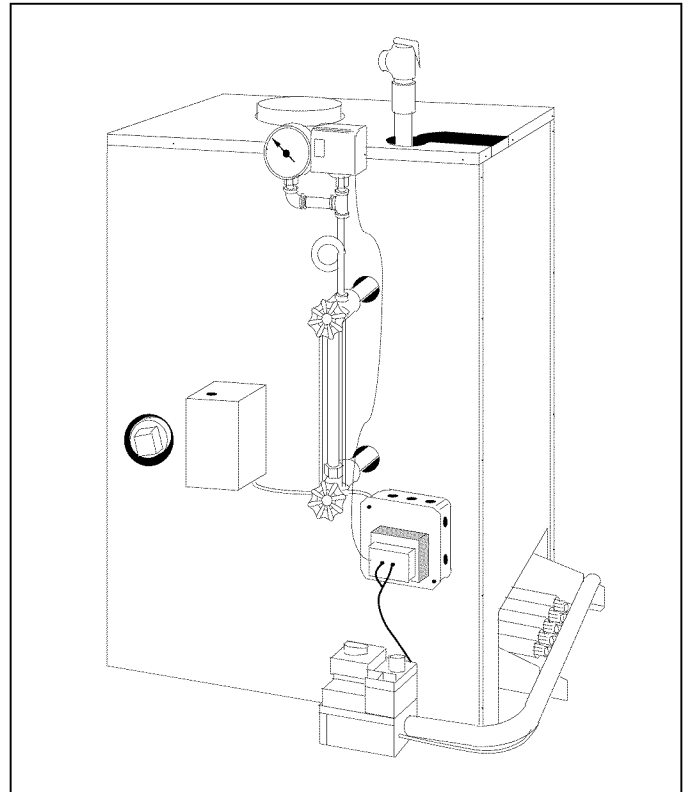


# HydroTherm®

## VGAB-SERIES INSTALLATION, OPERATION & MAINTENANCE MANUAL AND REPLACEMENT PARTS LIST

Gas-Fired Steam Cast Iron Boilers  
175,000 to 400,000 Btuh Input

Standing Pilot,  
Standing Pilot & Vent Damper,  
Intermittent Pilot and Intermittent Pilot  
& Vent Damper



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## HydroTherm®

# SECTION 1: INTRODUCTION

## CODE COMPLIANCE

Boiler installations must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the National Fuel Gas Code ANSI Z223.1-latest edition. Where required by the authority having jurisdiction, the installation must also conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

All electrical wiring must be in accordance with National Electric Code ANSI/NFPA No.70-latest edition and any additional state or local code requirements. If an external source is utilized, boiler, when installed, must be electrically grounded in accordance with

requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code, ANSI/NFPA No.70-latest edition. UL listed power limited circuit cable is almost universally approved for safety controls on heating equipment, either internally or externally, without protection of conduits or raceway.

For Canada, the installation must be in accordance with Standards CGA B149.1 and B149.2 Installation Codes for Gas Burning Appliances and Equipment and/or local codes. All electrical connections are to be made in accordance with Standard C.S.A. C22.1 Canadian Electrical Code, Part 1 and/or local codes.

BOILER MODEL	DIMENSIONS				
	A	B	C	D	E
VGA-175B	22 1/2"	18"	10 1/2"	7"	25"
VGA-200B	22 1/2"	18"	10 1/2"	7"	25"
VGA-250B	26"	21 1/2"	12 1/2"	8"	30"
VGA-300B	29 1/2"	25"	14"	8"	30"
VGA-350B	33 1/2"	28 1/2"	15 1/2"	9"	37"
VGA-400B	36 1/2"	32"	17 1/2"	9"	37"

NOTE: SPILL & ROLLOUT SWITCHES USED ON VGA-175 THRU VGA-250.

\* FOR MODELS SUPPLIED WITH VENT DAMPER ADD 3 5/8" TO DIM. E

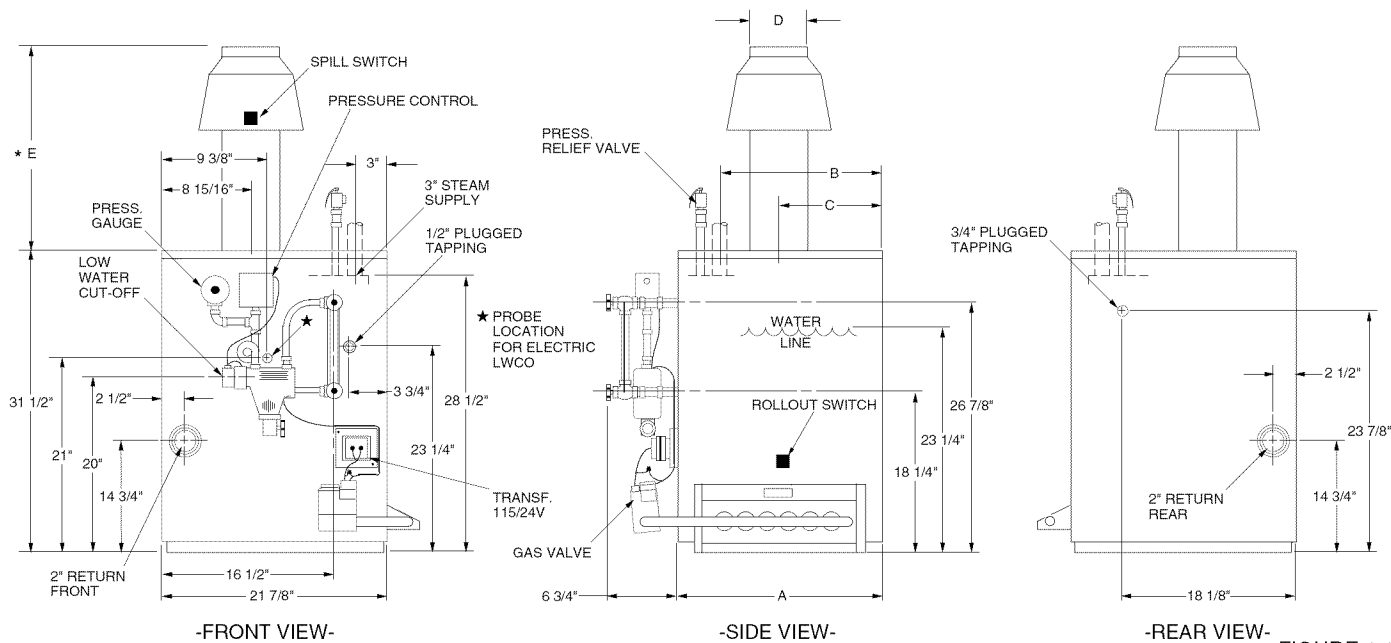


FIGURE 1.1

Note: Optional Float Low Water Cut-Off shown.

The following terms are used throughout this manual to bring attention to the presence of potential hazards or to important information concerning the product:

**DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.

**WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.

**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor injury or property damage.

**NOTE:** Used to notify of special instructions on installation, operation or maintenance which are important to equipment but not related to personal injury hazards.

## VENTING REQUIREMENTS

When connecting to gas vents or chimneys, vent installations shall be in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1-latest edition, or applicable provisions of the local building codes. For Canada, the provisions of B149.1 and B149.2 shall apply.

Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.

When two or more appliances vent into a common flue, the area of the common flue should be at least equal to the area of the largest flue plus 50% of the areas of the additional flue or vent connectors.

When existing boiler is removed from common venting system, common venting system is likely to be too large for proper venting of appliances remaining connected to it. At time of removal of existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while other appliances remaining connected to the common venting system are not in operation:

1. Seal all unused openings in common venting system.
2. 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.
3. 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 appliance 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.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from cigarette, cigar or pipe.
6. After it has been determined that each appliance remaining connected to common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to previous conditions of use.

7. Any improper operation of the common venting system should be corrected so the installation conforms with National Fuel Gas Code, ANSI Z223.1-latest edition. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix G in the National Fuel Gas Code, ANSI Z223.1-latest edition. For Canada, the provisions of B149.1 and B149.2 shall apply.

**DANGER: A chimney which does not meet modern safety standards will result in a fire or deadly carbon monoxide poisoning of the building residents.**

## CHIMNEY REQUIREMENTS

Chimney condition is of paramount importance for a safe and efficient boiler installation. All new and replacement installations must include a chimney inspection by a qualified individual or agency. Chimney construction materials must be compatible with the fuel being used.

Particular attention should be paid on all oil-to-gas conversions. Soot may have accumulated in chimney and/or degraded chimney liner. Most utilities require complete chimney cleaning. Others may require installation of new liner, spill switches or other chimney upgrades. Check with local utility for required safety precautions.

**WARNING: This boiler must be supplied with combustion air in accordance with Section 5.3, Air for Combustion & Ventilation, ANSI Z223.1 and applicable local building codes. Failure to provide adequate combustion air for this appliance can result in excessive levels of carbon monoxide which can result in severe personal injury or death!**

## COMBUSTION AIR REQUIREMENTS

If the boiler is installed in an unconfined space, adequate air will be available via normal infiltration. However, if building construction is unusually tight or the boiler is installed in a confined space (a space whose volume is less than 50 cubic feet per 1000 Btu/hr of gas input for all fuel burning equipment), adequate air for combustion must be provided by two openings: one located about 6" below the ceiling, the other about 6" above the floor. When communicating directly with the outside or through a vertical duct, each opening must have a minimum free area of one square inch per 4000 Btu/hr of gas input. Horizontal ducts to the outside must have a minimum free area of one square inch per 2000 Btu/hr of gas input. When ventilation is provided by openings in doors, etc. to adjoining spaces having adequate infiltration, each opening must have a minimum free area of one square inch per 1000 Btu/hr of gas input.

**NOTE: Boiler employs atmospheric combustion. Combustion air must not be contaminated with halogenated hydrocarbon vapors, aerosol propellants or freon. Otherwise, boiler heat exchanger will be subject to corrosion, reducing boiler life.**

## **WATER TREATMENT**

Water treatment is recommended in areas where water quality is a problem. A local water treatment company should be consulted to determine the requirements for your particular system and locality.

**NOTE: Boiler is not for use in systems where water is replenished. Minerals in the water can build up on the heat transfer surfaces and cause overheating and subsequent failure of the heat exchanger.**

**NOTE: Boiler utilizes EPDM synthetic rubber seals. Water treatment chemicals and system cleaning chemicals must be compatible with this and all other construction materials.**

## **SHIPMENT OF BOILER**

Each boiler is shipped in a single carton. Draft hood is shipped in a separate carton.

## **Optional Vent Damper**

When ordered, the vent damper is shipped in an individual carton packaged with the boiler. Mounting of the damper is required.

**WARNING: Installers must follow local regulations with respect to the installation of CO detectors and follow the manufacturer's stated maintenance schedule for this boiler!**

**ATTENTION: Observer les règlements régional à l'égard des détecteurs de monoxyde de carbone et observer entretien de manufacturier pour cette chaudière!**

# SECTION 2: BOILER INSTALLATION

## STEP 1: LOCATING AND SETTING THE BOILER

► **PROCEDURE A:** Check that provisions for combustion air are in accordance with National Fuel Gas Code ANSI Z223.1-latest edition and all applicable local codes. In Canada, follow CAN/CGA B149.1 or .2 installation codes.

**WARNING:** Adequate fresh air must be provided for combustion. Otherwise, improper boiler operation and inadequate venting of deadly flue gases may result.

If boiler is installed in an unconfined space, adequate air will be available via normal infiltration.

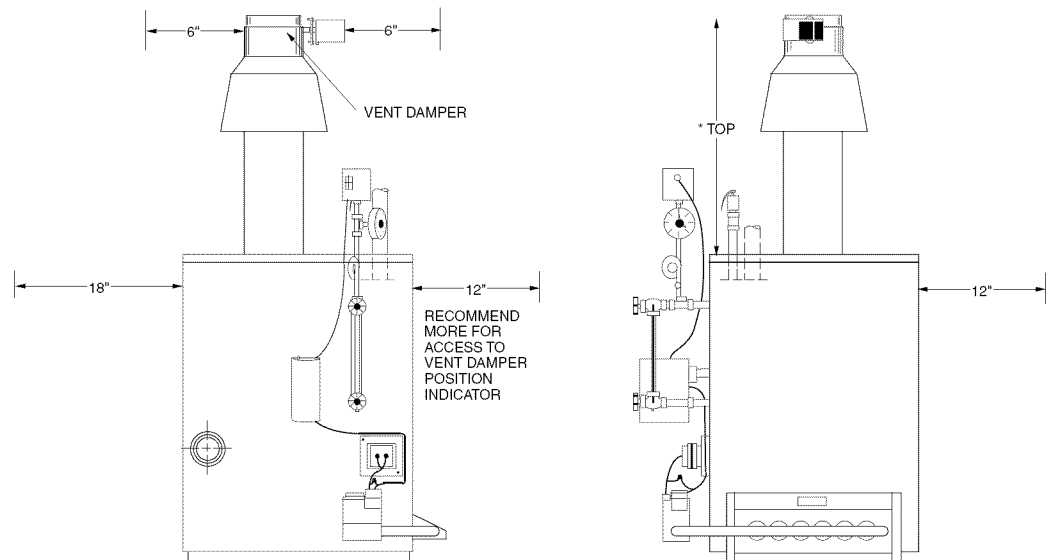
If boiler is installed in a confined space (a space with a volume of less than 50 cubic feet per 1000 Btu/hr of gas input for all fuel burning equipment) or building construction is unusually tight, adequate air for combustion must be provided by two openings: one located about 6" below the ceiling, the other about

6" above the floor. When communicating directly with the outside, each opening must have a minimum free area of one square inch per 4000 Btu/hr of gas input. When ventilation air is provided by openings in doors, etc. to adjoining spaces having adequate infiltration, each opening must have a minimum free area of one square inch per 1000 Btu/hr of gas input.

