

# ENGINEERING MANUAL

## VRF Central Touchscreen Controller

### Engineering Manual

< VRF Central Touchscreen Controller >

CCXL01

< VRF Central Touchscreen Controller Adapter >

CCXLA01

< Energy Calculation Software >

CCSE01



### **Important Notice**



- Johnson Controls Inc. pursues a policy of continuing improvement in design and performance in its products. As such, Johnson Controls Inc. reserves the right to make changes at any time without prior notice.
- Johnson Controls Inc. cannot anticipate every possible circumstance that might involve a potential hazard.
- This central controller is designed for VRF air conditioning applications only.  
Do not use this product for anything other than the purposes for which it was intended for.
- The installer and system specialist shall safeguard against leakage in accordance with local pipefitter and electrical codes. The following standards may be applicable, if local regulations are not available. International Organization for Standardization: (ISO 5149 or European Standard, EN 378). No part of this manual may be reproduced in any way without the expressed written consent of Johnson Controls Inc.
- This central controller is operated and serviced in North America and comes with a full complement of the appropriate Safety, Danger, Caution and Warnings.
- If you have questions, please contact your distributor or contractor.
- This manual provides common descriptions, basic and advanced information to maintain and service this central controller which you operate as well for other models.
- This manual should be considered as a permanent part of the air conditioning equipment and should remain with the air conditioning equipment.
- No part of this manual may be reproduced without the expressed written permission of Johnson Controls, Inc.

### **Product Inspection upon Arrival**


1. Upon receiving this product, inspect it for any damages incurred in transit. Claims for damage, either apparent or concealed, should be filed immediately with the shipping company.
2. Check the model number, electrical characteristics (power supply, voltage, and frequency rating), and any accessories to determine if they agree with the purchase order.
3. The standard utilization for this unit is explained in these instructions. Use of this equipment for purposes other than what it designed for is not recommended.
4. Please contact your local agent or contractor as any issues arise involving installation, performance, or maintenance arise. Liability does not cover defects originating from unauthorized modifications performed by a customer without the written consent of Johnson Controls, Inc.  
Performing any mechanical alterations on this product without the consent of the manufacturer will render your warranty null and void.

## 1. Safety Summary

### Signal Words

 <b>WARNING</b>	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
<b>NOTICE</b>	Indicates information considered important, but not hazard-related (for example, messages relating to property damage).

### General Precautions

 <b>WARNING</b>	To reduce the risk of serious injury or death, read these instructions thoroughly and follow all warnings or cautions included in all manuals that accompanied the product and are attached to the unit. <i>Refer back to these safety instructions as needed.</i>
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- This system, including this central controller, should be installed by personnel certified by Johnson Controls, Inc. Personnel must be qualified according to local, state and national building and safety codes and regulations. Incorrect installation could cause leaks, electric shock, fire or an explosion. In areas where Seismic Performance requirements are specified, the appropriate measures should be taken during installation to guard against possible damage or injury that might occur in an earthquake.  
If the unit is not installed appropriately, injuries may occur because of the falling unit.
- Use appropriate Personal Protective Equipment (PPE), such as gloves, protective goggles and electrical protection equipment and tools suited for electrical operation purposes.
- When transporting, be careful while picking up, moving and mounting these units.  
Although the central controller may be packed using plastic straps, do not use them for transporting from one location to another. Do not stand on or put any material on the central controller.
- When installing the central controller cables to the units, do not touch or adjust any safety devices inside the indoor or outdoor units. All safety features, disengagement, and interlocks must be in place and functioning correctly before the equipment is put into operation. If these devices are improperly adjusted or tampered with in any way, a serious accident can occur. Never bypass, wire around, or jump-out any safety device or switch.
- Use only Johnson Controls recommended, provided as standardized, or replacement parts.
- Johnson Controls will not assume any liability for injuries or damage caused by not following steps outlined or described in this manual. Unauthorized modifications to Johnson Controls products are prohibited as they...
  - May create hazards which could result in death, serious injury or equipment damage;
  - Will void product warranties;
  - May invalidate product regulatory certifications;
  - May violate OSHA standards;

<b>NOTICE</b>	Take the following precautions to reduce the risk of property damage.
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- Do not touch the main circuit board or electronic components in the controller or remote devices. Make sure that dust and/or steam does not accumulate on the circuit board.
- When installing the unit in a hospital or other facility where electromagnetic waves are generated from nearby medical and/or electronic devices, be prepared for noise and electronic interference "Electromagnetic Interference (EMI)". Do not install where the waves can directly radiate into the electrical box, controller cable, or controller. Inverters, appliances, high-frequency medical equipment, and radio communications equipment may cause the unit to malfunction. The operation of the unit may also adversely affect these same devices. Install the unit at least 10 ft. (approximately 3m) away from such devices.
- Locate the wireless controller at a distance of at least three feet (approximately 1m) between the indoor unit and electric lighting. Otherwise, the receiver part of the unit may have difficulty receiving operation commands.

- If the wired controller is installed in a location where electromagnetic radiation is generated, make sure that the wired controller is shielded and cables are sleeved inside conduit tube.
- If there is a source of electrical interference near the power source, install noise suppression equipment (filter).
- During the test run, check the unit's operation temperature. If the unit is used in an environment where the temperature exceeds the operation boundary, it may cause severe damage.  
Check the operation temperature boundary in the manual. If there is no specified temperature, use the unit within the operation temperature boundary of 32 to 104°F (0 to 40°C).
- Read installation and appropriate user manuals for connection with peripheral devices.  
If a warning window appears on the screen, the product stops, does not work properly or works intermittently, immediately stop using the equipment.

