Rinnai ENERGYSAVER® Direct Vent Wall Furnace Installation Fundamentals
This instructional presentation is provided by Rinnai America Corporation as a service to demonstrate common techniques used in installing and/or servicing Rinnai America products. An effort has been made to represent accurate and complete information at the time of publication; however, the information contained herein may not be current or applicable to specific products so review all available information and applicable codes.

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NOTICE: This video course will require approximately 90 minutes to complete. If at any time you need to stop the course, click the pause button at the bottom of the screen. You can review any previous slide during the presentation by clicking the desired slide in the outline pane to the left. You may not, however, advance to any unviewed slides. If you need to leave the presentation, you will be allowed to resume where you left off when you return.

Additionally, it is recommended that you take notes throughout the presentation as there will be an assessment to test your knowledge at the end.
## Product Model Numbers and Specifications

<table>
<thead>
<tr>
<th>NEW MODELS</th>
<th>PREVIOUS MODELS</th>
<th>CFM*</th>
<th>MAX POWER*</th>
<th>DECIBELS*</th>
<th>INPUT BTU RANGE*</th>
<th>AFUE (Efficiency)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX08C</td>
<td>ES08, RHFE 201 FA</td>
<td>55.5-82.0</td>
<td>41-42 W</td>
<td>27-36dB</td>
<td>3,000-8,000 NG/LP</td>
<td>NG-82% LP 83%</td>
</tr>
<tr>
<td>EX11C</td>
<td>ES11, RHFE 263 FAII</td>
<td>69.3-102.5</td>
<td>44-47 W</td>
<td>31-38dB</td>
<td>5,500-11,000 NG</td>
<td>NG-81% LP 82%</td>
</tr>
<tr>
<td>EX17C</td>
<td>ES17, RHFE 431 FAIII EX17, RHFE 431 WTA</td>
<td>111.3-137.8</td>
<td>40-46 W</td>
<td>33-38dB</td>
<td>8,200-16,700 NG/LP</td>
<td>NG-81% LP 82%</td>
</tr>
<tr>
<td>EX22C</td>
<td>ES22, RHFE 556 FAIII EX22, RHFE 556 WTA</td>
<td>111.3-162.7</td>
<td>52 W</td>
<td>32-42dB</td>
<td>8,200-21,500 NG</td>
<td>NG-81% LP 82%</td>
</tr>
<tr>
<td>ES38</td>
<td>RHFE 1004 FA</td>
<td>203.4-360.6</td>
<td>121 W</td>
<td>37-47dBA</td>
<td>10,500-38,400 NG</td>
<td>NG-80.6% LP 82%</td>
</tr>
</tbody>
</table>

Ensure the correct part number is identified for service / parts support

*Current model specifications-previous models may slightly vary

All models available in beige EX22(C) and ES38 models are also available in white.
Features and Benefits

• When sized correctly, the ENERGYSAVER® Furnace can be used as a whole house/primary heat source.

• Easy Control and Operation
  • One-touch ignition
  • Programmable thermostat with a temperature range between 55°F to 95°F (13°C to 35°C)
  • During normal operation, the display will dim to save power
  • Display available in Fahrenheit or Celsius
  • Setback and Frost Protection allows a minimum temperature to be maintained even when off or between scheduled heating events
  • Adjustable maximum temperature setting
  • Energy saving economy setting
Features and Benefits

• The unit’s standby power consumption is less than 1 watt.
• Seven-stage Intelligent Modulating Gas Valve and blower control.
• Warm air discharge at floor level.
  o Directional louvers to optimize direction of air flow.
• Ultra-quiet operation-Decibel range of 27-47 is comparable to a normal conversation.
• Gas type is field convertible.
• Restart Functions allow automatic restart after ignition, combustion, or power failures.
• Small 3” diameter concentric vent.
Safety Features

• Self Diagnostic Circuitry-Should the ENERGYSAVER® detect an unsafe operating condition, the unit will shut down and a fault code will display indicating the specific issue.
  o If the shutdown is due to an ignition or combustion failure, the unit will attempt to relight automatically.

• Function/Child Lock

• Cool to the touch Cabinets.

• Restricted air filter indication lamp and audible reminder-Current model ENERGYSAVERS will flash a reminder lamp and emit an audible beep if it detects operational conditions indicative of a restricted air filter.

• Sealed Heat Exchanger-flame and combustion is sealed from the heating area.
• Overheat protection- Multiple temperature sensors monitor the appliance’s temperature. Shut down occurs if an unsafe operational temperature is detected.

• Combustion and convection fan validation-should either of these fans fail to maintain the proper speed (likely due to a restriction), the PCB will not allow the unit to operate.

• Electronic ignition-no standing pilot.

• Power failure protection-Should the ENERGYSAVER lose power, the gas supply will automatically close. Upon resumption of power, the unit will automatically attempt to restart.

• ENERGYSAVERS are equipped with an inline glass fuse and surge protection to protect from over-current or power surge.
To ensure the ENERGYSAVER operates as designed, an industry standard Btu heat loss calculation must be performed on the area to be heated.

- This calculation considers all factors that contribute to heat loss such as:
  - Area and volume of the space to be heated
  - Geographical location and climate where the furnace will be located
  - Structural characteristics of the building such as number of windows, exterior doors, construction material, etc
- The Air Conditioning Contractors’ Association (ACCA) has an industry standard Btu calculation in their “Manual J” publication.
- A qualified and licensed installer should be familiar with this type of calculation.
- Rinnai also offers a basic DV sizing calculator at [http://www.rinnai.us/heat_selector_2007.swf](http://www.rinnai.us/heat_selector_2007.swf)
- NOTE: Incorrectly sized applications can lead to the ENERGYSAVER short-cycling or failing to bring the area to the desired set point temperature.
The ENERGYSAVER has the ability to heat an entire structure from a central room. Here’s how:

- **2\textsuperscript{nd} law of thermodynamics** – Heat seeks cold
  - Once the main room approaches the set point temperature, the heat begins to move to other rooms—seeking cold.
  - The variable gas valve and blower control modulate to ensure heat reaches the remainder of the structure without overheating the main area.
- Cold air is detected quickly by the thermistor—mounted two inches above the floor and able to detect changes as small as $6/10\textsuperscript{th}$s of a degree (Fahrenheit).
- These features aid in reducing stratification in the atmosphere (different layers of room temperature).

