

Model ERGW

Installation Instructions for Outdoor Unit of the HTM Plus Remote Heating System

IMPORTANT TO THE INSTALLER

Before installing this unit please read this manual to familiarize yourself on the specific items which must be adhered to such as maximum external static pressure to unit, air temperature rise, min. or max. cfm and motor speed connections. Affix these Installation Instructions adjacent to the furnace.

TO THE OWNER

It is important that you fill out the owner's registration card and mail it today. When filling in the registration card, be sure to include the Model, Manufacturing and Serial Numbers, plus the installation date.

Your warranty certificate is also supplied with the unit. Read the warranty carefully and note what is covered. Keep the warranty certificate in a safe place, so you can find it, if necessary.

If additional operating instructions are required, call the dealer through whom the purchase was made.

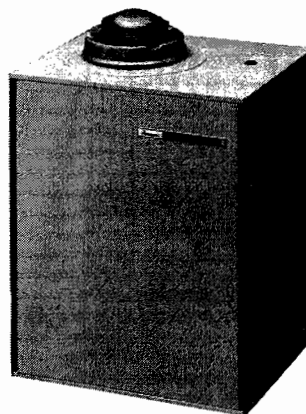
Keep this literature in a safe place for future reference.

! WARNING

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the furnace before shutting off the electrical supply.

! WARNING

FOR YOUR SAFETY
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.



! WARNING

This product contains or produces a chemical or chemicals which may cause serious illness or death and which are known to the State of California to cause cancer, birth defects or other reproductive harm.

! WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage or death. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

! WARNING

FOR YOUR SAFETY WHAT TO DO IF YOU SMELL GAS

- Extinguish any open flame.
- Open windows.
- 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.



RECOGNIZE THIS SYMBOL AS A SAFETY PRECAUTION.

THE INSTALLATION AND SERVICING OF THIS EQUIPMENT SHOULD BE PERFORMED ONLY BY QUALIFIED, EXPERIENCED TECHNICIANS.

A3414411

Due to policy of continual product improvement, the right is reserved to change specifications and design without notice.

SPECIFICATIONS

OUTDOOR HEATING UNIT		
Model	ERGW00121B	ERGW00151B
Heating Max. BTUH Input	120,000	150,000
Heating Capacity BTUH/AFUE**	99,000/82.4	125,000/81.4
Heating Capacity Input	100,000*	—
Heating Capacity BTUH/AFUE**	84,000/83.4	—
Heating Min. BTUH Input	80,000	130,000
Heating Capacity BTUH/AFUE**	67,000/84.2	110,000/82.4
Pump and Combustion Blower Motor H.P./RPM	1/3/3300	1/3/3300
Ignition—Ignitor Warm Up, Seconds	45	45
Lock Out Timing, Seconds	15	15
Gas Connection Male IPS	1/2"	1/2"
Electrical Data — 60 Hertz (a)		
Voltage Single Phase	115	115
Maximum Over Current Protection, Amps	15	15
Maximum Input Amps	8.1	8.1
Wire—Number and Minimum Size (AWG)	(2) 14	(2) 14
Ground Wire, AWG (Chassis Ground)	(1) 14	(1) 14
Shipping Weight, Approximate Pounds	92	96
Net Weight, Approximate Pounds	83	89

*Input as shipped from factory with natural gas orifice plate. Unit may be re-rated with factory supplied orifice plates. Unit may be field converted for propane gas, with factory supplied orifices.

**Amana tests based on DOE test procedures. See nameplate for CGA certified output ratings. AFUE ratings shown are for natural gas.

†Dependent on relative location of outdoor and indoor sections.

OUTDOOR UNIT CLEARANCE

Minimum:

Front: 36"

Sides 6"

Rear 12"

Top: Un-obstructed 36"
Roof overhang permissible

*For additional clearances, refer to page 4 and the "Outdoor Unit Location" section.

APPLICATION NOTES

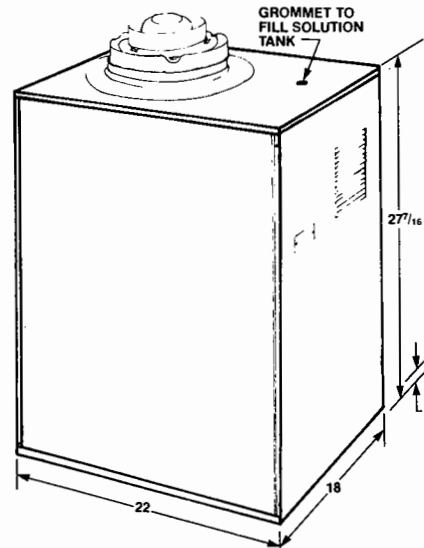


CAUTION

Property damage hazard — To avoid the possibilities of property damage, unsatisfactory system performance, and/or loss of warranty coverage, do not use the ERGW in non-standard applications.

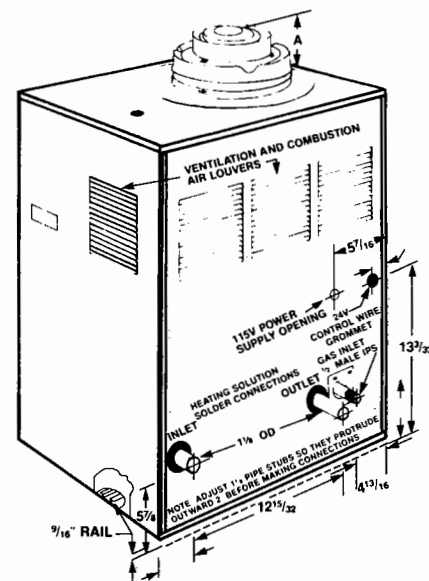
Non-standard applications include, but not limited to, the following:

- Swimming pool heating
- Hot tub heating
- Hydronic heating



DIMENSIONS

MODEL	A
ERGW00121B	3 7/8
ERGW00151B	6 3/8



- Commercial water heating
- ERGW plus any heat exchanger not provided by Amana
- Installations in which the temperature of the air entering the EBWC or ECSW coil when heating is less than 55F or more than 100F.
- Installations in which more than one heat exchanger receives heated glycol solution at any one time.
- Installations in which any heat exchanger is located more than fifteen (15) feet vertically above the ERGW.
- Elevation of the glycol expansion tank to the "high point" of the glycol system, or removal of the tank from the system.
- Use of heat transfer solutions other than non-diluted Amana HTM Heat Transfer Solutions (ethylene glycol or propylene glycol).

DESCRIPTION

The Remote HTM® Plus System is a unique means of heating which supplies warm air through a duct system and having the option of also supplying domestic hot water. The gas heating unit is installed outdoors and, therefore, no indoor flue is required. A glycol solution heated in the HTM (Heat Transfer Module) is pumped through tubing to an indoor air handling unit which consists of a finned tube coil and blower to supply warm air through a duct system. A valve may be installed which will divert the heating glycol solution to a finned tube coil immersed inside a hot water tank to supply domestic hot water.

To assure that your unit operates safely and efficiently, it must be installed, operated, and maintained in accordance with these installation and operating instructions, all local building codes and ordinances, or, in their absence, with the latest edition of the National Fuel Gas Code, ANSI Z223.1*, in Canada with the CAN/CGA-B149 Installation Codes, local plumbing or waste water codes, and other applicable local codes..

The nominal heating capacity of the system should be greater than or equal to the total heat loss of the area to be heated. The total heat loss should be calculated by an approved method or in accordance with "A.S.H.R.A.E. Guide" or "Manual J-Load Calculations" published by the Air Conditioning Contractors of America.

*Obtain from:
American National Standards Institute
1430 Broadway
New York, NY 10018

SYSTEM

Outdoor sections designed to be matched-up per below table. Follow Installation Instructions provided with each section. Before installing any one of these units, the installation instructions for each of the sections to be used must be referenced.

OUTDOOR SECTION	INDOOR SECTION	OPT. WATER HEATER
ERGW00121 (A,B)	EBWC3612M	EGWH0040D (A,B)
ERGW00151 (A,B)	EBWC6015M	EGWH0040 C A

If desired, indoor section EBWC can be replaced by indoor coil ECSW12HOMA plus an air handler by others. The air handler must be able to move enough air to produce a temperature rise of 60 to 90°F across the ECSW coil.

RECEIVING

Upon receipt of the unit, the equipment should be inspected for any damage which may have occurred in transit. If damage is obvious, it should be noted on the carrier's freight bill and a request for inspection and settlement of claim made at once. Units are usually shipped F.O.B., and it is the consignee's responsibility to file damage claims.

CHECKLIST - DATA SHEET

A test data sheet is found on the back cover of this manual. The installer may wish to use it as a checklist to follow as the system is installed and started up.

VENT CAP SEAL

Silicon RTV (Room Temperature Vulcanizing) Sealant should be used to fill gaps between flue cap, wrapper, and O rings, if required. Inspect after assembly to determine that all gaps have been sealed. Leaks can be detected by placing an inspection mirror below flue cap seal. The mirror is then moved around perimeter of flue cap. Look for fogging of mirror due to warm moist flue products striking the cooler mirror.

OLD VENTING SYSTEM

WHEN AN EXISTING FURNACE IS REMOVED FROM A VENTING SYSTEM SERVING OTHER APPLIANCES, the venting system may be too large to properly vent the remaining attached appliances.

The following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

- (a) Seal any unused openings in the common venting system.
- (b) Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
- (c) Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
- (d) Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so appliance will operate continuously.
- (e) Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.
- (f) After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous conditions of use.
- (g) If improper venting is observed during any of the above tests, the common venting system must be corrected and in accordance with the National Fuel Gas Code, ANSI Z223.1-1984 and Addenda, Z223.1a-1987.

If resizing any portion of the common venting system, use the appropriate table in Appendix G in the National Fuel Gas Code, ANSI Z223.1 and Addenda, Z223.1a-1987.

