SI-110

IR Controller

User Manual

Copyright & Disclaimer

FCC Interference Statement

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 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.

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Disposal

	This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

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Table of Contents

1   Overview

The SI-110, is a Z-Wave plus compliant Z-Wave-to-IR Bridge to control Air Conditioner by receiving Z-Wave command and translating it to Infrared command. With it's comprehensive built-In IR Code library. SI-110 can control different brands and models of Air Conditioners worldwide. The SI-110 is a security enabled Z-Wave plus device. A security Enabled Z-Wave Plus Controller must be used in order to fully utilize the product. The SI-110 is a Z-Wave slave device; it depends on the gateway on how to setup a particular AC brand with the correct IR code. Different gateway's have different user interfaces for setup.

This product can be included and operated in any Z-WaveTM network with other Z-WaveTM certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

The device adopts the Z-WaveTM 500 series chip, when your Z-WaveTM network system is all made by Z-WaveTM 500 series devices. The network system will have the advantages.

1.1 Adding to Z-WaveTM Network

First time adding, activate the device through battery, and then it can be added into the Z-WaveTM network. First, make sure the primary controller is in the inclusion mode. When first power is applied, its LED flashes on and off alternately and repeatedly at 0.5 second intervals. It implies that it has not been assigned a node ID and start auto inclusion.

1.1.1. Auto Inclusion

Note: Auto inclusion timeout is 2 minute during which the node information of explorer frame will be emitted once several seconds. Unlike "inclusion" function as shown in the table below, the execution of auto inclusion is free from pressing the Include/Exclude button in the case.

The table below lists an operation summary of basic Z-Wave functions. Please refer to the instructions for your Z-WaveTM Certificated Primary Controller to access the Setup function, and to include/exclude/associate devices.

Function	Description
Inclusion	1. Have Z-Wave^{TM} Controller entered add mode. 2. Press the add key on the side of the device three times in rapid succession. 3. After add successful, the device will wake to receive the setting command from Z-Wave^{TM} Controller about 20 seconds.
Exclusion	1. Have Z-Wave^{TM} Controller entered remove mode. 2. Press the "add" key on the side of the device three times in rapid succession. 3. Node ID has been excluded.
Reset	***Notice: Use this procedure only in the event that the primary controller is lost or otherwise inoperable.*** 1. Long Press the "add " key 3 second, the LED will green light ON 2. Then release the "add "key AFTER LED blink green twice.
Association	Please consult your Gateway supplier for more detail. Normally, User can ignore this step during the setup. SI-110 supports 1 association group Association Group #1 Association Group #1 (max. 1 node) is default to associate with the primary controller (Gateway/Hub/Controller) for SI-110 Status change report, refer to below for report details: • Current Room Temperature (report in precision of 0.5°C or

	1°F) (It will be according to Configuration Parameter 39 setting to decide the trigger level) • Current Battery Level (Only apply in Low Battery Warning happened) • Device Reset Locally Notification (Only report when the SI-110 has been triggered the RESET TO DEFAULT)
1. Including a node ID allocated by Z-Wave^{TM} Controller means "**Add**" or "**Inclusion**". Excluding a node ID allocated by Z-Wave^{TM} Controller means "**Remove**" or "**Exclusion**". 2. Failed or success in including/excluding the node ID can be viewed from Z-Wave^{TM} Controller.	

Notice 1: The device cannot work normally in the first time. Please make sure the battery is full before the first use.

Notice 2: Always RESET a Z-WaveTM device before trying to add it to a Z-WaveTM network.

1.2 LED Indication

To distinguish what

State Type	LED Indication
Normal	Under normal operation, Blink Green when sending command to AC
No node/Inclusion	Under normal operation, During inclusion Green Indicator LED turns ON and blinks twice until the Inclusion has finished then stay off.
IR Learning	Green LED indicator turns ON for indicating the Start of IR Code learning Successful: Green Indicator LED flashes TWICE. Unsuccessful: Red indicator LED flashes TWICE.

1.3 Choosing a Suitable Location

1. Do not locate the SI-110 IR Controller facing direct sunlight, humid or dusty place.
2. The suitable ambient temperature for the SI-110 IR Controller is 0°C~40°C.
3. After putting it into use, the body of SI-110 IR Controller will become a little bit hot of which phenomenon is normal.

