iCN-653(TH) Operation and User Manual

Parameter Table

I. Parameter Table and Factory Settings

Basic Function Options				
	Parameter	Code	Factory Setting	Adjustable Range
1	Max. Cooling Temp. Upper Limit	cH	35.0℃	Min. Cooling Temp. Lower Limit ~35.0°C
2	Min. Cooling Temp. Lower Limit	cL	15.0℃	15.0°C ~ Max. Cooling Temp. Upper Limit
3	Max. Heating Temp. Upper Limit	hH	35.0℃	Min. Heating Temp. Lower Limit ~35.0°C
4	Min. Heating Temp. Lower Limit	hL	15.0℃	15.0°C ~ Max. Heating Temp. Upper Limit
5	Valve (3-Way Valve/Compressor) Delay Protection Time	Pd	0 (No Delay)	0(No Delay) 、1(1 min)、2(3 min)
6	Temperature Compensation Setting	tc	0.0℃	-5.0~5.0°C
7	Panel Backlight	bL	30 (30 sec)	30 (30 sec)、 -- (Always On)
8	Panel Key Tone	bu	on (Enabled)	on (Enabled)、oF (Disabled) Note : This function is invalid for iCN-653

Advanced Function Options				
	Parameter	Code	Factory Setting	Adjustable Range
9	Power Recovery Mode	PP	2 (Power Off)	0(Memory Mode)、1(Auto Restart)、2(Remain Off)
10	Coil Configuration	Pi	1 (2-Pipe/DX/Boiler)	0(4-Pipe/Electric Heating)、1(2-Pipe/DX/Boiler)
11	Intermittent Air Supply Function	Pu	0(Intermittent Air Supply - Off)	0(Disable Intermittent Air Supply)、 1(Enable Intermittent Air Supply)
12	Room Card Function	dE	0(Disable Intermittent Air Supply)	oF(Disable Intermittent Air Supply)、 on (Enable Room Card Function)
13	Card Removal Mode	dn	0(Stop AC When Card Removed)	0(Stop AC When Card Removed)、 1(Maintain AC When Card Removed)
14	Room Card Fan Speed	dF	AuTo (Automatic)	AuTo (Auto) (Low) (Medium-Low) (Medium) (Medium-High) (High)
15	Room Card Cooling Set Temperature	dC	27℃	15.0℃~35.0℃ Note : Operation is limited by cooling temperature upper /lower limits.
16	Room Card Heating Set Temperature	dH	23℃	15.0℃~35.0℃ Note : Operation is limited by heating temperature upper/lower limits.

2. Call Mode and KEYCARD Operation Relationship (Table 2)

On external call reconnection / Call Mode Setting	Keycard Removed (K.C Line Grounded)	Keycard Inserted (K.C Line Open)
0 (Call Memory)	Execute based on the Keycard Removal Mode: 1. dn=0: Controller OFF 2. dn=1: Continuous AC operation (determined by Cool/Heat/Fan mode, Keycard airflow, Keycard cooling set temp, and Keycard heating set temp)	Controller operates according to the previous state
1 (Call Power-On)	Execute based on the Keycard Removal Mode: 1. dn=0: Controller OFF 2. dn=1: Continuous AC operation (determined by Cool/Heat/Fan mode, Keycard airflow, Keycard cooling set temp, and Keycard heating set temp)	Controller ON
2 (Call Power-Off)	Execute based on the Keycard Removal Mode: 1. dn=0: Controller OFF 2. dn=1: Continuous AC operation (determined by Cool/Heat/Fan mode, Keycard airflow, Keycard cooling set temp, and Keycard heating set temp)	Controller OFF

Note 1 : KEY CARD is an optional feature and is not included in the standard configuration.

Note 2 : To enable the KEY CARD function, set the parameter option (dE) to ON.