## Installation Precautions



Take the following precautions to reduce the risk of electric shock, fire or explosion resulting in serious injury or death:

- If the remote sensors are not used with this controller, then do not install this controller...
  - In a room where there is no thermostat.
  - Where the unit is exposed to direct sunshine or direct light.
  - Where the unit is in close proximity to a heat source.
  - Where hot/cold air from the outdoors, or a draft from elsewhere (such as air vents, diffusers or grilles) can affect air circulation.
  - In areas with poor air circulation and ventilation.
- Perform a test run using the controller to ensure normal operation. Safety guards, shields, barriers, covers, and protective devices must be in place while the compressor/unit is operating.  
During the test run, keep fingers and clothing away from any moving parts.

After installation work for the system has been completed, explain the "Safety Precautions," use, and maintenance of the unit to the customer according to the information in all manuals that accompanied the system. All manuals and warranty information must be given to the user.

## Electrical Precautions



Take the following precautions to reduce the risk of electric shock, fire or explosion resulting in serious injury or death:

- Only use electrical protection equipment and tools suited for this installation.
- Insulate the wired controller against moisture and temperature extremes.
- Use specified cables between units and the controller.
- Communication cabling shall be a minimum of 18-Gauge, 2-Conductor, Stranded Copper. Shielded cable must be considered for applications and routing in areas of high EMI and other sources of potentially excessive electrical noise to reduce the potential for communication errors. When shielded cabling is applied, proper bonding and termination of the cable shield is required as per Johnson Controls guidelines. Plenum and riser ratings for communication cables must be considered per application and local code requirements.
- The polarity of the input terminals is important, so be sure to match the polarity when using contacts that have polarity.
- Highly dangerous electrical voltages may be used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause serious injury or death.
- Before installing the controller or remote devices, ensure that the indoor and outdoor unit operation has been stopped. Further, be sure to wait at least five minutes before turning off the main power switch to the indoor or outdoor units. Otherwise, water leakage or electrical breakdown may result.
- Do not open the service cover or access panel to the indoor or outdoor units or controllers without turning OFF the main power supply. Before connecting or servicing the controller or cables to indoor or outdoor units, open and tag all disconnect switches. Never assume electrical power is disconnected. Check with a meter and equipment.

- Use an exclusive power supply at the controller's rated voltage.
- Be sure to install circuit breakers (ground fault interrupter, isolating switch, molded case circuit breaker, and so forth) with the specified capacity. Ensure that the wiring terminals are tightened securely to recommended torque specifications.
- Clamp electrical wires securely with a cord clamp after all wiring is connected to the terminal block. In addition, run wires securely through the wiring access channel.
- When installing the power lines, do not apply tension to the cables. Secure the suspended cables at regular intervals, but not too tightly.
- Make sure that the terminals do not come into contact with the surface of the electrical box. If the terminals are too close to the surface, it may lead to failures at the terminal connection.
- Do not clean with, or pour water into, the controller as it could cause electric shock and/or damage the unit. Do not use strong detergent such as a solvent. Clean with a soft cloth.
- Check that the ground wire is securely connected. Do not connect ground wiring to gas piping, water piping, lighting conductor, or telephone ground wiring.
- If there are frequent occurrences with blown fuses or flipped circuit breakers, shut down the system immediately and contact your service contractor.

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## 1.1 Function Specification

Item	Description	
(1) Model	VRF Central Touchscreen Controller: CCLX01 VRF Central Touchscreen Controller Adapter: CCXLA01 *1 Energy Calculation Software: CCSE01 *2	
(2) Product Code	VRF Central Touchscreen Controller: 60292274 VRF Central Touchscreen Controller Adapter: 60292275 Energy Calculation Software: 60292276	
(3) Management Range	H-LINK: 16 Groups: 2,048 Blocks: 512 *3 Areas: 512 *3 (Up to 128 Groups can be registered on 1 H-LINK)	
(4) Control Function	On/Off Mode Set temperature (including dual setpoint for Auto mode) Fan speed Louver	Remote Controller (RC) prohibition Filter sign reset Function selection for indoor units *4 Function selection for outdoor units *5 Capacity control for outdoor units *5 Lower noise control for outdoor units *5
(5) Monitor	On/Off Mode Set temperature (including dual setpoint for Auto mode) Air intake temperature RC sensor temperature Outdoor temperature *6	Fan Speed Louver RC prohibition Thermo-ON information Filter sign/Auto cleaning fault Alarm status/Alarm codes Setback information
(6) Display Format	Panel (7 sizes provided) Layout List	
(7) Schedule	Weekly schedule (16 items/day) Annual schedule (Exception day 1-5, summer/winter/regular)	
(8) Displayed Item for Usage History	Each of the following data of up to 2 years' can be shown: • Accumulated operation time • Accumulated thermo-ON time • Ave. air intake temp. • Ave. outdoor temp. • Ave. temp. (including dual setpoint for Auto mode) • Ave. RC sensor temp.	
(9) External In/Output	Management Point [VRF Central Touchscreen Controller/VRF Central Touchscreen Controller Adapter] External input: 4 (Level or pulse) External output: 2 (Set voltage contact/ No-voltage contact on DSW)	
	Features [Energy saving] • Run/Stop • RC prohibition • Temperature shift (For Cool/Dry mode: +1°F ~ +18°F (+1°C ~ +9°C)) (For Heat mode: -1°F ~ -18°F (-1°C ~ -9°C)) • Mode shift (Mode shifted to Fan when in Cool/Dry mode, and shifted to Stop in Heat mode) • Capacity control on outdoor units • Lower noise control for outdoor units	[Control/Monitor] Controlled items: • Run/Stop • Mode (Cool/Heat) Monitored items: • Run/Stop • Mode (Cool/Heat) • Alarm state [Others] • Power consumption signal input • Emergency stop
(10) History	• Alarm history: 10,000 records • External In/Output history: 1,000 records • Pulse input history: 6 months	

\*1. Required only when the system consists of multiple H-LINKs

\*2. Required only for calculating electricity

\*3. No restriction on the number of H-LINK

\*4. Some indoor units may not fully support all functions.

