

High Altitude Conversion Kit

Supersedes: 145.25-IOM3 (708)

Form 145.25-IOM3 (908)

HIGH ALTITUDE CONVERSION KIT INSTALLATION MANUAL

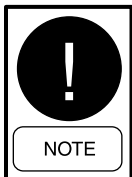
HAKIT -20, -40, -60, -80 KIT

Kits are available for field converting from low altitude (0-2000 ft.) to high altitude burner orifices (2000- 4500 ft.). The conversion kits must be installed by a qualified service agency.

"WARNING"



"THE CONVERSION SHALL BE CARRIED OUT BY A MANUFACTURER'S AUTHORIZED REPRESENTATIVE, IN ACCORDANCE WITH THE REQUIREMENTS OF THE MANUFACTURER, PROVINCIAL OR TERRITORIAL AUTHORITIES HAVING JURISDICTION AND IN ACCORDANCE WITH THE REQUIREMENTS OF THE CAN/CGA-B149.1 or CAN/CGA-B149.2 INSTALLATION CODES"



All models listed below may be field or factory converted for use at high altitudes:

**SGAD201212
SGAD401212
SGAD603012
SGAD803012**

**R or SGAD40(18 or 24)12
R or SGAD60(18 or 24)12**

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, oils, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in

which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:



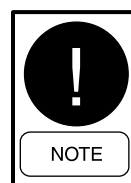
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.



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



NOTE is used to highlight additional information which may be helpful to you.



All wiring must be in accordance with published specifications and must be performed ONLY by qualified service personnel. Johnson Controls will not be responsible for damages/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this will void the manufacturer's warranty and cause serious damage to property or injury to persons.

CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson Controls policy for continuous product improvement, the information contained in this document is subject to change without notice. While Johnson Controls makes no commitment to update or provide current information automatically to the manual owner, that information, if applicable, can be obtained by contacting the nearest Johnson Controls service office.

It is the responsibility of operating/service personnel as to the applicability of these documents to the equipment in question. If there is any question in the mind of operating/service personnel as to the applicability of these documents, then, prior to working on the equipment, they should verify with the owner whether the equipment has been modified and if current literature is available.



Work on this equipment should only be done by properly trained personnel who are qualified to work on this type of equipment. Failure to comply with this requirement could expose the worker, the equipment and the building and its inhabitants to the risk of injury or property damage.

The instructions are written assuming the individual who will perform this work is a fully trained HVAC & R journeyman or equivalent, certified in refrigerant handling and recovery techniques, and knowledgeable with regard to electrical lock out/tag out procedures. The individual performing this work should be aware of and comply with all national, state and local safety and environmental regulations while carrying out this work. Before attempting to work on any equipment, the individual should be thoroughly familiar with the equipment by reading and understanding the associated service literature applicable to the equipment. If you do not have this literature, you may obtain it by contacting a Johnson Controls Service Office.

Should there be any question concerning any aspect of the tasks outlined in this instruction, please consult a Johnson Controls Service Office prior to attempting the work. Please be aware that this information may be time sensitive and that Johnson Controls reserves the right to revise this information at any time. Be certain you are working with the latest information.

The High Altitude Conversion Kit consists of the following parts and instructions:

- **Main Burner Orifices** – (Johnson Controls/AJAX Part #: OBN-205H) Size = Ø2.05 mm
The number of orifices required is 1 for each 20,000 Btu/hr of input capacity.
- **Label** – “Conversion Data Plate”- (Johnson Controls/AJAX Part #: STK-PK-10)
- **High Altitude Conversion Kit Installation Instructions** – (Johnson Controls/AJAX Part #: IIN-004HA)
These instructions included in the kit.



Attach Conversion Data Plate adjacent to the Unit Name Plate

IMPORTANT:

Each kit contains exact number of needed orifices.
Do not replace burner plug with High Altitude Orifice

1. ORIFICE SIZE

See FIG. 1 for initial gas orifice sizes as shipped from factory. Check with your local gas supplier to determine heat value (BTU/CU.FT) of gas in your area. Depending on your local heat value and elevation, you may need to adjust manifold pressure or change orifices to get proper gas input rate. See Section 3.

Initial Orifice Size		
Input* Btu/hr	Natural Gas Orifice Size*	Propane Orifice Size*
All Size Units	2.15mm	1.30mm
2,000-4,500' Above Sea level	2.05mm	1.20mm
* See Furnace rating plate located on blower door.		

FIG. 1 - Orifice Sizes

2. DERATING FOR HIGH ALTITUDES

A. Installer responsibility

For operation at elevations above 2,000 feet the density of air is reduced, therefore, the furnace should be derated at the rate of four percent (4%) for each 1,000 feet above 2,000 feet of elevation. It is the installers responsibility to see that the input is adjusted properly. In Canada, derate 10% for elevations for 2,000 to 4,500 feet.

