40VM900007 ERV
VRF (Variable Refrigerant Flow) System
Indoor Unit Interface

Installation and Operating Instructions

Part Number 40VM900007

CONTENTS

SAFETY CONSIDERATIONS

Read and follow manufacturer instructions carefully. Follow all local electrical codes during installation. All wiring must conform to local and national electrical codes. Improper wiring or installation may damage thermostat.

Understand the signal words — DANGER, WARNING, and CAUTION. DANGER identifies the most serious hazards, which will result in severe personal injury or death. WARNING signifies hazards that could result in personal injury or death. CAUTION is used to identify unsafe practices, which would result in minor personal injury or product and property damage.

Recognize safety information. This is the safety-alert symbol (⚠). When this symbol is displayed on the unit and in instructions or manuals, be alert to the potential for personal injury. Installing, starting up, and servicing equipment can be hazardous due to system pressure, electrical components, and equipment location.

“Note that changes or modifications of this product are not expressly approved by the party responsible for compliance and could void the user’s authority to operate the equipment.

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

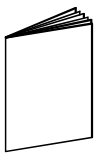
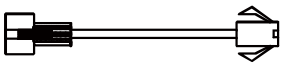
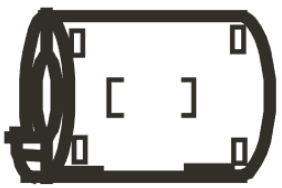
instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off 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 the 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.

GENERAL

The ERV interface for the VRF (Variable Refrigerant Flow) system is a control board that allows field-supplied ERV unit to tie into our VRF system.

ACCESSORIES

Table 1 —Accessories

Model Name	Outline	Quantity	Function
Installation and Owners Manual		1	As reference for installation and operation
Mounting Screw		4	For mounting the box
Temperature Sensor		2	Temperature acquisition
Extension Wire for Sensor		2	Extension
Ferrite Core		1	EMI suppression

DIMENSIONS

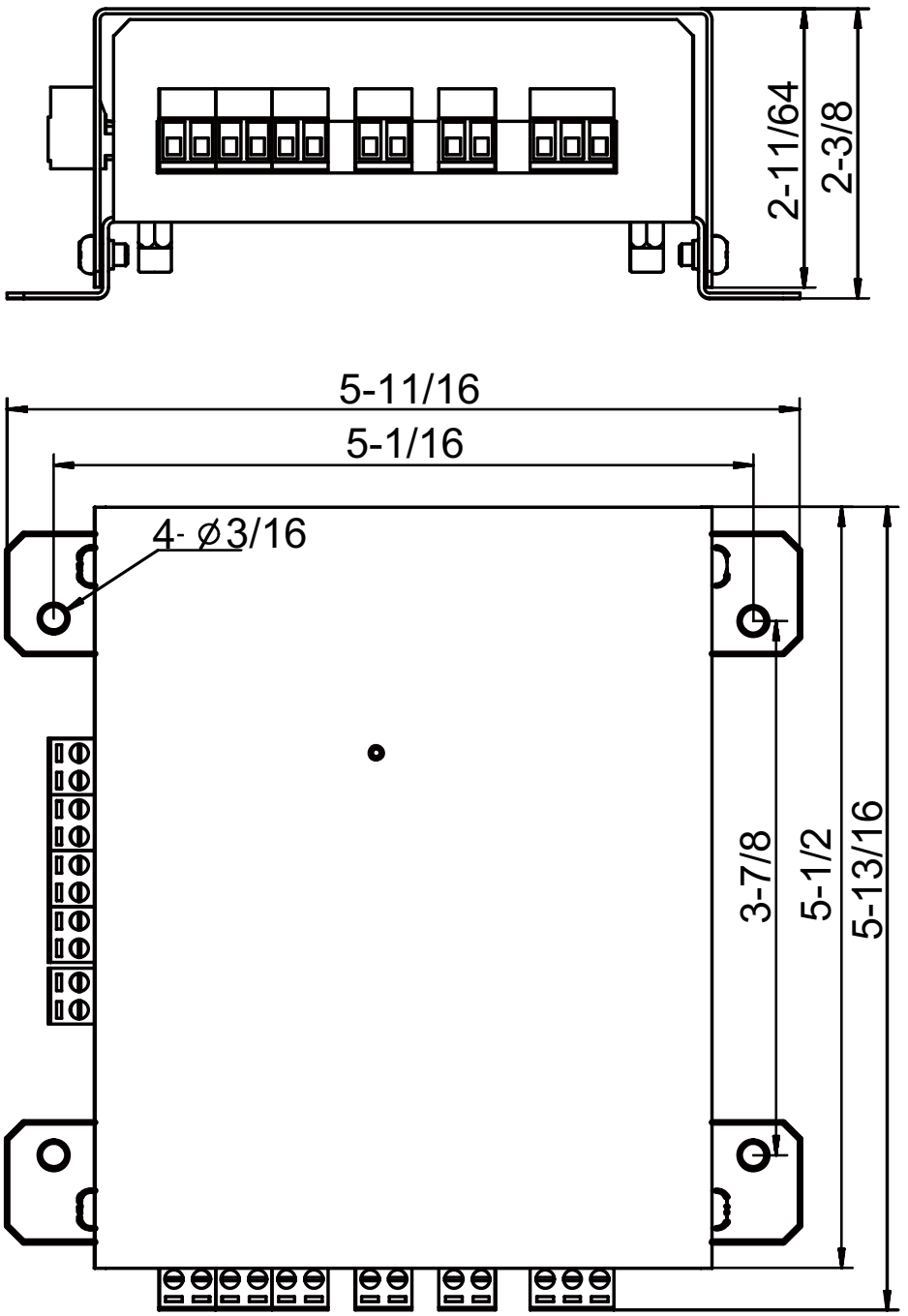


Fig. 1 — Dimensional Drawing

SELECTING INSTALLATION POSITION

The ERV interface should be installed in the electrical box of the ERV indoor unit. Avoid installing ERV interface near high voltage components and heat generating devices.

