

Description

The I-CON 2433 is a microprocessor-based fuel/electricity-saving controller for Roof-Top-Units (RTUs) having 1 stage of warm-air heating and/or up to 2 stages of DX cooling. It reduces fuel and electricity consumption, wear on parts and emissions by actively managing the burner and/or compressor cycling in conjunction with the existing operating control (Thermostat). Efficiency gains and savings are achieved by matching the RTU's output more closely to the required load. This controller continuously indicates average savings per control scheme. In addition, the controller is programmable. The programmable settings and key data is stored in non-volatile memory. Access to all functions is via a touch-sensitive TFT color display.

Electric Ratings

Power input: 115 or 208-230 VAC, 5 Watts max., 50/60Hz.
Control circuit input: 24,115/208-230 VAC \pm 10%, 0.1A max. Burden
Relay Contact: Form B, 10A @ 220 VAC (General Purpose)

Environmental Conditions

For Indoor Use. (Non-exposure to Outdoor conditions)
Maximum Altitude 6,600ft. (2000M).
Controller Operational Temperature Range: 0° - 140°F (-17° - 60°C)
Sensor Operational Temperature Range: -13° - 200°F (-25° - 182°C)
Controller Maximum Rh: 90% non-condensing
Mains Supply Voltage Fluctuations: +10%, -20%
Transient Over-Voltage Category (III)
Pollution Degree (2)

Maintenance

Maintenance of the controller is NOT required. The Controller will provide many years of Energy Savings.

Warranty

I-CON controls carry a limited manufacturer's warranty¹ against breakdowns or defects in materials and/or workmanship for 10 years². If an I-CON control fails during normal operation, ICS™ will provide a replacement product at no charge.

Performance Guarantee

The I-CON controls carry a 10% energy reduction guarantee. If, after the first year of operation, the I-CON control does not reduce the fuel consumption of your heating system or the electric consumption of your cooling system compressor by the guaranteed amount³, ICS will refund the difference between your savings and our guarantee⁴.

¹ Only valid for the original installation.

² Signs of moisture and/or tampering will void the Warranty.

³ Consumption data must be normalized for the periods of comparison.

⁴ Refund amount will not exceed the manufacturing "List Price" of the control at the time of sale and the control must be returned to ICS.

Installation

The following instructions must be followed:

1. Prior to the actual installation, the following must be determined.
 - a) Identification and measurement of the power that will be applied to the controller.
 - b) Identification and measurement of the control circuit voltage(s) that will be used to control the burner and/or compressor(s).
 - c) Determination of the Pre-Purge time, for use in the Heating scheme configuration.
 - d) Prior to the mounting of the controller the voltage input selection switch should be placed in the proper position. Note: The controller may be powered by either 115 VAC or 208-230 VAC. Based upon the input voltage, the switch should be in either the 115V or 220V position. Applying the wrong voltage and/or improper switch settings will void the Warranty.
2. **Ensure ALL POWER TO THE RTU IS OFF!**

Do not apply power to the controller until directed to do so further in these Instructions.
3. Determine a suitable mounting location for the controller and mount, using suitable hardware, within the RTU's electric panel. Consideration should be given to accessibility of the touch-screen, routing and connection of the various wiring, and serviceability. It may be necessary to relocate some items in the electric enclosure to obtain room for the controller. At no time should the controller be exposed to outdoor conditions.
4. Sensors:
 - a) Properly locate and mount the supply and return sensors on the duct-work, using a 3/8" drill bit for the sensor to penetrate into the airstream. The Supply-Air sensor should be mounted in the airstream as close to the furnace as possible but at least 18" downstream from the heat-exchanger so as to not pick up any radiant heat. The Return-Air sensor should be mounted in the Return-Air airstream, and that the airstream does not contain any Mixed-Air (combination of Outdoor and Return Air) or Outdoor Makeup-Air. Note that there is a difference between the Supply-Air sensor and the Return-Air sensor. The Supply-Air sensor has only two (2) wire connections. The Return-Air sensor has four (4) connections.
 - b) Properly locate and mount the Outside-Air sensor on the North-Facing side of the RTU out of direct sunlight.
 - c) Properly route and wire (See wiring diagram) the sensors to the controller, using the supplied screw driver. Note: The provided 2-conductor cable is for connecting the Supply-Air sensor. The 4-conductor cable is for connecting the Return and Outside Air temperature sensors.
5. Power wiring to controller: **All wiring must conform to the regulations and requirements in effect at the location of installation by properly trained and, if necessary, licensed installers.**
 - a) Confirm that the voltage selection switch is positioned properly based upon the power input voltage value determined in 'Installation 1, a' above.
 - b) Connect the power wiring to the controller (See wiring diagram). **DO NOT APPLY POWER TO THE RTU AT THIS TIME!**
6. Control wiring to controller:

The controller is electrically installed in series (**NEVER IN PARALLEL**) with the operating-controls. It is very important that it be installed, electrically, before any interlocks to ensure proper operation of the burner or compressor, and to eliminate any alarm or fault conditions that could arise because the *ICON* controller is delaying the burner and/or compressor from running. **AT NO TIME SHOULD ANY SAFETY CONTROLS OR CIRCUITS BE CIRCUMVENTED.**

The individual control circuits may be energized by 24vac or 115/208-230vac. Because of this, it is MANDATORY that the proper common for the individual control circuits be identified and utilized. Follow the wiring diagram on Page 5.

