



Hanshow ESL Controller HS_C09959 Product Manual
V1.0.2
HS-AP-GEN3001

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STATEMENT

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ABOUT THE MANUAL

The manual mainly introduces the role of HS_C09959, functional, hardware parameters, features and precautions, as well as all the information that can help you install and achieve good performance.

Thank you very much for using the HS_C09959 of Hanshow.

Please read the product manual carefully before using this product, retain the document for subsequent use or for the next owner. If the instructions contained in this manual are insufficient to resolve issues that occur during device operation or maintenance, please contact Hanshow Technical Customer Service Center (400-0365-305) directly, we will provide you with multi-channel technical services.

TARGET USERS

This document provides engineers with necessary data and related guidelines. Users have to master the basic knowledge on communication, DSP, network and so on. This manual is applicable for the below engineers:

- Testing Engineer
- Technical Support Engineer
- After Sales Engineer
- Installation Engineer

SYMBOL DESCRIPTION

Icon	Description
	Information indicated with this icon should be paid special attention and attached great importance by the reader
	Information indicated with this icon is the explanation on the formal text for the readers to comprehend the text better
[X-X]	It means special noun definition is provided here

EXPLANATION OF TERMS

Acronym	Expanded form	Description
AP	Wireless Access Point	ESL controller
ESL	Electronic Shelves Label	ESL
Wi-Fi	Wireless Fidelity	Wireless Fidelity
BT	Bluetooth	Bluetooth
RF	Radio Frequency	Electromagnetic frequency that can radiate into space

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1 Overview

HS_C09959 is the third generation wireless Access Point (AP) researched and developed independently by Hanshow Technology Co., Ltd, which is highly integrated to meet rapid development of new-generation AP. HS_C09959 achieves higher performance, smaller volume and low power, making customer to have a better data services experience.

HS_C09959 works at the wireless frequency band of 2.4G. It is response for the data transmission and information interaction between ESL and ESL-Working, which adopts the design of modular and omnidirectional internal antenna, one ARM A7 processor, and integrates RF module, as well as supporting all software and hardware products of Hanshow.

1.1 System architecture of ESL controller

ESL controller system consists of ShopWeb, ESL-Working, ESL controller (AP), Electronic Shelves Label (ESL) and Hand-hold Terminal (PDA), interacting with ESL and ESL-Working, the system architecture as shown in [Figure 1-1](#).

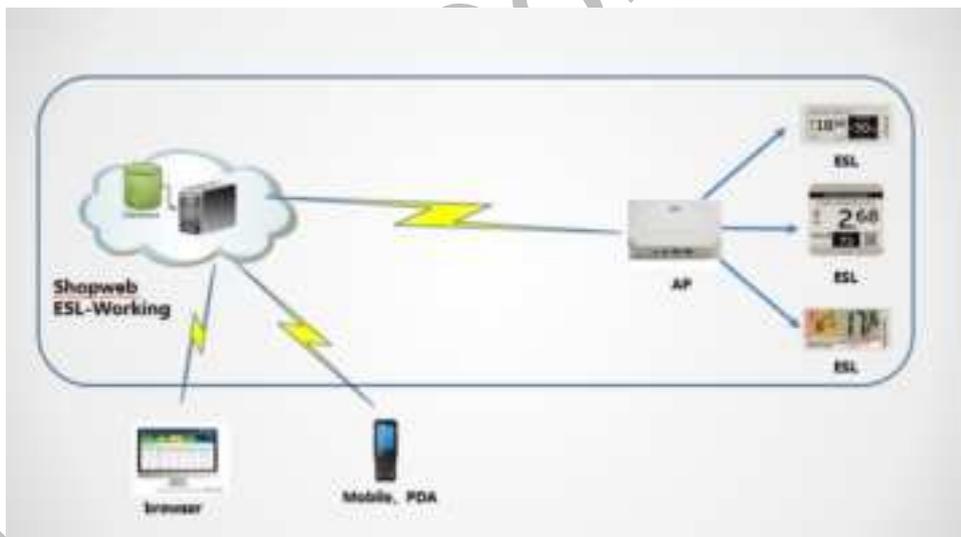


Figure 1-1 Overall system architecture of ESL controller

The HS_C09959 is an integral part of Hanshow electronic shelf label system, to be as data transmission links and responsible for data forwarding. HS_C09959 connects to electronic working system via Ethernet interface (POE), and establishing bi-directional 2.4GHz wireless communication with ESL.

- Downlink: HS_C09959 could receive downlink packets from ESL-Working via wireless network, and send variable price, inventory and template data to ESL.

- Uplink: HS_C09959 will forward heartbeats data and other information to ESL-Working platform based on the ESL wireless protocol standard.

1.2 Features

The main features of HS_C09959 are as follows:

- Operation System (OS): embedded Linux operation system, it works for data interaction with ESL-working system, including the registration of ESL controller system, heartbeat reception, data transmission, and support for on-line upgrade, etc.
- Radio frequency system: support four way RF subsystem, and support concurrent communication in order to ensure communicate success rate, reduce the packet loss and improve the efficiency of channel.
- Memory: support 512MB DDR3L + 256MB NandFlash
- Compatibility: support all Hanshow series label, including label with LCD and EPD screen
- Multiple power supply: support power supply by POE and AC/DC power adapter
- Administration configuration: support Web configuration mode
- LED light: LED light real-time display working status

2 Hardware feature

This chapter presents the information, including the basic configuration, physical interface, indicator meaning, nameplate information, status code information and view parameter.

