

HANG16, HALP13, HAPS30, HAPS31 HIGH ALTITUDE CONVERSION KIT(S)

INSTALLATION INSTRUCTIONS

Description

This kit contains the appropriate burner orifices, and/or pressure switch for the application of 90% furnaces in installations above their maximum (as shipped) rated altitudes. These kits are not applicable in Canada. Kits apply as shown in the table below.

UPFLOW	"Standard" and "High Altitude" Kits		
	0 - 7,000 Feet (Standard Altitude)		
	Natural Gas Orifices	Propane Gas Orifices	Pressure Switch
	No Change	LPM-06	No Change
7,001 - 11,000 Feet			
Natural Gas Orifices	Propane Gas Orifices	Pressure Switch	
HANG16	HALP13	HAPS30	

COUNTERFLOW	"Standard" and "High Altitude" Kits		
	0 - 7,000 Feet (Standard Altitude)		
	Natural Gas Orifices	Propane Gas Orifices	Pressure Switch
	No Change	LPM-06	No Change
7,001 - 11,000 Feet			
Natural Gas Orifices	Propane Gas Orifices	Pressure Switch	
HANG16	HALP13	HAPS31	

Table 1

Above an altitude of 7,000 feet, a derating of the appliance must be followed since the CFM moved by the induced draft blower remains almost constant while the pounds of oxygen in that air is reduced as altitude increases. If this procedure is not followed and the fuel input is not reduced the resulting combustion can be inefficient, incomplete, or possibly cause premature heat exchanger failure due to excessive temperature rise. The burner orifices in the high altitude kits have been selected as a result of agency certified testing at high altitude and will provide the appropriate derating (Table 2).

Orifice selection is based on non-derated gas [at standard conditions of 29.92 in Hg and 60°F—approximately 1,000 Btu/ft³ for natural gas and 2,500 Btu/ft³ for propane]. **NOTE: "Point of use" Btu content will be less due to decreased atmospheric pressure.** If the Btu content of your gas supply has been artificially changed to account for altitude, contact your gas supplier for orifice sizing.

Altitude (ft)	Natural Gas Derate	Propane Gas Derate
7,001 - 11,000	24 ± 2%	33 ± 2%

Table 2

Do not derate by adjusting the manifold pressure to a lower pressure setting than specified on the furnace nameplate. A lower air density in combination with a lower manifold pressure at the burner orifice will prevent the orifice from aspirating the proper amount of air into the burner required for complete combustion.

In addition to using smaller orifices to reduce the fuel input, a different pressure switch must be used above the maximum (as shipped) rated altitude. A high altitude pressure switch is necessary as a result of the reduction in air density and is required regardless of the Btu content of the fuel used.

Altitude (ft.)	Burner Orifice Size	
	Natural	Propane
0 - 7,000	#43	#55
7,001 - 11,000	#44	#56

Table 3



RECOGNIZE THIS SYMBOL AS A SAFETY PRECAUTION

ATTENTION INSTALLING PERSONNEL

As a professional installer you have an obligation to know the product better than the customer. This includes all safety precautions and related items.

Prior to actual installation, thoroughly familiarize yourself with this Instruction Manual. Pay special attention to all safety warnings. Often during installation or repair it is possible to place yourself in a position which is more hazardous than when the unit is in operation.

Remember, it is **your** responsibility to install the product safely and to know it well enough to be able to instruct a customer in its safe use.

Safety is a matter of common sense...a matter of thinking before acting. Most dealers have a list of specific good safety practices...follow them.

The precautions listed in this Installation Manual are intended as supplemental to existing practices. However, if there is a direct conflict between existing practices and the content of this manual, the precautions listed here take precedence.



