE-H12G supports DDNS service offered by DynDNS to manage its changed IP address as a host name. Because of this, you have to make an account and create host names on the website of DynDNS before use this.

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

Figure 7-1 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 allowed used TCP/UDP for using this option. The [Data Type] can be selected as ASCII or hexadecimal, and the [Interval] is available on configuration.

☞ *Please refer to “Notify IP Change” document for details.*

7.2 I/O Control

7.2.1 Notify Input Port Change

This is a feature that immediately sends a response packet to the master without a query from the master when the input port status of CIE-H12G changes. This feature can be used when CIE-H12G is operating as a slave.

7.2.2 Valid Time

CIE-H12G recognizes a signal on its input port as a valid signal only if it is maintained for the duration of the Valid Time. If the signal on the input port is not maintained for the time set in this item, it will be ignored. The unit is 1ms.

7.2.3 Delay

CIE-H12G reflects the output value to the output port after the time set in [Delay]. If it is set to 0, CIE-H12G reflects the output value to the output port immediately. [Delay] applies to all cases including Modbus/TCP, Macro and HTTP. The unit is 1ms.

7.2.4 Master function for configuring Internet switches

CIE-H12G provides master functionality for configuring an Internet switch. An Internet switch is a configuration method that connects devices to devices via Modbus/TCP, transmitting digital inputs to digital outputs. In this configuration, one side must be set as a master and the other as a slave. The master sends queries to the slave, and the slave responds to the master's queries. Digital signals are transmitted in both directions.

Master	
Poll Interval	<input type="text" value="1000"/> ms
Control Method of Slave's Output Ports	FC 16 (Multiple) ▾
Control Method of Master's Output Ports	AND ▾

Figure 7-2 Master

- Poll Interval

This is the setting to configure the query interval for the master. The unit is milliseconds, and the default value is 1 second (1000).

- Control Method of Slave's Output Ports

This item sets the Modbus/TCP function code to use in the master's control query. FC 16 controls the word units, and FC 05 controls the bit units. The default value is FC 16.

- Control Method of Master's Output Ports

This is the setting to control the master's output port when there are two or more slaves. With the AND setting, the master controls the output port by logical AND operation with the status of the corresponding input port of all slaves, while with the OR setting, the master controls the output port by logical OR operation with the status of the corresponding input port of all slaves.

☞ *Refer to the [Internet Switch], [Combinations of digital I/O Controllers] documents on our web site for details.*

8 Self-Test in Trouble

When users are in trouble with using CIE-H12G, make sure of the following steps first.

8.1 Searching problem with ezManager

- Confirming types of configuration utility
CIE-H12G can be configured by ezManager.
- Cancelling the Firewall operation
In case of being blocked by firewalls of a personal computer or network block, you must cancel all the firewalls before searching CIE-H12G.

☞ *Most of vaccine programs have firewall functions so it can cause some trouble to search CIE-H12G. Close or pause these programs before searching the product.*

- Stable supply of the power
Check if the power is supplied continually. The red LED on CIE-H12G shows that the power is switched on.
- Connection with the network
Make sure that the network connection is fine including Ethernet cable. In this step, we recommend that users connect CIE-H12G with PC directly or in the same network hub.
- Checking options of restriction
In case that restriction of access is activated, the communication with ezManager will be unavailable. When users are in this situation, make CIE-H12G operate in ISP mode.

8.2 Connection Problem over Modbus/TCP

- Checking parameters related with TCP/IP

When CIE-H12G has a private network IP address, personal computer's IP address has to be on the same sub network. Check if the IP address and local port number are correct. In case of a fixed IP address, the subnet mask, gateway IP address and DNS IP address should be configured.

Slave or Master
Local IP Address, the connection mode (Active / Passive), Peer Address and Peer Port, Subnet Mask, Gateway IP Address, DNS IP Address, DDNS option and etc.

Table 8-1 major parameters related with Modbus/TCP

- PING Test

Confirm the connection over the network by PING test. If CIE-H12G does not send any reply from the request, check the network environment.