2.1 Basic configuration

HS_C09959 has the following basic configuration, as shown in [Table 2-1](#).

Table 2-1 Basic configuration for HS_C09959

HS_C09959 specifications	
Power supply module	
Input voltage	DC 12V or POE 802.3af/at
Rated current	1A (adapter)/350 mA (POE)
Rated power	12W
Other	Overload/over-voltage/over-temperature protection
Main processor module	
CPU	528MHz ARM
Memory	512MB DDR3L + 256MB NandFlash
OS	Linux 4.1.15
RF module (2.4G Module)	
Working frequency	2402 MHz ~ 2480 MHz
Transmit power	6dBm by default
Antenna gain	2dBi
Antenna features	Four omni-directional antenna
Ultra high sensitivity	-95dBm at 500Kbps -97dBm at 100Kbps
Ethernet module	
Connection speed	10/100M (adaptive)
Auto-negotiation	Support

HS_C09959 specifications	
Automatic flip	Support
DHCP	Support
POE module	
Input voltage	36 ~ 57V DC
Output voltage	12V
Rated current	1A
Maximum power	12W
Standard	IEEE 802.3af/at
Power parameter	
Idle state power	12V, 160mA
Maximum power	12V, 370mA
Temperature	
Operating temperature	0°C ~ 50°C
Storage temperature	-30°C ~ 70°C

2.2 Physical interface

HS_C09959's physical interfaces are as shown in [Figure 2-1](#), and each interface's function is illustrated in [Table 2-2](#).



Figure 2-1 External interface of HS_C09959

Table 2-2 Function description for each interface

No.	Interface name	Description
1	Reset button	<ul style="list-style-type: none"> ● Press and hold: restore factory settings, press this button for more than 5 seconds, ● Press: HS_C09959 could switch between enabling DHCP and fixed IP (192.168.1.199), after triggering the function, it will invalid to press in 30 seconds. For detailed information, refer to the section of 4.1.
2	USB interface	USB2.0 interface, output current is less than 5V/250mA.
3	Power interface	Can connect to DC power adapter that is standard 12V/1A adapter provided by Hanshow
4	CONSOLE interface	Professionals debug device interface
5	POE interface	Adaptive 10M/100M Ethernet, and support IEEE 802.3at/af standard Ethernet power supply
6	Light	LED indicator is used for system status. For more information, refer to section of 2.3
7	Light	LED indicator is used for network status. For more information, refer to section of 2.3

No.	Interface name	Description
8	Light	LED indicator is used for power status. For more information, refer to section of 2.3
9	Two-digit nixie tube	Green, which is HS_C09959 ID got from ESL-Working when HS_C09959 is connected to ESL-Working successfully. (The direction of Nixie light is aligned to Hanshow logo direction on the panel.)

2.3 Indicator meaning

There are two-digit Nixie light and three LED indicators in the front panel, as shown in [Figure 2-2](#).



Figure 2-2 Front panel of HS_C09959

Table 2-2 Nixie light and LED indicators description

No.	Name	Status	Description
1	System indicator light status	Green	Green light is always on, and system runs normally
		Green flashing	Green light flashing, and data transmission status.
		Red	Red light is always being on, system runs abnormally.
2	Network indicator light status	Green	Green light is always on, Ethernet link normally, but not connect to ESL-Working
		Green flashing	Green flashing, Ethernet link normally, and connect to ESL-Working normally
		Red	Red light is always on, Ethernet link

No.	Name	Status	Description
			abnormally
3	Power indicator light	On	Green light is on, and AP is powered-on
		Off	Green light is off, and AP is powered-off
4	Nixie light	Number	AP has been connected to ESL-Working, the number currently is ID, and the range of 1 ~ 99 (if the ID is over 99, just display the last two-digit)
		--	AP is not connected to ESL-Working

⚠Notice: Pay attention to note that all system indicators are being on **Red** firstly once AP powered-on, then they are changing to **Green** when the system works normally.

2.4 Nameplate information

HS_C09959's nameplate information has the following implications, as shown in [Figure 2-3](#).

- IP address and MAC address are default configuration in HS_C09959.
- IP address can be modified through configuration page.
- HS_C09959 supports POE and DC power supply, and either POE or DC, but not both.



Figure 2-3 Nameplate information for HS_C09959

2.5 Status code meaning

The definition of two-digit Nixie light displayed on panel is shown as [Table 2-3](#).

Table 2-3 Status code meaning

Code value	Description
--	AP is not connected to ESL-Working
Number	AP has been connected to ESL-Working, and the number currently displayed is ID, the range of 1 ~ 99 (If the ID is over 99, just display the last two-digit).
DH	AP is able to switch status between DHCP/Static IP , if switching to DHCP , the nixie light displays DH .
ST	AP is able to switch status between DHCP/Static IP , if switching to Static IP , the nixie light displays ST .

2.6 View parameter

HS_C09959's view parameter such as structural materials, dimension&weight, and color parameter are shown in [Table 2-4](#).