If there is not enough space inside the ERV unit to mount ERV interface, it can be mounted outside the unit. Follow the local code for wiring between ERV unit and ERV interface. Make sure the cover of ERV interface is installed after wiring to avoid any moisture or dust accumulation.

Do not install the controller in a place exposed to water or in a condensing environment.

Do not install the device in a location where there is direct sunlight or where the temperature may become greater than 104°F(40°C) or less than 32°F(0°C).

This product is neither waterproof nor dustproof, so it can only be installed indoors.

RECOMMENDED CLEARANCES

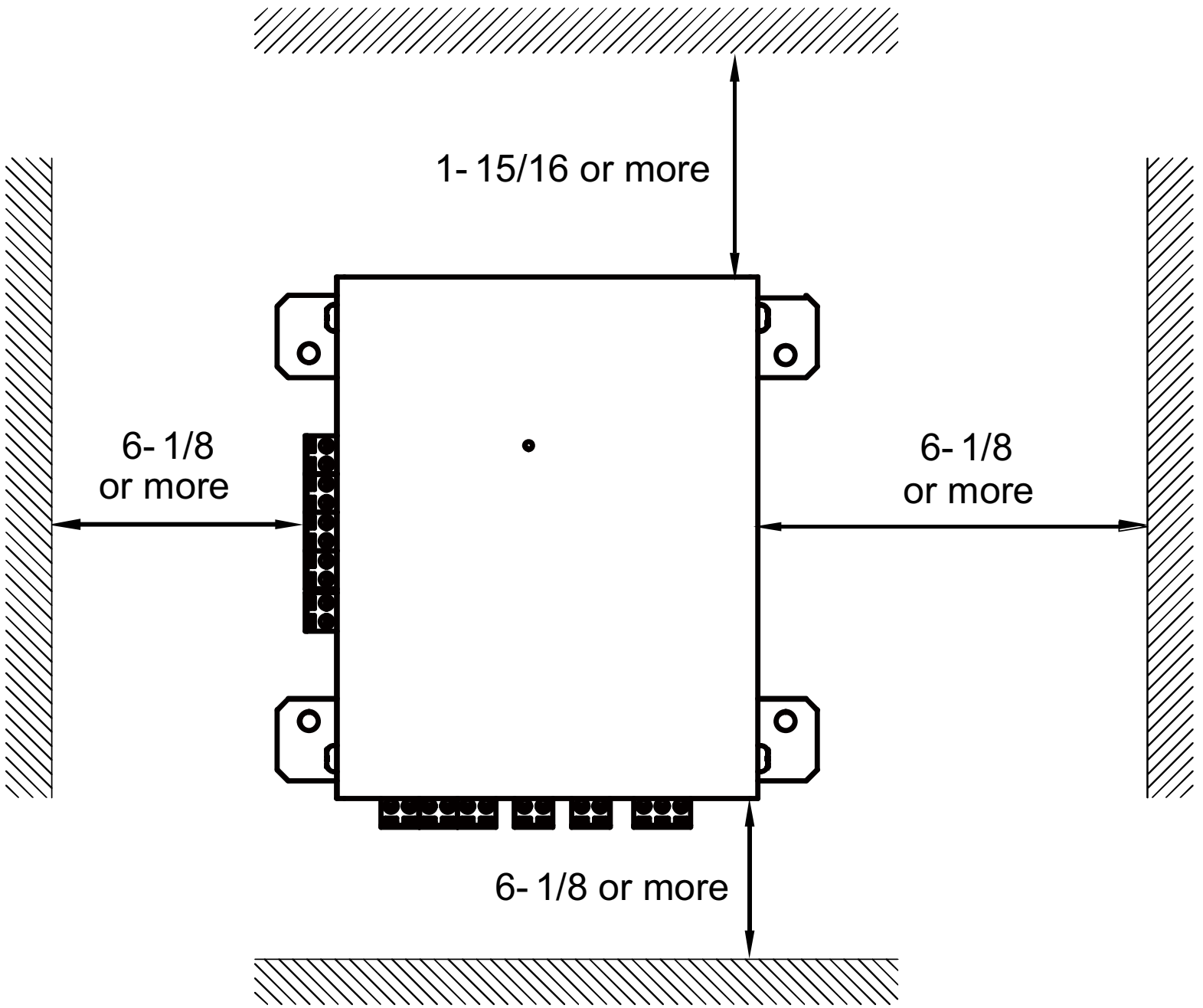


Fig. 2 — Mounting Clearances

INSTALLATION

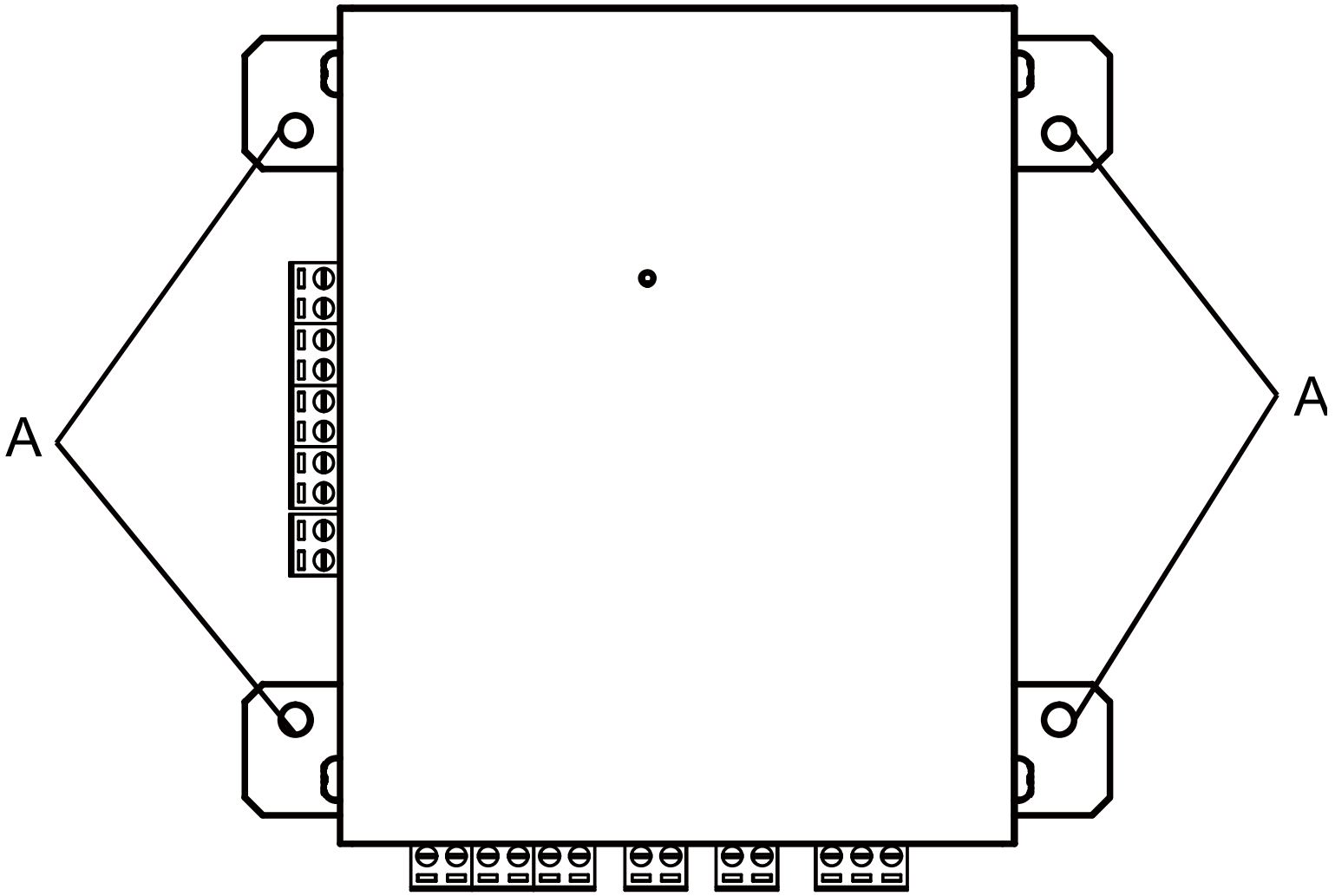


Fig. 3 — Attaching the box

To install the unit:
Use the mounting screws provided with the ERV interface to mount the unit using holes (A) as shown in Figure.

WIRING DETAILS

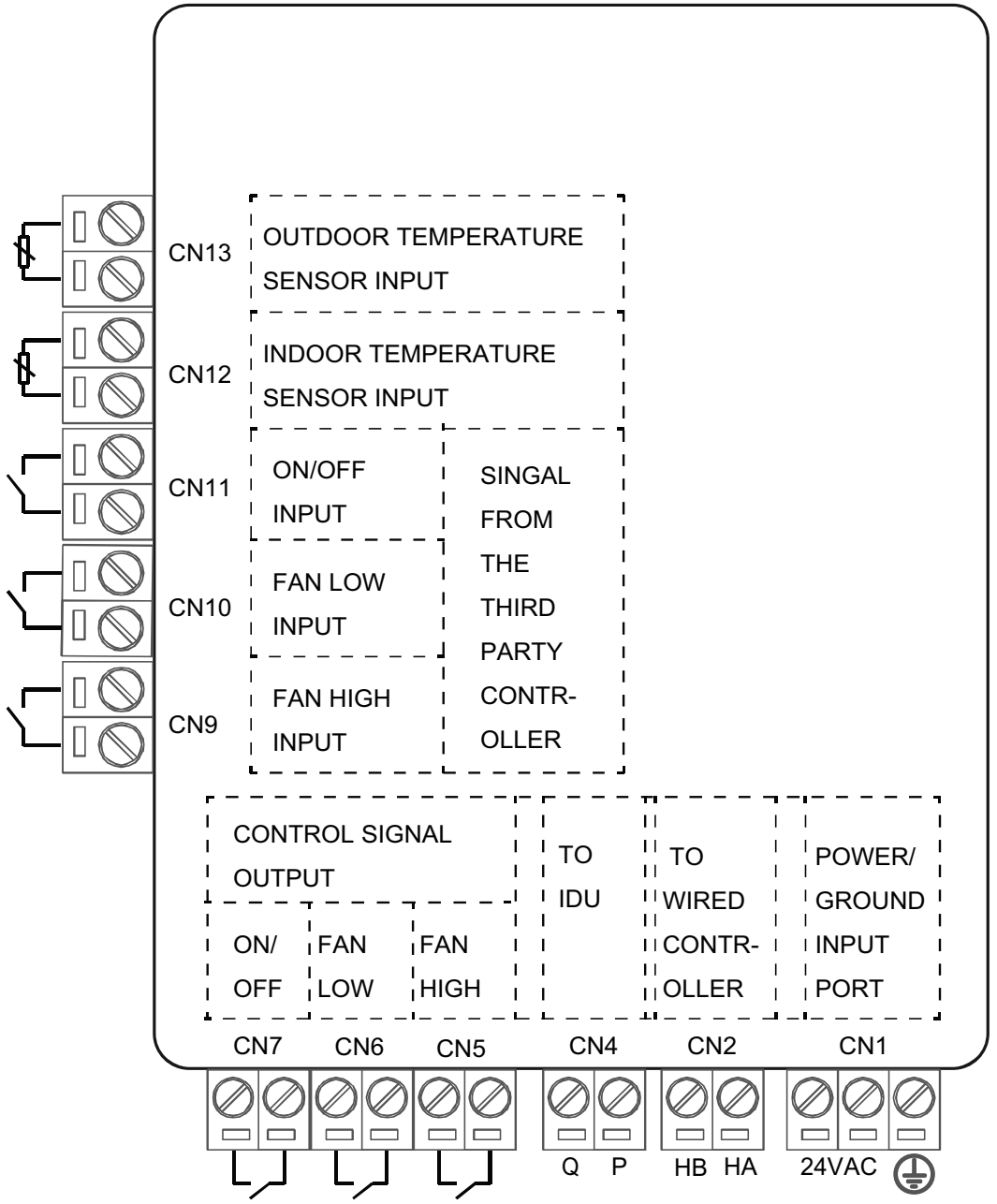


Fig. 4 — Function of each port

POWER WIRING

Voltage: 24VAC
Current: 300mA
Wire: 3*AWG18-16#, copper wire

The ERV indoor unit interface requires 24 VAC power. Verify that the power voltage is within±10% of the rated voltage, and capacity of current must be at least 300 mA.