(Click here to watch animation)
**ENERGYSAVER®—Whole House Furnaces**

**Key concepts**

- Variable speed technology – Modulating gas and air based on the heat loss at that moment

- With on/off single stage operation, gas usage can be high due to alternating periods between maximum flame and no flame at all.

- The Energysaver’s modulating technology has the ability to replace only the heat escaping the structure by continuously operating at heating levels based on the demand at that moment.

- This results in different layers of temperatures throughout the structure leading to a less than comfortable living environment.

- This leads to lower gas usage and higher levels of comfort.

![On / Off Single Stage Heating Appliance](image1)

![Continuous-Run Modulating Technology](image2)
1. Combustion fan purges heat chamber, PCB verifies fan rotation
2. Ignition spark begins
3. When sensing electrode detects spark, gas valve assembly opens
4. Ignition occurs and heat exchanger warms
5. Spark stops as flame rod & PCB verify flame
6. When heat exchanger is warm enough, convection room blower circulates warm air into the structure.
7. When filled, the humidifier tray ensures the air is not too dry (if needed)
8. Thermistor & PCB determine gas and fan settings
9. When temperature set point is reached, if needed, gas valves close & combustion fan stops. Convection fan continues to run to cool down unit.
10. When temperature drops, process starts over
**Control Panel Review (C-Series models)**

**Description Key**
The following pages will cover each topic in detail

1. Child Safety Lock
2. Economy Feature
3. Timer 1 and 2
   Note: While off, pressing Timer 1 and 2 together will change the display from Fahrenheit to Celsius
4. Override
   Temporarily bypasses timers
5. Temperature Control and Display-
   Display will enter a power saving dimmer mode during normal operation
6. Timer and Clock Setup
7. Setback Feature
8. Restricted Filter Indicator
   This lamp is on the front panel of the ES38
9. Operation Lamp
   Green = standby
   Solid red = when flame is present
   Flashing red = fault code is present
   This lamp is on the front panel of the ES38
10. On/Off Button

**EX08C, 11C, 17C, 22C MODELS**

**ES38 MODELS (Production after 7/2011)**
Control Panel Review (all other current models)

ES38 MODELS
Production before 7/2011

The below table shows the temperature range of all models

<table>
<thead>
<tr>
<th>Fahrenheit</th>
<th>L (approx. 55)</th>
<th>60</th>
<th>62</th>
<th>64</th>
<th>66</th>
<th>68</th>
<th>70</th>
<th>72</th>
<th>74</th>
<th>76</th>
<th>78</th>
<th>80</th>
<th>H (approx. 95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celsius</td>
<td>L (approx. 13)</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>H (approx. 35)</td>
</tr>
</tbody>
</table>

Temperature Control and Display
Room temp lamp stays on
Room temp displays only when adjusted

Function Lock -
Pressing both arrows will engage

Economy Feature
Economy Mode is designed to save gas usage over time.

- The Economy Function is based on the theory that the human body cannot detect small temperature changes over an extended period of time.
- 30 minutes after the set point temperature is achieved, the unit will reduce the temperature by 2°F. After 30 additional minutes, the unit will reduce the temperature an additional 2°F.
- The maximum temperature reduction will not exceed 4°F.
- This reduction will not occur if the unit is undersized and cannot maintain the initial set point.

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Economy Function

Initial Set point is 70°F

After 30 minutes of maintaining 70°F, the unit will maintain 68°F.

After 30 minutes of maintaining 68°F, the unit will maintain 66°F. No further reduction will occur.
C-Series ENERGYSAVERS® have two primary methods of operation:

- Exclusively as a thermostatically controlled furnace.
- When left to operate on a continuous-run basis using feedback from its thermostat, the ENERGYSAVER will achieve an optimum balance between comfort and efficiency.

- As a programmable furnace with two separate timers and a setback function

  - The timers allow two separate heating events to be set.
  - Timer 1 and Timer 2 (individually or both as needed) can then be engaged to allow the unit to turn on and off for those events.
  - The ENERGYSAVER is designed to attempt to have the area at the set point temperature when the timer event begins—meaning it could turn on several minutes earlier to achieve set point temperature.
  - To set the clock and timers, see the installation manual.
Clock, Timer, and Setback Functions (C-Series)

- If needed, the Override button can be selected to temporarily turn on or off the timers to allow manual operation.
- If the unit is operating during a Timer’s event, pressing Override will turn the unit off until the next Timer’s event.
- If the unit is off between Timer events, pressing Override will turn it on. It will continue to run until the end of the next Timer’s event and return to Timer operation.
- If Override is turned off, the unit will return to Timer operation.
Clock, Timer, and Setback Functions (C-Series)

Setback allows a minimum temperature to be pre-set and maintained between timer events or while the unit is turned off.

• This feature’s primary function is to slightly reduce the temperature (and gas usage) during extended periods of nonuse or inactivity—such as sleeping or when the home is empty.
  • NOTE: When this feature is used as a setback function for energy savings, it is not advisable to reduce setback more than 4-6°F from the regular set point. This could cause the ENERGYSAVER® to use more gas to return to the set point and cancel any savings achieved.

• This feature can also be used as frost protection during longer periods of vacancy (such as in a second home). For this use the setback temperature can be set as low as 38°F.
  • Even when off, if the setback feature is engaged, the setback temperature will be maintained.
  • If power is lost and setback is ON, it will be ON at the resumption of power.

The following example shows how, when used together, the timer and setback functions can maximize comfort and efficiency:

- **Daily schedule:**
  - Occupants wake at 5am
  - Home is empty from 9am until 4pm
  - Occupants are asleep from 11pm until 5am

- **Operation temperature is set to 70°F**
  - Timer 1 is set from 5am to 9am
  - Timer 2 is set from 4pm to 11pm
  - Setback is set to 66°F

Between timer events, the Setback temp of 66°F is maintained.