OUTDOOR UNIT LOCATION

This unit is approved for outdoor installation only. An extension of the flue cap or addition of a flue pipe is not sanctioned or approved. The outdoor unit should be installed on a concrete slab at least 2" larger than the unit on all sides.

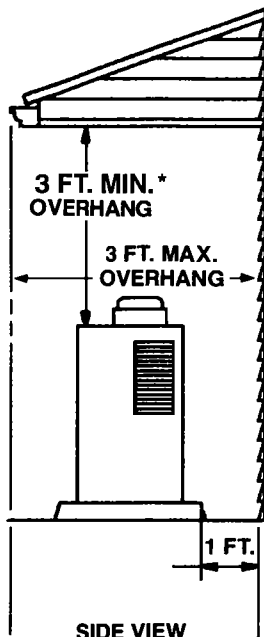
Be sure to observe the following clearances:

- The vent cap (top) of the unit must be at least four feet below, four feet horizontally from, or one foot above any door, window, or gravity air inlet into any building.
- The vent cap (top) of the unit must be at least three feet above any forced air inlet located within ten feet.
- Minimum clearances to overhangs are shown in Figure 1. Patios and decks must not be placed over the unit unless these minimum clearances are observed.
- A clearance of 36 inches from the front panel of the unit is required for service access.
- A clearance of 12 inches from the rear panel of the unit is required for proper airflow, and to keep combustion products away from the building.
- A clearance of 6 inches from the sides of the unit is required for proper airflow.

Do not let side and rear louvers get obstructed with leaves, shrubs or snow to assure adequate combustion and ventilation air.

Gutters or deflectors must be installed on the roof to prevent water from shedding on the unit.

The location of the outside unit should be picked to provide the most direct piping to the indoor air handler and the optional water heater.



SIDE VIEW
FIGURE 1

* If soffit vents are present, a 4 ft. minimum overhang is required.

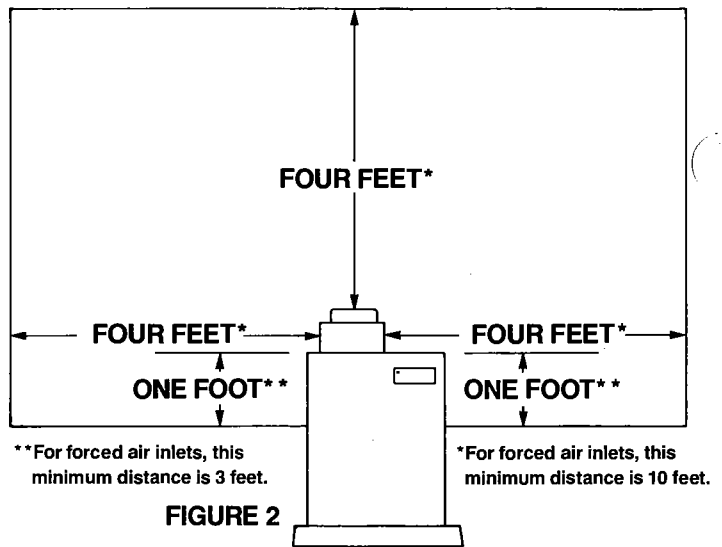


FIGURE 2

GAS CONNECTIONS AND PIPING

Installation must conform to local codes, or in the absence of local codes, the latest edition of the National Fuel Gas Code, ANSI Z223.1 or National Standards of Canada manual B-149 Installation Code for Natural Gas Appliances. Use a pipe joint compound resistant to both natural and liquefied petroleum gases. Remove protective cap nipple from 1/2" IPS nipple and install a ground joint union, then a nipple, tee, plus a 4" nipple with the lower end capped to make a drip leg. See Fig. 3. Galvanized pipe and fittings are not recommended.

The drip leg is important to prevent foreign matter and condensate from entering the gas valve. The cap may be removed to drain condensate from the line and drip leg.

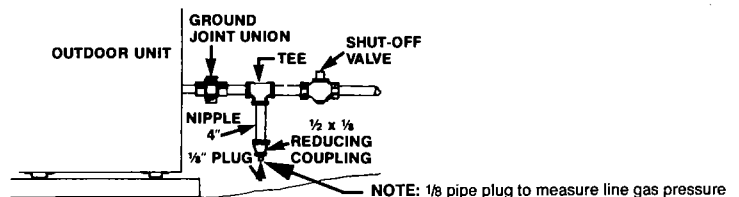


FIGURE 3

INLET GAS PRESSURE		
NATURAL	NORMAL 7"	MIN. 3.5", MAX. 10.5"
PROPANE	NORMAL 11"	MIN. 8", MAX. 13.0"

INLET GAS PRESSURE MUST NOT EXCEED THE MAXIMUM VALUE SHOWN IN TABLE ABOVE. WITH ALL APPLIANCES OPERATING, INLET GAS PRESSURE MUST NOT DROP BELOW THE MINIMUM VALUES SHOWN ABOVE.



CAUTION

To avoid the possible unsatisfactory operation or equipment damage due to underfiring of equipment, do not undersize the natural gas/propane piping from the meter/tank to the furnace. When sizing a trunk line per the tables, include all appliances on that line that could be operated simultaneously.

The gas pipe supplying the furnace must be properly sized based on the cubic feet per hour of gas flow required, specific gravity of the gas and length of the run. The gas line installation must comply with local codes, or in the absence of local codes, with the latest edition of the National Fuel Gas Code ANSI Z223.1 or CAN/COA B149 Installation Codes.

**NATURAL GAS CAPACITY OF PIPE
IN CUBIC FEET OF GAS PER HOUR (CFH)**

Length of Pipe in Feet	Nominal Black Pipe Size				
	1/2"	3/4"	1"	1 1/4"	1 1/2"
10	132	278	520	1,050	1,600
20	92	190	350	730	1,100
30	73	152	285	590	980
40	63	130	245	500	760
50	56	115	215	440	670
60	50	105	195	400	610
70	46	96	180	370	560
80	43	90	170	350	530
90	40	84	160	320	490
100	38	79	150	305	460

(Press .5 Psig or less and Pressure Drop of 0.3" W.C.; Based on 0.60 Specific Gravity Gas)

$$CFH = \frac{BTUH \text{ FURNACE INPUT}}{\text{CALORIC VALUE OF GAS}}$$



CAUTION

To avoid the possibility of property damage, personal injury or fire, the following instructions must be performed regarding gas connections, pressure testing, location of shut-off valve and installation of gas piping.



The unit and its gas connections must be leak tested before placing in operation. Because of the danger of explosion or fire, never use a match or open flame to test for leaks. Never exceed specified pressures for testing. Higher pressure may damage the gas valve and cause overfiring which may result in heat exchanger failure.



This unit and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.48 kPa).



This unit must be isolated from the gas supply system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (3.48kPa).



The shut-off valve should be located in a convenient location (within (6) six feet of unit) between the meter and the unit. Proper sizing of gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas and the length of the run. Lay out the piping plan and refer to the code manual to obtain the correct pipe sizing for each branch run, etc.



When installing the gas piping to the unit, be sure to hold the nipple extending out of the rear of the unit with a pipe wrench. This will prevent the unit nipple

and gas valve from rotating or causing undue strain on the combustion blower and motor.

UNIT CONVERSION FOR PROPANE, TANKS AND PIPING



WARNING

PERSONAL INJURY HAZARD

If your propane gas furnace is installed in a basement, an excavated area or a confined space, we strongly recommend that you contact your propane supplier about installing a warning device that would alert you to a gas leak.

... Propane gas is heavier than air and 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.

An undetected gas leak would create a danger of explosion or fire. If you suspect the presence of gas, follow the instructions on the cover of this manual. Failure to do so could result in **SERIOUS PERSONAL INJURY OR DEATH.**



WARNING

PERSONAL INJURY HAZARD

Iron oxide (rust) can reduce the level of odorant in propane gas. A gas detecting device is the only reliable method to detect a propane gas leak. Contact your propane supplier about installing a gas detecting warning device to alert you in the event that a gas leak should develop.

Failure to detect a propane gas leak could result in an **EXPLOSION** or **FIRE** which could cause **SERIOUS PERSONAL INJURY OR DEATH.**

The unit referred to in this manual is shipped for operation on natural gas. To operate the unit on propane, a conversion orifice plate must be installed. The re-rating air/gas orifice plates for natural gas and conversion plates are factory supplied with the unit. See unit instruction plate or "FUEL AND INPUT SELECTION" section for information regarding changing air/gas orifice plates.

All propane gas installations must conform to the safety standards of the National Board of Fire Underwriters (See NFPA Manual 58) or in Canada with National Standards of Canada B149.2 Installation Code for Propane Gas Burning Appliance.

For satisfactory operation, the propane gas pressure must be 11 inches W.C. at the unit valve inlet under full load. Maintaining proper gas pressure depends on three main factors:

- Vaporization rate, which depends on (a) temperature of the liquid, and (b) "wetted surface" area of the container or containers.
- Proper pressure regulation. (Two-stage regulation is recommended from the standpoint of both cost and efficiency.)
- Pressure drop in lines between regulators, and between second stage regulator and the appliance. Pipe size required will depend on length of pipe run and total load of all appliances.

Complete information regarding tank sizing for vaporization, recommended regulator settings, and pipe sizing is available from most regulator manufacturers and propane gas suppliers.

Please refer to the Figure 4 for typical propane gas installations.

Propane is an excellent solvent, and special pipe dope must be used when assembling piping for this gas as it will quickly dissolve white lead or most standard commercial compounds. Shellac base compounds resistant to the actions of liquified petroleum gases such as Gasolac, Stalactic, Clyde's or John Crane are satisfactory.

