Service Instructions

for use by heating contractor

Vitocrossal 200
CM2 Series
Gas condensing boiler with Pre-mix cylinder burner

Heating input: 663 to 1112 MBH
194 to 326 kW

VITOCROSSAL 200



Product may not be exactly as shown

IMPORTANT

Read and save these instructions for future reference.

5607 706 - 04 10/2014

Please file in Service Binder

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).

- **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 Safety Requirements".*

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

- **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 subsection entitled "Mechanical room" in the "Installation Instructions".*

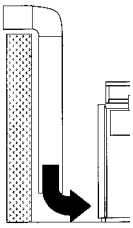
- **Advice to owner**
  Once the installation work is complete, the heating contractor must familiarize the system operator/ ultimate owner with all equipment, as well as safety precautions/requirements, shutdown procedure, and the need for professional service annually before the heating season begins.

- **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 subsection entitled "Mechanical room" and "Venting requirements" 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 subsection entitled "Mechanical room" 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". All products of combustion must be safely vented to the outdoors.*

⚠ WARNING

Installers must follow local regulations with respect to installation of carbon monoxide detectors. Follow the Viessmann maintenance schedule of the boiler contained in this manual.

Equipment

Tools

- Assortment of flat head and phillips screwdrivers
- Pipe wrenches
- Open-ended wrenches
- Pipe sealant
- Assortment of Hex keys
- Flashlight
- Approved leak detection fluid for natural gas and propane gas

Cleaning supplies

- Plastic hand brush
- Cleaning/service brush
- Vacuum cleaner
- Clean rags

Testing/analysis equipment
(use only calibrated equipment)

- Flue gas analyzer to measure % CO_2 or O_2 (i.e. Bacharach fluid samplers or a suitable electronic analyzer)
- Multimeter to measure 0-120 VAC, 0-20 amps AC and 0-100 microamps DC
- Pressure gage to measure gas pressure 0 - 28 "w.c. A non-electric MagnehelicR pressure gage (0 - 10 psig) may also be used.
- Carbon monoxide measuring equipment (0 - 400 ppm)
- Bacharach calculator or suitable tables to calculate efficiency
- Stack thermometer dial settings 0 to 250°F (121°C)
- ⅛ in. NPT male to ¼ in. barb adaptor fitting, as well as tubing for pressure measurement

Technical information

The following is a list of literature applicable to the Vitocrossal 200, CM2 boiler:

- Installation Instructions
- Service Instructions
- Operating Instructions

For installation of the heating system, please refer also to the technical literature of other System Technology devices:

- Installation Instructions for Viessmann boiler control
- Installation Instructions for Viessmann indirect-fired hot water storage tank(s)
- Installation Instructions for burner and accessories

Replacement parts

The materials listed below are recommended to be on hand for all service calls.

For a complete listing of replacement components, please see Parts List starting on page 50 of these instructions.

Order replacement components from your Viessmann distributor.

⚠ CAUTION

Use only original Viessmann recommended components when replacing defective parts. Installation of incorrect replacement parts can cause hazardous operation and will void warranty.

Product Information

High efficiency gas-fired hot water condensing boiler.

For operation with modulating boiler water temperatures in closed loop, forced circulation hot water heating systems.

The Vitocrossal 200, CM2 boilers are CSA certified with Viessmann burners which must be used in conjunction with this boiler series.

The proper burner size must be verified and the burner is factory adjusted so that the maximum input of the appropriate boiler size is always observed. The gas burner must always be installed according to the instructions provided by the burner manufacturer.

The boiler model selected should be based on an accurate heat loss calculation of the building. The boiler selected must be compatible with the connected radiation.

The Vitocrossal 200 boiler is suitable for a maximum operating pressure of 75 psig and a maximum boiler water temperature of 210°F (99°C).

This boiler does not require a flow switch.

⚠ WARNING

Exposing the boiler to pressures and temperatures in excess of those listed will result in damages, and will render warranty null and void.

About these Installation 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.*

▶ *This symbol indicates that other instructions must be referenced.*

Important Regulatory and Installation Requirements

Fiberglass wool and ceramic fiber materials

WARNING

Inhaling of fiberglass wool and/or ceramic fiber materials is a possible cancer hazard. These materials can also cause respiratory, skin and eye irritation.

The state of California has listed the airborne fibers of these materials as a possible cancer hazard through inhalation. When handling these materials, special care must be applied.

Suppliers of ceramic fiber products recommend the following first aid measures:

- *Respiratory tract (nose and throat) irritation:* If respiratory tract irritation develops, move the person to a dust free location.
- *Eye irritation:* If eyes become irritated, flush immediately with large amounts of lukewarm water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Do not rub eyes.
- *Skin irritation:* If skin becomes irritated, remove soiled clothing. Do not rub or scratch exposed skin. Wash area of contact thoroughly with soap and water. Using a skin cream or lotion after washing may be helpful.
- *Gastrointestinal irritation:* If gastrointestinal tract irritation develops, move the person to a dust free environment.

Suppliers of fiberglass wool products recommend the following precautions be taken when handling these materials:

- Avoid breathing fiberglass dust and contact with skin and eyes.
- Use NIOSH approved dust/mist respirator.
- Wear long-sleeved, loose fitting clothing, gloves and eye protection.
- Wash work clothes separately from other clothing. Rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out and spraying may generate airborne fiber concentration requiring additional protection.

First aid measures

- If eye contact occurs, flush eyes with water to remove dust. If symptoms persist, seek medical attention.
- If skin contact occurs, wash affected areas gently with soap and warm water after handling.

WARNING

Appliance materials of construction, products of combustion and the fuel contain alumina, silica, heavy metals, carbon monoxide, nitrogen oxides, aldehydes and/or other toxic or harmful substances which can cause serious injury or loss of life and which are known to the State of California to cause cancer, birth defects and other reproductive harm. Always use proper safety clothing, respirators and equipment when servicing or working nearby the appliance.

Important Regulatory and Installation Requirements *(continued)*

Instructing the system user

The installer of the system is responsible to ensure the system operator/ultimate owner is made familiar with the functioning of the system, 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 53 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.

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.

▶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.

Viessmann offers frequent installation and service seminars to familiarize our partners with our products. Please inquire.

▶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 Vitocrossal 200, CM2:
- Technical Data Manual
- Installation Instructions
- Service Instructions
- Operating Instructions
- Wiring diagrams

Additional applicable literature:
- Viessmann boiler controls manuals

▶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.

Page

General Information

Safety, Installation and Warranty Requirements.....2
Equipment.....3
Tools.....3
Cleaning supplies.....3
Testing/analysis equipment.....3
Technical information.....3
Replacement parts.....3
Product Information.....3
About these Installation Instructions.....4
Important Regulatory and Installation Requirements.....4
Instructing the system user.....5
Initial start-up.....5
Working on the equipment.....5
Technical literature.....5

Safety

Safety Instructions.....8
Target group.....8
Regulations.....8
If you smell gas.....8
If you smell flue gas.....8
Working on the system.....8
Repair work.....8
Auxiliary components, spare and wearing parts.....8
Checking the high limit safety cut-out setting.....8
Filling the heating system with water and venting the system.....8
Filling siphon with water.....8

Commissioning, Inspection and Maintenance

Steps - Commissioning, Inspection and Maintenance.....9
Commissioning the system.....9
Select the gas type.....9
Conversion to liquid propane gas (LPG).....10
Conversion to natural gas (NG).....11
Converting gas type on burner control unit.....12
Altitude adjustment.....12
Reducing operational input (if required).....13
Checking the static and the supply pressure.....13
Supply pressure for NG and LPG.....14
Checking the Rotary Damper Setting (CM2 246/311only)..14
Checking the CO_2 level.....15
Preparing the test.....15
CO_2 test at the upper heating input.....15
CO_2 test at the lower heating output.....16
Displaying the ionization current.....16
Shutting down the system.....17
Opening the boiler door.....17
Separating the neutralizing system (if installed) from the boiler and connecting the drain hose.....17
Cleaning the combustion chamber and heating surfaces..17
Checking gaskets and thermal insulation parts.....17
Checking all connections for leaks.....17
Cleaning and reconnecting the condensate drain system..18
Checking the condensate drain and the neutralizing system (if installed).....18
Checking neutralization unit (if installed).....18
Checking the cylinder burner assembly.....18
Checking the ignition and ionization electrodes.....19
Closing the boiler door.....19
Cleaning the burner.....19
Making the electrical burner connection.....19
Checking all gas connections for leaks.....20

Page

Commissioning, Inspection and Maintenance *(continued)*

Checking the Flue Side Gaskets/Seals and Flue Gas Temperature Switch....20
Replacing the Flue Gas Temperature Sensor....21
Replacing the Boiler Temperature Sensor....22
Checking the Diaphragm Expansion Vessel and System Pressure....22
Check proper expansion tank and system pressures....22
Water Quality....22

Burner Service

Further Details Regarding the Individual Steps....23
Fan pressure monitoring function (air pressure switch 1)..23
Combustion chamber pressure monitoring (air pressure switch 2)....23
Gas inlet pressure monitoring switch - GDW1....24
Valve seat pressure monitoring switch - GDW2....24
Burner Component Overview....25
CM2 pre-mix cylinder burner 186/246/311....25
Accessing the Boiler....26
Burner Control....26
Burner Control Coding Card....27
Burner Control Programming Unit....28
Gas Valve (NG)....28
Gas Valve (LPG)....29
Air Pressure Switch....30
2/2-Way Solenoid Valve (choke valve) (for CM2 186 burner only)....30
Ignition Unit....31
Ignition Cable....31
Ignition Electrode Block....32
Ionization Electrode Block....32
Motorized Burner Inlet Damper....33
Inlet Damper Servomotor....33
Inlet Damper Linkage....34
Plug Console with Relay....34
Burner Fan....35
Burner Tube....35
Burner Door....36
Burner Door Refactory....37
Further Installation and Initial Start Up Instructions....37

Burner Control Unit

Burner Control Unit....38
Display and programming unit....38
Operating display....38
Information configuration display....40
Resetting Operating Parameters to Factory Setting....42
Manual Mode and Service Display....42

Flow Diagram

Burner Control Unit Flow Diagram....43

Connection Diagram

Burner Control Unit Connection Diagram....45

Troubleshooting

Faults....46
Fault display....46
Fault memory....46
Fault Codes....47
General process errors....47
Faults Without Fault Display....49
Adjusting Coding Addresses at the Control Unit....49

Parts

Parts Lists....50

Record

Maintenance Record....53

Inspection and Maintenance

Inspection and Maintenance....54

Specifications

Technical Data....56
Cylinder Burner....58

Safety Instructions

Target group

These instructions are intended exclusively for qualified contractors.

- Work on gas installations must only be carried out by a licensed professional heating contractor.
- Work on electrical equipment must only be carried out by a qualified electrician.
- The system must be commissioned by the system installer or a qualified person authorised by the installer.
- This appliance has **not** been designed to be operated by individuals other than those qualified and trained.

Regulations

Observe the following when working on this system:

- Statutory regulations regarding the prevention of accidents
- Statutory regulations regarding environmental protection
- Codes of practice of the relevant trade associations.

If you smell gas

WARNING

Escaping gas can lead to explosions which may result in serious injury.

- Do not smoke. Prevent naked flames and sparks. Do not press any switches for lights or electrical appliances.
- Close the gas shut-off valve.
- Open windows and doors.
- Remove all people from the danger zone.
- Notify your gas or electricity supply utility from outside the building.
- Shut off the electricity supply to the building from a safe place (outside the building).

If you smell flue gas

WARNING

Flue gas can lead to life threatening poisoning.

- Shut down the heating system.
- Ventilate boiler room.
- Close all doors in the living space

Working on the system

- Where gas is used as the fuel, close the main gas shut-off valve and safeguard it against unintentional reopening
- Isolate the system from the power supply (e.g. at the separate fuse or a main switch) and check that it is de-energized
- Safeguard the system against reconnection.

Note: Electronic assemblies can be damaged by electrostatic discharges. Before beginning work, touch grounded objects, such as heating or water pipes, to discharge static loads.

Repair work

Note: Repairing components that fulfil a safety function can compromise the safe operation of your system. Replace faulty components only with original Viessmann spare parts.

Auxiliary components, spare and wearing parts

Note: Spare and wearing parts that have not been tested together with the system can compromise its function. Installing non-authorised components and making non-approved modifications or conversions can compromise safety and may invalidate our warranty. For replacements, use only original spare parts supplied or approved by Viessmann.

Checking the high limit safety cut-off setting

Never set the high limit safety cut-off higher than 99°C.

See the control section of the Installation Instructions.

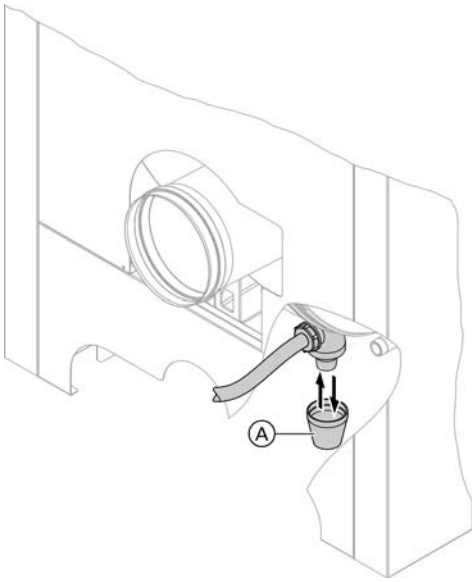
Filling the heating system with water and venting the system

For water hardness and pH value see page 22.

Note: Observe the water quality requirements on page 22.

Filling siphon with water

1. Undo the siphon cup Ⓐ and fill with water (otherwise flue gas may escape).
2. Check that the condensate can drain freely.
3. Refit the siphon cup Ⓐ.



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Steps – Commissioning, Inspection and Maintenance

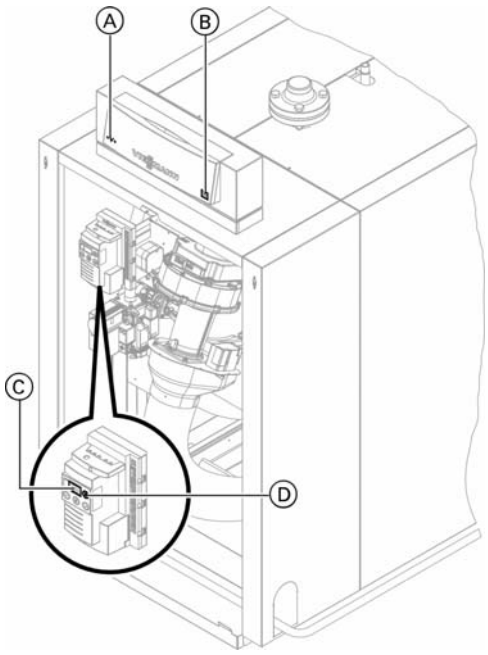
Commissioning the system

⚠ WARNING

Failure to ensure that all flue gases have been safely vented to the outdoors can cause property damage, severe personal injury, or loss of life. Flue gases may contain deadly carbon monoxide.

See the control section of the Installation Instructions and neutralizing system Operating Instructions.

1. Check the heating system pressure. Permissible boiler operating pressure: 75 psi.
2. Check the gas supply pressure.
3. Open the gas line shut-off valves.
4. Switch ON the main power (breakers).
5. Switch ON system ON/OFF switch Ⓑ at the control unit. If fault indicator Ⓐ on the control unit illuminates and burner control unit display Ⓒ flashes, first press reset button **R** Ⓓ on the burner control unit.



Note: The system can enter a fault state during commissioning if there is insufficient gas in the supply line (the fault indicator on the control unit illuminates). Vent the gas supply line again and reset the burner control unit.
Remove air from the gas line with an approved gas purge burner or vent outdoors.

6. Match the coding card at the burner control unit according to the chart on this page. Also refer to page 27.

See the control section of the Installation Instructions and neutralizing system Operating Instructions.

7. Check the function of the neutralizing system.
   Note: Neutralizing system operating instructions.
8. Check all gaskets and plugs, and retighten if necessary
   Note: We recommend you check all connections on the heating water side for leaks after approximately 500 hours run (see page 17).
9. Check the boiler door a few days after commissioning and retighten all screws.

Select the gas type

1. The boiler is factory set to operate with natural gas. See the following subsection for conversion instructions to liquid propane gas.
2. Ensure that the fuel type listed on the boiler rating plate is the correct type for the installation being attempted.
3. Record the gas type in the “Maintenance Record“ on page 53.

The Vitocrossal 200 CM2 boiler is for use with gases whose characteristics fall within the following ranges. Other types of gas such as LNG with different heating value can be used.

