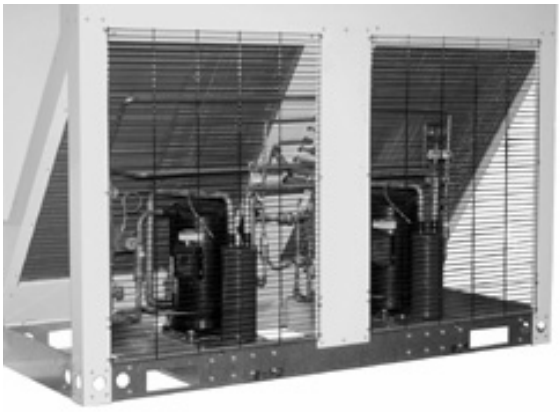
# INSTALLATION OPERATION and MAINTENANCE MANUAL

## High Efficiency Packaged Model TRS Series Air Conditioning Systems, Model Sizes 036 Thru 420

## --- The TRS Series uses R- 410A Refrigerant –

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**⚠ WARNING: READ SAFE OPERATION RULES AND MANUAL CAREFULLY**

## SAFETY LABELING AND SIGNAL WORDS

### Danger, Warning and Caution

The signal words **DANGER, WARNING** and **CAUTION** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING** and **CAUTION** will be used on product labels and throughout this manual and other manuals that may apply to the product.

### Signal Words

**DANGER** – Immediate hazards which **WILL** result in severe personal injury or death.

**WARNING** – Hazards or unsafe practices which **COULD** result in severe personal injury or death.

**CAUTION** – Hazards or unsafe practices which **COULD** result in minor personal injury or product or property damage.

### Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

**⚠ WARNING**

The signal word **CAUTION** is used throughout this manual in the following manner:

**CAUTION**

**Product Labeling**

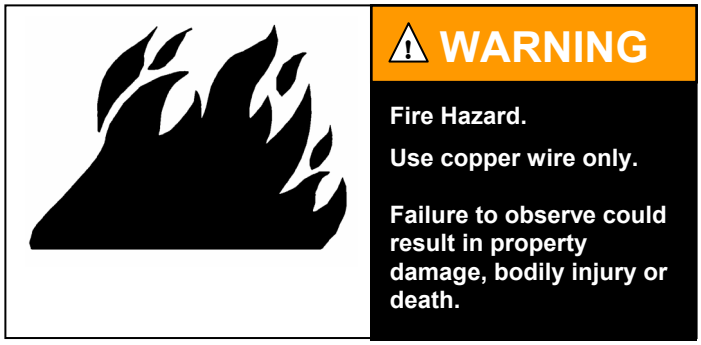
Signal words are used in combination with colors and/or pictures on product labels. Following are examples of product labels with explanations of the colors used.

### Danger Label

White lettering on a black background except the word **DANGER** which is white with a red background.

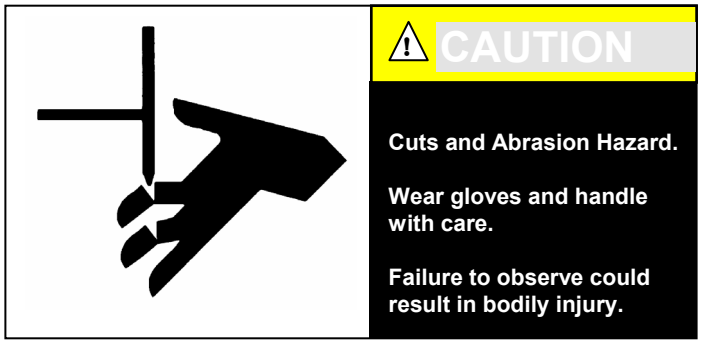

### Warning Label

White lettering on a black background except the word **WARNING** which is white with an orange background.




### Caution Label

White lettering on a black background except the word **CAUTION** which is white with a yellow background.




**⚠ WARNING**

**This unit contains HFC-(R410A), an azeotropic mixture of R-32 (Difluoromethane) and R-125 (Pentafluoroethane). DO NOT VENT HFC-(R410A) to the atmosphere. The U. S. Clean Air Act requires the recovery of any residual refrigerant. Do not use R-22 service equipment or components on R410A systems.**

## GENERAL DESCRIPTION

The model TRS Series A packaged cooling and heating unit is designed to cool a conditioned space with mechanical refrigeration, chilled water, energy conservation wheel or a combination of these systems. During the heating mode supply air may be heated by indirect fired gas, electric strip, steam or hot water. The cabinet design provides space for a number of options, including 100% outside air applications and the use of desiccant wheels. Most of these options will be covered in this manual; for those of a more custom nature, consult the ADDISON Application Engineering Department.

Model TRS units are designed for rooftop curb, slab mounted or installed on post and rail applications. Horizontal supply with 100% outside air does not require a curb and may be slab mounted. Horizontal or vertical supply with vertical return is available with a 14" high solid bottom roof curb (sold separately as an option). Horizontal supply and return air duct connections are made with the use of a 24" high solid bottom roof curb (sold separately as an option).

**Unpacking, Inspection**

When received, the unit should be checked for damage that might have occurred in transit. If damage is found, it should be noted on the carrier's Freight Bill. Request for inspection by carrier's agent should be made in writing at once.

**Design Certification**

All units are certified by Electrical Testing Laboratories (E.T.L.) under ANSI/UL 1995. The gas furnace designs are certified by E.T.L. under the appropriate ANSI standards for use with natural or propane (L.P.) gas as specified when ordering unit.

**Codes and Ordinances**

These units must be installed in accordance with the standard of the National Fire Protection Association or the National Fuel Gas Code. The National Fuel Gas Code is available from the American Gas Association, 1515 Wilson Boulevard, Arlington, VA 22209. NFPA Publications are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269. Local authorities having jurisdiction should be consulted before installations are made to verify local codes and installation procedures.

All field wiring to the unit must be done in accordance with these instructions, the National Electric Code (ANSI/NFPA 70-1981) in the United States and all local codes and ordinances.

Clearances from the heater and vent to construction or material in storage must conform with the National Fuel Gas Code, pertaining to gas-burning devices, and such material **must not attain a temperature over 160°F** by continued operation of the heater.

Installation should be done by a qualified agency in accordance with the instructions in this manual and in compliance with all codes clearances and requirements of authorities having jurisdiction.

## INSTALLATION

**Unit Location, Clearances**

A 36" clearance must be allowed for access to the compressor and electrical panel. A 24" clearance must be maintained for the air inlet to the condenser coil(s). Do not locate the unit under an overhang that will short circuit hot air to the coil intakes.

When installed at ground level, the unit should be mounted on a level concrete slab which should extend at least 2" beyond the unit on all sides. The top of the slab should be 2" above the ground level. The depth of the slab below the ground level and its structural design is governed by the type of soil and climatic conditions. The slab must not be in contact with any part of the building wall or foundation. The space between the slab and building wall prevents the possibility of transmitting vibration to the building. The dimensions of the slab or roof mount should be checked and verified before the equipment arrives. Unit supports, roof opening, roof curb flashing, drain requirements, and electric locations are important to a good installation.

When installing the equipment on top of a building, the following should be considered. Structural members supporting the unit must be sufficiently strong for the weight of the unit and mounting rails. Transmission of sound into the building is sometimes a problem when the structure is not strong enough.

Locate the unit as near as possible to the center of the area to be environmentally controlled. Sufficient clearance must be available for service, edge of roof, other units, or hazards. The condenser air inlet and discharge air must be unobstructed by overhang, walls, or other equipment. Avoid locations next to exhaust fans or flues.

Select a location where external water drainage cannot collect around the unit. Locate the unit so roof runoff water does not pour directly on the unit. Provide gutter or other shielding at roof level.

Where snowfall is anticipated, mount the unit above the maximum snow depth for the area.

## INSTALLATION (CONT'D)

**Curb Installation, Protrusions**

Proper installation for the TRS series requires that the roof mounting of the curb be firmly and permanently attached to the roof structure. Check for adequate fastening method prior to setting rooftop unit on curb.

Inspect curb to insure that none of the utility services (electric, gas, drain lines) routed through the curb protrude above the curb. Being a fully welded solid bottom curb, duct connections can be made before unit is set on curb. Duct openings are to be sized and cut by the installing contractor in the solid curb.

**Rigging**

**WARNING:** Be sure that the crane and lift material (bars, cable, chain), (or other lifting device) capacity is adequate for the unit weight. See Addison specification literature for unit weights. The total unit weight calculated must include all appropriate options for your unit. Certain options can add significant weight to a unit.

Spreader bars keep the lift cables from damaging the cabinet once the unit has been lifted, these bars will be required in all instances. Keep the tension equal, improper lift tension can damage wiring, refrigeration lines and the water tight integrity of the cabinet as well as sheet metal damage to the unit cabinet.


**Figure 1**

Lower unit carefully onto roof mounting curb or mounting rails or ground level slab. While rigging unit, center of gravity will cause condenser end to be lower than supply/return air end. Bring condenser end of unit into alignment with curb. With condenser end of unit resting on curb member and using curb as fulcrum, lower front end of unit until entire unit is seated on curb.

**Rigging Removal**

Remove spreader bars, lifting cables and other rigging equipment. Use caution not to dent scratch or otherwise damage cabinet or intake and exhaust hoods.

**CAUTION:** Do not allow crane hooks and spreader bars to rest on roof of the unit.

**ELECTRICAL**

**Wiring Connections**

Power wiring should be connected to the main power terminal block located within the unit main control section. Power wiring connections on units with factory disconnects should be made at the line side of the disconnect switch.

Low voltage wiring connections are made to the remote mounted controller or time clock.

**DO NOT TAMPER WITH FACTORY WIRING**

Contact your local representative or the factory if assistance is required. The internal power and control wiring of these units is factory installed and each unit is thoroughly tested prior to shipment.

Independent Power Source

It is recommended that an independent 115-volt power source be brought to the vicinity of the rooftop unit for portable lights and tools used by the service mechanic.

**Main Power Wiring**

The units are factory wired for the voltage shown on the nameplate.

Main power wiring should be sized for the minimum wire ampacity shown on the nameplate.An external weather-tight disconnect switch properly sized for the unit total load is required for each unit. Disconnect must be installed in accordance with Local and/or National Electric Codes.

Power wiring may enter the Rooftop Unit through the through the unit base and roof curbs on all models. Install conduit connectors at the entrance locations. External connectors must be weatherproof.

**Grounding**

All units must be properly grounded. The ground lug is provided for this purpose. **DO NOT** use the ground lug for connecting a neutral conductor. The unit must be electrically grounded in accordance with local codes, or in the absence of local codes, with the NEC ANSI/NFPA 70 1981.

Once it is established that supply voltage is within the utilization range, check and calculate if an unbalanced condition exists between phases. Calculate percent voltage unbalance as follows:

$$\text{Percent Voltage Unbalance} = 100X \frac{\text{Maximum Voltage Deviation From Average Voltage}}{\text{Average Voltage}}$$

EXAMPLE — With voltage of 220, 215 and 210

Average voltage = 220 + 215 + 210

= 645 ÷ 3 = 215

Maximum voltage deviation from

Average voltage = 220 – 215 = 5

$$\text{Percent Voltage} = \frac{100 \times 5}{215} = \frac{500}{215} = 2.3\%$$

Percent voltage unbalance must not exceed (2%) two percent

Contact power company if phase unbalance exceeds 2%.

**Control System Wiring:** For commercial equipment the following table lists the minimum size of 24 volt class 2 wire to be used.

| WIRE SIZE | FT. RUN FROM UNIT TO THERMOSTAT OR LONGEST RUN |
|---|---|
| 18 AWG | Maximum Run 50 Feet |
| 16AWG | Maximum Run 75 Feet |
| 14AWG | Maximum Run 100/125 Feet |
| 12AWG | Maximum Run 150/200 Feet |

**Note:** Wiring - Consult the wiring diagram furnished with the unit. These units are custom designed for each application. The unit wiring diagram is located inside the control panel of each unit.

**Ductwork**

Properly sized and installed ductwork is critical to reliable performance of the unit and system. The TRS Series is down flow (vertical), horizontal supply and 100% outside air or horizontal supply and return duct connections with the use of a tall horizontal duct curb. All duct connections with the use of a curb are to be field sized and cut. All ductwork must be installed according to local codes, practices and requirements.

Industry manuals should be used as a guide to sizing and designing the duct system. Ducts passing through unconditioned spaces must be well insulated with vapor barrier to prevent condensation.