TYPICAL PROPANE PIPING

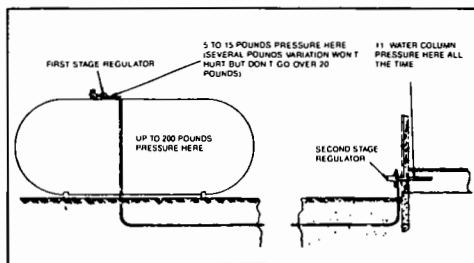


FIGURE 4

PROPANE PIPING CHARTS

Sizing Between First and Second Stage Regulator
Maximum Propane Capacities listed are based on 2 PSIG Pressure Drop at 10 PSIG Setting. Capacities in 1,000 BTU/HR

PIPE OR TUBING LENGTH, FEET	TUBING SIZE, O.O., TYPE L					NOMINAL PIPE SIZE, SCHEDULE 40	
	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"
10	730	1,700	3,200	5,300	8,300	3,200	7,500
20	500	1,100	2,200	3,700	5,800	2,200	4,200
30	400	920	2,000	2,900	4,700	1,800	4,000
40	370	850	1,700	2,700	4,100	1,600	3,700
50	330	770	1,500	2,400	3,700	1,500	3,400
60	300	700	1,300	2,200	3,300	1,300	3,100
80	260	610	1,200	1,900	2,900	1,200	2,600
100	220	540	1,000	1,700	2,600	1,000	2,300
125	200	490	900	1,400	2,300	900	2,100
150	190	430	830	1,300	2,100	830	1,900
175	170	400	780	1,200	1,900	770	1,700
200	160	380	730	1,100	1,800	720	1,500

To Convert to Capacities at 15 PSIG Settings — Multiply by 1.130
To Convert to Capacities at 5 PSIG Settings — Multiply by 0.879

Sizing Between Single or Second Stage Regulator and Appliance*
Maximum Propane Capacities Listed are Based on 1/2" W.C. Pressure Drop at 11" W.C. Setting. Capacities in 1,000 BTU/HR

PIPE OR TUBING LENGTH, FEET	TUBING SIZE, O.D., TYPE L						NOMINAL PIPE SIZE, SCHEDULE 40				
	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"	1 1/2"	2"	2 1/2"	
10	39	92	199	329	501	935	275	567	1,071	2,205	3,307
20	26	62	131	216	346	630	189	393	732	1,496	2,299
30	21	50	107	181	277	500	152	315	590	1,212	1,858
40	19	41	90	145	233	427	129	267	504	1,039	1,559
50	18	37	79	131	198	376	114	237	448	913	1,417
60	16	35	72	121	187	340	103	217	409	834	1,275
80	13	29	62	104	155	289	89	185	346	724	1,086
100	11	26	55	90	138	255	78	162	307	630	976
125	10	24	48	81	122	224	69	146	275	567	866
150	9	21	43	72	109	202	63	132	252	511	787
200	8	19	39	66	100	187	54	112	209	439	685
250	8	17	36	60	93	172	48	100	185	390	590

*DATA IN ACCORDANCE WITH NFPA PAMPHLET NO. 54

NOTE: Because of the nature of the negative pressure gas valve and the second stage regulator, it is important to have an adequate volume of propane available between the second stage regulator and the appliance. Recommended *minimum* lengths/diameter between the second stage regulator and the appliance are:

MINIMUM LENGTH, FT.	TUBING SIZE, O.D., TYPE L					
	3/8"	1/2"	5/8"	3/4"	7/8"	1"
NA	NA	10.0	6.7	4.8	2.8	

MINIMUM LENGTH, FT.	NOMINAL PIPE SIZE, SCHEDULE 40				
	1/2"	3/4"	1"	1 1/4"	1 1/2"
7.7	4.4	2.7	1.6	1.1	

NA = Not Applicable — Do Not Use.

FIGURE 5

LOCATION—INDOOR UNIT AND WATER TANK

For indoor unit location and installation, refer to the installation instruction supplied with the indoor unit and water heater. No heat exchanger may be located more than 15 feet vertically above the ERGW unit.

HEATING SOLUTION PIPING

For proper solution pipe sizing, refer to the tables in the back of this manual. Most installations will require **1" ID copper pipe**. ^{40/60} or ^{50/50} lead/tin solders should be used. Do not use silfos, silver solder or equal high temperature melting solders on the diverter valve connections.

The solution piping may be brought into the indoor air handler from either side through knock-outs provided.

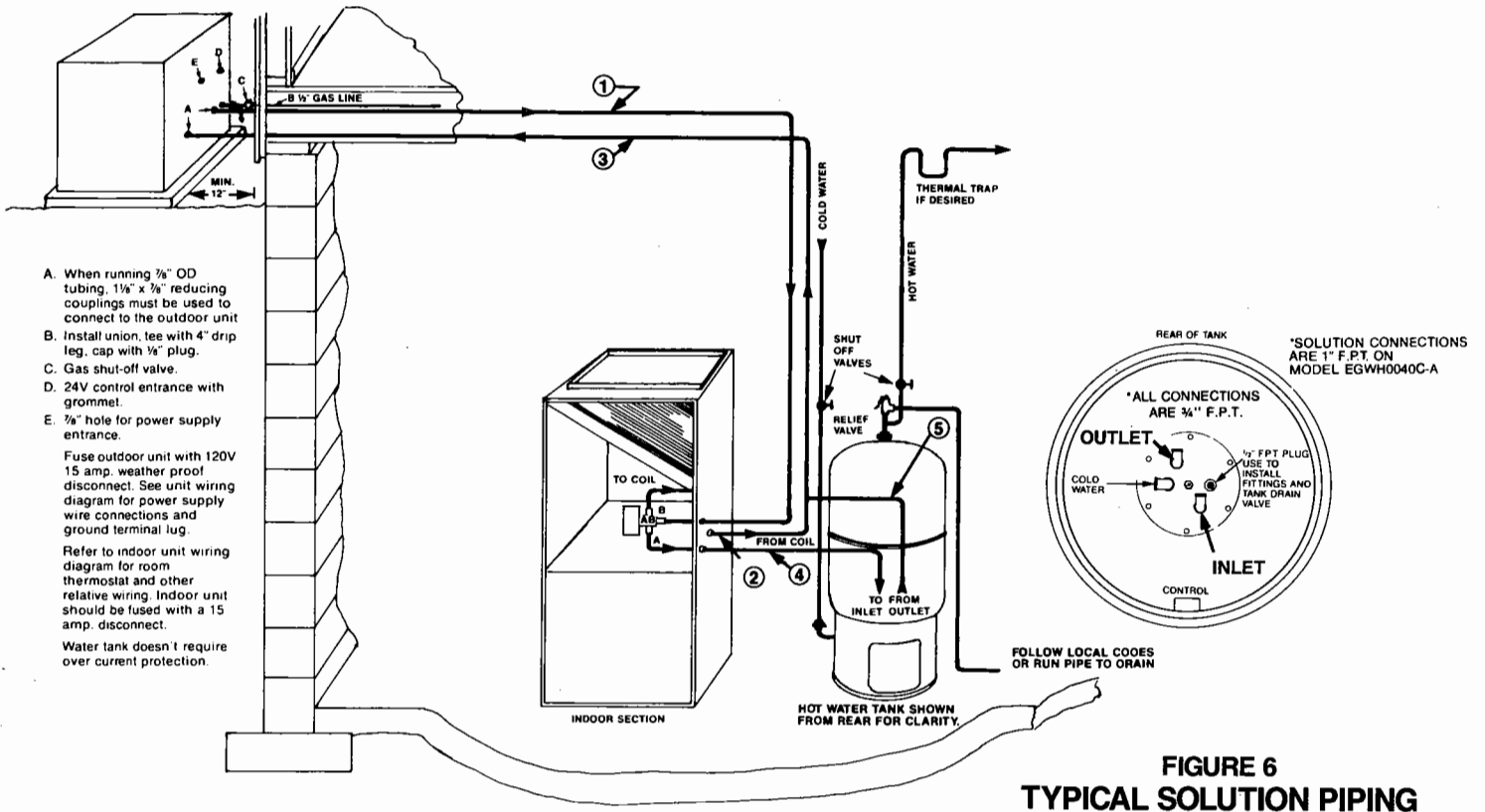
ALWAYS MAKE A PIPING LAYOUT SO THE PIPING SIZE CAN BE DETERMINED PRIOR TO THE INSTALLATION.

NOTE: Before the solution piping is connected to the outdoor units, the two stubs must be adjusted to protrude 2" out of the cabinet. This dimension is factory set; however, the dimension can be greatly changed during shipping to its final destination.

The inlet and outlet heating solution connections on the outdoor unit are 1 1/8" MALE OD (1"). When using 7/8" OD (3/4")

copper tubing a 1 1/8" x 7/8" reducing coupling must be used to inter-connect to the 7/8" OD piping, refer to Figure 6 for a TYPICAL PIPED SYSTEM.

If a water heater is to be installed, refer to the installation instructions supplied with tank. **NOTE:** All external solution piping to the indoor, outdoor units and to the water heater tank must be insulated (3/8" wall Rubatex or equal).



ELECTRICAL CONNECTIONS

When installed, the unit must be electrically grounded in accordance with local codes or in the absence of local codes, with the latest edition of the National Electrical Code, ANSI/NFPA No. 70, or in Canada, Canadian Electrical Code, C22.1.

Refer to Page 2 regarding the location for the 115V and 24V control wires, and openings. See Page 2 for outdoor unit connection openings. The outdoor unit must be protected by a 15 amp over-current protection device. The outdoor unit must have a weather proof disconnect adjacent to the unit and a flexible liquid tight conduit run through the opening shown in Figure 7. Termination of the flexible conduit must be made with a connector to the opening provided in the rear of the control panel box. See "A" Figure 7. Size and run the three conductors (black, white and ground) to black and white wires and equipment ground lug as indicated in Figure 7. The 24V control wires should enter the outdoor unit through the rubber grommet. Wiring must be weather proof. (Conduit or 5 wire weather proof cable.)