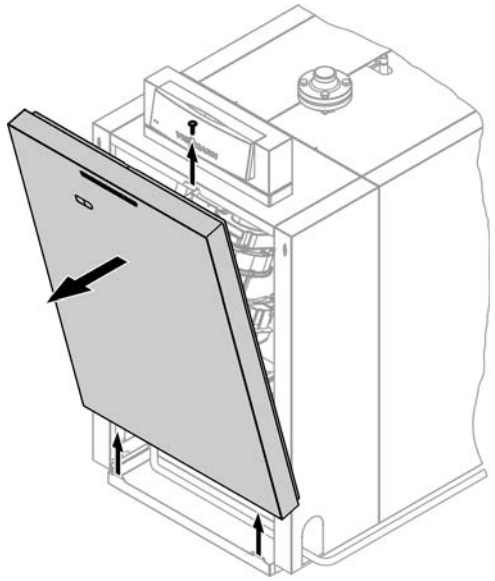
	Natural Gas	Liquid Propane Gas
Heating value (gross) Btu/ft^3	970 to 1100	2466 to 2542
Specific gravity	0.57 to 0.70	1.522 to 1.574
Ultimate carbon dioxide (CO_2) %	11.7 to 12.2	13.73 to 13.82

CM2 Burner Coding Card	Part No.
Model 186	7838592
Model 246	7838593
Model 311	7838594

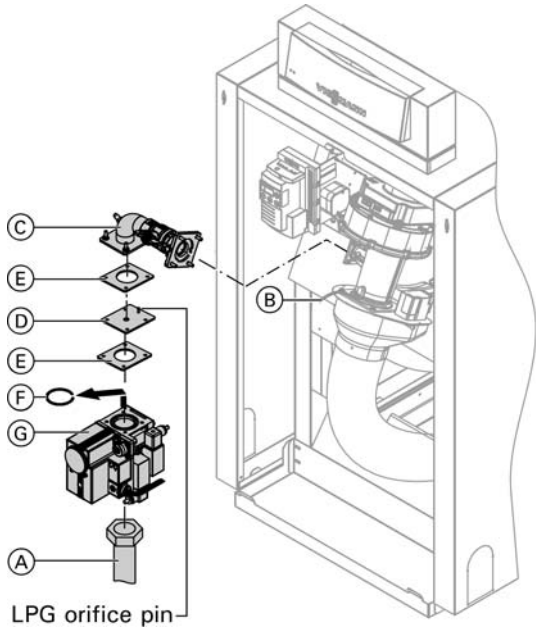
Steps – Commissioning, Inspection and Maintenance *(continued)*

Conversion to liquid propane gas (LPG)
(The LPG conversion kit is supplied with the burner)

1. Close the gas shut-off valve.
2. Switch OFF the system ON/OFF switch at the boiler control unit.
3. Switch OFF the main boiler circuit breaker (outside the boiler room) or the power supply and prevent unauthorized reconnection.
4. Remove boiler front cover.



5. Undo gas supply fitting Ⓐ
6. Disconnect compensation tubing Ⓑ connected between the venturi tube and the gas valve.



7. Remove four 8 mm hex nuts. Detach the gas valve from flange Ⓒ.
8. Remove and discard O-ring Ⓕ from gas valve. Install rubberized cork gasket Ⓔ onto the gas valve face. Install the LPG orifice Ⓓ (with pin). Install second rubberized cork gasket on top of the LPG orifice.

⚠ WARNING

Install LPG orifice with the pin at the top and to the rear. Wrong installation of the orifice will lead to leakage.

9. Secure gas valve, orifice Ⓓ and rubberized cork gaskets Ⓔ to the flange of the mixing system Ⓒ. Torque nuts diagonally with 17.7 lb/in (2.0 Nm).
10. Secure and tighten gas supply fitting Ⓐ.
11. Reconnect the compensation tubing Ⓑ (connected between the venturi tube and the gas valve).
12. Apply:
    - Partial rating plate above CSA rating plate located on top panel (behind the boiler control).
    - Label Ⓖ indicating that this unit is equipped for LPG over the NG label located on the gas valve.
    - Label indicating that this unit has been coverted from NG to LPG next to the CSA rating plate (on the top panel).
    - Fill out and fax conversion report.
13. Check all gas fittings for leaks.

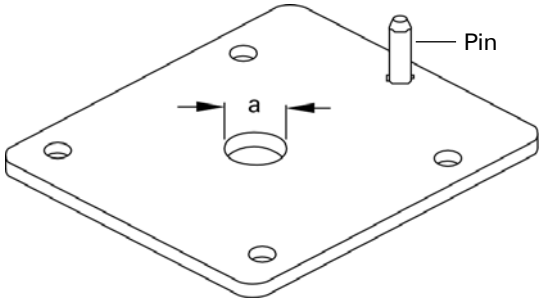
⚠ WARNING

Escaping gas leads to a risk of explosion. Check all fittings for gas leaks.

Note: The use of leak detecting spray can result in incorrect functions. Leak detecting spray must not come into contact with electrical components.

Gas orifice dimensions (liquid propane gas) for boiler models 186 to 311

Boiler Model	Dimension a in. (mm)
186	0.38 (9.7)
246	0.48 (12.2)
311	0.54 (13.6)

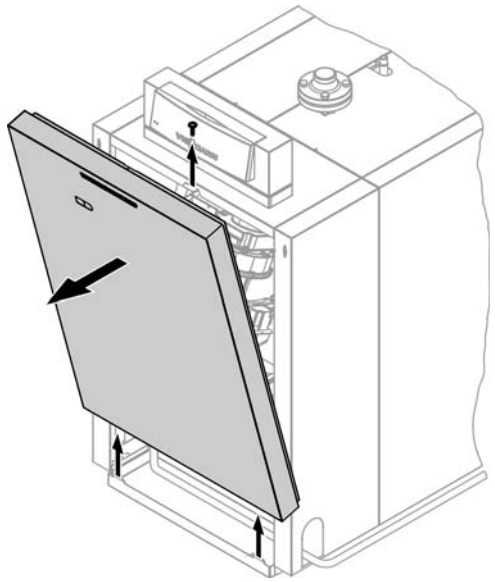


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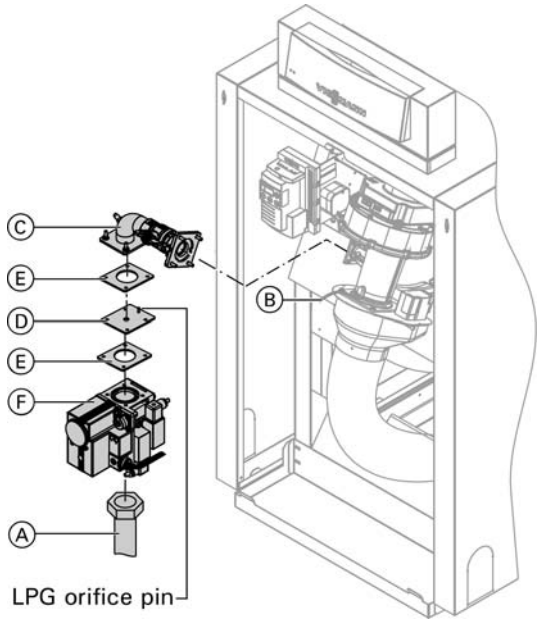
Steps – Commissioning, Inspection and Maintenance *(continued)*

Conversion to natural gas (NG)

1. Close the gas shut-off valve.
2. Switch OFF the system ON/OFF switch at the boiler control unit.
3. Switch OFF the main boiler circuit breaker (outside the boiler room) or the power supply and prevent unauthorized reconnection.
4. Remove boiler front cover.



5. Undo gas supply fitting Ⓐ.
6. Disconnect compensation tubing Ⓑ connected between the venturi tube and the gas valve.



7. Remove four 8 mm hex nuts. Detach the gas valve from flange Ⓒ.
8. Remove and dispose of the LPG orifice Ⓓ (with pin) and the rubberized cork gaskets Ⓔ. Install a new rubberized cork gasket between the gas valve and flange Ⓒ.

   Note: No separate orifice is necessary for Natural Gas.
9. Secure gas valve, to the flange of the mixing system Ⓒ. Torque nuts diagonally with 17.7 lb/in (2.0 Nm).
10. Secure and tighten gas supply fitting Ⓐ.
11. Reconnect the compensation tubing Ⓑ (connected between the venturi tube and the gas valve).
12. Apply:
    - Partial rating plate above CSA rating plate located on top panel (behind the boiler control).
    - Label Ⓕ indicating that this unit is equipped for LPG over the NG label located on the gas valve.
    - Label indicating that this unit has been converted from NG to LPG next to the CSA rating plate (on the top panel).
    - Fill out and fax conversion report.
13. Check all gas fittings for leaks.

⚠ WARNING

Escaping gas leads to a risk of explosion.
Check all fittings for gas leaks.

Note: The use of leak detecting spray can result in incorrect functions. Leak detecting spray must not come into contact with electrical components.

Note: For commissioning, see page 9. Switch the burner to maximum heating output. For this, activate the emissions test switch at the boiler control unit.

Steps – Commissioning, Inspection and Maintenance *(continued)*

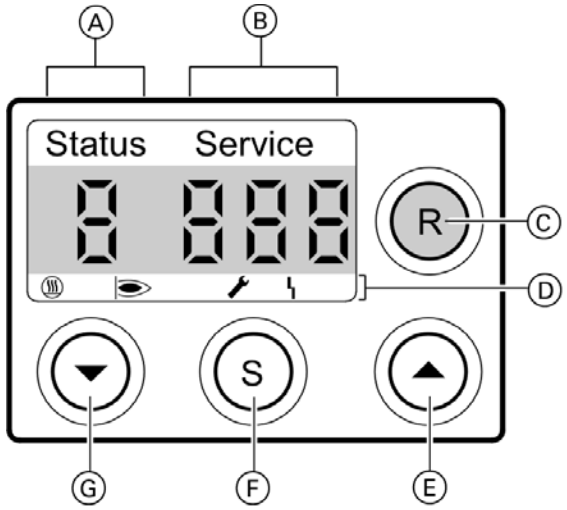
Converting gas type on burner control unit

To implement the changes the burner has to be in stand-by, Status "0", Service "0".

1. Press button **S** Ⓕ, hold for more than 2 seconds and the "🔧" in the display area Ⓓ will flash.
2. Press button ▲ Ⓔ until "6" appears in the Service display Ⓑ.
3. Press button **S** Ⓕ, until "6" appears in the Status display Ⓐ.
4. Press button ▲ Ⓔ until "2" appears in the Service display Ⓑ.
5. Press button **S** Ⓕ until "2" appears under Status Ⓐ.
6. The current of gas will be displayed under Service window (0 = NG, or 1 = LPG).
7. Press buttons ▲ Ⓔ or ▼ Ⓖ to set "0" for NG and "1" for LPG.
8. Press button **S** Ⓕ to confirm. Upon successful completion "1" will be displayed under Service for a short time. Repeat procedure if "0" appears.
9. Press button **S** Ⓕ to exit setting mode and return to operating mode.
10. Press button **R** Ⓒ for more than 2 seconds and the system restarts and the settings will be applied.

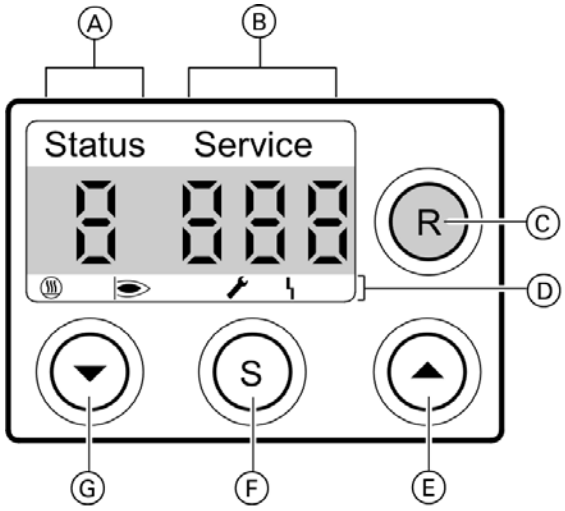
Note: Each time the burner restarts, the setup parameters, max. input, gas type and altitude will show up on the display as in the table below.

Max. Input: "1; 70...100" = Modulation Level %
Gas Type: "2; nG" = Natural Gas or
"2; LPG" = Liquid Propane Gas
Altitude: "3; LA" = Low Altitude
"3; HA" = High Altitude)



Altitude adjustment

To implement the changes the burner has to be in stand-by, Status "0", Service "0".



1. Press button **S** Ⓕ, hold for more than 2 seconds and the "🔧" in the display area Ⓓ will flash.
2. Press button ▲ Ⓔ until "6" appears in the Service display Ⓑ.
3. Press button **S** Ⓕ, until "6" appears in the Status display Ⓐ.
4. Press button ▲ Ⓔ until "3" appears in the Service display Ⓑ.
5. Press button **S** Ⓕ until "3" appears in the Status display Ⓐ.
6. The current altitude will be displayed under Service display Ⓑ (0 = Low Altitude, or 1 = High Altitude).
7. Press buttons ▲ Ⓔ or ▼ Ⓖ until "1" appears for "High Altitude". "1" will be displayed under Service for a short time.
8. Press button **S** Ⓕ to confirm. Set again to "1" if "0" appears.
9. Press button **S** Ⓕ to exit setting mode and return to operating mode.
10. Press button **R** Ⓒ for more than 2 seconds and the system restarts and the settings will be applied.
11. Fill out and apply "Altitude Conversion" label next to Rating Plate.
12. Fill out and fax conversion report.

Note: Each time the burner restarts, the setup parameters, max. input, gas type and altitude will show up on the display as in the table below.

Max. Input: "1; 70...100" = Modulation Level %
Gas Type: "2; nG" = Natural Gas or
"2; LPG" = Liquid Propane Gas
Altitude: "3; LA" = Low Altitude
"3; HA" = High Altitude)

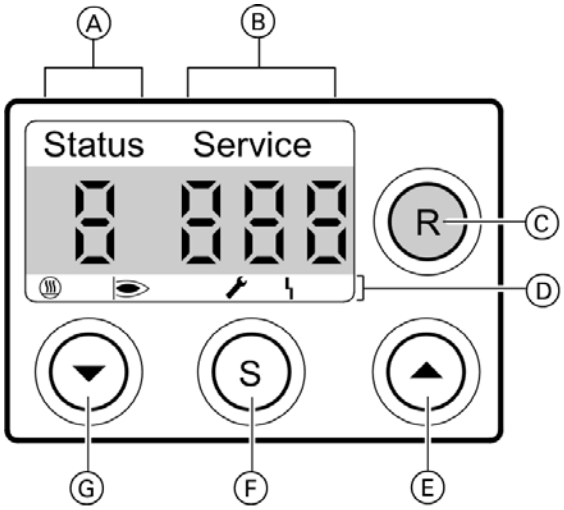
Steps – Commissioning, Inspection and Maintenance *(continued)*

Reducing operational input (if required)

To implement the changes the burner has to be in stand-by, Status "0", Service "0".

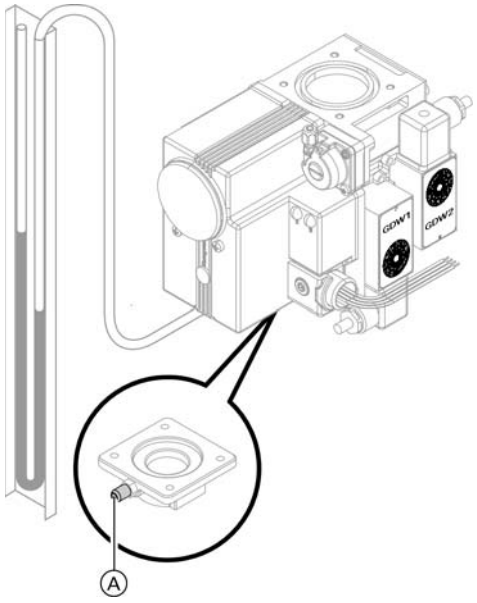
The maximum operational input of the burner can be set to between 0 and 100 % if necessary:
"100" = 100% = upper heating input,
"0" = 0% = lower heating input

1. Press button **S** Ⓕ and hold for longer than 2 seconds and "🔧" in the display area Ⓓ will flash.
2. Press button ▲ Ⓔ until "6" appears in the service display Ⓑ.
3. Press button **S** Ⓕ, until "6" appears in the status display Ⓐ.
4. Press button **S** Ⓕ and "1" will appear in the status display Ⓐ and the current value for the maximum operational input is shown in % in the service display Ⓑ.
5. Press button ▲ Ⓔ or ▼ Ⓖ for the required maximum operational input.
6. Press button **S** Ⓕ to confirm. If applied successfully, "1" will be shown in the service display Ⓑ.
   If the adjustment failed, service display Ⓑ will show "0".
7. Press button **S** Ⓕ to switch to the operating display.
8. Press button **R** Ⓒ for more than 2 seconds and the system restarts and the settings will be applied.