**Condensate Piping**

A condensate trap must be provided by customer. Drainage of condensate directly onto the roof is acceptable if permitted by local codes. It is recommended that a small drip pad of either stone, or tar, wood or metal be provided to prevent any possible damage to the roof. If condensate is to be piped into the building drainage system, the drain line must penetrate the roof external to the unit. Refer to local codes for additional requirements.

# INSTALLATION (CONT'D)

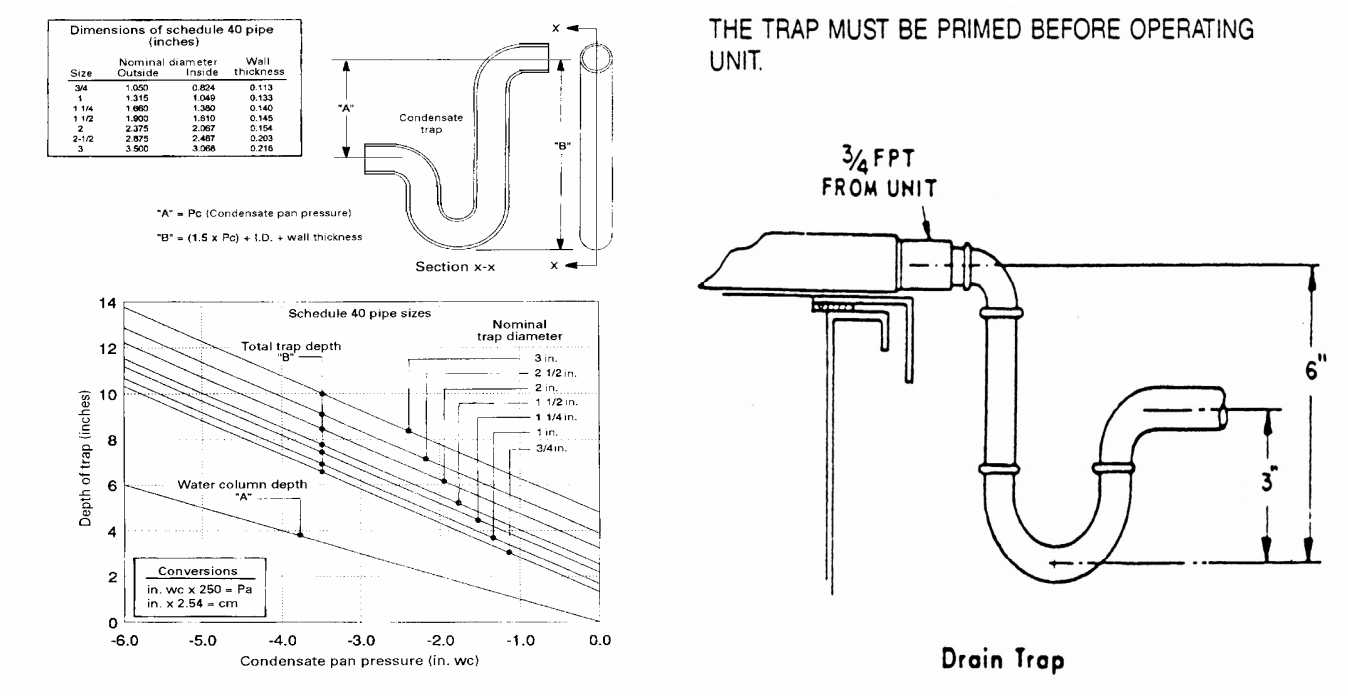



**Figure 2**

**CAUTION: Units with high internal and external static pressure drops will require a deeper trap. Use the graph and table in Figure 2.**

## WARNING

**GAS PIPING AND VENTING**

For TRS units with gas furnace options locate the gas furnace instruction manual located inside each unit control vestibule. **This manual will provide you with specific installation requirements and important safety and warning information that must be reviewed prior to installation of the gas heating equipment.**

Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapors or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons, or in applications with airborne silicone substances. Improper installation, adjustment alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operation, and maintenance instructions thoroughly before installing or servicing this equipment.

## WARNING

**FOR YOUR SAFETY**

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

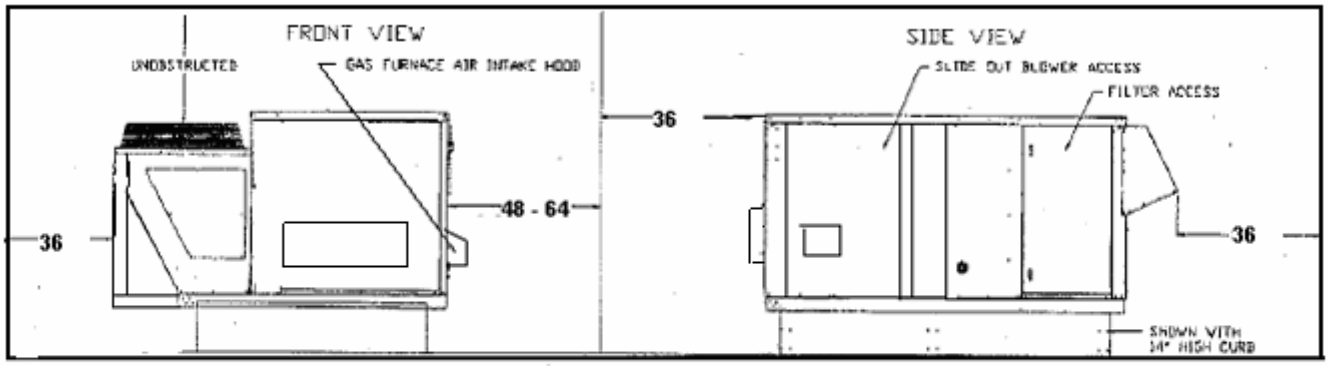
## INSTALLATION (CONT'D)

**Clearances**

Adequate clearance around the unit must be kept for safety, accessibility, service, and maintenance. 48 inches clearance is required on the side (furnace and electrical) end of the unit. This clearance must be maintained for compressor removal and up to 64 inches in the case of a furnace or ECW wheel unit.

All combustible materials must be kept out of the area. A 48 inch clearance is also required on the front (outside air) end of the unit for blower removal and for adequate outside air accessibility. The clearance of 64 inches on the filter access side of the unit is required for ECW wheel removal if installed. A clearance of 36 inches is required on the condenser side for an adequate supply of condenser air.

### Accessibility, Service and Maintenance Clearances




**WARNING! IMPORTANT NOTE: No windows, doors, exhaust or intake air opening maybe located in front of the gas furnace flue outlet. To do so exposes the building occupants to the DANGER of carbon monoxide poisoning! This could result in severe personal injury or death.**

### Combustion Air Clearances

| Model | REQUIRED CLEARANCES | | | | |
|---|---|---|---|---|---|
| | Top | Sides* | | Bottom | |
| | | Control | Opposite | To Combustibles | To Non-Combustibles |
| TRS Series | 36" | Width Of Furnace Plus 6" | 0" | 24" | 0" |
| *Provide clearance as shown for safety, for combustion, and for service. | | | | | |

## COOLING SYSTEM OPTIONS

**Hot Gas Bypass**

Hot gas bypass is a means of capacity control during lower ambient temperature conditions. The Hot Gas Bypass valve is an adjustable valve and should be set to open when the refrigerant suction pressure drops to 107-112 psig. It varies unit capacity by introducing discharge refrigerant into the evaporator circuit where it creates a false evaporator load. The hot gas is cooled prior to its return to the compressor as it passes through the evaporator.

The Hot Gas Bypass Solenoid Valve is energized through the thermostat and routs discharge gas to the hot gas bypass valve. It is de-energized during the pump down cycle.

## COOLING SYSTEM OPTIONS (CONT"D)

**Head Pressure Control**

Low ambient control. Cycling the condenser fan or fans in response to compressor discharge pressure will permit stable operation in ambients down to 32F. The operating pressure switch is adjustable to match customer needs; it is factory set to re-energize the fans when discharge pressure drops to 295 psig and energize them when pressure increases to 410 psig.

**Variable Speed Control**

The ***VARISPEED***™ Fan Control System controls the compressor discharge pressure. The speed control module responds to discharge pressure; it speeds the condenser fan up as pressure rises and slows the fan down as pressure falls due to load conditions or as outdoor ambient temperature falls.

Head pressure control is accomplished with one or two variable speed condenser fan drives and controller, factory set to begin fan rotation at 311 psig and be at full fan speed at 410 psig.

Dual compressor, dual fan units have one variable speed motor and controller on each circuit.

Single or tandem compressor, four fan units have one variable speed motor and control and three 3 phase constant speed motors. Two adjustable pressure controls are used on the 3 fans, the first operating one fan between 443 psig and 358 psig, the second operating two fans between 460 psig and 375 psig.

**CAUTION:** Pressure settings on the constant speed fans must **NOT** be set so as to permit operation below 358 psig or the variable speed motor may stall and overheat.

Single compressor, single fan units will have one variable speed motor and control.

At low ambient, the variable speed fan operates, increasing in speed until maximum RPM is achieved at or around 45°F ambient. An adjustable pressure switch operates the constant speed three-phase fan set to energize the motor at 443 psig and de-energize at 358 psig. In the ambient temperature span of approximately 50°F to 53°F, the variable speed fan will ramp between maximum and minimum speed while the constant speed fan cycles. The start-stop cycle varies from 45 seconds to 2½ minutes during this period.

At 53°F, both fans are operating; the variable speed at minimum RPM and the constant speed at full RPM. As the ambient continues to rise, the variable speed motor increases to full speed and remains there.

If the application calls for a closer setting between maximum and minimum pressure settings on the constant speed fan, for example 443 psig on, 388 psig off, the effect will be to lengthen the temperature span during which the cycling takes place, for example 50°F to 57°F.

**Adjustable High and Low Pressure Switches**

Standard cooling units are equipped with non-adjustable pressure switches. The low pressure switch is set to open at 135± psig and is an automatic reset switch closing at 99± psig. The high pressure switch is set to open at 640± psig and is a manual reset switch set to close at 595± psig.

Units can be equipped with adjustable high and low pressure switches for those installations that require finer settings than the non-adjustable switches provide. Low pressure switches have both set point and differential adjustments and are automatic reset. High pressure switches must not be set above 640 psig and are manual reset. Set point and differential are adjustable.

## MECHANICAL ADJUSTMENTS

**SET FAN RPM.**

All evaporator motor sheaves are set when tested and shipped from the factory. Actual rpm must be set and verified with a tachometer. Refer to the following Blower Performance Chart for basic unit fan rpm.

With disconnect switch open, place a jumper wire across Terminals R and G at TS1 Terminal Block. Close disconnect switch; evaporator fan motor will operate so rpm can be checked.

**FAN ROTATION CHECK**

Check that fan rotates clockwise when viewed from the drive side of unit and in accordance with rotation arrow shown on blower housing. If it does not, reverse two incoming power cables at TB Terminal Block.

Do not attempt to change load side wiring. Internal wiring assures all motors will rotate in correct direction once evaporator fan motor rotation check has been made.

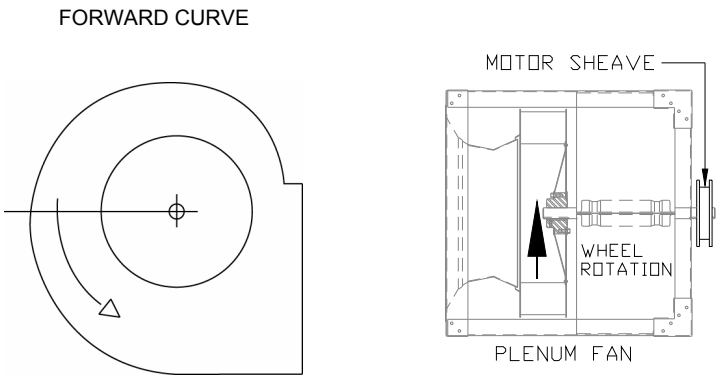



Figure 4

**Blower Rotation**

**DRIVE BELT TENSION AND ALIGNMENT**

For ease of service the TRS model unit is equipped with a slide out fan assembly. Two screws must be removed and the wire harness wire tie must be cut to allow the fan to slide forward.

**WARNING: The fan can slide completely out of the cabinet so us extreme care not to slide fan out to a point where the fan could fall out of the cabinet causing severe personal injury and or equipment and roof damage. Leave at least 12 inches of the fan slide flanges engaged to the blower box rails to allow for proper support of the fan. Never apply additional weight or stand on the blower as a step!**

Fan belt alignment and tension should be checked. Tension should be 3/4" depression per foot of belt span between pulleys.