**NOTE:** Boiler employs atmospheric combustion. Combustion air must not be contaminated with halogenated hydrocarbon vapors, aerosol propellants or freon; otherwise, heat exchanger will be subject to corrosion, reducing boiler life.

► **PROCEDURE B:** Check minimum clearances to combustibles are proper as shown. Local requirements may specify greater clearances & must be adhered to.

Boiler shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during appliance operation and service (low water cutoff replacement, condensate trap, control replacement,



\* 52" FOR VGA-175/200/250/300  
58" FOR VGA-350/400

FIGURE 2.1

**WARNING:** Never install boiler on combustible flooring without combustible flooring pan or on carpeting as heat damage and/or fire may result.

**CAUTION:** Locate boiler so horizontal connecting flue pipe is as short as possible. Maximize height of vertical flue connector.

**NOTE:** Do not loosen tie rods on absorption unit. They accommodate thermal expansion. Loss of boiler structural integrity and water leaks/damage may result.

Step 1 Continued On Next Page

**►PROCEDURE C:  
Check component positioning.**

1. Remove all packing material from boiler.
2. Install on non-combustible floor only, unless local codes permit use and fabrication of a fireproof base (see Fig. 2.2).
3. Check that burners and controls are in the proper position.

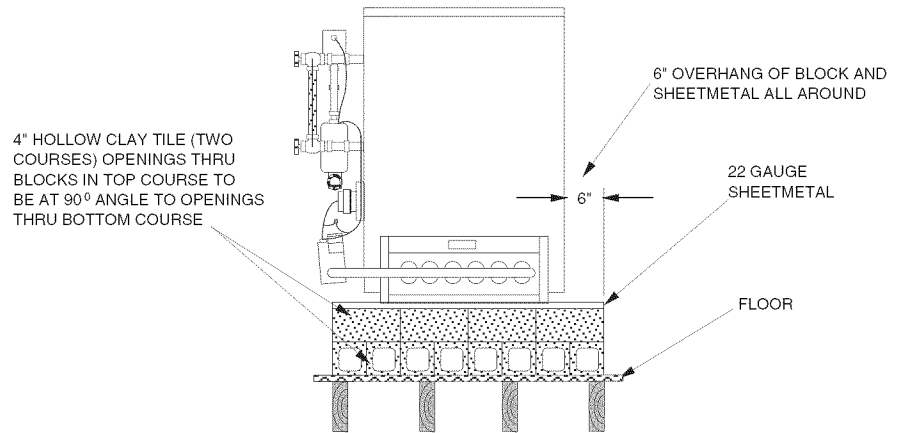


FIGURE 2.2

**STEP 2: INSTALLING STEAM PIPING**

Typical piping connections are shown in Figure 2.3. All external piping must be supported by hangers, not by the boiler or its accessories.

Proper steam piping practices must be followed at all times. Maintain proper clearances between piping and combustible material.

Supply outlet must run full size from boiler to a header at least 24" above top of boiler. Condensate return piping should be connected to boiler through a "Hartford Loop." Install gate valves in supply and return.

The supply and return lines should be equipped with drain cocks to drain sediment and sludge from lowest points of boiler.

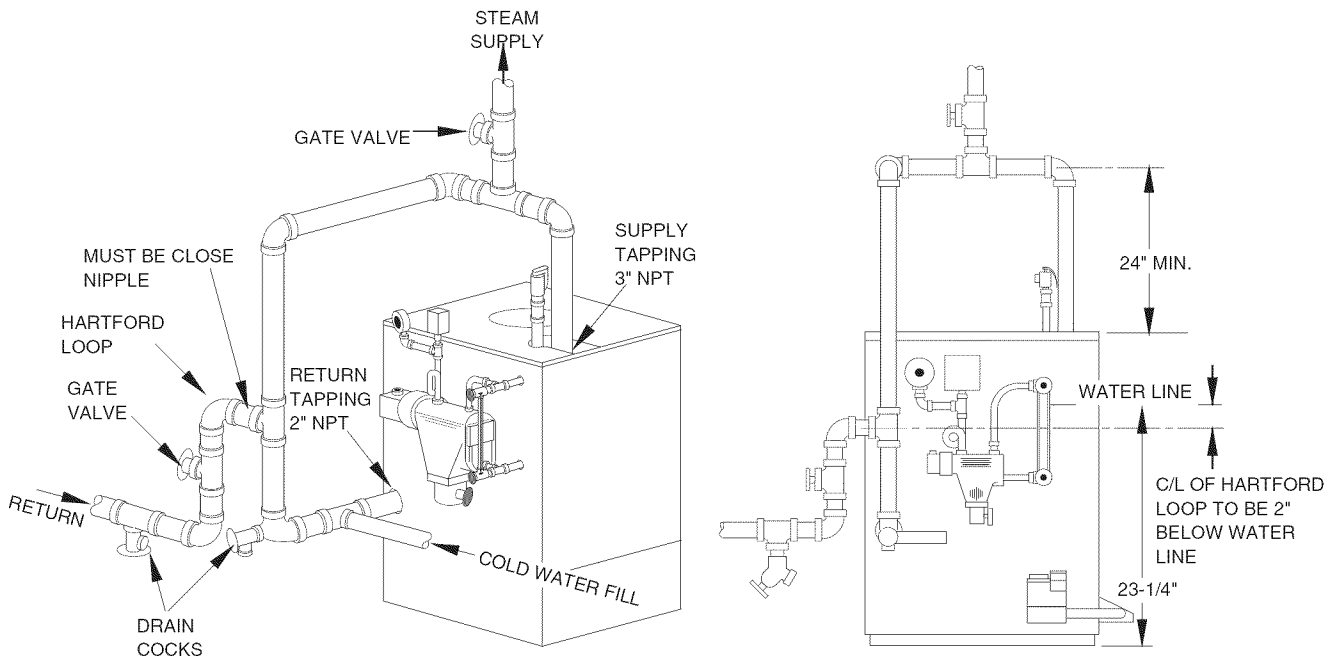


FIGURE 2.3

### STEP 3: INSTALLING HYDRONIC COMPONENTS

A low-water cutoff must be installed to protect the unit from dry-fire.

Screw extension nipple into 3/4" tapping on top of the absorption unit and install relief valve into top of nipple with the spindle in the vertical position (i.e., with the valve discharge in the horizontal)(See Figure 2.4).

**WARNING: Never install any type of valve between the pressure relief valve and the boiler! Failure to comply with this warning can result in a boiler explosion causing extensive property damage, severe personal injury or death!**

Most localities require the discharge piping to terminate within 6" of the floor. Check local code requirements if in doubt. Discharge piping must be of same size or larger than the relief valve outlet and should be run as short and straight as possible. Elbows in the discharge piping should be placed as close to the valve as possible. If valve discharge is to be drained away, the discharge piping must not be hard-piped to the drain piping (i.e., an open funnel or similar arrangement must be used).

**CAUTION: Piping must be installed from the relief valve discharge so there will be no danger of scalding personnel.**

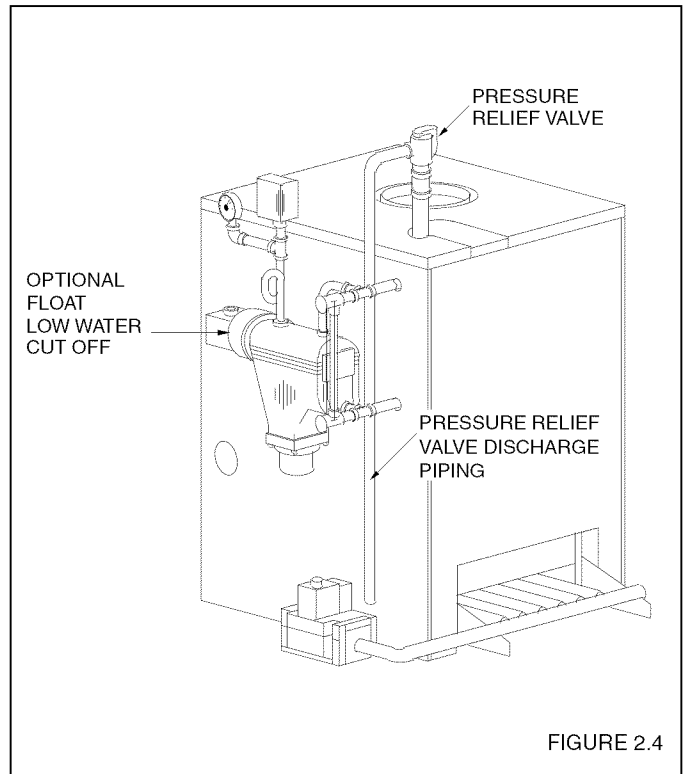


FIGURE 2.4

### STEP 4: VENTING BOILER

**DANGER: Drafthood, vent outlet and vent damper as supplied must not be altered in any way as proper boiler operation would be jeopardized. Flame rollout, fire or carbon monoxide poisoning will result.**

Install draft hood on boiler. If the draft hood shroud has a hole near the relief opening for installing a spill switch, mount draft hood so the hole faces to the front of the boiler. **Spill switches are provided on Model VGA-175B, VGA-200B &VGA-250B boilers.**

Applicable boiler is equipped with a factory-mounted spill switch harness/mounting bracket assembly; spill switch is provided in plastic bag. See Figure 2.5. Install mounting bracket on outside surface of draft hood shroud with screws provided (HARNESS MUST BE ON OUTSIDE OF SHROUD). Install spill switch in hole in shroud (on outside surface) with screws provided. Plug wiring leads from harness/bracket assembly onto flat terminals on spill switch.

**NOTE: Boiler will not operate unless wiring leads to spill switch are connected.**

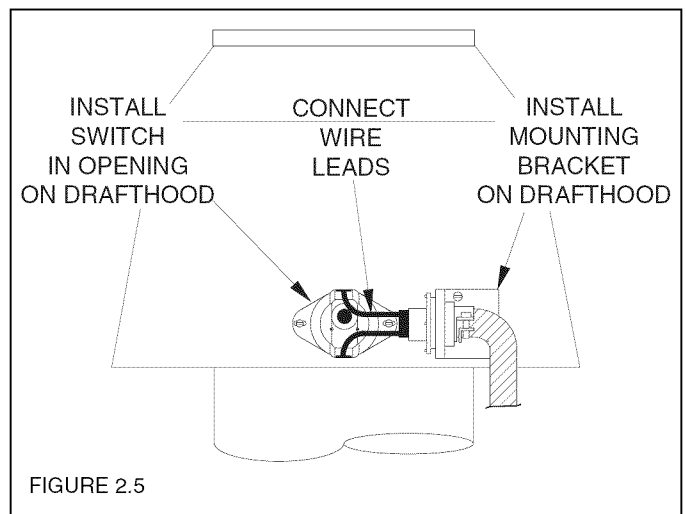


FIGURE 2.5

If vent damper is supplied with boiler, it must be installed between the top of the draft hood and the flue pipe. See "Installing The Vent Damper" instructions.

Connect draft hood to chimney or Class B vent. Flue pipe must be same diameter as the draft hood outlet.

The flue or vent connectors must be installed flush with the inside chimney liner surface and sealed in place with furnace cement. Horizontal portions of the single wall and type B venting systems shall be supported by use of strap hangers or their equivalent. Vent supports should be placed a maximum of 15-feet apart and as required to prevent sagging. The vent connectors shall be pitched 1/4" per foot upwards towards the chimney or vent termination.

**DANGER: Only the boiler may be served by the vent damper. Do not attempt to use it to vent an additional appliance. This will cause fire or carbon monoxide poisoning.**

### Installing Vent Damper

The vent damper must be mounted directly on top of the draft hood.

Locate the motor on the right side and position the cable so that it does not touch the metal surface of the draft hood (see Figure 2.6). If necessary, turn angle connector on vent damper upward until cable clears; tighten locknut to secure. The direction of the flow arrow imprinted on the vent damper must point upward. The damper position indicator, which is located on the side of the vent damper opposite the motor, must be visible.

**CAUTION: A minimum of 6" between vent damper and combustible materials must be maintained. The vent damper must be accessible for servicing and checking position indicator.**

Remove hairpin shipping clip which holds damper blade in closed position and observe that damper blade rotates slowly to open position. Do not force it closed as it may damage the gear train and void the warranty. The blade should move freely and without obstruction.

Secure the vent damper housing to the drafthood outlet with sheet metal screws or pop rivets. Refer to Figure 2.8 for fastener locations. Install flue pipe over top of vent damper and secure to damper housing with sheet metal screws or pop rivets.

Attach vent damper cable to cable clamp on boiler front panel and join the Molex connector (see Figure 2.6 or Figure 2.6A).