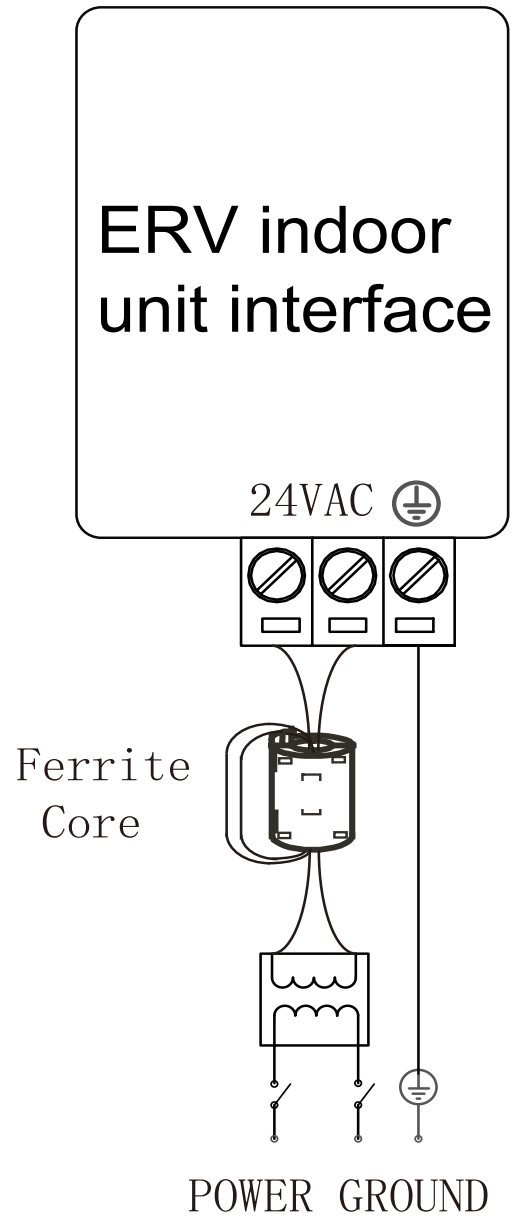


Fig. 5 — Power Wiring

NOTE: 24VAC is field supplied.

NOTE:
The distance between ferrite core and ERV board should not be more than 6 inches and the wire needs to be wrapped twice around the core.

COMMUNICATION WIRING

Type: Shielding 2-core twisted pair cable, copper wire
Diameter: AWG 20 to 16 (0.51 to 1.31mm2)

Maximum wiring length:

- Within 3937 ft. between the outdoor and the ERV interface
- Within 3937 ft. between the MDC and the ERV interface
- Within 820 ft. between the wire controller and ERV interface