Personal injury hazard. Use extreme care during the following procedures and obey Safety Information.

Failure to do so may result in personal Injury.

The following safety rules MUST always be followed when working near belt drive.

**Always Turn The Power Off**

1. Turn the power to the unit OFF before you begin working on it.

**Always Wear Protective Clothing**

2. **NEVER** wear loose or bulky clothes, such as neckties, exposed shirttails, loose sleeves, or lab coats around belt drives. Wear gloves while inspecting sheaves to avoid nicks, burrs, or sharply worn pulley edges.

   The blower speed is changed by adjusting the variable speed pulley mounted on the blower motor.

   If the blower speed needed is different than the speed of the blower as shipped, follow the steps below to change the blower speed. Before changing the blower speed, read the above safety rules first.

3. Turn electric power **OFF**.
4. Remove the side blower access panel. Loosen the four motor mount bolts
5. Turn the motor adjustment bolt counterclockwise until the belt is slack enough to come off easily.
6. Remove the belt. Do **NOT** pry off belt.
7. Loosen set screw(s) on the outer half of the adjustable pulley.
8. The unit has one of two different types of adjustable pulleys.
9. Remove key if unit has a keyway type pulley.
10. To set the blower for a desired CFM (L/s), first turn the outer half of the adjustable pulley clockwise until it meets the inner half of the pulley.

## MECHANICAL ADJUSTMENTS (CONT'D)

11.Turn the outer half of the adjustable pulley counter clockwise the correct number of turns to obtain the desired CFM (L/s).

**NOTE:** To increase the blower speed, turn the outer half of the adjustable pulley clockwise. To decrease the blower speed, turn the outer half of the adjustable pulley counter clockwise.

12. Replace key if unit has keyway type pulley.
13. Tighten set screw(s).
14. Put on belt.
15. Turn motor adjustment bolt clockwise until the belt has enough tension at the proper deflection. Use one of the commercially available belt tension gauges to set the correct tension at the proper deflection.
16. Use a straight edge (angle iron, straight piece of board or anything with a straight surface or edge) to check the alignment of the blower pulley with blower motor pulley.
18. It may be necessary to back the tension off the belt temporarily and tighten one of the motor mount bolts before it is possible to adjust the angle of the blower motor.
19. Tighten all four blower motor mount bolt

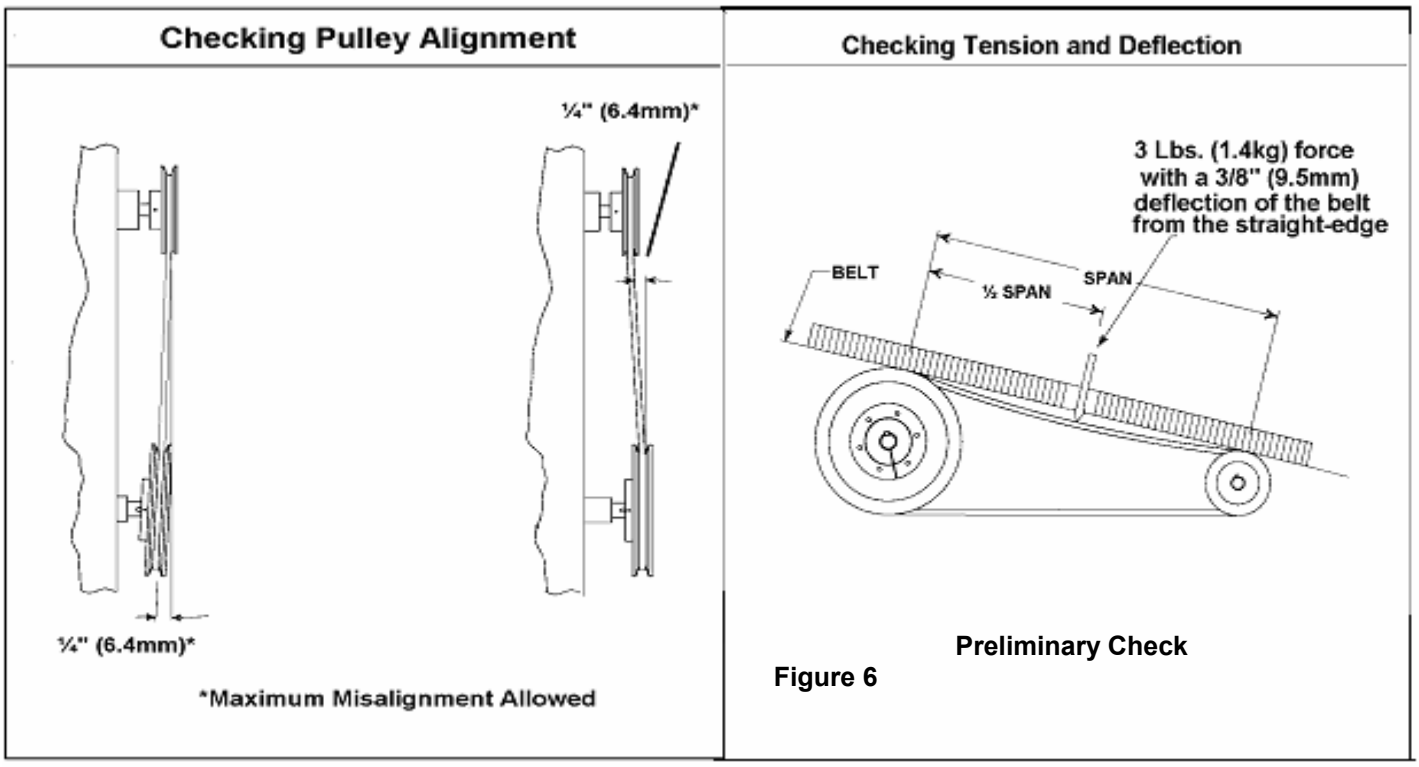



**Figure 6**

## ELECTRICAL SYSTEM OPTIONS

**Airflow Switch.** Designed to prevent system operation unless there is proof of blower operation. A differential pressure switch measures the air pressures at the suction and discharge of the blower.

**Clogged Filter Indicator.** Dirty or clogged filters are indicated when the preset pressure differential across the filters is reached. The indicator is factory installed and is manually reset. It includes contacts for remote indication.

**Convenience Outlet. (Field Wired)** A 115V GFCI receptacle mounted in a 2"x4" enclosure and is furnished with a 15 amp circuit breaker. Separate 115-volt power source and ground is required.

## ELECTRICAL SYSTEM OPTIONS (CONT'D)

**Convenience Outlet. (Factory Wired)** A 115V GFCI receptacle mounted in a 2"x4" enclosure may be furnished with a 15 amp circuit breaker, disconnect and 1500 Watt transformer. The transformer will be field connected to the line side of the unit disconnect switch.

**Exhaust Fan Interlock.** A relay installed in the unit control panel is energized when the blower is energized to interlock the unit with building exhaust fan(s).

**Power Through the Curb.** A chase is installed in the curb, directly under the electrical control section to bring power wiring inside the curb, preventing a separate roof penetration. The sleeve must be sealed after wiring is completed with suitable mastic to prevent water from entering the space.

**Firestat.** This control, mounted in the return air section, de-energizes the unit when return air reaches 135°F. The firestat is a manual reset control.

**Sure-Trip™.** This control automatically stops the unit whenever a phase is lost, when phases are out of sequence, or when supply voltage drops too low. Restart is automatic with a 5-minute delay after proper power supply conditions are restored.

**Unit Controller** A multi-function PLC controller is installed, in which complete unit operation is established through inputs of temperature, pressure, humidity sensors as well as other analog and digital inputs. The controller will provide a complete operating and monitoring system.

## SEQUENCE OF OPERATION (HEATING)

**Heating, Hydronic or Steam**

Both hydronic and steam heat require a one or two row coil generally located downstream of the evaporator coil.

Controls for hydronic heat will involve a 3 way motorized mixing or blending valve, driven by a signal from a leaving air temperature thermostat.

Controls for low-pressure steam heat contain a motorized throttling valve driven by a signal from a leaving air temperature thermostat

**Heating, Electric Resistance**

1. Three-phase power to the unit distribution block energizes 24-volt circuit in transformer T.
2. Indoor blower motor contactor is energized through normally closed contact of heat relay, stage 1, HR1, completing circuit from C to D.
3. A call for first stage heat closes circuit W1 and C, energizing HR1.
4. Heating contactor No. 1, HC1 is energized through closed air pressure differential switch APS, if used; closed high limit switches AR1 and AR2 and closed HR1 contact.
5. A call for second stage heat closes circuit W2 and C, energizing heat relay stage 2, HR2.
6. Closed HR2 contact energizes Heating Contactor No. 2, HC2.
7. Fusing and high limit switches protect the unit from malfunction.

**Heating, Gas**

See the Gas Furnace instructions for gas furnace wiring and performance data. Additional information can be found on the furnace access door such as the rating and serial label, wiring and lighting instruction label.

The furnace section is made from the control terminal across the N.C. contacts of the combustion pressure switch, energizing pilot ignition time delay relay heater. After delay of approximately 30-50 seconds the time delay relay's switch closes energizing the furnace Venter motor. As the Venter operates, it causes the combustion pressure switch to open. The ignition control energizes a high voltage electric spark, and the pilot valve solenoid in the combination gas valve.

The flame sensor proves the presence of the pilot flame generating a DC current of 0.2 micro-amp (or greater) to the ignition control. The ignition control's internal switch action then de-energizes the spark transformer and makes a circuit to the high fire solenoid of the combination gas valve.

When there is a call for gas furnace operation the discharge air temperature causes a change in the resistance of a discharge air sensor thermistor. The Maxitrol solid state control center measures the sensor's change in resistance and sends a varying DC current to the Modulator-Regulator valve to adjust the gas input as required.
Startup and Operation

**WARNING**

# WARNINGS OF POTENTIAL HAZARDS

1. **DANGER:** Failure to comply will result in severe personal injury or death and/or property damage.
2. **WARNING:** Failure to comply could result in severe personal injury or death and/or property damage.
3. **CAUTION:** Failure to comply could result in minor personal injury and/or property damage.

### 1. Installation Codes

The duct furnaces covered in this manual are design-certified by Intertek Testing Services (ETL) and are approved for use in the United States and Canada for use with natural or propane gas. See the "RATINGS AND SERIAL INFORMATION" label located on the inside of the vestibule access door for the type of gas, correct firing rate and electrical characteristics your furnace is equipped for.
In the United States, these furnaces must be installed in accordance with the standard of the National Fire Protection Association (NFPA) or the National Fuel Gas Code ANSI Z223.1a (latest edition). The National Fuel Gas Code is available from the American Gas Association, 1515 Wilson Boulevard, Arlington, VA. 22209. NFPA Publications are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.
In Canada, installations must be in accordance with the CAN/CGA B149.1 and B149.2 Installation Code for Gas Burning Appliances and Equipment. Canadian Codes are available from the Standards Department, Canadian Gas Association, 55 Scarsdale Road, Don Mills, Ontario M3B-2R3.
Local authorities having jurisdiction should be consulted before installations are made to verify local codes and installation procedures.