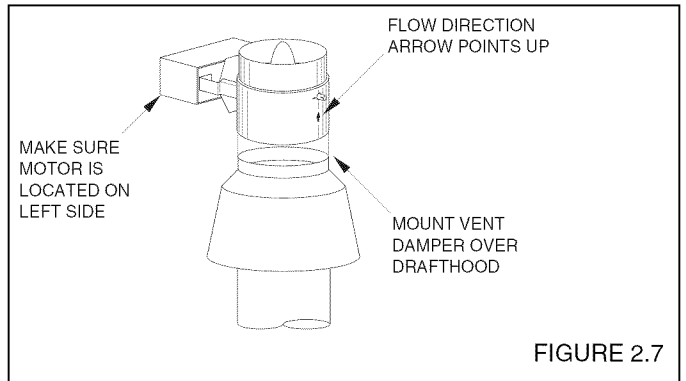


FIGURE 2.7

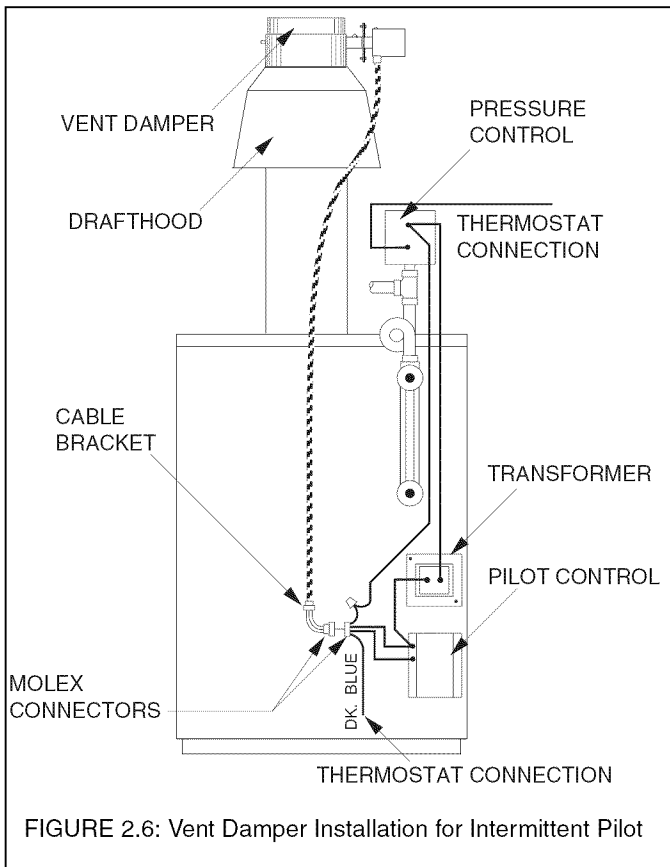


FIGURE 2.6: Vent Damper Installation for Intermittent Pilot

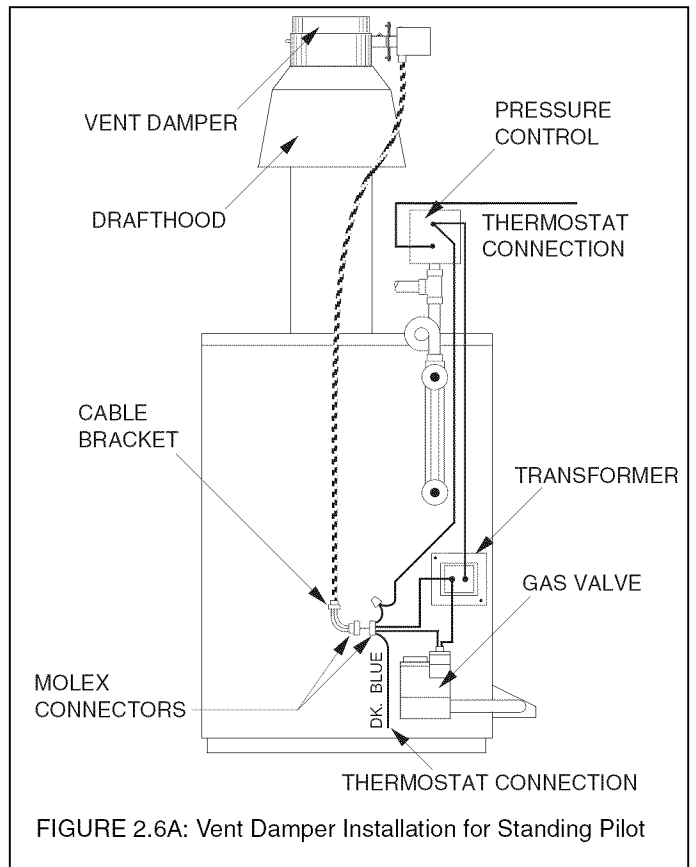


FIGURE 2.6A: Vent Damper Installation for Standing Pilot



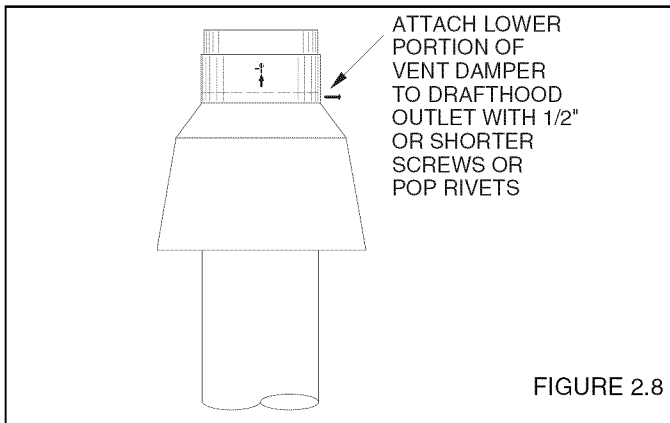


FIGURE 2.8

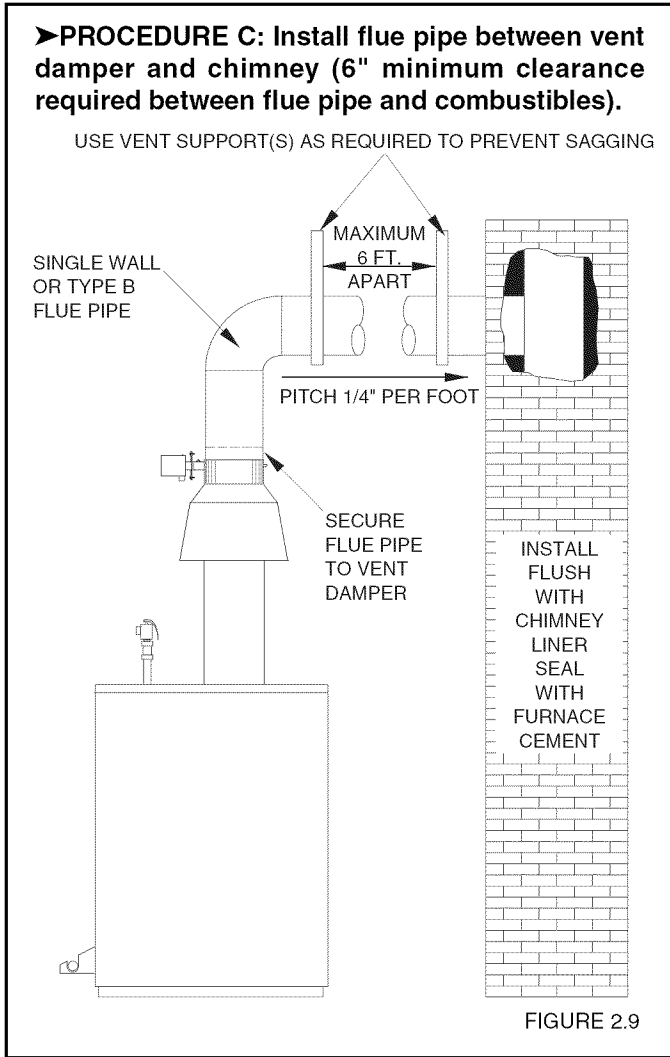


FIGURE 2.9

**ADDITIONAL VENTING REQUIREMENTS:** When connecting to gas vents or chimneys, vent installations shall be in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1-latest edition, or applicable provisions of the local building codes.

Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.

When two or more appliances vent into a common flue, the area of the common flue should be at least equal to the area

of the largest flue plus 50% of the areas of the additional flue or vent connectors.

When an existing boiler is removed from a common venting system, common venting system is likely to be too large for proper venting of appliances remaining connected to it. At time of removal of existing boiler, following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while other appliances remaining connected to common venting system are not in operation:

1. Seal all unused openings in common venting system.
2. 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.
3. 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 appliance 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.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from cigarette, cigar or pipe.
6. After it has been determined that each appliance remaining connected to common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to previous conditions of use.
7. Any improper operation of the common venting system should be corrected so installation conforms with the National Fuel Gas Code, ANSI Z223.1-latest edition. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix G in the National Fuel Gas Code, ANSI Z223.1-latest edition. For Canada, the provisions of CAN/CGA B149(.1 or .2) shall apply.

**ADDITIONAL CHIMNEY REQUIREMENTS:** Chimney condition is of paramount importance for a safe and efficient boiler installation. All installations must include a chimney inspection by a qualified individual or agency. Chimney construction materials must be compatible with the fuel being used.

Particular attention should be paid on all oil-to-gas conversions. Soot may have accumulated in chimney and/or degraded chimney liner. Most utilities require complete chimney cleaning. Others may require installation of new liner, spill switches or other chimney upgrades. Check with local utility for required safety precautions.

**DANGER: A chimney which does not meet modern safety standards will result in a fire or deadly carbon monoxide poisoning of the building residents.**

## STEP 5: INSTALLING & TESTING GAS PIPING

Connect the gas piping from the meter to the boiler using a pipe size which will result in a pressure drop of less than 0.3" W.C. for natural gas or 0.5" W.C. for propane. See Figure 2.10 for the appropriate gas pipe sizing and example.

Good piping practices should be followed at all times. See Figure 2.11 for a typical gas piping arrangement. All piping must be supported by hangers, not by the boiler or its accessories.

Install a full-sized sediment trap at the low point in gas line upstream of gas valve. Install a non-restrictive lubricated plug valve in the gas line close to the boiler. Install a ground joint union at the gas valve inlet to allow for servicing. Check local codes and utilities for any special requirements and procedures.

Pipe joint compound (pipe dope) must be compatible with the fuel (natural gas or propane) being used.

**Maximum Capacity of Pipe in Cubic Feet of Natural Gas per Hour for Gas Pressures of 0.5 Psig or Less and a Pressure Drop of 0.3 Inch Water Column**

(Based on a 0.60 Specific Gravity Gas)

Nominal Iron Pipe Size, Inches	Internal Diameter, Inches	Length of Pipe, Feet														
		10	20	30	40	50	60	70	80	90	100	125	150	175	200	
1/4"	.326	32	22	18	15	14	12	11	11	10	9	8	8	7	6	
3/8"	.493	72	49	40	34	30	27	25	23	22	21	18	17	15	14	
1/2"	.622	132	92	73	63	56	50	46	43	40	38	34	31	28	26	
3/4"	.824	278	190	152	130	115	105	96	90	84	79	72	64	59	55	
1"	1.049	520	350	285	245	215	195	180	170	160	150	130	120	110	100	
1-1/4"	1.380	1,050	730	590	500	440	400	370	350	320	305	275	250	225	210	
1-1/2"	1.610	1,600	1,100	890	760	670	600	560	530	490	460	410	380	350	320	
2"	2.067	3,050	2,100	1,650	1,450	1,270	1,150	1,500	990	930	870	780	710	650	610	
2-1/2"	2.469	4,800	3,300	2,700	2,300	2,000	1,850	1,700	1,600	1,500	1,400	1,250	1,130	1,050	980	
3"	3.026	8,500	5,900	4,700	4,100	3,600	3,250	3,000	2,800	2,600	2,500	2,200	2,000	1,850	1,700	
4"	4.026	17,500	12,000	9,700	8,300	7,400	6,800	6,200	5,800	5,400	5,100	4,500	4,100	3,800	3,500	

**Maximum Capacity of Pipe in Thousands of Btu per Hour of Undiluted Liquefied Petroleum Gases (at 11 Inches Water Column Inlet Pressure)**

(Based on a Pressure Drop of 0.5 Inch Water Column)

Nominal Iron Pipe Size, Inches	Length of Pipe, Feet												
	10	20	30	40	50	60	70	80	90	100	125	150	
1/2"	275	189	152	129	114	103	96	89	83	78	69	63	
3/4"	567	393	315	267	237	217	196	185	173	162	146	132	
1"	1071	732	590	504	448	409	378	346	322	307	275	252	
1-1/4"	2205	1496	1212	1039	937	834	771	724	677	630	567	511	
1-1/2"	3307	2299	1858	1559	1417	1275	1180	1086	1023	967	866	787	
2"	6221	4331	3465	2992	2646	2394	2205	2047	1921	1811	1606	1498	

**Example:** Boiler Model VGA-300B is to be installed. The distance from the existing gas meter installation site is 20 feet. What pipe size must be used? The local utility indicates the heating value of the natural gas being supplied is 1,000 Btu per cubic foot. Determine the cubic feet of gas per hour for above boiler model:

$$\frac{300,000 \text{ Btu per hour}}{1,000 \text{ Btu per cu. ft.}} = 300 \text{ cu. ft. per hour}$$

1. Find 20 ft. in the upper portion of the table for natural gas under **Length of Pipe, Feet** heading.
2. Moving down the column, match the required capacity. The higher capacity is acceptable. In our case, it is 350 cu. ft.
3. Move to the left-hand column **Nominal Iron Pipe Size, Inches** to read required pipe size. In our case, it is 1".

