

Start-up/Service Instructions

for use by heating contractor

VIESSMANN

Vitogas 100

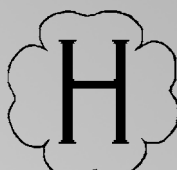
GS10 Series

Natural gas-/propane-fired, two-stage
atmospheric cast iron boiler

Heating input 300 to 380 MBH
 88 to 111 kW

Please file in Service Binder

VITOGAS 100



IMPORTANT

Read and save these instructions
for future reference.

Safety, Installation and Warranty Requirements

Please ensure that these instructions are read and understood before commencing installation. Failure to comply with the instructions listed below and details printed in this manual can cause **product/property damage**, **severe personal injury**, and/or **loss of life**. Ensure all requirements below are understood and fulfilled (including detailed information found in manual subsections).

■ Licensed professional heating contractor

The installation, adjustment, service, and maintenance of this equipment *must be performed* by a licensed professional heating contractor.

► Please see section entitled "Important Regulatory and Installation Requirements".



■ Contaminated air

Air contaminated by chemicals can cause by-products in the combustion process which are *poisonous* to inhabitants and destructive to Viessmann equipment.

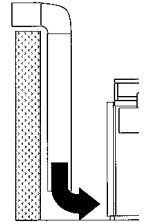
► For a listing of chemicals which cannot be stored in or near the boiler room, please see section entitled "Combustion Air Supply" in the Installation Instructions.



■ Fresh air

This equipment requires fresh air for safe operation and must be installed ensuring provisions for *adequate combustion and ventilation air* exist.

► For information pertaining to the fresh air requirements of this product, please see section entitled "Combustion Air Supply" in the Installation Instructions.



■ Product documentation

Read all applicable documentation before commencing installation. Store documentation near boiler in a readily accessible location for reference in the future by service personnel.

► For a listing of applicable literature, please see section entitled "Important Regulatory and Installation Requirements".



■ Carbon monoxide

Improper installation, adjustment, service and/or maintenance can cause flue products to flow into living space. Flue products contain *poisonous* carbon monoxide gas.

► For information pertaining to the proper installation, adjustment, service and maintenance of this equipment to avoid formation of carbon monoxide, please see sections entitled "Combustion Air Supply" and "Venting Connection" in the Installation Instructions.



■ Equipment venting

Never operate boiler without an *installed venting system*. An improper venting system can cause carbon monoxide poisoning.

► For information pertaining to venting and chimney requirements, please see section entitled "Venting Connection" in the Installation Instructions. All products of combustion must be safely vented to the outdoors.



■ Advice to owner

Once the installation work is complete, the heating contractor must familiarize the system operator/ultimate owner with all equipment, as well as safety precautions/requirements, shut-down procedure, and the need for professional service annually before the heating season begins.

**WARNING**

Installers must follow local regulations with respect to installation of carbon monoxide detectors. Follow manufacturer's maintenance schedule of boiler.

■ Warranty

Information contained in this and related product documentation must be read and followed. *Failure to do so renders warranty null and void.*



Warning

This boiler requires fresh air for safe operation and **must** be installed with provisions for adequate combustion and ventilation air (in accordance with local codes and regulations of authorities having jurisdiction).

Do not operate this boiler in areas with contaminated combustion air. High levels of contaminants such as dust, lint or chemicals can be found at construction sites, home renovations, in garages, workshops, in dry cleaning/laundry facilities, near swimming pools and in manufacturing facilities.

Contaminated combustion air **will damage** the boiler and may lead to substantial property damage, severe personal injury and/or death. Ensure boiler/burner is inspected and serviced by a qualified heating contractor at least once a year in accordance with these Start-up/Service Instructions.

Safety

Important Regulatory and Installation Requirements	4
--	---

General Information

About these Start-up/Service Instructions	5
---	---

Necessary Tools	5
-----------------------	---

Initial Start-up and Service

Overview	6
----------------	---

Procedures	7
------------------	---

Troubleshooting Guide

Diagnosis and Correction	20
--------------------------------	----

Additional Information

Functioning of Burner Ignition System	22
---	----

Ignition System Wiring Diagram	23
--------------------------------------	----

Parts List	24
------------------	----

Maintenance Record	2
--------------------------	---

Lighting and Operating Instructions	28
---	----

Important Regulatory and Installation Requirements

Instructing the system user

The installer of the system is responsible to ensure the system operator/ultimate owner is made familiar with the system functioning, its activation, and its shut-down.

→ The following topics must be covered:

*Proper system operation sequence.
Explain the equipment as well as the need for combustion air.
Demonstrate an emergency shut-down, what to do and what not.
Explain that there is no substitute for proper maintenance to help ensure safe operation.*

Initial start-up

Initial start-up must be performed by a qualified heating contractor. Completion of the Maintenance Record by the heating contractor is also required.

→ The Maintenance Record is located on page 26 of this manual.

Working on the equipment

The installation, adjustment, service, and maintenance of this equipment must be done by a **licensed professional heating contractor** who is qualified and experienced in the installation, service, and maintenance of hot water heating systems. There are no user serviceable parts on this equipment.

→ Please carefully read this manual prior to attempting start-up, maintenance or service. Any warranty is null and void if these instructions are not followed.

For information regarding other Viessmann System Technology componentry, please reference documentation of the respective product.

We offer frequent installation and service seminars to familiarize our partners with our products. Please inquire.

Ensure **main power** supply to equipment, the heating system, and all external controls has been **deactivated**. **Close main gas supply valve**. Take precautions in all instances to avoid accidental activation of power during service work.

→ The completeness and functionality of field supplied electrical controls and components must be verified by the heating contractor. These include low-water cut-offs, flow switches (if used), staging controls, pumps, motorized valves, air vents, thermostats, etc.

Technical literature

Literature applicable to all aspects of the Vitogas 100:

- Technical Data Manual
- Installation Instructions
- Start-up/Service Instructions
- Operating Instructions and User's Information Manual

→ Leave all literature at the installation site and advise the system operator/ultimate owner where the literature can be found. Contact Viessmann for additional copies.

→ This product comes with several safety instruction labels attached. Do not remove!
Contact Viessmann immediately if replacement labels are required.

Additional applicable literature:

- Vitotronic controls manuals

About these Start-up/Service Instructions



Take note of all symbols and notations intended to draw attention to potential hazards or important product information. These include "WARNING", "CAUTION", and "IMPORTANT". See below.



WARNING

Indicates an imminently hazardous situation which, if not avoided, could result in death, serious injury or substantial product/property damage.

→ Warnings draw your attention to the presence of potential hazards or important product information.



CAUTION

Indicates an imminently hazardous situation which, if not avoided, may result in minor injury or product/property damage.

→ Cautions draw your attention to the presence of potential hazards or important product information.

IMPORTANT

→ Helpful hints for installation, operation or maintenance which pertain to the product.



→ This symbol indicates that additional, pertinent information is to be found in column three.



→ This symbol indicates that other instructions must be referenced.

Necessary Tools

Special Items

- Approved leak detection fluid for natural gas and propane gas
- Loctite

Testing/analysis equipment

- Multimeter to measure 0 - 120 VAC, 0 - 12 A AC and 0 - 20 μ A DC
- Flue gas analyzer to measure % CO₂ or O₂ (i.e. Bacharach fluid samplers or suitable electronic analyzer)
- Manometer to measure gas pressure 0 to 7 "w.c. (accurately) and up to 28 "w.c. gas pressure (or a non-electric Magnehelic® manometer may also be utilized)
- Stack thermometer 0 to 500 °F / 0 to 260 °C
- Bacharach calculator or suitable tables to calculate efficiency
- Carbon monoxide measuring equipment 0 to 400 ppm
- 1/8" NPT male to 1/4" barb adaptor fitting plus tubing for pressure measurement

→ Use only calibrated equipment.