1.4 Installation

Step 1 Apply Power to the SI-110 IR Controller
• Open the SI-110 Casing backside
• Install 2x AA batteries (not included) or use Micro USB.
• SI-110 will detect the first applied power source to decide what Z-Wave device role it will be in after included into the Z-Wave gateway: battery= sleeping device (FLiRS mode).
• Once the SI-110 is included into a Z-Wave network, the working mode (sleeping or awake) cannot be changed, unless it is excluded and re-apply the power.
•SI-110 can be included and operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of Vendor to increase reliability of the network.

Step 2 Include SI-110 to a Z-Wave Gateway
Step Procedure / Description Status Indicator
1.Refer to your primary controller to enter into the Inclusion Mode or Exclusion Mode
2.When it is prompted to enter it, please click the "Add" button 3x in rapid succession (see red arrow) within 1,5 second. Green Indicator will turn On and will turn Off after successful inclusion.

Notes:
1. It is recommended to perform the Remove (Exclude) procedure before performing an Add (Include) procedure.
2. Green Indicator flashes TWICE then stay off to represent the Add / Remove process failed, please repeat the above step again.

Temperature Sensor

Micro USB | "PROG" Button | LED Indicator

External IR Port
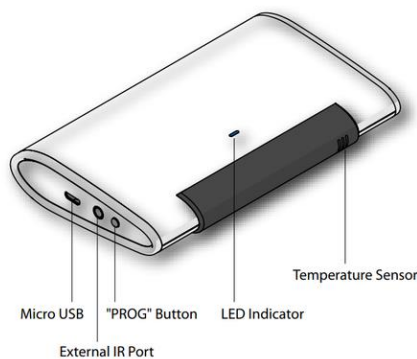
Step 3 Setup Automatic Status Report Association to Gateway (normally not used)
•Please consult your Gateway supplier for more detail. Normally, User can ignore this step during the setup.
SI-110 supports 1 association group
Association Group #1
Association Group #1 (max. 1 node) is default to associate with the primary controller (Gateway/Hub/Controller) for the Status change report, refer to below for report details:
• Current Room Temperature (report in precision of 0.5°C or 1°F) (It will be according to Configuration Parameter 39 setting to decide the trigger level)
• Current Battery Level (Only apply in Low Battery Warning happened)

Step 4 Setup Air Conditioner IR code
• The UI of set up the IR code varies from different gateways. If gateways have dedicated UI for the IR code setup please refer to the gateway UI and ignore the below steps.
• If your gateway does not have dedicated UI for SI-110 code setup, but support Z-Wave thermostat Command Class and Configuration Command Class. You may refer to below steps to setup the IR code using the configuration options in your gateway.

Important Information
• Different brand or model of air conditioner has different function. For example, some air conditioner only support temperature set from 18°C - 30°C, if user set 17°C on gateway, SI-110 will not respond.
• There could be more than 1 code for each brand, some does not support Heat, if User selected a code that does not support Heat but Original air conditioner supports Heat Function, please continue to try next code until the correct one is selected.
• You can record down your Device Code for future reference after setting up the SI-110 correctly.

1.5 Programming IR Learning and Parameter

1.5.1. IR Code Learning

1.5.1.1. IR Code Learning

Step Procedure / Description Status Indicator
1.Refer to your primary controller App manual or User guide, enter to the config page that can input the Configuration parameter

2.Look up Below mapping table for learning, and decide the IR setting you intend to learn next.

3.Open the Gateway's Config page in the app input parameter number "25" and parameter value (according to below Mapping Table), then complete the Configuration process.
Then Green Indicator still turns ON for indicating the IR Code Learning Start

4.Aim the Original Air Conditioner Remote at SI-110 according to below position within 1-3cm Press "Power ON" button on the Original Air Conditioner Remote.
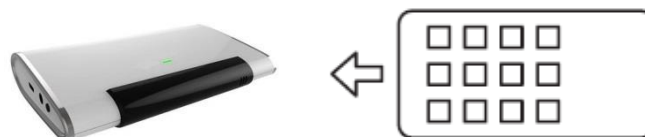
If the Learning is failed, repeat Step 3 to step 4. To learn next IR code, repeat Step 2 to step 4.