FIGURE 2.10

## Testing Gas Piping

**DANGER: Before placing gas piping into service, carefully test it to assure every joint is gas tight. Bubble test all joints with a soap solution. NEVER TEST WITH AN OPEN FLAME AS FIRE OR EXPLOSION WILL RESULT.**

For any pressure testing in excess of 1/2 psi, the boiler and its individual shutoff valve must be isolated from the piping system by disconnecting them and capping the outlet(s). For any pressure testing equal to or less than 1/2 psi, the boiler must be isolated from the piping system by closing its manual shutoff valve.

Minimum pressure required at the gas valve inlet is 5" W.C. for natural gas and 11" W.C. for propane. Maximum pressure allowable at the gas valve inlet is 12" W.C. If the gas pressure is above these limits, a pressure regulator must be installed. If the gas pressure is below these limits, contact the local utility.

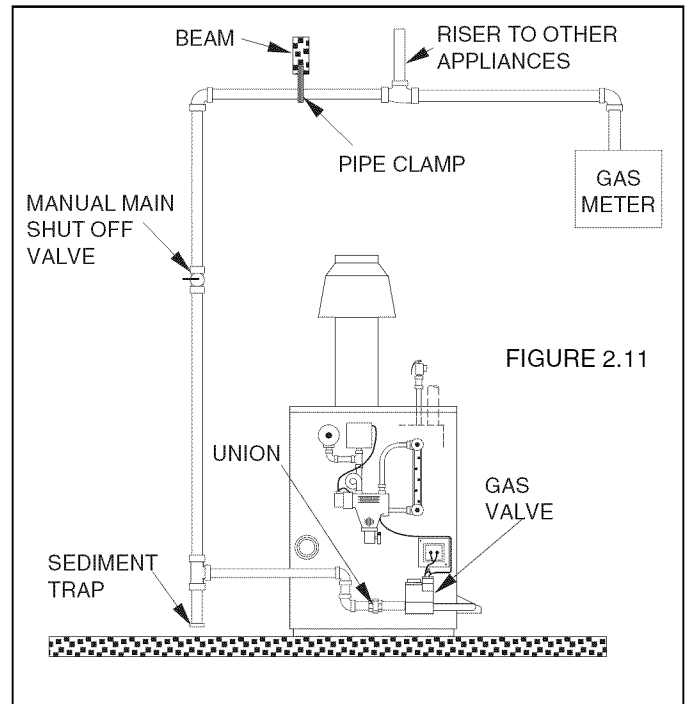


FIGURE 2.11

## STEP 6: WIRING THE BOILER

**WARNING: Turn off electrical power supply before servicing. Contact with live electric components can cause electric shock or death.**

All electrical and control wiring must be installed in accordance with the codes listed in Section 1 of this manual. Follow the wiring diagram for your particular installation as shown in Figures 2.13 through 2.20. For United States only, VGA-350B and 400B natural gas

standing pilot units have a secondary pressuretrol (located to the right of the primary pressuretrol when facing the front of the boiler). Connect wiring assemblies (provided on boiler) from the low water cut-off or transformer to the primary pressure control and from the gas valve to the secondary pressure control as shown in Fig. 2.9. **Do not readjust the secondary pressuretrol;** its purpose is to interrupt thermocouple power to the gas valve in case the primary pressuretrol fails to function.

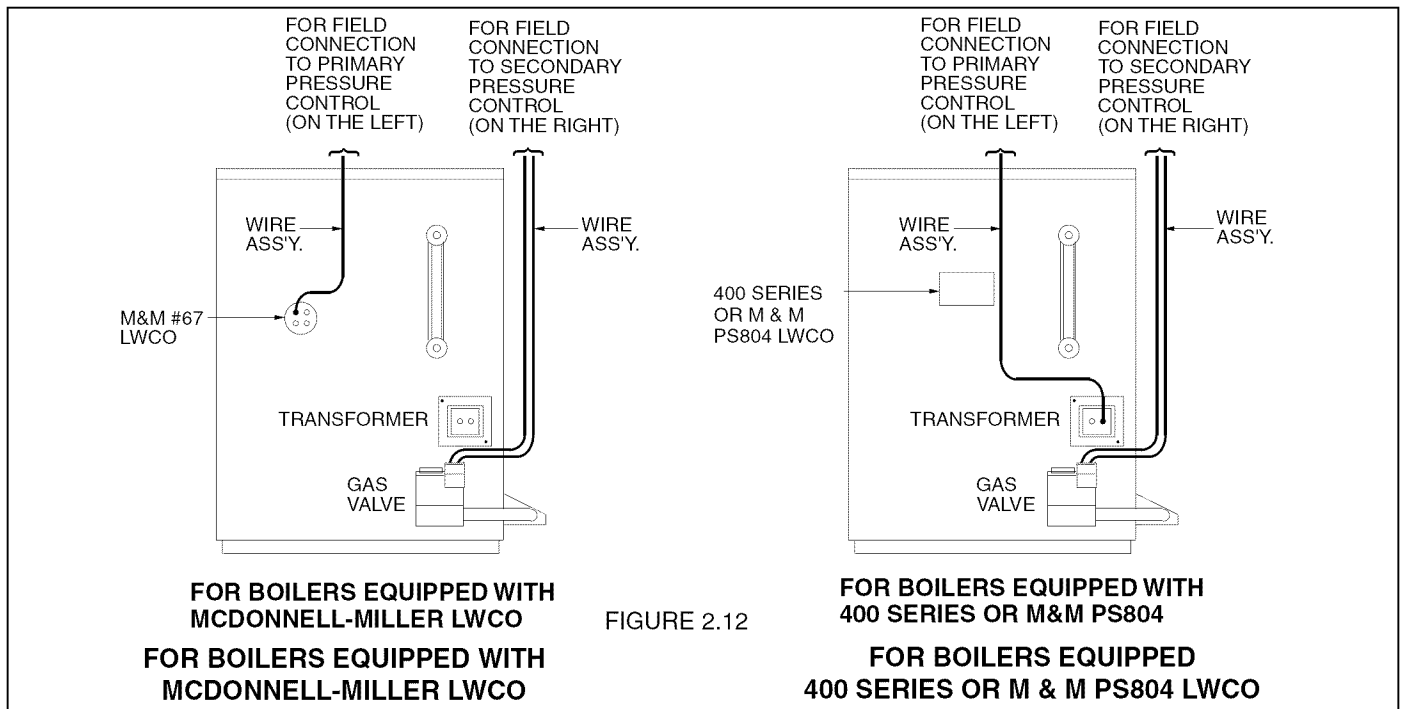


FIGURE 2.12

For vent damper-equipped models, connect thermostat to blue leads (see Figure 2.6).

**NOTE:** If any of original wire supplied with boiler must be replaced, use similar wire of 105 C rating. Otherwise, insulation may melt or degrade, exposing bare wire.

**NOTE:** Boiler transformer must not be used to power external accessories (i.e., zone valves,

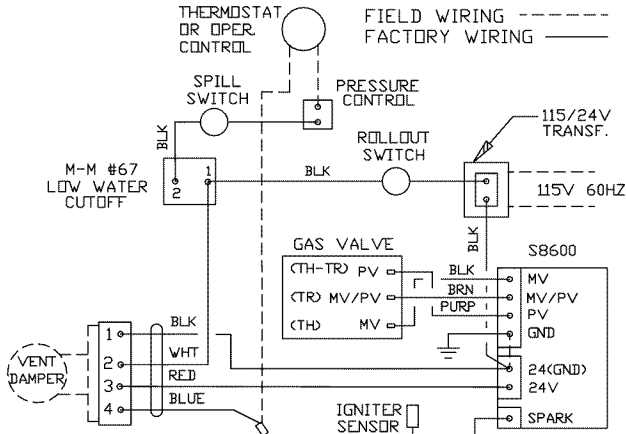
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relays, etc.) Otherwise, transformer will be overloaded and burn out.

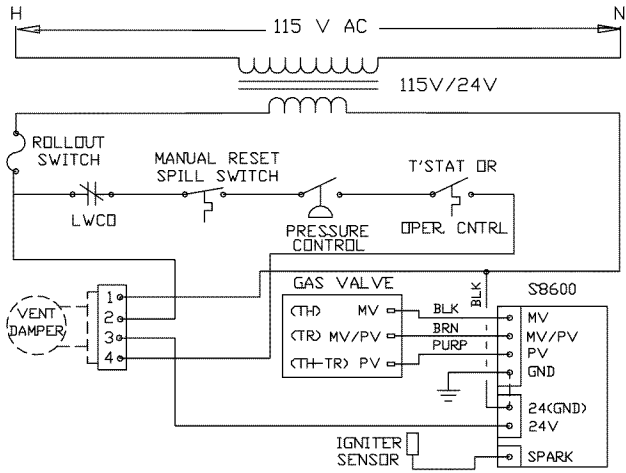
**CAUTION:** Label all wire prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation! Verify proper operation after servicing.

**OPERATING SEQUENCE  
STEAM BOILERS EQUIPPED WITH VENT  
DAMPER FLOAT TYPE LWCO AND IID**

MOTOR DRIVES VENT DAMPER TO CLOSED POSITION AND REMAINS CLOSED DURING STANDBY. SENSING CIRCUIT IS CONTINUOUSLY MONITORED. THERMOSTAT (OR OPERATING CONTROL) CALLS FOR HEAT. DAMPER BLADE OPENS. DAMPER END SWITCH CLOSURES (PROVING DAMPER OPEN). IF NO FAILURE EXISTS, THE PILOT VALVE AND IGNITER ARE ENERGIZED. PILOT IS IGNITED AND SENSOR SENSES FLAME. MAIN VALVE IS ENERGIZED AND IGNITER DE-ENERGIZED. UNIT OPERATES UNTIL THERMOSTAT (OR OPERATING CONTROL) IS SATISFIED. SYSTEM RETURNS TO STANDBY WITH DAMPER CLOSED.



IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE BOILER MUST BE REPLACED, USE A SIMILAR WIRE OF 105° C RATING.



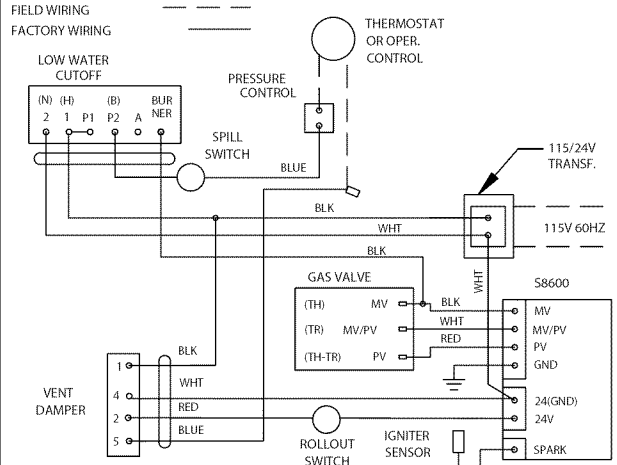
SPILL AND ROLLOUT SWITCHES USED WHEN INPUT IS LESS THAN 300,000 BTUH

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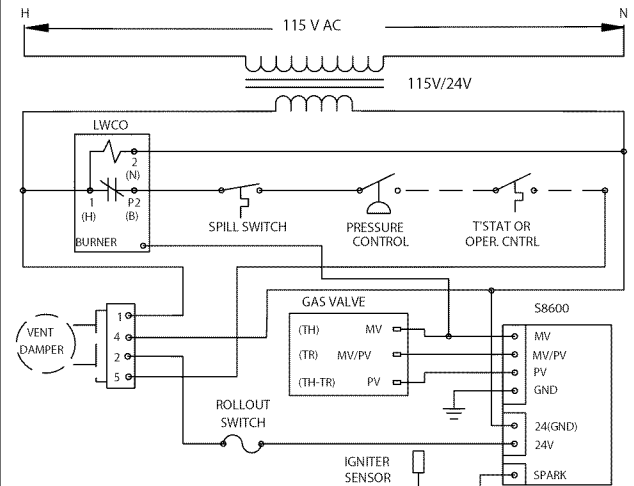
**FIGURE 2.13: WIRING DIAGRAM & OPERATION SEQUENCE FOR BOILERS EQUIPPED WITH INTERMITTENT PILOT, VENT DAMPER & MCDONNELL-MILLER WATER CUT-OFF**

**OPERATING SEQUENCE  
STEAM BOILERS EQUIPPED WITH VENT DAMPER,  
CG-400 SERIES LWCO AND IID**

1. MOTOR DRIVES VENT DAMPER TO CLOSED POSITION AND REMAINS CLOSED DURING STANDBY.
2. SENSING CIRCUIT IS CONTINUOUSLY MONITORED.
3. THERMOSTAT (OR OPERATING CONTROL) CALLS FOR HEAT.
4. DAMPER BLADE OPENS.
5. DAMPER END SWITCH CLOSURES (PROVING DAMPER OPEN).
6. IF NO FAILURE EXISTS, THE PILOT VALVE AND IGNITER ARE ENERGIZED.
7. PILOT IS IGNITED AND SENSOR SENSES FLAME.
8. MAIN VALVE IS ENERGIZED AND IGNITER DE-ENERGIZED.
9. UNIT OPERATES UNTIL THERMOSTAT (OR OPERATING CONTROL) IS SATISFIED.
10. SYSTEM RETURNS TO STANDBY WITH DAMPER CLOSED.



IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE BOILER MUST BE REPLACED, USE A SIMILAR WIRE OF 105° C RATING.



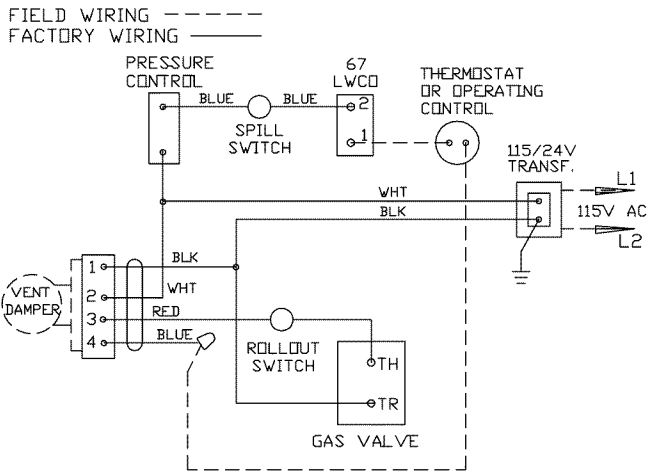
SPILL AND ROLLOUT SWITCHES ON 3 THRU 6 SECTION ONLY

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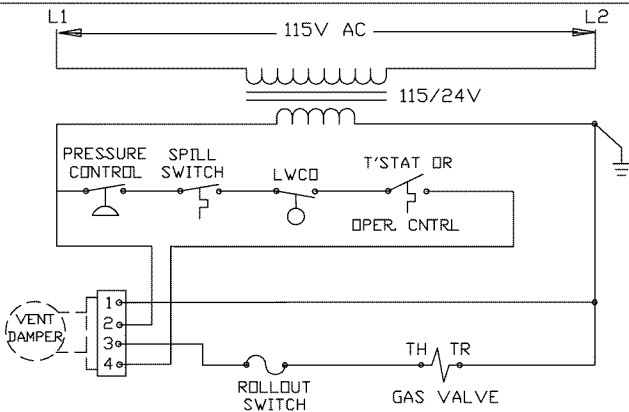
**FIGURE 2.14: WIRING DIAGRAM & OPERATION SEQUENCE FOR BOILERS EQUIPPED WITH INTERMITTENT PILOT, VENT DAMPER & CG-400 SERIES LWCO**

**OPERATING SEQUENCE FOR STEAM BOILERS  
EQUIPPED WITH STANDING PILOT, VENT  
DAMPER, HI-LIMIT & 67 LWCO**

1. MOTOR DRIVES VENT DAMPER TO CLOSED POSITION AND REMAINS CLOSED DURING STANDBY.
2. STANDING PILOT REMAINS LIT.
3. SENSING CIRCUIT IS CONTINUOUSLY MONITORED.
4. THERMOSTAT (OR OPERATING CONTROL) CALLS FOR HEAT.
5. DAMPER BLADE OPENS.
6. DAMPER END SWITCH CLOSSES (PROVING VENT DAMPER OPEN)
7. MAIN VALVE IS ENERGIZED
8. UNIT OPERATES UNTIL THERMOSTAT (OR OPERATING CONTROL) IS SATISFIED.
9. SYSTEM RETURNS TO STANDBY WITH DAMPER CLOSED.



IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE MTW (105°C) WIRE OR ITS EQUIVALENT.



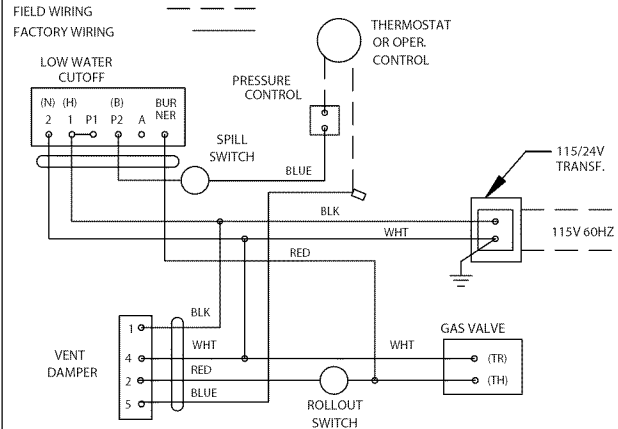
SPILL AND ROLLOUT SWITCHES USED WHEN INPUT IS LESS THAN 300,000 BTUH

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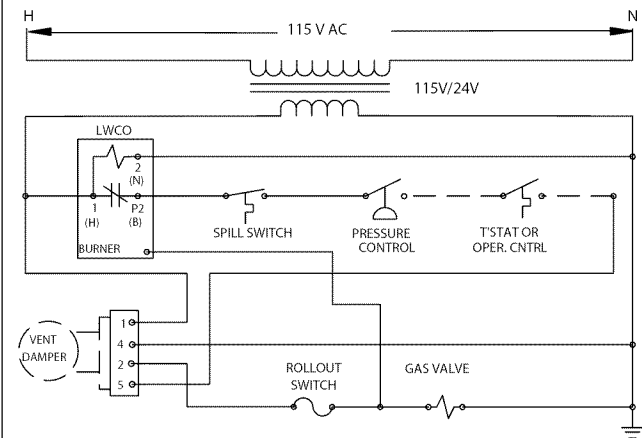
**FIGURE 2.15: WIRING DIAGRAM & OPERATION SEQUENCE FOR BOILERS EQUIPPED WITH STANDING PILOT, VENT DAMPER & MCDONNELL-MILLER WATER CUT-OFF (EXCEPT FOR VGA-350 & VGA-400 N.G.)**

**OPERATING SEQUENCE FOR STEAM BOILERS  
EQUIPPED WITH STANDING PILOT, VENT DAMPER  
HI-LIMIT & CG-400 SERIES LWCO**

1. MOTOR DRIVES VENT DAMPER TO CLOSED POSITION AND REMAINS CLOSED DURING STANDBY.
2. STANDING PILOT REMAINS LIT.
3. SENSING CIRCUIT IS CONTINUOUSLY MONITORED.
4. THERMOSTAT (OR OPERATING CONTROL) CALLS FOR HEAT.
5. DAMPER BLADE OPENS.
6. DAMPER END SWITCH CLOSSES (PROVING DAMPER OPEN).
7. MAIN VALVE IS ENERGIZED.
8. UNIT OPERATES UNTIL THERMOSTAT (OR OPERATING CONTROL) IS SATISFIED.
9. SYSTEM RETURNS TO STANDBY WITH DAMPER CLOSED.



IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE BOILER MUST BE REPLACED, USE A SIMILAR WIRE OF 105°C RATING.



NATURAL GAS 3 THRU 7 SECTION.  
LP GAS 3 THRU 9 SECTION.  
SPILL & ROLLOUT SWITCHES ON 3 THRU 6 SECTION ONLY.

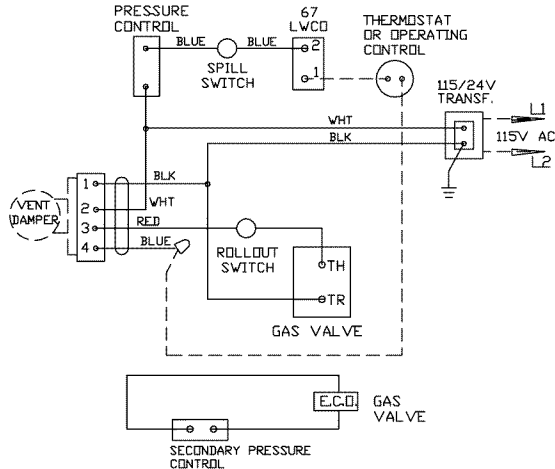
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**FIGURE 2.16: WIRING DIAGRAM & OPERATION SEQUENCE FOR BOILERS EQUIPPED WITH STANDING PILOT, VENT DAMPER & CG-400 SERIES LWCO (EXCEPT FOR VGA-350 & VGA-400 N.G.)**

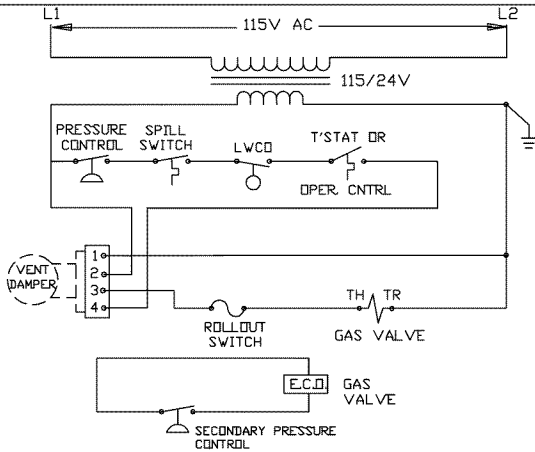
**OPERATING SEQUENCE FOR STEAM BOILERS  
EQUIPPED WITH STANDING PILOT, VENT  
DAMPER, HI-LIMIT, E.C.O. & 67 LWCO**

1. MOTOR DRIVES VENT DAMPER TO CLOSED POSITION AND REMAINS CLOSED DURING STANDBY.
2. STANDING PILOT REMAINS LIT.
3. SENSING CIRCUIT IS CONTINUOUSLY MONITORED.
4. THERMOSTAT (OR OPERATING CONTROL) CALLS FOR HEAT.
5. DAMPER BLADE OPENS.
6. DAMPER END SWITCH CLOSSES (PROVING VENT DAMPER OPEN)
7. MAIN VALVE IS ENERGIZED
8. UNIT OPERATES UNTIL THERMOSTAT (OR OPERATING CONTROL) IS SATISFIED.
9. SYSTEM RETURNS TO STANDBY WITH DAMPER CLOSED.

FIELD WIRING - - - - -  
FACTORY WIRING



IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE MTW (05°C) WIRE OR ITS EQUIVALENT.



SPILL AND ROLLOUT SWITCHES USED WHEN INPUT IS LESS THAN 300,000 BTUH

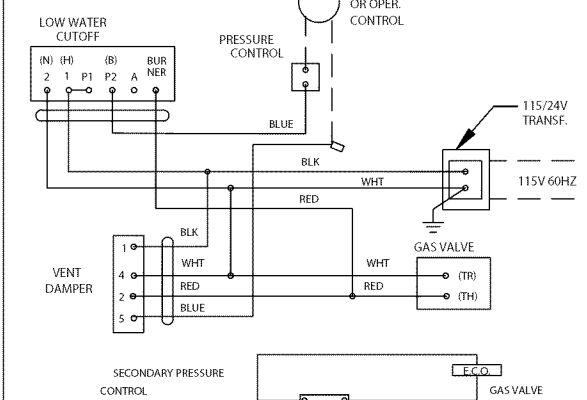
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**FIGURE 2.17: WIRING DIAGRAM & OPERATION SEQUENCE FOR BOILERS EQUIPPED WITH STANDING PILOT, MCDONNELL-MILLER LOW WATER CUT-OFF & SECOND PRESSURE CONTROL (FOR VGA-350 & VGA-400 N.G.)**

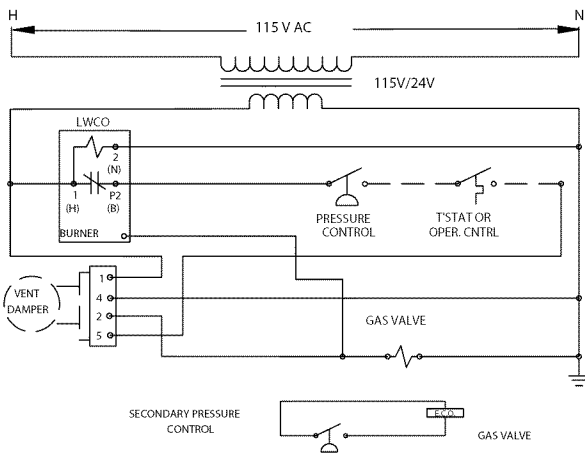
**OPERATING SEQUENCE FOR SREAM BOILERS  
EQUIPPED WITH STANDING PILOT, VENT DAMPER,  
HI-LIMIT, ECO & CG-400 SERIES LWCO**

1. MOTOR DRIVES VENT DAMPER TO CLOSED POSITION AND REMAINS CLOSED DURING STANDBY.
2. STANDING PILOT REMAINS LIT.
3. SENSING CIRCUIT IS CONTINUOUSLY MONITORED.
4. THERMOSTAT (OR OPERATING CONTROL) CALLS FOR HEAT.
5. DAMPER BLADE OPENS.
6. DAMPER END SWITCH CLOSSES (PROVING DAMPER OPEN).
7. MAIN VALVE IS ENERGIZED.
8. UNIT OPERATES UNTIL THERMOSTAT (OR OPERATING CONTROL) IS SATISFIED.
9. SYSTEM RETURNS TO STANDBY WITH DAMPER CLOSED.