Cleaning supplies

- Hand brush
- Rags
- Vacuum cleaner
- Cleaning brush (standard equipment)

Overview

		Steps to carry out for Initial start-up	Steps to carry out for Service
I		1. Preparations prior to start-up	page 7
I	S	2. Select appropriate gas type	page 8
I		3. Check static, running and manifold gas supply pressure	page 9
I	S	4. Measure flue gas values	page 12
I	S	5. Measure ionization current	page 12
I	S	6. Measure chimney draft	page 13
	S	7. Shut down heating system	page 14
	S	8. Remove burner tray	page 14
	S	9. Inspect burners	page 15
	S	10. Inspect pilot burner	page 1
	S	11. Clean heat exchanger, if applicable (with burner tray removed)	page 15
	S	12. Reinstall burner tray	page 16
I	S	13. Inspect all water pipe connections	page 16
I	S	14. Check safety devices	page 16
I	S	15. Check precharged expansion and non-diaphragm tank and pressure of system	page 16
I	S	16. Check electrical connections	page 17
I	S	17. Start up heating system	page 17
I	S	18. Ensure proper automatic shut-off function of valve in gas train	page 17
I	S	19. Check blocked vent safety switch	page 18
I	S	20. Perform combustion analysis	page 18
I	S	21. Combustion air supply	page 19
I		22. Post start-up checklist	page 19

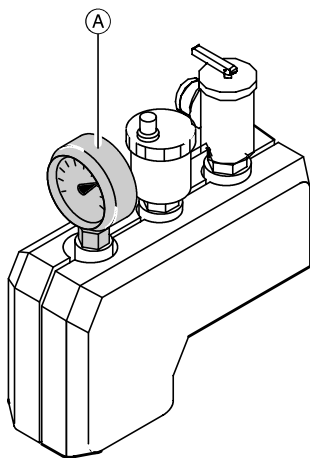
Procedures

Initial start-up

1. Preparations prior to start-up



Vitotronic Boiler Controls



1. Ensure fresh air intake of mechanical room is open and that chimney and all flue pipes are connected, sealed and unobstructed inside. Verify that all requirements in the Combustion Air Supply section in the Vitogas 100, GS10 Installation Instructions are met.

2. Ensure proper operation of expansion tank (see Maintenance/Service manual).

3. To remove debris and/or sludge ensure that the system piping is flushed out. Failure to do so could cause settlement in the boiler causing overheating and damage not covered by warranty.

4. Fill heating system with water and bleed out air completely. Ensure complete system is properly vented of air.

Max. boiler operating press.

..... 60 psig

Pressure relief discharge press.

..... 30 psig

5. Perform a pressure test of the boiler and the water piping. Pressure test must not exceed $1\frac{1}{2}$ times the maximum system operating pressure (60 psig (A)) of the boiler. Pressure relief valve must be removed during pressure test. Any leaks must be corrected.

6. Adjust fill pressure to a level compatible with normal operation. Recommended operational fill pressure (A) 10 - 15 psig when system is cold.

7. Reinstall pressure relief valve.

8. Ensure proper/adequate fuel supply exists; open gas shut-off valve.

→ If the nitrogen pressure of the precharged expansion tank is less than the static pressure of the system, inflate membrane pressure to slightly exceed pressure of system. The static pressure required at the tank is based upon the static height of the system. The system fill pressure value must be equal to the expansion tank pressure value at approx. 60 °F/15.6 °C.

→ Water treatment should be considered in areas where it is known that boiler feed water contains a high mineral content and hardness.

In areas where freezing might occur, an antifreeze may be added to the system water to protect the system. Please adhere to the specifications given by the antifreeze manufacturer. Do not use automotive silicate-based antifreeze.

Please observe that an antifreeze/water mixture may require a backflow preventer within the automatic water feed and influence components such as diaphragm expansion tanks, radiation, etc. A 40% antifreeze content will provide freeze-up protection to -10°F/-23°C. Do not use antifreeze other than specifically made for hot water heating systems. System also may contain components which might be negatively affected by antifreeze. Check total system frequently when filled with antifreeze.

Procedures (continued)

Initial start-up

Service

2. Select appropriate gas type

- 1. Ensure that the fuel type listed on the boiler rating plate is the correct type for the installation being attempted.
- 2. Record fuel type in Maintenance Record.

IMPORTANT

The Maintenance Record is located in the back of this manual.

The Vitogas 100, GS10 boiler is for use with gases whose characteristics fall within the following ranges:

		Natural gas	Propane gas
Heating value (gross)	Btu/ft ³	970 to 1100	2466 to 2542
Specific gravity		0.57 to 0.70	1.522 to 1.574
Ultimate carbon dioxide (CO ₂)	%	11.7 to 12.2	13.73 to 13.82

Vitogas 100, GS10 heating boilers produce the following:

when fired with natural gas:
CO₂ measurement before draft hood (before dilution air) 6.0 - 9.0 %
CO₂ measurement in vent pipe (after draft hood) 2.5 - 5.0 %

when fired with propane gas:
CO₂ measurement before draft hood (before dilution air) 7.0 - 9.5%
CO₂ measurement in vent pipe (after draft hood) 3.0 - 5.8 %

Boilers for use with natural gas have gas valves, pilot and main burner orifices different from those used on propane. Only use the gas specified on the boiler rating plate.

For high altitude areas, boiler has been derated by 4% for every 1000 ft./ 305 m elevation above 4500 ft./ 1372 m.

 CAUTION

Do not make any attempt whatsoever to increase the % CO₂ on this atmospheric gas-fired boiler.

IMPORTANT

DO NOT OVERFIRE BOILER.

IMPORTANT

In some high altitude areas the natural gas heating value may be lower than 970 Btu/ft³. Consult your local gas supplier for heating value verification.

Measure manifold pressure as described in this manual. For natural gas, the gas meter must be clocked to verify input.

Procedures (continued)

Initial start-up

Service

3. Check static, running and manifold gas supply pressure

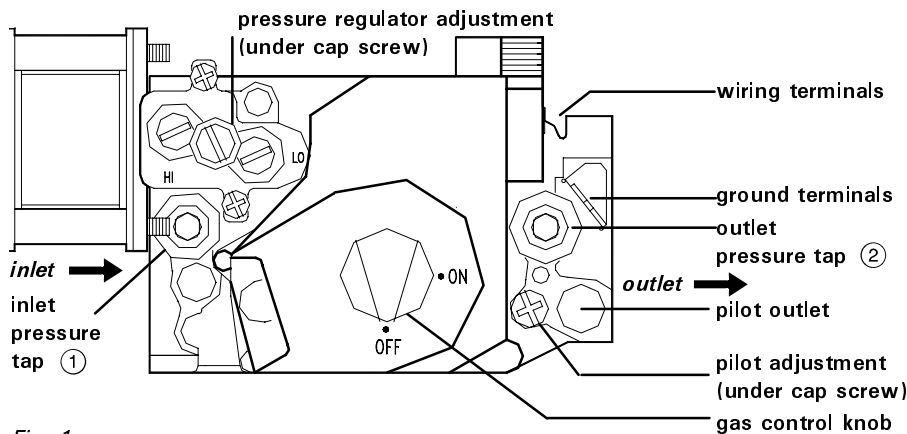


Fig. 1
Measuring static gas supply and running gas supply pressure using inlet pressure tap



WARNING

Ensure there are no gas leaks at inlet pressure tap of gas valve.



CAUTION

Ensure that there are no open flames in the room.

IMPORTANT

A 1/8" male NPT to 1/4" barb adaptor is required to insert in gas valve inlet pressure tap. This adaptor is used to connect tubing from gas valve inlet pressure tap to manometer.

Gas supply static pressure:

1. Ensure manual gas shut-off valve (field supplied) is closed.
2. Remove screw in inlet pressure tap ^① and attach non-electric Magnehelic[®] manometer or U-tube manometer.
3. Open manual gas shut-off valve.
4. Measure static pressure:
natural gas max. 14 "w.c.
propane gas max. 14 "w.c.
If pressure exceeds 14 "w.c., shut off gas supply with manual shut-off valve and contact gas supplier to decrease gas pressure. If 14 "w.c. or less, proceed to next step.
5. Activate boiler control as described in separate Operating Instructions. Pilot burner begins trial for ignition.