Function Description

1 Operation / Keypad Instructions

1.1 Power Button ⏻ : Press once to turn the power ON/OFF。

1.2 Mode Button M :

1.2.1 When the unit is ON, press once to switch operation modes : Cooling, Heating, Fan.

1.2.2 When the unit is OFF, press and hold for 3 seconds to enter basic function settings (refer to Section 2.9).

1.3 Fan Speed Button ❀ :

1.3.1 When the unit is ON, press once to select fan speed :
5-speed options: (Auto), Low, Low-Medium, Medium, Medium-High, High.

1.3.2 In Fan mode, Auto fan speed is unavailable.

1.3.3 In Cooling mode (unit ON), press and hold for 5 seconds to enable/disable Sleep Mode.

1.4 Temperature Setting Button (▲/▼) :

1.4.1 When the unit is ON, press once to adjust the set temperature by ±0.5°C. Press and hold to adjust rapidly.

1.4.2 During adjustment, "SET" is displayed to the left of the temperature value.
Cooling Mode : Adjustable between minimum cooling lockout temperature and maximum cooling lockout temperature.
Heating Mode : Adjustable between minimum heating lockout temperature and maximum heating lockout temperature.

1.4.3 The temperature setting will be automatically saved and revert to room temperature display after 5 seconds of inactivity.

1.4.4 Temperature setting is unavailable in Fan mode.

1.4.5 Press both ▲ (Up) and ▼ (Down) temperature keys simultaneously to set 0–24hr scheduled ON/OFF.

1.4.6 In function options, adjust or select settings as needed.

1.4.7 Key Lock (Lock) : Set/Release: Hold both ▲ and ▼ keys for 5 seconds while powered OFF.
Locked State : Only power ON/OFF and 0–24hr scheduling are operable.

1.5 KEYCARD (K.C Line External Control) :

1.5.1 The controller's operation upon power restoration depends on the call mode setting and KEYCARD insertion/removal status, as defined in Table 2.

1.5.2 After power restoration :
Remove KEYCARD : Controller operates per Card Removal Mode.
Insert KEYCARD : Normal operation resumes.

1.5.3 In Cooling mode after power restoration, if KEYCARD is removed :

1.5.3.1 If Card Removal Mode = Stop (dn=0) : Controller forces OFF.

1.5.3.2 If Card Removal Mode = Continue (dn=1) : Operates at KEYCARD-set airflow (dF) and cooling temperature (dC).

1.5.4 Heating Mode Operation (After Power Recovery & KEYCARD Removal) :

1.5.4.1 (dn=0) : System forces OFF when card is removed.

1.5.4.2 (dn=1) : Maintains operation using preset airflow (dF) and heating temp (dH).

1.5.5 Fan Mode Operation (After Power Recovery & KEYCARD Removal) :

1.5.5.1 (dn=0) : System forces OFF when card is removed.

1.5.5.2 (dn=1) : Continues Fan-only operation.

1.5.6 Normal Operation (KEYCARD Inserted) :
Full control resumes in all modes (Cooling/Heating/Fan) after power recovery.

2 Functional Specifications

2.1 Temperature Display
Range : 0.0°C to 50.0°C，Accuracy : ±1°C，Resolution : 0.5°C

2.2 Detection Range：-5.0℃~55.0℃

2.3 Temperature Setting Range

2.3.1 Cooling Mode : Adjustable between minimum cooling lockout temp and maximum cooling lockout temp.

2.3.2 Heating Mode : Adjustable between minimum heating lockout temp and maximum heating lockout temp.

2.4 Default Settings
Mode : Cooling Fan， Speed : Auto Set ，Temperature : 26°C

2.5 Cooling Mode Operation

2.5.1 Valve Contact Logic :

2.5.1.1 Opens when room temp ≥ (Set Temp+0.5℃)

2.5.1.2 Closes when room temp ≤ (Set Temp - 0.5℃)

2.5.2 Adjustable Fan Speeds : Auto / High / Medium-High / Medium / Low-Medium / Low

2.5.2.1 Automatic Fan Speed Control Logic
The fan speed (VSP voltage output) is determined by PI control based on the temperature difference (ΔT = Room Temp - Set Temp) :
$u(t) = Kp * e(t) + Ki\int e(t)\,dt$
u(t) : VSP output voltage (controls fan speed)
e(t) : ΔT (Room Temp - Set Temp)
Kp : Proportional gain coefficient
Ki : Integral gain coefficient