FIELD WIRING - - - - -  
FACTORY WIRING



IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE BOILER MUST BE REPLACED, USE A SIMILAR WIRE OF 105°C RATING.



NATURAL GAS 8 & 9 SECTION.

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**FIGURE 2.18: WIRING DIAGRAM & OPERATION SEQUENCE FOR BOILERS EQUIPPED WITH STANDING PILOT, CG-400 SERIES LWCO & SECOND PRESSURE CONTROL (FOR VGA-350 & VGA-400 N.G.)**

# SECTION 3: START-UP & OPERATION

## SEQUENCE OF OPERATION

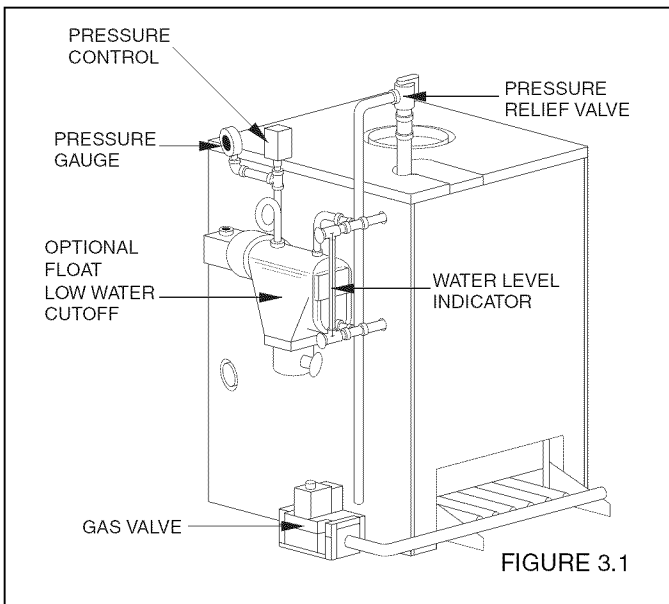
For sequence of operation of the particular boiler being installed, refer to Figures 2.13 through 2.20 in Section 2 of this manual.

### Spill and rollout switches are mounted on Model VGA-175B, VGA-200B & VGA-250B boilers.

For boilers with a spill switch, the switch detects the escape of combustion products through the draft diverter relief opening and interrupts the power to the gas valve preventing unsafe boiler operation. Escape of flue products could be caused by a blocked or collapsed chimney or inadequate chimney draft. This is a manual reset-type device and can be reactivated by depressing the spill switch reset button mounted in the front of the boiler's draft hood (see Figure 1.1 for switch location).

For boilers with a flame rollout switch, the switch prevents flame rollout from the boiler combustion chamber, caused by blocked boiler flue passageways, by interrupting power to the gas valve to prevent unsafe boiler operation. This is either a single use device, which must be replaced if it is tripped, or a manual reset-type device than can be reset by depressing the reset button. See Figure 1.1 for switch location). Flue passages must be inspected by a qualified installer if this problem occurs, prior to switch replacement.

**WARNING: If boiler cannot be restored to normal operation after re-setting of spill switch, or if flame rollout switch has tripped, do not attempt to put the boiler in operation. Immediately contact a qualified service professional.**



## PRIOR TO START-UP

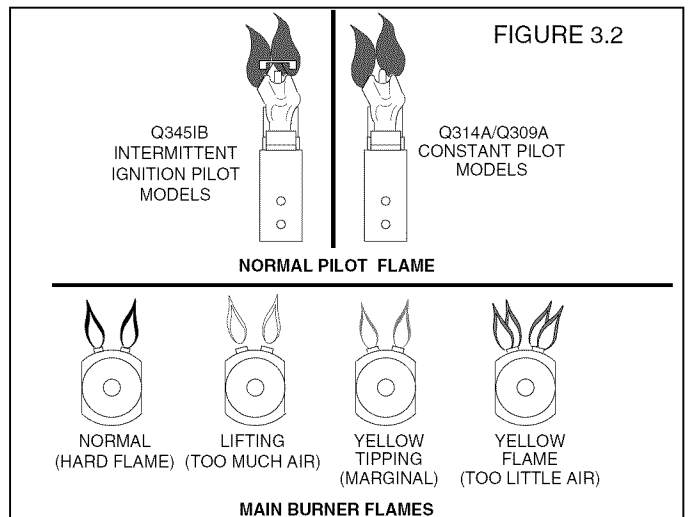
Fill system with water until the water level indicator (sight glass) is approximately 2/3 full. This water level is 23" from the surface on which the boiler sits.

## SYSTEM START-UP & ADJUSTMENTS

Safe lighting and other performance criteria were met with the gas manifold and control assembly provided on the boiler when the boiler underwent tests specified in ANSI Z21.13.

**WARNING: Keep boiler area clear and free from combustible materials, gasoline and other flammable vapors and liquids. Otherwise fire or explosion may result.**

1. Check combination gas valve on boiler and make sure it is in the OFF position.
2. For vent damper-equipped models, with the thermostat set to call for heat, observe that vent damper position indicator rotates to the open position. Damper must be in the open position when appliance main burner is operating.
  - a. After damper opens, spark should appear at the intermittent pilot ignition electrodes.
  - b. Set thermostat to no longer call for heat. Spark should stop. Observe that damper position indicator rotates to the closed position.
  - c. Set thermostat to call for heat.
3. Light the boiler. For Model VGA-B boilers with standing pilot see lighting instructions for Continuous Pilot on page 19. For Model VGA-B boilers with intermittent pilot, see lighting instructions for Intermittent Pilot on page 19.
4. Observe pilot and main burner flame (see Figure 3.2). All burner ports should be ignited and burn with a steady blue flame.





**WARNING**

**Yellow, floating flames indicate a lack of combustion air. Do not operate the boiler until the problem is solved or severe personal injury or death may occur!**

5. Boilers are shipped from the factory with the primary air shutters on the main burner wide open. It is recommended these air shutters be left in the wide open position unless there is lifting of the flame above the burner ports. If there is lifting, the air shutters should be gradually closed until the lifting is eliminated. It may also be necessary to adjust the primary air shutters if the input rate is reduced by a change in the orifices.

6. After burner has been in operation for about 10 minutes, check gas input rate to boiler as follows:

- a. Make sure all appliances served by the meter are turned off during timing of gas input rate to the boiler.
- b. Measure the time in seconds that it takes for the boiler to use 10 cubic feet of gas. Divide 36,000 by the number of seconds (this is the number of cubic feet of gas used per hour). Multiply this figure by the heating value of the gas to obtain Btu input per hour.

Example: A VGA-300B boiler takes 2 minutes to use 10 cubic feet of natural gas. The local utility indicated the heating value of the natural gas being supplied is 1000 Btu/cu ft. Therefore:

2 minutes = 120 seconds.

$$\frac{36,000}{120} \times 1000 = 300,000 \text{ Btu/hr}$$

Therefore, the boiler input is correct.

**NOTE: Before calculating the input of the heating equipment, obtain the heating value of the gas from the local utility.**

7. If input needs to be corrected, adjust combination gas valve pressure regulator. (Regulator is factory set at 3-1/2" W.C. for natural gas and 10" W.C. for propane.) Turn adjusting screw clockwise to increase gas flow (increase input). Turn adjusting screw counterclockwise to decrease gas flow (decrease input). In no case should final manifold pressure setting vary more than  $\pm .3$ " from factory-set pressures. If rated input cannot be obtained with adjustment, gas supply pressure or orifice size may be cause. Consult local utility and Hydrotherm.

8. Gas burner orifices supplied with boiler have been carefully designed to provide correct gas input rate for most gas conditions typically found in the U.S. and Canada.

Occasionally, however, local gas characteristics may not allow unit to be properly adjusted for input. If this is the case, local utility or Hydrotherm may recommend orifices be changed. When changing orifices follow the procedures detailed in Section 4 of this manual.

9. Start and stop burners several times by raising and lowering the thermostat setting.

10. After boiler has been firing long enough to raise boiler pressure above minimum setting of the primary pressuretrol limit, check limit by turning its setting from maximum to minimum setting. This should turn boiler off. Return limit to desired setting. For United States only, VGA-350B and 400B also have a secondary pressuretrol (located to the right of the primary pressuretrol when facing the front of the boiler). **DO NOT READJUST THE SECONDARY PRESSURETROL** (it is factory-set and sealed at 15 psig).

11. Check boiler safety shutoff controls.

- a. For boilers with standing pilot, with boiler firing, disconnect thermocouple lead from the valve. The valve should close.
- b. For boilers with intermittent pilot, with boiler firing, disconnect wire connected to the "PV" terminal on the Honeywell S8600 control. The gas valve should close.

12. On initial start-up and prior to each heating season, boiler must be cleaned (see "Steam Boiler Cleaning Instructions" in Section 4 of this manual).

## WARNING:

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

**A. 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 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.

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

**C.** 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 CONTINUOUS PILOT INSTRUCTIONS

### Standing Pilot Honeywell VR8300 and White Rodgers 36C04 - Natural or Propane Gas

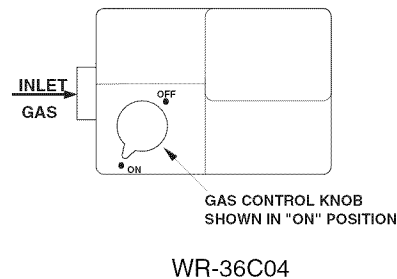
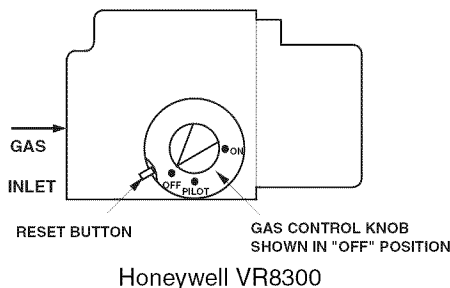
This appliance has a pilot which must be lit by hand. When lighting the pilot, follow these instructions exactly.

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

1. **STOP!** Read the safety information on this page.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. Turn gas control knob clockwise  $\curvearrowright$  to "OFF". (For WR-36C04: Push in gas control slightly and turn clockwise  $\curvearrowright$  to "OFF" unless knob is pushed in slightly.) Do not force.
5. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you then smell gas, **STOP!** Follow "A" in the safety information above. If you don't smell gas, go to the next step.
6. Remove the base door covering the top of the burners and enclosing the pilot.
7. Find pilot - Follow metal tube from gas control. The pilot is

between the central burner tubes behind the base door.

8. Turn knob on gas control counterclockwise to  $\curvearrowleft$  "Pilot".
9. Push down and hold the red button. Immediately light the pilot with a match. Continue to hold the red button down for about one (1) minute after the pilot is lit. Release button and it will pop back up. Pilot should remain lit. If it goes out, repeat steps 4 through 9.
- If button does not pop up when released, stop immediately and call your service technician or gas supplier.
- If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.
10. Replace the base door.
11. Turn gas control knob counterclockwise  $\curvearrowleft$  to "ON".
12. Turn on all electric power to the appliance.
13. Set thermostat to desired setting.

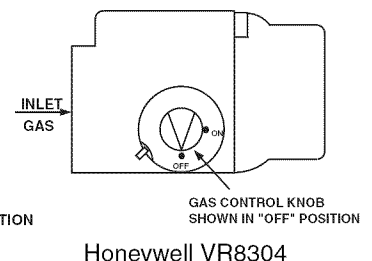
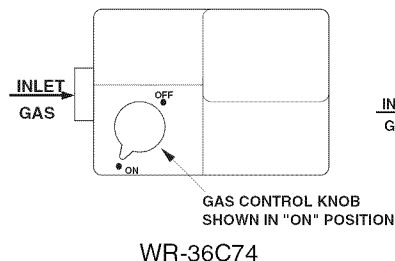


## OPERATING INSTRUCTIONS

### Intermittent Ignition White Rodgers 36C74/Honeywell VR8304

1. **STOP!** Read the safety information on this page.
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 pilot. Do not try to light the pilot by hand.
5. Turn gas control knob clockwise  $\curvearrowright$  to "OFF".
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you then smell gas, **STOP!** Follow "A" in the safety information above. If you don't smell gas, go to next step.
7. Turn gas control knob counterclockwise  $\curvearrowleft$  to "ON".
8. Turn on all electric power to the appliance.

9. Set the thermostat to the desired setting.
10. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" on next page 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. Turn gas control knob counterclockwise ↶ to "OFF". Do not force.

## SECTION 4: MAINTENANCE

This boiler has been designed to provide years of trouble free performance in normal installations. Examination by the homeowner at the beginning of each heating season, and in mid-heating season, should assure continued good performance. In addition, the boiler should be examined by a qualified service professional at least once every year.