Note: Each time the burner restarts, the setup parameters, max. output, gas type and altitude will show up on the display as in the table below.

Checking the static and the supply pressure



1. Close the gas shut-off valve.
2. Undo the screw inside test nipple Ⓐ. Do Not Remove.
3. Connect the pressure tester at test nipple Ⓐ.
4. Open the gas shut-off valve.
5. Check the static pressure (max. 14"w.c.).
6. Record the actual value in the report (on page 53).

IMPORTANT

A CO measurement (see page 15) must be taken before and after working on gas appliances to eliminate risks to health and to guarantee the satisfactory condition of the system.

IMPORTANT

The burner is automatically ignited and starts operation after a safety time has elapsed.
During initial start-up, the unit may indicate a fault because of air in the gas supply pipe (especially for liquid propane gas). After approximately 5 seconds, press the reset button R Ⓒ to reset the burner. The ignition procedure is repeated. This boiler employs a direct spark ignition system.

⚠ WARNING

Never purge a gas line into a combustion chamber. Never use matches, candles, flame, or other sources of ignition for purpose of checking leakage. Use a soap-and-water solution to check for leakage. Failure to follow this warning could result in fire, explosion, personal injury, or death.

⚠ WARNING

Ensure that there is no open flame in the room.

Steps – Commissioning, Inspection and Maintenance *(continued)*

Supply pressure for NG and LPG.

1. Start the burner

Note: For commissioning, see page 9. Switch the burner to maximum heating output. For this, activate the emissions test switch at the boiler control unit.

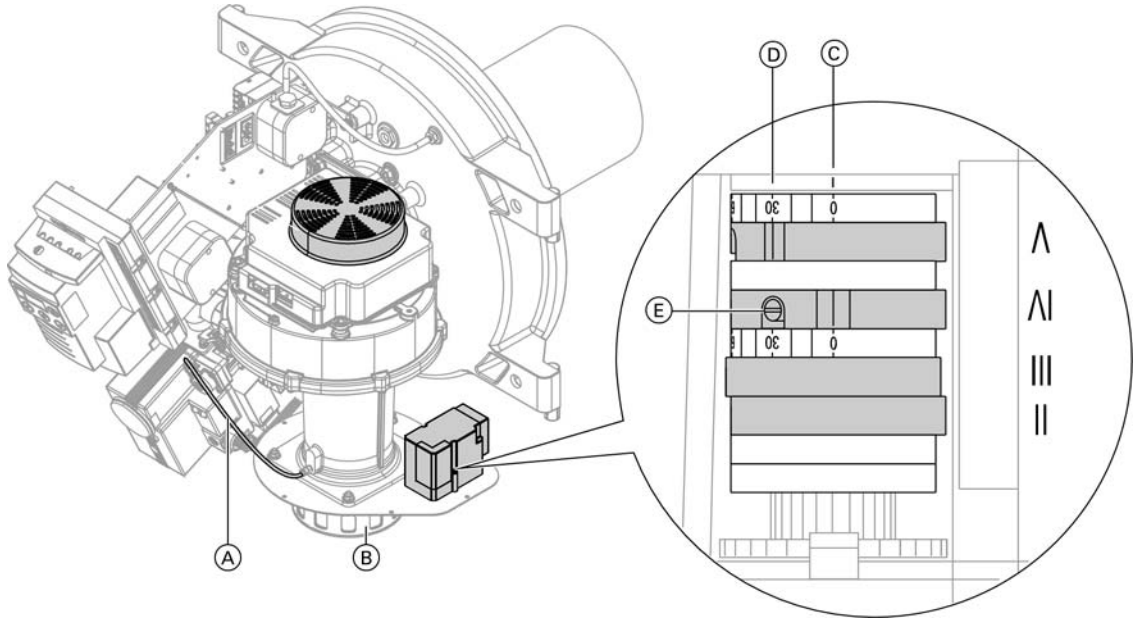
2. Measure the supply pressure (running pressure). Use suitable measuring instruments calibrated with a minimum resolution of 0.04 "w.c. for measuring the supply pressure.
   Value must be:

Note: The supply pressure should be between 4"w.c. and 14"w.c. The gas pressure switch for the inlet pressure test/check is factory set to 4"w.c. Never alter this setting.

3. Record the actual value in the report (on page 53).
4. Close the gas shut-off valve.
5. Remove the pressure tester and close test nipple Ⓐ (shown on page 13).

Supply pressure with:		Corrective action
Natural gas	Liquid propane gas	
under 4"w.c.	under 10"w.c.	Do not attempt adjustment. Call local gas utility
4 to 14"w.c.	10 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.

Checking the Rotary Damper Setting (CM2 246/311 only)



The electro-mechanical inlet air damper reduces the amount of air during ignition timing, for a smoother ignition of the burner.

1. Open the gas shut-off valve.
2. Check the position of the rotary damper in burner idle mode. The rotary damper windows Ⓑ must be completely open and the graduated collar Ⓓ on the air damper motor must be set to "0" relative to mark Ⓒ.
3. Check whether compensation tubing Ⓐ has been connected between the gas valve and venturi mixing pipe.
4. Start the burner.
5. Check the position of the rotary damper during the start-up phase. The rotary damper windows Ⓑ must be almost closed for approximately 5 seconds, during which time the graduated collar Ⓓ is set as follows:

Boiler Models	Rotary damper setting in °
246	35 (close) / 0 (open)
311	35 (close) / 0 (open)

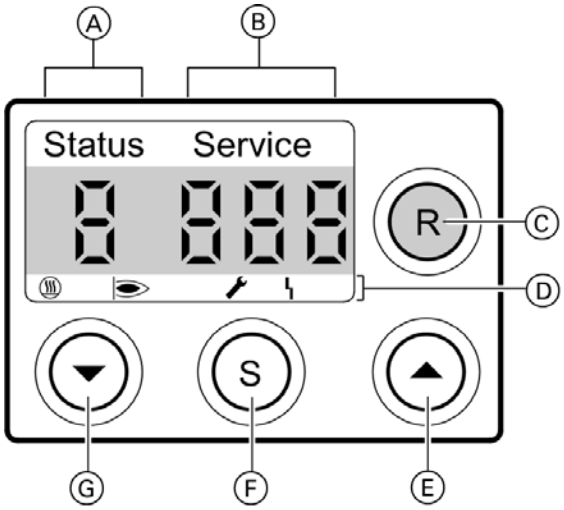
Steps – Commissioning, Inspection and Maintenance *(continued)*

Checking the CO_2 level

Preparing the test

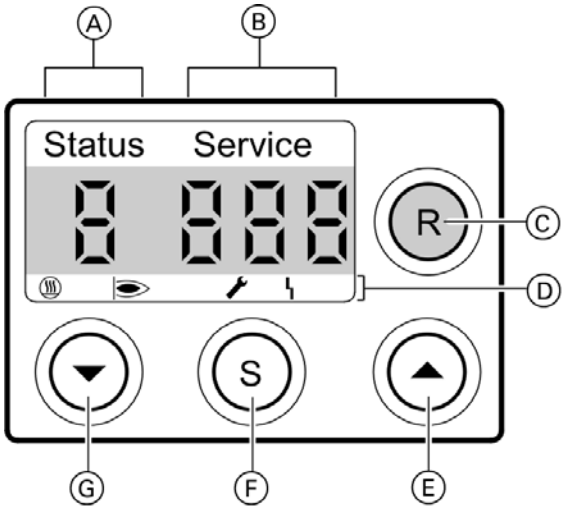
1. Open the gas shut-off valve.
2. Start the burner with the emissions test switch enabled at the boiler control unit.
3. At the same time, press button **S** Ⓕ and button ▼ Ⓖ and hold for longer than 2 seconds.

   The display will then show the following:
   - Under Status Ⓐ: "P" (= relay test)
   - Under Service Ⓑ: Modulation level in %
     "100" = 100% = upper heating input,
     "0" = 0% = lower heating input



CO_2 Test at the upper heating input

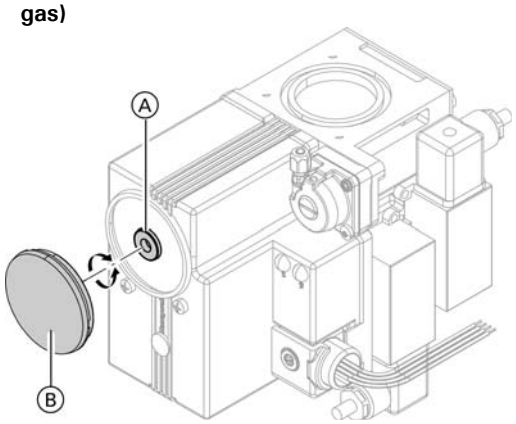
1. Press button ▲ Ⓔ until the service display Ⓑ has incremented to "100"(= 100%).



2. Check the CO_2 level at the flue pipe.

Boiler Model	Permissible CO_2 content in % @ Hi-Fire	
	NG	LPG
186	8.5 - 9.5	10.0 - 11.0
246	8.5 - 9.5	10.0 - 11.0
311	8.5 - 9.5	10.0 - 11.0

3. If the CO_2 level must be adjusted:
   - Remove cap Ⓑ.
   - Turn adjusting screw Ⓐ in small increments (3 mm Allen key) until the CO_2 level falls within the specified range:
     - Turning clockwise → CO_2 level **falls (less gas)**
     - Turning counter-clockwise → CO_2 level **rises (more gas)**



4. Record the actual value in the report (on page 53).

Steps – Commissioning, Inspection and Maintenance *(continued)*

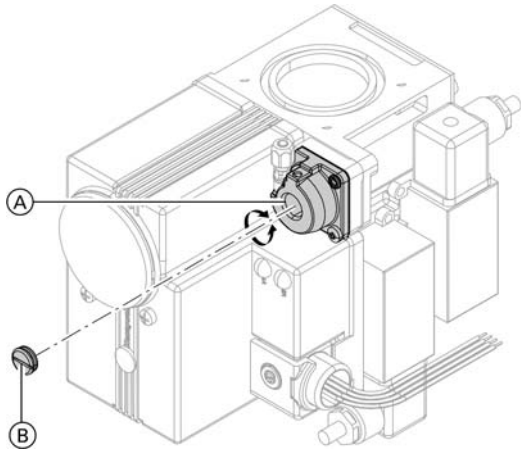
CO_2 Test at the lower heating output

1. Press button ▼ Ⓖ until the service display Ⓑ has counted down to "0" (lower heating output).
2. Check the CO_2 level at the flue pipe.

Boiler Model	Permissible CO_2 content in % @ Low-Fire	
	NG	LPG
186	8.0 - 9.0	9.5 - 10.5
246	8.0 - 9.0	9.5 - 10.5
311	8.0 - 9.0	9.5 - 10.5

Note: The CO_2 content must always be lower in partial load than it is in full load.

3. If the CO_2 content must be adjusted:
   - Remove cover Ⓑ (see illustration below)
   - Turn adjusting screw Ⓐ (see illustration below) in small increments (Torx 40) until the CO_2 content falls within the specified range:
     - Turning clockwise → CO_2 content increases (more gas)
     - Turning counter-clockwise → CO_2 content falls (less gas)



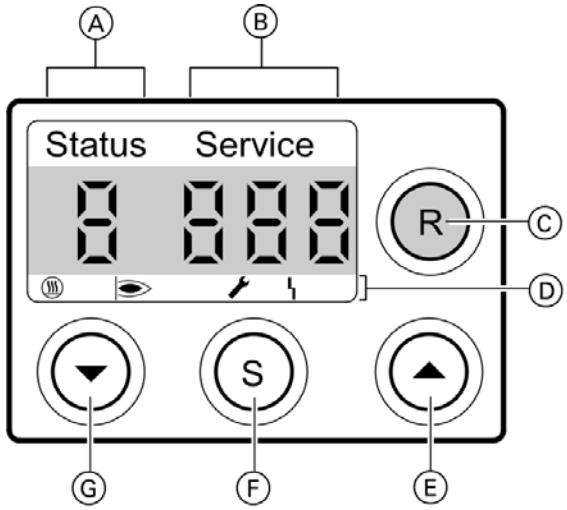
4. Record the actual value in the report (on page 53).

Rechecking the values:

Regulate again to the upper and lower heating output using the burner programming unit. If the values do not match the permissible CO_2 content according to the table, repeat the steps for the upper and lower heating output.

5. On the burner control press **S** Ⓕ and ▼ Ⓖ simultaneously for more than 2 seconds. The burner will change to the operating mode.

Displaying the ionization current



Note: The ionization current must be called up via the burner control unit. It is not possible to measure the ionization current using a multimeter.

1. Press button **S** Ⓕ, hold for more than 2 seconds and the " 🔧 " in the display area Ⓓ will flash.
2. Press button ▲Ⓔ until "5" appears in the service display Ⓑ.
3. Press button **S** Ⓕ and "5" will appear in the status display Ⓐ.
4. Press button ▲Ⓔ until ".3" appears in the service display Ⓑ.
5. Press button **S** Ⓕ and "3"will appear in the status display Ⓐ (during operation the ionization current is displayed under service display Ⓑ (e.g. 30 = 3.0 μA).
6. Start the burner with the emissions test switch at the boiler control unit.
7. Read the ionization current.

   Note: The ionization current should be at least 3 μA for approximately 2 to 3 seconds after the gas valve has been opened and during operation.

8. Record the actual value in the report (on page 53).
9. Press button **S** Ⓕ, hold for more than 2 seconds and the " 🔧 " in the display area Ⓓ will flash.
10. Press button ▲Ⓔ until "5" appears in the service display Ⓑ.
11. Press button **S** Ⓕ and "5" will appear in the status display Ⓐ.
12. Press button ▲Ⓔ until "0" appears in the service display Ⓑ.
13. Press button **S** Ⓕ to switch to the operating display.

Steps – Commissioning, Inspection and Maintenance *(continued)*

Shutting down the system

1. Switch OFF the main circuit breaker or the power supply and safeguard against unauthorized reconnection.

⚠ WARNING

Mains voltage can be extremely dangerous.
For maintenance work, isolate the system from the power supply.

2. Remove the boiler front cover.
3. Release burner cables with plug [41] and [90] from the burner control unit and route them out of the burner casing.
4. Close the gas shut-off valve.

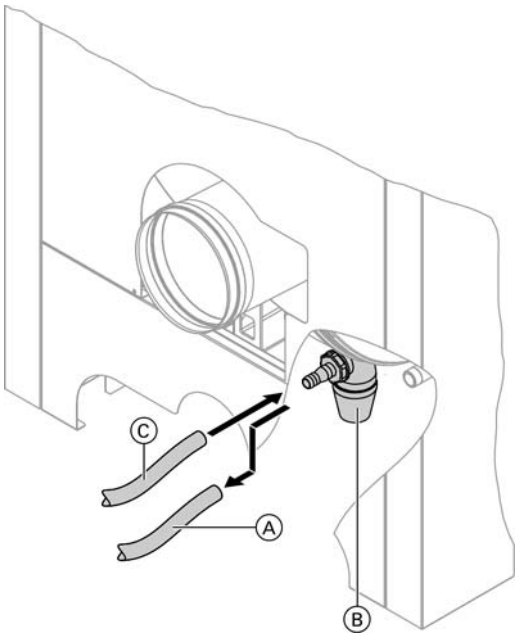
Opening the boiler door

1. Remove the gas supply pipe.
2. Undo the four screws on the boiler door and open the door.

Note: Scratches inside the combustion chamber can lead to corrosion. Never put tools or other objects into the combustion chamber.

Separating the neutralizing system (if installed) from the boiler and connecting the drain hose

1. Separate hose Ⓐ to the neutralizing system from siphon Ⓑ.
2. Connect drain or cleaning hose Ⓒ to the siphon and run it to the drain.



Cleaning the combustion chamber and heating surfaces

Thoroughly clean the combustion chamber and heating surfaces with a water jet.

Note: Scratches on parts that are in contact with flue gas can lead to corrosion. Only use plastic brushes, not wire brushes nor sharp objects.

For normal cleaning, flush the heating surfaces thoroughly with a water jet. You may use cleaning agents if you notice stubborn residues, surface discoloration or soot deposits. For this, observe the following:

- Only use solvent-free cleaning agents. Ensure that no cleaning agent gets between the boiler body and the thermal insulation.