**WARNING: To ensure safety, follow the instructions provided on the "LIGHTING INSTRUCTIONS" label located on the inside of the vestibule access door and on page 15 of this instruction manual.**

**WARNING: Read ALL instructions to prevent personal injury or death.**

**WARNING: This manual is for use only by a qualified heating installer/service technician.**

**WARNING: Do not block flow of supply, combustion or ventilation air to the furnace. Should overheating occur or gas supply fail to shut off, DO NOT TURN OFF OR DISCONNECT ELECTRICAL SUPPLY to inducer fan. Instead, SHUT OFF THE GAS SUPPLY at a location external to the appliance.**

**WARNING: To avoid electric shock disconnect all electrical supply before installing or performing maintenance.**

**WARNING: If any of the original factory installed wiring must be replaced it must be replaced with copper wire of the same gauge and insulation rated for a minimum of 105°C.**

**CAUTION: To avoid potentially severe burns, allow furnace to cool before performing maintenance.**

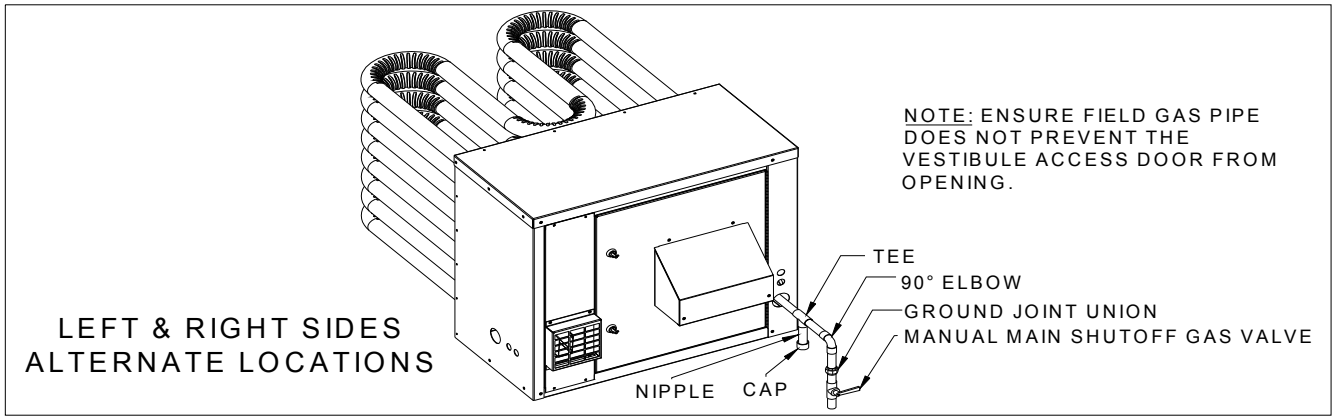
### 2. Chlorines and Harsh Environments

The presence of chlorine vapors in the combustion air of gas-fired heating equipment presents a potential corrosion hazard. Chlorine will, when exposed to flame, precipitate from the compound, usually Freon or degreaser vapors, and go into solution with any condensation that is present in the heat exchanger or associated parts. The result is hydrochloric acid which readily attacks all metals including 409 and 439 stainless steels. Care should be taken to separate these vapors from the combustion process. This may be done by wise location of the furnace with regard to exhausters or prevailing wind direction. Remember, chlorine is heavier than air. This fact should be kept in mind when determining installation locations of heating equipment and building exhaust systems.

# GAS FURNACE (CONT'D)

### 3. Gas Piping (Individual or Multiple Furnace Applications)

All piping must be in accordance with the National Fuel Gas Code ANSI Z223.1a (latest edition), published by the American Gas Association or CAN/CGA-B149.1 and B149.2 (latest edition), published by the Canadian Gas Association. Always refer to local codes where required. Open the vestibule access door. Select the proper gas pipe clearance hole pre-installed in the furnace cabinet in three places depending on the best location for the field gas line. This may require moving the pipe grommet from its factory installed position to the desired location as well as moving the cap to the old location of the pipe grommet to ensure rain water will not get inside the furnace vestibule. All model DF duct furnace use ¾" NPT gas connections to the gas valve. **See Table 1** for proper pipe diameter for the length and Btu input.




Support piping with hangers, not by the furnace. Purge all air from the gas supply piping. Before placing the duct furnace into operation, check the furnace and its gas connections for leaks.

**NOTICE: Close manual main shutoff valve during any pressure testing at less than 13 IN. WC.**
**The gas valve is equipped with two 1/8" NPT taps for gas pressure measurements.**

**Disconnect furnace and gas valve from gas supply piping during any pressure testing greater than 13 IN. WC. Installer must add a 1/8" minimum NPT fitting in this case.**

**WARNING: DO NOT CHECK FOR GAS LEAKS WITH AN OPEN FLAME. Use a bubble test. Failure to use a bubble test or check for leaks can cause severe personal injury, death or substantial property damage.**

Use pipe sealing compound compatible with propane gases. Apply sparingly only to male threads of pipe joints so that pipe sealing compound does not block gas flow.

**WARNING: Failure to apply pipe sealing compound as detailed above can result in severe personal injury, death or substantial property damage.**

**NATURAL GAS:**

Refer to **Table 1** for pipe length and diameter. Base on maximum rated furnace input (divide by 1,000 to obtain cubic feet per hour). **Table 1** is only for gas with specific gravity 0.60, with a pressure drop through the gas piping of 0.30 IN. WC. For additional gas pipe sizing information, refer to ANSI Z223.1 for installations in the United States or for Canadian installations refer to CAN/CGA B149.1 or B149.2.

Natural Gas Required Pressures:

- Maximum: 13 IN. WC
- Minimum: 5 IN. WC
- Manifold gas pressure: 3.5 IN. WC

## GAS FURNACE (CONT'D)

**PROPANE GAS:**

Contact the gas supplier to size pipes, tanks and 100% lockup gas pressure regulator. Adjust propane regulator provided by the gas supplier for 13 IN. WC maximum pressure.

Propane Gas Required Pressures:

- Maximum: 13 IN. WC
- Minimum: 11 IN. WC
- Manifold gas pressure: 10 IN. WC

**(Table #1)**

| **Gas pipe length** (feet) | **Natural Gas (1000 BTU/Cubic Feet) Capacity of pipe for pipe size of:** (Capacity in cubic feet gas per hour) Pipe capacity for 0.60 specific gravity | | | | | **Propane Gas (2550 BTU/Cubic Feet) Capacity of pipe for pipe size of:** (Capacity in cubic feet gas per hour) Pipe capacity for 1.60 specific gravity | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" |
| 10 | 278 | 520 | 1050 | 1600 | 2700 | 122 | 228 | 465 | 687 | 1304 |
| 20 | 190 | 350 | 730 | 1100 | 2100 | 116 | 214 | 445 | 671 | 1281 |
| 30 | 152 | 285 | 590 | 890 | 1650 | 93 | 174 | 360 | 543 | 1007 |
| 40 | 130 | 245 | 500 | 760 | 1450 | 79 | 149 | 305 | 464 | 885 |
| 50 | 115 | 215 | 440 | 670 | 1270 | 70 | 131 | 268 | 409 | 775 |
| 60 | 105 | 195 | 400 | 610 | 1105 | 64 | 119 | 244 | 372 | 674 |
| 70 | 96 | 180 | 370 | 560 | 1050 | 59 | 110 | 226 | 342 | 641 |
| 90 | 84 | 160 | 320 | 490 | 930 | 51 | 98 | 195 | 299 | 567 |
| 100 | 79 | 150 | 305 | 460 | 870 | 48 | 92 | 186 | 281 | 531 |
| 125 | 72 | 130 | 275 | 410 | 780 | 44 | 79 | 168 | 250 | 476 |
| 150 | 64 | 120 | 250 | 380 | 710 | 39 | 73 | 153 | 232 | 433 |
| 175 | 59 | 110 | 225 | 350 | 650 | 36 | 67 | 137 | 214 | 397 |
| 200 | 55 | 100 | 210 | 320 | 610 | 34 | 61 | 128 | 195 | 372 |

## GAS HEAT (CONT'D)

**4a Operation – Lighting instructions**

**WARNING: To ensure safety, follow the instructions provided on the "LIGHTING INSTRUCTIONS" label located inside of the vestibule access door and on this page.**

### FOR YOUR SAFETY READ BEFORE LIGHTING

**WARNING:** If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the pilot by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

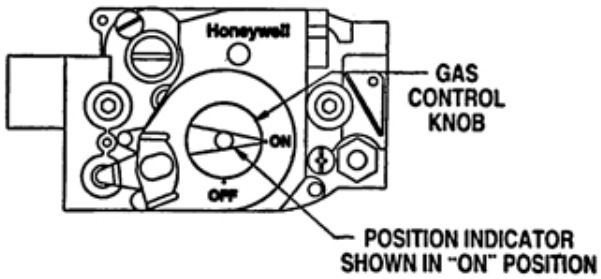
WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to turn the gas control knob. Never use tools. If the knob will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempt repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

### LIGHTING INSTRUCTION

1. STOP! Read the safety information above on this label
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to to light the burner by hand.




5. Open the control access door.
6. Turn the gas control knob clockwise ↻ to "OFF".
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas go to the next step.
8. Turn gas control knob counterclockwise ↺ to "ON"
9. Close the control access door.
10. Turn on all electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

### TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Open the control access door.
4. Push in gas control knob slightly and turn clockwise ↻ to "OFF". Do not force.
5. Close the control access door.

0527P-1394

## GAS HEAT (CONT'D)

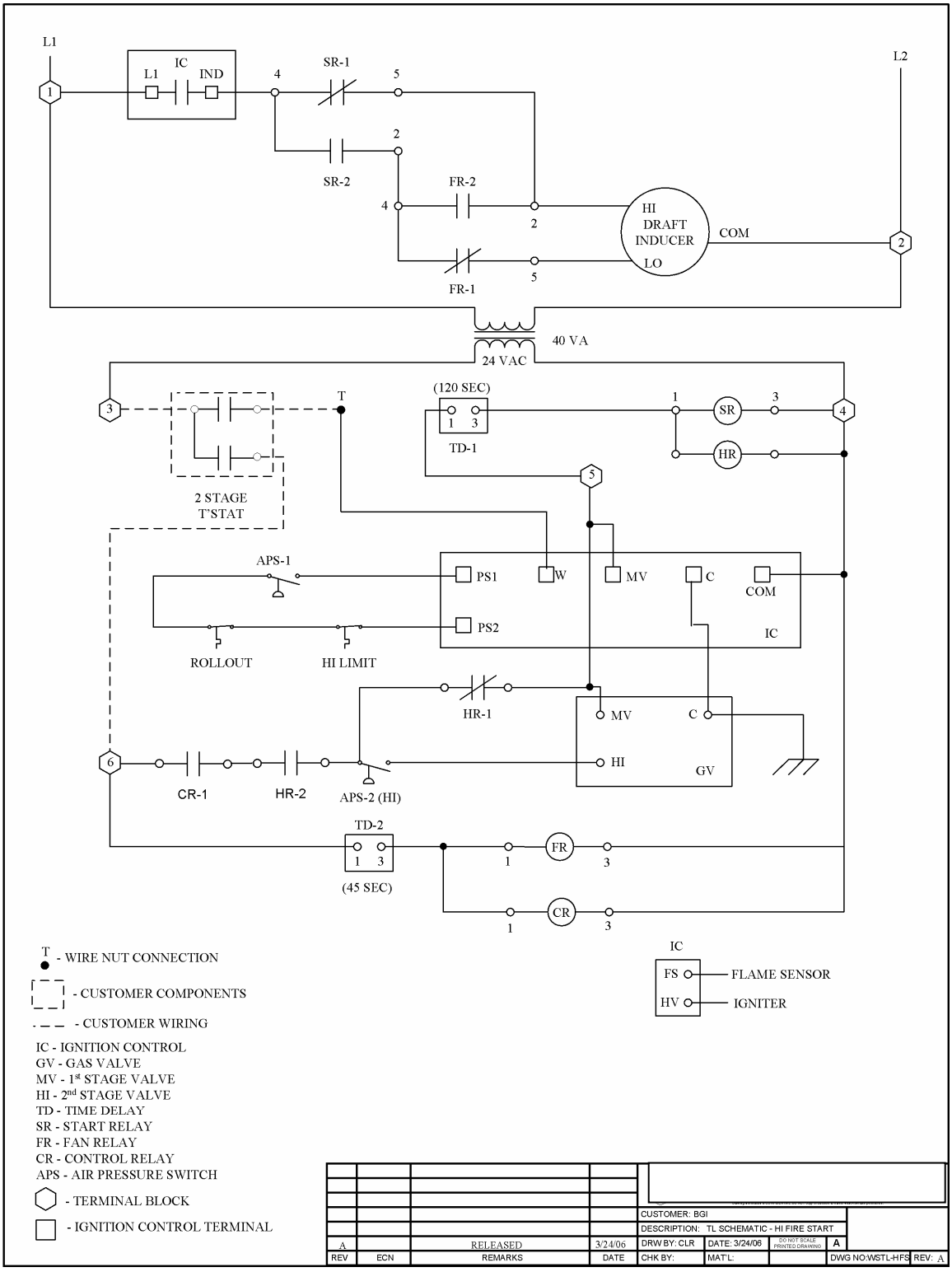
1. **Read Lighting Instructions** on page 15.
2. **Raise** space thermostat to call for heat.
3. **Inducer motor energizes**. After pressure switch proves proper airflow, control module initiates a 30-second purge.
4. **Control module sparks** the direct spark igniter and opens main gas valve.
    a. If main **burners do not light** within 4 seconds, the main gas valve is closed and the spark igniter turned off. The ignition control initiates a 30 second post-purge, then starts a new cycle.
    b. If main **burner does light** and control module senses flame current, spark igniter is turned off and burners stay on until space temperature satisfies the thermostat.
5. During main burner operation:
    a. The ignition control monitors main burner flame current. If signal is lost, the spark igniter is energized and sequence returns to step 4.
    b. If power is interrupted, control system shuts off main gas valve and restarts at step 2 when power is restored.
6. In the event the supply air limit control shuts down the furnace during operation, the control module closes the main gas valve, but keep the inducer energized for 30 seconds post-purge.
7. **Lower** space thermostat setting to stop call for heat. Thermostat is satisfied – Main gas valve is closed inducer is turned off.
8. Furnace is now in the **off cycle**.
9. **Repeat steps 1 through 7 several times to verify correct furnace operation.**
10. Return the space thermostat to normal setting.
11. If so equipped, set thermostat heat anticipator setting to 0.4 amps, adjusted for gas valve and control current.