**DANGER: To avoid fire and explosion hazards: Do not store anything against the boiler or allow dirt or debris to accumulate in the area immediately surrounding the boiler. Keep boiler area clear and free from combustible materials, gasoline and other flammable vapors and liquids. Lint, paper or rags must not be allowed to accumulate near the burners. Do not place clothing on boiler to dry. Do not obstruct the flow of combustion and ventilation air.**

**NOTE: Do not draw water from heating system for cleaning. Minerals in the water can build up on the heat transfer surfaces and cause overheating and subsequent failure of the cast iron sections.**

**NOTE: If boiler is equipped with a low water cutoff, follow manufacturer's maintenance instructions.**

### BEFORE EACH HEATING SEASON

1. Remove and inspect draft hood and vent piping (connecting draft hood to chimney or vent) for obstructions, soot accumulation, rust or corrosion. Clean and replace as necessary. Check tightness of joints; seal all joints where necessary.
2. Check boiler flue passageways in the boiler sections for any blockage or soot accumulation. Remove draft hood, jacket top and cast iron dome. Using a flashlight, examine all flue passageways.
  - a. If passageways are free of soot and obstructions, replace dome and seal with furnace cement.
  - b. If passageways need cleaning, remove burners as described in paragraph 3 below. Insert long-handle bristle flue brush down between section tubes and upward through sections from combustion chamber in both diagonal directions to remove carbon from finned surfaces. Vacuum debris. Replace dome and seal with furnace cement.
  - c. Reinstall jacket top panel and draft hood.

3. Check and clean burner assembly. Remove burner access panel. Lift burners up and to rear until burners are disengaged from orifices. Brush top of burners with soft bristle brush and blow out with air or vacuum.

4. Check gas manifold for proper position and reassemble burners to the manifold. Line up holes in burners with the orifices, and slide assembly back into position. **BE SURE TO REINSTALL BURNERS WITH BURNER PORTS ON THE TOP SURFACE (UPRIGHT).**

5. When a low water cut-off, LWCO, has been utilized, follow the manufacturer's maintenance instructions. As a minimum, test the operation of electronic controls at least once a year. Remove clean and inspect the probe. Float type controls should be flushed once a month during the heating season. If the LWCO fails to operate properly it must be replaced. One probe type controls, remove, clean and test the probe once a month during the heating season. If the LWCO fails to operate properly it must be replaced.

6. Follow "System Start-Up & Adjustments" procedures in Section 3 of this manual.

### Steam Boiler Cleaning Instructions

The following procedures must be followed on initial start-up and if the presence of sediment, sludge or impurities hamper proper boiler operations.

1. With gate valves closed on supply and return lines, start burner and allow boiler to become pressurized so that the pressuretrol may be adjusted and set for limit cut-off desired (normally about 3 psi). Turn off burner and allow pressure to drop to 0 psi., then proceed with the following cleaning procedure.
2. Remove the pressure relief valve.
3. Add caustic soda (lewis lye) through this opening at the rate of one pound per thousand square feet of radiation capacity. Scout, Squirk or similar steam boiler cleaners may be used instead of lye. Trisodium phosphate (1/4#) is also an excellent cleaner.
4. Provide pipe connection (full size) from pressure relief valve opening to a convenient drain to serve as a vent.
5. Fill the boiler with a manual fill valve until water starts to trickle from this pipe.

6. Fire boiler at sufficient rate to generate and maintain steam. Entrained water and impurities will then discharge (with steam) from open vent. Add water as necessary so that the low water cutoff does not shut off burner.

7. Continue this process for a minimum of one hour. The process should continue until the steam is dry (no water coming from the vent when the water in the gauge glass is at a normal level, approximately 2/3 full). The time required could vary up to 3 hours.

8. Turn burner to off position. While boiler is still hot, drain completely through boiler drain. Make sure that all low points in the return line are also completely drained. These areas could trap chemicals and dirt.

9. Close boiler drain and refill with clean untreated warm water. If warm water is not used, fill very slowly so as not to crack boiler sections. Fill until water overflows through vent pipe and runs clear.

10. Completely drain boiler again. Refill with clean untreated water to normal level.

11. Remove vent drain piping and reinstall pressure relief valve. Open gate valves on supply and return lines. Turn on burner. System is now ready to operate.

**HOW TO CHANGE ORIFICES**

1. Shut off power supply and gas supply to the boiler.
2. Remove burner access panel. Lift burners up and to rear until burners are disengaged from orifices.
3. Check orifices for proper drill size. Size is stamped onto the body of the brass orifice (see Figure 4.1). Size can also be checked by using a pin gauge.
4. All orifices are screwed into the manifold and may be removed by using a 5/8" wrench or socket.
5. Reverse procedures above to install orifices and burners. **BE SURE TO REINSTALL BURNERS WITH BURNER PORTS ON TOP SURFACE (UPRIGHT).**

**HEATING SYSTEM PROBLEMS & CAUSES**

**No Heat**

1. Blown fuse or circuit breaker.
2. Switch turned off.
3. Pilot outage
4. IID system malfunction.
5. Flue damper not open.
6. Water level too low.

**Insufficient Heat**

1. Incorrect thermostat anticipator setting.
2. Low pressuretrol setting.
3. Boiler undersized or underfired.
4. Insufficient radiation.

**Odor, Excessive Moisture In Building**

1. Leak in piping.
2. Carbon build-up in flueways.
3. Blocked chimney.

**Yellow Flame, Carbon Build-Up**

1. Unit overfired.
2. Air shutter misadjustment.
3. Wrong orifices.
4. Burning in burner mixing tube.

**Noise**

1. Ignition or ignition noise due to incorrect air shutter adjustment.
2. Whistle due to burr on orifices.
3. Burner "fluting" due to air shutter opening too wide.

**Overheating**

1. Wrong thermostat anticipator setting.
2. Bad thermostat location.
3. Bad thermostat.

Boiler Model	VGA-175B	VGA-200B	VGA-250B	VGA-3000B	VGA-350B	VGA-400B	
(1) Nat. Gas Drill Size	34	32	31	33	32	32	FIGURE 4.1
(2) Prop. Gas Drill Size	52	50	50	51	51	50	

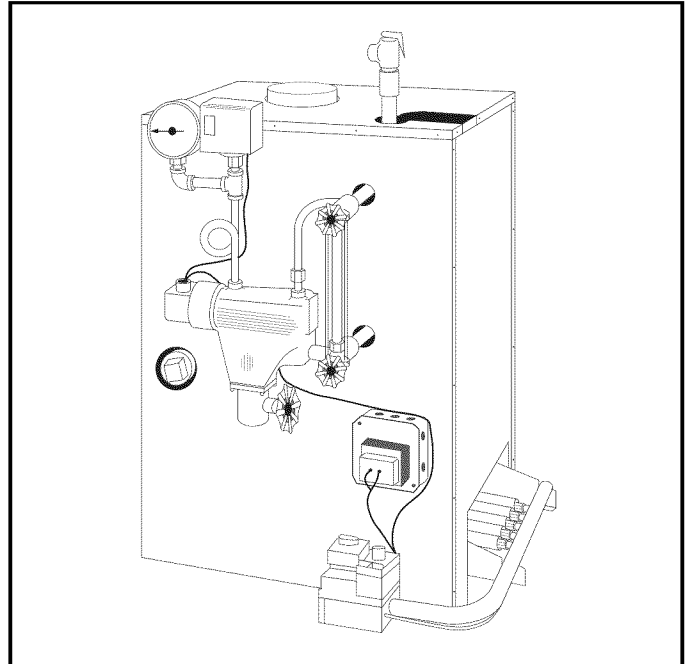
**CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.**

# HydroTherm®

## MODEL VGA-B SERIES REPLACEMENT PARTS LIST

### ORDERING INFORMATION

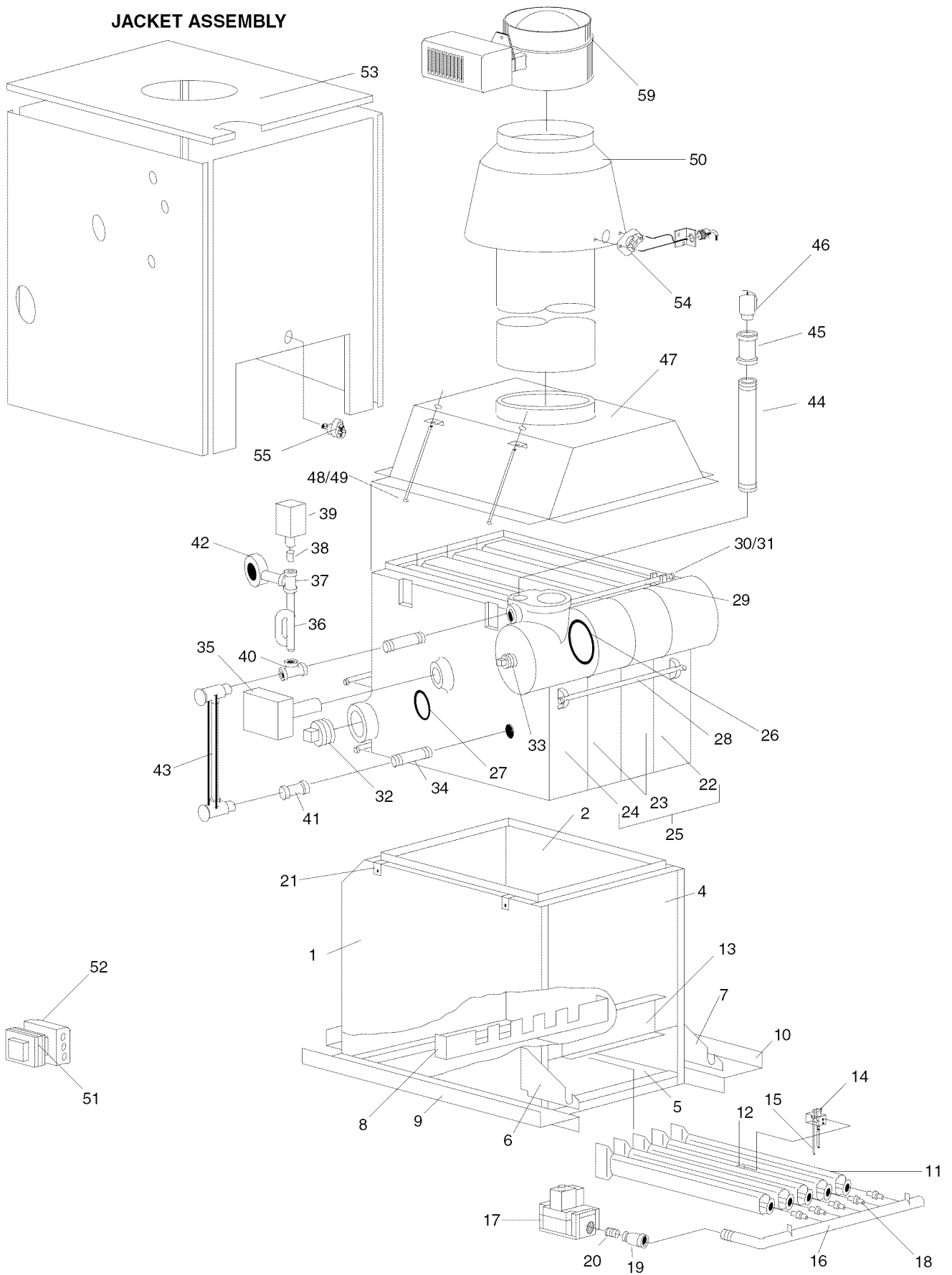
When ordering replacement parts, provide the model and serial number shown on the unit rating plate as well as the part number and name as shown in the parts list. Parts may be obtained from your local Hydrotherm heating contractor.



REF NO.	NAME OF PART	PART NO.	VGA 175B	VGA 200B	VGA 250B	VGA 300B	VGA 350B	VGA 400B
1	Front Panel - Base Ass'y	BM-8052				1	1	1
	Front Panel - Base Ass'y	BM-8053	1	1	1			
2	Rear Panel - Base Ass'y	BM-8054				1	1	1
	Rear Panel - Base Ass'y	BM-8055	1	1	1			
3	Side Panel - L.H. - Base Ass'y	BM-8058	1	1				
	Side Panel - L.H. - Base Ass'y	BM-8059			1			
	Side Panel - L.H. - Base Ass'y	BM-8060				1		
	Side Panel - L.H. - Base Ass'y	BM-8061					1	
	Side Panel - L.H. - Base Ass'y	BM-8062						1
4	Side Panel - R.H. - Base Ass'y	BM-8065	1	1				
	Side Panel - R.H. - Base Ass'y	BM-8066			1			
	Side Panel - R.H. - Base Ass'y	BM-8067				1		
	Side Panel - R.H. - Base Ass'y	BM-8068					1	
	Side Panel - R.H. - Base Ass'y	BM-8069						1
5	Base Pan	BM-2671	1	1				
	Base Pan	BM-2672			1			
	Base Pan	BM-2673				1		
	Base Pan	BM-2674					1	
	Base Pan	BM-2675						1
6	Manifold Bracket-Front	03-7347	1	1	1			
	Manifold Bracket-Front	03-7349				1	1	1
7	Manifold Bracket-Rear	03-7348	1	1	1			
	Manifold Bracket-Rear	03-7350				1	1	1