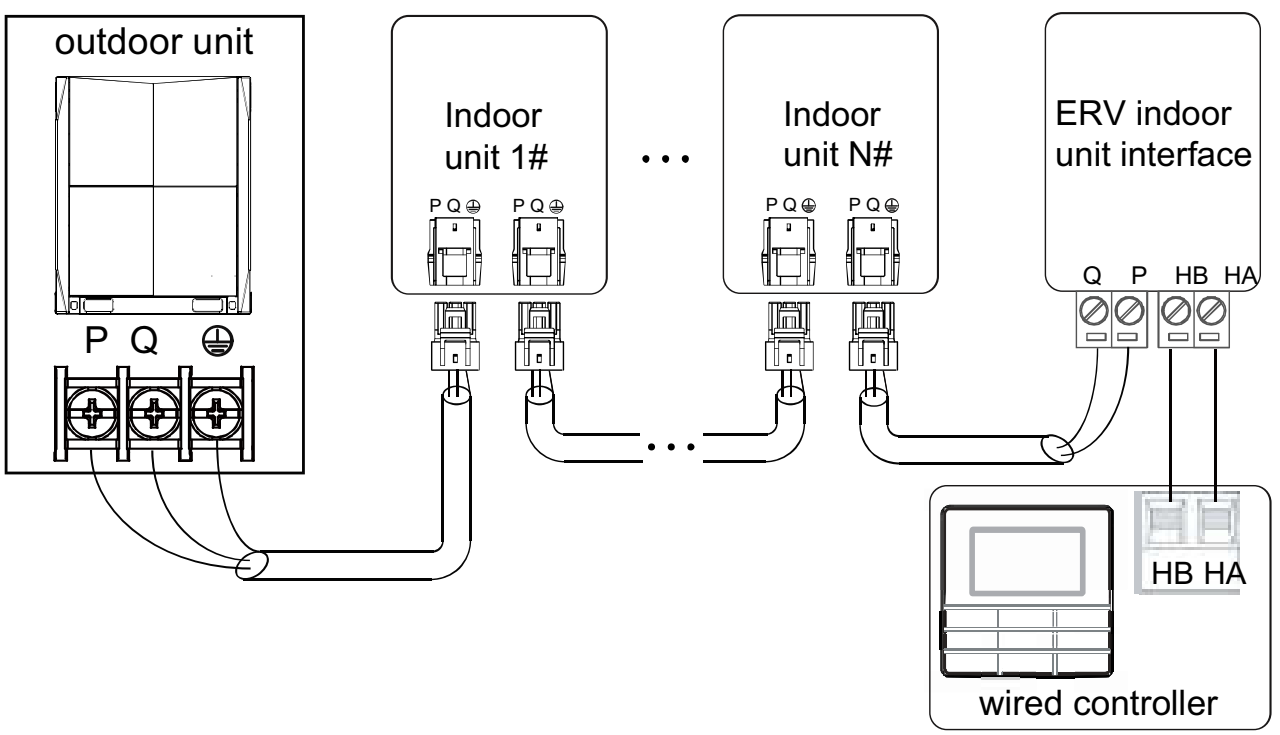


Fig. 6 — Communication wiring for heat pump system

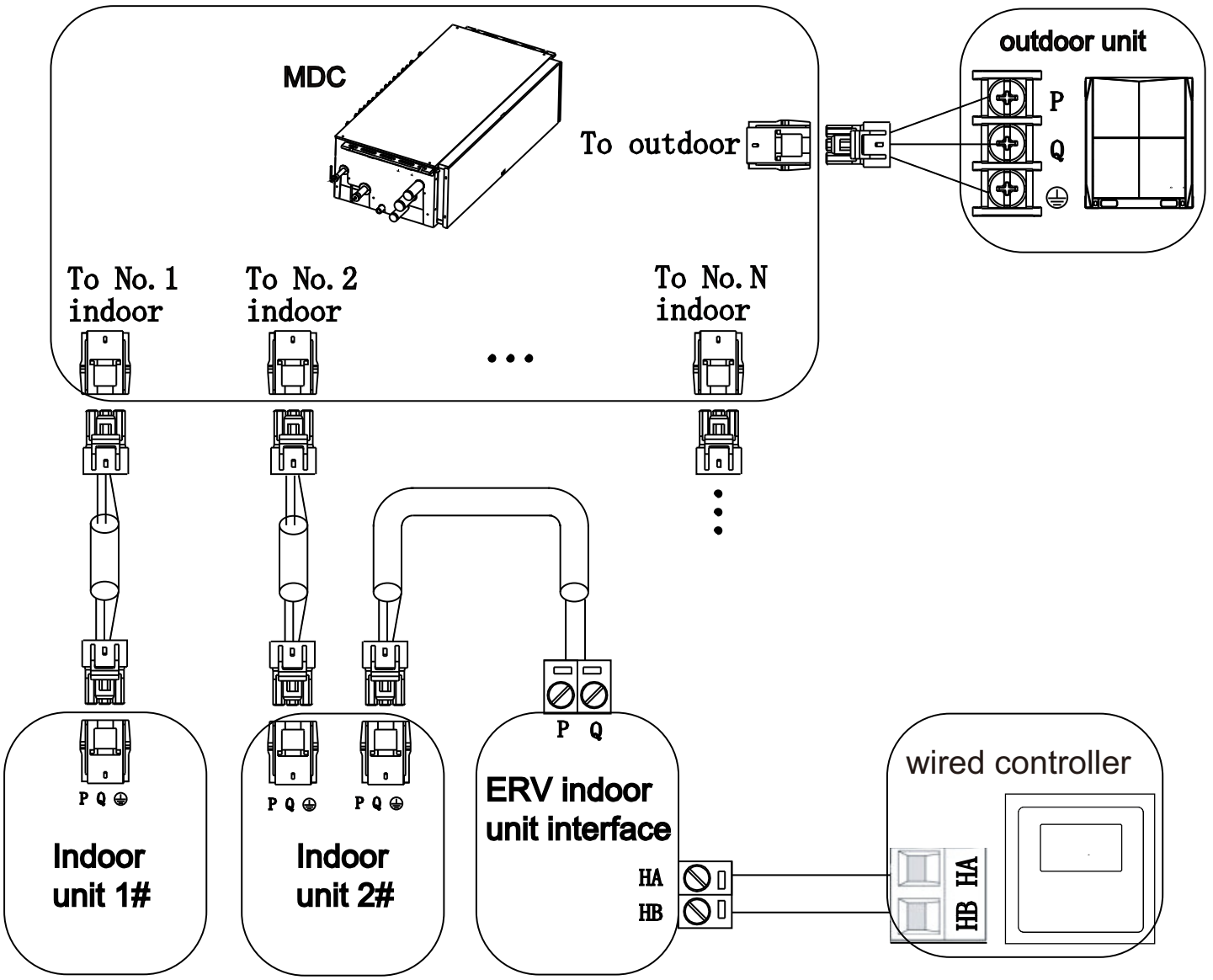


Fig. 7 — Communication wiring for heat recovery system

NOTE:
Do not connect the main power source to terminal blocks of the communication line.

TEMPERATURE SENSOR DETAILS

ERV interface is provided with temperature sensor and extension wire as standard accessories. Sensors are used to sense indoor and outdoor temperatures. Extension wires can be used for sensor location beyond 45 inches from the unit. See Figure 8 for additional details.