FIGURE 7

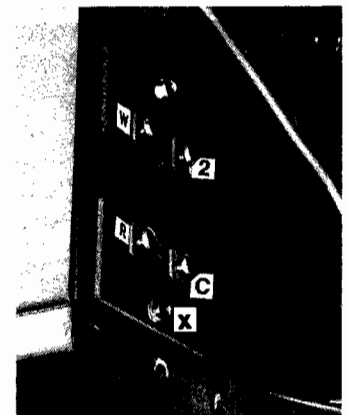


FIGURE 8

The wiring diagram in this manual includes the installation of the water heater. The junction box is located adjacent to the cold water inlet. See unit wiring adjacent to the cold water inlet. See unit wiring diagram to determine the terminals to which the two wires from the water heater have to be connected to in the indoor air handling unit.

NOTE: All 24V control wiring may be run with 18 gauge (min.) wires. The wiring diagram shown is a complete control system including air conditioning. If a system is applied for heating only (indoor and outdoor units) a heating only thermostat may be used and connected as shown below.

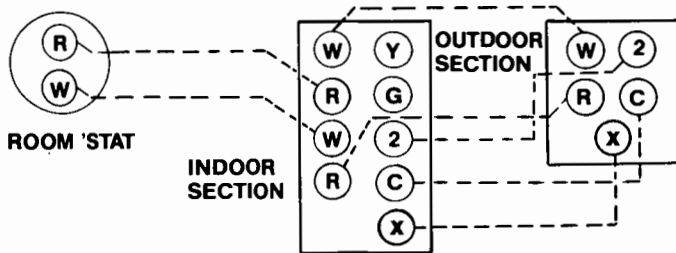


FIGURE 9

NOTE: The information shown in the ELECTRICAL CONNECTION section is only presented as a guide. It is important to electrically connect the units, properly size fuses or over-current protection devices and wires in accordance with the National Electric Code, ANSI/NFPA No. 70-1987 and/or all existing local codes.

Field wiring shall conform with the temperature limitation for type T wire (63°F rise).

ROOM THERMOSTAT

The room thermostat must be located in the space to be air conditioned. It should be approximately 5 feet above the floor and must not be subjected to cold or warm air from the supply grilles or exposed to the sun or superficial heat and undue vibration. Please refer to the installation instructions of the room thermostat for more explicit information.

HEAT ANTICIPATOR

The heat anticipator in the room thermostat must be adjusted to obtain the proper number of heating cycles per hour. Set as called out on the unit wiring diagram. (Normal 1.0 information on wiring diagram takes precedence.)

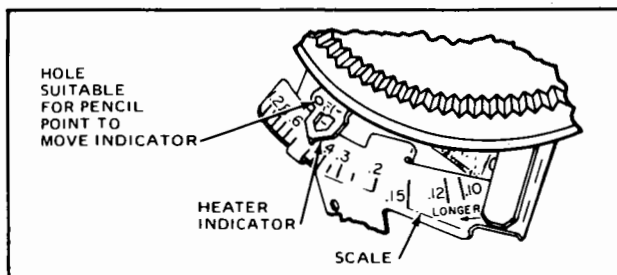


FIGURE 10

GLYCOL HEAT TRANSFER SOLUTION

Unit must be charged with Amana HTM Heat Transfer Solution only. This is premixed and should not be diluted. This solution can be used to (minus) -34°F.



CAUTION

Use of any heat transfer fluids other than Amana HTM Ethylene (or Propylene) Glycol Heat Transfer Solution could result in equipment damage and/or loss of warranty coverage.

If colder temperatures are apt to be encountered, especially if the system is shut down for any extended period of time, a 55% glycol/water solution may be used.

SOLUTION CHARGING PROCEDURE

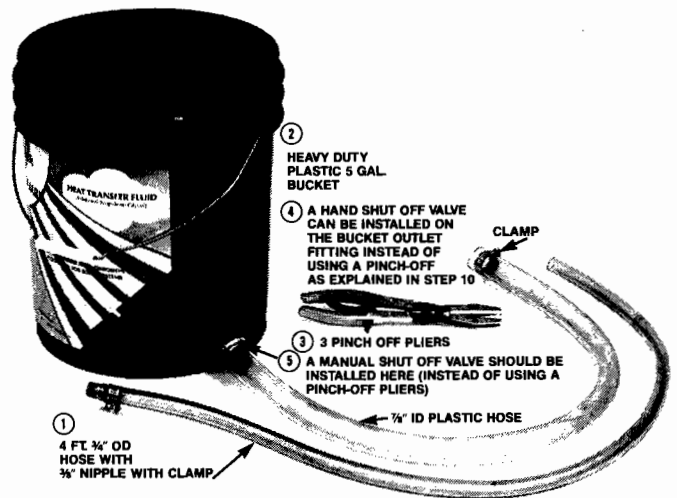


FIGURE 11

Figure 11 illustrates the items which are required to charge the system with glycol solution.

1. Four feet of transparent $\frac{3}{4}$ " OD hose with a $\frac{3}{8}$ " nipple secured with a hose clamp.
2. A heavy duty five gallon plastic bucket with a shut-off valve and four feet of $\frac{7}{8}$ " ID hose attached with a fitting near the bottom.
3. Three pairs of pinchoff pliers. (KD No. 45) or equal.
4. Six inches of 18 gauge jumper wire.
5. Sufficient heat transfer solution to fill the system.



WARNING

Amana ethylene glycol heat transfer solution contains ethylene glycol which is harmful or fatal if swallowed. Accidental poisoning can cause central nervous system effects, metabolic acidosis, kidney effects. It may also cause eye irritation.

Based on animal data: Ethylene glycol is a possible birth defect hazard. Repeated exposure may cause kidney and liver effects.

Do not drink product or solution. Avoid contact with eyes, skin or clothing. Wash thoroughly after handling.

First Aid: If swallowed induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention. In case of contact, immediately flush eyes with plenty of water. Call a physician if irritation persists.

GENERAL PROCEDURE:

The HTM system is a continuous loop which is vented to the atmosphere at the expansion tank.

To charge a unit correctly requires the entire loop be filled with glycol solution without introducing air into the system.

To prevent air from being trapped in the piping or heat exchangers, it is most important that the loop is charged from one side only. Charging from one side of the loop allows air to be forced through the piping and heat exchangers and then expelled into the air vent at the expansion tank.



WARNING

To avoid the hazard of electrical shock, personal injury or death, before performing any of the following steps, disconnect this unit from all electrical power.

1. Remove (Fig. 12)

- A. Flue Cap
- B. Pipe plug from module top
- C. Fill plug
- D. Ignitor module electrical plug
- E. Cap from charging tee

2. Install (Fig. 13)

- A. Charging hose from fill bucket to charging tee (charging hose)
- B. Hose from top of module to expansion tank (Module hose) (Use split grommet at top of expansion tank)

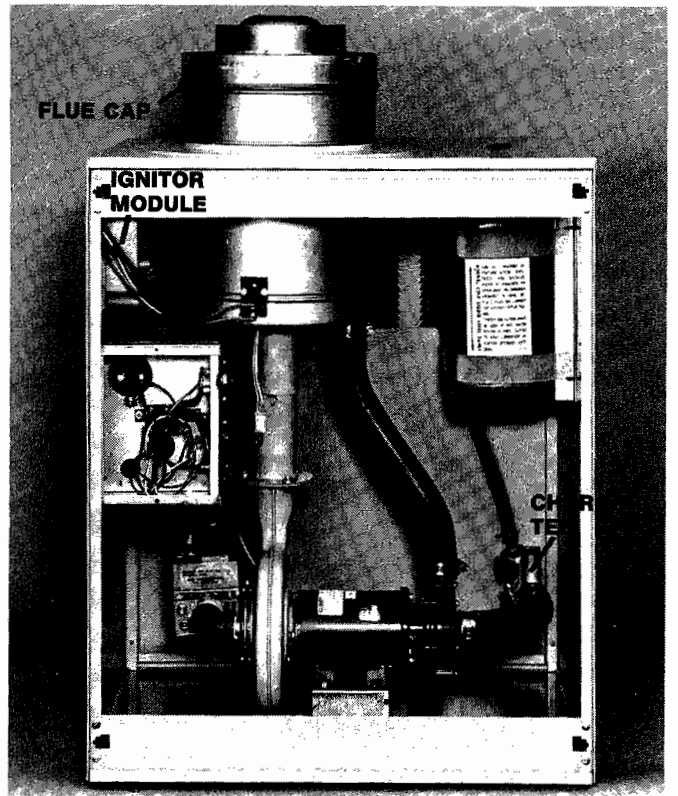
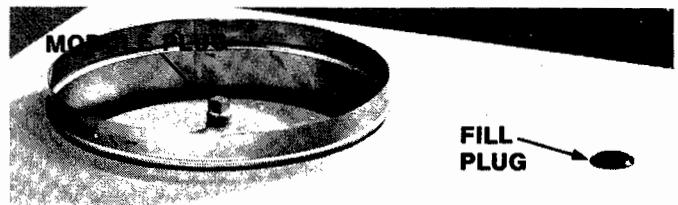


FIGURE 12

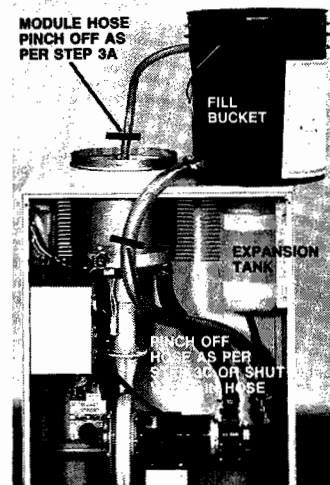


FIGURE 13

3. **Pinch Hoses** (Fig. 14)
 - A. At top of module
 - B. Between charging tee and vent tube
 - C. From fill bucket
4. **Fill Bucket** (Fig. 13) with required solution (See chart 1) and continue to add solution as required to maintain liquid seal at bucket outlet.
5. **Open Clamp** on charging hose and continue to fill system until expansion tank is **half full**.
NOTE: If indoor tubing or heat exchanger is above outdoor unit, turn on outdoor pump to circulate solution.
6. **Open Clamp** between charging tee and vent tube. Turn on pump (if not done previously) and continue to circulate solution until expansion tank is full to top level marked on tank.
7. **Water Heater Charging** - After all air stops circulating into the expansion tank, charge the water heater by turning water heater thermostat to hot position and circulate solution through the tank hot water coil.