REF NO.	NAME OF PART	PART NO.	VGA 175B	VGA 200B	VGA 250B	VGA 300B	VGA 350B	VGA 400B
8	Burner Support Bracket	03-7369	1	1				
	Burner Support Bracket	03-7370			1			
	Burner Support Bracket	03-7371				1		
	Burner Support Bracket	03-7372					1	
	Burner Support Bracket	03-7373						1
9	Jacket Support Bracket - Front	03-7135	1	1	1	1	1	1
10	Jacket Support Bracket - Rear	03-7136	1	1	1	1	1	1
—	Jacket Support Bracket - L.H.	03-7353	1	1				
	Jacket Support Bracket - L.H.	03-7354			1			
	Jacket Support Bracket - L.H.	03-7355				1		
	Jacket Support Bracket - L.H.	03-7356					1	
	Jacket Support Bracket - L.H.	03-7357						1
—	Burner Baffle	03-7389				4		
	Burner Baffle	03-7390					4	
	Burner Baffle	03-7391						4
11	Burner	03-7114	5	5	6	7	8	9
12	Burner w/Pilot Bracket	03-7118	1	1	1	1	1	1
13	Base Door Ass'y	03-7519-1	1	1				
	Base Door Ass'y	03-7520-1			1			
	Base Door Ass'y	03-7521-1				1		
	Base Door Ass'y	03-7522-1					1	
	Base Door Ass'y	03-7523-1						1
14	Pilot Ass'y - N.G. - Q314A	BM-2662	1	1				
	Pilot Ass'y - N.G. - Q314A	BM-2663			1			
	Pilot Ass'y - N.G. - Q314A	BM-2664				1		
	Pilot Ass'y - N.G. - Q314A	BM-2665					1	
	Pilot Ass'y - N.G. - Q314A	BM-2666						1
	Pilot Ass'y - L.P. - Q314ALB	BM-2667	1	1				
	Pilot Ass'y - L.P. - Q314ALB	BM-2668			1			
	Pilot Ass'y - L.P. - Q314ALB	BM-2669				1		
	Pilot Ass'y - L.P. - Q314ALB	BM-2670						1
—	Pilot Orifice - N.G. (BCR18)	62-3326	1	1	1	1	1	1
	Pilot Orifice - L.P. (BBR10)	62-3327	1	1	1	1	1	1
15	Thermocouple - K16R-36	04-1337	1	1	1			
	Thermocouple - K16R-48	04-1338				1	1	1
16	Manifold	24-1364	1	1				
	Manifold	24-1365			1			
	Manifold	24-1366				1		
	Manifold	24-1405					1	
	Manifold	24-1406						1
17	Gas Valve - Nat. VR8300C 4043 (Nat.)	02-1552	1	1	1	1		
	Gas Valve - W.R. 36C04-439 (Nat.)	02-1547					1	1
	Gas Valve - LP VR8300C 4035 (LP)	02-1553	1	1	1	1	1	1
18	Burner Orifice-No. 31 (N.G.)	25-1118			6			
	Burner Orifice-No. 32 (N.G.)	25-1132		5			9	10
	Burner Orifice-No. 33 (N.G.)	25-1130				8		
	Burner Orifice-No. 34 (N.G.)	25-1119	5					
	Burner Orifice-No. 50 (L.P.)	25-1123		5	6			10
	Burner Orifice-No. 51 (L.P.)	25-1124				8	9	
	Burner Orifice-No. 52 (L.P.)	25-1129	5					
19	Coupling - 1" X 3/4"	56-5003				1		
20	Nipple - 3/4" X Close	53-1120				1		
21	Hold Down Bracket	03-7296	4	4	4	4	4	4

# JACKET ASSEMBLY



REF NO.	NAME OF PART	PART NO.	VGA 175B	VGA 200B	VGA 250B	VGA 300B	VGA 350B	VGA 400B
22	Section, Rear	BM-9677	1	1	1	1	1	1
23	Section, Intermediate	BM-9693	3	3	4	5	6	7
24	Section, Front (No Coll Opening)	BM-9678	1	1	1	1	1	1
25	Abs. Unit Ass'y	BM-3162	1	1				
	Abs. Unit Ass'y	BM-3163			1			
	Abs. Unit Ass'y	BM-3164				1		
	Abs. Unit Ass'y	BM-3165					1	
	Abs. Unit Ass'y	BM-3166						1
26	Port Seal - 5"	59-2004	4	4	5	6	7	8
27	Port Seal - 2"	59-2003	4	4	5	6	7	8
28	3/8-16 X 18 1/2" Lg. Tie Rod	44-1063	3	3				
	3/8-16 X 22" Lg. Tie Rod	44-1025			3			
	3/8-16 X 26" Lg. Tie Rod	44-1023				3		
	3/8-16 X 29 1/2" Lg. Tie Rod	44-1024					3	
	3/8-16 X 32" Lg. Tie Rod	44-1028						3
29	3/8-16 X 15 1/2" Lg. Tie Rod	44-1019	1	1				
	3/8-16 X 19" Lg. Tie Rod	44-1021			1			
	3/8-16 X 22 1/2" Lg. Tie Rod	44-1022				1		
	3/8-16 X 26" Lg. Tie Rod	44-1023					1	
	3/8-16 X 29 1/2" Lg. Tie Rod	44-1024						1
30	3/8-16 Hex Nuts	57-4617	7	7	7	7	7	7
31	3/8 Flat Washer	57-4602	7	7	7	7	7	7
32	Pipe Plug - 2" Sq. Hd	56-4552	1	1	1	1	1	1
33	Pipe Plug - 1/2" Sq. Hd	56-4601	1	1	1	1	1	1
34	Nipple - 1/2 X 4" (Brass)	53-1106					4	4
35	Low Water Cut-Off CG400	21-2018	1	1	1	1	1	1
36	Pigtail - 1/4"	56-5400	1	1	1	1	1	1
37	Tee - 1/4"	56-1000	1	1	1	1	1	1
38	Nipple - 1/4" X Close	53-1026	1	1	1	1	2	2
39	Pressuretrol	02-4807	1	1	1	1	2	2
—	Nipple - 1/4" X 3	53-1028	1	1	1	1	2	2
40	Tee - 1/2" X 1/2" X 1/4" (Brass)	56-1352	2	2	2	2	2	2
41	Plug 1/4" Sq. Hd.	56-4605	1	1	1	1	1	1
42	Press. Gauge	20-3002	1	1	1	1	1	1
43	Water Gauge	20-2005	1	1	1	1	1	1
44	Nipple - 3/4" X 6"	53-1129	1	1	1	1	1	1
45	Coupling - 3/4"	56-5001	1	1	1	1	1	1
46	Pop Safety Valve - 15 P.S.I.	22-1401	1	1	1	1	1	1
47	Flue Collector	70-3835	1	1				
	Flue Collector	70-3836			1			
	Flue Collector	70-3837				1		
	Flue Collector	70-3838					1	
	Flue Collector	70-3839						1
48	5/16 - 18 X 6" Lg. Carr. Bolt	57-1070	4	4	4	4	4	4
49	5/16 - 18 Hex. Nut	57-2602	4	4	4	4	4	4
50	Draft Hood- 7" For Spill Switch*	03-8144	1	1				
	Draft Hood- 8" For Spill Switch*	03-8146			1			
	Draft Hood- 7"	03-7607	1	1				
	Draft Hood- 8"	03-7609			1	1		
	Draft Hood- 9"	03-7610					1	1
51	Transformer - 115/24V	26-3005	1	1	1	1	1	1
	Transformer - 4280 (VGAM Only)	26-3200						
52	Junction Box -4" X 4"	58-1800	1	1	1	1	1	1
—	Silicone Sealant 11 oz.	10-6627	1	1	1	1	1	1
—	Fiberglass Rope - 5 Ft.	10-6651	1	1	1	2	2	2



REF NO.	NAME OF PART	PART NO.	VGA 175B	VGA 200B	VGA 250B	VGA 300B	VGA 350B	VGA 400B
—	Jacket-Complete	BM-2676	1	1				
	Jacket-Complete	BM-2677			1			
	Jacket-Complete	BM-2678				1		
	Jacket-Complete	BM-2679					1	
	Jacket-Complete	BM-2680						1
54	Manual Reset Spill Switch*	58-2526	1	1	1			
55	Rollout Switch (Thermal Fuse)*	58-1893	1	1	1			

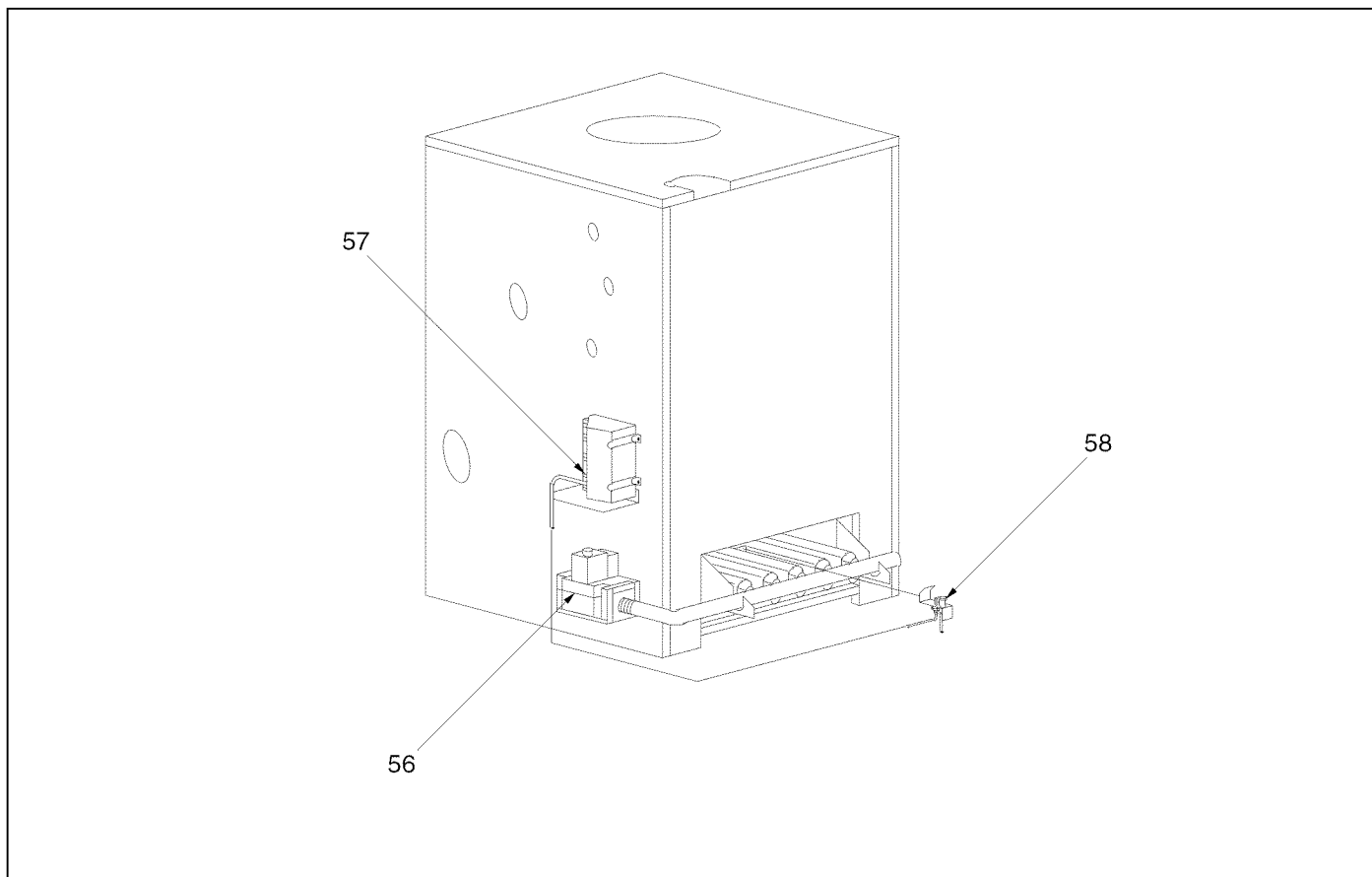
\*These components are not used on Multi-Temp modules (VGAM).

## PARTS FOR HONEYWELL INTERMITTENT PILOT SYSTEM (SEE DIAGRAM BELOW)

REF NO.	NAME OF PART	PART NO.	VGA 175B	VGA 200B	VGA 250B	VGA 300B	VGA 350B	VGA 400B
56	Gas Valve - Nat. VR8304P 3332	02-1556	1	1	1			
	Gas Valve - Nat. VR8304P 3/4"	02-1554				1	1	1
	Gas Valve - LP VR8304P 3340	02-1561	1	1	1			
	Gas Valve - LP VR8304P 4330	02-1555				1	1	1
	Gas Valve - Nat. W.R. 36C74-427	02-1549				1	1	1
	Gas Valve - LP W.R. 36C74-326	02-1550				1	1	1
57	Pilot Control - S8600M	BM-8143	1	1	1	1	1	1
58	Pilot Burner Assembly- Q345IB1103 N.G.	62-3668	1	1	1	1	1	1
	Pilot Burner Assembly- LP	BM-9613	1	1	1	1	1	1
—	Pilot Orifice N.G. (BCR18).	62-3326	1	1	1	1	1	1
	Pilot Orifice LP (BCR10).	62-3327	1	1	1	1	1	1
—	Transformer - 40VA- Not Shown	26-3001	1	1	1	1	1	1

## ADDITIONAL COMPONENTS FOR VENT DAMPER

—	Vent Damper - 7"	02-5854	1	1				
	Vent Damper - 8"	02-5855			1	1		
	Vent Damper - 9"	02-5856					1	1
—	Vent Damper Harness - Consult Factory							
—	Cable Bracket	03-7144	1	1	1	1	1	1





# ***HydroTherm***<sup>®</sup>

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