| LED Status | Code Description |
|---|---|
| Steady On | Good Control-Normal Operation |
| 1 Flash | Open Position Pressure Switch |
| 2 Flashes | Stuck Closed Position Pressure Switch |
| 3 Flashes | Failed Ignition |
| 4 Flashes | Too Many Flame Losses |
| 5 Flashes | Internal Ignition Control Fault |
| 6 Flashes | Too Many Pressure Switch Losses |

# GAS HEAT (CONT'D)

### 4c Operation wiring diagrams

### Figure 3A - 2 Stage Control System Connection Wiring Diagram



# TH - Sequence of Operation –High Fire Start with Two-Stage Burner & Draft Fan Operation

## UT 1016-424 Direct Ignition Control

1. Thermostat (1st stage or 1st and 2nd stage) closes on call for heat.
2. 24 VAC to is supplied to Ignition Control (Terminal W)
3. Draft Inducer high speed is energized through IND and SR-1 (N/C) of the start relay (SR) @ line voltage.
4. Air Switch (APS-1) closes initiating 30 second pre-purge.
5. The draft inducer runs at high-speed and APS-2 will be closed.
6. At end of prepurge period, Terminal MV on the ignition control is energized, powering the 1st stage valve directly and the 2nd stage valve through normally closed contact HR-1 on High-fire relay (HR). The spark igniter and gas valves are energized for a 5 second ignition trial. At the same time TD-1 is energized and begins delay timing (120 seconds).
7. Burners ignite and cross light, operating at maximum input rate (Manifold pressure set at 3.3" to 3.5 " w.c.).
8. Flame is detected by flame sensor, and control operates in steady state heating condition.
9. The unit will continue operating with high-speed inducer and at maximum input for the balance of delay time on TD-1.
10. The thermostat or controller will determine the sequence that occurs when TD-1 completes its timing sequence.
11. If the thermostat is only calling for 1st stage heating, 24VAC is supplied to start relay (SR) and Hi-Fire Relay (HR). Contact HR-1 opens and contact SR-2 closes. Line voltage is now supplied to the low speed draft inducer leg through contact FR-1 and 24 V to 1st stage valve only. Heater operates at low fire and low speed draft inducer.
12. If the 1st stage input rate is insufficient to achieve the set temperature, the 2nd stage contact will close, energizing Terminal 6 and providing 24V to Timer TD-2 and begin its delay timing (45 seconds).
13. At the end of the delay timing 24V is provided to the Fan Relay (FR) and Control Relay (CR)
14. Line voltage is supplied to the high-speed draft inducer leg through FR-2 and 24VAC is supplied to the high fire gas valve (2nd stage) through control relay contact CR-1 (N/O) and APS-2.
15. 2nd stage of Main Gas Valve (HI) opens to the high fire gas pressure position (3.3" to 3.5" w.c.).
16. Operation continues on High fire until the 2nd stage thermostat or controller is satisfied, opening the 2nd stage contact.
17. Power is interrupted without delay to the fan relay (FR) closing contact FR-1 and control relay (CR) opening CR-1.
18. The 2nd stage (high fire) gas valve is de-energized and the low speed fan is energized through FR-1.
19. The heater will continue to run at 1st stage (low fire and low speed inducer) as described in Step 11.
20. If continued operation at low fire does not satisfy the thermostat, steps 12 through 17 will be repeated.
21. If the Thermostat is satisfied while operating at low fire condition, the contact opens interrupting power to the control.
22. If the 1st and 2nd stage contacts on the thermostat or controller close at the same time, the Ignition control and Terminal 6 will be powered at the same time. The 30-second prepurge will start as well as the delay timing on TD-2 (45 seconds). At end of prepurge period, the ignition sequence in (6) above begins. The unit will run at high fire and high-speed inducer. until TD-1 times out.
23. When TD-1 times out HR-1 will open and HR-2 will close. TD-2's timing cycle will also completed and FR and CR will be energized. Contacts FR-2 and CR-1 will already be closed. APS-2 will be closed and the draft inducer will continue to run at high speed. The 2nd stage valve will be energized through HR-2, and the unit will continue to operate at full input rate.
24. The control system is capable of three retrials if the above sequence is interrupted at any point. Refer to following instructions if above sequence does not occur.

---

Operational failures during a call for heat result in "lockout" of the ignition control. Control may be brought out of lockout by cycling the thermostat or power off for a minimum of 5 seconds

25. If the air pressure switch (APS-1) does not close after the inducer is energized or if limit or rollout switch(es) are open, the control will wait one minute for the air switch to close and then lock out. (1 Flash)
26. If the air pressure switch (APS-1) is closed when the inducer is energized, the control will wait one minute for the sir switch to open and then close or lock out will occur. (2 Flashes)
27. If flame sensor indicates presence of flame during purge period, when no flame should be present, the inducer will remain energized but the gas valve off until the cause of the "false flame" is removed. (5 flashes)
28. If ignition is not achieved within 5 seconds, the gas valve is shut off; the inducer keeps running for an interpurge period. Additional ignition trials follow the specified sequence. If all trials (3) for ignition have occurred without proper ignition and flame detection, the control locksout. (3 Flashes)
29. If flame is lost once it has been established, the control will shut off the gas supply within 0.8 second and enter the interpurge period. Control will initiate up to 3 additional trials per normal operation sequence. (4 Flashes)
30. If the control detects power to the gas valve when it should be off, or not powered when it should be on, the control will go into lockout with all outputs off. (5 flashes)

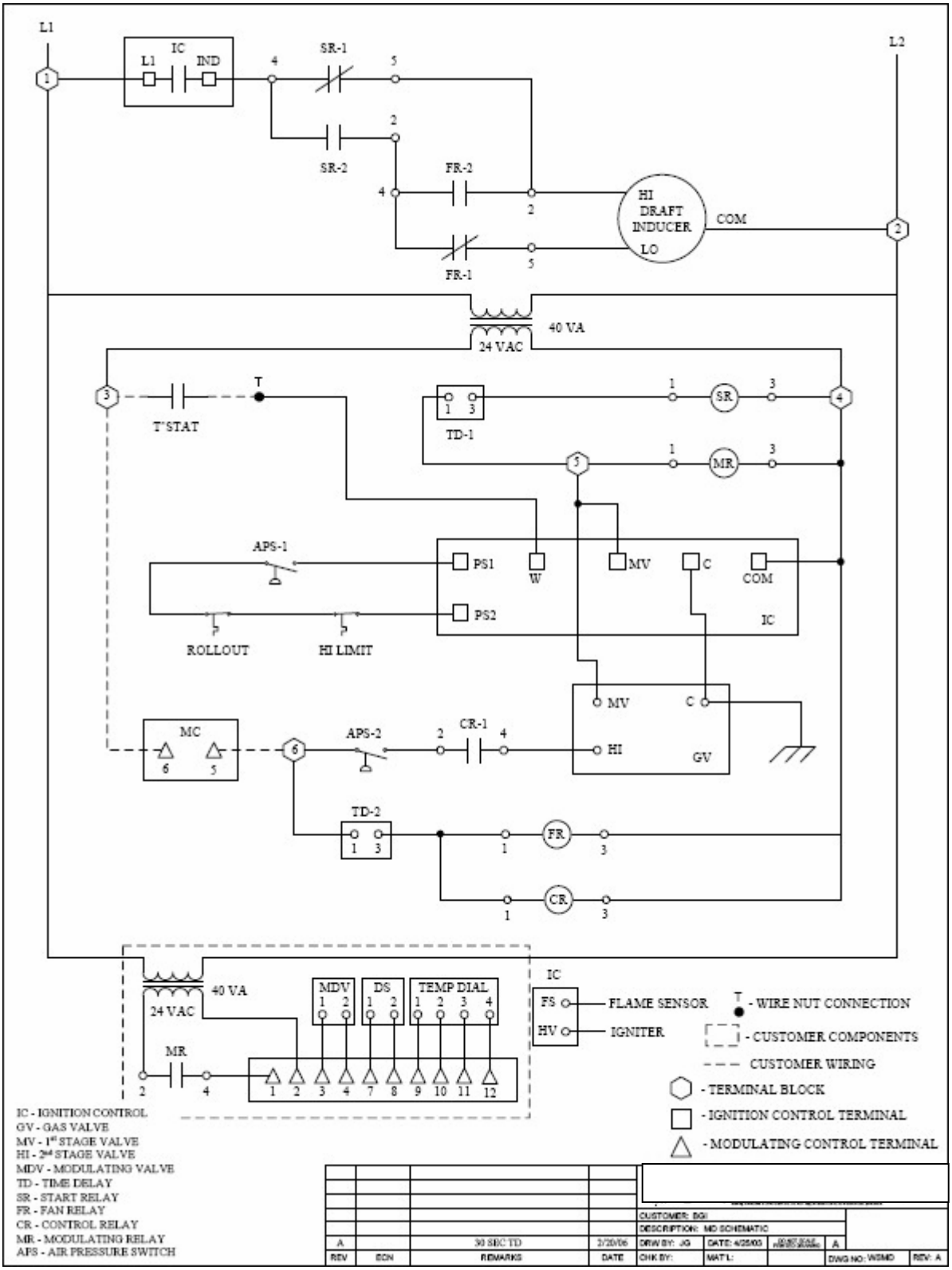
## LED Flash Code Key (UT1016-400 Series)

**On – Steady** Control operation normal
**1 Flash** Open Pressure switch, limit switch or flame rollout switch
**2 Flashes** Pressure switch stuck closed
**3 Flashes** Ignition / flame sense failure
**4 Flashes** Repeated flame losses
**5 Flashes** Internal control fault
**6 Flashes** Repeated pressure switch losses

# GAS HEAT (CONT'D)

### 4e Operation wiring diagrams – Continued

**Figure 4A - 25 to 100% Modulation Control System Connection Wiring Diagram**



## MD - Sequence of Operation –Full Modulation

### UT 1016-424 Direct Ignition Control

1. Thermostat closes on call for heat.
2. 24 VAC to is supplied to Ignition Control (Terminal W)
3. Draft Inducer high speed is energized through IND and SR-1 (N/C) of the start relay (SR) @ line voltage.
4. Air Switch (APS-1) closes initiating 30 second pre-purge.
5. The draft inducer runs at high speed.
6. At end of prepurge period, the Spark and Gas Valve low fire (LO) are energized for a 5 second ignition trial. At the same time TD-1 and MR are energized. TD-1 begins delay timing (30 seconds) and power is provided to the A1093 control thru terminals 1 & 2 on the control, initiating a 30 second timing with the modulating valve in its full open position.
7. Burners ignite at 55% of maximum input rate (Manifold pressure set at 1.1 to 1.2 " w.c.) and carryover.
8. Flame is detected by flame sensor, and control operates in steady state heating condition.
9. The unit will continue firing @ 55% of maximum input and the draft inducer continues to run at high speed for the balance of delay time on TD-1.
10. When TD-1 completes its timing sequence, 24VAC is supplied to start relay (SR) closing contact SR-2. Line voltage is now supplied to the low speed draft inducer leg through contact FR-1. At the same time, the timing in the MC (A1093 amplifier) is completed and the MC will begin to vary voltage to the M520 Modulator Valve (MDV) in response to the duct temperature sensor (DS) and temperature controller (TC) signal.
11. Heater continues in operation at low fire, and input is modulated to provide 25 % to 55% of maximum input.
12. If the 1st stage input rate is insufficient to achieve the set discharge temperature on the controller, the amplifier output to the modulator (MDV) increases above a set point
13. This causes an internal relay to close in the MC, energizing terminal 5 on the MC and powering the time delay (TD-2).
14. The time delay will time out in 30 seconds and energize the Fan Relay (FR) and Control Relay (CR)
15. Line voltage is supplied to the high-speed draft inducer leg through FR-2.
16. When APS-2 is closed, 24VAC is supplied to the high fire (2nd stage) through control relay contact CR-1 (N/O).
17. 2nd stage of Main Gas Valve (HI) opens to the high fire gas pressure position (3.5" w.c.).
18. The MC (A1093) amplifier output to modulator (MDV) varies proportionately based on the DS sensed discharge air temperature versus set discharge temperature on the TC.
19. The modulator valve (MDV) adjusts gas pressure to provide for 55% to 100% of maximum input to maintain selected discharge air temperature.
20. If less than 55% input is required to maintain temperature, the amplifier output to modulator will decrease, causing the internal relay in the MC to open, which de-energizes terminal 5 on the MC (A1093).
21. Power is interrupted without delay to air pressure switch (APS-2), fan relay (FR) and control relay (CR).
22. The 2nd stage (high fire) gas valve is de-energized and the fan relay opens, energizing the low speed fan through FR-1.
23. The heater will continue to run at 1st stage (low fire and low speed inducer) as described in Step 11.
24. If continued operation at low fire does not satisfy the thermostat, steps 12 through 19 will be repeated.
25. If the Thermostat is satisfied while operating at low fire condition, the contact opens interrupting power to control and shutting off the heater.
26. The control system is capable of three retrials if the above sequence is interrupted at any point. Refer to following instructions if above sequence does not occur.