Successful: Green Indicator flashes TWICE
Unsuccessful: Red Indicator flashes TWICE.

5.Once you finished the IR Code Learning, please go to Configuration setting page on the Gateway browser and input parameter number "27" and parameter value "000" to select the dedicated AC code number "000" for learning.

Green Indicator flashes ONCE every time if receives a command from Gateway

Tips
• Make sure your Original Remote is in Power OFF Status. • Make sure your Original Remote set FAN Speed to AUTO and FAN SWING to AUTO/ON • Press and Hold the Power Key on Original Remote UNTIL SI-110 indicate Successful or Not. • User need at least Learn the OFF (Parameter Value 0), and one Temperature Mode (Parameter Value 2 ~ 28) to complete the usage model. • Keep away from Incandescent Light or Direct Sunlight during learning. • Make sure IR Transmitter of your Original Remote alight with learning diode of SI-110, you may also slight adjust closer or further away the distance between the two devices. For some Remotes the IR transmitter is hidden behind a lens and may not be installed at the center of the remote. • Make sure the power is good on both devices, especially the Original remote. Use Fresh Batteries in both devices is recommended.

1.5.1.2. IR Learning Mapping Table (Parameter Number 25)

Parameter Value (Storage Location)	Thermostat Command & IR Setting	
	Storage in Celsius Unit	Storage in Fahrenheit Unit
0	OFF	OFF
1	ON(Resume)	ON(Resume)
2	17°C COOL	63°F COOL
3	18°C COOL	64°F COOL
4	19°C COOL	66°F or 67°F COOL
5	20°C COOL	68°F or 69°F COOL
6	21°C COOL	70°F or 71°F COOL
7	22°C COOL	72°F or 73°F COOL
8	23°C COOL	74°F or 75°F COOL
9	24°C COOL	76°F COOL
10	25°C COOL	77°F or 78°F COOL
11	26°C COOL	79°F or 80°F COOL
12	27°C COOL	81°F or 82°F COOL
13	28°C COOL	83°F or 84°F COOL
14	29°C COOL	85°F COOL
15	30°C COOL	86°F COOL
16	17°C HEAT	63°F HEAT
17	18°C HEAT	64°F HEAT
18	19°C HEAT	66°F or 67°F HEAT
19	20°C HEAT	68°F or 69°F HEAT
20	21°C HEAT	70°F or 71°F HEAT
21	22°C HEAT	72°F or 73°F HEAT
22	23°C HEAT	74°F or 75°F HEAT
23	24°C HEAT	76°F HEAT
24	25°C HEAT	77°F or 78°F HEAT
25	26°C HEAT	79°F or 80°F HEAT
26	27°C HEAT	81°F or 82°F HEAT
27	28°C HEAT	83°F or 84°F HEAT
28	29°C HEAT	85°F HEAT

29	30°C HEAT	86°F HEAT
30	DRY Mode	DRY Mode
31	AUTO Mode	AUTO Mode
32	FAN Mode	FAN MODE

Important Information

• After all learning is completed, User can go back to the control page on the gateway for normal operation.
• On the Gateway UI, User can only use the Temperature range from the mapping table, OFF, ON (RESUME), COOL, HEAT, DRY MODE, AUTO MODE and FAN MODE.
• If User only learnt ON (RESUME), OFF, or part of the settings according to the above table, SI-110 will send the learnt data to the Air Conditioner only. For example, User only learnt ON(RESUME),OFF, 22°C COOL, 24°C HEAT, SI-110 will not send the IR Data to Air Conditioner if User set 27°C Cool on the gateway.
• User can still use gateway to set up Scene and Schedule with SI-110. For example, to have AC turn on at 23°C every day at 7am or 25°C at 11pm. Just make sure the set code is learnt.
• The learning mapping table is for split Air Conditioner, which Remote Control is with LCD Display. For Window type Air Conditioner (which Remote Control is without LCD Display), the mapping table with temperatures do not apply, due to different type of IR Control Protocol. However, User may still use OFF, ON (RESUME), DRY, AUTO or FAN Key for Learning.
• (Because the POWER key on the Original Remote (without LCD Display) is toggle, user can choose either ON key or OFF key to learn Power key. After Learning is done, press once to turn on the Air Conditioner if the Air Conditioner is OFF, press once to turn OFF if the Air Conditioner is ON).