2.5.3 System Status
Main Unit Contact : ON
Heater Contact : OFF

2.5.4 Intermittent Fan Disabled (Pu=0) Fan runs continuously, regardless of valve contact status (open/closed).

2.5.5 Intermittent Fan Enabled (Pu=1) Valve Open : Fan runs continuously.
Valve Closed : Fan stops.

2.6 Heating Mode Specifications :

2.6.1 2-Pipe System Operation (Boiler/DX Coil, Pi=1)

2.6.1.1 Valve Opens when : Set Temperature ≥ (Room Temperature + 0.5°C)

2.6.1.2 Valve Closes when : Set Temperature ≤ (Room Temperature - 0.5°C)

2.6.1.3 Heater Contact : ON，Main Unit Contact : ON

2.6.2 4-Pipe System Operation (Electric Heater, Pi=0)

2.6.2.1 Heater Activates when : Set Temperature ≥ (Room Temperature + 0.5°C).

2.6.2.2 Heater Deactivates when : Set Temperature ≤ (Room Temperature - 0.5°C)

2.6.2.3 Valve Contact : OFF，Main Unit Contact : ON

2.6.2.4 30-second Fan Delay after shutdown (allows residual heat dissipation)

2.6.3 Fan Speed Settings & Control Logic :
Auto / High / Medium-High / Medium / Low-Medium / Low

2.6.3.1 Automatic Speed Control Algorithm (PI Control) :
The fan speed (VSP output voltage) is dynamically adjusted based on the temperature difference (ΔT = Set Temp - Room Temp) using :
$u(t) = Kp * e(t) + Ki\int e(t)\,dt$
u(t) : VSP output voltage (controls fan RPM)
e(t) : ΔT (Set Temp - Room Temp)
Kp : Proportional gain coefficient (immediate response to ΔT)
Ki : Integral gain coefficient (compensates for sustained ΔT)

2.6.4 Intermittent Fan Function - Disabled (Pu=0)
Fan operates continuously regardless of valve/heater contact status (open or closed)

2.6.5 Fan operates continuously when valve/heater contact is OPEN
Fan stops when valve/heater contact is CLOSED

2.7 Valve (3-Way Valve/Compressor) Delay Protection Time :

2.7.1 No Delay Protection (Pd=0)

2.7.2 1-Minute Delay Protection (Pd=1)

2.7.3 3-Minute Delay Protection (Pd=2)

(1) Basic Function Access :

While the unit is OFF, press and hold the Mode button (M) for 3 seconds to enter basic function settings.

2.8 Power Recovery Mode Settings :

2.8.1 Power-On Forced Shutdown (PP=2)

2.8.2 Power-On Forced Startup (PP=1) - Powers ON with last used mode, fan speed and set temperature.

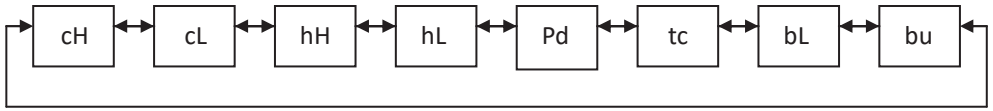
2.8.3 Power Memory Mode (PP=0) - Resumes previous ON/OFF state with last used mode, fan speed and set temperature.

2.9 Function Options :

2.9.1 Basic Function Settings :

(1)While the unit is OFF, press and hold the Mode button (M) for 3 seconds to enter basic function settings.