Table 2-4 HS_C09959 view parameter

Structural materials	
The case and the bottom shell	ABS plastic material
Indicate lampshades	Translucent PC
Size	
Length (mm)	166mm
Width (mm)	166mm
Height (mm)	40.5mm
Weight	
Whole belt packing (g)	505
Net weight (g)	397
Color	
Appearance color	Two color selection: white and black

3 Product installation

3.1 Installation requirements

In actual use, HS_C09959 should be installed in a higher position to achieve better transmission and coverage. Moreover, the higher the installation height, the smaller the device spacing should be, as shown in [Figure 3-1](#).

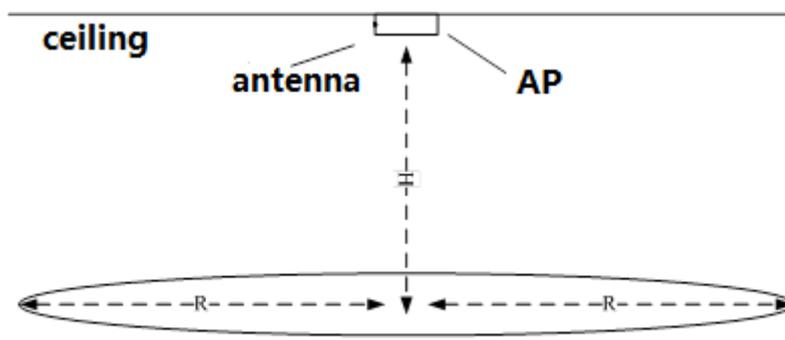


Figure 3-1 HS_C09959 installation

The recommendations for installation scenario are as follows:

- When the shelf height is $\leq 3\text{m}$, **H** in [Figure 3-1](#) is recommended to 3m ~ 5m, and the coverage radius **R** is 10 ~ 15m. It is recommended that the installation distance of two Hanshow APs is about 25m, and at least 5m;
- When the shelf height is 3 ~ 5m, **H** in [Figure 3-1](#) is recommended to 5 ~ 8m, and the coverage radius **R** is 7 ~ 12m. It is recommended that the installation distance of two Hanshow APs is about 20m and at least 5m.

Notice:

- If shelf height exceeds 5m, the installation height of AP is determined according to the actual situation;
- The installation height of AP should be higher than shelf height to avoid signal occlusion.

3.2 Installation accessories

HS_C09959's standard installation accessories and assembly drawing is shown in [Figure 3-2](#) and [Figure 3-3](#).

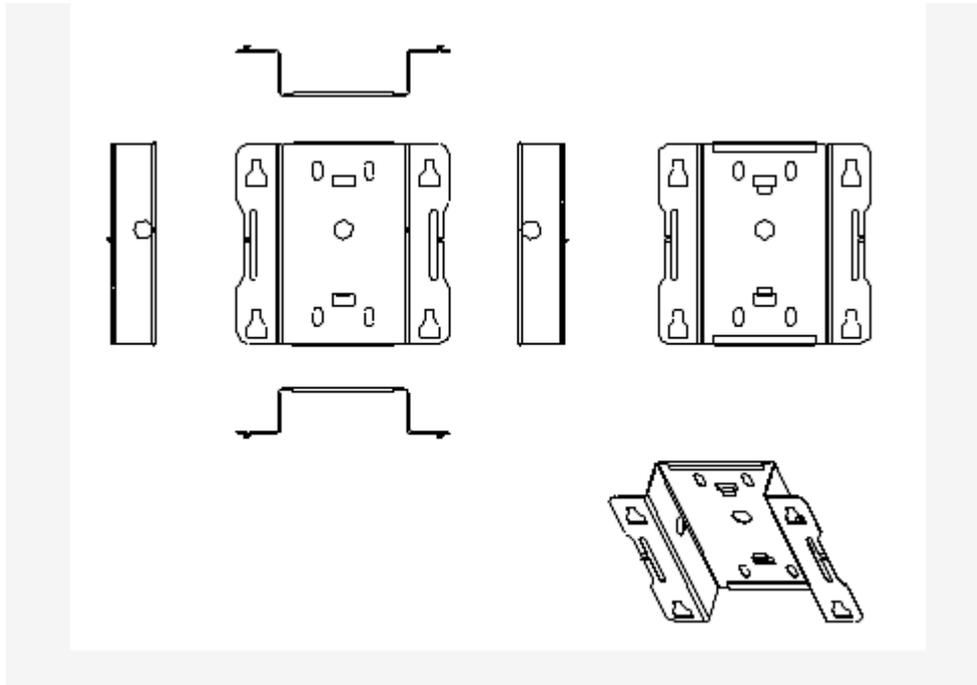


Figure 3-2 Standard installation accessories for HS_C09959

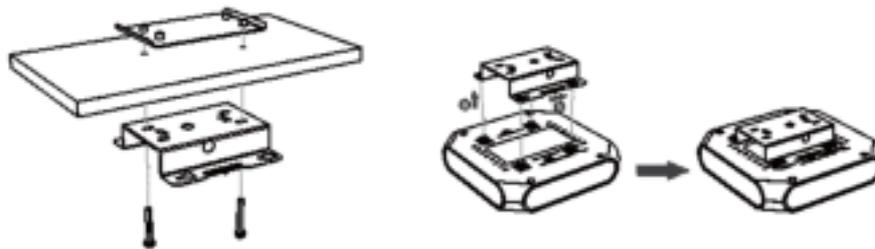


Figure 3-3 Assembly drawing for HS_C09959

Note:

- How to install HS_C09959, Ceiling Horizontal Suspended Mounting is recommended.
- For more detailed information, refer to [\(HS-AP-GEN3002\) Hanshow ESL controller HS_C09959 Installation Manual](#).