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IMPORTANT INFORMATION

WARNING

HIGH VOLTAGE
DISCONNECT ALL ELECTRICAL POWER AND SHUT OFF GAS SUPPLY BEFORE SERVICING OR INSTALLING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

WARNING

IF THE GAS FURNACE IS INSTALLED IN A BASEMENT, AN EXCAVATED AREA OR A CONFINED SPACE, IT IS STRONGLY RECOMMENDED TO CONTACT A PROPANE SUPPLIER TO INSTALL A GAS DETECTING WARNING DEVICE IN CASE OF A GAS LEAK.

- **SINCE PROPANE GAS IS HEAVIER THAN AIR, ANY LEAKING GAS CAN SETTLE IN ANY LOW AREAS OR CONFINED SPACES.**
- **PROPANE GAS ODORANT MAY FADE, MAKING THE GAS UNDETECTABLE EXCEPT WITH A WARNING DEVICE.**

WARNING

IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

- **DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.**
- **WHAT TO DO IF YOU SMELL GAS:**
 - **DO NOT TRY TO LIGHT ANY APPLIANCE.**
 - **DO NOT TOUCH ANY ELECTRICAL SWITCH; DO NOT USE ANY PHONE IN YOUR BUILDING.**
 - **IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR’S PHONE. FOLLOW THE GAS SUPPLIER’S INSTRUCTIONS.**
 - **IF YOU CANNOT REACH YOUR GAS SUPPLIER, CALL THE FIRE DEPARTMENT.**
- **INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.**

WARNING

PERSONAL INJURY OR DEATH MAY RESULT FROM IMPROPER INSTALLATION OR MAINTENANCE PERFORMED BY UNTRAINED PERSONNAL. CALL YOUR INSTALLING DEALER OR OTHER QUALIFIED SERVICE COMPANIES TO PERFORM THE INSTALLATION OR MAINTENANCE INSPECTION.

WARNING

TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO EXPLOSION OR FIRE, INSTALL A GAS DETECTING WARNING DEVICE. SINCE THE ODORANT IN PROPANE GAS CAN BE REDUCED BY IRON OXIDE (RUST), A GAS DETECTING WARNING DEVICE IS THE ONLY RELIABLE METHOD TO DETECT PROPANE GAS LEAKS.

Contact a local propane gas supplier about installing a gas detecting warning device.

NOTE: *To ensure proper operation, install, operate and maintain the unit in accordance with these installation instructions, all local building codes and ordinances. In their absence, follow the latest edition of the National Fuel Gas Code (NFPA 54/ANSI Z223.1), and/or CAN/CSA B149.1 Installation Codes.*

HANG16 and HALP13

The conversion from “standard altitude” orifices (as shipped from the factory) to “high altitude” orifices requires:

- Removing gas manifold
- Replacing burner orifices
- Reinstalling gas manifold

Before proceeding, shut OFF gas supply at manual shut-off and turn off power to the unit.

CAUTION

TO AVOID THE RISK OF PROPERTY DAMAGE, PERSONAL INJURY OR FIRE, SHUT OFF GAS SUPPLY FIRST, THEN DISCONNECT THE ELECTRICAL SUPPLY BEFORE PROCEEDING WITH CONVERSION.

ORIFICE INSTALLATION - HANG16 AND HALP13

GAS MANIFOLD REMOVAL

1. Shut OFF gas supply at manual shutoff and turn OFF power to the unit.



TO AVOID THE RISK OF PROPERTY DAMAGE, PERSONAL INJURY OR FIRE, SHUT OFF GAS SUPPLY FIRST, THEN DISCONNECT THE ELECTRICAL SUPPLY BEFORE PROCEEDING WITH CONVERSION.

2. Disconnect wiring from the gas valve.
3. Where necessary, cut wire ties securing wiring to manifold.
4. Remove the screws securing the gas manifold and valve to the burner bracket. Separate gas manifold and valve from burner bracket.