(2)After entering basic functions, the LCD displays "cH". Use ▲/▼ keys to cycle through main options : cH, cL, hH, hL, Pd, tc, bL, bu



Basic Function Option Codes	Main Option	Sub-Option
Max. Cooling Temp. Upper Limit	cH	15.0~35.0℃
Min. Cooling Temp. Lower Limit	cL	15.0~35.0℃
Max. Heating Temp. Upper Limit	hH	15.0~35.0℃
Min. Heating Temp. Lower Limit	hL	15.0~35.0℃
Valve (3-Way/Compressor) Delay Protection Time	Pd	0,1,2
Temperature Compensation Setting	tc	-5.0~5.0℃
Panel Backlight	bL	30, --
Panel Key Tone	bu	on,oF

(3) Sub-Option Access :

When the LCD displays a main option, press the Mode (M) button to enter its sub-option.

(4) Parameter Adjustment :

Upon entering a sub-option, the LCD displays the current parameter value.

Adjust the value using ▲ or ▼, then press Mode (M) to confirm and return to the main options.

(5) Save & Exit :

Auto-Save : If no key is pressed for 20 seconds, or if Mode (M) is held for 3+ seconds, the system :

Saves the new setting to EEPROM (permanent memory).

Exits the adjustment mode.

Displays room temperature on the LCD.

2.9.2 Advanced Function Settings : Contact your dealer for configuration.

3 Troubleshooting (The controller will automatically shut down when the following faults occur)

3.1 E1 Error – Indicates motor-related protection (overcurrent/overvoltage/low voltage/overtemperature).

3.1.1 The E1 code will remain locked on the LCD panel.

After troubleshooting the motor issue, press the Power Button ⏻ to reset.

3.2 E2 Error – Indicates temperature sensor malfunction (short circuit/open circuit).

3.2.1 The E2 code will remain locked on the LCD panel.

After repairing the sensor, press the Power Button ⏻ to reset.

3.3 E3 Error – Indicates communication failure between the panel and controller.

3.3.1 Check for broken wires or loose connections in the communication wiring.

4 Important Notices

4.1 Before installation, ensure the power supply is turned off to prevent electric shock.

4.2 Follow the wiring diagram during installation to avoid incorrect connections and potential hazards.

4.3 Do not install the controller in humid environments to prevent malfunction.

4.4 Before powering on, verify that wiring and input voltage are correct.

4.5 Damage caused by improper installation is not covered under warranty.

4.6 For communication wiring, use UL2464-compliant 24AWG or 26AWG 3C shielded cable.

5 Specifications

5.1 Dimensions

5.1.1 Panel : 120mm (L) × 70mm (W) × 14mm (H)

5.1.2 Driver Box : 170mm (L) × 163mm (W) × 66mm (H)

5.2 Environmental Limits

5.2.1 Operating Conditions : 0°C to 50°C, <90% RH (non-condensing)

5.2.2 Storage Conditions : -10°C to 60°C, <90% RH (non-condensing)

5.3 Input/Output

5.3.1 Power Supply : 220V Model : AC 220V–240V,
110V Model : AC 100V–120V,
PFC Model : AC 100V–240V, 50/60Hz (Single Phase)

5.3.2 Keycard Input ×1 (Optional, not included in standard configuration)

5.3.3 Temperature Sensor Input ×1

5.3.4 Keypad Input ×5 (iCN-653 : Physical buttons, iCN-653TH : Touch buttons)

5.3.5 Output Terminals :

5.3.5.1 Valve Contact : 1A ×1

5.3.5.2 DC Brushless Fan Motor Output :
Single Motor Model : U1/V1/W1 ×1
Dual Motor Model : U2/V2/W2 ×1

5.3.5.3 Host Interlock Contact – 1A ×1 (dry contact / non-energized)

5.3.5.4 Heater Contact – 1A ×1 (Optional, not included in standard configuration)

5.3.5.5 Load Fuse – 8A/250VAC

5.3.5.6 If contact capacity is insufficient, install an additional relay (user-provided).

5.3.5 Display Output – LCD with backlight

5.3.6 Communication Distance – Max. 100 meters

6 Wiring

Refer to the iCN3-Wire Communication (DC Fan Motor) Series Wiring Guide for installation instructions.