\*5. Available for applicable indoor units only

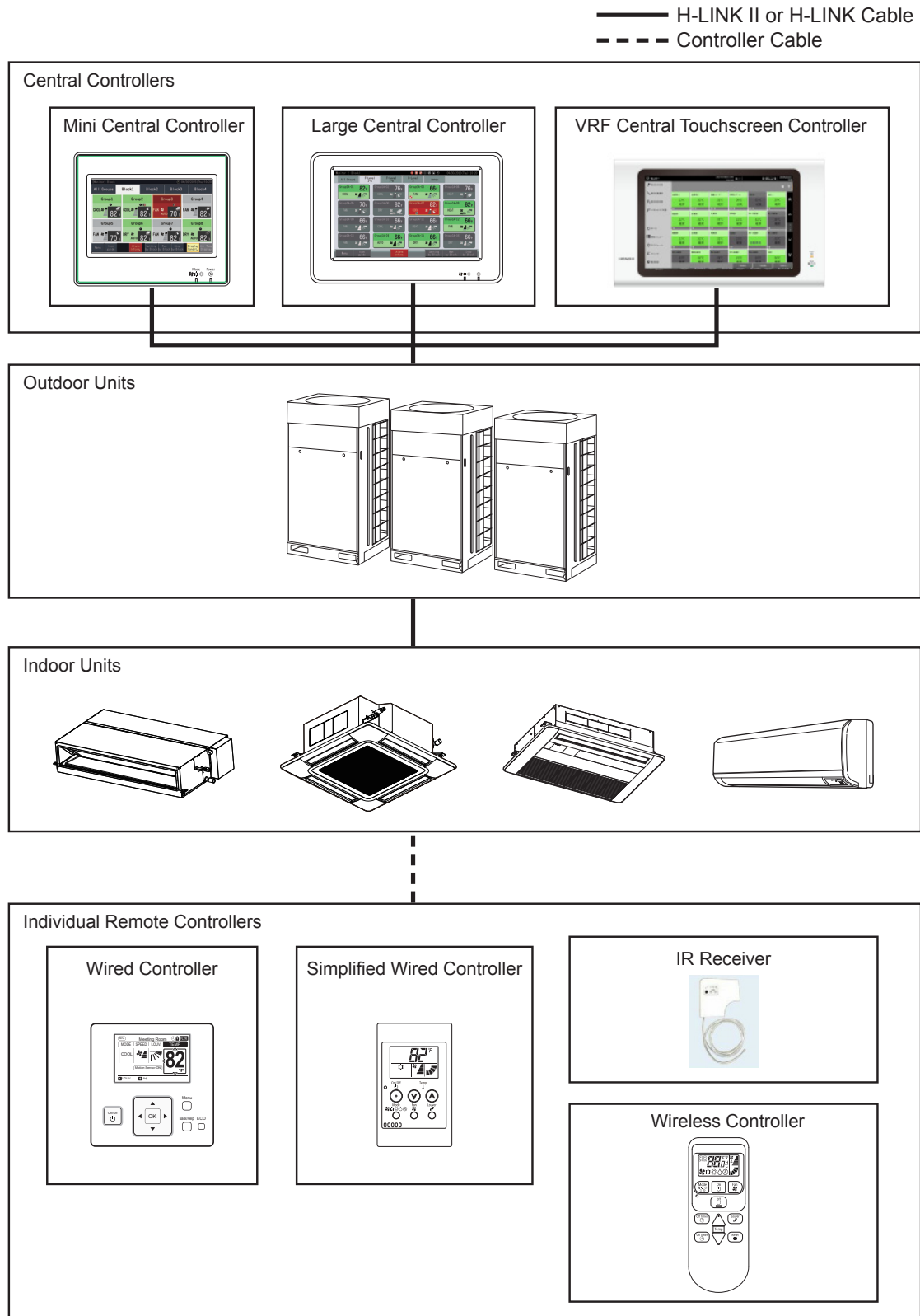
\*6. This is the air intake temperature on representative outdoor unit.

## SYSTEM SUMMARY

### 1.2 Control Device

#### 1.2.1 Line Up

Refer to the illustrations below showing the VRF control system components.

