



Hanshow ESL Controller HS_C09983 Product Manual

V1.0.1

HS-AP-USB5001

For more information, visit our website at: <https://www.hanshow.com>

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ABOUT THE MANUAL

Thank you for using Hanshow ESL Controller HS_C09983!

This document describes the features, technical specifications, configuration methods and precautions of ESL Controller HS_C09983, helping you quickly understand all information of the device.

Before using the product for the first time, please read this document carefully and retain the manual 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 (China: 400-0365-305; Benelux: +800-808-36000; France: 0800-90-2530; Germany/Poland: +800-836-86836; USA: 001-866-9570989; Australia: 0061-1800-953008) 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
ESL Controller	ESL Controller	Also called AP that is used for data interaction between ESL-Working and ESL Controller.
ESL	Electronic Shelf Label	Used for displaying product information like promotion information, price and grade, etc.
HiLPC	High-density Low Power Cellular Network	Hanshow's 5 th generation wireless communication protocol.
RF	Radio Frequency	Electromagnetic frequency that can radiate into space.

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1 Product Introduction

1.1 Appearance and naming

HS_C09983 is the fifth-generation ESL controller independently developed by Hanshow Technology. This product supports both Hanshow's proprietary "HiLPC" wireless narrowband communication protocol and standard Bluetooth-based wireless communication protocols. It features a USB interface with an embedded micro board design and is integrated into WLAN devices that offer USB virtual network port functionality, forming a USB-converged access point. In practice, it is plugged into Wi-Fi devices via the USB interface (typically deployed near the ceiling of buildings). Its main advantage lies in reducing network deployment costs while providing users with an enhanced data service experience.

HS_C09983 operates on the 2.4GHz wireless frequency band and is responsible for data transmission and information exchange between the ESL-Working system and ESLs. It adopts a modular design with omnidirectional onboard antennas, is equipped with an ARM processor, integrates RF modules, and supports various series of Hanshow electronic shelf labels (ESLs).

An example of its appearance is shown in [Figure 1-1](#):



Figure 1-1 HS_C09983 (White)

1.2 Product characteristics

1.2.1 Hardware characteristics

- Hardware interface: USB port can serve as virtual Ethernet port and power port.
- RF system: 4 RF channels which can support concurrent communication.
- LED indicator: Display of real-time working status.
- Physical interface and indicator: See [Figure 1-2](#). Interface feature descriptions see [Table 1-1](#).

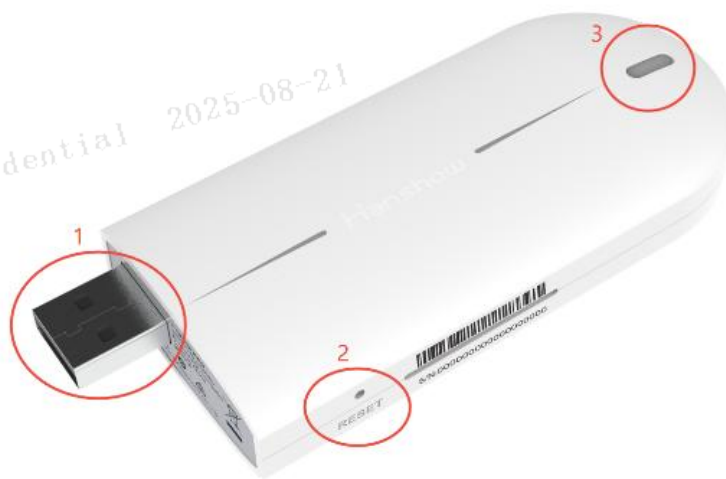


Figure 1-2 HS_C09983 Physical Interface Diagram

 **NOTE:** The above image is for reference only, the actual product prevails.

Table 1-1 Function description for HS_C09983's interfaces

No.	Interface name	Description
1	USB interface	A USB 2.0 interface used for power port and virtual network port.
2	RESET button	● Press and hold reset button over 5s will resume factory settings; ● Press reset button can switch between DHCP service activation and static IP (192.168.1.199). Mind that the reset button will be invalid within 30s after either feature is triggered. More information please refer to section Key operation.
3	LED indicator	● When LED is off or red light is constantly on, system operation is in abnormal state; ● When green light is constantly on, Ethernet connection is normal and ESL-Working is unconnected; ● When green light blinks rapidly, or blanks during startup, system has not obtained IP; ● When green light blinks slowly, Ethernet connection is normal and ESL-Working is connected.

⚠ NOTICE: The ESL controller shall enter self-test mode after it is booted (about 1 minute), the dual-color LED shall blink alternatively. LED shall stop blinking when system operates normally. In case an exception occurs: if you find the red LED is constantly on after it blinks once, this means the daughterboard No.1 is in abnormal state; if you find the red LED is constantly on after it blinks twice, this means the daughterboard No.2 is in abnormal state; if you find the red LED is constantly on after it blinks 3 times, this means the daughterboard No.3 is in abnormal state; if you find the red LED is constantly, this means the motherboard is in abnormal state.

1.2.2 Software characteristics

- Operating system: An embedded Linux OS handles data interchanges with ESL-Working, such as: registration of ESL controller system, heartbeat reception, data transmission etc. In addition, online upgrade can be supported.
- Smart dual-system: Dual-system is supported for the sake of automatically disaster recovery capacity.
- Compatibility: Support all the ESL products currently sold by Hanshow.
- Administrative configuration: Can support Webpage configuration.