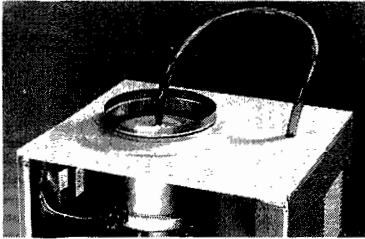


FIGURE 14

8. **After** both coil and water tank are charged, partially open the module hose (above) and continue to circulate until Module Hose is clear of air.
NOTE: All air must be removed during this step as the unit will not expel air during normal operation.

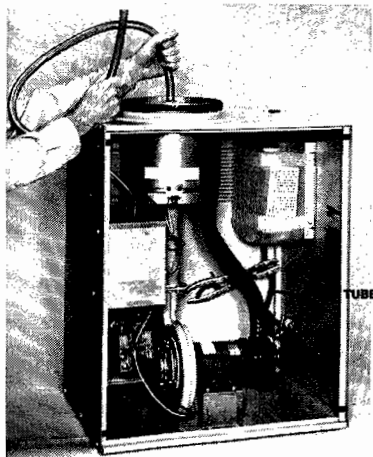


FIGURE 15

9. **Replace** cap on charging tee and module plug.
PROCEDURE: (1) Pinch off rubber vent tube. (2) Remove tube from top of module and replace plug. (3) Keep vent tube and charging hose pinched off. (4) Lower charging bucket below level of charging tee. (5) Remove charging hose and replace rubber plug. (Fig. 15)

10. **Finally**
 - A. Install insulation muffler at top of module
 - B. Plug in ignition module
 - C. Set water heater thermostat to normal (midrange).
 - D. Install flue cap and fiberglass sound ring.
 - E. Close indoor unit disconnect and run unit through several cycles.
 - F. A final check for air:
 - a. Listen for excessive noise from pump surging
 - b. Level of solution should not change excessively in expansion tank during heating operation and when unit is shut down.

GAS TYPE AND INPUT SELECTION

The outdoor unit is factory equipped with a natural gas orifice plate sized for a nominal 100,000 or 150,000 BTUH input. It may be field rerated or converted so it can be used with propane gas. To rerate or convert to propane gas only the air/gas orifice plate has to be changed.

Model	Natural Gas (factory installed)	Additional Orifice Plates		
		Propane	Natural	Propane
ERGW0015-1B	150M	150M	130M	130M
ERGW0012-1B	100M	100M	80/120M	80/120M

IMPORTANT: If unit is rerated, change blower motor speed. Follow instructions as outlined on wiring diagram furnished with unit or this manual.

To change the gas/air orifice plate proceed as follows after the unit electrical switch has been disengaged and the gas valve has been closed.

1. Loosen screws A (3) with 1/4" box or open end wrench. (Fig. 16)
2. Remove screw B.
3. Pull gas/air orifice plate out. (Fig. 17)
4. Install the new plate selected from the tabulation above. All plates are identified by type gas and BTUH gas input. Install plate with stamping towards the valve.
5. Install screw B and tighten screws A. All screws must be drawn up evenly. **DO NOT OVER TIGHTEN OR STRIP THE SCREWS.**

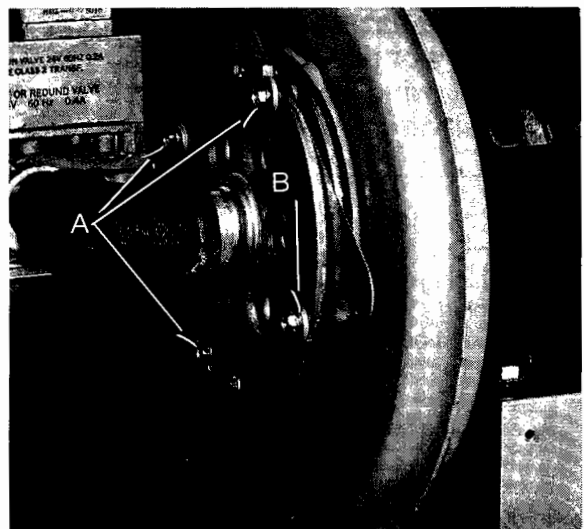


FIGURE 16

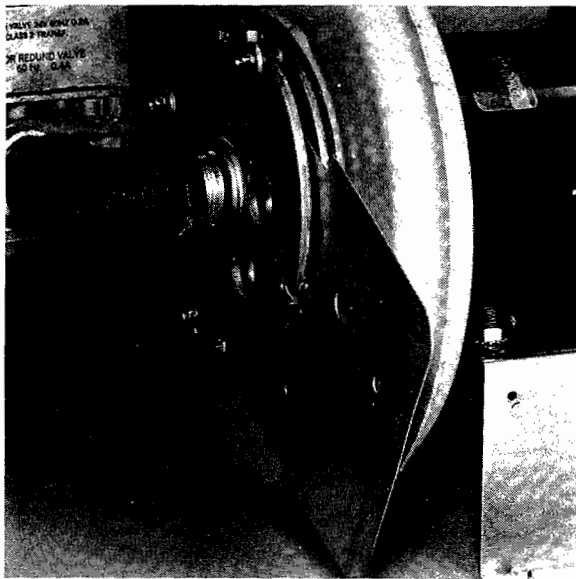


FIGURE 17

6. Remove 1/8" IPS plug from the gas valve and install a 1/8" IPS fitting. Connect a hose between negative side of a manometer or U tube and the fitting.
7. Important: Do not short any 24V leads to ground. A direct short may cause the ignition module or transformer to be replaced. These two components are not to be repaired in the field.



CAUTION

To avoid personal injury or property damage, be certain there is no open flame in the vicinity during air bleeding procedure.

8. There will be air in the gas supply line after testing for leaks on a new installation. Therefore, the air must be bled from the line by cracking open the ground joint union until pure gas is expelled. Tighten union and wait for five minutes until all gas has been dissipated in the air. Be certain there is no open flame in the vicinity during air bleeding procedure. The unit is placed in operation by closing the main electrical disconnect switches for the outdoor unit and the indoor air handler.

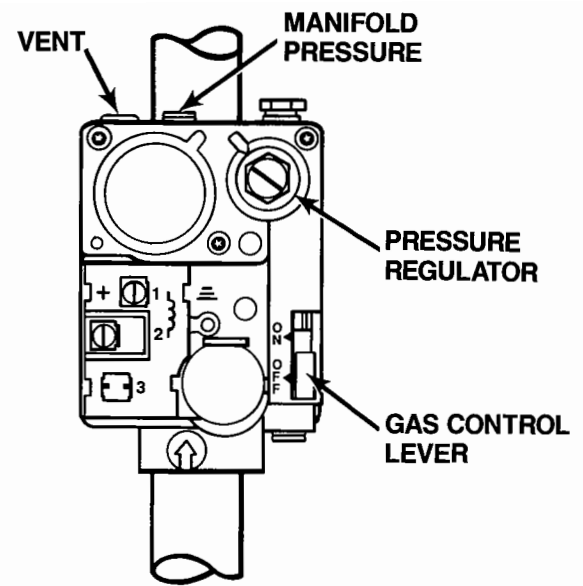


FIGURE 18

Turn on manual gas valve and slide gas control lever to the ON position. Refer to Figure 18 regarding gas valve lever and index point.

Turn the room thermostat setting to a point above the room temperature, set the selector switch to HEAT and the fan switch to AUTO. The solution pump/combustion blower motor should start. There probably is still some air in the gas supply line if ignition does not take place.

The unit will shut off in approximately 15 seconds. It will be necessary to move the room thermostat system switch to OFF (without hot water tank in the system) or disengage the air handler disconnect switch (with hot water tank in the system) for at least one minute to allow the ignition module to reset itself. It may take several cycles before the flame is established.

The air circulating blower will keep running after the heat transfer module is off, that is, until the fan stat contacts open. Put the unit through several cycles of about three minutes on and five minutes off. The resultant expansion and contraction of the solution will expel any air that might be in the system.

- 8b. Start the unit in a heating cycle. During the 45 second ignitor warmup period, the pump/combustion blower will be running, and the gas valve will be closed. While this occurs, you should be able to read a minimum of -2.0 inches water column on the manometer. If the manometer reading is not a deep enough negative pressure (Examples: -1.0 inches is not acceptable, -2.2 inches is acceptable), check for items such as:
 - Motor not up to speed due to low voltage, miswired capacitor, etc.
 - Air leaks upstream of the combustion blower.
 - A plugged module or other restriction downstream of the combustion blower.
9. Read the negative gas pressure on the manometer. It should read negative .20 inches water column when the unit is firing.

If the reading is higher than negative .10 inches (close to zero) the input will be high. If the reading is lower than negative .30 (further away from zero), the input will be reduced. Readings within these tolerances (plus or minus .10 inches) will allow approximately a $\pm 3\%$ BTU input change from the normal.

If the negative pressure doesn't read $-.20''$ remove the cap (see Figure 18) from gas valve and turn adjusting screw accordingly. Replace cap before taking reading.

- Input to this unit should never exceed the BTUH as shown on the rating plate. Check the gas meter for input to the unit as shown below.

NOTE: On outdoor equipment the gas input will vary with the temperature of the gas. Rated input will be at approximately 10°F. With warmer ambient and gas temperatures, the input will be decreased. For example, at 70°F the input will decrease 12%.