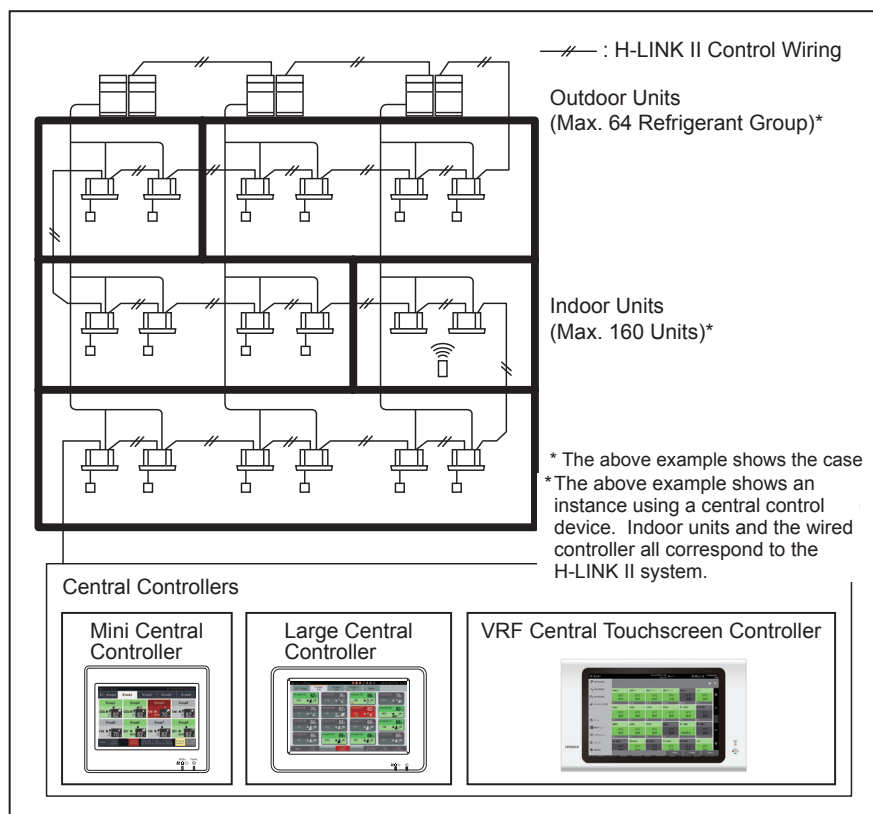


Control Devices	Control Device Options	Model Name
	Wired Controller	CIW01
	Simplified Wired Controller	CIS01
	Wireless Controller	CIR01
	IR(Infrared) Receiver Kit for 4-Way Cassette	C4IRK01
	IR(Infrared) Receiver Kit for 1-Way Cassette	C1IRK01
	IR(Infrared) Receiver Kit for Wall Mounted and Ducted	CWDIRK01
	Mini Central Controller	CCM01
	Large Central Controller	CCL01
	VRF Central Touchscreen Controller / Adapter	CCXL01/CCXLA01

## SYSTEM SUMMARY

### H-LINK II

The H-LINK transmission system for connection between outdoor and indoor units provides an extended system configuration and improved functions without sacrificing workability and flexibility.



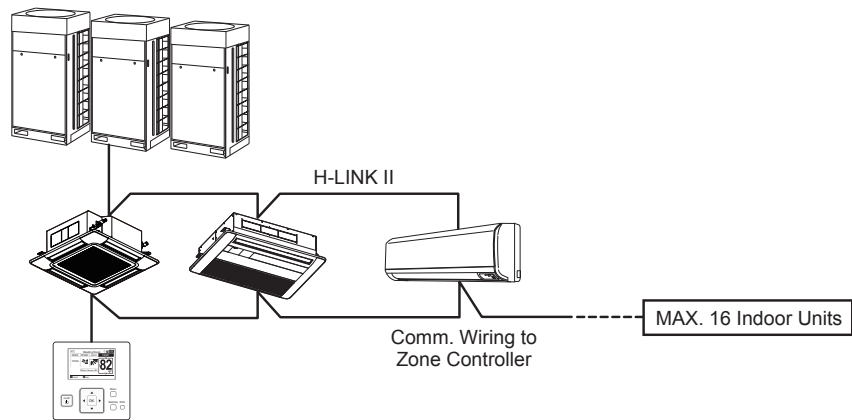
Item	H-LINK II
Max. Number of Refrigerant Groups / System	64
Address Setting Range of Indoor Units / Refrigerant Group	0 to 63
Max. Number of Indoor Units / System	160
Total Number of Devices in the same H-LINK	200
Max. Wiring Length	Total 3,281feet(1,000m)

Control System Device	Outdoor Unit/ Indoor Unit	1 (One) H-LINK II System	
		Outdoor Units (Number of Ref. Groups)	Indoor Units
H-LINK II	H-LINK II	64	160

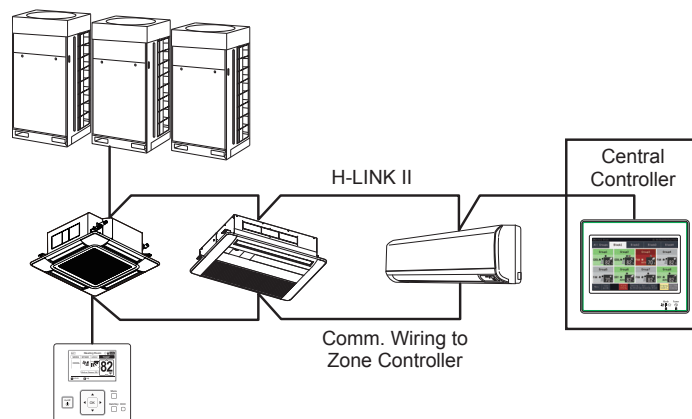
### 1.3 System Configuration Example

#### (1) Individual Remote Controller Configuration Example

Below are illustrations of configured individual remote controllers.



#### (2) Central Controller Configuration Example





## 2. System Specification

### 2.1 Features

- (1) Management of up to 2,048 groups (2,560 indoor units)\*

This product alone can monitor and control air conditioners.

\* With 15 VRF Central Touchscreen Controller Adapters (optional) connected.

- (2) Touch screen LCD

Newly adopted 12.1 inch wide color LCD provides user-friendly touch screen operation.

- (3) Supports SD memory card and USB flash device

Operation and status can be saved and acquired. Utilize saved data for energy saving by displaying and analyzing on PC.