1.3 Specifications

Product Specifications are as shown in [Table 1-2](#):

Table 1-2 HS_C09983 specifications

Item		Description
Power consumption	Input voltage	DC 5V
	Rated power	1.9W
	Max. power	2.5W
	Other	Over-load/over-voltage/over-heat protection
RF module (2.4G module)	Working frequency	2,402MHz ~ 2,480MHz 2,481MHz ~ 2,493MHz (only applies to Japan)
	Output power	6dBm by default
	Antenna gain	≥0.5dBi
	Antenna characteristics	Three-channel Omni-directional onboard antenna
	Ultra-high sensitivity	-95dBm at 500Kbps; -97dBm at 100Kbps
RF module (Bluetooth module)	Working frequency	2,402MHz ~ 2,480MHz
	Output power	6dBm by default
	Antenna gain	≥1dBi
	Antenna characteristics	Single-channel Omni-directional onboard antenna
	Ultra-high sensitivity	-93dBm at 1Mbps;
Ethernet connection	Connection rate	10/100M (USB virtual network port Adaptive)
	Auto-negotiation	Support
	DHCP	Support
Temperature	Operating temperature	0°C ~ 50°C (32°F~122°F)
	Storage temperature	-30°C ~ 70°C (22°F~158°F)
Humidity	Relative humidity (%RH)	10% ~ 90% (non-condensing)
Dimension	L*W*H (mm)	40.2*99.7*15.8
Weight	Net weight	37g
Case color	-	White

2 Ex-factory state description

2.1 Nameplate information

The nameplate of HS_C09983 contains the following implications, as shown in [Figure 2-1](#).

- Product model: HS_C09983.



Figure 2-1 Nameplate of HS_C09983

Note:

- The nameplate is only for reference, the actual product prevails.
- The SN and MAC address are all on the side of HS_C09983.

2.2 Ex-factory packaging

HS_C09983 is packaged by Kraft paper, and the packaging list is:

- ESL Controller (HS_C09983) *1
- Fixing accessory *1

3 Product features

3.1 System architecture

Hanshow ESL system is composed by Electronic Shelf Label (ESL), ESL controller, ESL-Working, PriSmart, database, integration server, monitoring system and Handheld Terminals, as shown in [Figure 3-1](#):

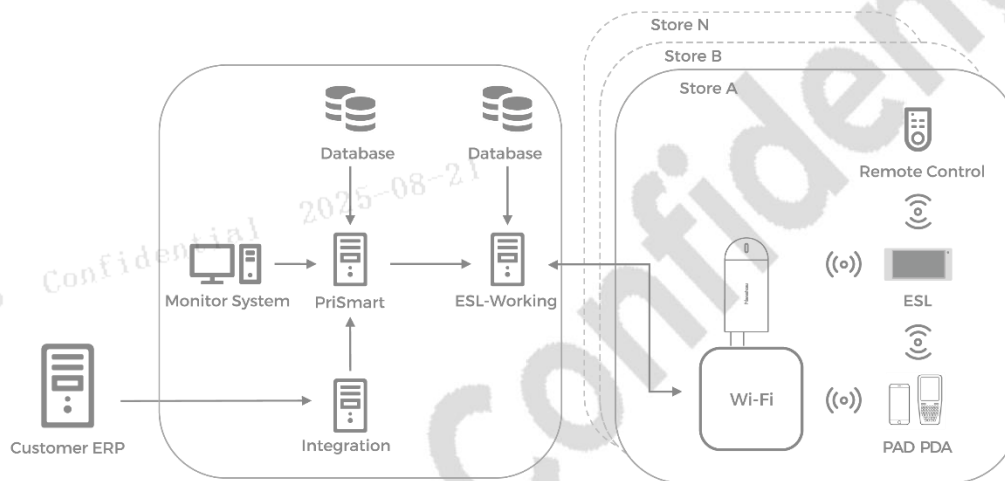


Figure 3-1 ESL system architecture

3.2 ESL controller product features

The ESL Controller is a critical component of Hanshow's ESL system. It is responsible for data transmission and control message exchange between the ESL-Working system and the ESLs. Through the ESL controller, ESL-Working can manage ESLs, implements service operations, and receive status updates reported by the ESL.

The ESL controller connects to the ESL-Working system via an Ethernet interface (USB virtual network port) and establishes bidirectional wireless communication with ESLs using either the 2.4GHz frequency or a standard Bluetooth protocol. Its features include:

- Downlink: The ESL controller receives downlink packets from ESL-Working and performs tasks such as updates, networking, upgrades, fast flashing, and global etc. operations on the ESLs.

- Uplink: It forwards heartbeat packets and other ESL information to the ESL-Working platform based on the ESL wireless protocol standard.
- Cellular networking technology, with a coverage radius of up to 25 meters.
- Financial-grade security chip, supporting AES-256, AES-128, RSA1024/2048 encryption algorithms, SHA hashing, and TRNG (true random number generation) to ensure system security and reliability.
- Multi-antenna technology to increase single AP capacity.
- Remote upgrade support.
- Real-time status reporting and monitoring.
- Assists in ESL management.

3.3 Feature list

Table 3-1 Feature list

No.	Feature	Description
1	Webpage configuration	Users can set network, set server, reboot ESL controller, describe the device, set NTP server, change password, restore factory setting, upgrade the system and set Proxy.
2	Heartbeat reception	Periodically collect ESL reported heartbeat data, in which contain ESL basic information, such as: ESL ID, firmware version number, wake-up cycle, work frequency point, battery volume etc.
3	Update	Once there is change(s) of commodity information, such as: price change, release of promotion information etc., update feature shall be enabled by the system in order to refresh corresponding ESL screen(s).