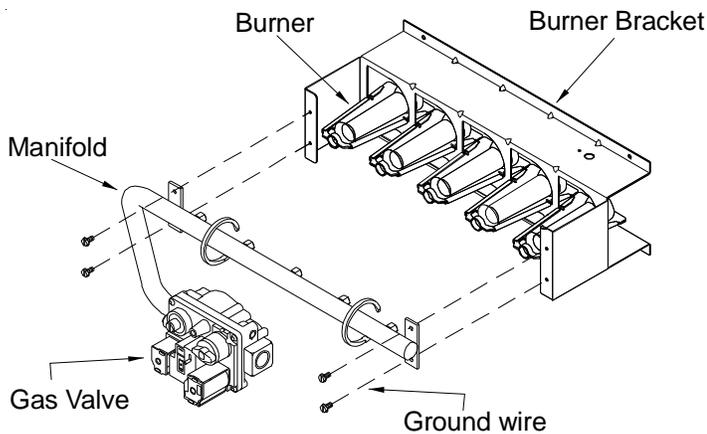


Figure 1
Gas Manifold Removal
(Upflow shown, counterflow similar)

BURNER ORIFICE REPLACEMENT

1. Remove **standard** altitude natural gas orifices from gas manifold using a box end wrench.
2. Install **high altitude** gas orifices supplied in the high altitude kit. Tighten orifices with a box-end wrench; do not use a socket wrench as it could damage the orifices; do not cross-thread or overtighten. Refer to Tables 1 and 2 for the appropriate **high altitude** kit and orifice size. Orifice usage depends on an installation's gas usage (natural or propane) and altitude.

GAS MANIFOLD RE-INSTALLATION

1. Reinstall gas manifold and valve. Make certain that the orifices are inserted in each burner and that each burner remains properly seated in the burner bracket.

(NOTE: Secure green burner assembly ground wire with manifold screw).

2. Reconnect wiring to gas valve. Secure wiring to manifold using wire ties provided.



WIRING MUST NOT INTERFERE WITH ORIFICES OR BURNERS, OR CONTACT ANY HOT SURFACES.

3. Refer to the following sections detailing *Adjustments and Checks for natural gas (HANG16) or Propane Spring Change for propane gas (HALP13)*.

ADJUSTMENTS AND CHECKS - HANG16

The following adjustments and checks are a required part of this conversion. Adjustment and checks include:

- Leak checking orifices
- Checking and adjusting line and manifold gas pressures
- Verifying proper unit operation (input rate, operational sequence, burner flame, temperature rise, etc.)

Before proceeding, shut OFF gas supply at manual shut-off and turn off power to the unit.



TO AVOID THE RISK OF PROPERTY DAMAGE, PERSONAL INJURY OR FIRE, SHUT OFF GAS SUPPLY FIRST, THEN DISCONNECT THE ELECTRICAL SUPPLY BEFORE PROCEEDING WITH CONVERSION.

ORIFICE LEAK CHECK



TO AVOID THE POSSIBILITY OF EXPLOSION OR FIRE, NEVER USE A MATCH OR OPEN FLAME TO TEST FOR LEAKS.

Leak check burner orifice threads using a soap solution.

LINE PRESSURE CHECK



TO AVOID PERSONAL INJURY OR PROPERTY DAMAGE DUE TO FIRE, MAKE CERTAIN ALL WIRES DISCONNECTED FROM THE PRESSURE SWITCH DURING THIS PROCEDURE ARE PROPERLY RECONNECTED.

1. Shut OFF gas at the manual gas shutoff valve and turn OFF power to the unit.
2. Connect a calibrated water manometer or appropriate gas pressure gauge at either the gas valve **inlet** pressure tap or gas piping drip leg.
3. Turn ON the power and gas, put the unit into heating cycle and turn on all other gas consuming appliances.
4. Measure the gas supply pressure with the burners firing. The inlet gas pressure for natural gas should be between **5.0 and 10.0 inches W.C.** If supply pressure differs from required, make necessary adjustments to pressure regulator(s), gas piping, etc.