- (4) Energy calculation

Energy calculation is available as an optional feature.

- (5) Various information display styles

Choose from panel/layout/list display depending on the number of controlled points and items to be monitored.

- Panel: Displays items that are frequently controlled/monitored.

Panel size can be selected from 7 types.

- Layout: Shows physical allocation of ACs from flat pattern and/or bird's eye view.

- List: Shows all information of air conditioners.\*

Information can be sorted/filtered by status and setting states to monitor only what is necessary.

\* Utilize sorting/filtering to narrow down the items to be shown.

- (6) No more restrictions on H-LINK wiring

Air conditioners on different H-LINKs can be arranged into one target group (Block or Area).

- (7) Pulse input count

Meter reading is available by connecting pulse transmission meters.

## SYSTEM SPECIFICATION

- Applicable Models

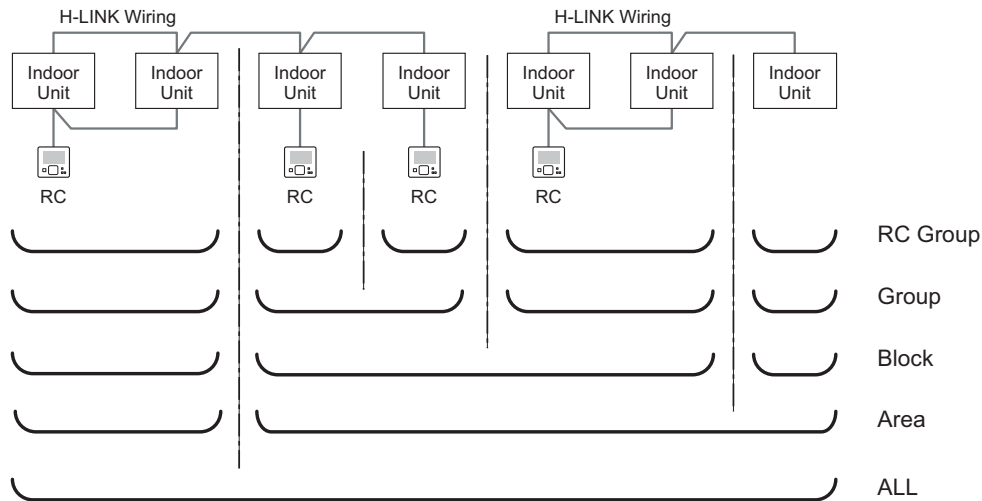
As for 2017/11/28

Item	Model Type	JCI Model Name
Outdoor Unit	Top Flow (208/230V) Heat Pump and Heat Recovery Standard Type	(H,Y)VAH(P,R)_B31S
		(H,Y)VAH(P,R)_B32S
	Top Flow (208/230V) Heat Pump and Heat Recovery Less Module Type	(H,Y)VAH(P,R)_B31LM
		(H,Y)VAH(P,R)_B41S
	Top Flow (460V) Heat Pump and Heat Recovery Standard Type	(H,Y)VAH(P,R)_B42S
		(H,Y)VAH(P,R)_B41LM
	Top Flow (460V) Heat Pump and Heat Recovery Less Module Type	(H,Y)VAH(P,R)_B41LM
		(H,Y)VAH(P,R)_B41LM
Indoor Unit	Side Flow (208/230V) Heat Pump	(H,Y)VAHP_B21S
	Top Flow (208/230V) Heat Pump Low Ambient Type	(H,Y)VAHP_B31CW
	Top Flow (460V) Heat Pump Low Ambient Type	(H,Y)VAHP_B41CW
	Ducted (High Static)	(H,Y)IDH_B21S
		(H,Y)IDH_B22S
	Ducted (Medium Static)	(H,Y>IDM_B21S
		(H,Y)IDM_B22S
	Ducted (Slim)	(H,Y)IDS_B21S
	Ducted (EconoFresh)	(H,Y)IDM_B21E
	DOAS	(H,Y)DOA_B21S
	Air Handler with DX-Kit	(H,Y)MAHP_(B,C,D)21S
	Ceiling-Mounted 4-Way Cassette	(H,Y)IC4_B21S
	Ceiling-Mounted 4-Way Cassette Mini	(H,Y)ICM_B21S
	Ceiling-Mounted 2-Way Cassette	(H,Y)IC2_B21S
	Ceiling-Mounted 1-Way Cassette	(H,Y)IC1_B21S
	Wall-Mounted	TIWM_B21S
	Ceiling Suspended	(H,Y)ICS_B21S
	Floor Exposed	(H,Y)IFE_B21S
	Floor Concealed	(H,Y)IFC_B21S



- Managing Range

VRF Central Touchscreen Controller, with 15 VRF Central Touchscreen Controller Adapter, can control up to 2,048 groups (CCXL01+VRF Central Touchscreen Controller Adapter (15 H-LINK) x 128 groups). No restriction on H-LINK to arrange Blocks and Areas.



RC Group- Registered on CCXL01 as a collection of indoor units (up to 16) connected via RC control line.

Group- Registered on CCXL01 as a collection of multiple RC groups altogether.

Block - Registered on CCXL01 as a collection of multiple Groups altogether.

Area – Registered on CCXL01 as a collection of multiple Blocks altogether.