4 Product operation

4.1 Key operation

Reset button supports press and hold and press, each owns different function.

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 network. AP address will switch between DHCP and static IP with each press.

- When the ESL controller is in DHCP client mode, device IP will be obtained from the DHCP server.
- When the ESL controller is in static IP mode, the default settings are as follows:

IPv4 address--192.168.1.199, Subnet mask--255.255.255.0, Gateway--192.168.1.1.

 **NOTE: The protection interval between two operations should be at least 30s, that is, if you press again within 30s after last successful operation, your operation will be invalid.**

4.1.2 Press and hold

Press and hold reset button is more than 5s, AP will restore factory setting. The nixie light is off and the device will restore factory setting and reboot. Restore factory setting contains the following contents:

- Restore to DHCP client mode.
- Restore to auto search mode of ESL-Working.
- Clear custom description.
- Restore web login password to "admin".
- NTP restores to disabled by default.

4.2 Parameter setting

HS_C09983 supports web-based configuration mode, allowing users to configure and manage the device via a web page.

4.2.1 Device homepage

By accessing the IP address of HS_C09983, you can enter the device's login page for configuration. For example: If the IP address of HS_C09983 is 192.168.51.100, then by visiting the IP address: <https://192.168.51.100>, you will be able to enter the login page and configuration homepage to set up HS_C09983. The default password is: "admin".

Upon reaching the login page, you will be prompted to set a password. The password should consist of 8 to 32 characters including numbers, letters, and special symbols (~!@#) to enhance password strength. After resetting the password, click **OK** after resetting it, or click **Cancel**, as shown in [Figure 4-1](#) and [Figure 4-2](#).

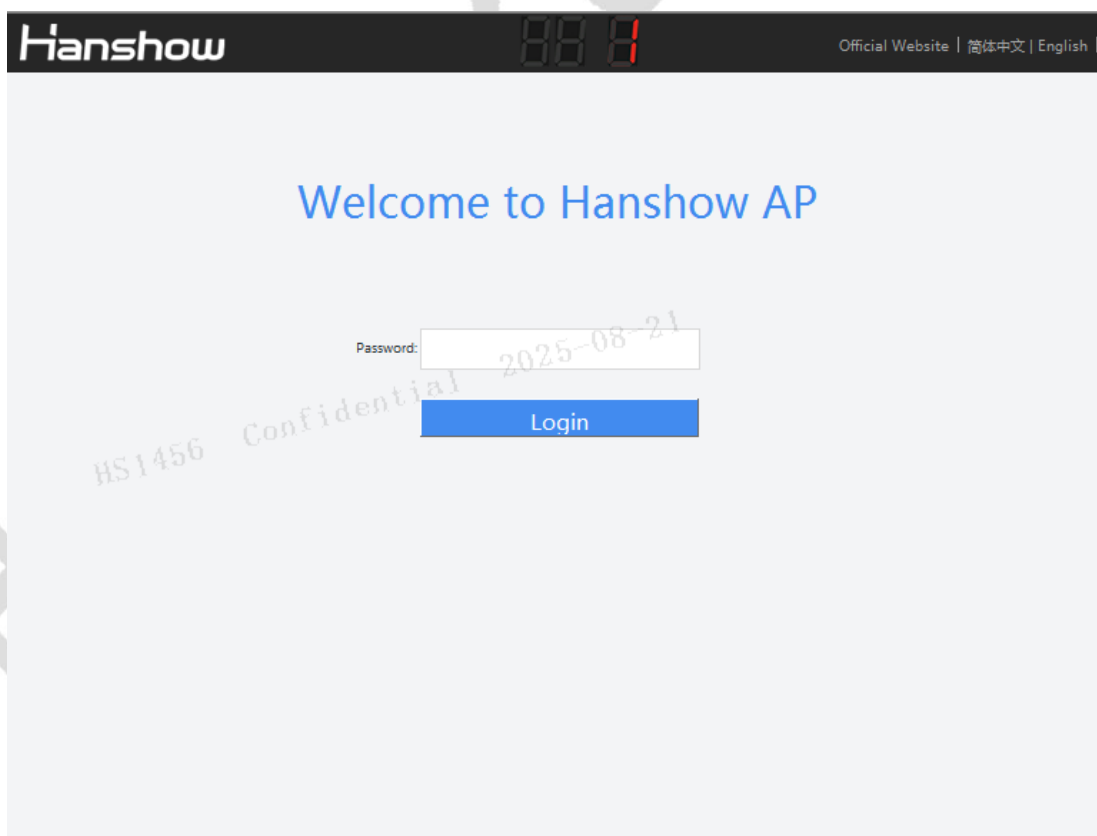
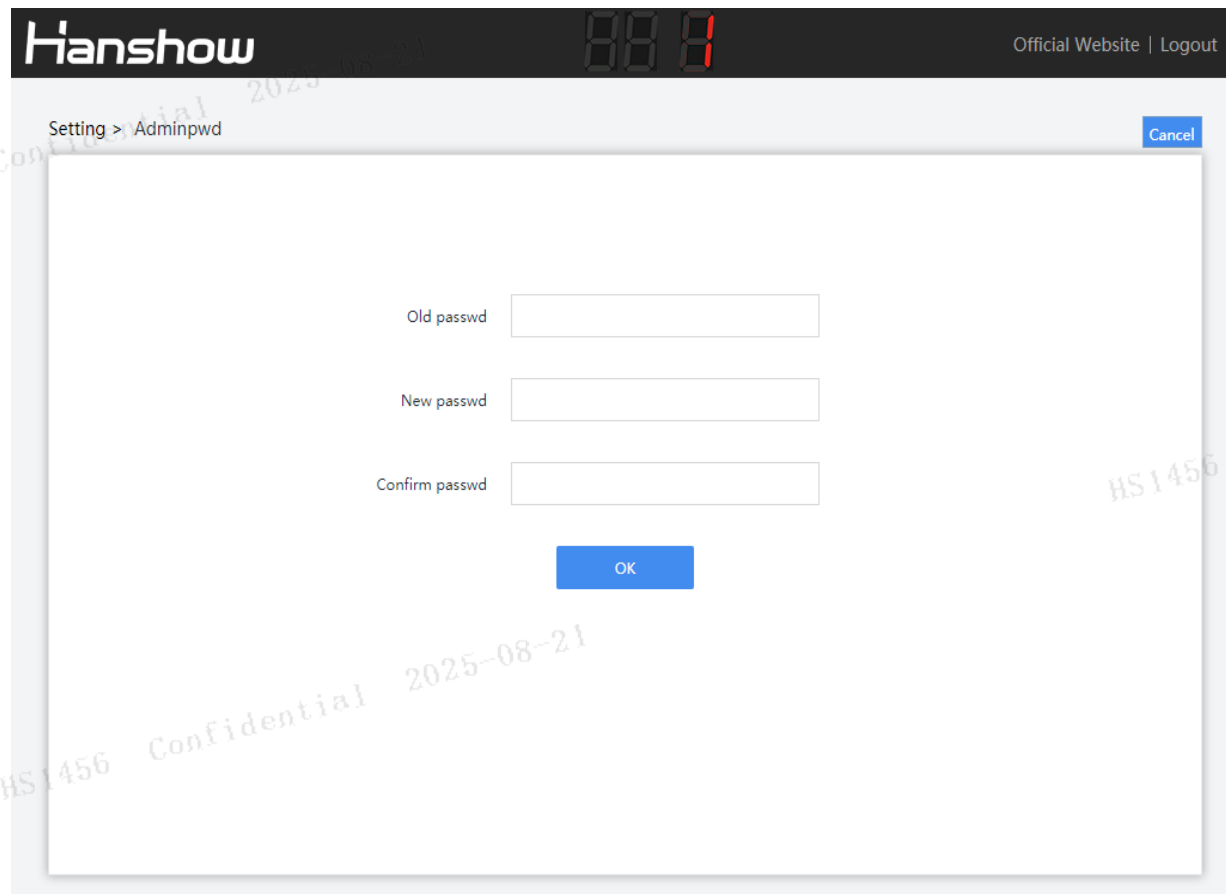