IMPORTANT

Due to air in the gas line, pilot burner may not light within safety timing (90 sec.). Turn power off and on (repeating pilot trial for ignition) until all air is purged. Once all air is purged, pilot flame will occur allowing main burner operation.

Gas supply running flow (upstream) pressure:

6. Measure running gas supply pressure; value should be:
 - natural gas: between 7 and 14 "w.c.
 - propane gas: between 11 and 14 "w.c.
 Use inlet pressure tap ^①.

7. Continue with point 9 if the running flow pressure lies within the stated range.

If the running pressure is outside of the stated range, see table below.

8. Close main gas shut-off valve, deactivate power on Vitotronic control via the on/off switch (boiler shuts down), disconnect manometer, and close inlet pressure tap ^① with 1/8" Allen screw.

Running supply pressure with		Corrective action
Natural gas	Propane gas	
under 7 "w.c.	under 11 "w.c.	Do not attempt adjustment. Call local gas utility to increase pressure.
7 to 14 "w.c.	11 to 14 "w.c.	Start up boiler.
over 14 "w.c.	over 14 "w.c.	Do not attempt adjustment. Call local gas utility to decrease pressure. Boiler valve must not be exposed to pressure over 14 "w.c.

Procedures (continued)

Initial start-up

Service

3. Check static, running and manifold gas supply pressure (continued)

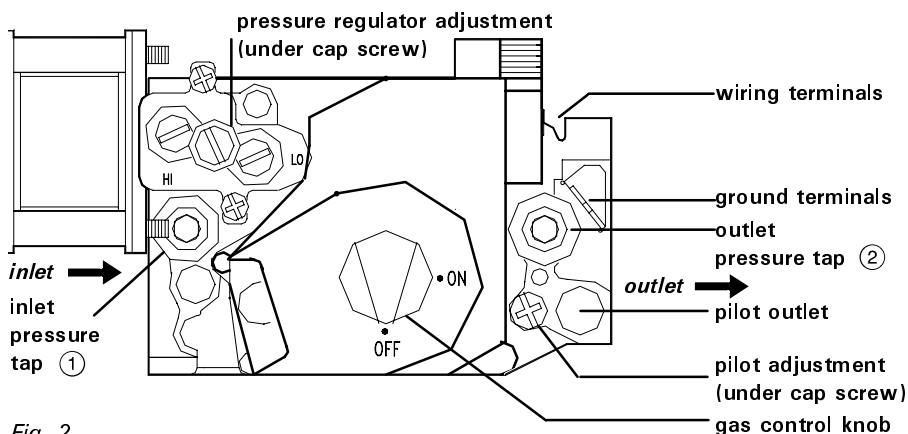


Fig. 2
Measuring manifold gas pressure using outlet pressure tap

**WARNING**

Ensure there are no gas leaks at inlet pressure tap of gas valve.

**WARNING**

First stage manifold pressure is factory set to 2.4 "w.c. for natural gas and to 5.0 "w.c. for liquid propane. These values are not field adjustable.

IMPORTANT

A 1/8" male NPT to 1/4" barb adaptor is required to insert in gas valve outlet pressure tap. This adaptor is used to connect tubing from gas valve outlet pressure tap to manometer.

Manifold pressure:

9. Remove gas valve outlet pressure tap ② and connect U-tube manometer or non-electric Magnehelic® manometer.

10. Open manual gas shut-off valve.

11. Activate boiler control as described in separate Operating Instructions.

12. Measure full load manifold pressure. Manifold pressure must be:

natural gas 4.7 "w.c.
propane gas 10 "w.c.

for normal operation at sea level. To increase gas pressure (and flow), turn pressure regulator adjustment screw clockwise; to decrease gas pressure (and flow), turn pressure regulator adjustment screw counterclockwise.

13. Close main gas shut-off valve, deactivate power on control via on/off switch (boiler shuts down), disconnect manometer, and close outlet ② with screw.

14. For natural gas, the gas meter must be clocked to verify input. Manifold pressure may need to be adjusted to obtain proper input.

15. Install front boiler panel and fasten with screw provided.

C n a r a g a r r i n

1. Ensure all other gas equipment served by the meter is turned off during timing of gas input to Vitogas 100, GS10 boiler.

2. Measure the time in seconds it takes for the boiler to use 10 cu. ft. of gas. Divide 36,000 by the number of seconds and you get the number of cu. ft. of gas used per hour. Multiply this number by the heating value of the gas to obtain Btu per hour input.

For example: A Vitogas 100, GS10 (300,000 Btu/h input) requires 2 minutes (120 seconds) to use 10 cu. ft. of natural gas. After contacting the local utility, you find the heating value is 1000 Btu per cu. ft. Therefore, $36,000/120 \times 1000 = 300,000$ Btu/h input. Therefore, the boiler input is correct.

Burner input formulas (for low altitude only):

INPUT = $3600 \div t \times 1000$ where
t = TIME (sec.) for 1 ft.³

INPUT = $3600 \times .01 \times 1000 \times 35.31 \div T$
where

T = TIME (sec.) for .01 m³ natural gas

IMPORTANT

A boiler underfired by 5% is acceptable. Do not overfire the boiler.

**CAUTION**

Always contact your gas utility to obtain the correct heating value before clocking the meter.

Procedures (continued)

Initial start-up

Service

3. Check static, running and manifold gas supply pressure (continued)

 WARNING

Always ensure the correct orifices are installed in the boiler. See table below.

The boiler must achieve the output stated on the rating plate. Do not overfire the boiler.

Technical Data

Boiler Model		Model No.	GS10-72	GS10-84	GS10-96
CSA input	full load	MBH	300	340	380
		kW	88	100	111
	partial load	MBH	210	238	266
		kW	62	70	78
CSA output	full load	MBH	257	291	325
		kW	75	85	95
	partial load	MBH	180	204	228
		kW	53	60	67
Min. gas supply pressure					
Natural Gas		"w.c.	7	7	7
Liquid Propane		"w.c.	11	11	11
Max. gas supply pressure *1		"w.c.	14	14	14
Flue gas (NG) *2					
Temperature (at boiler water supply temp. of 180 °F/82 °C)					
– at rated full load		°F	237	226	231
		°C	114	108	111
– at rated partial load		°F	195	196	201
		°C	90	91	94
Number of burner tubes			6	7	8
Natural gas flow rate		ft ³ /h	300	340	380
(0 - 4500 ft./0 - 1372 m altitude)		m ³ /h	8.50	9.63	10.76
Propane gas flow rate		ft ³ /h	120	136	152
(0 - 4500 ft./0 - 1372 m altitude)		m ³ /h	3.39	3.84	4.29
Main burner orifices diameter					
0 - 4500 ft./0 - 1372 m					
Natural gas		Ø mm	3.10	3.05	3.05
Propane gas		Ø mm	2.00	1.95	1.95
4500 - 7000 ft./1372 - 2134 m *3					
Natural gas		Ø mm	2.95	2.90	2.90
Propane gas		Ø mm	1.90	1.85	1.85
7000 - 10 000 ft./2134 - 3048 m *3					
Natural gas		Ø mm	2.80	2.75	2.75
Propane gas		Ø mm	1.80	1.75	1.75
Pilot burner orifices diameter for intermittent pilot ignition system					
Natural gas		Ø mm	0.38 (#26)		
Propane gas		Ø mm	0.24 (#24)		

*1If the gas supply pressure is higher than the maximum permissible value, a separate gas regulator must be installed upstream of the boiler system.

*2Measured flue gas temperature after dilution air with combustion air temperature of 68 °F/20 °C.

*3Diameters given for altitudes above sea level.

Full load manifold pressure is 4.7 "w.c. for natural gas and 10 "w.c. for propane gas for 0 - 4500 ft./0 - 1372 m, 4500 - 7000 ft./1372 - 2134 m and 7000 - 10 000 ft./2134 - 3048 m altitudes.