- Combination Use with Other Controllers

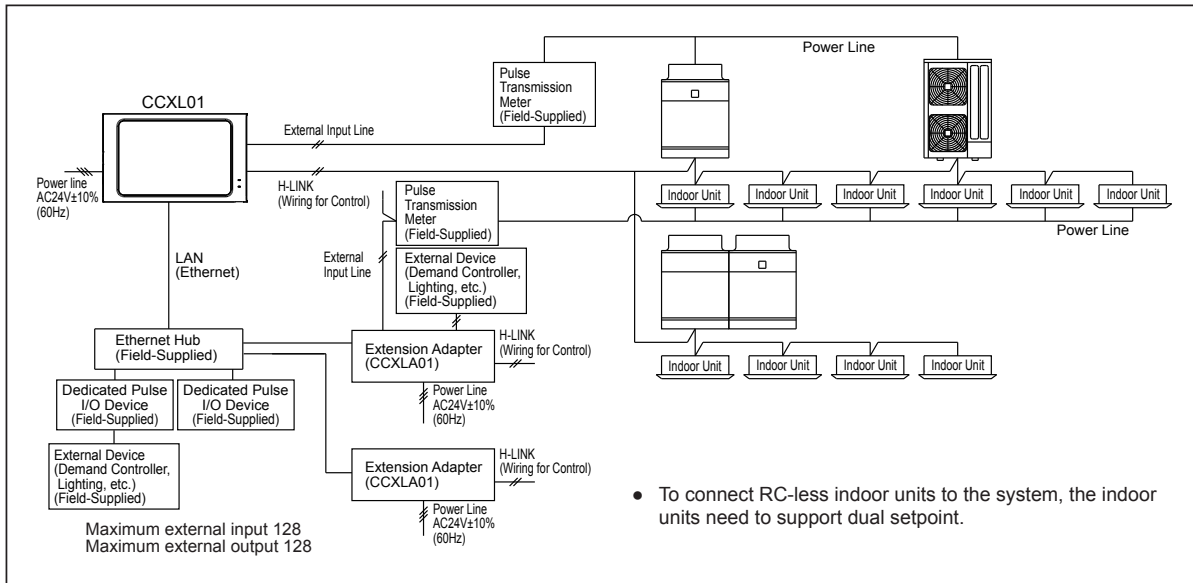
Applicable Controllers

- Mini Central Controller: CCM01
- Large Central Controller: CCL01

NOTES:

1. To connect RC-less indoor units to the system where 2 or more controllers are connected, the indoor units need to support dual setpoint.
2. Up to 8 central controllers, including VRF Central Touchscreen Controller can be connected to 1 H-LINK.
3. If central controller that doesn't support dual setpoint coexists on the same network, dual setpoint and setback function are unavailable on entire system.

## 2.2 Example for System Configuration



NOTICE:

- Adequate monitoring and control may not be assumed upon occurrence of device failure. It is strongly recommended to prepare alternate plan (as to use Remote Control Switch (RCS) to control/monitor air conditioners) for such cases.
- Conduct test run on all indoor units to ensure system is operating correctly.
- Upon recovery, make change or control again as necessary if air conditioning system is not working as expected.
- VRF Central Touchscreen Controller, Extension adapter and their peripherals are assumed to be always ON. Energy calculation, usage history and other history records for period within which any of the device was turned OFF may not be available.
- Controlling and monitoring on the system are all based on the clock on VRF Central Touchscreen Controller.  
Correct operation may not be expected due to unnecessary clock setting change on VRF Central Touchscreen Controller.
- Use keyboard exclusively for inputting character strings.
- 60, 61, 64 and 65 alarm indicates communication failure between air conditioners and this system. Hence each value shown on screen may not be of actual value.
- The screen-shot image in this manual may differ from the actual controller image.
- While you are reading pulse via external input, pulse count is not accumulated when power is cut or checking connection. This may affect to usage accumulation and calculation. This important item needs to be well discussed with customer prior to system launch.

Terms	Definitions
RC-less, (Remote Controller-less) unit	This term indicates indoor unit without remote controller connected to it. This does not include instances where multiple indoor units are connected or set to be controlled and monitored by a single remote controller.
Facility unit	The units are monitored or controlled by this software through external input/output(s).
PIO (dedicated extension pulse input/output device)	In this document, PIO refers to programmable logic controller with 128 input/output each manufactured by Industrial Equipment Systems Co. Ltd. VRF Central Touchscreen Controller (CCXL01) and VRF Central Touchscreen Controller Adapter (CCXLA01) can monitor/control 2 PIO devices respectively.

## 2.3 Standard Specification

### • VRF Central Touchscreen Controller Hardware Specification

Item	Specification
Dimensions (W×H×D)	14-5/8 × 8-15/16 × 1-1/4 + 1-1/8 (molded in wall) inch (372 × 227.2 × 32.5 + 27.8 (molded in wall) mm)
Net Weight	7.7lbs. (3.5kg)
Installation Condition	For indoor use only. Applicable for on wall mount and wall built in.
Clock Accuracy	+/- 70 seconds/month
Ambient Temperature	32~104°F (0~40°C)
Ambient Humidity	20-85% RH (No condensation)
Display	1.2 inch TFT color liquid crystal display
Power Supply	AC24V ± 10%, 60Hz
Power Consumption	50W (Max.) (55VA)

### • VRF Central Touchscreen Controller Adapter Hardware Specification

Item	Specification
Dimensions (W×H×D)	10-1/16 × 2-13/16 × 6-1/8 (protruding part not included) inch (255.6 × 72 × 155 (protruding part not included) mm)
Net Weight	3.3lbs. (1.5kg)
Installation Condition	For indoor use only. Applicable for horizontal installation and vertical on wall mount.
Ambient Temperature	32~104°F (0~40°C)
Ambient Humidity	20-85% RH (No condensation)
Power Supply	AC24V ± 10%, 60Hz
Power Consumption	10W or less (12VA)