Figure 4-1 Login page



Setting > Adminpwd

Cancel

Old passwd

New passwd

Confirm passwd

OK

Figure 4-2 Password setting page

If the password setup does not comply with security rules, a password rule prompt message will pop up. If there is an error in setting the password, an error prompt message will appear.

NOTE:

- Both Chinese and English are supported, switch the language you want in upper-right corner.
- If the password strength is not strong enough, a pop-up prompts to reset your password. If you don't want to reset, click "Cancel" to skip.

HS_C09983's configuration homepage is as shown in [Figure 4-3](#).

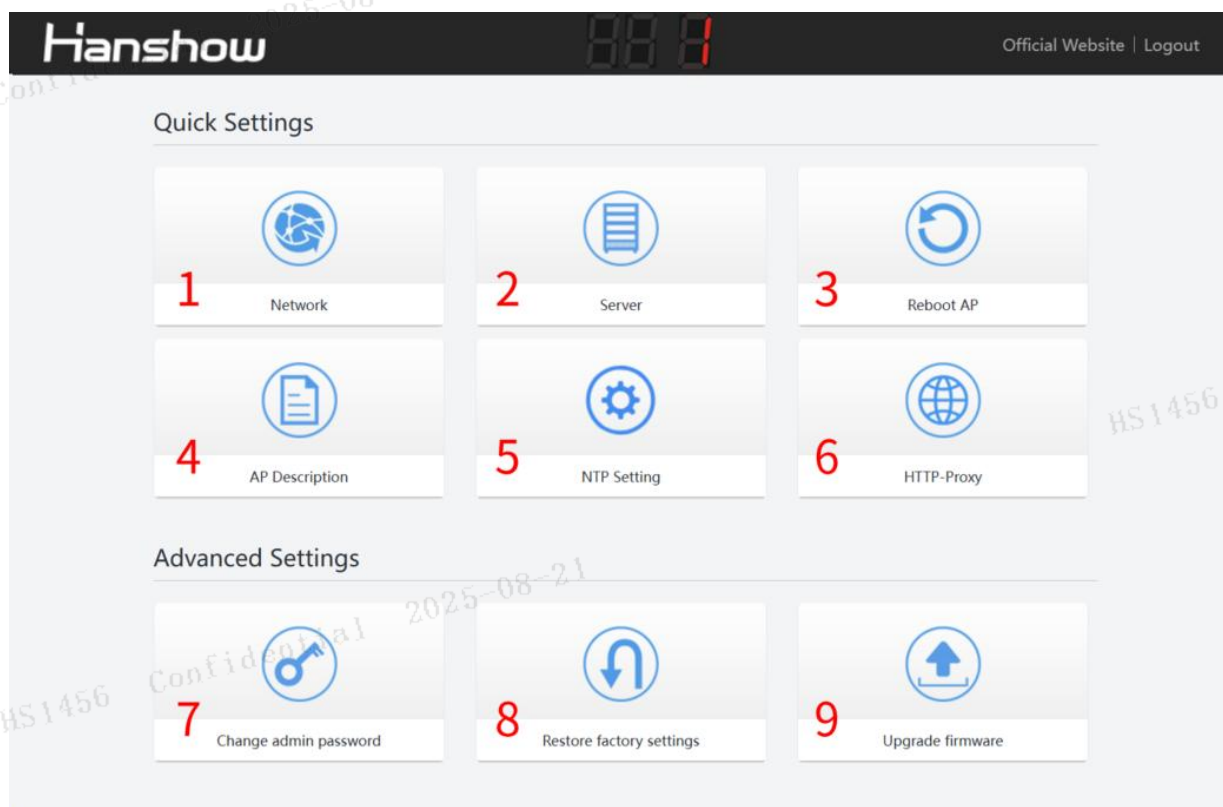


Figure 4-3 Configuration homepage

The configuration items are illustrated as shown in [Table 4-1](#):

Table 4-1 Configuration option description

No.	Configuration Item	Description
1	Network	Configure network parameters.
2	Server	Configure ESL-Working parameter.
3	Reboot AP	Reboot the device.
4	AP Description	Add description information.
5	NTP Setting	Configure NTP service.
6	Proxy Setting	Set Proxy parameters.
7	Change admin password	Change login password.
8	Restore factory settings	Restore factory settings.
9	Upgrade firmware	Upgrade for main system and RF subsystem.

4.2.2 Network setting

Network setting is used for setting network parameter of HS_C09983. It supports two IP types: IPv4 and IPv6; two IP address acquisition modes: DHCP or static IP.

If IP type is IPv4, the configuration page is shown in [Figure 4-4](#):

Setting > Network

Cancel

1 IPType IPV4

2 DHCP OFF

3 IPv4 address 192.168.1.199

4 Subnet mask 255.255.255.0

5 Gateway 192.168.1.1

6 DNS1 192.168.2.1

DNS2 192.168.2.101

7 MAC 98:6D:35:7C:4D:FE

OK

Figure 4-4 Network configuration page 1

The configuration options are illustrated as shown in [Table 4-2](#).

Table 4-2 Configuration option description

No.	Configuration Option	Description
1	IP type	Support IPv6/IPv4 dual protocol stacks. To configure the parameters when selecting IPv4.
2	DHCP	- When set to OFF, IP address should be configured manually. - When set to ON, the device is DHCP client, and IP address should be obtained from DHCP server.
3	IPv4 address	Configurable when DHCP is OFF.
4	Subnet mask	Configurable when DHCP is OFF.
5	Gateway	Configurable when DHCP is OFF.
6	DNS	Domain Name Server (DNS), DNS1: Primary DNS server; DNS2: Secondary server. Must be set when the ESL-Working address is configured as domain name address; Enable DHCP, to get DNS from DHCP.
7	MAC	Unique MAC address, refer to the nameplate.

If IP type is IPv6, the configuration page is shown in [Figure 4-5](#):

The screenshot displays the 'Setting > Network' configuration page. At the top, there is a 'Cancel' button. The main configuration area contains the following fields:

- 1 IPtype: IPV6 (dropdown menu)
- 2 DHCP: ON (toggle switch)
- 3 IPv6 address: (text input field)
- 4 Gateway: (text input field)
- 5 DNS1: (text input field)
- DNS2: (text input field)
- DNS3: (text input field)
- 6 MAC: 98:6D:35:7C:4D:FE (text input field)

An 'OK' button is located at the bottom of the configuration area.

Figure 4-5 Network configuration page 2

The configuration items are illustrated as shown in [Table 4-3](#).

Table 4-3 Configuration option description

No.	Configuration Item	Description
1	IP type	Support IPv6/IPv4 dual protocol stacks. To configure the parameters when selecting IPv6.
2	DHCP	- When set to OFF, IP address should be configured manually. - When set to ON, the device is DHCP client, and IP address should be obtained from DHCP server.
3	IPv6 address	Configurable when DHCP is OFF.
4	Gateway	Configurable when DHCP is OFF.
5	DNS	Domain Name Server (DNS): - DNS1: Primary DNS server; - DNS2: Secondary server; - DNS3: Secondary server. Must be set when the ESL-Working address is configured as domain name address; Enable DHCP, to get DNS from DHCP.
6	MAC	Unique MAC address, refer to nameplate.

 **NOTE:** The modified network settings take effect immediately; you need to re-enter the set URL to access the web.

4.2.3 Server setting

This can set IP address and port number of the server, as shown in [Figure 4-6](#):

Figure 4-6 Server setting

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

Table 4-4 Configuration option description

No.	Configuration Item	Description
1	AUTO search	- When set to OFF, you need to set the related server parameters manually. - When set to ON, the AP will automatically search and connect to server address in local area network (LAN).
2	IPv6	- Disable represents server address can be configured as IPv4 format address (It is configurable when AUTO search is off), and an error will be reported if the configuration format is incorrect. - Enable represents server address can be configured as IPv6 format address (It is configurable when AUTO search is off). And an error will be reported if the configuration format

No.	Configuration Item	Description
		is incorrect.
3	ESL-Working address	The IPv4 or DNS in server is configurable when AUTO search is OFF.
4	Port number	Port number of the server: - When AUTO search is set to ON, it presents the target server address searched by the AP. - When AUTO search is set to OFF, it presents the target server address accessed by the AP.
5	SSL	Whether to use SSL to connect to server securely.
6	SSL MUTUAL AUTH	Whether to verify the server certificate. This feature is valid only when SSL is enabled.