Procedures (continued)

Initial start-up

Service

4. Measure flue gas values



WARNING

A CO analysis must be performed before and after any work activities to ensure that equipment operation is safe (health-wise) to inhabitants, and to be able to guarantee optimal operation of the system.

- Carbon dioxide CO₂ or
 - Oxygen content O₂
 - Carbon monoxide CO
 - Flue gas temperature (gross)
 - Flue gas loss
- must be measured and recorded in the Maintenance Record on page 26 of this manual.

Typical combustion results in the stack (at full load) are:

CO ₂ :	2.5 to 5%
Gross flue gas temp.:	200 - 250 °F/ 93 - 121 °C
CO:	< 25 ppm
Flue loss:	< 17%

Initial start-up

Service

5. Measure ionization current



CAUTION

Before connecting testing equipment, deactivate control via power switch.

1. Connect a DC μ A multimeter in series with the "sense" wire from the S8600B ignition control module.
2. Measure the DC μ A (microamp) current.
3. If the current value is
 - steady and greater than 1.5 μ A - OK
 - less than 1.5 μ A - the ignition control module or the pilot burner must be replaced.
4. Record value in Maintenance Record on page 26 of this manual.

IMPORTANT

Ionization current must be > 5 μ A with main burners in operation (firing).

Procedures (continued)

Initial start-up

Service

6. Measure chimney draft

The boiler shall be connected to a chimney having sufficient draft at all times to ensure safe and proper operation.

Down drafting and condensation problems must be corrected.

- Measure the chimney draft after the draft hood and record value in Maintenance Record on page 26 of this manual.
- The chimney draft is recommended to be between:
-0.012 "w.c. and -0.04 "w.c.



WARNING

Never operate boiler without a venting system which safely vents all products of combustion to the outdoors.

Chimney and vent system must meet current safety codes.



*Installation Instructions
Vitogas 100, GS10*

Any corroded parts of vent system must be replaced. Inspect vent system every year before heating season begins.

Procedures (continued)

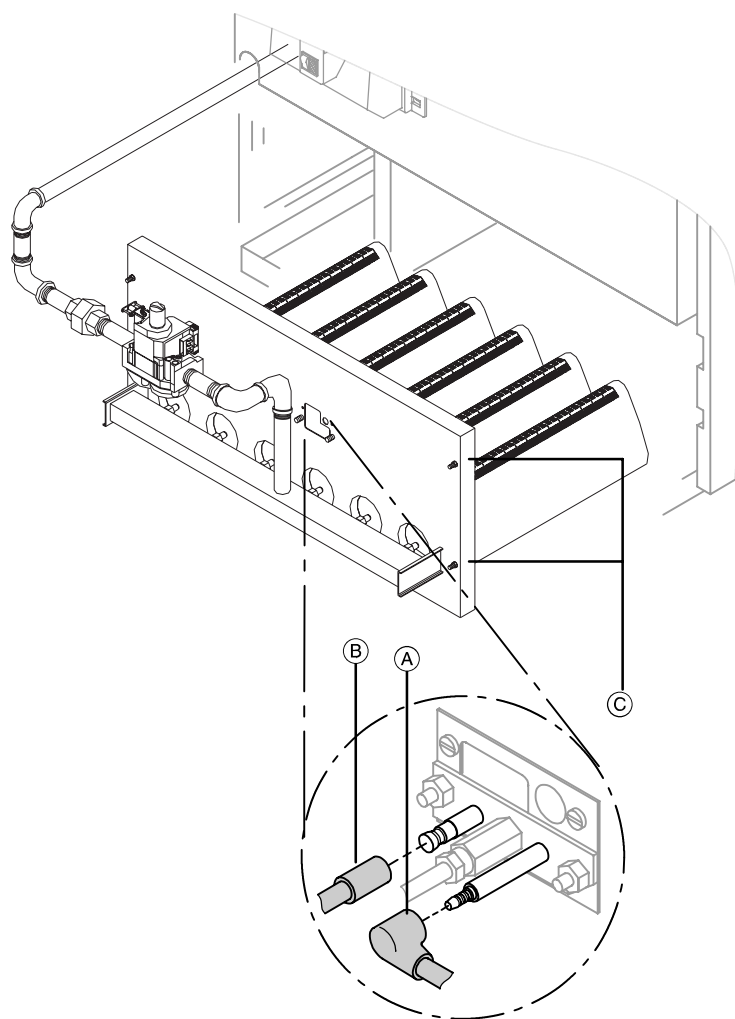
Service

7. Shut down heating system

1. Deactivate power on boiler control.
2. Deactivate main power supply to equipment and take precautions to avoid accidental activation.
3. Close manual gas supply valve.

Service

8. Remove burner tray



1. Close gas supply valve.
2. Remove front panel; unlock panel using a flat-head screwdriver.
3. Disconnect ground cable from mid panel.
4. Disconnect four wires from gas valve (PV, MV, C and HI).
5. Disconnect ignition electrode (A) and ionization electrode (B) cabling from ignition burner.
6. Disconnect $\frac{3}{4}$ " union from gas supply line.
7. Remove screws (C) and carefully pull out burner tray.

Procedures (continued)

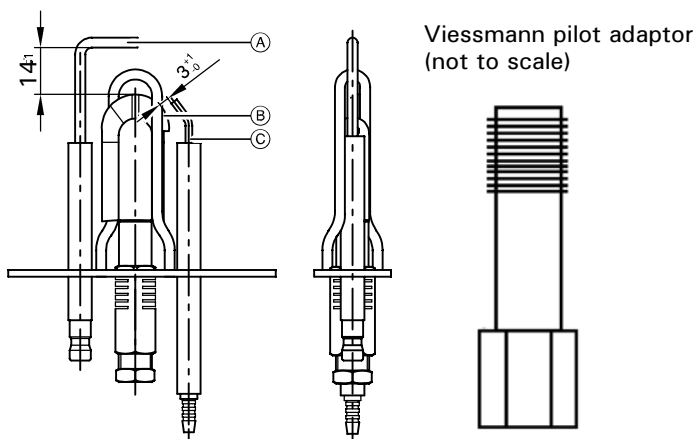
Service

9. Inspect burners

1. Ensure gas orifices and slots of burner tubes are visually free of defect or damage.
2. Blow out burner tubes with high pressure air, clean with a soft bristle (non-metallic) brush.

Service

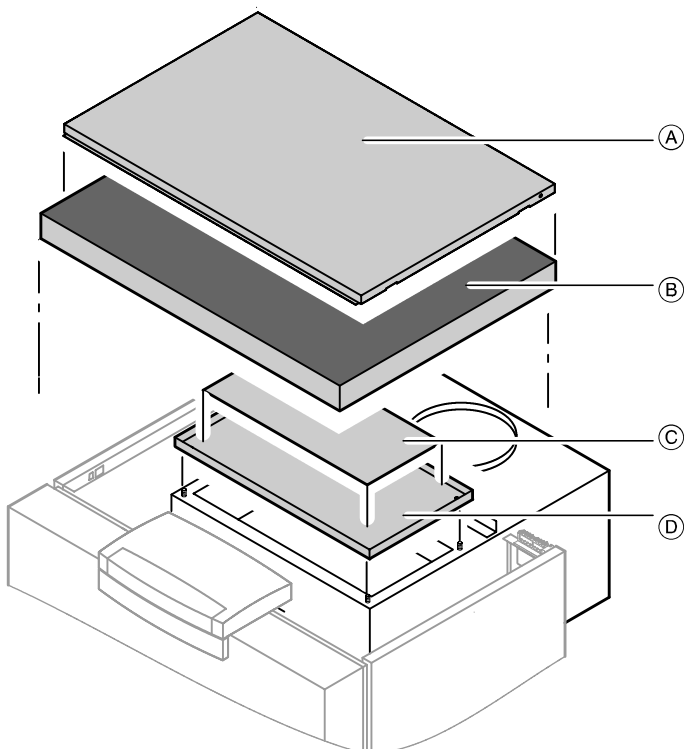
10. Inspect pilot burner



1. Ensure ionization electrode (A), pilot burner (B) and ignition electrode (C) are visually free of defect or damage.
2. Check spark gap.
3. Use emery cloth to clean ionization electrode.
4. Replace pilot burner if necessary.
5. Viessmann pilot orifice (not shown):
 - Natural gas stamped "26"
 - Propane gas stamped "24"

Service

11. Clean heat exchanger, if applicable (with burner tray removed)



1. Loosen sheet metal screws from the back and remove top panel (A).
2. Unhook spring-clips and remove insulation blanket (B) and mineral wool blanket (C).
3. Remove cover (D) of draft hood.
4. Clean heat exchanger of pressure vessel (with burner tray removed) using factory supplied cleaning brush.