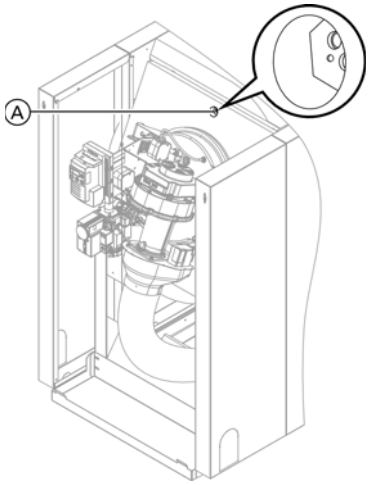
  Note: The cleaning agent must not contain hydrocarbon-based solvents or potassium. Follow the cleaning agents instructions.
- Remove deposits of combustion by-products with alkaline agents containing tenside.
- Remove coatings and surface discoloration (yellowish brown) with phosphoric acid-based Antox 75 E Plus or citric acid-based CitiSurf 3050 (by Stellar Solutions Inc.)
- Rinse thoroughly with water.

Checking gaskets and thermal insulation parts

1. Check gaskets and the sealing rope in the boiler door for damage.
2. Check the thermal insulation components of the boiler door for possible damage.
3. Replace any damaged parts.

Checking all connections for leaks

1. Check all connections on the heating water side and sensor well Ⓐ for leaks.

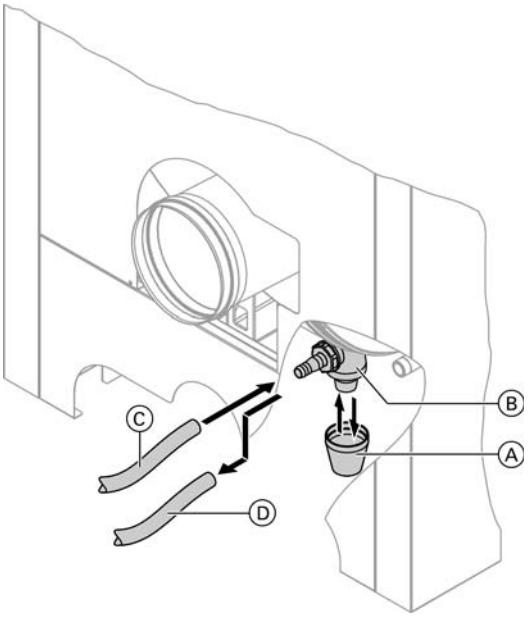


Note: Also check the connections to control equipment and to the minimum pressure switch (low water indicator) for leaks.

Steps – Commissioning, Inspection and Maintenance *(continued)*

Cleaning and reconnecting the condensate drain system

Note: Clean the inside of the condensate drain system at least annually.



1. Pull drain or cleaning hose Ⓒ off.
2. Clean the inside of the condensate drain system (hose, pipe).
3. Clean the neutralizing system (if installed) in accordance with the manufacturer's instructions.

See Neutralization System Operating Instructions.

Note: You can obtain the neutralizing granulate from Viessmann.

4. Release and flush lower part Ⓐ of siphon Ⓑ.
5. Fill lower part Ⓐ of siphon Ⓑ with water and reassemble.
6. Install hose Ⓓ of the neutralizing system to the siphon.

Checking the condensate drain and the neutralizing system (if installed)

Add water to the combustion chamber.

Note: The water must flow from the condensate drain without back pressure.

If necessary, clean the condensate drain again.

IMPORTANT

If the condensate does not drain freely, the condensate will accumulate in the bottom part of the boiler, resulting in burner shut-down (fault message).

Check neutralization unit (if installed)

1. Check the pH value of the condensate with a pH measuring strip (field supplied). If the pH value is less than 6.5, replace granulate.
2. If contaminated - rinse the neutralization unit with tap water.
3. Add granulate as marked.

IMPORTANT

The granulate is consumed as it neutrralizes the condensate. The red marking indicates the minimum filling level.

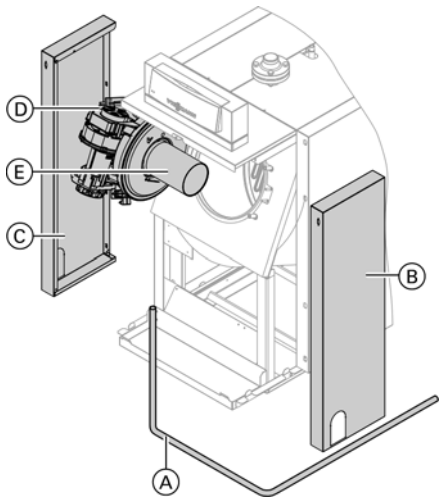
See Neutralization Unit "Installation Instructions".

Checking the cylinder burner assembly

⚠ WARNING

Escaping gas leads to a risk of explosion.
Close the gas shut-off valve.

1. Undo fitting on the gas supply pipe.
2. Undo the screws on the boiler door and open the door.
3. Remove side panels Ⓑ and Ⓒ.
4. Check the wire mesh of the cylinder burner assembly Ⓔ for damage.
4. Replace cylinder burner assembly Ⓔ if required.



See Replacement Instructions for burner.

Note: For maintenance purposes, route the gas supply pipe Ⓐ on the opposite side of the burner Ⓓ door hinges.

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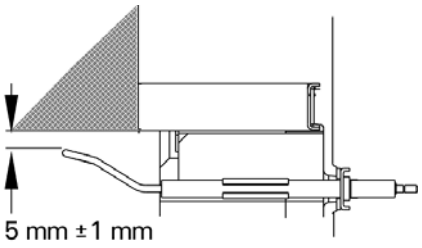
Steps – Commissioning, Inspection and Maintenance *(continued)*

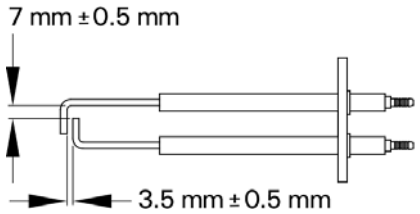
Checking the ignition and ionization electrodes

Check the ignition electrodes and the ionization electrode for correct gap towards the cylinder burner assembly and damage (replace if required).

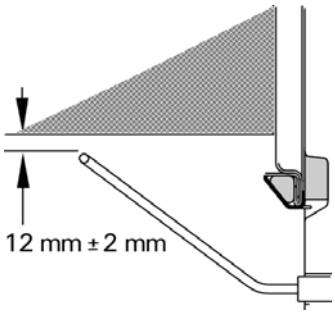
See burner component Installation Instructions.

Ignition electrodes





Ionization electrode



Closing the boiler door

Note: Tighten the boiler door screws evenly across with a torque of approximately 13 lb/ft (18 Nm).

Cleaning the burner

1. Loosen the retaining clamp and disconnect the combustion air flex hose Ⓐ.
2. Visually inspect the combustion air hose Ⓐ and venturi mixing pipe Ⓑ.
3. If cleaning is required remove the venturi Ⓑ (refer to page 35 for burner fan removal procedures) and clean the venturi pipe, fan casing and impeller with low pressure compressed air.

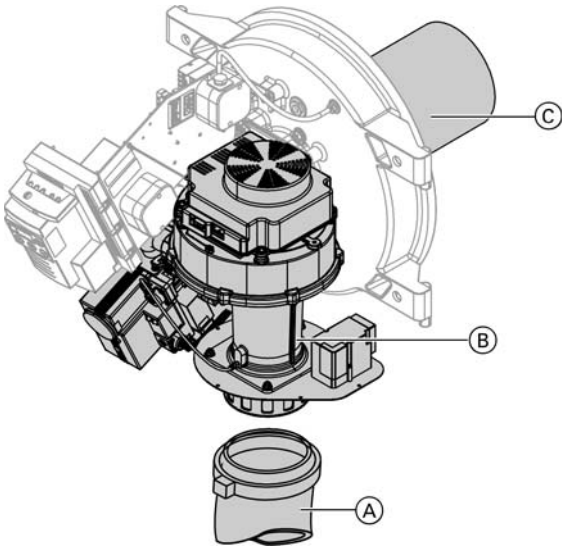
CAUTION

Working with compressed air may lead to serious injury.
Never direct the air jet at yourself or others.
Always wear appropriate personal protective equipment and clothing.

4. To clean the burner, vacuum the inside and outside of the burner tube Ⓒ (refer to page 35 for burner tube removal procedures).

IMPORTANT

Use a soft upholstery brush when cleaning the outside of the burner tube to prevent damage.



Steps – Commissioning, Inspection and Maintenance

Checking all gas connections for leaks

WARNING

Escaping gas leads to a risk of explosion. Always carry out the following steps.

Note: The use of leak detecting spray can result in incorrect functions. Leak detecting spray must not come into contact with electrical components.

1. Insert new gaskets in all gas fittings that have been opened and then tighten those fittings.
2. Open the gas shut-off valve.
3. Check the inlet seals of the gas valve for tightness.
4. Start the burner.
5. Check the outlet seals of the gas valve and fittings between the fan and the boiler door and between the fan and the venturi pipe for tightness.

Checking the Flue Side Gaskets/Seals and Flue Gas Temperature Switch

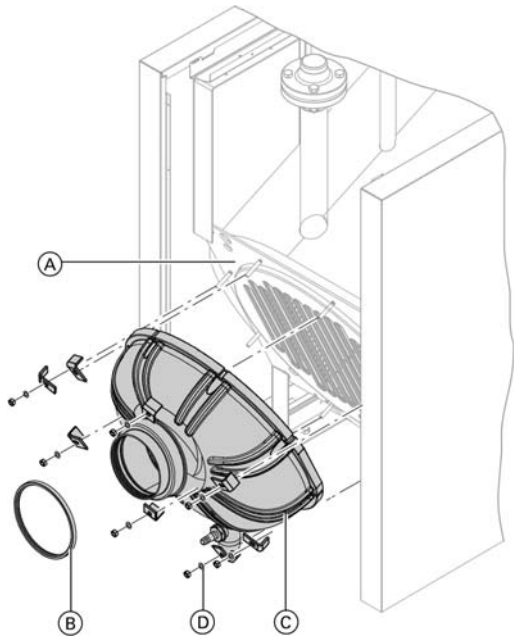
Flue side gaskets/seals

1. Remove the rear panels from the boiler and disconnect the venting system from the flue gas collector.

Refer to the Installation Instructions for details.

2. Check the lip seal Ⓑ and replace, if required.
3. Check that the flue gas collector Ⓒ is tight to the boiler Ⓐ. If required, retighten the flue gas collector mounting fasteners Ⓓ.

Note: The seals/gaskets can also be checked under full load with an inspection mirror. If required, remove the thermal insulation components. Traces of condensate on the outside of flue gas collector Ⓒ also point towards a leak.



Flue temperature switch

Boilers with a polypropylene flue gas collector are supplied with a flue gas temperature switch, which must be installed.

Boilers with a stainless steel flue gas collector do not have provisions for a sensor well but may connect an optional flue gas temperature switch in the venting system. Contact your venting supplier.

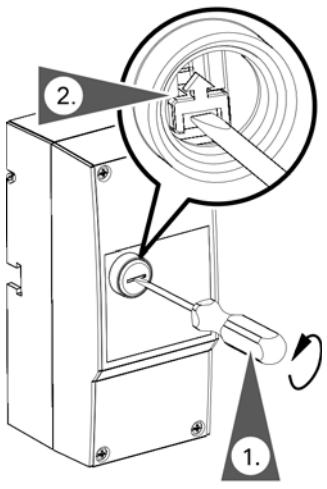
This temperature switch is factory set to 212°F (100°C). Do Not Adjust. During the operation of the boiler, should the switch become activated (open as a safety cut-out), check the boiler control for a C1 fault on the display. Also check the flue gas collector and/or vent system for any damage.

The temperature switch can be reset once the temperature drops approximately 20°F (10°C) from the factory set point.

To reset the switch;

1. Unscrew the reset cap and set aside.
2. Push the reset switch up.
3. Reinstall the reset cap.

Note: If the switch cannot be reset, replace the switch.



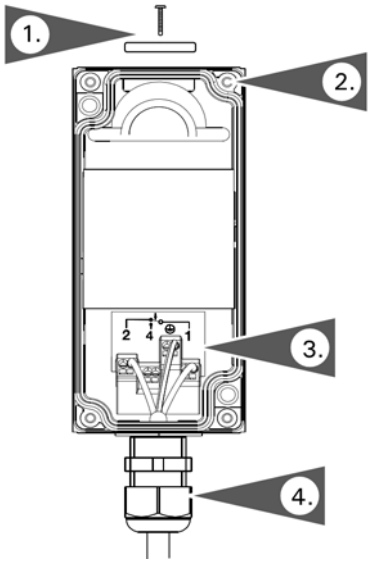
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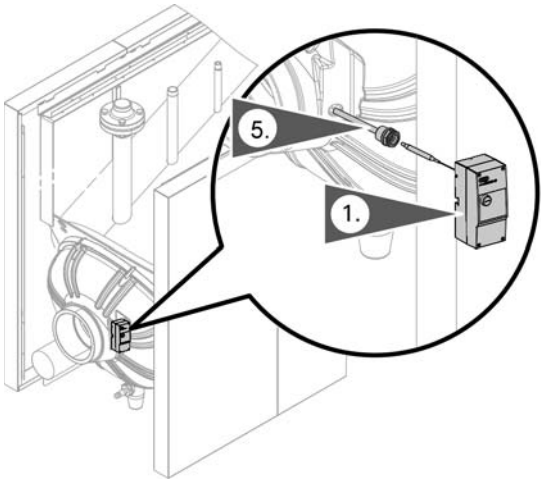
Replacing the Flue Gas Temperature Sensor

1. Remove the retaining screw and support bar from the top of the switch. Remove switch from flue gas collector sensor well.
2. Remove the four switch cover screws and cover.
3. Disconnect the wiring from the switch terminals.
4. Disconnect the switch box cable connector.
5. Remove sensor well from the flue gas collector.
6. Install new sensor well and torque to 44 lb/in (5 Nm).
7. Install new flue gas temperature switch.

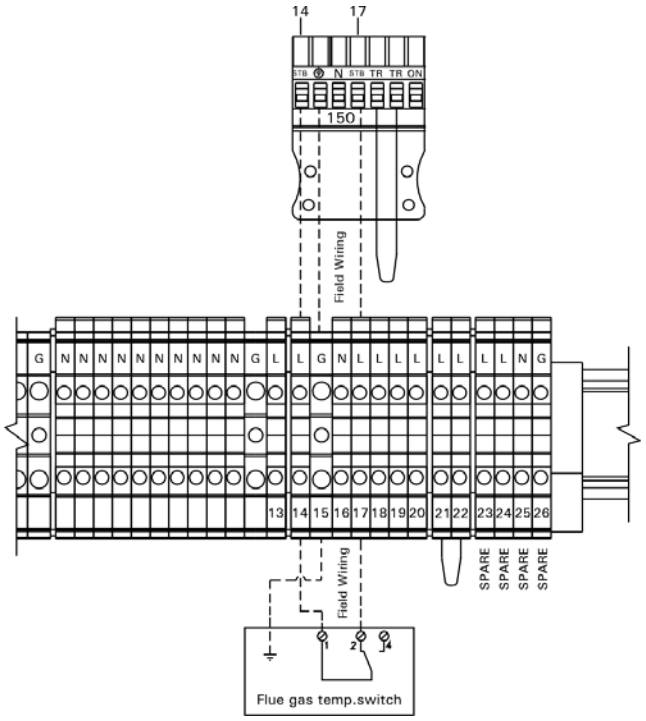
IMPORTANT

Careful not to damage the temperature probe or capillary during installation.





Boiler electrical junction box flue gas temperature switch connections



Refer to the Vitotronic Installation and Service Instructions for details.

Checking the Diaphragm Expansion Vessel and System Pressure

Check proper expansion tank and system pressures



See expansion tank manufacturer's instructions.

IMPORTANT

The diaphragm expansion tank must be able to hold the heating water expansion volume inside the boiler, and must be properly sized for the system.

CAUTION

Damage on boiler or other system components may result if these recommendations are not followed.

CAUTION

Carry out all check in accordance with the expansion tank manufacturer's instructions. Limit pressure fluctuations to the lowest possible differential. Cyclical pressure fluctuations and greater pressure differentials indicate a system fault. Immediately remedy such faults, otherwise other heating system components may become faulty.

This diaphragm expansion vessel reduces the frequency and severity of pressure fluctuations; the service life of the circulating pump is improved and therefore the operational reliability and service life of system components increased.

IMPORTANT

Carry out this test on a cold system.

1. Drain system or close cap valve on the diaphragm expansion tank and reduce the pressure until the pressure gage indicates "0".
2. 60°F (15.5°C) water fill pressure must equal diaphragm expansion tank pressure.