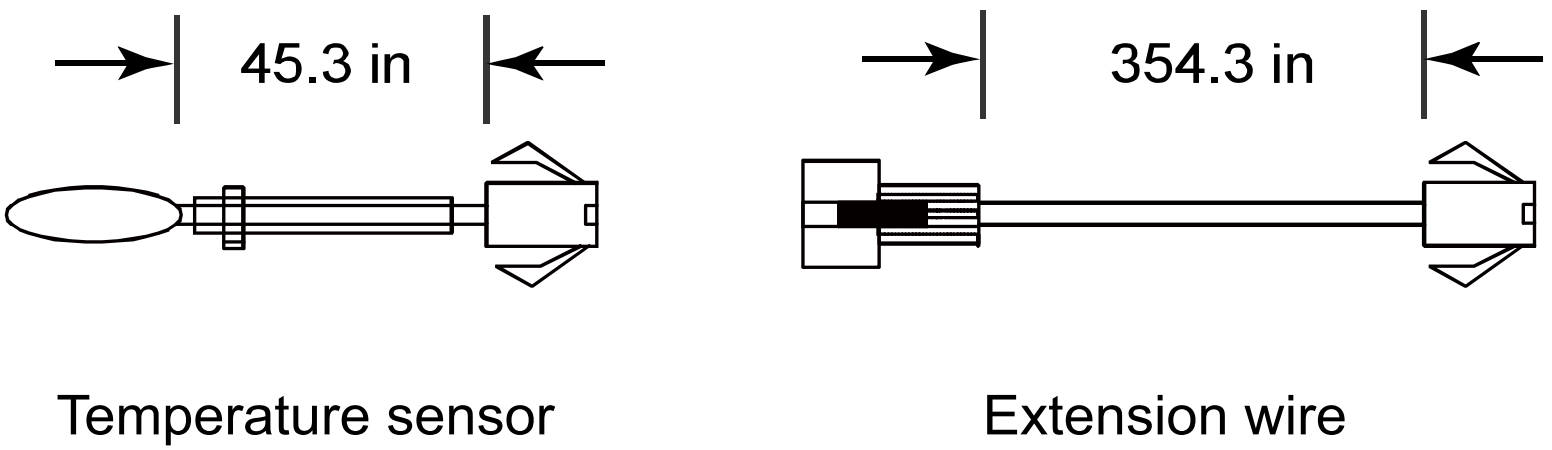


Fig. 8 — Temp sensors and extension wires

The temperature sensors should be installed where they can show the actual indoor and outdoor temperatures separately. Secure the sensor ensuring it is protected from water, dust, mechanical stress, and other conditions that can influence the temperature reading or sensor lifespan.

Follow these steps to wire the temperature sensor to the ERV indoor unit interface board.

1. Cut the connector on the ERV indoor unit interface side.

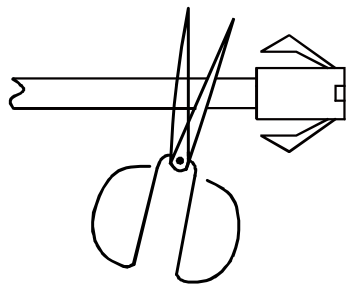


Fig. 9 — Cut connector

2. Strip a suitable length of insulation layer.

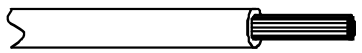


Fig. 10 — Strip insulation

3. Screw the sensor wire to the corresponding terminal on ERV indoor unit interface board.

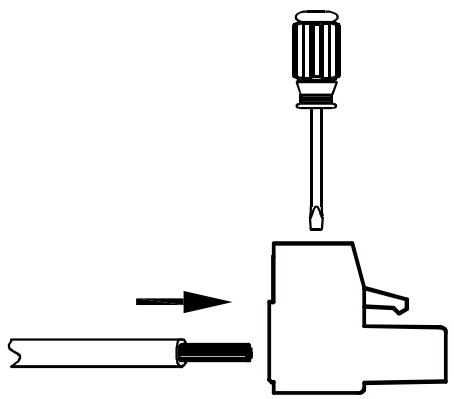


Fig. 11 — Attach sensor wire

THIRD-PARTY CONTROLLERS

CN9, CN10, and CN11 are used to connect the third-party controller. The ON/OFF and fan speed control signal from the third-party controller must be a dry contact signal.

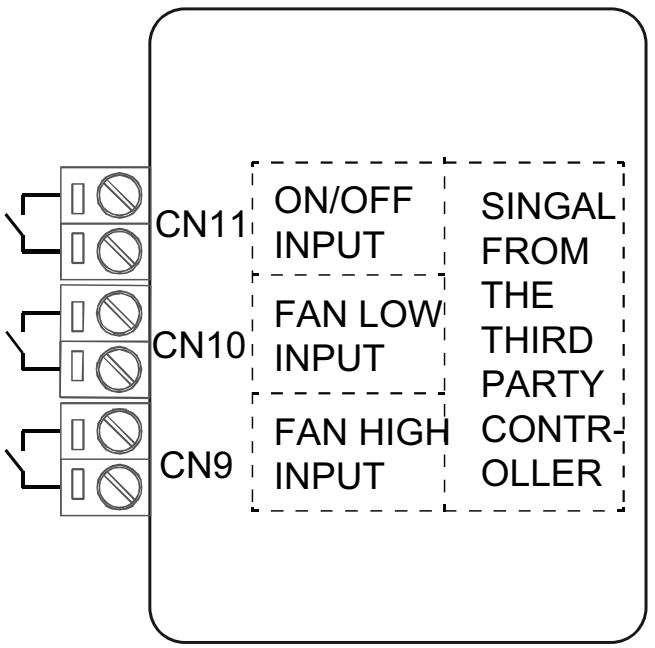
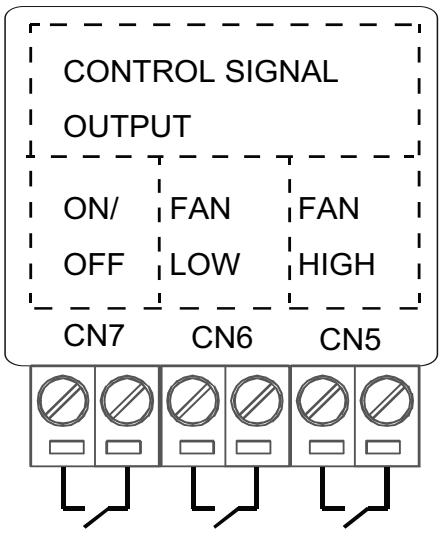


Fig. 12 — Signal from third-party controller

NOTE:
The ON/OFF and fan speed control signal type from the third-party controller must be a dry contact signal.

CONTROL SIGNAL OUTPUT

CN5, CN6, AND CN7 are the terminals for ON/OFF and the fan speed signal output of ERV indoor unit interface. The signal type is dry contact.



The voltage and current must be meet the requirements of Tables 2 and 3.