Timer 1 70°F temp is maintained.

Between timer events, the Setback temperature of 66°F is maintained.

Timer 2 70°F temp is maintained.

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Timer 1
70°F temp is maintained

Timer 2
70°F temp is maintained
All ES, EX, and C-Series models will attempt restart after a power failure or flame failure to ensure heating is not interrupted for extended periods of time.

• If there is a power failure while the appliance is operating, the unit will attempt to restart automatically when the power is restored.
• The timers will retain their settings after a power outage.
• After an outage, the clock will retain the time at that moment until power resumes. Therefore, a short power outage (a few minutes) will have virtually no effect on timer operations whereas a longer outage will require the clock to be reset. Dashes will initially display to indicate an outage occurred.
• Should a high gust of wind, gas outage, etc. occur that affects the flame characteristic, the unit will automatically shut down, purge the combustion chamber, and attempt to re-ignite.
• If the unit cannot ignite or maintain flame for 15 seconds after ignition, code 11 will flash and the unit will try to ignite again in one hour.
• This code will not be stored in the fault code history.
• If at some point after 15 seconds of established flame the flame fails, the unit will immediately attempt to relight with no code flashing.
• If the unit cannot relight after this flame failure, code 11 will flash and the unit will try to ignite again in one hour.
• If the unit continually or intermittently fails to ignite, a qualified service technician may be needed to determine the cause.
• Each manual has a section named “Restart Function” that explains this procedure.
• Flame failure fault codes (code 12’s) are no longer needed due to this enhancement.
Fault Codes

- A fault code will flash on the unit when a fault occurs. The unit will stop operating.
- Operation intervention is required for all codes EXCEPT a code 11.
- To view the last nine fault codes, with the unit OFF, press the UP, DOWN, and, ECONOMY buttons simultaneously

<table>
<thead>
<tr>
<th>CODE</th>
<th>PROBABLE CAUSE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Ignition or Flame failure</td>
<td>Flame current inadequate; Unit will attempt to relight (see Manual-Restart Feature)</td>
</tr>
<tr>
<td>14</td>
<td>Overheat Safety Device</td>
<td>Overheat safety bimetal(s) or thermal fuse has activated</td>
</tr>
<tr>
<td>16</td>
<td>Over temperature cut off</td>
<td>Room temperature is sensed as being above 104°F for longer than 10 minutes</td>
</tr>
<tr>
<td>31</td>
<td>Room temperature thermistor disconnection</td>
<td>Room temperature thermistor open circuit</td>
</tr>
<tr>
<td>32</td>
<td>Room temperature thermistor short circuit</td>
<td>Room temperature thermistor wire shorted or touching bare metal</td>
</tr>
<tr>
<td>33</td>
<td>High limit thermistor disconnection</td>
<td>High limit thermistor open circuit</td>
</tr>
<tr>
<td>34</td>
<td>High limit thermistor short circuit</td>
<td>High limit thermistor shorted or touching bare metal</td>
</tr>
<tr>
<td>49</td>
<td>Pressure sensor disconnect or breakdown</td>
<td>Check sensor connection to PCB &amp; hoses to blower motor</td>
</tr>
<tr>
<td>53</td>
<td>Abnormal spark sensed</td>
<td>Spark not sensed correctly</td>
</tr>
<tr>
<td>61</td>
<td>Abnormal combustion fan motor rpm</td>
<td>Fan speed not achieved within time or goes over speed</td>
</tr>
<tr>
<td>62</td>
<td>Convection fan failure</td>
<td>Ensure convection fan can turn freely</td>
</tr>
<tr>
<td>70</td>
<td>ON/OFF switch failure</td>
<td>ON/OFF switch connects continuously for more than 15 seconds</td>
</tr>
<tr>
<td>71</td>
<td>Solenoid valve check</td>
<td>Solenoid valve(s) (SV1 &amp; SV2) signal and response signal are different</td>
</tr>
<tr>
<td>72</td>
<td>Flame rod failure</td>
<td>PCB fails to sense microamps within 20 seconds</td>
</tr>
<tr>
<td>73</td>
<td>Communication failure</td>
<td>Data transfer within PCB fails</td>
</tr>
<tr>
<td>99</td>
<td>Flue block or venting disconnect</td>
<td>Check intake and exhaust inside and outside for blockage or freezing</td>
</tr>
</tbody>
</table>
Warranty and Maintenance

• Warranty

<table>
<thead>
<tr>
<th>Rinnai ENERGYSAVER® Furnace Warranty</th>
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</thead>
<tbody>
<tr>
<td>Heat Exchanger Coverage</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>10 years</td>
</tr>
</tbody>
</table>

Refer to each model’s installation and owner manual for full warranty details

• Maintenance and Service
  • The appliance should be inspected at least annually by a qualified service technician—see the installation manual for full details.
  • The exterior can be cleaned with a damp, warm cloth.
  • Ensure the vent termination is kept free of snow, ice, or any other obstructions.
  • Ensure the filter(s) are kept clean to ensure proper operation.
  • If the filter(s) become blocked, the filter indicator light will illuminate and the unit will beep every five minutes. If ignored, the unit will eventually cease operation and display a fault code 14.
  • Ensure the unit is OFF while the filter is removed—this will also allow the filter lamp and beep to reset.
Rinnai America’s phone support structure consists of the following departments:

- **CRC – Consumer Response Center** – Fielding general calls, consumer questions, etc.
  - Available in office from 8 a.m. to 8 p.m. EST, Monday - Friday

- **Parts and Warranty Department** – Fielding parts orders and warranty issues
  - Available in office from 8 a.m. to 5 p.m. EST, Monday – Friday

- **Technical Support Department** – Fielding technical issues related to the function of all Rinnai Products
  - Available in office from 8 a.m. to 8 p.m. EST, Monday – Friday AND 24/7/365 on call support for technicians who are at the service location.