To measure the gas input using the gas meter proceed as follows:

- Turn off gas supply to all other appliances except the outdoor unit.
- With the outdoor unit operating, time the smallest dial on the meter for one complete revolution. If this is a 2 cubic foot dial, divide the seconds by 2; if it is a 1 cubic foot dial, use the seconds as is. This gives the seconds per cubic foot of gas being delivered to the furnace.
- INPUT = GAS HTG VALUE \times 3600 \div SEC. PER CUBIC FOOT

Example: Natural gas with a heating value of 1000 BTU per cubic foot and 34 seconds per cubic foot as determined by Step 2, then:

$$\begin{aligned} \text{Input} &= 1000 \times 3600 \div 34 \\ &= 106,000 \text{ BTU per Hour} \end{aligned}$$

NOTE: BTU content of the gas should be obtained from the gas supplier.

This measured input must not be greater than the input indicated on the rating plate of the outdoor unit.

- Relight all other appliances turned off in Step 1 above. Be sure all pilot burners are operating.

GAS RATE - CUBIC FEET PER HOUR											
Seconds for one Revolution	SIZE OF TEST DIAL					Seconds for one Revolution	SIZE OF TEST DIAL				
	1/4 cu ft	1/2 cu ft	1 cu ft	2 cu ft	5 cu ft		1/4 cu ft	1/2 cu ft	1 cu ft	2 cu ft	5 cu ft
10	90	180	460	220	1800						
11	82	164	327	655	1636	36	25	50	100	200	500
12	75	150	300	600	1500	37	—	—	9"	195	486
13	69	138	277	555	1385	38	23	47	95	180	474
14	64	129	257	514	1286	39	—	—	92	185	462
15	60	120	240	480	1200	40	22	45	90	180	450
16	56	113	225	450	1125	41	—	—	—	176	439
17	53	106	212	424	1059	42	21	43	86	172	429
18	50	100	200	400	1000	43	—	—	—	167	419
19	47	95	189	379	947	44	—	41	82	164	409
20	45	90	180	360	900	45	20	40	80	160	400
21	43	86	171	345	857	46	—	—	78	157	391
22	41	82	164	327	818	47	19	38	76	153	383
23	39	78	157	313	783	48	—	—	75	150	375
24	37	75	150	300	750	49	—	—	—	147	367
25	36	72	144	288	720	50	18	36	72	144	360
26	34	69	138	277	692	51	—	—	—	141	355
27	33	67	133	267	667	52	—	—	69	138	346
28	32	64	129	257	643	53	17	34	—	136	340
29	31	62	124	248	621	54	—	—	67	133	333
30	30	60	120	240	600	55	—	—	—	131	327
31	—	—	116	232	581	56	16	32	64	129	321
32	28	56	115	225	563	57	—	—	—	126	316
33	—	—	109	218	545	58	—	31	62	124	310
34	26	53	106	212	529	59	—	—	—	122	305
35	—	—	103	206	514	60	15	30	60	120	300

FIGURE 19

On Propane gas installations there is no gas meter to measure the cubic foot per hour gas consumption. It, therefore, becomes necessary to take a manifold pressure reading. It should read negative .20" WC.

GLYCOL SOLUTION TEMPERATURES

Turn the water heater thermostat to the OFF setting, and adjust the room thermostat to its warmest setting. Allow the system to operate for several minutes so that steady state conditions can be reached.

Measure solution supply and return temperatures with a clamp-on thermocouple type temperature tester or equivalent attached to the copper pipe just outside the outdoor unit. Insulate the temperature tester as necessary to reduce heat loss to ambient surroundings. Return glycol temperature must not be less than 140°F. Supply glycol temperature must not be more than 200°F.

(Supply temperature — Return temperature) = ΔT . ΔT must be within the ranges shown below according to your BTUH input. (**Note:** The table below includes built-in tolerances due to small variances from nominal conditions or small inaccuracies in test instruments. Do not accept readings outside of the ranges shown.)

Input (BTUh)	ΔT (°F)
80,000	9 to 21
100,000	12 to 26
120,000	14 to 31
130,000	15 to 30
150,000	17 to 35

If glycol temperatures (supply, return, and ΔT) are not within the acceptable limits, the following troubleshooting chart may be helpful:

Problem	Look for
High ΔT	<ul style="list-style-type: none"> — Undersized glycol piping — Excessively long runs of glycol piping — Restrictions in glycol piping
Low ΔT	<ul style="list-style-type: none"> — Oversized glycol piping — Incorrect test data
Supply temperature $> 200^\circ\text{F}$, ΔT OK	<ul style="list-style-type: none"> — Dirty indoor filter — Dirty indoor coil — Blower motor too slow — Excessive external static to blower — Mineral buildup on water heater — Deposits inside of glycol piping — Overfiring of ERGW unit — Too high of a return air temperature ($< 100^\circ\text{F}$) to indoor coil/blower
Return temperature $< 140^\circ\text{F}$, ΔT OK	<ul style="list-style-type: none"> — Blower motor too fast — Not enough external static to blower — Cold water in water heater — Underfiring of ERGW unit — Too low of a return air temperature ($< 55^\circ\text{F}$) to indoor coil/blower

OPERATING INSTRUCTIONS

1. Close the manual gas valve external to the outdoor unit.
2. Turn off the electrical power supply to both the indoor unit and outdoor unit.
3. Set room thermostat to lowest possible setting. If a water tank is in the system, set its thermostat to lowest possible setting.
4. Remove the door on the front of the outdoor unit, by removing 4 screws.
5. This furnace is equipped with an ignition device which automatically lights the burner. Do not try to light burner by hand.
6. Push and slide gas control lever to "OFF" position. See Fig. 18.
7. Wait five (5) minutes to clear out any gas.
8. Slide gas control lever to "ON". See Fig. 18.
9. Replace the door on the front of the outdoor unit.
10. Open the manual gas valve external to the outdoor unit.
11. Turn on the electrical power supply to both the indoor unit and the outdoor unit.
12. Set thermostat(s) to desired setting.

NOTE: There is a one minute delay between thermostat energizing and burner firing.



CAUTION

This unit should not be used as a "construction heater" during the finishing phases of a new structure. This type of use may result in premature failure of the unit due to extremely low return air temperatures and exposure to corrosive or very dirty atmospheres.

TO TURN OFF FURNACE

1. Set the thermostat(s) to lowest setting.
2. Turn off the electrical power supply to both the indoor unit and outdoor unit.
3. Push and slide gas control lever to "OFF" position. See Fig. 18.
4. Close manual gas shut off valve external to the outdoor unit.
5. Replace the door on the front of outdoor unit.

GENERAL HEATING CYCLE INFORMATION

When the room thermostat is set to HEAT and the fan to AUTO, the system will go into heating if the thermostat is set at a temperature higher than the room temperature.

The heating relay in the outdoor unit will close when the contacts in the room thermostat make; starting the pump/combustion blower motor and energizing the electronic ignition module. The igniter is heated for 45 seconds at which time the gas valve opens. Ignition occurs and the flame is established. The presence of flame is sensed electronically.

If flame is not established within 15 seconds, power to the gas valve is broken. The outdoor unit can make two more attempts for ignition before going into lockout.

The unit will continue to fire until the room thermostat is satisfied at which time the ignition control is de-energized closing the gas valve and stopping the pump/combustion blower motor.

The air circulating blower motor starts and stops in response to the fan stat which is a time delay sequencer. This turns the blower on approximately 15 seconds after ignition and turns it off approximately 75 seconds after the heating cycle is completed.

In the cooling mode, the circuitry in the room thermostat will close the cooling contacts and simultaneously pull in the blower relay to energize the cooling speed and break contacts to the heating speed.



CAUTION

Some installations will use a different blower speed for cooling than is used for heating. If this is the case, do not set the thermostat fan switch to ON (constant fan operation) without first confirming that the cooling fan speed will give a temperature rise within the limits listed on the unit nameplate. Temperature rises outside of the limits listed could result in premature failure of the heat exchanger.

When the heating cycle is completed, the heating coil cools down and the fan stat opens the circuit to the heating speed.

If there is a power or gas interruption, the electronic ignition module timing sequence repeats with the gas valve closing and the igniter restarting on its 45 second heat up interval.

If the companion water heater is connected into the system, the water heater thermostat takes precedent over the room thermostat temperature setting. The diverter valve motor is energized when the tank thermostat closes, and drives the diverter valve to the water heating position. The diverter valve will again move to the air heating mode when the water heater thermostat is satisfied.

RESET AFTER LOCK-OUT;

Should ignition lockout occur, it is necessary to break power to the electronic ignition module. If a water heater is not used, it is only necessary to turn the room thermostat down below the room temperature for thirty seconds before resetting to the desired temperatures. When a water heater is used, it is necessary to disengage the electrical disconnect to the air handling unit. Power must be off for 30 seconds before engaging the switch to try for ignition.

SYSTEM LIMIT CONTROLS:

The solution limit control sensing capillary measures the temperature of the solution in one of the module tubes. The normally closed contacts will open when the solution reaches a pre-determined temperature which is abnormal. See Figure 20 for location of this limit control.

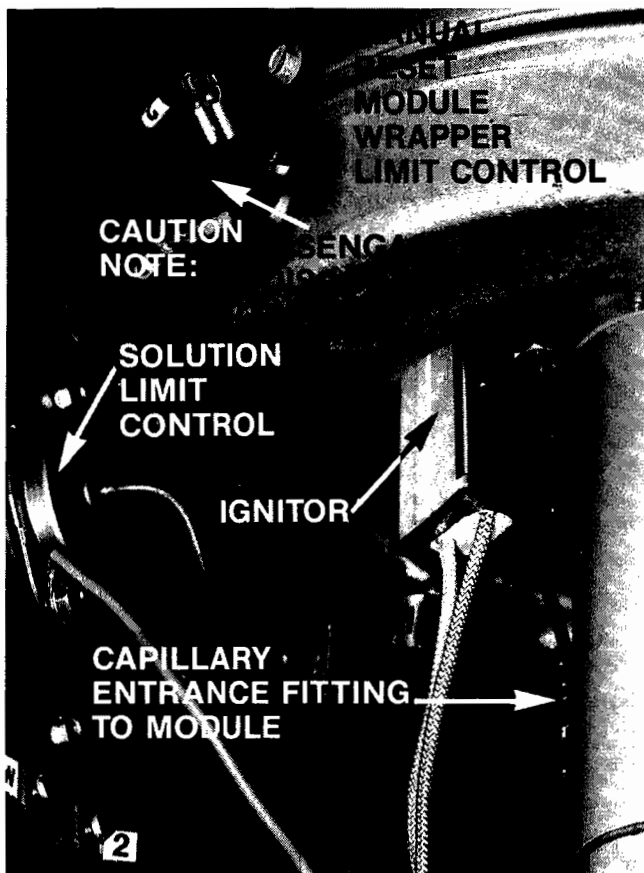


FIGURE 20

The normally open contacts of the solution limit will close and cause the pump relay to stay energized so the solution pump can continue to run and cool the heating solution.