Table 2 —Max. AC Voltage

Port	Max. Voltage (VAC)	Max Current (A)
CN5, CN6, CN7	250	1

Table 3: Max. DC Voltage

Port	Max. Voltage (VDC)	Max Current (A)
CN5, CN6, CN7	30	1

DIP SWITCH SETTINGS

SW1-1/2: The ON/OFF and fan speed control signal can be from the 40VM series wire controller or a third-party controller. The signal source is set by adjusting SW1-1 and SW1-2 according to Table 4.

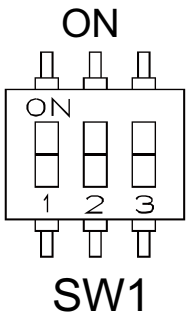


Fig. 13 — Dip Switch

Table 4 — DIP Switch 1-1 (1-2)

SW1-1	SW1-2	Result
OFF	OFF	Choose both ON/OFF and fan speed signal from the 40VM series controller
OFF	ON	Choose ON/OFF signal from the 40VM series controller and the fan speed signal from the third-party controller
ON	OFF	Choose ON/OFF signal from the third-party controller and fan the speed signal from the 40VM series controller
ON	ON	Choose both ON/OFF and fan speed signal from the third-party controller

SW1-3: When power is off and then turned on, the ERV indoor unit interface can be set to automatic restart or non-automatic restart by adjusting SW1-3 according to Table 5.

Table 5 —DIP Switch 1-3

SW1-3	Result
OFF	Automatic restart function
ON	Non-automatic restart function

Only ON/OFF and fan speed signal are chosen from the 40VM9 series controller. The automatic restart function can be effective.

NOTE: After changing the status of any DIP switch on the circuit board, be sure to power cycle the unit so that it can take effect.

OPERATING INSTRUCTIONS

When a wired controller, 40VM900003 or 40VM900005, is connected to the ERV indoor unit interface, the wired controller automatically converts to the ERV user interface. Refer to Figures 14 and 15 below.

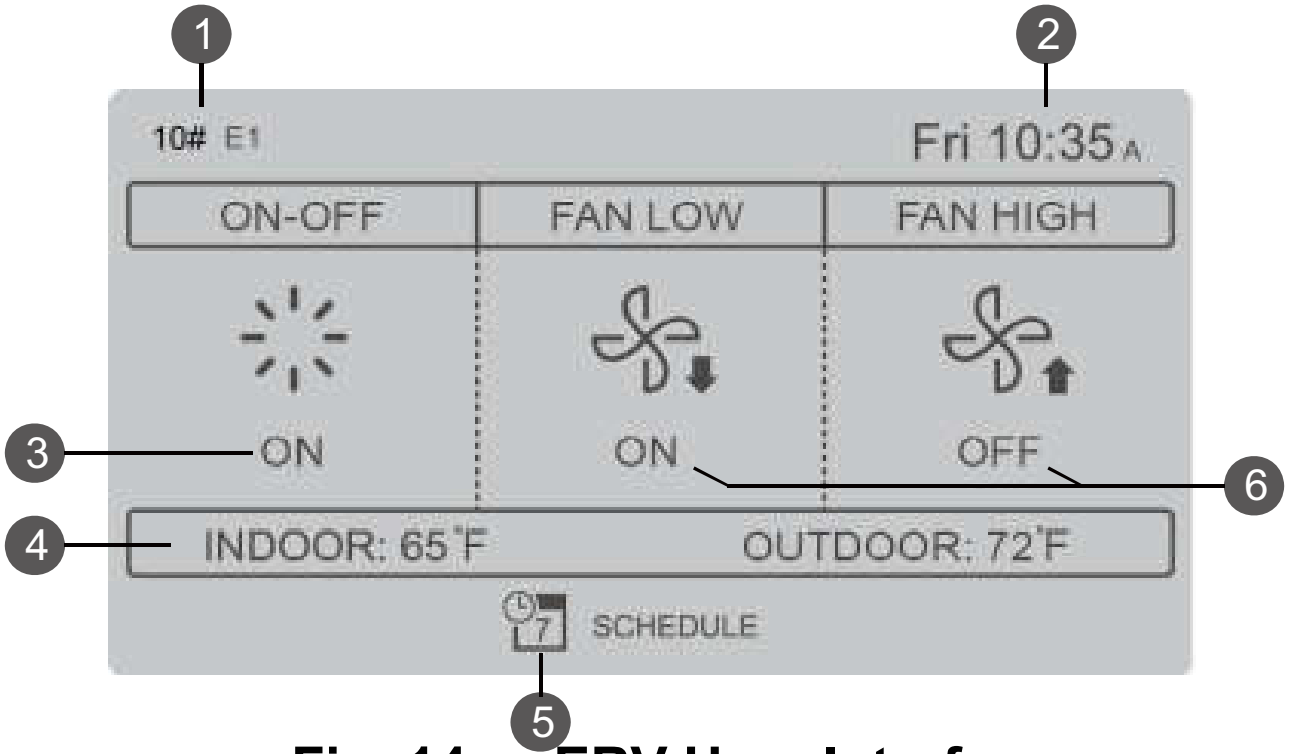


Fig. 14 — ERV User Interface

ERV user interface of 40VM900003 wired controller

1 = Address of ERV indoor unit interface and error code
2 = Clock
3 = Status ON/OFF
4 = Indoor and outdoor ambient temperature
5 = Schedule
6 = Status of fan speed