4 Product operation

4.1 Key operation

Reset key supports press and hold and press that owns different function respectively.

4.1.1 Press

Press is used to switch IP address acquisition mode. This feature is strictly limited and just to operate when AP is not connected to the network. AP address will switch between DHCP and static IP with each press.

- When AP works at DHCP client mode, its IP address will get from DHCP server.
- When AP works at static IP mode, its default settings are: IP --192.168.1.199, Subnet mask -- 255.255.255.0, and Gateway -- 192.168.1.1.

The nixie light of AP will also give corresponding prompt:

- When AP switches to DHCP mode, nixie light will display **DH**, and last for 5s.
- When AP switches to static IP mode, nixie light will display **ST**, and last for 5s.
- When AP is not connect to ESL-Working, nixie light is always display --.

 **Note:** The protection time between two operations is 30s, that is, if you press again in 30s after the last successful operation, your operation will be invalid.

4.1.2 Press and hold

Press and hold reset key is more than 5s, AP will restore factory setting. And the nixie light and LED indicators on the front panel is all being on, about 2s, changing to off, AP will restore factory setting and re-startup.

Restore factory setting has the following contents:

- Restore to DHCP client mode
- Restore to auto search mode of ESL-Working
- Clear the custom description
- Restore web login password to **admin**

4.2 Parameter setting

HS_C09959 supports Web configuration mode, that is, user can manage the AP via Web.

4.2.1 Homepage

You can logon the HSC09959 IP address to configure the page. For example: If HS_C09959 IP is 192.168.51.100, logging on to <http://192.168.51.100>, that is, enter the following page to configure related parameters, as shown in *Figure 4-1* and *Figure 4-2*.

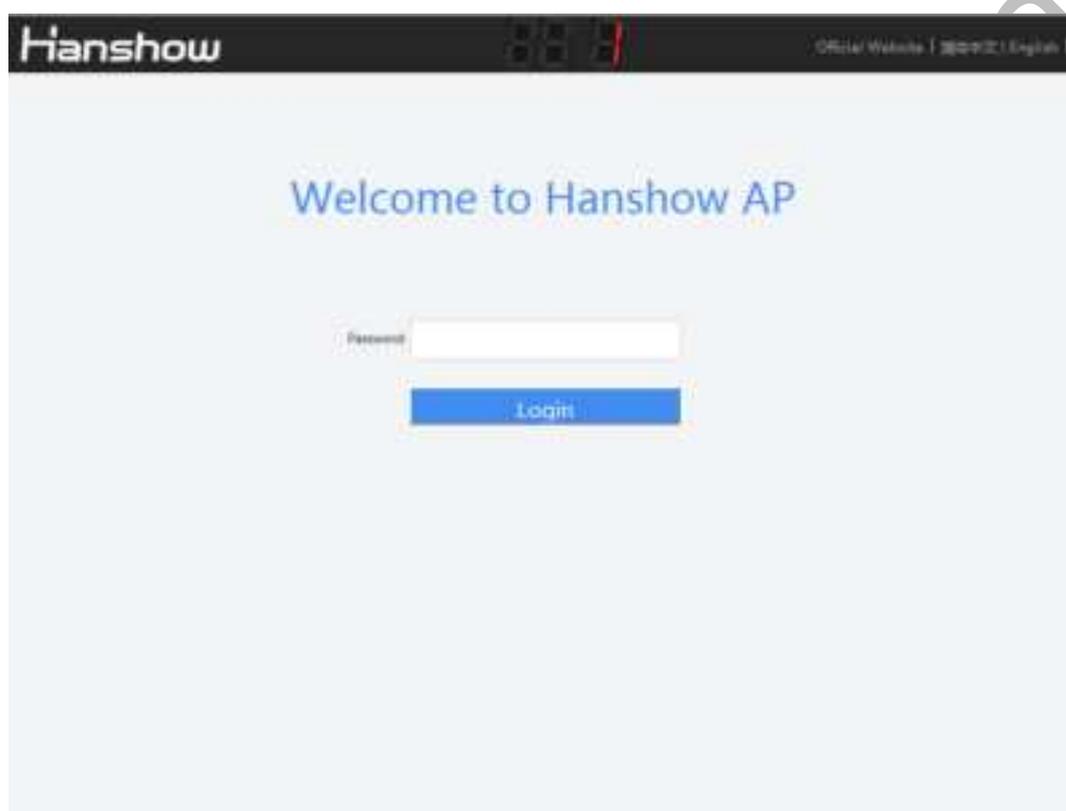


Figure 4-1 Login page

 **Note:**

- The default password of HS_C09958 is admin, and enter your password to logon the homepage.
- Both Chinese and English are supported on the page, and users can switch the language by the upper right corner.