CAUTION

Do not use chemical cleaners under any circumstance.

5. Remove debris from the base plate
6.
 - Reinstall draft hood cover.
 - Place mineral wool blanket and insulation blanket over cover and fasten to insulation blanket of boiler, using spring-clips.
 - Install top panel.

Procedures (continued)

Initial start-up

Service

12. Reinstall burner tray

Initial start-up

Service

13. Inspect all water pipe connections

Check heating system and domestic hot water connections. Ensure all connections are pressure tight. Correct any leaks found on fittings, pumps, valves, etc..

Initial start-up

Service

14. Check safety devices

Ensure proper operation of low water cut-off(s) (if applicable), pressure relief valve, and pump(s).

Check pressure gage, air vent and pressure relief valve. Ensure that pressure relief valve does not leak and that it operates in accordance with information provided by the manufacturer.

Refer to maintenance instructions supplied with low water cut-offs, pumps, etc.

Flush float water type low water cut-offs (if used).

Follow local regulations with respect to backflow preventers.

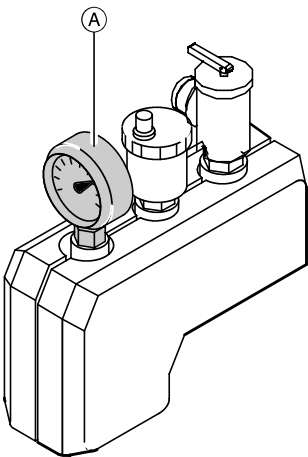
If oil-lubricated pumps are used, ensure proper lubrication.

If motorized zone valves are used, refer to maintenance instructions provided with zone valves.

Initial start-up

Service

15. Check precharged expansion and non-diaphragm tank and pressure of system



Refer to maintenance instructions supplied with diaphragm expansion tank. Check fill pressure when system is cold.

Ensure proper operation of expansion tank.

If an older non-diaphragm expansion tank is used, ensure the correct water level is present (2/3 water, 1/3 air).

The usual water fill pressure is between 10 and 15 psig with the system cold.

The system fill pressure value must be equal to the expansion tank pressure value at approx. 60 °F/15.6 °C.

Check pressure gage (A) on safety header. A lower pressure gage reading usually indicates loss of water due to leakage. All leaks must be corrected. Refer to instructions packaged with automatic fill valve.

Procedures (continued)

Initial start-up

Service

16. Check electrical connections

Ensure all plug-in connectors and strain reliefs make positive contact and are seated properly.



*Start-up/Service Instructions
Vitotronic Boiler Control*

Initial start-up

Service

17. Start up heating system



*Operating Instructions
Heating System,
Accessories*

Install front panel prior to start-up.



WARNING

The gas supply piping must be leak tested before placing the boiler in operation.



CAUTION

Ensure all joints of gas line are pressure tight and that gas valves do not leak when under normal operating pressure (use approved leak detection liquid).

Initial start-up

Service

18. Ensure proper automatic shut-off function of valve in gas train

1. Deactivate power on boiler control.
2. Burner deactivation must occur evenly and quickly (see burner observation port near pilot burner).
3. Replace gas valve if deactivation does not occur evenly and quickly.

Procedures (continued)

Initial start-up

Service

19. Check blocked vent safety switch

The blocked vent safety switch is located at the back of the boiler in the draft hood. In the event of complete vent blockage, the bi-metallic spill switch heats up due to flue gas spillage and interrupts 24 VAC to the gas control, shutting down the burner. The switch requires manual resetting by pushing in the red button. If the switch activates, the vent system must be checked inside and out and the blockage or defect corrected by a qualified heating contractor before the boiler is put back in operation. The blocked vent safety switch is set to 200°F/93°C.

1. Disconnect chimney piping from the draft hood.
2. Cover draft hood chimney connection in order to test functionality of blocked vent safety switch.

**WARNING**

Ensure that windows in the room are open. Provide proper ventilation.

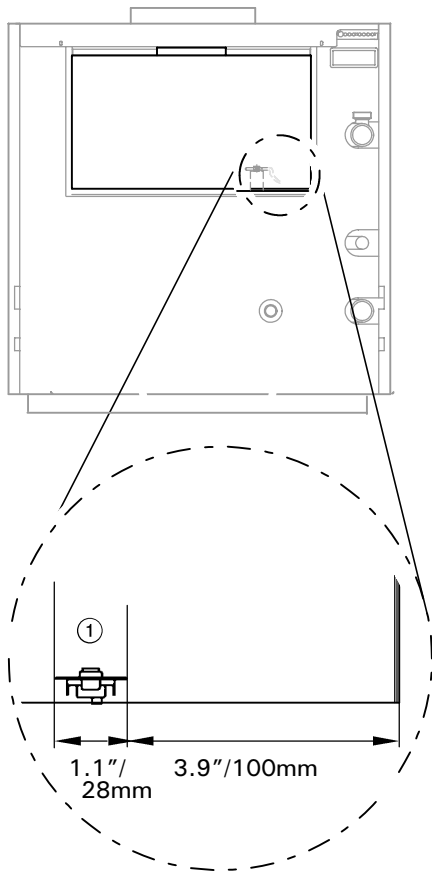
3. Activate boiler.
The blocked vent safety switch must deactivate the burners not more than 2 minutes after activation.

**WARNING**

Never test functionality of blocked vent safety switch using an open flame. Direct, intense heat may damage sensor. A short-circuit or tripping of the sensor deactivates burners.

- Check position of switch ① if blocked vent safety switch requires more than 2 minutes to deactivate.
- Replace switch or check wiring:
 - if blocked vent safety switch does not deactivate
 - if burners do not activate
 - if switch is corroded in any way.

4. Deactivate boiler.
5. Uncover draft hood chimney connection and reconnect chimney piping to draft hood.



- ① Bottom of blocked vent switch bracket, sensing cup must point upward.

Initial start-up

Service

20. Perform combustion analysis

1. For a combustion analysis, please repeat steps commencing on page 12.
2. Record measurements and settings on page 26 of this manual.
3. Reclock burners if necessary.

5167 468 v1.1

Procedures (continued)

Initial start-up

Service

21. Combustion air supply

Please note:

This boiler is equipped with premix burner tubes. Both primary and secondary air for combustion are supplied by entrainment through the burner front openings.

Ensure an adequate supply of combustion and ventilation air is available. If outside air duct is necessary, ensure it is installed. Viessmann recommends the use of combustion air from an outdoor source.

Ensure that nothing is obstructing the flow of combustion ventilation air and no chemicals, garbage, gasoline, combustible materials, flammable vapors and liquids are stored (not even temporarily) in the vicinity of the boiler.



*Vitogas 100, GS10
Installation Instructions*

Initial start-up

22. Post start-up checklist

- Once system water is heated, deactivate circulating pump/boiler and vent system of any remaining air within piping, radiation and boiler.
- Check for proper boiler circulation, pump, zone valve, thermostat or operating control functions.
- Check adjustable high limit aquastat by dialing it to a setting below the water temperature in the boiler. The gas burner must be deactivated. Turning the dial back to a setting higher than the present boiler water temperature must result in reactivation of gas burner.
- Cycle boiler on and off with the room thermostat (or other operating control) to verify that the burner shuts down when the room thermostat is adjusted below room temperature.