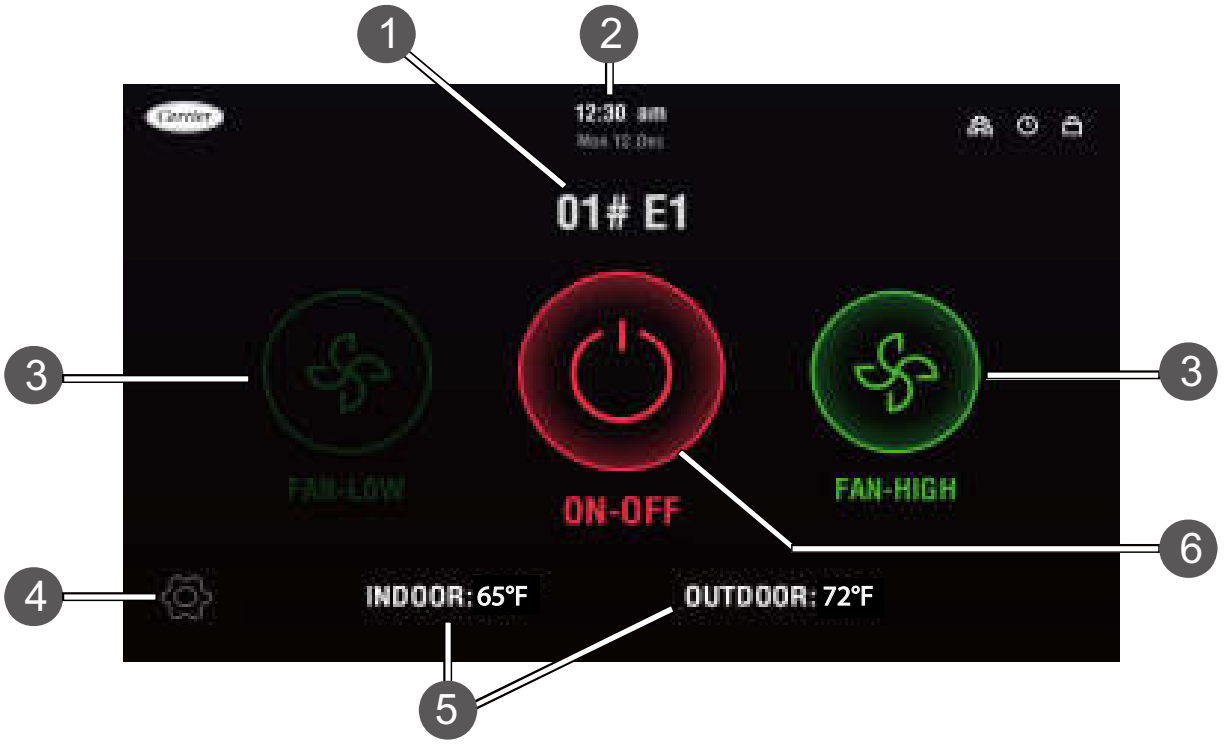


Fig. 15 — ERV User Interface of 40VM900005 Wired Controller

NOTE: One wired controller can only connect one ERV indoor unit interface. Other indoor units and ERV indoor unit interfaces cannot share one wired controller.

1 = Address of ERV indoor unit interface and error code
2 = Clock
3 = Fan Status
4 = Settings
5 = Schedule
6 = Status ON/OFF

SIGNAL INPUT AND OUTPUT

When the source of control signal is selected, the ERV indoor unit will only respond to the signal from the selected controller. The details between input and output are show in Table 6.

Table 6 — Signal Input/Output

Signal Input			Signal Output		
ON/OFF	Fan Low	Fan High	ON/OFF	Fan Low	Fan High
ON	OFF	OFF	ON	OFF	OFF
ON	ON	OFF	ON	ON	OFF
ON	OFF	ON	ON	OFF	ON
ON	ON	ON	ON	ON	ON
OFF	OFF	OFF	OFF	OFF	OFF
OFF	ON	OFF	OFF	OFF	OFF
OFF	OFF	ON	OFF	OFF	OFF
OFF	ON	ON	OFF	OFF	OFF

Most of the time, the control signal output of the ERV indoor unit interface will vary. Follow the signal input as shown in Table 7. There is one exception: if both ON/OFF and fan speed signal source are selected from the 40VM series controller. In this situation, the ON/OFF signal is ON, fan low signal is OFF, and fan high speed is OFF. The output of the ERV indoor unit will be different from Table 6. The actual output is shown Table 7.

Table 7 — Actual control signal output of ERV indoor unit

Schedule signal input from wired controller			Signal output of ERV indoor unit interface		
ON/ OFF	Fan low	Fan high	ON/ OFF	Fan low	Fan high
ON	OFF	OFF	ON	Keep the wired controller current fan speed status when wired controller is ON	Keep the wired controller current fan speed status when wired controller is ON

NOTE: If both fan low speed and fan high speed are ON, the wired controller will only display that the fan high speed is ON.

TROUBLESHOOTING

If ERV indoor unit interface is connected to a wired controller, the error code will be displayed on the wired controller. The error definition of ERV indoor unit interface are shown in Table 8. Refer to the outdoor unit, indoor unit, or wired controller for the rest of error code.

Table 8 — Error codes

Error Code	Definition
E1	Communication error between ERV indoor unit interface and indoor unit
E2	Indoor ambient temperature sensor error
E4	Outdoor ambient temperature sensor error
E7	EEPROM error of ERV indoor unit interface
E9	Communication error between ERV indoor unit interface and wired controller

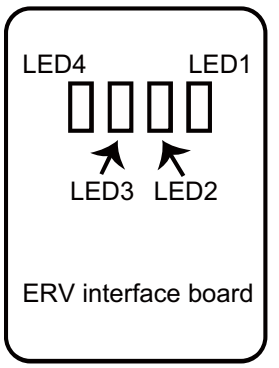


Fig. 16 — Layout of LED

The LED1-4 on the circuit board can also show the fault information of the ERV indoor unit interface as shown in Figure 16 and in Table 9.

NOTE: The cover of the ERV must be removed to see all 4 LEDs.

Table 9 —Fault information from LEDs

LED	Definition	Normal Status	Abnormal Status
LED1	Power Indicator	Light	Flash or Extinguish
LED2	Indicates communication between ERV indoor unit interface and wired controller	Extinguish	Flash
LED3	Indicates communication between ERV indoor unit interface and MDC or outdoor unit	Extinguish	Flash
LED4	Status indicator of indoor temperature sensor and outdoor sensor	Extinguish	Flash