Water Quality

The lifetime of the entire heating system is influenced by the water quality. A water treatment system will protect against damages caused by corrosion and lime formation.

Hard water conditions (i.e. calcium carbonate) must be avoided as it will cause deposits to accumulate on the heat exchanger surfaces.

If in any doubt about the water quality, please have a proper water analysis done. Check with regional chemical suppliers for boiler water treatment or with Viessmann Manufacturing Company Inc. directly.

Total output (MBH)	Total Hardness (ppm as $CaCO_3$)
> 1 Total ≤ 680	≤ 200
> 680 to ≤ 2050	≤ 150

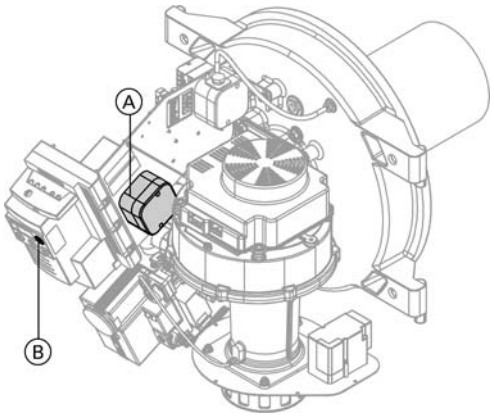
The pH value of the heating water should be between 8.2 and 9.5

5607 706 - 04

Further Details Regarding the Individual Steps

Fan pressure monitoring function (air pressure switch 1)

The switching threshold of air pressure switch 1 is monitored in all fan ramp-up phases and checked in modulating burner operation. This minimizes pre-purge.



Air pressure switch Ⓐ triggers a fault shutdown of the burner control unit under the following circumstances:

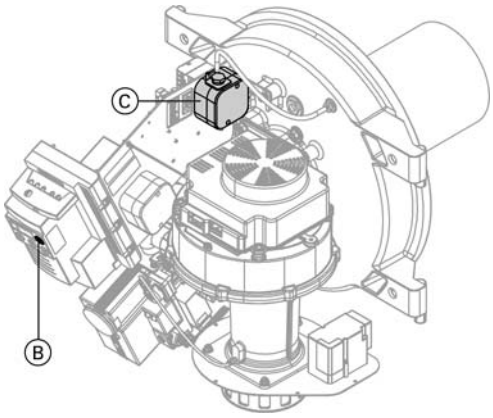
- If the idle state check is not successful after approximately 5 minutes.
- If, during the pre-purge phase, the air pressure is outside the permissible range (tolerance time approximately 5 minutes).
- If, during operation, the air pressure switch fails or the air pressure is outside the permissible range.

The fault shutdown is shown with fault display “F F5“ and “F F7“ on the burner control unit (see page 48) and can be rectified by pressing reset button **R** Ⓑ.

Boiler model	Air Pressure Switch 1 Adjustment Value in mbar
186	1 ↓
246	
311	

Note: The air pressure switch is a normally open contact that closes when pressure rises above its setpoint. Once the contact closes it will trigger a safety shutdown of the burner.

Combustion chamber pressure monitoring (air pressure switch 2)



To monitor the combustion chamber pressure, the switching threshold of air pressure switch 2 is monitored in all operating phases (except safety and stabilizing times).

Air pressure switch Ⓒ triggers a fault shutdown of the burner control unit under the following circumstances:

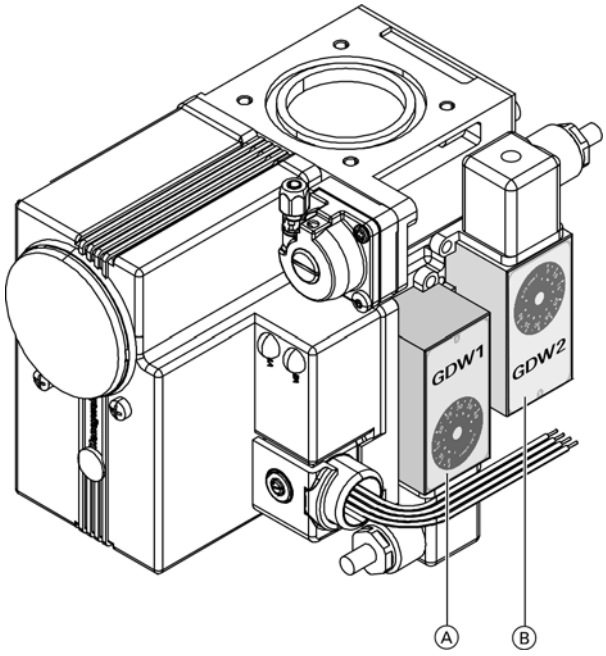
- If the combustion chamber pressure is outside the permissible range in the pre-purge phase, in control mode or in the post-purge phase after 2 attempts. The fault shutdown is shown with fault display “F Fb“ on the burner control unit (see page 49) and can be rectified by pressing reset button **R** Ⓑ.

Boiler model	Air Pressure Switch 2 Adjustment Value in mbar
186	5 ↑
246	
311	

Air pressure switch setting example shown



Further Details Regarding the Individual Steps *(continued)*



Legend

Ⓐ GDW1 - gas inlet pressure monitoring switch
Ⓑ GDW2 - valve seat gas pressure monitoring switch

Gas inlet pressure monitoring switch - GDW1

The factory default setting for the gas inlet pressure switch is 10 mbar (4" w.c.). This is the minimum gas pressure required for the burner to operate with natural gas fuel.

For liquid propane gas the switch can be left at factory default setting of 10 mbar (4" w.c.) or increased to 22.4 mbar (9" w.c.). This setting can be changed by removing the GDW1 cover and manually setting the dial.

The inlet gas switch GDW1 will trigger a stand still (waiting) state of the burner control unit when the gas pressure drops below the setpoint. The burner will retry after 5 minutes if the gas pressure returns to the setpoint threshold.

Valve seat gas pressure monitoring switch - GDW2
(outlet pressure at first valve seat)

The factory default setting for valve seat gas pressure switch is 10 mbar (4" w.c.).

The switch will trigger an E1 (pressure) or E2 (open circuit during control self diagnostics) faults on the burner control, if activated.

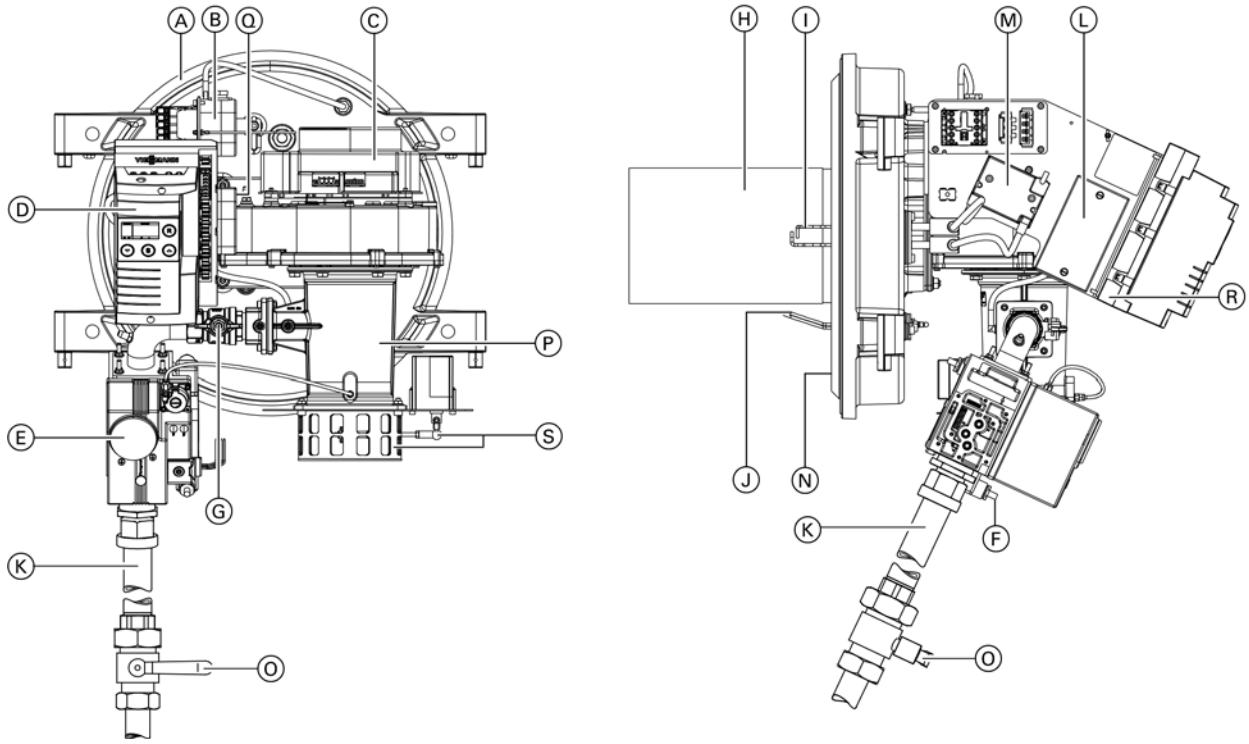
IMPORTANT

Do not adjust this switch.

5607 706 - 04

Burner Component Overview

CM2 pre-mix cylinder burner 186/246/311

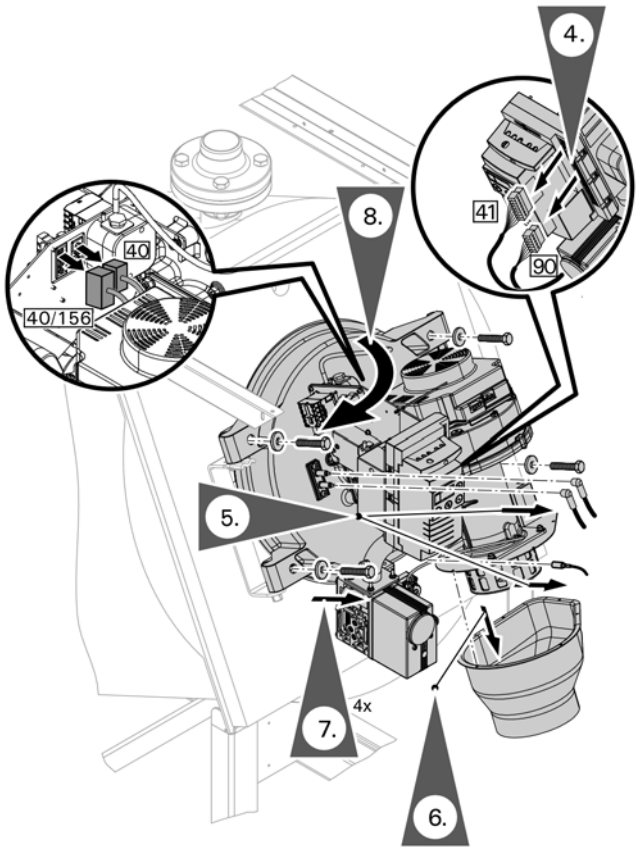


Legend

Ⓐ Boiler door
Ⓑ Air pressure switch 1
Ⓒ Fan
Ⓓ Burner display and programming unit
Ⓔ Gas valve with gas pressure switch
Ⓕ Gas supply pipe
Ⓖ Burner test firing valve
Ⓗ Cylinder burner assembly
Ⓘ Ignition electrodes
Ⓙ Ionization electrode
Ⓚ Gas pipe
Ⓛ AC-EMI suppression filter device
Ⓜ Ignition unit
Ⓝ Thermal insulation block
Ⓞ Manual shut-off valve
Ⓟ Venturi mixing pipe
Ⓠ Air pressure switch 2
Ⓡ Burner control sub-base
Ⓢ Servomotor and burner inlet damper (for models 246 / 311)

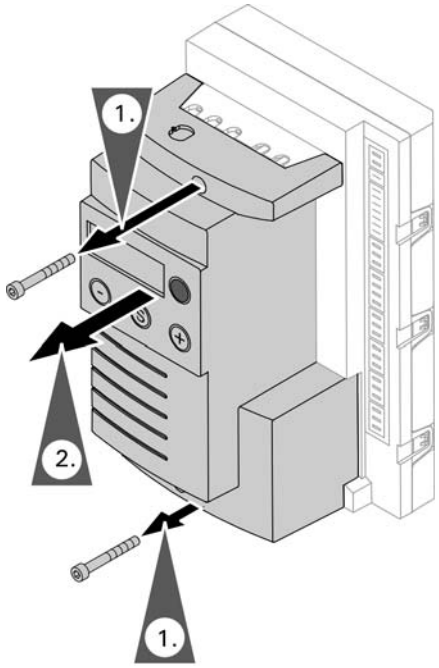
Note: Solenoid valve (choke valve) for CM2 model 186 (not shown).

Accessing the Boiler



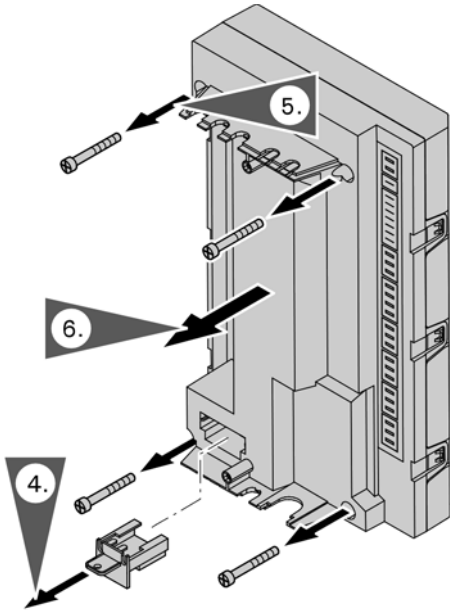
1. Close main gas supply valve.
2. Switch off main power switch. Ensure that main power to equipment being serviced is off.
3. Remove front panel and front side panels. Refer to the boiler Installation Instructions.
4. Remove plugs 41 and 90 from the burner control and plug 40/156 and 40 from the burner bracket.
5. Remove plugs from electrodes.
6. Remove air intake adaptor and air flex hose.
7. Open the gas connection to the burner.
8. Loosen four M12 screws and open burner door.

Burner Control



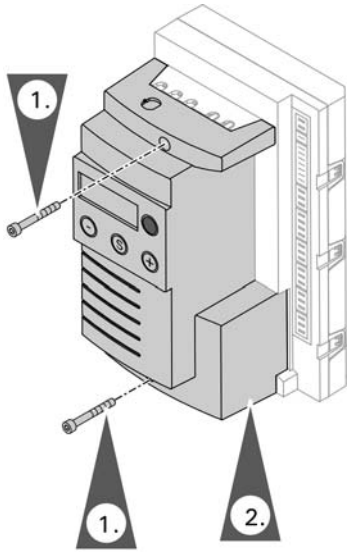
1. Loosen the two programming unit screws.
2. Lift and remove the programming unit from the burner control sub-base and disconnect the cable connection and set aside.
3. Disconnect all cable connections from the burner control sub-base.

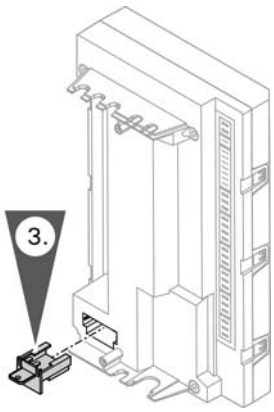
Burner Control *(continued)*



4. Remove coding card from burner control sub-base and set aside.
   Note: Ensure there is no power to the burner control when replacing the coding card.
5. Loosen the four screws from the burner control sub-base.
6. Remove burner control sub-base.
7. Reinstall in reverse order.