If the gas supplier has not already derated the gas BTU value, derating must be achieved by reducing the size of the main burner orifices. Contact gas supplier for more information on proper sizing. Adjustment of the manifold pressure to a lower pressure reading than what is specified in Section 3 of this manual (Manifold Pressure Adjustment) is considered to be an improper derate procedure. With a lower density of air and a lower manifold pressure at the burner orifice, the orifice will not aspirate the proper amount of primary air into the burner. Insufficient primary air can cause incomplete combustion, yellow tipping and quite possibly carbon build-up.

B. New orifice size. (2,000 to 4,500 feet)

To accomplish altitude derate, a natural gas orifice kit containing the natural gas orifices is available through your supplier. A similar propane (LP) gas orifice kit is available. Individual orifices are also available in a convenient lot size. Use only these orifices to assure proper performance. The natural gas orifice changes to 2.05 mm, while the propane (LP) orifice changes to 1.30 mm.

C. Changing Orifices.



Before changing orifices, turn off electrical power and gas. Failure to do so could result in electrical shock or gas leak, resulting in damage, injury of death.

1. Set room thermostat to its lowest or off setting.
2. Turn off electricity at electrical disconnect switch next to furnace.
3. Turn off manual shut-off valve in gas supply line just ahead of furnace.
4. Move gas control slide switch to OFF position.
5. Starting with burner farthest from gas control, remove burner screws and burners. Burners overlap. Burner farthest from gas control is on top. See FIG. 2.

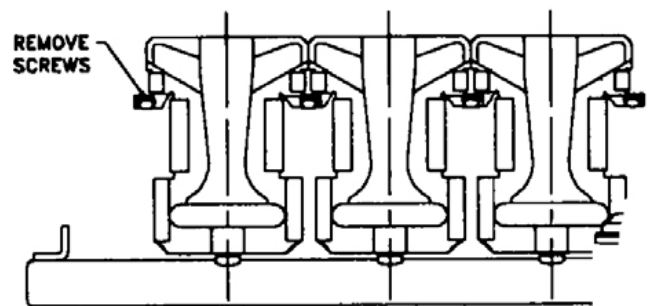


FIG. 2 -

6. Remove original gas orifices.
7. Hand thread new orifices into manifold. Do not crosstread; then tighten to torque of 50 inch-pounds.
8. Replace burners in reverse order from instructions in Step 5.
9. Check burner carryover alignment. They should touch but not overlap adjacent burner. Replace screws.
10. Move gas control slide switch to ON position.
11. Open manual shut-off valve in gas supply line just ahead of furnace.
12. Set room thermostat to its highest setting.
13. Turn on electricity at electrical disconnect switch located next to furnace.
14. Check for gas leaks using commercial soap solution made for leak detection.
15. Check gas input as per instructions in Section 3 of this Manual.

3. CHECKING GAS INPUT



Natural gas heating value (BTU/cu.ft.) can vary significantly. Therefore, it is the installers' responsibility to see that the BTU input does not exceed the rating of the furnace. Failure to do so could cause heat exchanger failure, asphyxiation, fire or explosion resulting in damage, injury or death.

Underfiring could cause inadequate heat, excessive condensation or ignition problems. Overfiring could cause sooting, flame impingement or overheating of heat exchanger.

A. Natural Gas

Before starting natural gas input check, obtain gas heat value at standard conditions from local supplier.

1. Make sure gas piping is large enough for all appliances connected to it to operate at once without lowering main line pressure. Failure to do so could cause lighting or burning problems on any of the appliances.
2. Make sure gas control inlet pressure does not exceed 10.5 inches W.C. Use method in described in Section 23A of Installation and Operation Manual to check gas supply line pressure.
3. Make sure all other gas appliances are off. You may leave pilots on. Start furnace following Operating Instructions on front door or in Users' Information Manual.
4. As furnace warms up, watch gas supply line (gas control inlet) pressure using "U" tube water manometer installed in gas control inlet pressure tap. Natural gas supply line pressure must still not exceed 10.5 inches W.C.
5. After verifying correct gas control inlet pressure, close shut-off valve in gas control inlet pressure tap. Move manometer connection to gas control outlet pressure tap. See Section 24 of Installation and Operation Manual. Open shut-off valve in outlet pressure tap and let furnace warm up for 6 minutes.
6. Normal manifold pressure should be 3.5 inches W.C. Adjust by removing regulator cover screw on gas control. Save cover screw for reinstallation. Turn inner adjustment screw counter-clockwise to decrease manifold pressure; turn clockwise increase manifold pressure.
7. Locate gas meter. Determine which dial has the least cubic feet of gas and how many cubic feet per revolution it represents. This is usually one-half, one or two cubic feet per revolution.
8. With stopwatch, measure time it takes to consume two cubic feet of gas. After determining the number of seconds for two cubic feet of gas to flow through meter, divide this time by two. This gives average time for one cubic foot of gas to flow through meter.
Example: If it took 58 seconds for two-cubic feet to flow, it would take 29 seconds for one-cubic foot to flow.
9. a. Use this formula to calculate gas input:

$$\text{Gas Input} = \frac{\text{Gas Btu/Cu. Ft.} \times 3,600 \text{ Sec/Hr}}{\text{Sec. for one cubic foot of gas}} \text{ Btuh}$$
 Example: Assume it took 56.25 seconds for one cubic foot of gas to flow and heating value of 1,000 BTU/CU.FT.