---

Operational failures during a call for heat result in "lockout" of the ignition control. Control may be brought out of lockout by cycling the thermostat or power off for a minimum of 5 seconds

27. If the air pressure switch (APS-1) does not close after the inducer is energized or if limit or rollout switch(es) are open, the control will wait one minute for the air switch to close and then lock out. (1 Flash)
28. If the air pressure switch (APS-1) is closed when the inducer is energized, the control will wait one minute for the sir switch to open and then close or lock out will occur. (2 Flashes)
29. If flame sensor indicates presence of flame during purge period, when no flame should be present, the inducer will remain energized but the gas valve off until the cause of the "false flame" is removed. (5 flashes)
30. If ignition is not achieved within 5 seconds, the gas valve is shut off; the inducer keeps running for an interpurge period. Additional ignition trials follow the specified sequence. If all trials (3) for ignition have occurred without proper ignition and flame detection, the control locksout. (3 Flashes)
31. If flame is lost once it has been established, the control will shut off the gas supply within 0.8 second and enter the interpurge period. Control will initiate up to 3 additional trials per normal operation sequence. (4 Flashes)
32. If the control detects power to the gas valve when it should be off, or not powered when it should be on, the control will go into lockout with all outputs off. (5 flashes)

## LED Flash Code Key (UT1016-400 Series)

| | |
|---|---|
| **On – Steady** | Control operation normal |
| **1 Flash** | Open Pressure switch, limit switch or flame rollout switch |
| **2 Flashes** | Pressure switch stuck closed |
| **3 Flashes** | Ignition / flame sense failure |
| **4 Flashes** | Repeated flame losses |
| **5 Flashes** | Internal control fault |
| **6 Flashes** | Repeated pressure switch losses |

**WARNING: This manual is for use only by a qualified heating installer/service technician.**

**WARNING: To avoid electric shock disconnect all electrical supply before installing or performing maintenance.**

**WARNING: This manual is for use only by a qualified heating installer/service technician.**

**WARNING: To avoid electric shock disconnect all electrical supply before installing or performing maintenance.**

**WARNING: If any of the original factory installed wiring must be replaced it must be replaced with copper wire of the same gauge and insulation rated for a minimum of 105°C.**

**WARNING: This manual is for use only by a qualified heating installer/service technician.**

**WARNING: To avoid electric shock disconnect all electrical supply before installing or performing maintenance.**

### 7 Warranty Information

For specific warranty information see the certificate included in the unit literature package. The limited warranty will be void if any of the following exists.

1. Furnace is in an atmosphere containing chlorinated, halogenated hydrocarbons, flammable vapors or any contaminant (silicone, aluminum oxide, all types of acids, etc.) that adheres to the spark ignition flame sensing rod or cause corrosion beyond what would be expected in fresh outdoor air.
2. Wiring is not in accordance with the diagram furnished with the unit.
3. Unit is installed without the proper clearances to combustibles stated in this manual and on the clearance to combustible and unit information label.
4. The supply air CFM range for the furnace is not adjusted within the ranges specified the TRS literature.
5. The furnace is **not** installed per the instructions in this manual and the labels attached to the model furnace or per local codes having jurisdiction.

## GAS HEAT (CONT'D)

**Table 9 - Repair Parts Available From Addison Products**

| 075 thru 400 Model Furnace Repair Parts | |
|---|---|
| Part Description | Addison Repair v Part Number v |
| Modulation, Valve, Maxitrol Model M520-44 | 0843P-0436 |
| Modulation, Control, Maxitrol Model A1093 | 0843P-0437 |
| Modulation, Mixing Tube (for duct temp. sensor) | 0843P-0424 |
| Modulation, Duct Sensor, Maxitrol Model TS194 | 0843P-0438 |
| Modulation, T-Stat Temp. Dial, Maxitrol Model TD92-0509 | 0843P-0439 |
| Modulation, TD92 T-Stat Mounting Bracket | 0703F-7487 |
| Modulation, System, Relay SPDT, for Gas Safety Valve | 0821N-0162A |
| Modulation, System, Relay Socket for 0821N-0162A | 0821N-0163A |
| All Gas Furnaces, Transformer 208/230 Volt, 40 VA | 0846N-0099 |
| All Gas Furnaces, Transformer 208/230 Volt, 20 VA | 0846N-0108A |
| All Gas Furnaces, Limit Control 140 Degree F. | 0843P-0440 |
| All Gas Furnaces, Relay (2) Per Unit | 0821N-0079A |
| All Gas Furnaces, Brass Condensate Union | 0191P-0051 |
| All Gas Furnaces, Silicone Tubing (Sold by the foot) | 0578P-0020 |
| All Gas Furnaces, Burner Ignition Control (1016-400, UT) | 0843P-0446 |
| All Gas Furnaces, 2 Stage Gas Valve (Set for Natural Gas) | 0843P-0447 |
| All Gas Furnaces, Direct Spark Igniter | 0843P-0448 |
| All Gas Furnace, Spark Igniter Wire Assembly | 0843P-0449 |
| All Gas Furnaces, Flame Sense Rod | 0843P-0450 |
| All Long Tube Furnaces, 2 Speed, Inducer Fan Assembly | 0843P-0451 |
| All Short Tube Furnaces, 2 Speed, Inducer Fan Assembly | 0843P-0452 |
| All Long Tube Furnaces, Tandem Pressure Switch | 0843P-0453 |
| All Short Tube Furnaces, Tandem Pressure Switch | 0843P-0454 |
| All Long Tube Furnaces, Hi Temp. Inducer to Collector Box Gasket | 0191P-0052 |
| All Short Tube Furnaces, Hi Temp. Inducer to Collector Box Gasket | 0191P-0053 |
| | |
| | |

**Contact Addison for repair parts or gas conversion kits using the information provided below**

## ENERGY CONSERVATION WHEEL

Before starting up the unit, check the following:
1. Does the rotor rotate freely by hand?
If not, recheck the seal to determine whether or not it is binding and if so adjust seals following the instructions below.
2. Is the motor rotation correct?
This can be checked by detaching the belts from the drive sheave and bumping the motor. The sheave should be rotating in the direction such that the belt will result in rotation per the exterior markings. If not, rewire the motor.
3.Does the air flow orientation match up to design?
See the identification markings on the cassette and/or refer to the general arrangement drawing to check the four duct connections to the unit.

4. Are the belts on correctly and sufficiently tight?
Belt length is set by the manufacturer. Consult NovelAire if the belt appears too loose.
5. Is the VFD programmed to control the unit and to prevent frost formation?
If not, follow the instructions in the manual accompanying the VFD and/or consult NovelAire.

**Seal checks**
The ECW is provided with a neoprene bulb seal which provides not only an effective seal in both the peripheral and side-to-side sealing directions but also one which is easily adjusted to compensate for seal run-in, shipping misalignment, etc. The neoprene bulb is
attached to a metal reinforced U-shaped neoprene grip. The metal/neoprene grip allows for an expandable grip range which can be moved closer or further from the sealing face as needed. The peripheral bulb seals against the wheel outer band and the inner bulb seals against the wheel face. With the wheel stopped, move seals as close to the sealing surface as possible but without exceeding grip range of bulb seal and without pressing the bulb
down against the seal face. Bump the motor. If the motor will not turn, the seal is too close and should be nudged back where needed. The seal will seek its equilibrium position based on the closest part of the sealing face. Because the seal is meant to be a non-contact seal, small gaps may be seen between seal and sealing surface once the equilibrium position is reached. Seal leakage is meant to be less than 5% at 1 inch of differential between supply and exhaust. Some seal run-in is to be expected, so don't be alarmed by small amounts of wear in the neoprene.

**Variable speed drive (VFD)**
Check the power supply for proper rating. Make sure that the proper jumper orientation is used for the specific control input. Make sure that the unit is programmed for proper input voltage and output voltage.

**Maintenance**

**Bearings**
Small ECW's, (smaller than ECW666) are provided with no maintenance inboard bearings. These bearings should require no maintenance during the life of the equipment. Larger ECW's come equipped with an external flanged bearing which should be greased annually. Use a petroleum based lubricant.

**Drive Motor**
The drive motors should require no maintenance. Replacement motors may be purchased from normal motor distributors such as Grainger, or directly from NovelAire if preferred.

**Drive Belts**
NovelAire ECW belts are multilink belts with individual links constructed of a high performance polyurethane elastomer reinforced with multiple plies of polyester fabric. This belt provides a strong, yet flexible, belting. The multilink feature provides quick, easy servicing or replacement. See the Appendix for belt repair/replacement instructions.

**Seals**
The seals are designed to be durable and require no maintenance other than adjustment, but if seals become worn or damaged they may easily be replaced. The seals are made to clip on the cassette or post metal easily. Call NovelAire for servicing information.

**Wheel**
The wheel is designed to last the life of the equipment. It should be protected by an ASHRAE 30% filter to keep dust and dirt from the heat transfer surface. The wheel is somewhat self cleaning through its normal action of rotating in and out of countercurrent air flow streams. If the wheel becomes dirty, it may be cleaned by blowing out the unit with compressed air (20 psig maximum). In cases of severe filthiness, the wheel may be removed from the cassette and washed with water following wheel removable procedures outlined below:

1. Remove air handler plenum sections so that the front or back of the cassette may be easily accessed and cleared.
2. Support the wheel from the bottom.
3. If the unit is equipped with an external flanged bearing, loosen the Allen screws in the bearing housing that keeps the shaft affixed in the horizontal plane of both bearing, front and back. Remove the shaft clips at the face of the hub from both sides of the shaft. Unbolt one post completely and remove post with bearing completely out. Remove the shaft. Roll the wheel carefully out.

## ENERGY CONSERVATION WHEEL (CONT'D)

4. If the unit is equipped with an internal bearing, unbolt the shaft screw on both sides of the shaft. Unbolt one post completely and remove post. Remove the shaft clips at the face of the hub from both sides of the shaft. Remove the shaft. Roll the wheel out carefully
5. With the wheel out, wash the media carefully with water. Once clean, allow the media to dry out for several hours or days if necessary.
6. Reinstall using the reverse procedure. Run the unit. It may take several hours for the desiccant to dry out and for the wheel to perform normally.