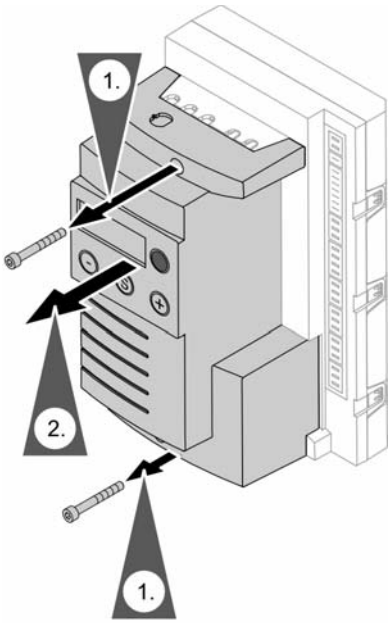
Burner Control Coding Card





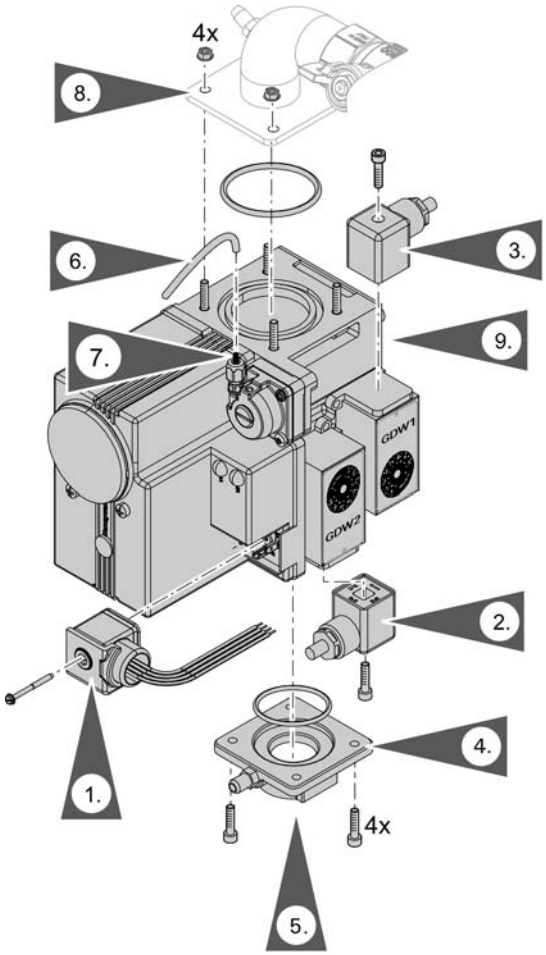
1. Loosen the two programming unit screws.
2. Lift the programming unit off the burner control sub-base and disconnect the cable plug and set aside.
3. Remove the coding card from burner control sub-base and replace.
   Note: Ensure there is no power to the burner control when replacing the coding card.
   Note: If error code “F b7”appears check the coding card that it matches the burner control.
4. Reinstall in reverse order.

Burner Control Programming Unit



1. Loosen the two programming unit screws.
2. Lift the programming unit off the burner control sub-base and disconnect the cable plug and replace.
3. Reinstall in reverse order.

Gas Valve (for NG)



1. Remove the screw and disconnect the electrical plug (black) from the gas valve.
2. Remove the screw and disconnect the electrical plug (white marked GDW2) from the gas pressure switch.
3. Remove the screw and disconnect the electrical plug (white) from the gas pressure switch.
4. Remove the four M5 (4 mm hex key) screws from the lower gas valve flange and set aside.
5. Disconnect gas supply line.
6. Disconnect compensation tubing from gas valve.
7. Remove tube support from gas valve and set aside.
8. Remove four M5 (8 mm hex) nuts from the gas manifold and set aside.
   Note: Clean surface area of manifold and replace O-ring.
9. Replace gas valve.
   Note: Install M5 studs to the gas valve to reconnect the manifold and torque to 17 lb/in (2 Nm).
10. Reinstall in reverse order.
    Note: Torque the M5 (4 mm hex) screws to 132 lb/in (15 Nm).
    Note: Torque the M5 (8 mm hex) nuts to 17 lb/in (2 Nm).

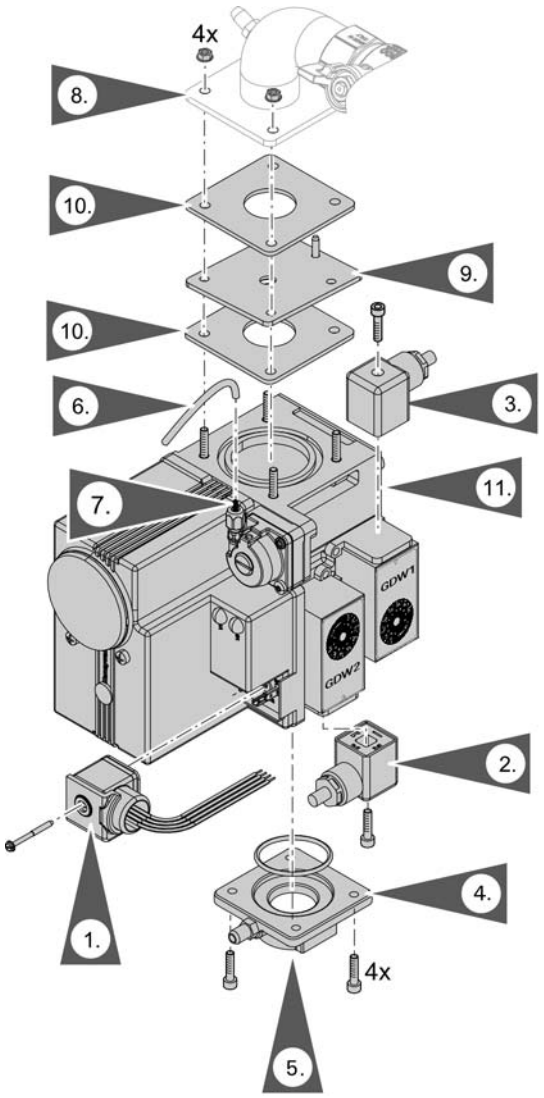
⚠ WARNING

Gas leakage may lead to explosion. Leak test the reconnected gas line and gas valve connections.

⚠ CAUTION

Usage of leak detection spray may lead to malfunction. Avoid contact between leak detection spray and electric contacts.

Gas Valve (for LPG)



1. Remove the screw and disconnect the electrical plug (black) from the gas valve.
2. Remove the screw and disconnect the electrical plug (white marked GDW2) from the gas pressure switch.
3. Remove the screw and disconnect the electrical plug (white) from the gas pressure switch.
4. Remove the four M5 (4 mm hex key) screws from the lower gas valve flange and set aside.
5. Disconnect gas supply line.
6. Disconnect compensation tubing from gas valve.
7. Remove tube support from gas valve and set aside.
8. Remove four M5 (8 mm hex) nuts from the gas manifold and set aside.
9. Remove LPG orifice and set aside.
10. Remove both LPG gaskets and replace.
    Note: Clean surface area of manifold and replace gasket.
11. Replace gas valve.
    Note: Install M5 studs to gas valve to reconnect the manifold and torque to 17 lb/in (2 Nm).
12. Reinstall in reverse order.

    Note: Torque the M5 (4 mm hex) screws to 132 lb/in (15 Nm).

    Note: Torque the M5 (8 mm hex) nuts to 17 lb/in (2 Nm).

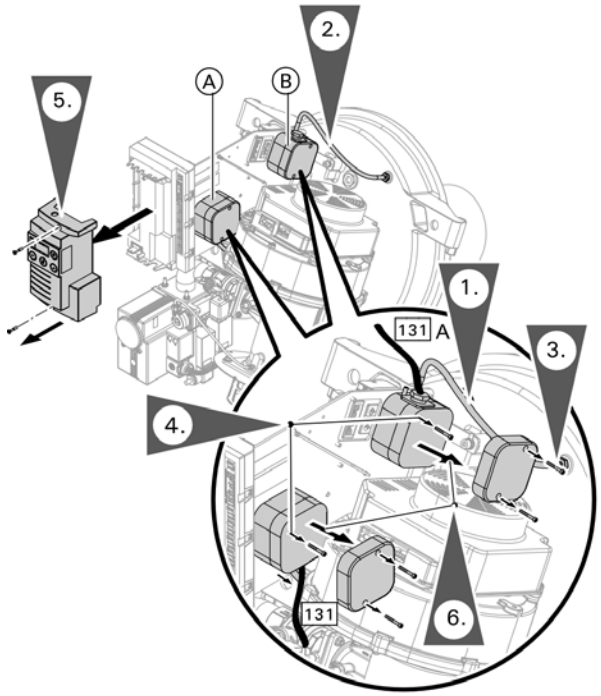
⚠ WARNING

Gas leakage may lead to explosion. Leak test the reconnected gas line and gas valve connections.

⚠ CAUTION

Usage of leak detection spray may lead to malfunction. Avoid contact between leak detection spray and electric contacts.

Air Pressure Switch



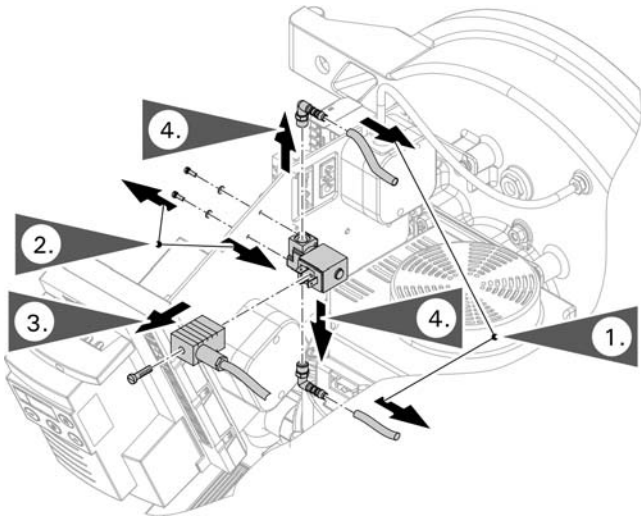
1. Disconnect the air tube from the air pressure switch.
2. Remove the M6 (5 mm hex key) screw and ground wire from the burner control bracket and set aside. Loosen the second bracket screw and carefully pivot the control bracket to access the pressure switch.
3. Remove the two cover screws and remove cover.
4. Remove two M4 (3 mm hex key) screws and remove the pressure switch.
5. Loosen the two programming unit screws to access the switch cable connector.
6. Cut the cable tie, loosen the locking tab on the connector and remove the cable.
7. Reinstall the pressure switch and torque the burner control bracket M6 (5 mm hex key) screw to 5 lb/in (0.6 Nm).
   Note: Ensure the ground wire is securely fastened.
   Note: Set new air pressure settings to the exact same settings as the old air pressure switch.
8. Reinstall in reverse order.

Legend

Ⓐ Air pressure switch of blower (APS1, connection hose with nozzle and electrical plug marked with 131).

Ⓑ Air pressure switch of combustion chamber (APS2, connection hose with nozzle and electrical plug marked with 131 A).

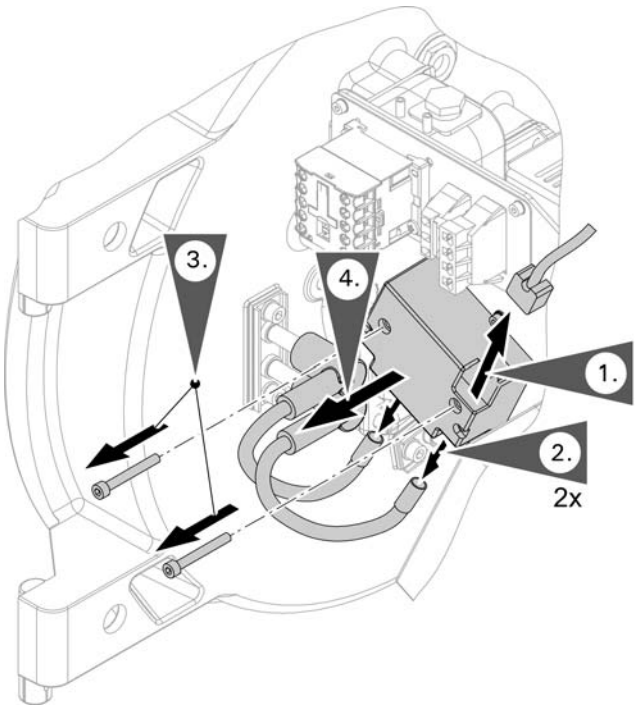
2/2-Way Solenoid Valve (choke valve) (for CM2 186 burner only)



During the ignition timing of the burner unit, the solenoid is activated for approximately less than 5 seconds. This will open the valve and allow fan positive pressure pneumatically linked to the gas pressure regulator. Positive pressure will allow more gas to be introduced into the burner for a smoother ignition.

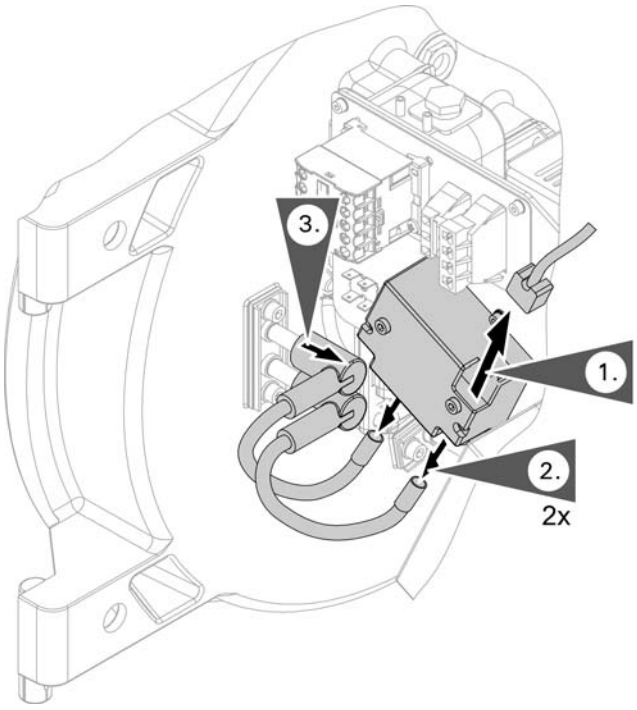
1. Remove connection hoses.
2. Loosen two screws and remove valve (note the direction of the installation).
3. Loosen plug screw and remove plug.
4. Loosen hose fitting.
5. Reinstall in reverse order.

Ignition Unit



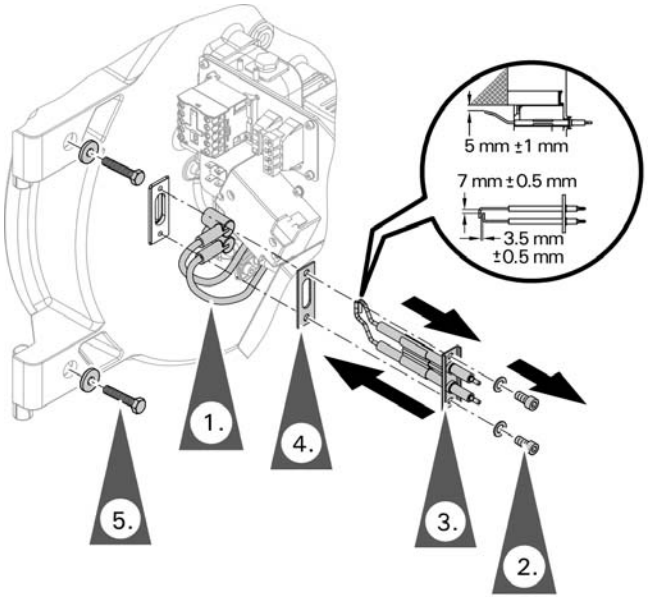
1. Remove plug from ignition unit.
2. Remove ignition cables from ignition unit.
3. Loosen screws of ignition unit.
4. Remove ignition unit.
5. Reinstall in reverse order.

Ignition Cable



1. Remove plug from ignition unit.
2. Remove ignition cables from ignition unit.
3. Remove ignition cables from the ignition electrodes.
4. Reinstall in reverse order.

Ignition Electrode Block



1. Disconnect the ignition cables from the ignition electrodes.
2. Remove the two M6 (5 mm hex) screws and washers from the ignition electrode block and set aside.
3. Remove the ignition electrode block from the burner door.
4. Remove the ignition electrode block gasket from the burner door.
5. Remove the four M12 (19 mm hex) burner door bolts and washers and set aside.
   Note: To access the burner door, disconnect gas line and plugs 40/156 and 40 from the burner control bracket and plugs 90 and 41 from the burner control.
6. Reinstall the new ignition electrode block and gasket.
7. Open the burner door and check dimensions between electrodes as well as electrode and burner as shown. Carefully adjust if necessary.
8. Reinstall in reverse order.
9. Torque the M12 (19 mm hex) burner door bolts to 13 lb/ft (18 Nm).
10. Torque the M6 (5 mm hex) burner door bolts to 13 lb/in (1.5 Nm).