- **Engineering / Applications Department** – Fielding issues related to product applications including sizing
  - Available in office from 8 a.m. to 5 p.m. EST (The engineering dept. does not perform heat loss calculations —an industry accepted Btu heat loss calculation must be performed by the installer)

### Rinnai America also provides the following web sites for support:

- [www.rinnai.us](http://www.rinnai.us) – The Partner Portal on our main site contains product, sales, and service information. Of Note—a comprehensive documents library and on-line parts ordering system is available. Website registration is required for access.
• All units are approved up to 10,200 feet.

• The Installation manual and the conversion manual supplied with each unit has instructions for high altitude settings.

• High altitude applications do not require additional or replacement parts—only a simple manifold gas pressure adjustment.

• Only a dual port manometer will be required to complete the altitude adjustment.

• All EnergySaver® furnaces can be field converted from NG to LP or LP to NG.

• Depending on model and year of manufacture, a conversion kit may be included with the product. If not, contact Rinnai for information on acquiring the proper kit (1-800-621-9419).
Maximum Temperature Limit

- All ENERGYSAVER® models now have the ability to set a maximum temperature limit directly from the control panel. This procedure is NOT in the manuals to allow property owners and managers to control this setting as needed.

- This is beneficial to landlords and property management to conserve energy and reduce unnecessary gas consumption.

- To perform this adjustment, do the following:

| Procedure for Setting Maximum Temperature Limit for ENERGYSAVER Furnaces |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| ES08, ES11 | EX08C, EX11C | ES17, ES22 | EX17C, EX22C | EX17, EX22 (WTA Models) | ES38 |
| 1. While the unit is off, press the “Function Lock” or “Child Lock” and “Up” arrow buttons at the same time for about 3 seconds until the unit beeps | 1. While the unit is off, press the “Economy” and “Select” buttons at the same time for about 3 seconds until the unit beeps | 1. While the unit is off, press the “Economy” and “Up” buttons at the same time for about 3 seconds until the unit beeps |
| 2. Select the maximum temperature with the up and down arrows |
| 3. Press the On/Off button to save the new setting |
This overview is not meant as a substitute for the installation and owner’s manual. Every furnace is shipped with a manual that should be followed completely. The following is a supplemental presentation and is intended as a tool for the first time installer.

QUALIFIED INSTALLING AGENCY
The installation must conform to local codes, in the absence of local codes, the installation must conform with American National Standard (National Fuel Gas Code) known as NFPA 54 and ANSI Z223.1

- A qualified service technician should install the appliance and inspect it before use.
- Follow all applicable national and local codes. For additional information, see the installation / owner’s manual and the product’s rating plate.

SAFETY DEFINITIONS

⚠️ DANGER
This is the safety alert symbol. This symbol alerts you to potential hazards that can kill or hurt you and others.

⚠️ CAUTION
Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

⚠️ WARNING
Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

⚠️ DANGER
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
Installation Guidelines

The following guidelines are from the installation / owner’s manual. Before beginning the installation process, please review the following:

• A manufactured home (USA only) or mobile home OEM installation must conform with the Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280, or, when such a standard is not applicable, the standard for Manufactured Home Installations, ANSI/NCSBCS A225.1, or the standard for Gas Equipped Recreational Vehicles and Mobile Housing. CSA Z240.4

• Appliance input ratings are based on sea level operation and need not be changed for operation up to 2000 ft (607 m) elevation. For operation at elevations above 2000 ft (609.9), manufactured to specified deration conditions for Canada and the United States. Refer to the high altitude adjustment procedure(s).

• If the flooring is carpet, tile, or other combustible material other than wood, then the appliance must be installed on a metal or wood panel extending the full width and depth of the appliance.
Installation Guidelines

The following guidelines are from the installation / owner’s manual. Before beginning the installation process, please review the following:

• This appliance discharges a large volume of warm air next to the floor. Any particles in the air such as cigarette smoke could cause discoloration in carpet. The warm air flow could discolor nylon carpets containing dyes or vinyl surfaces. To prevent discoloration of the floor covering a mat may be placed under the appliance which extends about 30 inches (750 mm) in front of it.

• This appliance is not designed to be built in.

• This appliance is only for use with the type of gas indicated on the rating plate. This appliance is not convertible for use with other gases unless a certified kit is used. If a conversion of the unit is needed, conversions must be performed by a qualified service provider at the owner’s expense.

• This appliance must not be connected to a chimney flue serving a separate solid-fuel burning appliance.

• A shut off valve (and appliance connector valve) should be installed in the upstream of the gas line to permit servicing. This valve is included.
Recommended Tools Needed for Installation

- Cordless / Electric drill
- 3 inch hole saw
- 5/8 inch X 18 inch pilot drill bit
- 1/8 inch drill bit (not shown)
- No. 2 Phillips bit
- No. 2 Phillips screwdriver
- 2 adjustable wrenches
- Pipe wrench
- Channel locks
- Needle nose pliers
- Side cutters
- Leak detector
- Pipe dope or LP Gas approved Teflon Tape
- Tape measure
- Jig saw

Always wear personal safety equipment when using power tools

Eye protection is recommended
View of Properly Installed Unit
Furnace Packaging and All Hardware

Ensure correct gas type is on package!

*Included with furnace:

- Installation and owner’s manual
- Wall termination that will fit wall thickness of 4.5”-9.5”
- Wall mounting back spacers
- Mounting screws
- Vent locking clamps
- Wall mounting template included
- ½” Jo-Mar shut-off gas valve
- Packing board to place under unit if installed on carpet (unit must be installed on an approved surface)

* Extension venting, vent covering, and nonstandard wall terminations are available separately

NOTE: Do not discard or cut into box—the wall template for termination is now on the back side of the cardboard.

All hardware needed for *standard installation is included in package with furnace.
Furnace Packaging and Hardware

Inspect packaging to ensure all parts and installation materials are removed before discarding.

Top of box contains screw hardware, back-spacers, vent termination, etc.