$$\text{Gas Input} = \frac{1,000 \times 3,600}{56.25} = 64,000 \text{ Btuh}$$
 If you left no other pilots on, this is the furnace gas input.
 - b. If you left water heater, dryer or range pilots on, allow for them in calculating correct furnace gas input. A quick way is to allow 1,000 Btuh for a water heater. Allow 500 Btuh for dryer and 500 Btuh for each range burner pilot.
 Example: If you left gas water heater, dryer, four range burner pilots and one oven pilot on, allow:

Water heater pilot	1,000 Btuh
Dryer pilot	500 Btuh
4 range burner pilots	2,000 Btuh
1 range oven pilot	500 Btuh
	4,000 Btuh

 Subtracting 4,000 Btuh from 64,000 Btuh measured above equals 60,000 Btuh. This would be the correct furnace gas input after allowing for pilots left on.
10. Manifold pressure may be adjusted within the range of 3.2 inches W.C. to 3.8 inches W.C. to achieve rated input. Set correct manifold pressure. Install cover screw and tighten to torque of 5 inch-pounds to prevent gas leakage
11. Turn off gas. Remove 1/8"-pipe manual shutoff valves you used. Install 1/8"-pipe plugs in gas control inlet and outlet pressure taps. Tighten to torque of 50 inch-pounds. Turn on gas. Check both pipe plugs for gas leaks. Use a commercial soap solution made for leak detection.

LIMITED WARRANTY

Johnson Controls warrants this product to be free from defects in workmanship or material for a period of one year from date of original installation or 18 months from date of shipment, whichever comes first

Johnson Controls obligation under this Warranty is LIMITED to repairing or replacing at our sole option, at our factory, any part thereof which shall be returned to our factory, transportation charges prepaid and which on examination proves to have been thus defective under normal domestic use not exceeding the fuel rating. The defective part should be returned through a qualified servicing dealer. Upon warranty determination, the replacement part will be shipped freight collect and assumes the unexpired portion of this Limited Warranty.

When a defective part can be repaired or replaced, Johnson Controls shall not be obligated to repair the entire unit or any part thereof other than the defective part.

This warranty applies only to the original homeowner, and is subject to the terms and conditions hereof.

COMPRESSOR – FIVE YEAR LIMITED WARRANTY

In addition to the One Year Limited Warranty, Johnson Controls warrants the compressor to be free from defects in workmanship or material for a period of five (5) years from the date of original installation. If a compressor fails during this five year period, a new compressor will be supplied. The customer will be responsible for freight costs from our factory for delivery of the replacement compressor and also for the return of the defective compressor which may be required under the terms of the Warranty. Labor and any other expense involved in replacing the compressor is not covered by this Warranty.

HEAT EXCHANGER – TEN YEAR LIMITED WARRANTY

In addition to the One Year Limited Warranty, Johnson Controls warrants the heat exchanger to be free from defects in workmanship for a period of ten (10) years from the date of original installation. During this time, a new replacement heat exchanger will be furnished, or at our sole option, a credit for the replacement heat exchanger may be allowed. Labor and other expenses involved in replacing the heat exchanger are not covered by this warranty. This Warranty applies only to the heat exchanger and not to other parts of the furnace, and only to the original homeowner, and is subject to the terms and conditions hereof.

LABOR AND COST NOT COVERED

This Warranty provides only replacement parts or credits, and does not provide for or cover any labor, shipping, handling or other costs for service travel, servicing, removing, or installing any parts.

EXCLUSIONS

This Warranty shall be void if:

1. The unit is not installed by a licensed or otherwise qualified or contractor and in compliance with the Installation Manual, applicable installation and good trade practices.
2. The defect or damage is caused by accident, abuse, negligence of any person or company, misuse, riot, flood, fire or Acts of God.
3. The unit is not operated and regularly serviced and maintained as called for in the Users' Manual.
4. Damages are caused by operating the unit in a commercial or corrosive atmosphere containing any damaging or dangerous chemicals.
5. The unit is modified or services in a manner not in accordance with the Installation Manual and Users' Manual.
6. Components, replacement parts, or other accessories not compatible with the unit or not approved by Johnson Controls have been used with or attached to the unit.
7. The defect or damage is not caused by Johnson Controls, or it arises from circumstances beyond the control of Johnson Controls.
8. The unit is installed outside the United States or Canada, or has been removed from the place where it was originally installed.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, OBLIGATIONS OR LIABILITIES, EXPRESSED OR IMPLIED BY EMPLOYEES OR REPRESENTATIVES OF JOHNSON CONTROLS. ALL STATUTORY, EXPRESSED OR IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY NEGATED AND EXCLUDED. ANY CLAIMS FOR INCIDENTAL AND CONSEQUENTIAL DAMAGES, OR ANY OTHER DAMAGES OR EXPENSES BEYOND THE TERMS OF THIS LIMITED WARRANTY ARE HEREBY EXPRESSLY NEGATED AND EXCLUDED.