NOTE:

- **Confirm whether the DNS server in network setting is correct after changing the DNS of server.**
- **Confirm whether the port number is correct after SSL is enabled. Generally, the port number connected by SSL or non-SSL is different.**
- **The modified server information will take effect about 30s later, no need to restart the AP.**

⚠NOTICE: You need to configure server address manually when ESL controller and server are used in different network segments.

4.2.4 Reboot AP

Click “Reboot AP”, click “OK” on pop-up box, the device will reboot. Reboot AP takes about 1min, as shown in [Figure 4-7](#):

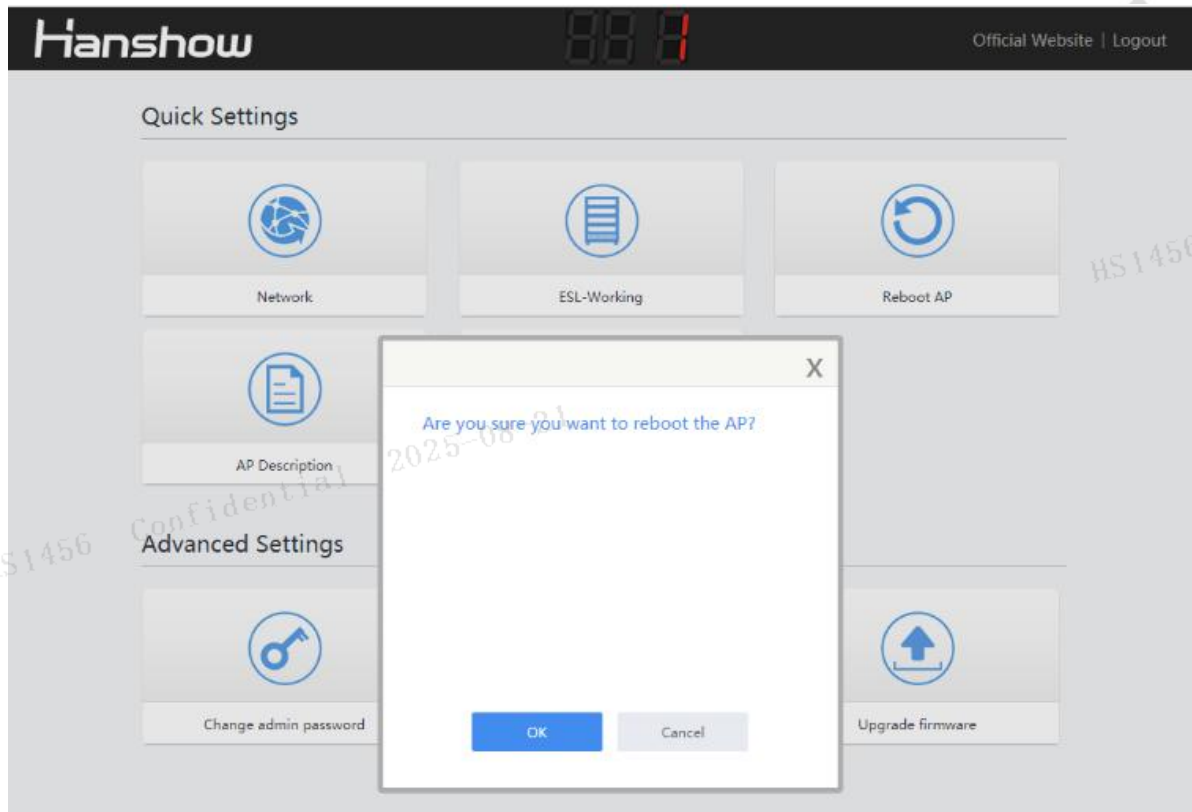


Figure 4-7 Reboot device

4.2.5 AP description

This can add custom information for AP record and recognition, as shown in [Figure 4-8](#):



Figure 4-8 AP description

4.2.6 NTP setting

NTP setting can add custom device acquisition time, easy to synchronize time in time zone, as shown in [Figure 4-9](#):

Setting > Time Zone

Time Zone: 'Asia/Shanghai'
Thu Dec 5 11:21:50 CST 2024

NTP Server Enable ☒

NTP DHCP Enable ☒

NTP Server 0.pool.ntp.org

NTP Server 1.pool.ntp.org

NTP Server 2.pool.ntp.org

NTP Server 3.pool.ntp.org

Time Zone Asia/Shanghai

OK

Figure 4-9 NTP setting

4.2.7 Change admin password

This is used for changing the login password of the configuration webpage, as shown in [Figure 4-10](#):

The screenshot shows the 'Setting > Adminpwd' page in the Hanshow configuration interface. The page has a dark header with the 'Hanshow' logo and 'Official Website | Logout' link. Below the header, the breadcrumb 'Setting > Adminpwd' is visible. The main content area contains three input fields: 'Old passwd', 'New passwd', and 'Confirm passwd'. Below these fields is a blue 'OK' button. A 'Cancel' button is located in the top right corner of the form area. The interface is watermarked with 'HS1456 Confidential' and a date '2025-08-21'.