- Turn OFF gas to the unit at the manual shutoff valve and disconnect manometer. Reinstall line pressure tap plug. Turn OFF any unnecessary appliances started in step 3.

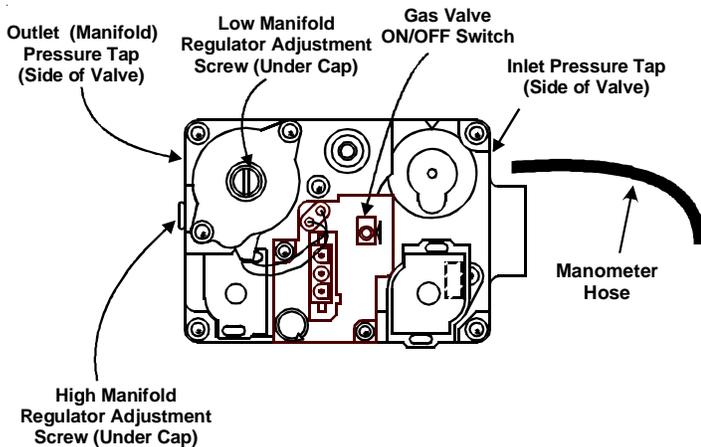


Figure 2
White-Rodgers 36E54

MANIFOLD PRESSURE CHECK

Only small variations in gas flow should be made by adjusting the gas valve pressure regulator. See Table 4 for the required natural gas manifold pressure.

Natural Gas Manifold Pressure	
Low Stage	High Stage
1.6 to 2.2" w.c.	3.0 to 3.6" w.c.

Table 4

- Turn OFF gas to the unit at the manual gas shutoff valve.
- Connect a calibrated water manometer or appropriate gas pressure gauge at the gas valve **outlet** pressure tap.
- Turn ON gas supply and operate unit.
- Remove the cap screw from the *high stage* manifold pressure regulator adjustment location.
- Using an Allen wrench, adjust *high stage* manifold regulator to the required manifold pressure (Table 4).
- Reinstall the *high stage* manifold pressure regulator cap screw. Confirm *high stage* manifold pressure.
- Remove the cap screw from the *low stage* manifold pressure regulator adjustment location.
- Using an Allen wrench, adjust *low stage* manifold regulator to the required manifold pressure.
- Reinstall the *low stage* manifold regulator cap screw. Confirm *low stage* manifold pressure.
- Turn OFF gas supply to unit. Disconnect manometer and reinstall manifold pressure tap plug.

UNIT OPERATION CHECKS - HANG16

CHECK NORMAL OPERATING SEQUENCE

OF IGNITION SYSTEM

Check the normal operating sequence of the ignition system to ensure burners light properly.

VERIFY GAS INPUT RATE(S)

- Turn OFF gas supply to all other gas-burning appliances except the furnace.
- Install jumper wires between the R and W1 and the R and W2 terminals of the integrated control module to initiate and maintain furnace operation on *high stage* heat.
- While the furnace is operating on *high stage*, record the time required (in seconds) for one complete revolution of the small gas meter dial.
- Calculate the number of seconds per cubic foot (sec/ft³) of gas being delivered to the furnace. If the dial is a one-cubic foot dial, divide the number of seconds recorded in step 3 by 1. If the dial is a two-cubic foot dial, divide the number of seconds recorded in step 2 by 2.
- Calculate the furnace input rate (*high stage*) in BTUs per hour (Btu/hr). Input equals in the sum of: the installation's heating value and a conversion factor (hours to seconds) divided by the number of seconds per cubic foot. The measured input must agree with the expected input calculated in step 6.

INPUT CALCULATION EXAMPLE:

Installation's gas heating value (**from gas supplier**)
1,000 Btu/ft³ (at standard conditions)

720 Btu/ft³ (at elevation)

Installation's seconds per cubic foot: 30 sec/ft³

Conversion Factor (hours to seconds): 3600 sec/hr

Input = (Htg. value x 3600) ÷ seconds per cubic foot

Input = (720 Btu/ft³ x 3600 sec/hr) ÷ 30 sec/ft³

Input = 86,400 Btu/hr (*high stage*)

This measured input must agree with the derates for your unit and altitude as indicated in Table 2.