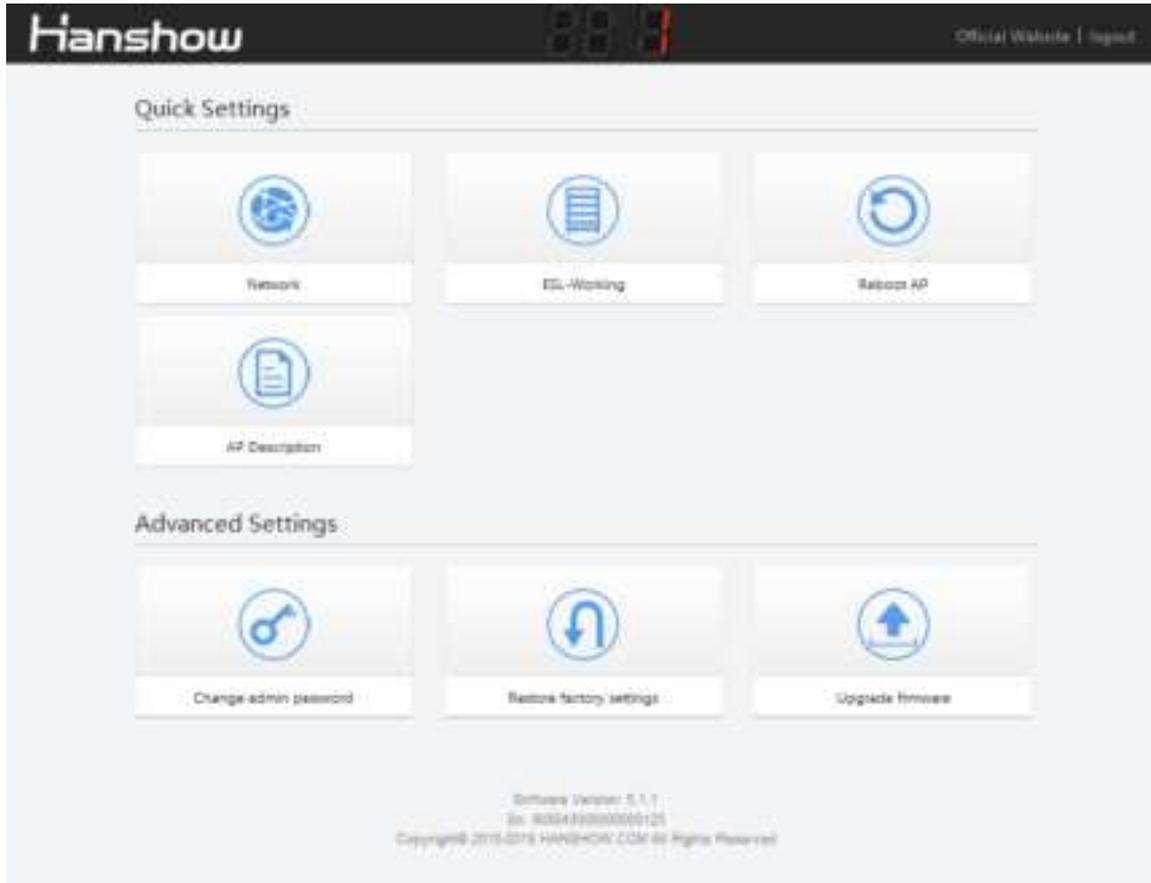


Figure 4-2 Configuration homepage

HS_C09959's configuration page is as shown in [Table 4-1](#).

Table 4-1 Configuration item description

Configuration item	Description
Network	Used to set the network parameters of HS_C09959, such as DHCP switch, IP address, subnet mask, etc.
ESL-Working	ESL-Working IP address, port number and SSL encryption can be set
Reboot AP	Reboot AP device
AP Description	Add description information
Change admin password	Used to modify the password of the configuration page
Restore factory settings	You can restore the default settings of HS_C09959
Update firmware	Software version upgrade for HS_C09959 main system and RF subsystem

4.2.2 Network setting

Network setting is used for setting the network parameter of HS_C09959. IP address acquiring mode includes DHCP or static IP, as show in [Figure 4-3](#).



Figure 4-3 Network configuration page

The detailed configuration item is illustrated as shown in [Table 4-2](#).

Table 4-2 Configuration item description

Configuration item	Description
DHCP	When set to OFF, IP address of device should be configured manually; When set to ON, the device is DHCP client, and IP address should be get from DHCP server.
IPv4 address	IPv4 address, can configure when the DHCP is OFF.
Subnet mask	Subnet mask, can configure when the DHCP is OFF.
Gateway	Gateway, can configure when the DHCP is OFF.
DNS	Domain Name Server (DNS), Must be set when the ESL-Working address is configured as domain name address;

Configuration item	Description
	Enable DHCP, to get DNS from DHCP.
MAC	Unique MAC address of device, refer to nameplate

Note: Network modified will effective immediately, and you need to re-enter setting website to access.

4.2.3 ESL-Working setting

ESL-Working setting can set IP address and port number of ESL-Working, as shown in [Figure 4-4](#).



Figure 4-4 ESL-Working setting

Configuration item of network configuration is illustrates as shown in [Table 4-3](#).

Table 4-3 Configuration item description

Configuration item	Description
AUTO search	When set to OFF, it need to specify relative parameter of ESL-Working manually. When set to ON, AP will search ESL-Working address in local area network (LAN), as well as accessible to ESL-Working automatically.
ESL-Working address	The IPv4 or DNS in ESL-Working can configure when AUTO search is set to OFF.