The normally closed contacts, of the limit will interrupt the circuit to the electronic ignition module. The system will go through the normal ignition and heating cycle after the solution has been cooled and the limit control resets itself.

The cause for the overheated solution must be corrected (dirty filters, mineral deposits on the water tank heat exchanger, inoperative blower motor in the indoor air handler, insufficient ductwork, air in the solution piping, coil or module).

MANUAL RESET LIMIT CONTROL — See Figure 20

A manual reset limit control is secured to the lower portion of the heat transfer module. It is activated by a very high module temperature, that may occur with a loss of the solution charge or by air trapped in the solution. The control will stop the entire unit.



WARNING

To avoid electrical shock or personal injury, be sure to disengage indoor and outdoor unit power disconnect switches before pushing in the reset button.

The limit must be manually reset to again start the unit. The limit control should be reset just once. If the unit goes out on limit again, the reason which caused the control to open must be ascertained and corrected. If unit doesn't start after pushing in the reset button and engaging the power switch, the module may still be too hot. Wait two minutes and try again. If the limit must be replaced, a small amount of heat conductive compound M2755-20 must be applied to face of disc.

LUBRICATION

The pump/combustion blower motor is permanently lubricated and does not require oiling.

FUNCTIONAL PARTS LIST

	ERGW00121B P1125401F	ERGW0015-1B P1125402F
Description	Qty.	Qty.
Hose, Suction, Inlet Pipe to Tee	1	1
Hose, Module Outlet	1	1
Hose, Suction, Pump to Tee	1	1
Hose, Pump Discharge	1	1
Hose, Tee to Exp. Tank	1	1
Limit Control, Auto Reset	1	1
Limit Control, Man., Reset	1	1
Wiring Harness, Ignition	1	1
Tank, Expansion	1	1
Flue Cap Weldment	1	1
Pad, Silencer (Top of HTM)	1	1
Bracket, Pad, Silencer (Top of HTM)	1	1
O Ring, Flue Cap to HTM Wrapper Seal	1	1
Ignition Control Module	1	
Plate, Orifice, 80M, Nat.	1	
Plate, Orifice, 100M, Nat.	1	
Plate, Orifice, 120M, Nat.	1	
Plate, Orifice, 80M, LP	1	
Plate, Orifice, 100M, LP	1	
Plate, Orifice, 120M, LP	1	
Plate, Orifice, 130M, Nat.		1
Plate, Orifice, 150M, Nat.		1
Plate, Orifice, 130M, LP		1
Plate, Orifice, 150M, LP		1
Heat Transfer Module	1	
Gasket, Ignitor	1	1
Top Transition Tube	1	1
Ignitor	1	1
Gasket Burner	1	1
Relay, SPDT	1	1
Terminal Board	1	1
Capacitor, Pump, 15 mfd 370V	1	1
Gasket, Fan Scroll	1	1
Gasket, Transition	1	1
Gasket, Mixer	1	1
Transition Tube, Bottom	1	1
Base Mixer	1	1
Heat Conductive Compound	AR	AR
Heat Transfer Solution	AR	AR

	ERGW0012-1B	ERGW0015-1B
Description	Qty.	Qty.
Plate, Mixer	1	1
Gas Valve, Redundant	1	1
Combustion Blower	1	1
Pump/Motor Assy.	1	1
Heat Transfer Module Kit (includes module, burner, and transition basket)		1
Heat Transfer Kit (includes module, burner, and transition basket)	1	
Burner		1
Burner	1	

GENERAL INFORMATION

1. When ordering any of the listed functional parts, be sure to provide the furnace model, manufacturing, and serial numbers with the order.
2. Although only functional parts are shown in the parts list, all sheet metal parts, doors, etc., may be ordered by description.
3. Functional parts are available from your Amana distributor.

PIPE SIZING FOR ERGW0012-1B

The HTM Plus remote heating unit has great application flexibility in terms of unit placement and variety of indoor heat transfer equipment; however, it is essential that minimum/maximum flow rates be maintained through the HTM module.

Design Guidelines:

1. **Connecting tubing and components** should be sized to obtain 9 G.P.M. (32.2 foot pressure drop). Minimum flow rate is 8 G.P.M. and maximum is 13.7 G.P.M.

2. **Component Pressure Drop** (Ft. of Pressure Drop at 9 G.P.M.)

EBWC3612M-A/B (Blower/Coil)*	5.6
EGWH0040D-A/B (Water Heater)**	20.5
ECSW Heat Coil	4.0
Restrictor Pipe or three-way Valve (Flair)	5.5
1" I.D. Type L Copper Tubing	6 ft./100 ft.
3/4" I.D. Type L Copper Tubing	21 ft./100 ft.

3. **Equivalent length in feet of copper sweat fittings**

	3/4" I.D.	1" I.D.
Short Radius Elbow	2.1	2.7
Tee — Straight Run	1.9	2.5
Tee — Side Branch	4.2	5.2

*The EBWC3612M-A and EBWC3612M-B have identical pressure drops.

**The EGWH0040D-A and EGWH0040D-B have identical pressure drops.

FLOW RATE OF ERGW0012-1B (G.P.M.)

CHART #1

SYSTEM	3/4" I.D. — *Effective length (ft.) (Type "L" Copper)										1" I.D. — *Effective length (ft.) (Type "L" Copper)																			
	0	10	20	30	40	50	60	70	80	90	100	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190
Air Heat w/ Restrictor or Diverter Valve	14.0	13.7	13.0	12.2	11.5	11.0	10.7	10.3	9.8	9.4	9.2	14.8	14.0	13.8	13.4	13.1	12.9	12.8	12.6	12.4	11.9	11.5	11.2	10.9	10.7	10.5				
Water Htr. w/o Restrictor or Diverter Valve	12.5	10.5	10.2	10.0	9.6	9.2	8.9	8.6	8.4	8.2	8.0	11.0	10.9	10.8	10.5	10.4	10.3	10.2	10.1	10.0	9.9	9.8	9.5	9.3	9.1	9.0				
Water Htr. w/ Diverter Valve	10.1	9.8	9.4	9.2	8.8	8.5	8.3	8.1	7.9	7.7	7.6	10.1	9.8	9.7	9.6	9.5	9.4	9.3	9.2	9.1	9.0	8.9	8.8	8.7	8.5	8.3				

*Effective length is sum of system straight lengths plus fitting equivalent length.

Example: — Water Heater w/diverter valve
 — 20 ft. of 3/4" I.D. pipe
 — 2 tees, 4 short radius elbows

1. Equivalent length of fittings
 — 2 tees @ 1.9 ft. per tee (2 x 1.9 = 3.8 ft.)
 — Elbows (2.1 x 4 = 8.4 ft.)

2. Total effective length = straight length + equivalent length (fittings)
 20 ft. + 3.8 + 8.4 = 34.2 effective feet

3. From chart, flow rate is 8.8 G.P.M.
 @ 40 ft. and 9.2 @ 30 ft. This
 would provide acceptable flow rates.

4. Avoid areas with heavy border.

CHART #2

USE CHART BELOW FOR SYSTEMS NOT LISTED IN CHART #1

Pressure drop (ft.) of system @ 9 GPM	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
Actual system GPM	15.1	14.1	13.2	12.5	11.8	11.3	10.8	10.3	10.1	9.6	9.4	9.1	8.8	8.6	8.3	8.1	7.9	7.7	7.6	7.4	7.2	7.0

1. Add up the pressure drop of the individual components at 9 G.P.M.

2. Look up new flow rate in Chart #2

Example: a. EGWH0040D-A water heater 20.5

b. 3-way valve 5.5

20' of 3/4" ID pipe 20.0
 2 Tees x 1.9' = 3.8
 4 elbows x 2.1 = 8.4

c. Total Effec. feet $34.2 \times 2.1 = \frac{7.2}{33.2}$

d. Chart #2 shows 9.1 G.P.M. with
 32 foot of heat and 8.8 with
 34 feet so 33.2 foot of heat
 will be 8.9 G.P.M. by interpolation.

3. Avoid areas with heavy border.

PIPE SIZING FOR ERGW0015-1B

Design Guidelines:

1. **Connecting tubing and components** should be sized to obtain 10 GPM (31 ft. pressure drop). Minimum flow rate is 9 GPM and maximum is 13.7 GPM.

2. **Component pressure drop** (ft. of pressure drop at 10 GPM)

ECSW Heat Coil	4.9
EBWC6015M-A (Blower Coil)	8.0
Restrictor Pipe	16.5
EGWH0040C-A (water heater)*	13.5
Three way Valve (flair)	6.5
3/4" I.D. type L copper tubing	26 ft./100 ft.
1" I.D. type L copper tubing	6 ft./100 ft.

3. **Equivalent length in feet of copper sweat fittings**

	3/4" I.D.	1" I.D.
Short Radius Elbow	2.1	2.7
Tee — Straight Run	1.9	2.5
Tee — Side Branch	4.2	5.2
Gate Valve — Open	1.5	1.9
Globe Valve — Open	35.7	46.0
45° Elbow	1.5	1.9

*This is a 3-pass water heater for lower pressure drop. All calculations on the following page assume the use of this water heater.

CHART #3

FLOW RATE OF ERGW0015-1B (G.P.M.)