Figure 4-10 Change password

4.2.8 Restore factory settings

Click **Restore factory settings**, click **OK** on pop-up box, the device will restore factory settings and reboot. Restore factory settings takes about 1min, as shown in [Figure 4-11](#):

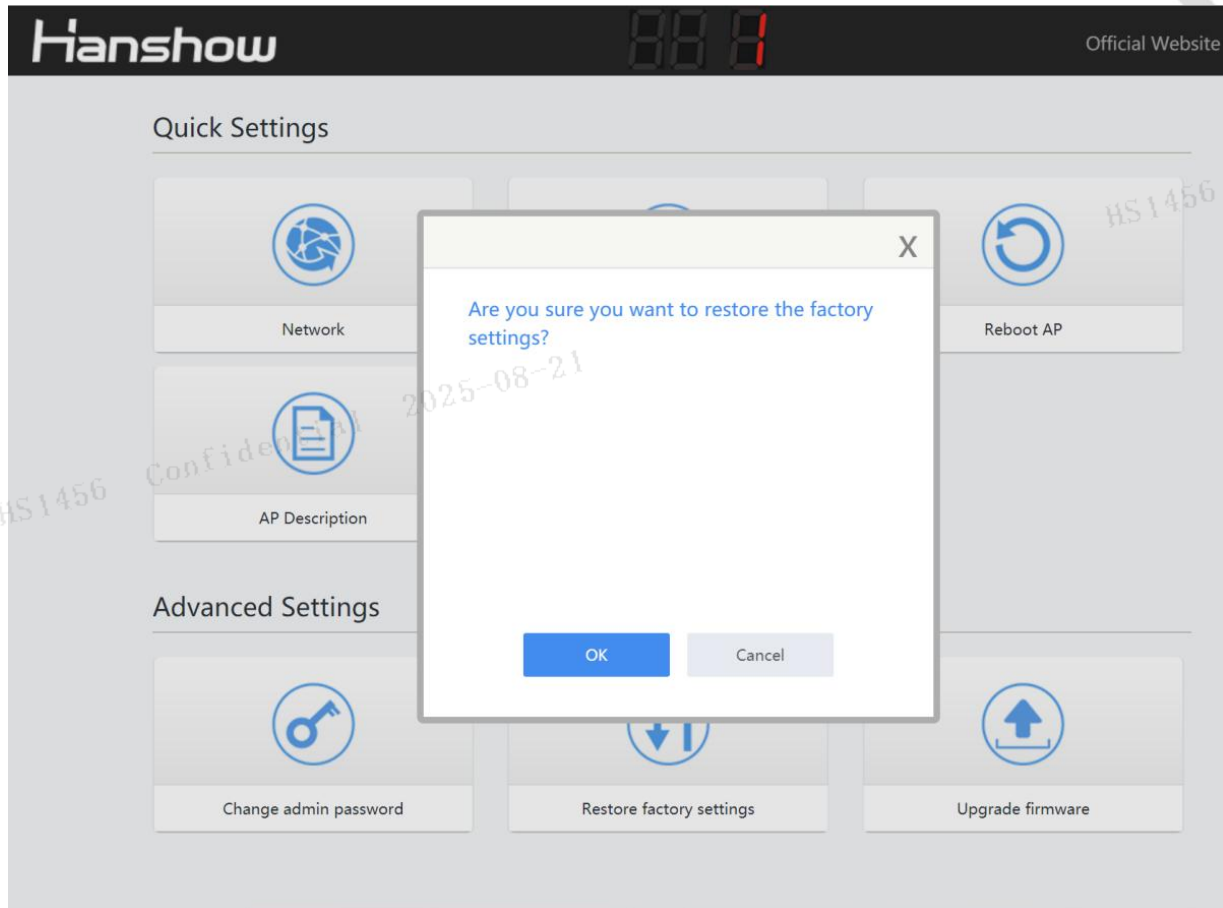


Figure 4-11 Restore factory setting

NOTE:

- Same as the reset key action.
- During the process of restoring to factory settings, do not turn off the power supply to the device, as this may lead to system abnormalities.

4.2.9 Upgrade firmware

HS_C09983 upgrade is used to online upgrade main system and RF subsystem. It supports local upgrade and remote upgrade.

- Local upgrade: It is mandatory to use an upgrade package with a specified version number for the upgrade.
- Remote upgrade: Currently, it is only available to LAN environment. If cross-network segment upgrade is required, you need to do port mapping in advance.

⚠NOTICE:

- **Don't cut off the power during the upgrade, as this may lead to system abnormalities.**
- **The entire upgrade procedure takes about 5 minutes.**

For more information, please refer to *Hanshow ESL Controller HS_C09983 Upgrade Manual*.

4.3 Workflow

Specific workflow is as follows:

1. Before using HS_C09983, please confirm if Wi-Fi device has 5V/500mA USB2.0 or above port, and if the software can support USB virtual Ethernet port feature.
2. Check if power cable and network cable are connected properly.
3. After power is on, do not boot ESL controller until Wi-Fi device is booted (this takes about 5 minutes).
4. The ESL controller takes about 1 minute to start. Once the system has started normally and the green indicator light is on, the device enters the working state.
5. After system startup, Follow the section of [Parameter setting](#) to configure relevant parameters accordingly.
6. ESL controller will automatically connect to ESL-Working after the correct configurations. If success, the indicators will flash green; if failed, the prompt messages appear. ESL controller will connect to ESL-Working regularly.