Diagnosis and Correction

Review the following points first in the event of failure:

- Is power available?
- Is the necessary gas pressure available?
- Are all products operating properly (i.e. thermostats, indoor/outdoor control, low water cut-off, etc.)?
- Are all plug connections tight and secure?



Troubleshooting the Boiler
Control see Start-up/Service
Instructions of Boiler Control



CAUTION

Use only Viessmann original components when replacing defective parts. Installation of incorrect replacement parts can cause hazardous operation.

Order replacement components from your Viessmann distributor.

Failure	Cause	Correction
Boiler does not start up	No power	Check fuse and connections of cabling. Ensure control is activated.
	LWCO - low water cut-off (if applicable) malfunctioning	Correct low water condition or air lock. Ensure proper operation of LWCO and replace if necessary.
	Blocked vent safety switch tripped	Correct any vent and flue blockages.
	Boiler water temperature too high	Wait until boiler water temperature has dropped by approx. 36 °F/20 °C.
	Boiler safety high limit aquastat has activated	Press reset button when boiler has cooled down. Check circulating pump operation.
	41 plug-in connectors are not properly connected	Connect 41 plug-in connector properly.
	Vent damper (if installed) is not open, vent damper is jammed, or vent damper motor has not activated	Ensure unobstructed operation of vent damper blade or replace vent damper. The boiler can be made operative until the new damper arrives by locking the blade in the open position with the service pin.
	If boiler is vented horizontally: Power venter operation malfunctioning	Check air proving switch. Refer to separate power venter manual.

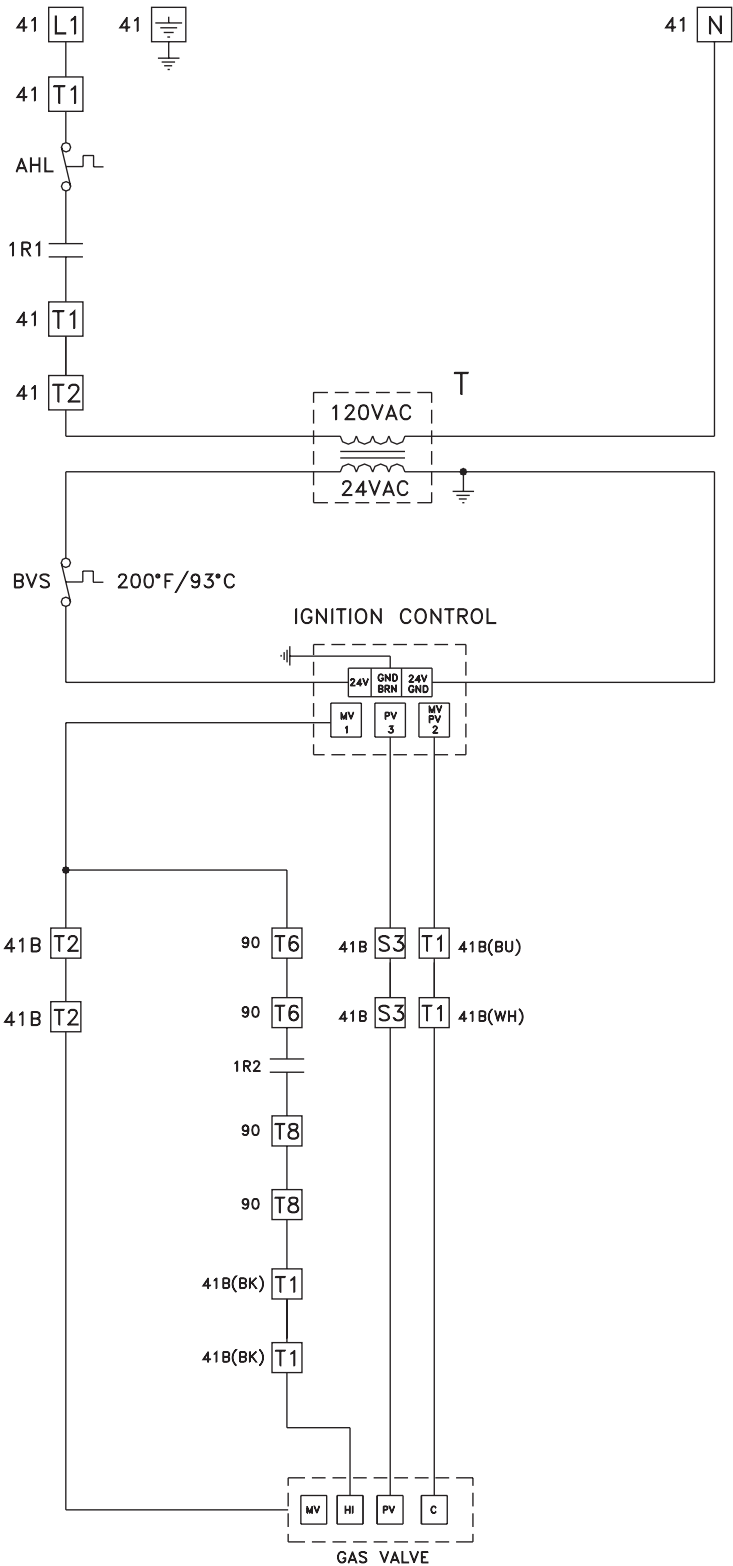
Diagnosis and Correction (continued)

Failure	Cause	Correction
Completion of 90 sec. safety timing without the pilot lighting or staying lit	No gas available	Air in gas train; turn power off and on to reset ignition control module and restart burner ignition sequence.
	Pilot burner does not light.	Remove debris in pilot orifice or drywall dust. Check pilot orifice. Ensure adequate pilot gas pressure.
	Gas valve does not open.	Check wires, check 24 V to gas valve (PV, MV, C and HI).
	Poor ground	Replace ground wire.
	Ionization current too low (must be > 1 μ A DC and steady)	Measure ionization current with DC amp meter for value > 1 μ A. Replace pilot burner or S8600B ignition module.
Pilot burner lights but main burner does not activate	Main gas valve not opening	Check wires, check for 24 V at MV and PV/MV; no voltage, replace ignition module. Replace gas valve.
Main burner does not stay on	Ionization current too low when main burners are lit	Excessive draft - check chimney. Check pilot burner. Replace S8600B module.

For fault indication on the boiler control, see technical documentation of boiler control.

Functioning of Burner Ignition System

Ladder diagram



Legend

- 41 Terminals in plug 41
- 41B Terminals in plug 41B
- 90 Terminals in plug 90
- AHL Adjustable high limit in boiler control
- 1R1 Operating contact in boiler control
- T Transformer 120V/24V
- BVS Blocked vent switch
- 1R2 Second stage in boiler control
- L1 120 V (hot)
- N 120 V (neutral)

- Demand for heat energizes first stage ignition module through the 24 V transformer.
- If boiler water temperature is below minimum water temperature, then second stage also energizes. Both stages fire to increase boiler water temperature.
- Once boiler water temperature is above minimum, second stage can de-energize if the heat demand causes potential-free contact of Vitotronic 90 plug to open circuit.
- Both ignition systems can cycle off adjustable high limit aquastat in boiler control during a demand for heat.
- BVS (blocked vent switch) can de-energize both ignition systems.