 - a) In the case of heating, the wire between the Thermostat (W lead) and 'W' terminal is interrupted. The lead going to the Thermostat 'W' gets connected to the Call terminal, the lead going to the 'W' terminal on the RTU goes to the Burner terminal.
 - b) In the case of cooling (either Cool-1 or Cool-2), the wire between the Thermostat (Y lead) and the 'Y' terminal interrupted. The lead going to the Thermostat 'Y' gets connected to the Call terminal and the lead going to the 'Y' terminal goes to the COMP1 or COMP2 terminal as the case may be. It is important that the RTU 'C' terminal be connected to the 24V terminal for all active controls.
7. Double-check all wiring and connections. Make sure there are no short-circuits between terminals.
8. When all of the above is confirmed, power may be re-applied to the RTU.
9. Verify and/or change the configuration for the individual controls (i.e. HEATING, COOLING-1, COOLING-2)

Configuration

The ICON 2433 controller has numerous configurable parameters to customize the control responses to achieve maximum savings. There are default values pre-configured into the various parameters that are proper for most applications. All of the Control Schemes (Heating and Cooling) are, by default, Enabled. It is suggested to disable any control scheme that is not being used. If you determine that the control needs to be further customized, we suggest contacting our Technical support staff to discuss. The range and options of the adjustments for each parameter is shown on the individual pages.

When configuring, none of the changes go into effect until the Enter button is selected. Most of the programming is typical for all three (3) of the control schemes, however there are some different parameters depending upon whether or not you are configuring Heating or Cooling.

The screen Contrast may be set from any control scheme and sets the Contrast for all screens.

In addition, the controller may be reset to factory default by selecting the 'RESET TO DEFAULTS' touch-button for the required control scheme. Doing it for one scheme does not reset them all.

The following Items may be set in the various configuration menus:

HEATING PARAMETERS

1. RESET TIMERS/COUNTERS [Y/N]
2. TEMPERATURE INDICATION IN °F OR °C.
3. PREPURGE TIME – Time in seconds determined during 'Installation, Step 1,c'. This is extremely important for proper savings calculation and display.
4. Maximum Supply-Air Temperature Limit.
5. Maximum Economizer Time Limit.
6. Control Scheme Enable/Disable.

COOL-1 or COOL-2 PARAMETERS

1. RESET TIMERS/COUNTERS [Y/N]
2. Maximum Economizer Time Limit.
3. Anti-Short-Cycle Time.
4. Maximum Standby Time Limit.
5. Minimum Percent (%) Delay.
6. Maximum Percent (%) Delay.
7. First Cycle Delay.
8. Cycles per Hour.
9. Cycle % /Hour.
10. Compressor Interlock Enable/Disable.
11. Control Scheme Enable/Disable.

Operation

All Functions, Screens and Unit Configuration is handled via the touch-sensitive TFT display.

After proper installation, including the proper setting of the control power input voltage selector switch, all sensors, control wiring, and the application of power, the control will activate. After a system check, the LED Activity indicator will blink on and off at a 2 second rate; indicating that the power is on and the program is running. In the event of a fault the touch-screen display will indicate the nature of the problem.

By default, after the Copyright notice, the control will start with the Heating Control status screen displayed. The additional Control screens and functions may be accessed via the touch-screen. See the Screen Display page for a view of the various Screens.

The possible messages and their explanations are as follows:

Status Messages:

STANDBY - The RTU is operating under its own internal operating-control, which has turned the burner/compressor off. This occurs until the load on the RTU demands a heating or cooling response. This message may be accompanied with a secondary message.

ECONOMIZING - The existing RTU control is responding to a heating or cooling demand, but the 2433 control is delaying the burner or compressor from running until the control algorithm has been satisfied. This message may be accompanied with a secondary message.

HEATING or COOLING - The controller has released the burner or compressor(s) to run.

SYSTEM BYPASSED – A condition has occurred that would inhibit the control from functioning properly. This message indicates that the control has taken itself out of the circuit (BYPASSED) and is no longer economizing. It will be accompanied with a secondary message that explains the cause.