SYSTEM	3/4" I.D. — *Effective length (ft.) (Type "L" Copper)										1" I.D. — *Effective length (ft.) (Type "L" Copper)										
	10	20	30	40	50	60	70	80	90	100	10	20	30	40	50	60	70	80	90	100	
Air Heat w/ Restrictor	10.6	10.4	9.7	9.6	9.3	9.0	8.7	8.4	11.0	10.8	10.7	10.6	10.5	10.4	10.3	10.1	10.1	9.9	9.7	9.5	9.0
Air Heat w/ Diverter Valve	13.0	12.5	11.6	11.3	10.7	10.4	9.9	9.6	13.7	13.2	13.0	12.9	12.8	12.6	12.4	12.2	12.0	11.8	11.6	10.9	10.4
Water Htr. w/ Diverter Valve	11.7	11.2	10.6	10.3	9.8	9.6	9.2	8.8	12.1	12.0	11.9	11.7	11.6	11.5	11.3	11.1	11.0	10.8	10.6	10.2	9.7

*Effective length is sum of system straight lengths plus fitting equivalent length.

Example: — Water Heater w/diverter valve
 — 28 ft. of 3/4" I.D. pipe
 — 2 tees, 4 short radius elbows

1. Equivalent length of fittings
 — 2 tees @ 1.9 ft. per tee (2 x 1.9 = 3.8 ft.)
 — Elbows (2.1 x 4 = 8.4 ft.)

2. Total effective length = straight length + equivalent length (fittings)
 28 ft. + 3.8 + 8.4 = 40.2 effective feet

3. From chart, flow rate is 10.3 G.P.M.
 @ 40 ft. This would provide acceptable flow rates.

4. Avoid areas with heavy border.

CHART #4

USE CHART BELOW FOR SYSTEMS NOT LISTED IN CHART #3

Pressure drop (ft.) of system @ 10 GPM	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46
Actual system GPM	15.2	14.2	13.3	12.8	12.2	11.7	11.3	10.8	10.5	10.2	9.8	9.6	9.4	9.1	8.8	8.6	8.4	8.2

1. Add up the pressure drop of the individual component at 10 G.P.M. flow rate.
2. Check flow rate from Chart #3

Example:

Use system from example above
 EGWH0040C-A, 3-way valve, 28 ft. of 3/4" I.D. pipe, 2 tees, 4 elbows.
 Total Pressure drop
 Water Heater 13.5
 3-way valve 6.5
 Fittings + line = 10.1
 40.2 ft. x .25 = 10.1
 Total Pressure Drop 30.1 ft.

3. From chart #4 at 30 ft. of drop, flow rate is 10.2 G.P.M.

TEST DATA SHEET FOR AMANA HTM SYSTEMS

1. Model #: _____ Serial #: _____ Mfg. #: _____
2. Date Installed: _____ Data taken by: _____ Date: _____
3. Date of Test: _____ Service Company: _____
4. Homeowner: _____ Address: _____
5. City: _____ State: _____ Zip: _____ PH# _____

— ELECTRICAL INFORMATION —

6. Fuse Size & Type: _____ Voltage to Unit: _____
7. Thermostat Brand: _____ Blower Speed Used: _____
Model #: _____ Part # _____ Amana Part # _____
8. Heat Anticipator Setting: _____

— GAS INFORMATION —

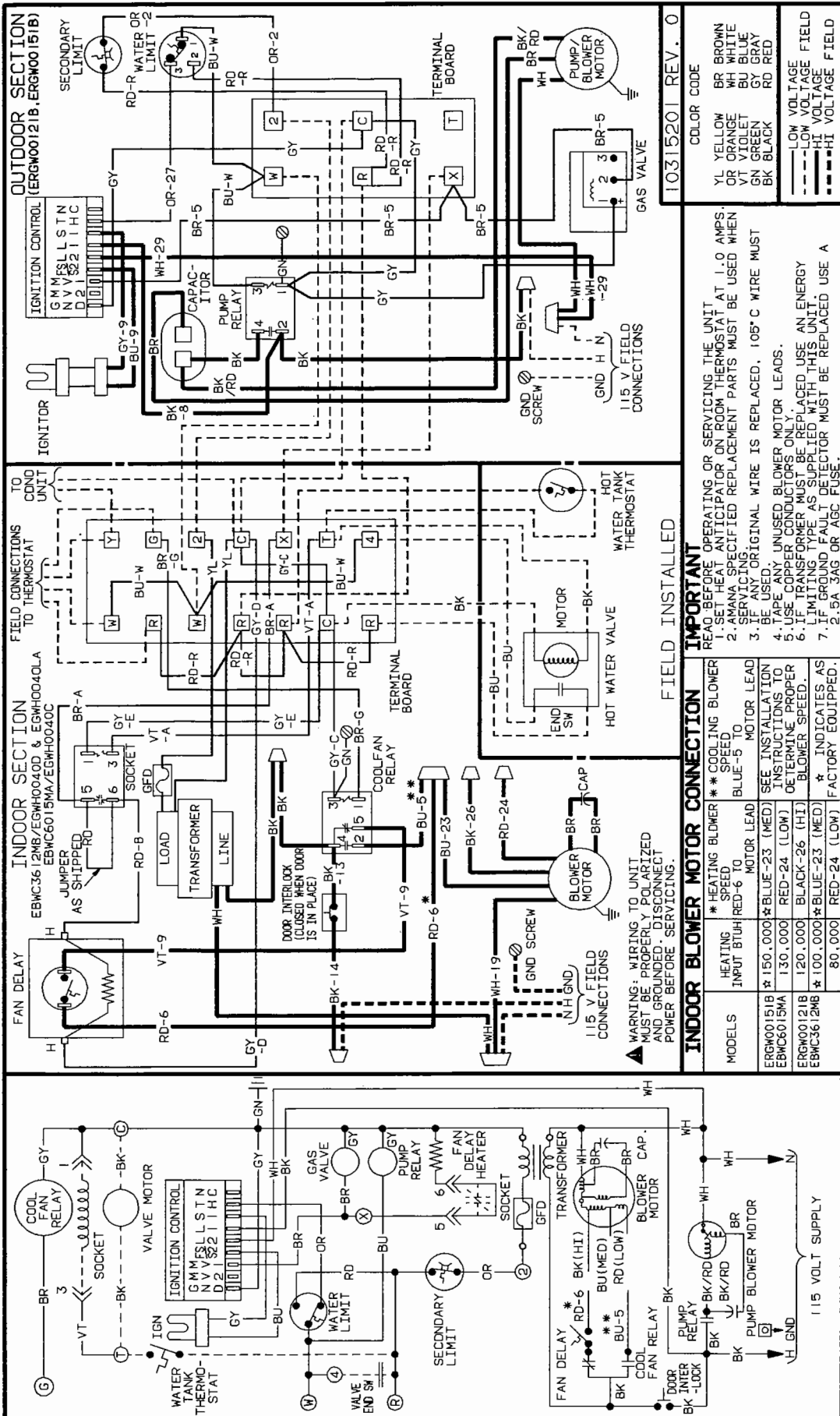
9. Type of Gas: Natural _____ Propane _____
10. Gas Supply Line Pressure (Inches Water Column)
Unit Operating: _____ Unit Not Operating: _____
11. Neg. Pressure-Valve Closed: _____ Neg. Pressure Valve Open: _____
12. Orifice Plate Used: _____ BTUH Input
13. BTUH Value of Gas: _____ (may be obtained from gas supplier)
Name of Gas Company: _____
14. Actual BTU Input (Clock Meter): _____ One Cu. Ft. Dial: _____
15. Two Cubic Foot Dial: _____

GENERAL INFORMATION

Legend: Water heater mode/air heat mode (list in appropriate blanks below)

16. Solution Pipe Sized I.D.: _____ / _____ Length of Run: _____ / _____
17. No. of Long Ells: _____ / _____ No. of Short Ells: _____ / _____ Tees No. _____ / _____
Total Effective Ft. of Pipe: _____ / _____ Type of Pipe Used: Copper, L K or M
18. Solution Temperatures: Supply _____ °F Return _____ °F
19. $\Delta T = \text{Supply} - \text{Return} =$ _____ °F
20. Duct Temperatures: Supply _____ °F Return _____ °F
21. Total Temperature Rise: _____ °F Ambient Temperature _____ °F
22. Duct Static Pressures: _____ W.C. Supply + _____ W.C. Return = _____
23. Air Filters Installed: Size & Type: _____

For a proper installation, compare the above results to the ranges listed in the appropriate installation manuals.



WARNING
 DISCONNECT POWER BEFORE SERVICING.
 WIRING TO UNIT MUST BE PROPERLY
 GROUNDED AND POLARIZED.

- IMPORTANT**
- REMO. BEFORE OPERATING OR SERVICING THE UNIT. SET FAN ANTICIPATOR OR ROOM THERMOSTAT AT 1.0 AMPS.
 - ALWAYS SPECIFIED REPLACEMENT PARTS MUST BE USED WHEN SERVICING.
 - IF ANY ORIGINAL WIRE IS REPLACED, 105°C WIRE MUST BE USED.
 - TAPE ANY UNUSED BLOWER MOTOR LEADS.
 - USE COPPER CONDUCTORS ONLY.
 - IF TRANSFORMER MUST BE REPLACED USE AN ENERGY LIMITING TYPE AS SUPPLIED WITH THIS UNIT.
 - IF GROUND FAULT DETECTOR MUST BE REPLACED USE A 2.5A SAG OR AGC FUSE.

10315201 REV. 0

COLOR CODE

YL	YELLOW
OR	ORANGE
VT	VIOLET
GN	GREEN
BK	BLACK
BR	BROWN
WH	WHITE
BU	BLUE
GY	GRAY
RD	RED

VOLTAGE FIELD

---	LOW VOLTAGE FIELD
- - -	LOW VOLTAGE FIELD
---	HI VOLTAGE FIELD
- - -	HI VOLTAGE FIELD

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