Documentation packet contains: installation manual and Warranty registration

Installer: Leave all documentation with unit
Consumer: Retain all documentation for future use

⚠️ WARNING ⚠️
DO NOT USE SUBSTITUTE MATERIALS
USE ONLY PARTS CERTIFIED WITH THE APPLIANCE
Furnace Packaging and all Hardware

HARDWARE PACKET

- Back spacer mounting brackets
- Exhaust pipe stoppers and clamps
- Longer tie wrap for securing intake hose to back frame
- Machine screws for attaching exhaust pipe to termination sleeve
- Screws for attaching exhaust sleeve (3) and top back spacer (2) to wall
- Sheet metal screws for attaching back spacers to furnace
- Sheet metal screws for attaching air intake clamps (not used on all models)
- Shorter tie wrap for securing air intake hose to termination

CAUTION Use the pipe stoppers, connectors, clamps, and screws according to the installation instructions in order to ensure no leakage of exhaust gases.
1. The packing board used for shipping can also be used to place under the unit if needed when installing on carpet.

2. Place furnace on board
   - Remove toe plate from furnace
   - Mark board to fit under furnace with no visible excess.

3. Cut board to fit full width of unit.

• When the furnace is installed directly on carpeting or other combustible material (excluding wood flooring), it must be installed on a metal or wood panel extending the full width and depth of the heater.
• The furnace may be installed on combustible wood flooring.

CAUTION
Practice good safety habits when using power equipment.
Identifying the Installation Location

FURNACE LOCATION

Furnace must be installed where the proper clearances from combustibles can be maintained.

Also ensure installation location is not in an area of excessive cold or warm air conduction.

NOTE: Don’t forget about service clearances!
Identifying the Installation Location

VENT LOCATION

Consider the following requirements when locating the outside vent termination:

• 12” clearance from grade or anticipated snow level (ANSI Z223.1)
• 9” clearance from a door or window that may be opened (ANSI Z223.1)
• 3 feet clearance above a forced air inlet located within 10 feet (ANSI Z223.1)
• Any other local, state or national code requirements
• Avoid vent locations over public walkways or near dryer vents
• Ensure any wall drilling will not compromise support studs, existing electrical, plumbing, or HVAC systems, etc.

24” from any flammable obstruction
10” from any non-flammable obstruction
20” from any obstruction
20” from any obstruction
12” from grade or snow level
24” from an opposing wall
Interior Wall Preparation

**TEMPLATE PLACEMENT**

Included with each furnace is a wall template to simplify mounting and vent hole location—2010 and newer models have the template printed on the cardboard packaging.

1. Cut the template out of the box.
2. Ensure bottom of template is cut correctly.
3. Temporarily tape the template to the wall at floor level.
4. Ensure template does not slip.

Ensure the cardboard is cut at the bottom of template.
SCORING THE WALL

1. Ensure vent hole will NOT compromise any structure support (stud), electrical, plumbing, HVAC system, etc.

2. Score the template anywhere in the shaded arc for the pilot bit.

3. Also score the two screw holes for the mounting wall bracket with a ⅛” bit.

4. Drill the vent hole with a pilot bit long enough to extend through the entire wall and no larger than the center bit of the hole saw being used.
INSTALLING THE MOUNTING BRACKET

Using the two previous scored screw holes, mount the rear mounting bracket to the wall.
Interior Wall Preparation

DRILLING THE VENT HOLE

1. Interior:
   Using a 3” inch hole saw, drill the vent hole guided by the previously drilled pilot hole.

   NOTE: Drill holes level or sloped downward 2° to the outside. Vent termination must have outward pitch to ensure condensation drains to the outside.

2. Exterior:
   Continue drilling hole guided by the previously drilled pilot hole.
1. Prepare the drip leg for furnace connection. **NOTE:** Do not attach the right side back spacer yet to allow enough space for tightening these fittings.

2. Attach the drip leg to the furnace. Use two wrenches to prevent damage to the furnace.

3. If using appliance flex gas line (recommended), attach flair adaptor to the drip leg. **NOTE:** The connection of the flexible gas line will be covered in a following procedure.

**IMPORTANT:** Ensure all code and gas line sizing requirements are followed! All connections should be properly tightened and sealed with pipe dope or Teflon tape.
INSTALLING THE LEFT AND RIGHT BACK SPACERS

The left and right back spacers are installed with a tab and slot at the top and middle and single screws at the bottom of the panels.

ROOM AIR THERMISTOR

NOTE: The room air thermistor comes with approximately 14” of wire. It can be moved higher if needed if there is an excessive amount of cold air conduction present. This should be a last resort—ideally, the cold air conduction should be eliminated.

Ensure two locking tabs align correctly

Secure one screw at the bottom of each side back spacer

Room air thermistor (yellow wires)- can be raised several inches if needed
INSTALLING THE AIR INTAKE HOSE CLIP

Mount the hose clip at the bottom of the furnace as shown below.

Models prior to 2010 use a clip in this location—see manual for details.

Use the longer tie-wrap included with hardware.
VENT TERMINAL PREPARATION

• The flue manifold (vent) must exhaust to the outside. Do not exhaust into other rooms.

• The flue is not designed to be positioned under floors or below the furnace.

• Clearance to combustibles for the vent sleeve and flanges is zero inches.

• This appliance can only be used with one of the five types of Rinnai vent kits. These kits and their dimensions are listed below and in each owner’s/installation manual.

<table>
<thead>
<tr>
<th>NAME</th>
<th>KIT NUMBER</th>
<th>KIT WALL DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>S Vent Kit</td>
<td>FOT-150</td>
<td>3”-4 ½” (75 – 115 mm)</td>
</tr>
<tr>
<td>*A Vent Kit</td>
<td>FOT-151</td>
<td>4 ½”-9 ½” (115 – 240 mm)</td>
</tr>
<tr>
<td>B Vent Kit</td>
<td>FOT-152</td>
<td>9 ½”-15 ¾” (240 – 400 mm)</td>
</tr>
<tr>
<td>C Vent Kit</td>
<td>FOT-153</td>
<td>15 ¾”-23 5/8” (400 – 600 mm)</td>
</tr>
<tr>
<td>D Vent Kit</td>
<td>FOT-154</td>
<td>23 5/8”-31 ½” (600 – 800 mm)</td>
</tr>
</tbody>
</table>

*Vent Kit A (FOT-151) is included with each furnace.
Vent Termination

FLUE MANIFOLD DISASSEMBLY

- The flue manifold consists of 3 parts:
  - Inside connection
  - Sleeve
  - Outside terminal

1. Disassemble the flue manifold by first pulling out the inside connection.

NOTE: Make sure the black gasket is always on the interconnector piece as shown.