DISABLED – The control function has been Disabled in configuration. This message will be accompanied with a secondary message.

During normal operation, the first three messages will appear sequentially.

Secondary Messages:

STANDBY TIMER EXPIRED - as a fail-safe for the control, the internal electronics are monitored. By default, this is set to 90 minutes (adjustable between 5 – 90 minutes and Disabled). Disabling, is NOT recommended. This message may appear periodically, especially during seasonal changes depending upon the need for heating/cooling. This message should go away as soon as a call-signal is sensed. If not, or the burner/compressor is running and the control indicates a status of STANDBY, service should be contacted.

ECONOMIZER TIMER EXPIRED – will be displayed if the burner or compressor has been released to run due to this timer expiring. This value is configurable. By default it is DISABLED.

SENSOR FAULT – this will be displayed whenever any of the sensors are in a fault condition that would cause a Bypass of that individual control function. The faulting sensor will be individually identified on all of the control Status screens.

SET MANUALLY BY OPERATOR – this will be displayed whenever a control is manually bypassed through the 'RESET/BYPASS' screen.

CRC FAULT – this message will be displayed if there is a communication issue that is resulting in inaccurate temperature or humidity indications. If this message persists; The affected sensor or control will require service.

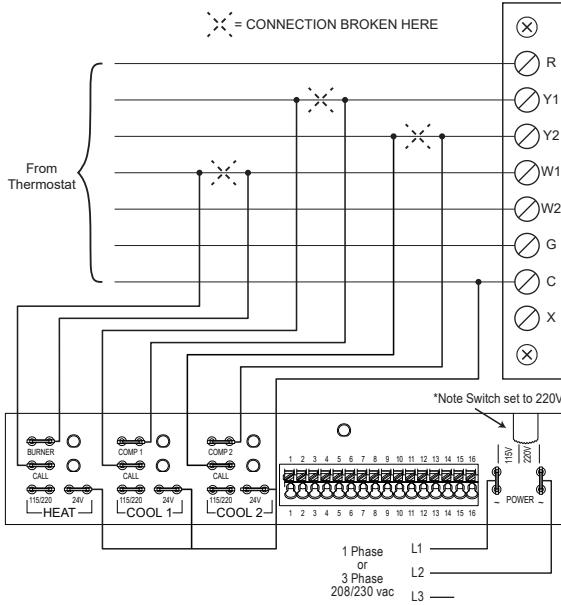
INTERNAL FAULT – a condition has been sensed that would inhibit the control from functioning. The control has bypassed itself, to allow the RTU's controls to function without the *ICON* 2433 control intervening. SERVICE MUST BE CONTACTED.....

ANTI SHORT CYCLING – this message will be displayed for a programmable amount of time after the compressor for that control stops running. By default this value is 2 minutes. The compressor will not be allowed to run again until the anti-short-cycle timer expires.

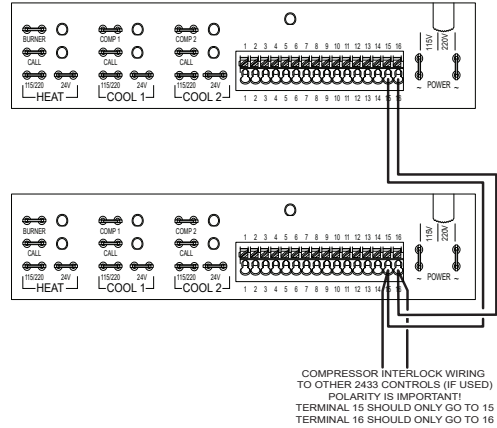
COMPRESSOR INTERLOCK – If enabled (by default) the compressors will not be allowed to energize at the same moment. This prevents voltage dropouts or brown-outs resulting from the high inrush currents of the compressors. This may reduce Peak-Demand billings. This function may be disabled individually per control, and may be extended to multiple *ICON* 2433 controllers.

Wiring Diagrams:

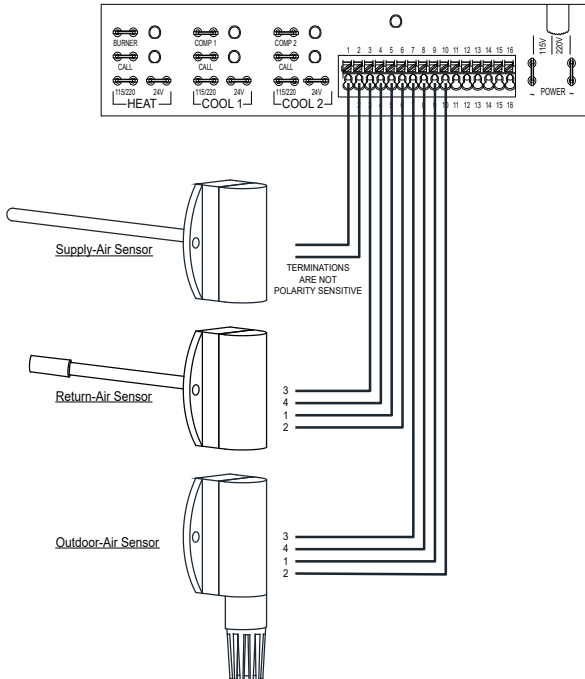
Typical 208-230vac POWER with 24vac Control