1.5.2. Z-Wave's Configuration

Functions	Parameter Number	Parameter Value	Size (bytes)
Learn IR code	25 (0x19)	Default: 0x0000 Range: (0x0000 to 0x20) refer to learning mapping table	2
Check IR Code Learning Status (Read Only)	26(0x1A)	Default: 0x00 Range: 0 to 4 (0x00 to 0x04) 0(0x00) : Idle - IR Channel is idle 1(0x01) : OK - the last learning Operation was completed successfully 2(0x02) : Learning - SI-110 is busy processing previous learning request 3(0x03) : Full – All locations are being used. 4(0x04) : The last learning request was failed Note:The status value 0x01 and 0x04 will be reset to 0x00 after SI-110 receives a get command to this parameter.	1
Set IR Code number from built-in code library	27 (0x1B)	Refer to Code Finder Webpage. Default: 0x0001 Please Set 0 (0X0000)	2
Control Air Conditioner "SWING" function	33 (0x21)	Default: 0x01 Range 0 to 1 (0x00 or 0x01) 0(0x00) : Swing OFF 1(0x01) : Swing Auto (Default)	1
Calibrate temperature reading	37 (0x25)	Temperature offset value. 0(0x00) = 0°C (Default) 1(0x01) = 1°C 2(0x02) = 2°C 3(0x03) = 3°C 4(0x04) = 4°C 5(0x05) = 5°C 255(0xFF) = -1°C	1

		254(0xFE) = -2°C 253(0xFD) = -3°C 252(0xFC) = -4°C 251(0xFB) = -5°C	
Set Auto Report Condition Trigger By Room Temperature Change	30 (0x1E	0(0x00) = Disable AUTO report function (Default) (for saving battery life) Auto report if room temperature is different from last report. 1(0x01) = 1°F (0.5°C) 2(0x02) = 2°F (1°C) 3(0x03) = 3°F (1.5°C) 4(0x04) = 4°F (2°C) 5(0x05) = 5°F (2.5°C) 6(0x06) = 6°F (3°C) 7(0x07) = 7°F (3.5°C) 8(0x08) = 8°F (4°C)	1
Set Auto Report Condition By Time Interval	34 (0x22)	Auto report by the following time interval. 1(0x01) = 1 Hr 2(0x02) = 2 Hrs 3(0x03) = 3 Hrs 4(0x04) = 4 Hrs 5(0x05) = 5 Hrs 6(0x06) = 6 Hrs 7(0x07) = 7 Hrs 8(0x08) = 8 Hrs (Default)	1

Numbering Format,
If the Gateway only support decimal numbering format, please change it to decimal value accordingly.

1.5.3. Firmware update Over The Air (OTA)

The SI-110 is based on 500 series SoC and supports Firmware Update Command Class, it can receives the updated firmware image sent by controller via the Z-wave RF media. It is a helpful and convenient way to improve some function if needed.
Caution: Do not running the OTA when the battery is running low.

Notes:

Reset to Factory Default

Press and Hold "add" button for 3 seconds on SI-110, the Green Indicator will light up. Then Release the "add" Button AFTER Green Indicator flashes TWICE.

Z-WaveTM Notification

After the device adding to the network, it will wake-up one time every 8 hours in default. When it wake-up it will report "Real Temperature" message to the Z-wave Gateway.

To wake-up the device immediately, please press the button on APP.

Z-WaveTM Message Report

Activate the power

* Battery Power Check

If the power level is too low, the red LED will flash red. Please change AA battery immediately

1.6 Specifications

Specification	
Model	SI-110 IR controller
Z-Wave Standard	Z-wave plus
Z-Wave Frequency	CE: 868.40MHz,869.85MHz
	FCC: 908.40MHz,916.00MHz
	JPN: 922 MHz ~ 927 MHz
Maximum Transmission Distance	40M (Indoor), 100M (Open Space)
IR Range	Max. 6 Meter
IR Control	Maximum To 32 Keys For Self-Customizing AC
Power	Battery (2x AA) or Micro USB
LED Indicator	1 Red/Green Color
Dimension and Environment	
Dimensions	128 X 78 X 22 mm
Operation Temperature	-10 ~ 45° C
Operation Humidity	>95%RH

** Specifications are subject to change and improvement without notice.

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