2. To remove the outer terminal pull and release the two internal stainless steel ties and then pull out the outer terminal.
1. Measure the wall thickness through the previously drilled hole. The end of the sleeve should protrude 3/16” – 3/8” (5-10mm) from the outside wall. The sleeve is threaded for adjustment. Adjust the sleeve length to wall thickness PLUS 3/16” – 3/8” (5-10mm).

**NOTE:** Do not extend beyond the red line on the sleeve.

2. If a shorter length is necessary an extension can be removed. Cut the plastic at the pre-existing mark and remove the extension.

**NOTE:** Vent Kit “S” does not have the removable extension.

---

**CAUTION**

Practice good safety habits when using sharp tools!

**IMPORTANT:**

Only cut the plastic green film with a knife. The vent itself is NOT designed to be cut!
Vent Termination

ATTACHING THE SLEEVE

1. Slide the sleeve through the interior side of hole. Ensure label “Top” is installed at the top of hole.

2. Ensure the sleeve extends 3/16” to 3/8” (5-10 mm)

   NOTE: The flange is offset 2° to allow condensate to drain outside

3. Attach the sleeve to the inside wall using 3 screws. If needed, use sheet rock anchors to secure to wall.

   CAUTION: Practice good safety habits when using power equipment tools!
VENT Termination

INSTALLING THE OUTER VENT TERMINAL

1. From the outside, insert the terminal into the sleeve with the marking “TOP” at the top. The left hand side locking tie should be marked “LEFT.”

2. For weather board walls (lap siding), add the second seal next to the terminal seal to compensate for siding angle.

3. On the inside, pull hard on the left and right hand ties. Clip the ties over the notches inside the sleeve. The ties should pull 2 or 3 notches past the starting point.

4. Cut the ties, leaving about ¾” (20mm) past the notch. Bend the excess back and parallel to the wall.

Practice good safety habits when using power equipment and sharp tools!
1. Push the assembly into the terminal tube with the label “top” matching the location on the sleeve. Ensure that the seal is in place on the inner tube.

2. Attach the inside connection with 3 screws.

NOTE: The inner connection can still be turned to install the screws.
OUTSIDE VIEW OF CORRECTLY INSTALLED TERMINATION
ATTACHING THE GAS CONNECTION (Part 2)

Tip: Using a flexible appliance gas line will enable the furnace to be slid into place with minimal effort.

1. Ensure all connections are properly tightened and sealed with pipe dope or Teflon tape.
2. Attach the included shut off valve and field supplied flexible gas line to the wall supply and furnace. Leak test all connections.
3. NOTE: Many models will allow the gas valve to be positioned behind the back spacer but still accessible by the consumer.

IMPORTANT: Ensure all code and gas line sizing requirements are followed. Shut off valve should be located in a manner that allows the unit to be removed for field service.

NOTE: If flexible gas line is not used, first complete the next step (sliding the furnace into place), then attach gas line accordingly.
1. If necessary, the unit can be leveled using the adjustable legs under the front right and left hand sides.

2. Slide the furnace into place. Ensure furnace is level and aligned to vent termination, back spacer mounting bracket, and gas line (if necessary).
Connecting the Vent Flue

1. Slide the stainless steel exhaust tube until it is fully inserted into the exhaust manifold terminal.

**NOTE:** NEVER bend the exhaust pipe that exits the furnace!

2. When sliding the tube, ensure it does not extend beyond the red line.

3. Connect the flue outlet to the manifold.

CONNECTING THE VENT FLUE
The following components can be connected by reaching behind the appliance as it is positioned against the wall.
4. Fit the locking clamp over the connection between the sliding tube and manifold. Engage the hook and rotate it until it snaps against the body of the clamp.

5. Slide the insulation sleeve up to the flue manifold. Slip the securing clips over the sleeve as shown.
Connecting the Air Intake

CONNECTING THE AIR INTAKE
The following components can be connected by reaching behind the appliance as it is positioned against the wall:

1. Connect the air intake hose to the side of the termination.
   
   **NOTE:** NEVER cut the gray air intake hose. It is sized to length for a standard termination.

2. Using the zip tie provided, fasten the air intake to the termination.
Installing the Top Back Spacer

The following components can be connected by reaching behind the appliance as it is positioned against the wall.

1. Install the spacer bracket on the rear of the top spacer with 2 decorative sheet metal screws.

2. Place top back spacer on the back of furnace, clipping the spacer bracket into the wall bracket.
3. Insert screws for top spacer on right and left side of back spacers.

4. Tighten two sheet metals screws on top back spacer.
Prepare for Operation

1. If needed remove the toe kick plate to fill the humidifier tray.
2. Fill the humidifier tray according to the installation manual. Replace toe kick plate.

1. To direct air flow, if needed, the front louver can be adjusted after removing louver plate (5 screws).
2. Install the filter.
3. Open all gas valves.
4. Turn unit on and set temperature.
5. Educate consumer on use and care.
Shipped with each ES38 is a vent adaptor that reduces the 50 mm diameter exhaust to 30 mm for connection to vent termination. **NOTE: If using extension sets, this reducer must be connected to the VENT TERMINATION ONLY! Do not use the smaller extension sets with this reducer installed at the furnace. The ES38 will not operate correctly.**

Included with the ES38 is male to female “street” elbow to attach to the unit before a union or flex line. This allows the installer to select the direction in which the gas line will be connected.
Extended Venting And High Altitude Installation Procedures
Vent Extension Installation Requirements

The following is an overview of guidelines and installation of Rinnai Direct Vent Furnace vent extensions. This is not a substitute for any current installation / owner’s manual or vent instructions.