5 FAQ

5.1 Hardware FAQ

5.1.1 Power indicator light is off

Troubleshooting steps:

- Wi-Fi devices require a USB interface that supports the virtual network port functionality.
- USB-powered devices should support at least a 500mA supply current.
- Ensure that the Wi-Fi device is connected properly and powered on.
- Check whether the Wi-Fi device's associated parameter settings are correct, such as whether the USB port is enabled. For specific configuration steps, please refer to the configuration instructions of the Wi-Fi device used.

After confirming the above steps, if the ESL controller still cannot be powered on normally, please contact technical support personnel or the agent from whom you purchased the ESL controller for assistance.

6 Repair instructions

6.1 Return and repair process

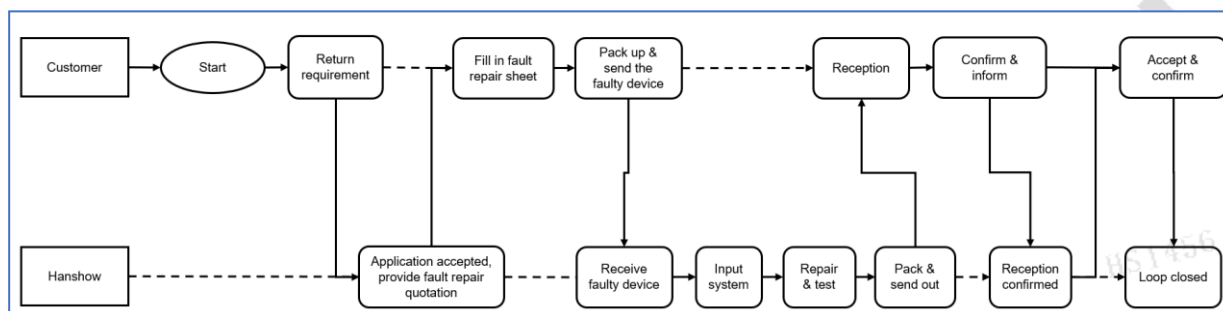


Figure 6-1 Return and repair process chart

6.2 Repair time limit

Repair of faulty device: since the faulty device is received by Party B and Party B confirms that the faulty device is within repair range; or since Party B receives repair expense, the faulty device shall be repaired within 30 days. After that, the repaired device shall be sent to the designated place by Party A. In case Party B fails to repair the faulty device, Party B shall provide substitute with the same capacities.

7 Maintenance

Please follow below advices when installing and using the ESL controller.

Table 7-1 Precautions and suggestions

Items	Description
Environment requirements	- Keep ESL controller operating in standard temperature and humidity. - The ESL controller operates best in normal indoor conditions. To prevent circuit damage, avoiding poor ventilation or other extreme conditions. - Do not install the ESL controller in an environment with dust, poisonous gases, flammable or explosive objects, or electromagnetic interference. - The ESL controller should be kept away from strong magnetic

Items	Description
	environments to minimize interference.
Safe precautions	● Take proper measures to avoid ESL controller damaged and installer injuries. ● Keep the ESL controller clean. ● Clean the device with a dry or damp soft cloth. Do not clean the device with wet cloth or liquid directly. ● Ensure the ventilation hole is not blocked. ● Unplug the power first when you need to move or clean the device. ● Place the ESL controller in a dry and flat position away from any liquid. ● Keep the device away from water or damp places to avoid water or moisture entering the case.
Pre-installation check	● Use network cable tester to check the network cable is normal. ● All power cables are not short-circuited or reversely connected and must be intact with no damage. ● Labels on cables are clear and correct. ● Ensure the ground conductor is intact. ● The Wi-Fi device you are using must have USB interface that can support virtual Ethernet port feature. ● No structural interference between the Wi-Fi device you are using and ESL controller. ● Confirm that USB power supply device can support at least 500mA output current and can support USB virtual Ethernet port feature.
Installation scenario	● Try to reduce the number of obstacles such as walls between the ESL controller and user terminals. ● Limit the metal shielding around the ESL controller to prevent cage interference effect.

Items	Description
Installation distance	● If the shelf height is $\leq 3\text{m}$, it is recommended that the installation distance of two Hanshow ESL controllers is about 20m, and at least 5m. ● If the shelf height is $3\text{m} \sim 5\text{m}$, it is recommended that the installation distance of two Hanshow ESL controllers is about 15m and at least 5m. ● If shelf height exceeds 5m, the installation height of ESL controller is determined according to actual situation after on-site field investigation. ● The ESL controller installation height should be higher than shelf to avoid signal shielding.
Network settings	● It is recommended to use the 5GHz frequency bands of your Wi-Fi ESL controller, instead of using the 2.4GHz frequency bands. ● If Wi-Fi ESL controller is 2.4GHz, recommended to set Wi-Fi channel to 1, 6 or 11. ● If Wi-Fi ESL controller is 2.4GHz, recommended to stagger the update time with ESLs to achieve optimal performance. ● Hanshow ESL controller may be limited or affected by other IoT devices that share the 2.4GHz frequency-band such as Wi-Fi, BT or Zigbee.
Post-installation check	● Install the ESL controller firmly on the ceiling to avoid ESL controller falling off and damaged. ● The green light should be on when the ESL controller runs properly.

8 FCC regulatory conformance

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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: 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

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

RF Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna and transmitter.