- Compare measured input rate with expected input resulting from altitude derate.

Derating Example 1: 11,500 BTU at 9,000 ft.

Sea level (high stage) input = 115,000 Btu/hr

From Table 2: Derate at 9,000 ft. = 24 ± 2%

Since this installation is approximately at the mid point of the elevation range, use the mid point of the derate: 24%.

Expected Input = 115,000 x (1 - .24) = 87,400 Btu/hr

Derating Example 2: 11,500 BTU at 7,501 ft.

Sea level (high stage) input = 115,000 Btu/hr

From Table 2: Derate at 7,001 ft. = 24 ± 2%

Since this installation is at the lower end of the elevation range, use the lower derate:

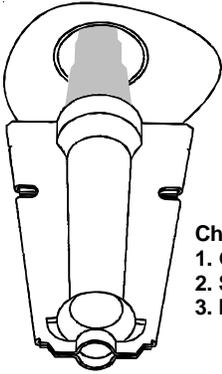
$$(24 - 2) = 22\%$$

Expected Input = 115,000 x (1 - .22) = 89,700 Btu/hr

7. Remove jumper wires from integrated control module.

INSPECT BURNER FLAME

The burner flames should be stable, soft and blue (dust may cause orange tips but they must not be yellow). They should extend directly outward from the burners without curling, floating, or lifting off.



- Check the burner flames for:
1. Good adjustment
 2. Stable, soft and blue
 3. Not curling, floating, or lifting off.

Figure 3
Burner Flame

CHECK AND ADJUST UNIT TEMPERATURE RISE

Check and adjust unit temperature rise(s) as described in the installation manual.

Temperature rise must be within the range shown on the furnace rating plate.

PROPANE GAS UNIT KIT INSTALLATION - HALP13

WARNING

IF THE GAS FURNACE IS INSTALLED IN A BASEMENT, AN EXCAVATED AREA OR A CONFINED SPACE, IT IS STRONGLY RECOMMENDED TO CONTACT A PROPANE SUPPLIER TO INSTALL A GAS DETECTING WARNING DEVICE IN CASE OF A GAS LEAK.

- SINCE PROPANE GAS IS HEAVIER THAN AIR, ANY LEAKING GAS CAN SETTLE IN ANY LOW AREAS OR CONFINED SPACES.
- PROPANE GAS ODORANT MAY FADE, MAKING THE GAS UNDETECTABLE EXCEPT WITH A WARNING DEVICE.

WARNING

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WARNING

IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

- DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.
- **WHAT TO DO IF YOU SMELL GAS:**
 - DO NOT TRY TO LIGHT ANY APPLIANCE.
 - DO NOT TOUCH ANY ELECTRICAL SWITCH; DO NOT USE ANY PHONE IN YOUR BUILDING.
 - IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR'S PHONE. FOLLOW THE GAS SUPPLIER'S INSTRUCTIONS.
 - IF YOU CANNOT REACH YOUR GAS SUPPLIER, CALL THE FIRE DEPARTMENT.
- INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.

CAUTION

TO PREVENT UNSATISFACTORY FURNACE OPERATION, THE PROPER GAS CONVERSION KIT MUST BE USED FOR THE GAS VALVE. USE THE WHITE-RODGERS SPRING KIT ONLY WITH THE WHITE-RIDGERS GAS VALVE.

WARNING

TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO EXPLOSION OR FIRE, INSTALL A GAS DETECTING WARNING DEVICE. SINCE THE ODORANT IN PROPANE GAS CAN BE REDUCED BY IRON OXIDE (RUST), A GAS DETECTING WARNING DEVICE IS THE ONLY RELIABLE METHOD TO DETECT PROPANE GAS LEAKS.