- Firewall

In case the networks which need strong security, the access may be denied by their firewall. Under this circumstance, users should ask the person in charge of their network to release ports which will be used. (Ex: TCP 502, UDP 50005)

- Operation Mode

A TCP connection is not possible when CIE-H12G is operating in the ISP or Serial Configuration mode.

- Connection Mode

To make a TCP connection, both a server (passive mode) and a client (active mode) should exist. If there are only servers or clients, the TCP connection cannot be established.

- ezTCP Firewall

When users set the ezTCP firewall with MAC and IP address, any hosts cannot be reachable to it except for the hosts who have the allowed MAC and IP address. Inactivate the option or check the setting is correct.

- Checking the TCP status

TCP is a protocol connected one to one without multiple connections function. Because of this, if a device is on a TCP connection, other requests are denied. If users are in this situation, check the network status by connecting on TELNET or using ezManager.

8.3 Communication Problem over Modbus/TCP

- Checking Modbus/TCP parameters

Check all the related parameters that [Unit ID], [Input Port Base Address], [Output Port Base Address], [Poll Interval] and [Notify Input change].

- Checking which mode is using

In case of MACRO, you can control the outputs of CIE-H12G. Turn the mode off if those modes are using.

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

9 Technical Support and Warranty

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:

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

9.2 Warranty

9.2.1 Free Repair Services

For product failures occurring within 2 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.

9.2.2 Charged Repair Services

For product failures occurring after the warranty period (2 years) or resulting from user's fault, repair service fees will be charged and the product will be replaced at user's expense.

10 Precaution and Exemption from Liability

10.1 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.

10.2 Exemption from Liability

10.2.1 English version

In no event shall Sollae Systems Co., Ltd. And its distributors be liable for any damages whatsoever (including, without limitation, damages for loss of profit, operating cost for commercial interruption, loss of information, or any other financial loss) from the use or inability to use the CIE-H12G even if Sollae Systems Co., Ltd. Or its distributors have been informed of such damages.

The CIE-H12G is not designed and not authorized for use in military applications, in nuclear applications, in airport applications or for use in applications involving explosives, or in medical applications, or for use in security alarm, or for use in a fire alarm, or in applications involving elevators, or in embedded applications in vehicles such as but not limited to cars, planes, trucks, boats, aircraft, helicopters, etc..

In the same way, the CIE-H12G is not designed, or intended, or authorized to test, develop, or be built into applications where failure could create a dangerous situation that may result in financial losses, damage to property, personal injury, or the death of people or animals. If you use the CIE-H12G voluntarily or involuntarily for such unauthorized applications, you agree to subtract Sollae Systems Co., Ltd. And its distributors from all liability for any claim for compensation.

Sollae Systems Co., Ltd. And its distributors entire liability and your exclusive remedy shall be Sollae Systems Co., Ltd. And its distributors option for the return of the price paid for, or repair, or replacement of the CIE-H12G.

Sollae Systems Co., Ltd. And its distributors disclaim all other warranties, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, with respect to the CIE-H12G including accompanying written material, hardware and firmware.

10.2.2 French version

- Documentation

La documentation du boîtier CIE-H12G est conçue avec la plus grande attention. Tous les efforts ont été mis en œuvre pour éviter les anomalies. Toutefois, nous ne pouvons garantir que cette documentation soit à 100% exempt de toute erreur. Les informations présentes dans cette documentation sont données à titre indicatif. Les caractéristiques techniques peuvent changer à tout moment sans aucun préavis dans le but d'améliorer la qualité et les possibilités des produits.

- Copyright et appellations commerciales

Toutes les marques, les procédés, les références et les appellations commerciales des produits cités dans la documentation appartiennent à leur propriétaire et Fabricant respectif.