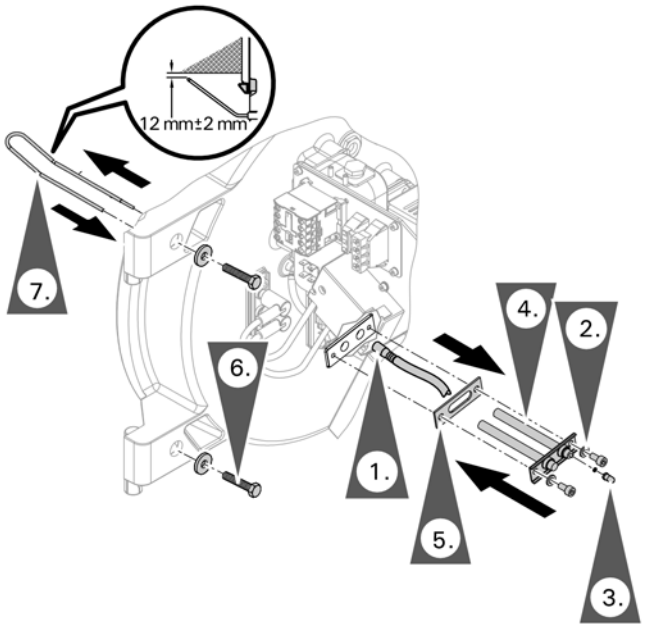
IMPORTANT

If adjustment to the electrode is necessary, be careful not to damage the ceramic sleeve of the electrode.

WARNING

Leak test the reconnected gas line.

Ionization Electrode Block



1. Disconnect the ionization cable from the ionization electrode.
2. Remove the two M6 (5 mm hex) screws and washers from the ionization electrode block and set aside.
3. Remove the 7 mm cable nozzle and set aside. Remove O-ring and discard.
4. Remove the ionization electrode block from the burner door.
5. Remove the ionization electrode block gasket from the burner door.
6. Remove the four M12 (19 mm hex) burner door bolts and washers and set aside.
   Note: To access the burner door, disconnect gas line and plugs 40/156 and 40 from the burner control bracket and plugs 90 and 41 from the burner control.
7. Open the burner door and remove the inside portion of the ionization electrode.
8. Reinstall the new ionization electrode block and gasket.
9. Check the dimension between the electrode and burner as shown. Carefully adjust if necessary.
10. Reinstall in reverse order.
11. Torque the M12 (19 mm hex) burner door bolts to 13 lb/ft (18 Nm).
12. Torque the M6 (5 mm hex) burner door bolts to 13 lb/in (1.5 Nm).

IMPORTANT

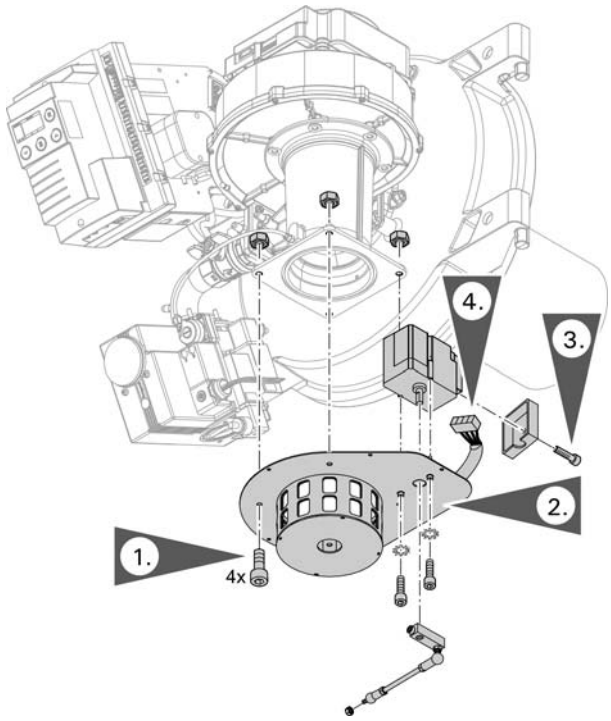
If adjustment to the electrode is necessary, be careful not to damage the ceramic sleeve of the electrode.

WARNING

Leak test the reconnected gas line.

5607 706 - 04

Motorized Burner Inlet Damper



Note: Only CM2 models 246 and 311 are equipped with a motorized burner inlet damper.

1. Remove the four M6 (5 mm hex) bolts and nuts from the burner inlet damper and set aside.
2. Remove the burner inlet damper from the burner along with the servomotor and linkage.
3. Remove the servomotor cover and screw and set aside.
4. Disconnect the servomotor electrical connection from the servomotor.
5. Remove the linkage and servomotor and set aside (see page 33 and 34).
6. Reinstall the servomotor and linkage to the new burner inlet damper.
   Note: Ensure the burner inlet damper vents are in the fully open position when reconnected. Adjust linkage if necessary.

CAUTION

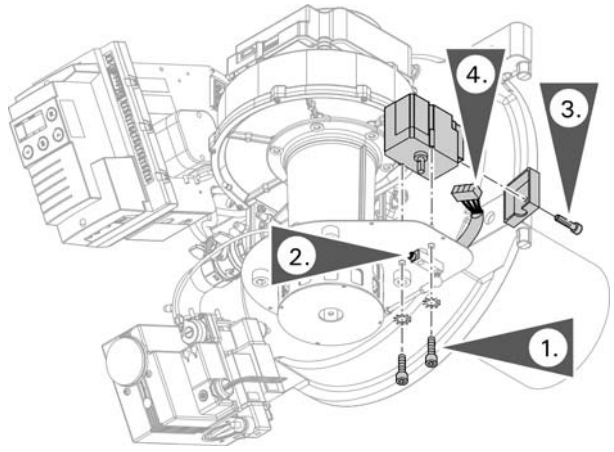
If burner inlet damper is not opened completely it may lead to malfunctions or indicates a wrong setup of the servomotor.

7. Reinstall in reverse order.

Note: Torque the M6 (5 mm hex) screws to 35 lb/in (4 Nm).

Note: Torque the linkage parts to 13 lb/in (1.5 Nm).

Inlet Damper Servomotor



Note: Only CM2 models 246 and 311 are equipped with an inlet damper servomotor.

1. Remove the two M4 (3 mm hex key) screws and washers connecting the servomotor and set aside.
2. Loosen the M5 (4 mm hex key) set screw connecting the linkage to the servomotor.
3. Remove the servomotor screw and cover and set aside.
4. Disconnect the servomotor electrical connection from the servomotor.
5. Remove the servomotor and replace.
   Note: Ensure the burner inlet damper vents are in the fully open position when reconnected. Adjust linkage if necessary.

CAUTION

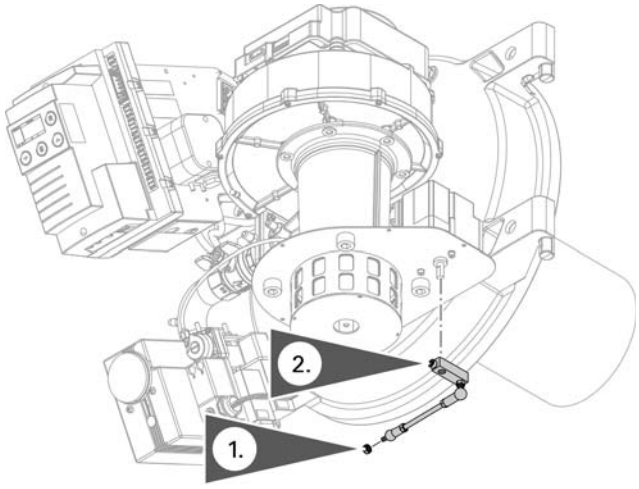
If burner inlet damper is not opened completely it may lead to malfunctions or indicates a wrong setup of the servomotor.

6. Reinstall in reverse order.

Note: Torque the M4 (3 mm hex) screws to 8.8 lb/in (1 Nm).

Note: Torque the M5 (4 mm hex) set screw to 13.2 lb/in (1.5 Nm).

Inlet Damper Linkage



Note: Only CM2 models 246 and 311 are equipped with a inlet damper linkage.

1. Remove the M4 (8 mm hex) nut connecting the linkage to the inlet damper bracket.
2. Loosen the M5 (4 mm hex key) set screw connecting the linkage to the servomotor.
3. Remove the linkage and replace.
   Note: Ensure the burner inlet damper vents are in the fully open position when reconnected. Adjust linkage if necessary.

CAUTION

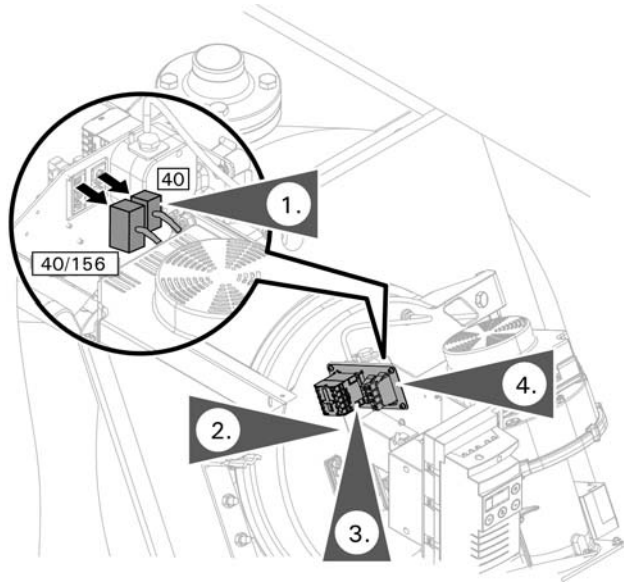
If burner inlet damper is not opened completely it may lead to malfunctions or indicates a wrong setup of the servomotor.

4. Reinstall in reverse order.

Note: Torque the M4 (8 mm hex) nut to 8.8 lb/in (1 Nm).

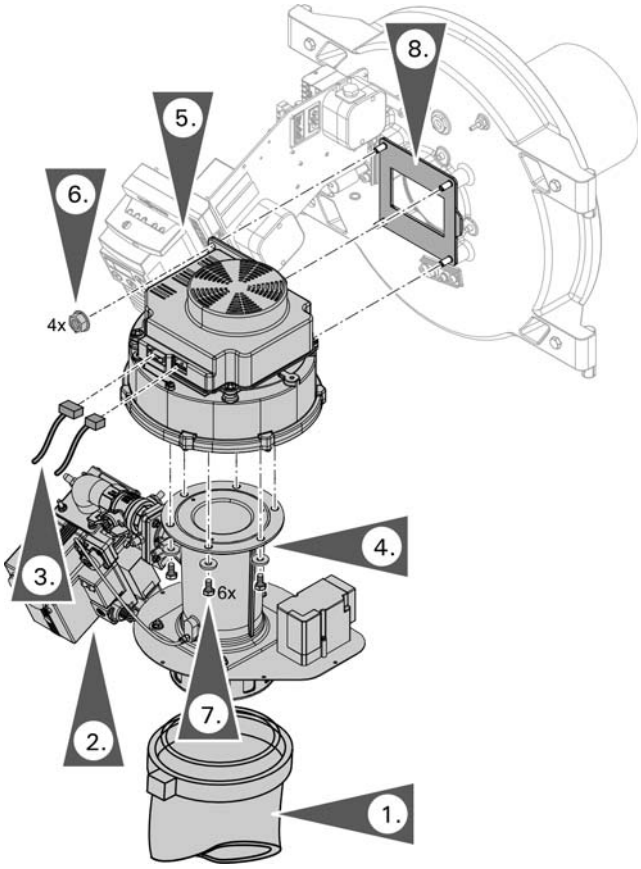
Note: Torque the M5 (4 mm hex) set screw to 13.2 lb/in (1.5 Nm).

Plug Console with Relay



1. Disconnect plugs 40/156 and 40 from the back of the plug console.
2. Disconnect the two ground wires (yellow/green) from the terminal block below the plug console.
3. Disconnect wires T1 (brown) and T2 (blue) from the relay contactor.
4. Remove the four 3 mm hex head screws and washers from the plug console mounting plate and set aside. Replace the plug console with relay.
5. Reinstall in reverse order.

Burner Fan

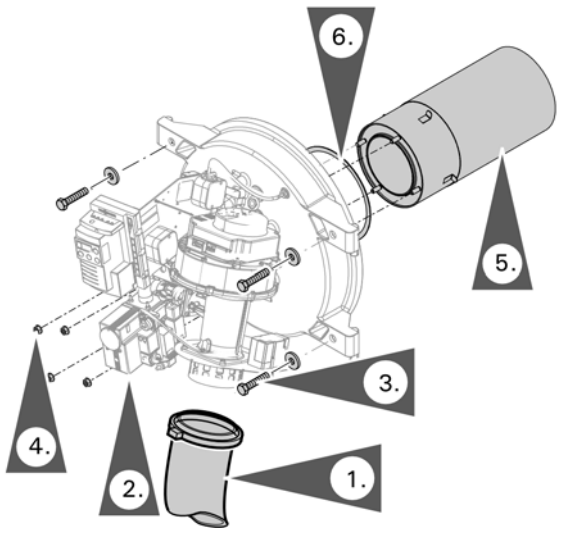


1. Loosen the retaining clamp and disconnect the combustion air flex hose and set aside.
2. Disconnect the gas line.
3. Disconnect electrical plugs 100 and 100A from the fan.
4. Disconnect the APS1 pressure switch tube from the venturi.
5. Disconnect electrical plugs 35, 36, 87, 111 and 122 from the burner control.
   Note: To disconnect electrical plugs 87 and 111 remove the burner control cover (see page 26).
6. Remove the four M8 (13 mm hex) nuts connecting the fan to the burner door and set aside.
7. Remove the six M8 (13 mm hex) bolts and washers connecting the fan to the venturi and set aside.
8. Replace the two fan/burner door gaskets as required.
   Note: Replace the gaskets in the original order and orientation.
9. When installing the fan to the venturi torque the M8 (13 mm hex) bolts to 53 lb/in (6 Nm).
   Note: Install the fan in the original orientation.
10. When installing the fan assembly to the burner door torque the M8 (13 mm hex) bolts nuts to 53 lb/in (6 Nm).
11. Reinstall in reverse order.

⚠ WARNING

Leak test the reconnected gas line.

Burner Tube

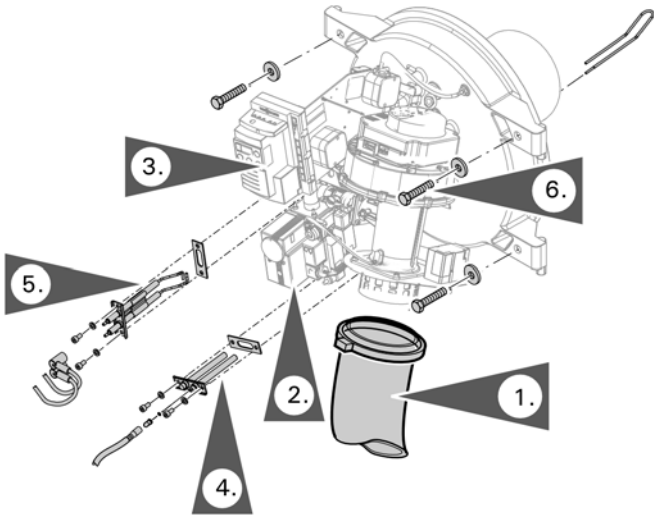


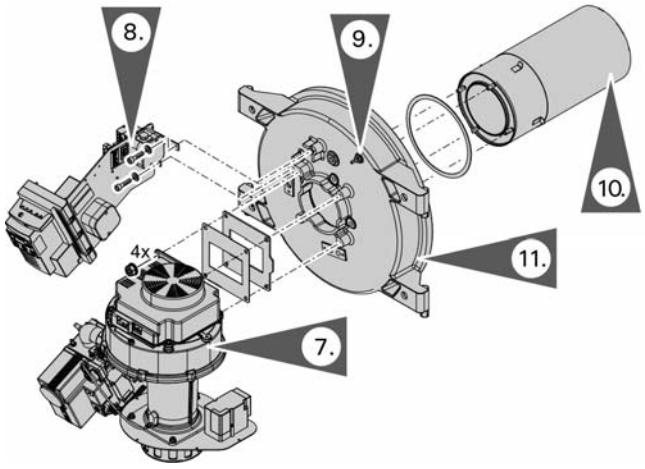
1. Loosen the retaining clamp and disconnect the combustion air flex hose and set aside.
2. Disconnect the gas line.
3. Remove the four M12 (19 mm hex) burner door bolts and washers and set aside.
   Note: To access the burner door, disconnect gas line and plugs 40/156 and 40 from the burner control bracket and plugs 90 and 41 from the burner control.
4. Remove the four burner tube M8 (13 mm hex) nuts from the burner door.
5. Remove the burner tube.
6. Remove the retaining ring and place it on the new burner tube.
   Note: When reinstalling the burner tube, rotate the burner tube until the mounting studs align with the holes in the burner door.
7. Torque the M8 (13 mm hex) burner tube nuts to 88 lb/in (10 Nm).
8. Torque the M12 (19 mm hex) door bolts to 13 lb/ft (18 Nm).
9. Reinstall in reverse order.

⚠ WARNING

Leak test the reconnected gas line.