## TROUBLE SHOOTING GUIDES

### General Refrigeration Circuit

| SYMPTOM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| A.Compressor will not start | 1. Power off, loose electrical connections or fuse open. | 1. Check disconnect switch, fuses and wiring. Replace parts or repair as necessary. |
| | 2. Compressor contactor not closing. | 2. Check voltage to contactor coil, transformer, slave relay, system. Replace parts as necessary. |
| | 3. Internal compressor thermal overload open. | 3. If compressor is hot, allow 2 hours to cool. See thermal overload below. |
| | 4. Compressor defective. | 4. Check compressor for electrical failure. Compressor may be seized, check for L.R.A. |
| | 5. High or low pressure switch open or defective. | 5. Check calibration of high or low pressure switch, re-calibrate or replace. |
| | 6. Oil pressure control open or defective. | 6. Check oil failure control. See oil failure control below. |
| B.Compressor starts but cuts out on low pressure switch. | 1. Low refrigerant charge | 1. Check sightglass and check pressures. |
| | 2. Airflow restricted. | 2. Check for dirty evaporator coil, dirty filters, dampers closed, iced evaporator, proper belt adjustment, proper motor amps, duct design |
| | 3. Restriction in liquid line. | 3. Check head pressure, check and adjust TXV if not functioning properly, check pressure drop across filter drier. |
| | 4. Defective low pressure switch. | 4. Check calibration of switch. |
| C. Compressor starts but cuts out on high pressure switch. | 1. Refrigerant overcharge. | 1. Check pressures, charge by sub cooling. |
| | 2. Condenser fan control has incorrect setting. | 2. Check calibration of low ambient control. |
| | 3. Fan motor defective. | 3. Check fan motor. |
| | 4. Condenser coil inlet obstructed or dirty. | 4. Check coil and inlet clearances and for possible air recirculation. |
| | 5. Air or non-condensables in system. | 5. Check high side equalized pressure reading with equivalent outdoor temperature. |
| | 6. Defective high pressure switch. | 6. Check calibration of switch. |
| | 7. Restriction in discharge or liquid line. | 7. Check discharge and liquid line pressures, check TXV. |
| D. Compressor cuts out on thermal overload. | 1. Low voltage. | 1. Check voltage. |
| | 2. Sustained high discharge pressure. | 2. Check running amperage and conditions described under “high discharge pressure.” |
| | 3. High suction and discharge pressures. | 3. Check TXV setting, check for air in system. |
| | 4. Defective compressor overload. | 4. Allow compressor to cool for two hours if compressor is hot. Recheck for open circuit. |
| | 5. Defective run capacitor. | 5. Check run capacitor for compressor and fan motor. |
| | 6. Improper refrigerant charge. | 6. Check subcooling. |
| | 7. Bearings or pistons too tight. | 7. Check for low oil level. |
| | 8. Allow time for compressor to cool. | 8. Check dome temperature of the compressor. |
| E. Compressor cuts out on oil failure control (semi-herm.) | 1. Low oil level. | 1. Check crankcase sightglass - add oil to bring level to midway in sightglass. |
| | 2. Defective oil pump. | 2. Check oil pump. |
| | 3. Defective control. | 3. Check oil failure control for calibration. |
| | 4. Liquid refrigerant is entering crankcase. | 4. Compressor will be wet. Check crankcase heater or cause for liquid feedback. |
| F. Noisy compressor. | 1. Scroll compressors are rotation sensitive. | 1. Reverse wiring at disconnect switch, recheck for correct evaporator blower rotation. |
| | 2. Refrigerant overcharge. | 2. Check pressures and subcooling. |
| | 3. Excessive or insufficient oil in compressor | 3. Check oil level in hermetic compressors. Check total ( crankcase. |
| | 4. Liquid floodback. | 4. Check TXV setting. Check for refrigerant overcharge. oil as recommended. |
| | 5. Tubing rattle. | 5. Dampen tubing vibration by taping or clamping. Bend tubing away from contact where possible. |
| | 6. Compressor defective. | 6. Check internal parts (semi-herm.) |

## TROUBLE SHOOTING GUIDES CONTINUED

### General Refrigeration Circuit Continued

| SYMPTOM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| G.Noisy unit operation. | 1.Blower rotational noise. | 1. Check blower, motor and drive for faulty adjustment or noisy bearings, loose parts, blower out of balance. |
| | 2.Air noise. | 2. Check ductwork. Air velocity too high. |
| | 3.Chattering contactor. | 3. Check for adequate control voltage, check for shorts or breaks, check thermostat, check contact points. |
| | 4.Tubing rattle. | 4. Dampen by taping or clamping, bend tubing away from contact when possible. |
| H.High suction pressure. | 1.Excessive load on evaporator coil. | 1. Check for high entering wet bulb temperature. Check for excessive airflow. |
| | 2.Broken compressor valves (Scroll compressors do not have valves.) | 2. Remove head (semi-herm.) inspect reeds. Scroll compressors should not be pumped down below 5 psig. |
| | 3.Compressor is unloaded. | 3. Check head pressure, check and adjust TXV if not functioning properly, check pressure drop across filter drier. Re-calibrate unloader pressure switch. |
| | 4.Leaking check valve. | 4. Check temperature across check valve. |
| | 5.Expansion valve not secured to suction line or TXV defective. | 5. Check the TXV, ensure bulb is insulated. |
| I.High discharge pressure. | 1.TXV setting. | 1. Check TXV setting and calibrate superheat. |
| | 2.Air inlet to condenser dirty or obstructed. | 2. Check for proper clearances and possible air recirculating. |
| | 3.Condenser fan motor defective. | 3. Check condenser fan motor and run capacitor. |
| | 4.Condenser fan control has incorrect setting. | 4. Check calibration of low ambient head pressure control. |
| J.Suction pressure too low. | 1.Refrigerant undercharge. | 1. Check pressures and subcooling. |
| | 2.Blower running backward. | 2. Interchange any two wires from 3 phase disconnect. |
| | 3.Loose blower, pulley or belts. | 3. Check drive pulley alignment, belt tension. |
| | 4.Defective or improperly adjusted expansion valve. | 4. Check superheat and adjust TXV. |
| | 5.Dirty filter. | 5. Check filter and evaporator coil. |
| | 6.Too little air flow or low entering air temperature. | 6. Check airflow and entering air wet bulb conditions. |
| | 7.Restriction in suction or liquid line. | 7. Check refrigerant circuit for restriction |
| K.Head pressure too low. | 1.Insufficient refrigerant charge. | 1. Check subcooling, check for leak. |
| | 2.Defective or improperly adjusted expansion valve. | 2. Check sub cooling and adjust TXV. |
| | 3.Low suction pressure. | 3. See “suction pressure too low” above. |
| | 4.Condenser fan control setting. | 4. Check calibration of low ambient control. |
| | 5.Defective compressor. | 5. See “high suction pressure” above. |
| L.Compressor short cycles. | 1.Thermostat location or malfunction. | 1. Check thermostat, check heat anticipator setting. |
| | 2.Improper refrigerant charge. | 2. Check subcooling, verify superheat. |
| | 3.Defective high or low pressure control. | 3. Check high or low pressure switch. |
| | 4.Liquid floodback. | 4. Possible tight bearings. |
| | 5.Defective expansion valve. | 5. Check TXV and superheat. |
| | 6.Poor air distribution. | 6. Check ductwork for recirculating. |
| | 7.High discharge pressure. | 7. See “high discharge pressure” above. |
| | 8.Leaking discharge valves in compressor. | 8. See “high suction pressure” above. |
| M.Running cycle too long or unit operates continuously. | 1.Refrigeration undercharged. | 1. Check subcooling. |
| | 2.Dirty filter or evaporator coil. | 2. Check filter, coil and airflow. |
| | 3Dirty or clogged condenser coil. | 3. Check coil and airflow. |
| | 4.Air or other non-condensables in system. | 4. Check equalized high side pressure with equivalent outdoor temperature. |
| | 5.Defective compressor. | 5. Check compressor for proper operation. |
| | 6.Restriction in suction and liquid line. | 6. Check for restrictions in refrigerant circuit. |
| | 7.Control contacts stuck. | 7. Check thermostat, shorts in wiring, slave relay compressor contactor |

## TROUBLE SHOOTING GUIDES CONTINUED

### General Refrigeration Circuit Continued

| SYMPTOM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| N. Supply air temperature too high. | 1. Refrigerant undercharge or leak in system.<br>2. Evaporator plugged with dirt or ice.<br>3. Improperly adjusted or defective expansion valve.<br>4. Defective compressor.<br>5. High discharge pressure.<br>6. Airflow is too high. | 1. Check subcooling and check for leaks.<br>2. Check evaporator, airflow and filter.<br>3. Check superheat and adjust TXV, check bulb.<br>4. Check compressor for proper operation.<br>5. See “high discharge pressure” above.<br>6. Check external static pressure. |
| O. Supply air temperature | 1. Airflow is too low.<br>2. Return air temperature too low. | 1. Check evaporator coil, filter, check for closed dampers, grills, drive for loose parts, belts, misalignment, check external static pressure.<br>2. Check entering air wet bulb conditions. |
| P. Liquid line too hot. | 1. Refrigerant undercharge.<br>2. High discharge pressure. | 1. Adjust the charge by subcooling.<br>2. See “high discharge pressure” above. |
| Q. Liquid line frosted or wet. | 1. Restriction in liquid line. | 1. Restriction upstream of point of frosting. |
| R. Suction line frosting. | 1. Insufficient evaporator air flow.<br>2. Restriction in suction or liquid line.<br>3. Malfunctioning or defective expansion valve. | 1. Check airflow, check drive for loose parts, belts, closed dampers.<br>2. Restriction upstream of point of frosting.<br>3. Check bulb of TXV. |
| S. Blower motor not running. | 1. Improper wiring.<br>2. Defective motor.<br>3. Defective thermostat or control circuit.<br>4. Motor off on overload protector. | 1. Check wiring diagrams.<br>2. Check motor and controller.<br>3. Check control circuit.<br>4. Allow motor to cool, check amperage. |

### Varispeed™ Condenser Head Pressure Control

| SYMPTOM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| A. No fan operation. | 1. Input pressure is below operating range.<br>2. No 24 volt control voltage<br>3. No input pressure to control.<br>4. Bad fan motor.<br>5. Pressure transducer problem. | 1. No problem, normal operation.<br>2. Check for 24 V AC at control.<br>3. Check alignment of capillary fitting. Schrader valve depressor must depress Schrader valve enough to allow pressure into capillary.<br>4. Disconnect power. Place a jumper from L1 to M1 and connect power. If fan does not start, motor is bad and should be replaced.<br>5. Disconnect 6 pin connector from right side of control. Place a jumper wire between third pin from the top and bottom pin on the control (not the cable). If fan goes to full speed, check for input pressure. If it has been determined there is adequate pressure, the transducer is bad and the control must be replaced. |
| B. Fan stops when pressure reaches the high end of the operating range. | 1. Control is not wired correctly. | 1. See wiring diagrams. |
| C. No fan modulation (On-Off Operation) | 1. Control is not wired correctly. | 1. See wiring diagrams. |
| D. Fan starts at full speed. | 1. Control is not wired correctly. | 1. See wiring diagrams. |
| E. Erratic fan operation. | 1. Control is not wired correctly.<br>2. Dirty or blocked condenser coil. | 1. Check to see if control voltage (24 V AC) is on same phase as motor.<br>2. Clean condenser coil. |
| F. Fan motor is cycling on thermal overload | 1. Dirty or blocked condenser coil.<br>2. Wrong motor for fan speed control application. | 1. Clean condenser coil.<br>2. Replace with motor approved for fan speed control application. |

## TROUBLE SHOOTING GUIDES CONTINUED

### Hot Gas Bypass Regulator

| SYMPTOM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| A. Erratic pressure control. | 1. Defective regulator.<br>2. Dirt causing regulator to bind.<br>3. Power source to hot gas solenoid or operation of the solenoid is intermittent. | 1. Replace defective part.<br>2. Disassemble regulator and clean internal parts. Install strainer.<br>3. Determine if problem is caused by supply voltage, solenoid, or excessive MOPD. Make changes necessary to correct problem. |
| B. Regulator leakage. | 1. Dirt in regulator causing seat to remain open.<br>2. Worn or eroded seating surface on regulator. | 1. Clean the regulator. Install strainer.<br>2. Replace defective part. |
| C. Regulator hunting (chattering) large fluctuations in controlled pressures. | 1. Regulator is oversized.<br>2. Regulator and liquid injection Thermo Valve have control interaction.<br>3. Regulator and cylinder unloaders have | 1. Contact Addison manufacturer for correctly sized regulator.<br>2. Increase superheat setting. Dampen bulb response by repositioning.<br>3. Differential should be increased between the controls by lowering the regulator's set point. |
| D. Regulator will not provide pressure control. | 1. Regulator seat is restricted.<br>2. Pressure adjusting stem is set at a point so high that suction pressure never reaches the set point.<br>3. Strainer clogged at the regulator inlet.<br>4. MOPD exceeded across the solenoid or loss of source voltage.<br>5. Solenoid coil burned out.<br>6. Wrong type distributor for hot gas bypass to the evaporator. | 1. Locate and remove stoppage. Install strainer.<br>2. Readjust the regulator.<br>3. Locate and remove stoppage.<br>4. Replace solenoid or troubleshoot the electrical problem.<br>5. Replace coil.<br>6. Install proper Venturi - Flo type distributor for low pressure drop. |
| E. Regulator fails to close. | 1. Dirt under seat of the regulator.<br>2. Diaphragm failure (leakage around the adjusting stem)<br>3. Pressure adjusting stem is set at a point so high that suction never reaches the set point.<br>4. Blocked external equalizer passage.<br>5. Worn or eroded regulator seat. | 1. Locate and remove stoppage. Install strainer or drier filter.<br>2. Replace defective parts.<br>3. Readjust the regulator.<br>4. Locate and remove stoppage. Install strainer.<br>5. Replace defective part. |

## TROUBLE SHOOTING GUIDES CONTINUED

### General Gas Furnace

See DF Instruction Manual Included with gas furnace(s) for trouble shooting details.