IMPORTANT: Propane gas is heavier than air and does not vent upward as natural gas fuels.

LOW PRESSURE LP KIT ACCESSORY INSTALLATION - HALP13

To guard against poor burner flame and possible sooting, install a Low Pressure LP kit (LPLP01). Follow the directions outlined in the instructions provided with the kit.

ADJUSTMENT AND CHECKS - HALP13

The following adjustments and checks are a required part of this conversion. Adjustments and checks include:

- Leak checking orifices
- Checking and adjusting line and manifold gas pressures
- Verifying proper unit operation (input rate, operational sequence, burner flame, temperature rise, etc.)

ORIFICE LEAK CHECK

Leak check burner orifice threads using a soap solution.

WARNING

TO AVOID THE POSSIBILITY OF EXPLOSION OR FIRE, NEVER USE A MATCH OR OPEN FLAME TO TEST FOR LEAKS.

LINE PRESSURE CHECK



CAUTION

TO AVOID THE RISK OF PROPERTY DAMAGE, PERSONAL INJURY OR FIRE, SHUT OFF GAS SUPPLY FIRST, THEN DISCONNECT THE ELECTRICAL SUPPLY BEFORE PROCEEDING WITH CONVERSION.

1. Shut OFF gas at the manual gas shutoff valve and turn OFF power to the unit.
2. Connect a calibrated water manometer or appropriate gas pressure gauge at either the gas valve **inlet** pressure tap or gas piping drip leg (Figure 2).
3. Turn ON the power and gas, put the unit into heating cycle and turn on all other gas consuming appliances.
4. Measure the gas supply pressure with the burners firing. The inlet gas pressure for propane gas must be between **11.0** and **13.0 inches W.C.** If supply pressure differs from required, make necessary adjustments to pressure regulator(s), gas piping, etc.
5. Turn OFF gas to the unit at the manual shutoff valve and disconnect manometer. Reinstall line pressure tap plug. Turn OFF any unnecessary appliances started in step 3.

MANIFOLD PRESSURE CHECK

Only small variations in gas flow should be made by adjusting the gas valve pressure regulator. See Table 5 for the required propane gas manifold pressure.

Propane Gas Manifold Pressure	
Low Stage	High Stage
5.7 to 6.3" w.c.	9.7 to 10.3" w.c.

Table 5

1. Turn OFF gas to the unit at the manual gas shutoff valve.
2. Connect a calibrated water manometer or appropriate gas pressure gauge at the gas valve **outlet** pressure tap.
3. Turn ON gas supply and operate unit.
4. Remove the cap screw from the *high stage* manifold pressure regulator adjustment location.
5. Using an Allen wrench, adjust *high stage* manifold regulator to the required manifold pressure (Table 5).
6. Reinstall the *high stage* manifold pressure regulator cap screw. Confirm *high stage* manifold pressure.
7. Remove the cap screw from the *low stage* manifold pressure regulator adjustment location.
8. Using an Allen wrench, adjust *low stage* manifold regulator to the required manifold pressure.
9. Reinstall the *low stage* manifold regulator cap screw. Confirm *low stage* manifold pressure.
10. Turn OFF gas supply to unit. Disconnect manometer and reinstall manifold pressure tap plug.

UNIT OPERATION CHECK - HALPS13

CHECK NORMAL OPERATING SEQUENCE OF IGNITION SYSTEM

Check the normal operating sequence of the ignition system to ensure burners light properly.

VERIFY GAS INPUT RATE(S)

Ensure that the appropriate orifices have been installed and the manifold pressure has been set as specified in these instructions.

INSPECT BURNER FLAME

The burner flames should be stable, soft and blue (dust may cause orange tips but they must not be yellow). They should extend directly outward from the burners without curling, floating, or lifting off.

CHECK AND ADJUST UNIT TEMPERATURE RISE

Check and adjust unit temperature rises as described in the installation manual.