### • Air Conditioners Communication Specification

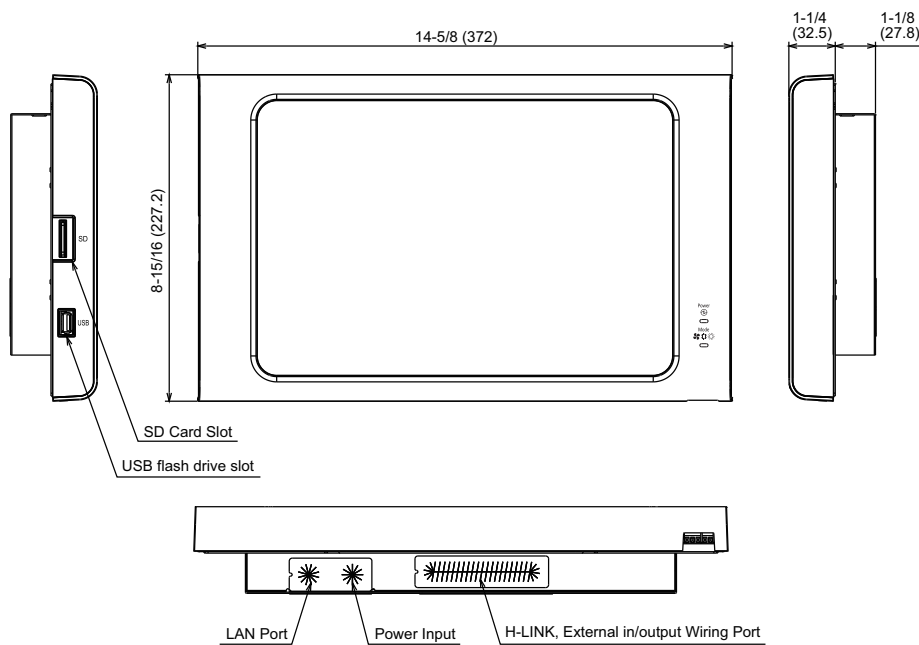
Item	Specification
Communication Peer	Indoor units / Outdoor units (*1)
Communication Line	Nonpolar Two Wires
Communication Method	Half-Duplex Communication
Synchronous Method	Asynchronous
Communication Speed	9,600 bps
Total Wiring Length	3,281 ft. (1000m)
Maximum Controlled Unit Number on System (*2)	Outdoor Unit: Max. 64 Units Indoor Unit: Max. 160 Units Central Controller: 8 pcs. Total Number: 200

(\*1): Refer to page 2-2.

(\*2): Maximum units that can be connected within 1 H-LINK (control wiring).