Typical Compressor Interlock



Typical Sensor Wiring



Screens: (Typical for HEATING or COOLING)

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MODEL: 2433

ECONOMIZER FH: b_ECA PC BD REV. 1.0

HEATING CONTROL

SAVINGS = 12.3%

STATUS: STANDBY

SECONDARY MESSAGE AREA

TEMPERATURES (°F) / Rh (%)

SUPPLY	RETURN	OUTDOOR
105°	072° / 37%	015° / 20%

HEATING CONTROL COOLING CONTROL 1 COOLING CONTROL 2 007 RESET/BYPASS

COUNTERS / CONFIG

007

HEATING CONTROL COOLING CONTROL 1 COOLING CONTROL 2 PREVIOUS SCREEN RESET/BYPASS

HEATING TIMERS

STANDBY-TIME: 0000000.0 Hrs.
ECONOMIZER-TIME: 0000000.0 Hrs.
RUN-TIME: 0000000.0 Hrs.
PREPURGE-TIME: 0000000.0 Hrs.
BYPASS-TIME: 0000000.0 Hrs.
FAULT-TIME: 0000000.0 Hrs.

HEATING CONTROL COOLING CONTROL 1 COOLING CONTROL 2 PREVIOUS SCREEN RESET/BYPASS

HEATING CONFIGURATION

PREVIOUS PARAMETER ESC +/YES -/NO

USE "PREVIOUS / NEXT" BUTTONS TO SE
USE "+/YES" AND "-/NO" BUTTONS TO MAKE CHANGES.
PRESS "ESC" TO EXIT CONFIGURATION SCREEN A

SYSTEM BYPASSES AND RESETS

CONTROL BYPASSES

HEATING BYPASS

COOLING-1 BYPASS

COOLING-2 BYPASS

UNIT RESETS

RESET ECONOMIZER

RESET HOT WATER

HEATING CONTROL

COOLING CONTROL 1

COOLING CONTROL 2

PREVIOUS SCREEN

RESET/BYPASS

SYSTEM BYPASSES AND RESETS

CONTROL BYPASSES

HEATING BYPASS

COOLING-1 BYPASS

COOLING-2 BYPASS

UNIT RESETS

RESET ECONOMIZER

RESET HOT WATER

PRESS RESET BUTTON TO CONFIRM

HEATING CONTROL

COOLING CONTROL 1

COOLING CONTROL 2

PREVIOUS SCREEN

RESET/BYPASS

HEATING CONTROL

SAVINGS = 12.3%

STATUS: SYSTEM BYPASSED

SET MANUALLY BY OPERATOR

TEMPERATURES(°F) / Rh (%)

SUPPLY	RETURN	OUTDOOR
105°	072°/37%	015°/20%

HEATING CONTROL

COOLING CONTROL 1

COOLING CONTROL 2

PREVIOUS SCREEN

RESET/BYPASS

CONFIGURATION SELECT

CHANGE SETTINGS

SET DISPLAY CONTRAST

RESET TO DEFAULTS

HEATING CONTROL

COOLING CONTROL 1

COOLING CONTROL 2

PREVIOUS SCREEN

RESET/BYPASS

IN PARAMETERS

SELECT PARAMETER.
PRESS ENTER TO SAVE CHANGES.
AND RETURN TO HOME PAGE

ENTER

NEXT PARAMETER

CONTRAST = 60%

ENTER must be pressed to Save Value!

+

-

ESC

ENTER

HEATING CONTROL

COOLING CONTROL 1

COOLING CONTROL 2

PREVIOUS SCREEN

RESET/BYPASS

HEATING CONFIGURATION PARAMETERS

RESET TO FACTORY DEFAULTS = YES CHANGE? [YES/NO]

***** PRESS ENTER TO CONFIRM *****

USE "PREVIOUS / NEXT" BUTTONS TO SELECT PARAMETER.
USE "+/YES" AND "-/NO" BUTTONS TO MAKE CHANGES. PRESS ENTER TO SAVE CHANGES.
PRESS "ESC" TO EXIT CONFIGURATION SCREEN AND RETURN TO HOME PAGE

PREVIOUS PARAMETER

ESC

+/YES

-/NO

ENTER

NEXT PARAMETER