Ignition System Wiring Diagram (Vitogas 100, GS10 with Vitotronic Controls)

FHL – SAFETY LIMIT
MANUAL RESET FIXED
(FIXED AT 230°F/110°C)
AHL – OPERATING LIMIT
ADJUSTABLE AQUASTAT

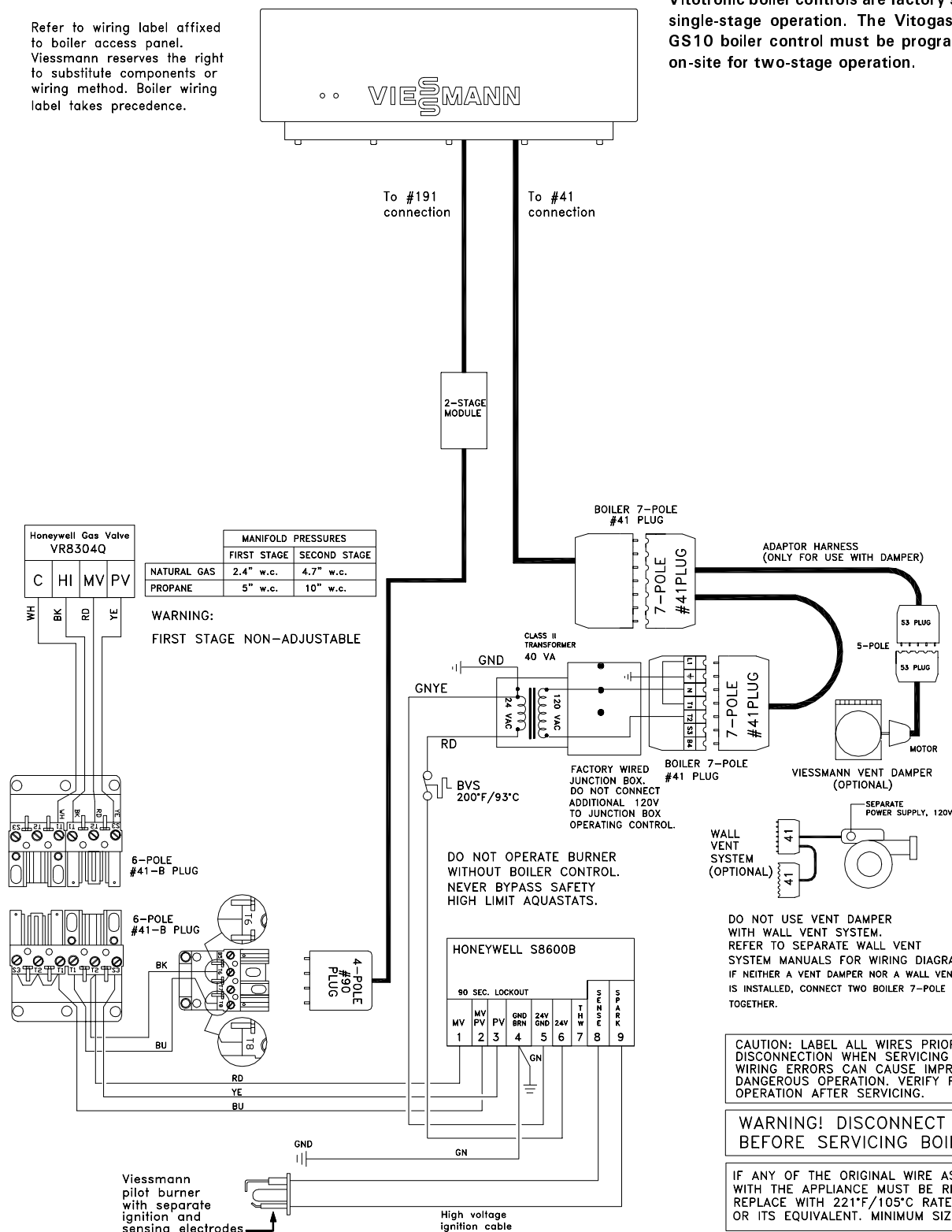
Refer to wiring label affixed to boiler access panel. Viessmann reserves the right to substitute components or wiring method. Boiler wiring label takes precedence.

VITOTRONIC BOILER CONTROL

REFER TO INTERNAL WIRING DIAGRAM SUPPLIED WITH THE VITOTRONIC CONTROL.

IMPORTANT

Vitotronic boiler controls are factory set for single-stage operation. The Vitogas 100, GS10 boiler control must be programmed on-site for two-stage operation.



Parts List

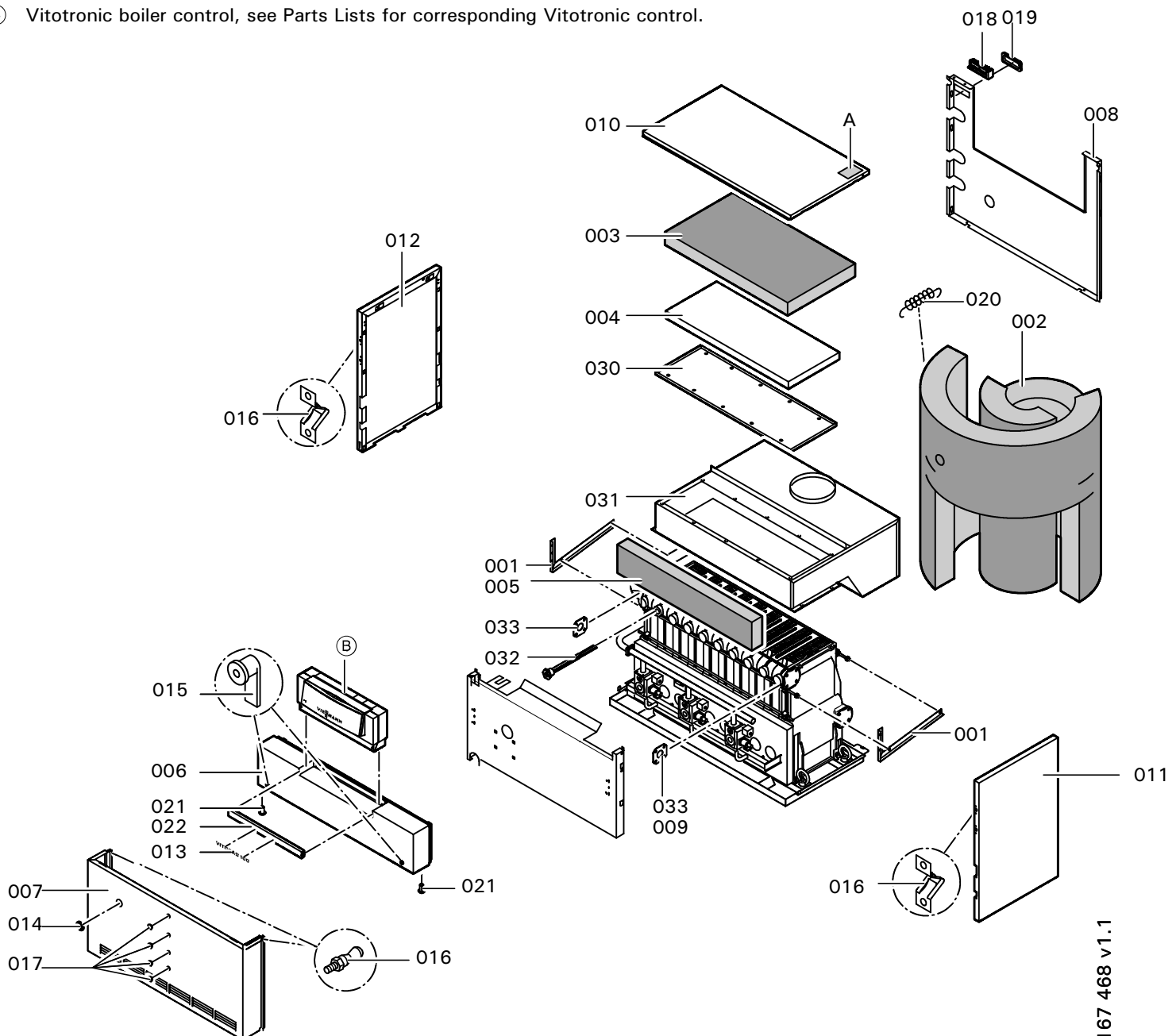
Ordering Replacement Parts:

Please provide boiler Model and Serial Number from rating plate when ordering replacement parts.
Order replacement parts from your Viessmann distributor.