Temperature rise must be within the range shown on the furnace rating plate.

LABEL ATTACHMENT

Attach conversion data plate, with correct input rating, adjacent to the unit rating plate. Use Table 6 to determine the correct data plate to be applied.

INPUT RATING (Propane Gas: Standard Altitude)	
Size	Input (Btu/hr)
045	33,500
070	50,300
091	67,000
115	83,800

Table 6

Post "conversion date certificate" adjacent to the unit rating plate.

HAPS30 and HAPS31

The conversion from "standard altitude" pressure switch assembly (as shipped from the factory) to "high altitude" pressure switch assembly requires:

- Removing standard altitude pressure switch
- Installing high altitude pressure switch

Before proceeding, shut OFF gas supply at manual shut-off and turn OFF power to the unit.

PRESSURE SWITCH REMOVAL/REPLACEMENT



TO AVOID THE RISK OF PROPERTY DAMAGE, PERSONAL INJURY OR FIRE, SHUT OFF GAS SUPPLY FIRST, THEN DISCONNECT THE ELECTRICAL SUPPLY BEFORE PROCEEDING WITH CONVERSION.

1. Shut OFF gas supply at manual shutoff and turn OFF power to the unit.
2. Locate induced draft blower two-stage pressure switch assembly.
3. Disconnect the pressure switch hose from the pressure switch assembly tee.
4. Disconnect *high stage* (yellow and orange) and *low stage* (red and blue) wiring from pressure switches.
5. Remove mounting bracket screw securing standard altitude pressure switch assembly to partition panel.
6. Install high altitude pressure switch assembly using screw removed in step 5. Refer to Table 7 for proper pressure switch kit.
7. Reconnect wiring to pressure switches.
8. Reconnect pressure switch hose to new assembly.
9. Verify proper furnace operation.

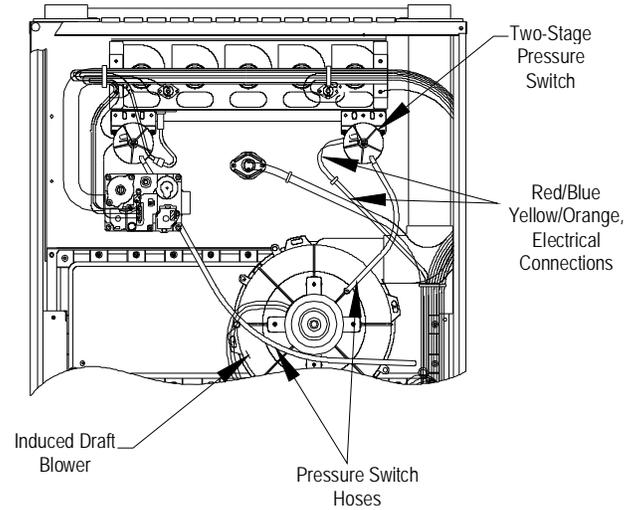


Figure 4
Induced Draft Blower
Pressure Switch Location
(Upflow shown, Counterflow similar)

7,001 - 11,000 ft.			
Kit	Pressure Switch	Set Point	
		Low Stage	High Stage
HAPS30	11177119	-0.15	-0.46
HAPS31	11177120	-0.15	-0.30

Table 7
Pressure Switch

NOTE: SPECIFICATIONS AND PERFORMANCE DATA LISTED HEREIN ARE SUBJECT TO CHANGE WITHOUT NOTICE

Quality Makes the Difference!

All of our systems are designed and manufactured with the same high quality standards regardless of size or efficiency. We have designed these units to significantly reduce the most frequent causes of product failure. They are simple to service and forgiving to operate. We use quality materials and components. Finally, every unit is run tested before it leaves the factory. That's why we know. . . **There's No Better Quality.**

Visit our website at www.daikincomfort.com, www.goodmanmfg.com or www.amana-hac.com for information on:

- Products
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