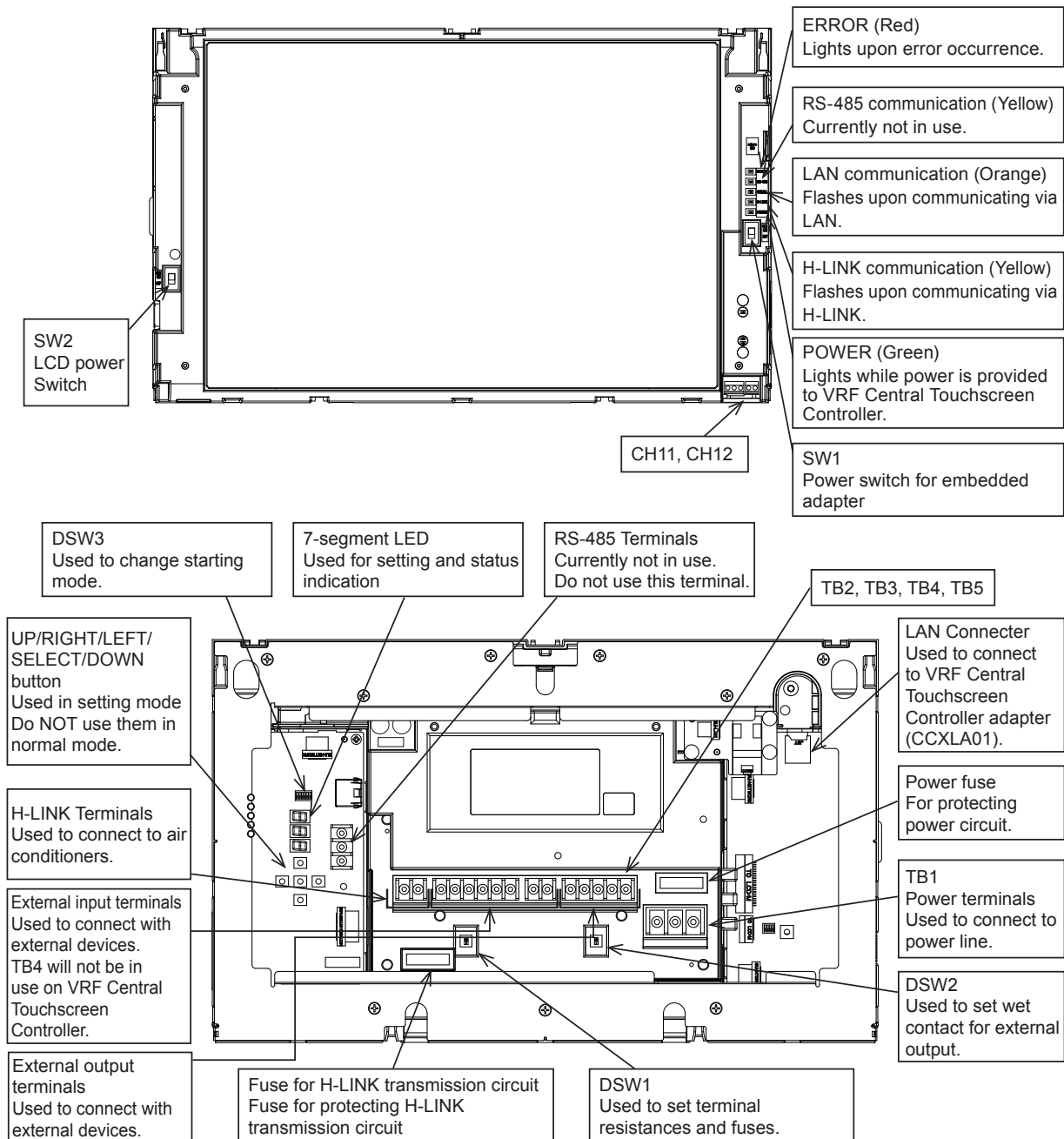
## 2.4 Appearance

(Unit: inch(mm))



# (1) Parts Names and Functions

The following diagram shows VRF Central Touchscreen Controller with front and rear cover removed. Each name and function are listed. Regarding how to connect each terminal, refer to “2.6.3 Electrical Wiring” on page 2-15. Regarding how to set each switch, refer to “2.6.4 Switch Setting Procedures” on page 2-17.



Status Indicator (LED)

Mark	Specification
ERROR	Lights upon system error occurrence (red)
RS-485	RS-485 flashes upon communication via RS-485.
LAN	Lights when communication link is established / Flashes while communicating (orange)
H-LINK	Flashes when communicating via H-LINK (communication line)(yellow)
POWER	Lights while internal power is ON (green).

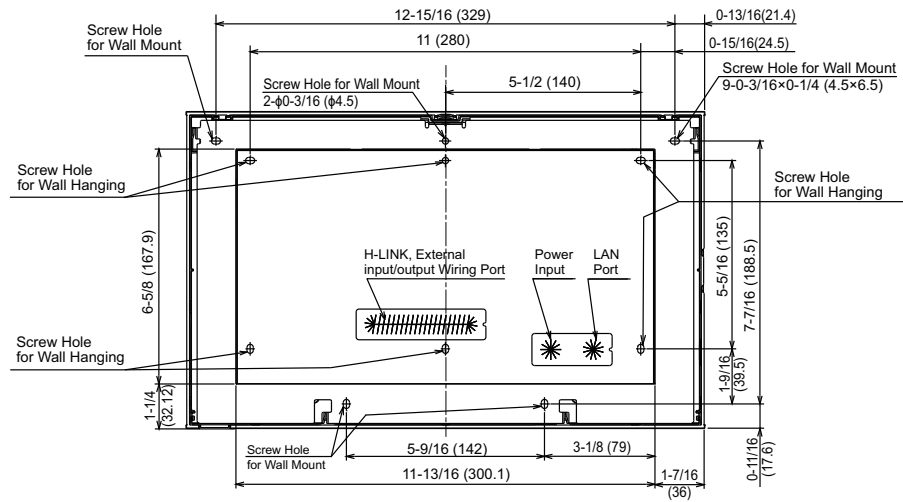
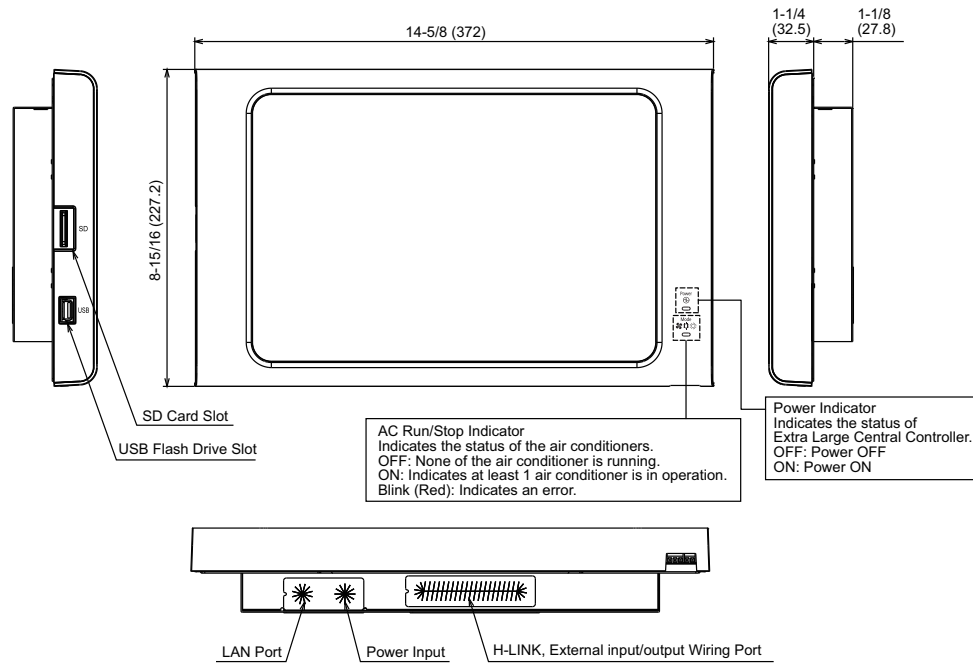
## SYSTEM SPECIFICATION

### (2) Dimension and Parts Names

Dimension and parts names are as follows:

#### ■ VRF Central Touchscreen Controller: CCXL01

(Unit: inch(mm))



Rear View

■ VRF Central Touchscreen Controller Adapter: CCXLA01

(Unit: inch(mm))