## TROUBLE SHOOTING GUIDES CONTINUED

### Maxitrol-Regulator

| SYMPTOM | POSSIBLE CAUSE | FIELD TEST | REMEDY |
|---|---|---|---|
| A. Automatic control valve will not close despite full range of modulating voltage at terminals 1 and 2. | 1. Faulty automatic control valve.<br>2. Installation wiring error.<br>3. Amplifier is faulty. | 1. Remove wire from valve, if valve doesn't close —valve is faulty.<br>2. Remove wire from amplifier terminal 10 and 11. If valve remains open check for miswiring.<br>3. If AC voltage will not drop to zero at terminals 8 and 11 when DC voltage at terminals 1 and 2 is above 20 V DC, amplifier is faulty. | 1. Replace automatic control valve.<br>2. Correct wiring.<br>3. Replace amplifier. |
| B. Automatic control valve will not open despite full range of modulating voltage at terminals 1 and 2. | 1. Faulty automatic control valve.<br>2. Open wire to automatic valve.<br>3. Amplifier is faulty. | 1. Read voltage across valve terminals. If 24 V AC, valve is faulty.<br>2. Read voltage across terminals 8 and 11 on amplifier. If 24V AC, check for open circuit to automatic valve. If space temperature is less than 60° or greater than 85°F.<br>3. If AC voltage reading remains zero when DC voltage at terminals 1 and 2 is below 14V DC, amplifier is faulty. If space temperature is less than 60° or greater than 85°F. | 1. Replace automatic control valve.<br>2. Correct wiring.<br>3. Replace amplifier. |
| C. No gas flow. | 1. Faulty power supply.<br>2. MR valve installed backward. | 1. Read voltage at amplifier terminals 8 and 14 (24 V AC).<br>2. Arrow on MR valve should point in direction of gas flow. | 1. Power supply must be 24V AC.<br>2. Install properly. |
| D. Continuous high fire. | 1. Room Override Thermostat, if used, calls for heat.<br>2. Open circuit in sensing and setting circuit. | 1. Remove T115 wires from amplifier terminals 3 and 14.<br>2. Disconnect and measure across wires connected to amplifier between terminals 3 and 4 (A1010). Should read between 8,000 and 12,000 ohms. | 1. If proper operation is obtained, check thermostat wiring for shorts. Rotate thermostat dial above and below room temperature to prove thermostat function.<br>2. If above 12,000 ohms check circuit for open or loose wires. |
| E. Continuous high fire but automatic valve cycles. | 1. Open circuit in wiring to MR valve.<br>2. Plunger jammed or installed upside down.<br>3. Faulty MR valve. | 1. Check wiring for defects.<br>2. Plunger should be smooth and clean and operate freely in solenoid sleeve.<br>3. Measure voltage across MR valve. | 1. Replace wiring if necessary.<br>2. Clean or replace plunger. |
| F. Furnace won't activate due to constant high modulating voltage (above 17 VDC). | 1. Short circuit in sensing and setting circuit | 1. Disconnect and measure across wires connected to amplifier terminals 3 and 4 (A1010). Should read between 8,000 and 12,000 ohms. | 1. If below 8,000 ohms check circuit for shorts or miswiring. |

## TROUBLE SHOOTING GUIDES CONTINUED
## Maxitrol-Regulator Continued

| SYMPTOM | POSSIBLE CAUSE | FIELD TEST | REMEDY |
|---|---|---|---|
| G. Continuous low or medium fire, but automatic valve cycles correctly. | 1. Heat load requires low fire only. | 1. Increase temperature setting 10 degrees. | 1. If heater goes to high fire, system is working correctly. |
| | 2. Plunger and/or maximum spring missing. | 2. Check for parts. | 2. Install correct parts. |
| | 3. Jammed plunger. | 3. Examine. Plunger should be clean, smooth, and operate freely in solenoid sleeve. | 3. Clean, or replace plunger if necessary. |
| | 4. Other valves faults. | 4. Remove wire from MR valve. | 4. If MR valve remains on low fire, valve may be faulty. |
| | 5. Inadequate supply pressure. | 5. Remove max. adjustment spring from MR valve, push down on plunger. Insufficient manifold pressure with furnace operating indicates supply is too low. | 5. Check for obstruction in gas pipe ahead of controls. Increase gas pressure if possible. |
| H. Incorrect discharge air temperature. | 1. Calibration. | 1. Check seal on calibration potentiometer. | 1. Recalibrate per “Temperature Calibration” procedure. |
| I. Erratic or severely pulsating flame. | 1. Dirty or sticking plunger. | 1. Examine. Plunger should be clean, smooth, and operate freely in solenoid sleeve. | 1. Clean or replace plunger if necessary. |
| | 2. Loose or broken wiring. | 2. Inspect wiring. | 2. Correct wiring. |
| | 3. Erratic voltage. | 3. Observe DC voltage across amplifier terminals 1 and 2. | 3. If erratic or pulsating DC voltage is observed and wiring shows no defects, replace amplifier. If erratic or pulsating voltage continues, contact Addison. |

*Control circuits external to the Maxitrol-Regulator and Amplifier can cause burner malfunction. Always check gas valve to be certain it is turned on, and check limit controls for normal operation.

# Addison Limited Warranty

The following is the Limited Warranty provided by Addison (a trade name of RG Adding LLC, herein "Seller") to any customer (herein "Buyer") for any goods an services (a "deliverable"):

1. Limited Warranty. Seller provides such warranty as set forth in any instruction manual provided with the deliverable, or if there is no such warranty or instruction manual, Seller warrants to Buyer that such deliverable will be free from defects in material and workmanship (in either case the "Limited Warranty"). The Limited Warranty is not transferable or assignable and any such transfer or assignment is void. If Buyer is authorized by Seller to be a reseller of deliverables that are goods or an installing contractor, the Limited Warranty may be passed through to Buyer's customer, but Buyer shall not alter the Limited Warranty in any way.

   The Limited Warranty does not cover service trips, service calls, costs of removing and reinstalling components and other labor charges or the cost of shipment of replacement parts. The Limited Warranty excludes damages due to (i) failure to install, operate or maintain deliverables as directed in any instruction manual provided or under applicable law or regulation, (ii) misuse, abuse, neglect or modification of a deliverable or any controls, in any way, (iii) improper service, use of replacement parts or accessories that are not specified by Seller, (iv) improper installation, or any relocation of a deliverable after initial installation, (v) incorrect supply, accident, fire, flood, acts of God or other casualty, (vi) use of a deliverable other than its intended purpose and normal usage, (vii) use of a deliverable in a corrosive atmosphere or any atmosphere containing contaminants, (viii) shipment of a deliverable (all claims must be filed with carrier), (ix) use of a deliverable in the vicinity of combustible or explosive materials, (x) any defect in a deliverable arising from a drawing, design, or specification supplied by or on behalf of Buyer, (xi) failure of parts, components, services or hook-ups not supplied by Seller, (xii) a deliverable not properly installed by a qualified contractor experienced in installing the deliverable, (xiii) inadequate air for combustion, (xiv) improper or rapid cycling of the compressor. No warranty coverage is applicable if Buyer cannot prove original purchase date and required annual maintenance history, the data plate and/or serial number on any deliverable is removed, defaced, modified or altered in any way, or Seller is not permitted to inspect the damaged deliverable.

   In addition to the foregoing limitations, the Limited Warranty is not applicable to goods that are not gas fired infrared (radiant) heaters if the failure is due to (a) the deliverable having been allowed to exceed its proper temperature limits due to improper operation or maintenance or inadequate air circulation over it, or (b) damage is due to not having a stainless steel secondary if 50% or more of outside air is introduced, temperature rise at minimum firing rate is below 10° F. or the air temperature entering the heat exchanger is below 45° F.

   Wear items or consumables such as belts, filters, coolant, etc. are not included under the Limited Warranty. The Limited Warranty does not cover the equipment and materials not manufactured by Seller; the warranty for those items shall be limited to only such warranty as that furnished by the manufacturer thereof as may properly be assigned to Buyer.

   No person other than an executive officer of Seller has authority to change or extend the terms of the Limited Warranty, and Buyer confirms that no other warranty terms have been extended by Seller or are applicable to the deliverables. Change or extensions to the terms of the Limited Warranty are binding only if confirmed in writing by Seller's duly authorized executive officer.

2. Limitation on Warranties/Damages. Any claim under the Limited Warranty set forth in section 1 must be made within the following time periods or such claim is waived: (a) for gas fired infrared (radiant) heaters and gas fired heat exchangers, the claim must be made within thirty-six (36) months from the date of purchase by Buyer or forty-two (42) months from date of shipment by Seller, whichever occurs first; (b) for compressors, the claim must be made within sixty (60) months from the date of purchase by Buyer, (c) for replacement parts, the claim must be made within the later of twelve (12) months from the date of shipment by Seller or any Limited Warranty period remaining on the deliverable with which the replacement part is used or is intended to be used; and (d) for all other deliverables, the claim must be made within twelve (12) months from the date of start-up or eighteen (18) months from the date of shipment by Seller, whichever occurs first. For all deliverables (other than replacement parts) that require installation and start-up, the otherwise applicable warranty period shall be extended by an additional four (4) months if (i) the installation and start-up is performed by a contractor on Seller's current list of contractors who have successfully completed Seller's current installation course for that deliverable and (ii) full details of the installation and start-up are provided to Seller at or prior to the time any warranty claim is made.

   Except as set forth in these terms, Seller makes no representation or warranty of any type, express or implied, including any warranty of merchantability, warranty of fitness for a particular purpose or warranty of

non-infringement or warranty arising from any course of dealing, course of performance or usage of trade.

Seller will not under any circumstances, be liable for any special, indirect, punitive or consequential damages (even if Seller has been notified of the possibility of such damages) resulting from or related to a product including, without limitation, any loss of profits, or loss of opportunity. Some jurisdictions do not allow limitations on warranties or damages, so this limitation or exclusion may not apply to Buyer.

3. Remedy. Seller's sole obligation and Buyer's exclusive remedy with respect to any deliverable, whether arising in contract, tort (including negligence), strict liability, breach of warranty or otherwise, is limited to Seller, at its discretion, replacing or repairing the defective deliverable, providing replacement parts or issuing Buyer a credit equal to the price paid to Seller for such defective deliverable, and in no event will Seller's liability exceed the amounts actually received by Seller for any deliverable.

   This exclusive remedy shall not be deemed to have failed its essential purpose so long as Seller is willing and able to repair or replace a defective deliverable or parts thereof or, also at Seller's option, to refund the price received by Seller for the defective deliverable, within a reasonable time after Buyer demonstrates that a defect exists in accordance with the terms and limitations of the Limited Warranty.

   If you have questions, contact your installing professional. Should you need replacement parts or have additional questions, call or write Addison:
   U.S.A.
   7050 Overland Road,
   Orlando, FL 32810
   407.292.4400
   on the web at: www.addison-hvac.com

**Installation Code and Annual Inspections:**
All installations and service of ADDISON equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Addison and conform to all requirements set forth in the ADDISON manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment. To help facilitate optimum performance and safety, Addison recommends that a qualified contractor annually inspect your ADDISON equipment and perform service where necessary, using only replacement parts sold and supplied by ADDISON.

**Further Information:** Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through ADDISON representatives. Please contact us for any further information you may require, including the Installation, Operation and Service Manual.

**These products are not for residential use.**

**This document is intended to assist licensed professionals in the exercise of their professional judgment.**

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Printed in the USA #527I-0BJS 0308