• The 08 series cannot use vent extensions.
• See each model’s owner’s / installation manual for permissible vent lengths.
• The vent termination must ALWAYS be horizontal.
• Vent extensions installed in ANY unconditioned air space MUST be insulated with high temperature insulation and must be accessible.
• All pipe stoppers, connectors, screws and hangars must be used in accordance to their instructions. The seals must be air tight for both the intake and exhaust air supply hoses.
• The intake air hose must equal the exhaust hose length to maintain a balanced flue system.
• The humidifier trays are made of enamel covered steel to resist rust and corrosion from the condensate draining back to the unit.
• The 38 series tray cannot be removed from the unit.
• The 08, 11, 17, and 22 series trays can be removed for cleaning but must be replaced before operation of the unit.
• Overflow of the humidifier tray is an indication that the venting extension was possibly installed incorrectly. No warranty claim will be approved covering overflow.
### Specific Venting Changes

- The table below illustrates each model’s permissible vent length and kit part numbers

<table>
<thead>
<tr>
<th>MODEL</th>
<th>ES08/EX08C</th>
<th>ES11/EX11C</th>
<th>ES17/EX17(C)</th>
<th>ES38</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total extended vent limit</td>
<td>0</td>
<td>13 feet</td>
<td>13 feet</td>
<td>13 feet</td>
</tr>
<tr>
<td>Total vertical limit</td>
<td>0</td>
<td>8 feet (unless greater than 2000’ altitude then only 5’ for the ES11)</td>
<td>10 feet</td>
<td>13 feet</td>
</tr>
<tr>
<td><strong>Extended Vent Guidelines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12” to 20” (0.3-0.5m) extension from exhaust to termination</td>
<td>Use kit FOT-155</td>
<td>Use kit FOT-219</td>
<td>Use kit FOT-102</td>
<td></td>
</tr>
<tr>
<td>21” to 40” (0.5-1m) extension from exhaust to termination</td>
<td>Use kit FOT-156</td>
<td>Use kit FOT-220</td>
<td>Use kit FOT-103</td>
<td></td>
</tr>
<tr>
<td>61” to 80” (1-2m) extension from exhaust to termination</td>
<td>Use kit FOT-157</td>
<td>Use kit FOT-221</td>
<td>Use kit FOT-114</td>
<td></td>
</tr>
<tr>
<td>Standard bent elbow (can be straightened for extensions less than 12”)</td>
<td>Use kit FOT-158 (only 1)</td>
<td>Use kit FOT-158</td>
<td>Use kit FOT-115</td>
<td></td>
</tr>
<tr>
<td>Long bent elbow (can be straightened for extensions less than 24”)</td>
<td>Not available for the ES08</td>
<td>Use kit FOT-190 or FOT-201</td>
<td>Use kit FOT-190 or FOT-201</td>
<td>Not available for the ES38</td>
</tr>
</tbody>
</table>

- Each extension kit comes with piping, mounting hardware and pipe connection accessories.
- See the installation / owner’s manual for a complete listing for the kit contents and detailed installation instructions.
- No more than two (2) elbows may be used on any furnace.
# PCB Adjustments for extended venting or high altitude

**MODELS: EX08C, EX17C, EX22C, ES38**

These models do not require an adjustment for vent length—only for high altitude

With the unit turned off but power still applied, remove front cover and press the test button on the PCB. Use the temperature arrows on the control panel to set as follows:

<table>
<thead>
<tr>
<th>NG</th>
<th>Description</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For installations from 0-2000’ above sea level</td>
<td>Set code to A1* or A5</td>
</tr>
<tr>
<td></td>
<td>For installations from 2001-5200’ above sea level</td>
<td>Set code to A2 or A6</td>
</tr>
<tr>
<td></td>
<td>For installations from 5201-7700’ above sea level</td>
<td>Set code to A3 or A7</td>
</tr>
<tr>
<td></td>
<td>For installations from 7701-10,200’ above sea level</td>
<td>Set code to A4 or A8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LP</th>
<th>Description</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For installations from 0-2000’ above sea level</td>
<td>Set code to L1* or L5</td>
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<tr>
<td></td>
<td>For installations from 2001-5200’ above sea level</td>
<td>Set code to L2 or L6</td>
</tr>
<tr>
<td></td>
<td>For installations from 5201-7700’ above sea level</td>
<td>Set code to L3 or L7</td>
</tr>
<tr>
<td></td>
<td>For installations from 7701-10,200’ above sea level</td>
<td>Set code to L4 or L8</td>
</tr>
</tbody>
</table>

*default setting
PCB Adjustments for extended venting or high altitude

**MODEL: EX11C**

With the unit turned off but power still applied, remove front cover and press the test button on the PCB. Use the temperature arrows on the control panel to set as follows: (See the previous slide for an illustration)

<table>
<thead>
<tr>
<th>NG</th>
<th>For installations from 0-2000’ above sea level</th>
<th>with a vent length of 0 to 7 ft</th>
<th>Set code to A1*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>with a vent length of 7 to 13 ft</td>
<td></td>
<td>Set code to A5</td>
</tr>
<tr>
<td></td>
<td>For installations from 2001-5200’ above sea level</td>
<td>with a vent length of 0 to 7 ft</td>
<td>Set code to A2</td>
</tr>
<tr>
<td></td>
<td>with a vent length of 7 to 13 ft</td>
<td></td>
<td>Set code to A6</td>
</tr>
<tr>
<td></td>
<td>For installations from 5201-7700’ above sea level</td>
<td>with a vent length of 0 to 7 ft</td>
<td>Set code to A3</td>
</tr>
<tr>
<td></td>
<td>with a vent length of 7 to 13 ft</td>
<td></td>
<td>Set code to A7</td>
</tr>
<tr>
<td></td>
<td>For installations from 7701-10,200’ above sea level</td>
<td>with a vent length of 0 to 7 ft</td>
<td>Set code to A4</td>
</tr>
<tr>
<td></td>
<td>with a vent length of 7 to 13 ft</td>
<td></td>
<td>Set code to A8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LP</th>
<th>For installations from 0-2000’ above sea level</th>
<th>with a vent length of 0 to 13 ft</th>
<th>Set code to L1* or L5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For installations from 2001-5200’ above sea level</td>
<td>with a vent length of 0 to 13 ft</td>
<td>Set code to L2 or L6</td>
</tr>
<tr>
<td></td>
<td>For installations from 5201-7700’ above sea level</td>
<td>with a vent length of 0 to 13 ft</td>
<td>Set code to L3 or L7</td>
</tr>
<tr>
<td></td>
<td>For installations from 7701-10,200’ above sea level</td>
<td>with a vent length of 0 to 13 ft</td>
<td>Set code to L4 or L8</td>
</tr>
</tbody>
</table>