- Conditions d'utilisations et limite de responsabilité

En aucun cas Sollae Systems Co., Ltd. ou un de ses distributeurs ne pourra être tenu responsable de dommages quels qu'ils soient (intégrant, mais sans limitation, les dommages pour perte de bénéfice commercial, interruption d'exploitation commerciale, perte d'informations et de données à caractère commercial ou de toute autre perte financière) provenant de l'utilisation ou de l'incapacité à pouvoir utiliser le boîtier CIE-H12G, même si Sollae Systems Co., Ltd. ou un de ses distributeurs a été informé de la possibilité de tels dommages.

Le boîtier CIE-H12G est exclusivement prévu pour un usage en intérieur, dans un environnement sec, tempéré (+10 °C à +40°C) et non poussiéreux. Le boîtier CIE-H12G n'est pas prévu, ni autorisé pour être utilisé en extérieur, ni de façon embarquée dans des engins mobiles de quelque nature que ce soit (voiture, camion, train, avion, etc...), ni en milieu explosif, ni dans des enceintes nucléaires, ni dans des ascenseurs, ni dans des aéroports, ni dans des enceintes hospitaliers, ni pour des applications à caractère médical, ni dans des dispositifs de détection et d'alerte anti-intrusion, ni dans des dispositifs de détection et d'alerte anti-incendie, ni dans des dispositifs d'alarme GTC, ni pour des applications militaires.

De même, le boîtier CIE-H12G n'est pas conçu, ni destiné, ni autorisé pour expérimenter, développer ou être intégré au sein d'applications dans lesquelles une

défaillance de celui-ci pourrait créer une situation dangereuse pouvant entraîner des pertes financières, des dégâts matériels, des blessures corporelles ou la mort de personnes ou d'animaux. Si vous utilisez le boîtier CIE-H12G volontairement ou involontairement pour de telles applications non autorisées, vous vous engagez à soustraire Sollae Systems Co., Ltd. et ses distributeurs de toute responsabilité et de toute demande de dédommagement.

En cas de litige, l'entière responsabilité de Sollae Systems Co., Ltd. et de ses distributeurs vis-à-vis de votre recours durant la période de garantie se limitera exclusivement selon le choix de Sollae Systems Co., Ltd. et de ses distributeurs au remboursement de votre produit ou de sa réparation ou de son échange. Sollae Systems Co., Ltd. et ses distributeurs démentent toutes autres garanties, exprimées ou implicites.

Tous les boîtiers CIE-H12G sont testés avant expédition. Toute utilisation en dehors des spécifications et limites indiquées dans cette documentation ainsi que les court-circuit, les chocs, les utilisations non autorisées, pourront affecter la fiabilité, créer des dysfonctionnements et/ou la destruction du boîtier CIE-H12G sans que la responsabilité de Sollae Systems Co., Ltd. et de ses distributeurs ne puissent être mise en cause, ni que le boîtier CIE-H12G puisse être échangé au titre de la garantie.

- Rappel sur l'évacuation des équipements électroniques usagés

Le symbole de la poubelle barré présent sur le boîtier CIE-H12G indique que vous ne pouvez pas vous débarrasser de ce dernier de la même façon que vos déchets courants. Au contraire, vous êtes responsable de l'évacuation du boîtier CIE-H12G lorsqu'il arrive en fin de vie (ou qu'il est hors d'usage) et à cet effet, vous êtes tenu de le remettre à un point de collecte agréé pour le recyclage des équipements électriques et électroniques usagés. Le tri, l'évacuation et le recyclage séparés de vos équipements usagés permettent de préserver les ressources naturelles et de s'assurer que ces équipements sont recyclés dans le respect de la santé humaine et de l'environnement. Pour plus d'informations sur les lieux de collecte des équipements électroniques usagés, contacter votre mairie ou votre service local de traitement des déchets.

11 History

Date	Version	Comments	Author
2023.03.20.	1.0	○ Created	Roy LEE
2023.04.03.	1.1	○ Corrected some errors and improved some expressions	Roy LEE
2024.01.05.	1.2	○ Modified the table 1-4 ○ Corrected some errors	Roy LEE