Configuration item	Description
Port number	Port number of ESL-Working: When AUTO search is set to ON, this port number is the target one for AP accessible to ESL-Working; When AUTO search is set to OFF, this port number is the target one for AP accessible to ESL-Working.
SSL	Whether to use SSL to connect securely with ESL-Working

 **Note:**

- After the domain name address of ESL-Working is set, you need to check if DNS server is configured correctly.
- If set to SSL is enabled, please check port number is correct. In general, the part number for connecting/nonconnecting to SSL is different.
- ESL-Working information modified will take effective about 30s later, no need to restart AP.

 **Notice:** Please make sure to configure ESL-Working address manually when AP and ESL-Working is used in the cross-network segment.

4.2.4 Reboot AP

Click **OK** on the homepage, a confirmation box pops up, then to confirm again. The device will reboot, as shown in [Figure 4-5](#).

Please wait for about 1min to reboot AP.

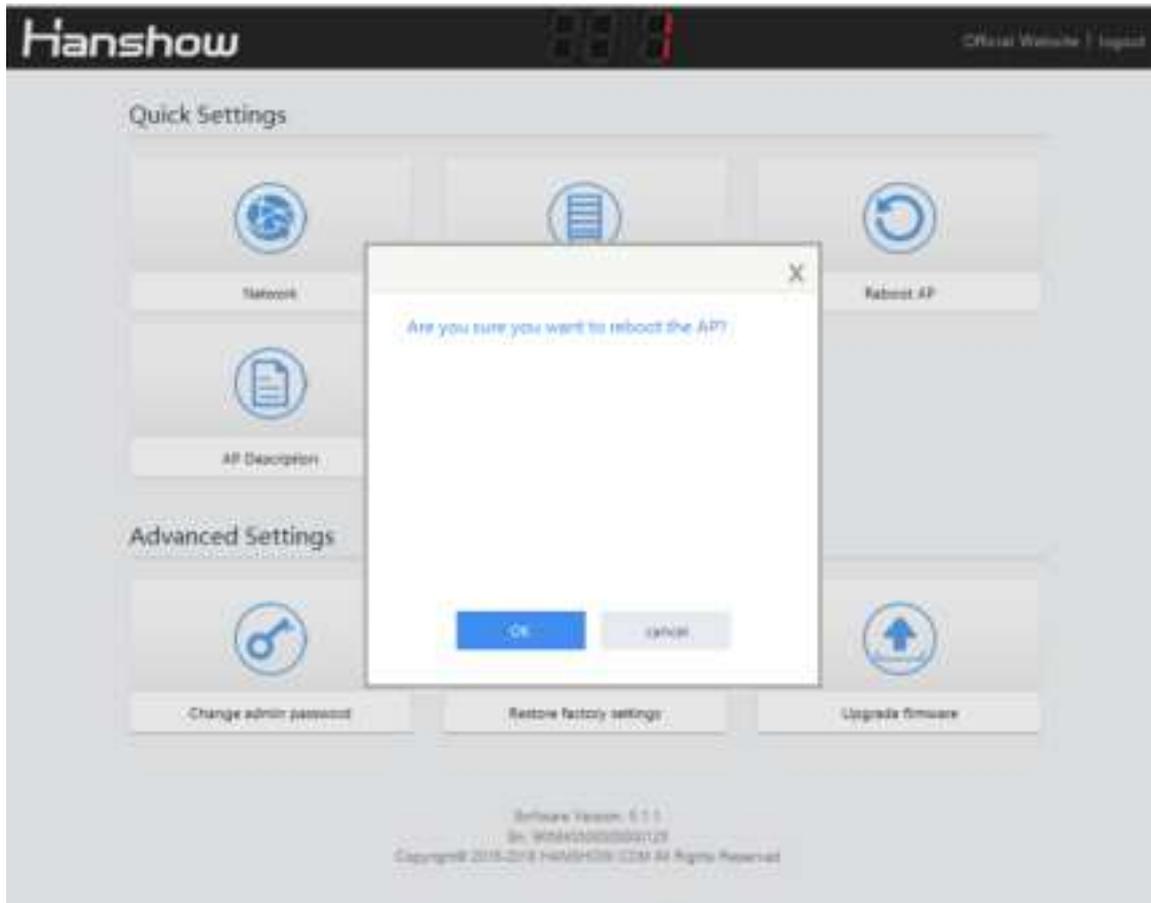


Figure 4-5 Reboot device

4.2.5 AP description

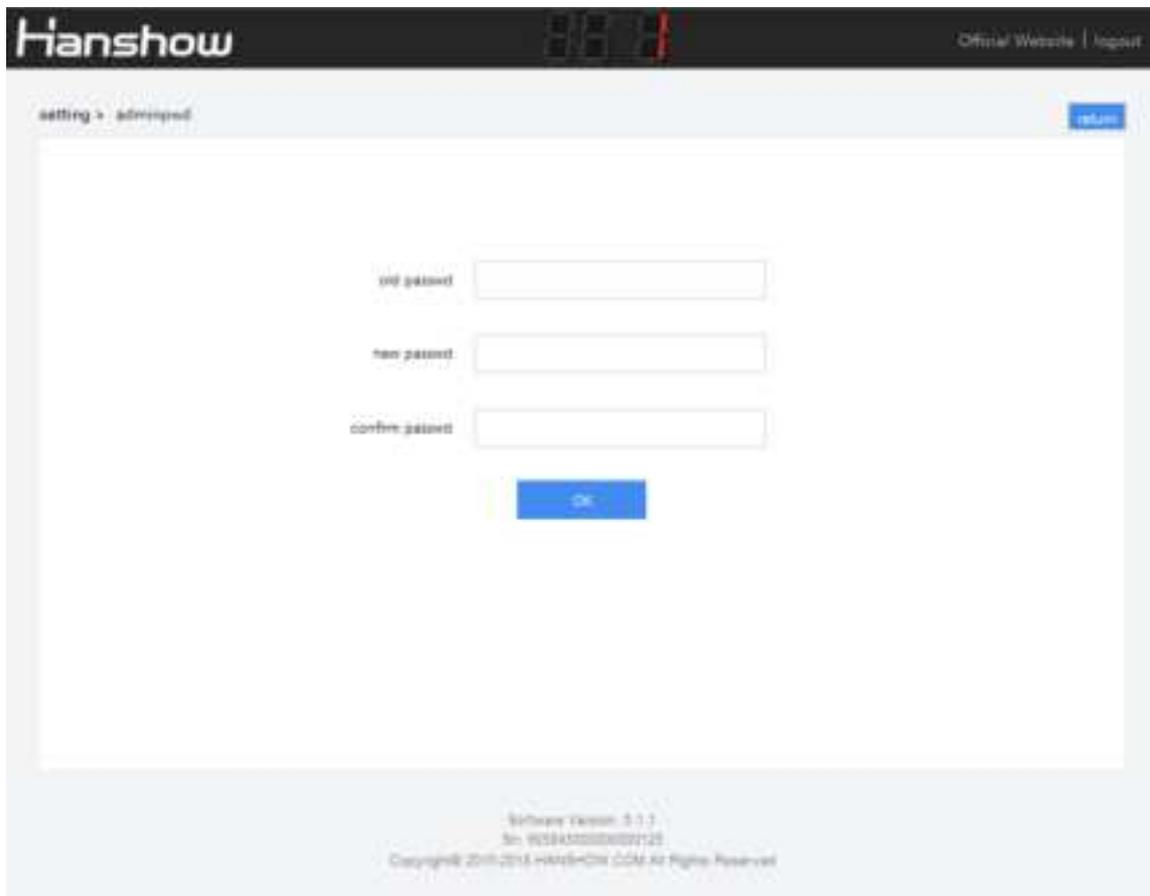
The description setting item of HS_C09959 can add custom device information description for record and recognition, as shown in [Figure 4-6](#).



Figure 4-6 AP description

4.2.6 Change admin password

Change admin password is used for changing the password of configuration page, as shown in [Figure 4-7](#).



The screenshot shows the 'setting > adminpwd' page in the Hanshow web interface. The page has a dark header with the 'Hanshow' logo and 'Official Website | Logout' link. Below the header, there is a breadcrumb 'setting > adminpwd' and a 'return' button. The main content area contains three input fields labeled 'old password', 'new password', and 'confirm password'. Below these fields is a blue 'OK' button. At the bottom of the page, there is a footer with 'Software Version: 3.1.1', 'Sn: 90284500000000000000', and 'Copyright © 2011-2015 Hanshow Co., Ltd. All Rights Reserved'.

Figure 4-7 Change password

4.2.7 Restore factory settings

It can restore the factory setting of AP. You need to check again on the pop-up dialog, click **OK**. The AP will restore factory setting and restart, as shown in [Figure 4-8](#).

Please wait for about 1min to restore factory setting.