Parts

002 Insulation blanket	010 Top panel	018 8-Channel strain relief
003 Insulation blanket, top	011 Side panel, right	019 Cover, edgemolding
004 Insulation, draft hood	012 Side panel, left	020 Spring clip f insul. (set of 4)
005 Insulation blanket, front	013 Nameplate	021 Spacer
006 Front panel, top	014 Rubber cover	031 Draft hood
007 Front panel, bottom	015 Lock mechanism	032 Sensor well
008 Rear panel	016 Access. pack (fr. panel hardw.)	033 Gasket, 110 x 110 x 3 mm
009 Mid panel	017 Panel cap	

Ⓑ Vitotronic boiler control, see Parts Lists for corresponding Vitotronic control.



Parts List (continued)

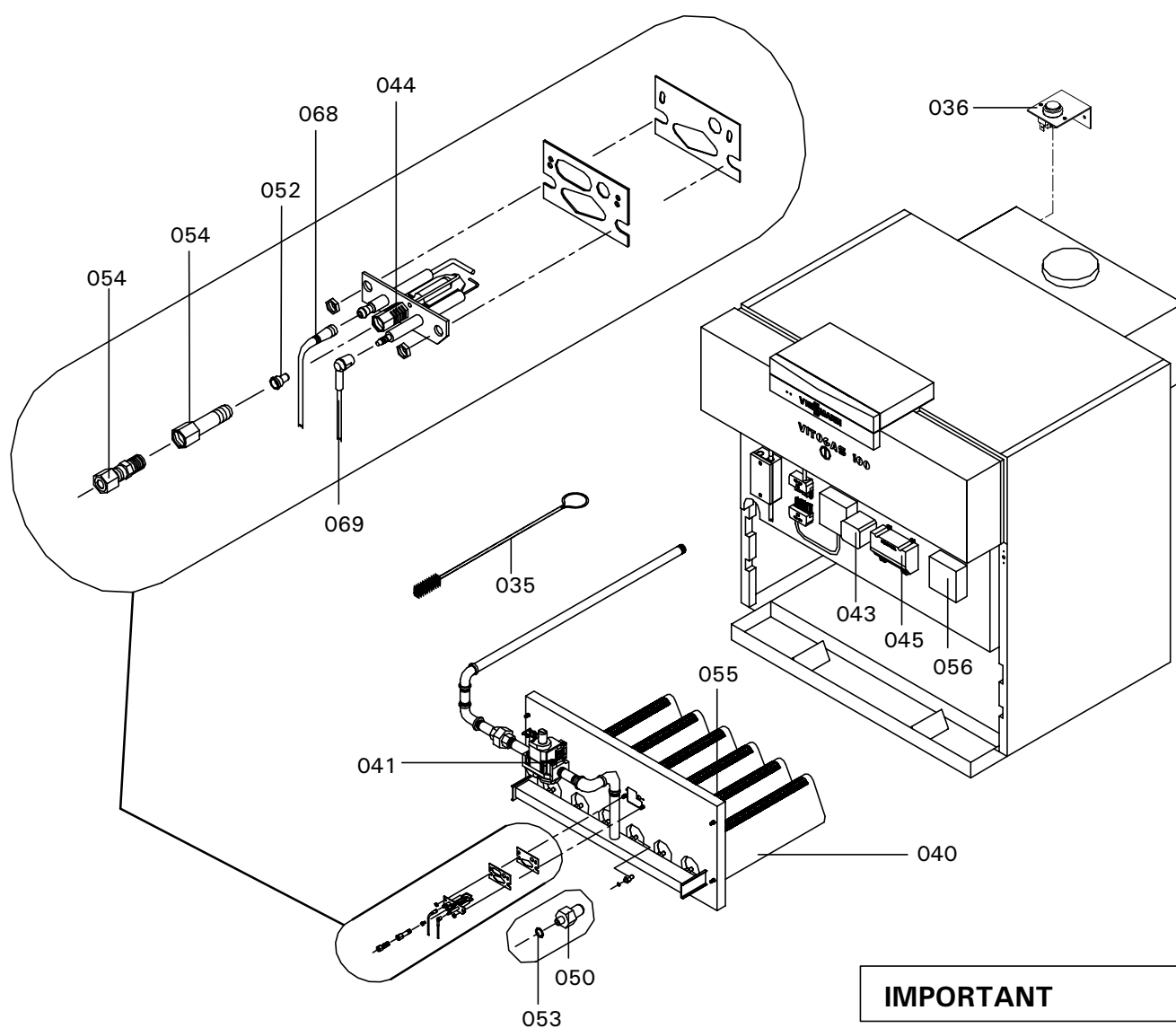
Parts

035 Cleaning brush c/w handle
 036 Blocked vent safety switch (set to
 200 °F/93 °C)
 040 Burner tube
 041 Gas valve (NG or LP)
 042 Ext. module, two-stage burner
 043 Transformer, 120/25V, 40VA
 044 Pilot (no adaptor/no orifice)
 045 Ignition module

050 Orifice (NG or LP)
 052 Pilot orifice
 053 Orifice ring
 054 Viessmann pilot adaptor
 055 Insulation, burner tray
 056 Pump junction box (applicable
 only for Vitotronic 100)
 068 Ionization cable
 069 Ignition cable

Parts (not illustrated)

070 Installation Instructions
 071 Start-up/Service Instructions
 072 Operating Instructions/User's
 Information Manual
 073 Touch-up spray paint
 074 Touch-up paint



IMPORTANT

Components on mid panel may not be situated as illustrated.

Maintenance Record

Measurements	Start-up date: by:	Service date: by:	Service date: by:	Service date: by:	Service date: by:	Service date: by:
Upstream static pressure before adjustment "w. .						
Running gas supply press. manifold						
☐ Natural gas "w. c.						
☐ Propane "w. c.						
Fuel type						
Orifice pressure before adjustment "w. c.						
after adjustment "w. c.						
Carbon dioxide CO ₂ in % before adjustment Vol. - %						
after adjustment Vol. - %						
Oxygen O ₂ in % before adjustment Vol. - %						
after adjustment Vol. - %						
Carbon monoxide CO before adjustment ppm						
after adjustment ppm						
ue gas temp. (gross) in °F / °C before adjustment						
after adjustment						
Flue gas loss before adjustment %						
after adjustment %						
Ionization current before adjustment μA						
after adjustment μA						
Chimney draft before adjustment " w. c.						
after adjustment " w. c.						

Lighting and Operating Instructions

THIS LABEL APPLIES TO GAS-FIRED BOILERS ONLY

FOR YOUR SAFETY READ BEFORE OPERATING

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

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

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

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

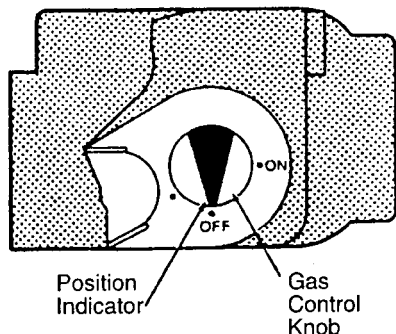
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to 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.

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

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
2. Set the thermostat or other operating control 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. Push in gas control knob slightly and turn clockwise  to "OFF".

NOTE: Knob cannot be turned to "OFF" unless knob is pushed in slightly. Do not force.

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

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat or other operating control to lowest setting.
2. Turn off all the electric power to the appliance if service is to be performed.

3. Turn gas control knob clockwise  to "OFF". Do not force.

Viessmann Manufacturing Company (U.S.) Inc.
45 Access Road
Warwick, Rhode Island • 02886 • USA
Tel. (401) 732-0667 • Fax (401) 732-0590
www.viessmann-us.com • info@viessmann-us.com

Viessmann Manufacturing Company Inc.
750 McMurray Road
Waterloo, Ontario • N2V 2G5 • Canada
Tel. (519) 885-6300 • Fax (519) 885-0887
www.viessmann.ca • info@viessmann.ca

Printed on environmentally friendly
(recycled and recyclable) paper.



Technical information subject to change without notice.

5167 468 v1.1