*default setting*
Selecting the Correct Vent Extension Kit

EXAMPLES OF EXTENSION SETS
- The following examples are for ES11 /EX11C Models.
- Other models will vary.
- Instructions and all hardware are included.

FOT-155 EXTENSION SET: 12-20 INCHES

FOT-157 EXTENSION SET: 61-80 INCHES
Use the pipe stoppers, connectors, clamps, and screws according to each extension set and model's installation instructions to ensure no leakage of exhaust gases!
Use the pipe stoppers, connectors, clamps, and screws according to each extension set and model’s installation instructions to ensure no leakage of exhaust gases!
Alternate Vent Termination Options

ALTERNATIVE TERMINATION CONNECTION

Flexibility for venting terminations is engineered into every Rinnai unit. Note below where the exhaust alignment position can be changed by moving the stainless steel plug for two additional positions depending on the application. Likewise note the two positions for intake air flexibility.

1. Remove the plug from the back of the termination
2. Reposition the plug to the bottom of the termination where labeled “exhaust”
3. Extension venting or elbows can now be connected to the back of the termination

NOTE: The elbow that is integrated into the termination DOES NOT count as one of the two elbows allowable
PREPARING FOR EXTENSION INSTALLATION

1. If the top back spacer is already secured to the furnace, temporarily remove it to allow fastening of the extension components to the furnace air intake and exhaust.

2. Located on the top back spacer are two sets of two punch outs (one on the left and one on the right). Remove the two that the extension will travel thru. Discard the excess sheet metal.

3. Measure from the end of the furnace exhaust to the point of termination or extension elbow. **NOTE: Refer to each model’s manual to ensure the vertical rise limit is not surpassed!**
VENT EXTENSION INSTALLATION GUIDELINES

1. The exhaust is connected between the bent pipe at the rear of the furnace and the exhaust port on the flue manifold.

2. Connect exhaust pipes with other straight pipes or bends (including the furnace exhaust) by fitting the male end into the female end.

3. If needed, extend the telescopic portion of the extension to the desired length. Do not extend beyond the red line.

   NOTE: Never cut the exhaust extension

4. Use pipe stopper A to clamp the connection of two pipes.

5. Use pipe stopper B to secure the length of the telescopic pipe.
CONNECTING THE AIR INTAKE EXTENSION

1. The air intake extension is connected between the air connection at the rear of the heater and the air intake port on the flue manifold.

2. Cut the air intake extension to the desired length. The lengths of the air intake hose and the exhaust pipe must be the same in order for the appliance to operate properly. Deburr all rough edges.

3. Remove the air intake elbow from the furnace intake hose (reverse threaded). Move this elbow to the end of the air intake extension.

4. Connect the air intake hoses by screwing (reverse thread) the hose joint half of its length into the air intake hose and the screwing another air intake hose into the hose joint.

NOTE: Never cut the hose attached to the appliance!

CAUTION
Practice good safety habits when using sharp tools!
1. Both the exhaust and air intake extensions are supported by clamps which are attached to the wall. Wall fixtures are provided to attach the clamps to the wall. A one inch clearance from combustibles should always be maintained from the exhaust. The clamps provided with the extension kit ensure this clearance is maintained from the wall and the air intake.

2. If an extension is installed horizontally, the air intake hose should be underneath the exhaust. In the event the air intake sags, it will not contact the exhaust.
Decorative Covers For Vent Extension Kits
Vent Extension Decorative Cover

EXAMPLES OF VENT COVERS

- Basic Installation
- Vent Cover with Elbow
- Vent Cover and Termination Cover
EXAMPLES OF VENT COVERS

- Basement Installation rough in stage
- Basement Installation finishing stage
- Basement Installation painted vent cover

Painted without priming
The simple design provides an easy and attractive way to cover vent extensions.
- The mounting bracket is installed to the wall behind the extension venting.
- The cover is mounted to the bracket from the sides.
- The cover is paintable aluminum and can be custom cut.
- All covers are sold as kits.
## Vent Extension Decorative Covers – New ES Series

<table>
<thead>
<tr>
<th>MODEL</th>
<th>ES38</th>
<th>ES11, EX11C, ES/EX17(C), ES/EX22(C)</th>
<th>DIAGRAM WITH DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE OF VENT COVER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flue Manifold Cover</td>
<td>Use kit FOT-132 Manifold Kit A</td>
<td>Use kit FOT-140 Manifold Kit B</td>
<td>![Diagram of Flue Manifold Cover]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vent Cover</td>
<td>Use kit FOT-133 Straight Cover Kit A</td>
<td>Use kit FOT-141 Straight Cover Kit B</td>
<td>![Diagram of Vent Cover]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vent Cover Elbow</td>
<td>Use kit FOT-134 Elbow Cover Kit A</td>
<td>Use kit FOT-142 Elbow Cover Kit B</td>
<td>![Diagram of Vent Cover Elbow]</td>
</tr>
</tbody>
</table>

**NOTES:**
- ES08/EX08 models cannot use extended venting
- Each kit comes with all required mounting hardware
This completes the direct vent installation course. Please contact technical support with any questions or issues.

1-888-746-6247