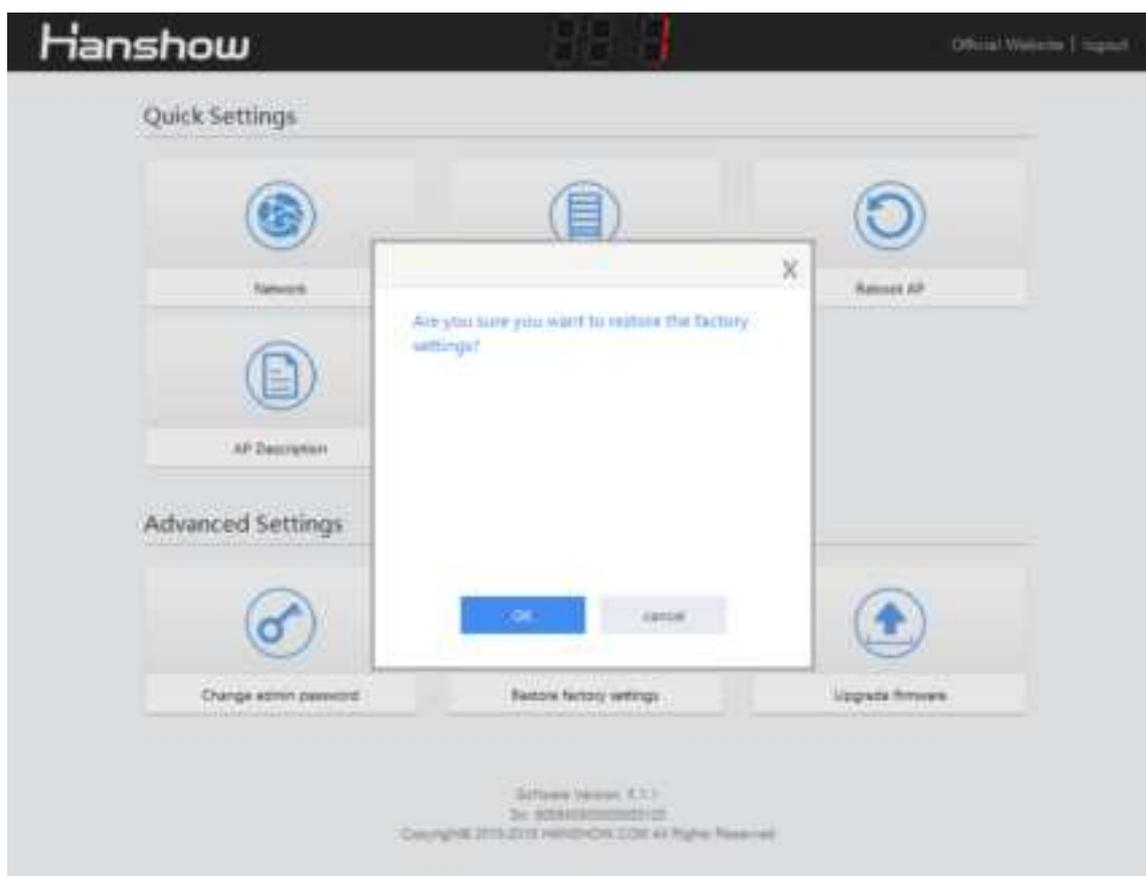


Figure 4-8 Restore factory settings

Note:

- The effect is the same as the press button.
- Don't cut off the power during the process of restoring factory setting, otherwise the device will be damaged.

4.2.8 Upgrade firmware

Upgrade firmware: Used for on-line upgrading of main system and RF subsystem.

Notice:

- Don't cut off the power during upgrading process, otherwise the system will be damaged.
- Upgrade the main PCB and four-way sub-PCB of RF.
- The whole upgrading process takes about 10 min.

For more detailed information, please refer to *(HP-AP-GEN3003) ESL Controller HS_C09959 Upgrade Manual*.

5 Workflow

1. Before starting HS_C09959, please check if the power cord and network cable are connected correctly in first.
2. Whether to use the standard 12V adapter or POE mode power supply
3. After powered-on, the power indicator on the HS_C09959 panel is on and the system starts to boot.
4. The startup time is about 1min. After the system is started, both of system status light and network status light is on, all of which indicate working status.
5. After the system starts, please follow the section of [4.2](#) to configure HS_C09959's IP and ESL-Working's IP.
6. HS_C09959 will automatically connect to ESL-Working after the configuration is correct. If success, network status indicator will display green; if failed, it will timing reconnect until connection is successful.
7. After HS_C09959 is connected to ESL-Working, the two digital tubes will display HS_C09959 ID. And HS_C09959 can perform data communication operations, including heartbeat reception, data transceiver, and label inquiry, etc.

6 Package

6.1 Package drawing

HS_C09959's physical packaging is shown as [Figure 6-1](#).



Figure 6-1 Package of HS_C09959

6.2 Package contents

HS_C09959's package contains:

- HS_C09959 device (with the product model on the nameplate)
- Sheet metal mounting bracket
- Screws
- Metal cable tie
- Quick Start Guide

7 Precautions

When installing and using HS_C09959 (hereinafter referred to as AP), please pay attention to the following precautions and suggestions:

Table 7-1 Precautions and suggestions

Item	Description
Pre-installation check	Before connecting the cables, please use the testing tool to check if the network cable is normal, and ensure AP can work normally.
Installation scenario	Avoid metal interference around the AP, especially the cage interference effect.
Install network cable	The cable is ultra 5 type and higher.
Installation distance	<ul style="list-style-type: none"> ● If the shelf height is $\leq 3\text{m}$, it is recommended that the installation distance of two Hanshow APs is about 25m, and at least 5m; ● If the shelf height is 3 ~ 5m, it is recommended that the installation distance of two Hanshow APs is about 20m and at least 5m; ● If shelf height exceeds 5m, the installation height of AP is determined according to the actual situation; ● Keep the distance not less than 2m from operator 4G; ● The installation height of AP should be higher than shelf height to avoid signal occlusion.
Installation check	<ul style="list-style-type: none"> ● Make sure the installation is fixed firmly in case of the loosening and falling-off. ● Never cable of POE into CONSOLE interface.
Network settings	<ul style="list-style-type: none"> ● It is suggested to set the channel of 2.4GHz as 1, 6 or 11 in case of using 2.4GHz Wi-Fi. ● It is required to stagger the time of RF optimization and ESL updating if users want to use 2.4GHz Wi-Fi. ● It is required to allocate the 2.4GHz wireless communication channel in advance in void of disturbance if other Internet of Things devices with 2.4GHz frequency band are used (such as Zigbee and BT).

8 FCC ID warning

8.1 Warning for nameplate

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.

8.2 Warning for product manual

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.