Burner Door





1. Loosen the retaining clamp and disconnect the combustion air flex hose and set aside.
2. Disconnect the gas line.
3. Disconnect electrical plugs 35, 36, 87, 111 and 122 from the burner control.
   Note: To disconnect electrical plugs 87 and 111 remove the burner control cover (see page 26).
4. Remove ionization electrode block (see page 32).
5. Remove ignition electrode block (see page 32).
6. Remove the four M12 (19 mm hex) burner door bolts, washers and cotter pin and set aside.
   Note: To access the burner door, disconnect gas line and plugs 40/156 and 40 from the burner control bracket and plugs 90 and 41 from the burner control.
7. Disconnect electrical plugs 100 and 100A from the fan. Disconnect pressure switch tubes APS1 from the venturi and APS2 from the burner door. Remove the four M8 (13 mm hex) nuts connecting the fan to the burner door and set aside. Remove fan/venturi assembly (see page 35 for additional information).
8. Remove two M6 (5 mm hex key) screws, washers and ground wire from the burner control bracket and set aside. Remove the burner control bracket assembly.
9. Remove pressure switch barb fitting from burner door and set aside.
   Note: Replace barb fitting washer as required.
10. Remove burner tube (see page 35).
11. Install new burner door.
    Note: Install burner door studs to new door for connection to fan/venturi assembly.

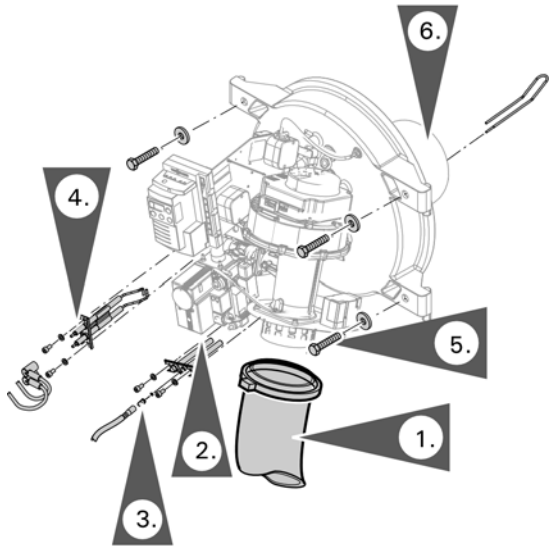
Note: When installing the fan/venturi assembly to the burner door torque nuts to 53 lb/in (6 Nm).
Torque M12 (19 mm hex) door bolts to 13 lb/ft (18Nm).
Torque the M8 (13 mm hex) nuts to 53 lb/in (6 Nm).

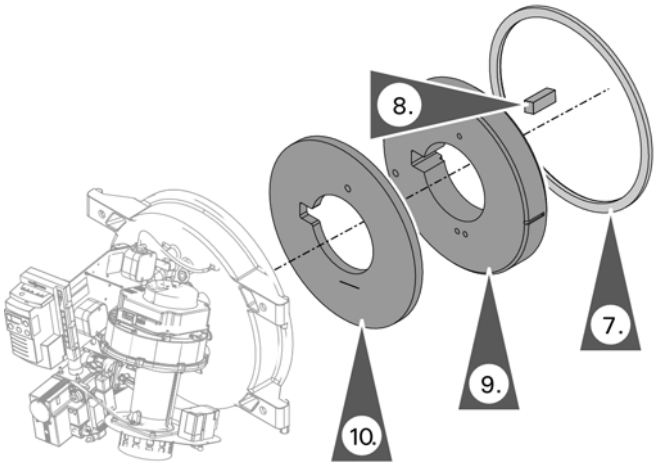
⚠ WARNING

Leak test the reconnected gas line.

6. Reinstall in reverse order.

Burner Door Refractory





1. Loosen the retaining clamp and disconnect the combustion air flex hose and set aside.
2. Disconnect the gas line.
3. Remove ionization electrode block (see page 32).
4. Remove ignition electrode block (see page 32).
5. Remove the four M12 (19 mm hex) burner door bolts and washers and set aside.
6. Remove burner tube (see page 35).
   Note: Replace burner tube gasket as required.
7. Remove rope seal.
   Note: When reinstalling the rope seal, apply high temperature silicon to hold in place.
8. Remove electrode block insulation.
9. Remove refactory.
10. Remove insulation blanket.

Torque M12 (19 mm hex) door bolts to 13 lb/ft (18Nm).

11. Reinstall in reverse order.

Further Installation and Initial Start Up Instructions

CAUTION

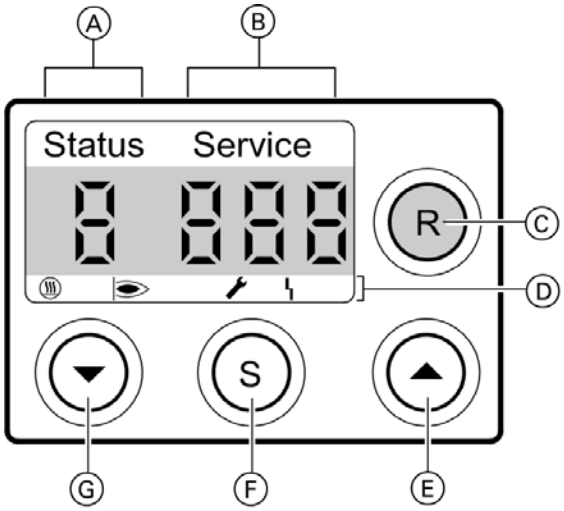
Using leak detection spray may lead to a malfunction. Avoid contact between leak detection spray and electric contacts.

1. Ensure all connections are tight and all electrical plugs are connected.
2. Reinstall all removed front, rear and side panels.
3. Start up burner and test burner functions.

Burner Control Unit

Display and programming unit

A display and programming unit is integrated into the burner control unit. The display indicates the relevant operating conditions, the service and parameter conditions as well as all fault and error messages.



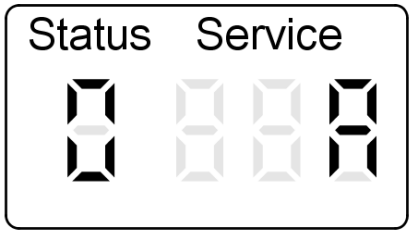
The display comprises four elements of seven segments each. Four keys enable adjustments to be made at the different operating levels.

Ⓐ Status display
Ⓑ Service display
Ⓒ Reset button
Ⓓ LEDs, from left: heat demand, flame, maintenance and fault.
Ⓕ Selection key
Ⓔ/Ⓖ Cursor keys

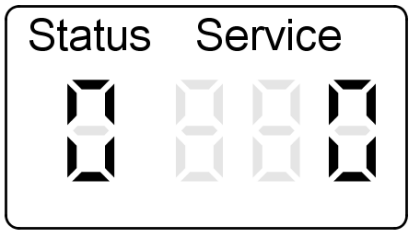
Operating display

In standard mode, the status display shows the current operating conditions. The same applies in a fault state after pressing reset button **R** Ⓒ.

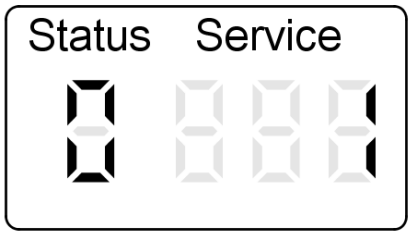
The following displays are scrolled through automatically. In case of faults, see the fault codes from page 46. You can exit at any time by pressing and holding the reset button **R** Ⓒ for more than 2 seconds.



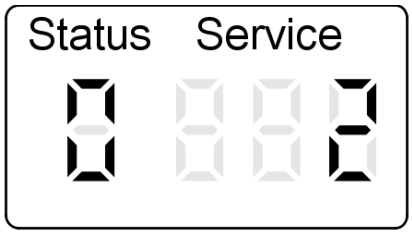
System start-up after power supply is switched ON.



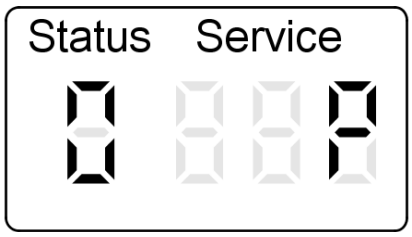
Standby



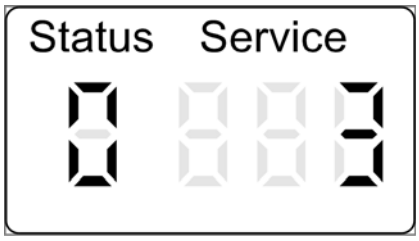
Idle state check
System tests



Fan ramp-up



Gas valve and/or relay test

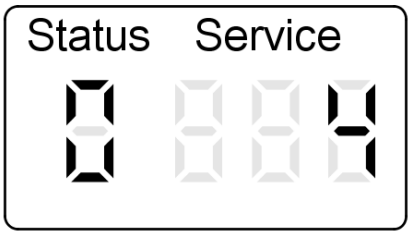


Pre-purge

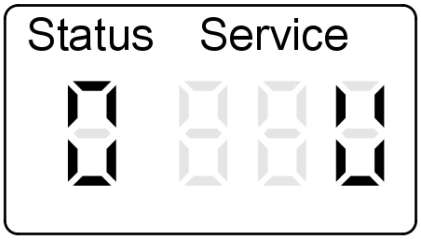
5607 706 - 04

Burner Control Unit *(continued)*

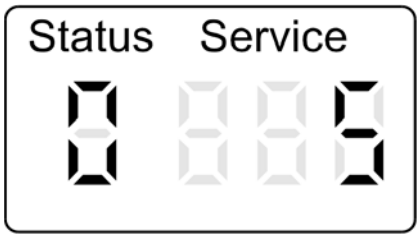
Operating display (continued)



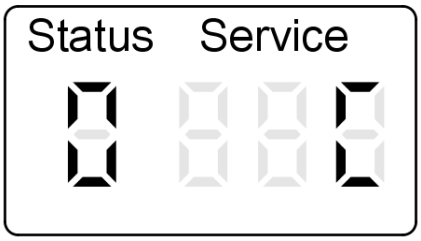
Pre-ignition



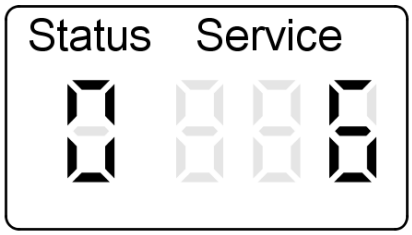
Maintenance program
no air pressure



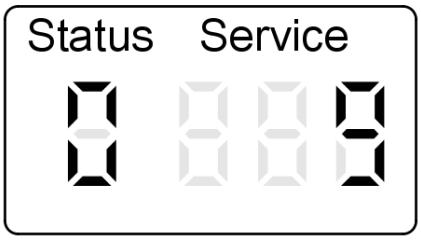
Ignition
Safety time
Flame established



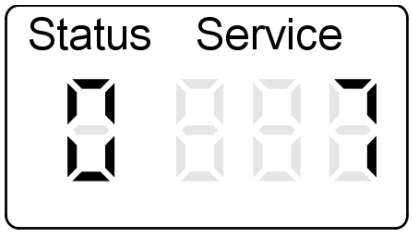
Maintenance program
no gas pressure or
mains undervoltage



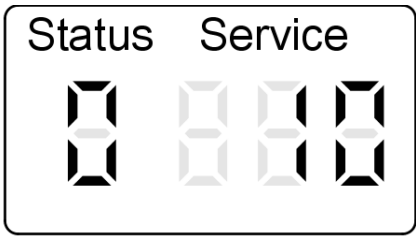
Flame stabilization



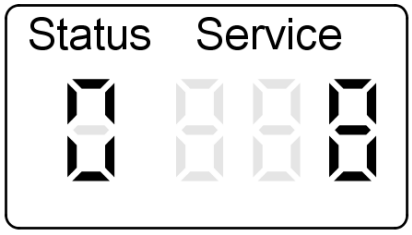
Forced ventilation
when no flame
was recognized



Operation with flame



Safety shutdown
due to flame tear-off



Reheat
Post-purge

Burner Control Unit *(continued)*

Information and configuration display

The information display and the configuration display are activated from the operating display. The menu selection is activated by pressing button **S** for longer than 2 seconds. You can scroll through the menu items with ▲/▼. A menu item is selected by pressing button **S** again and will be displayed under Status.

This mode is automatically terminated if no other key is pressed within 20 seconds.

Information regarding current meter readings, such as the start counter and permanent hours run meter, can be called up via the information display.

Information	
Menu item	Description
1	Continuous meters for start-ups and hours run
2	Meters for start-ups and hours run that can be reset
3	Software version
4	Fault history for the last 10 fault codes

Example: to delete the hours run meter, press the following buttons:

1. **S** longer than 2 seconds "🔧" flashes
2. ▲ until "2" is shown under Service.
3. **S** "1" will be displayed under Status

Menu items "5" and "6" are used to adjust configuration settings of the burner control unit.

Note: Only make adjustments when the burner control unit is on standby.

4. ▲ Scroll through Status until "6" is shown under Status:

Status	Description
1	Display of start-up meter with reset, 1 digit
2	Display of start-up meter with reset, 1000 digit
3	Menu item for deleting the start-up meter reading
4	Display of hours run meter with reset, 1 digit
5	Display of hours run meter with reset, 1000 digit
6	Menu item for deleting the hours run meter reading

5. **S** to confirm the deletion. If deleted successfully, "1" will be shown under Service, "0" if it failed.
6. **S** to change to the operating display.

Menu items "5" and "6" are used to adjust configuration settings of the burner control unit.

Note: Only make adjustments when the burner control unit is on standby.

Control parameter R62 "Rotational speed minimum input"

The parameter has the consequence that after a "fail of flame during operation" the burner can't be modulated in partial load (20%) in modulated operational mode for one hour. At this time the new level for parameter R62 is input load (50-60%).
To reset this setting earlier than one hour, you have to press the reset button R or switch off the burner control. If the boiler goes into stand by mode before the time has elapsed the settings are not reset.

Burner Control Unit *(continued)*

Configurations:

Menu item	Description
5	Changeover from the operating display of the burner control unit phase to other process information
6	Configuration of control function operating parameters

Menu item "5" is used to display the following process information:

Sub-menu Item	Process Information	Units/Scale
0	Phase	1
1	Boiler water temperature *1	°C
2	Flue gas temperature *1	°C
3	Ionization current	I in 1/10 µA
4	Set speed	%
5	PWM manipulated variable	%
6	Actual speed	RPM x10/min
7	Gas pressure switch 1	0 or 1
8	Gas pressure switch 2 *1	0 or 1
9	Air pressure switch	0 or 1
A	Gas valve 1	0 or 1
b	Gas valve 2 *1	0 or 1

**1 Not available for all boiler types, check at control unit if required.*

Example: to display the ionization current, press the following keys:

1. **S** longer than 2 seconds " 🔧 " flashes.
2. ▲ until "5" is shown under Service.
3. **S** "5" will be displayed under Status
4. ▲ until "3" is shown under Service.
5. **S** "3" is shown under Status and during operation the ionization current is shown under Service (e.g. 30 = 3.0 µA).
6. To exit the process information menu, press and hold **S** longer than 2 seconds "_" flashes.
7. ▲ until "5" is shown under Service.
8. **S** "5" will be displayed under Status
9. ▼ until "0" is shown under Service.
10. **S** to change to the operating display.

Burner Control Unit *(continued)*

Menu item "6" is used to change the following operating parameters:

Sub-menu Item	Parameter	Units/Scale
1	Maximum operational input	% of rated input
0	Reset all operating parameters to their delivered condition	

Example: to set the maximum operational burner input to between 0 and 100 %, press the following buttons:

1. **S** longer than 2 seconds "🔧" flashes.
2. ▲ until "6" is shown under Service.
3. **S** "6" will be displayed under Status and the current value for the maximum operational output in % is shown under Service.
4. ▲/▼ for required maximum operational output.
5. **S** to confirm. If applied successfully, "1" will be shown under Service, "0" if it failed.
6. **S** to change to the operating display.
7. **R** to reset unit and apply settings.

Resetting Operating Parameters to Factory Settings

To reset all operating parameters to factory settings, press the following buttons:

1. **S** longer than 2 seconds "🔧" flashes.
2. ▲ until "6" is shown under Service.
3. **S** "6" will be displayed under Status.
4. ▲ until "0" is shown under Service.
5. **S** "1" is shown under Status and "dEL" under Service.
6. **S** to confirm. If reset successfully, "1" will be shown under Service, "0" if it failed.
7. **S** to change to the operating display.
8. **R** to reset unit and apply settings.

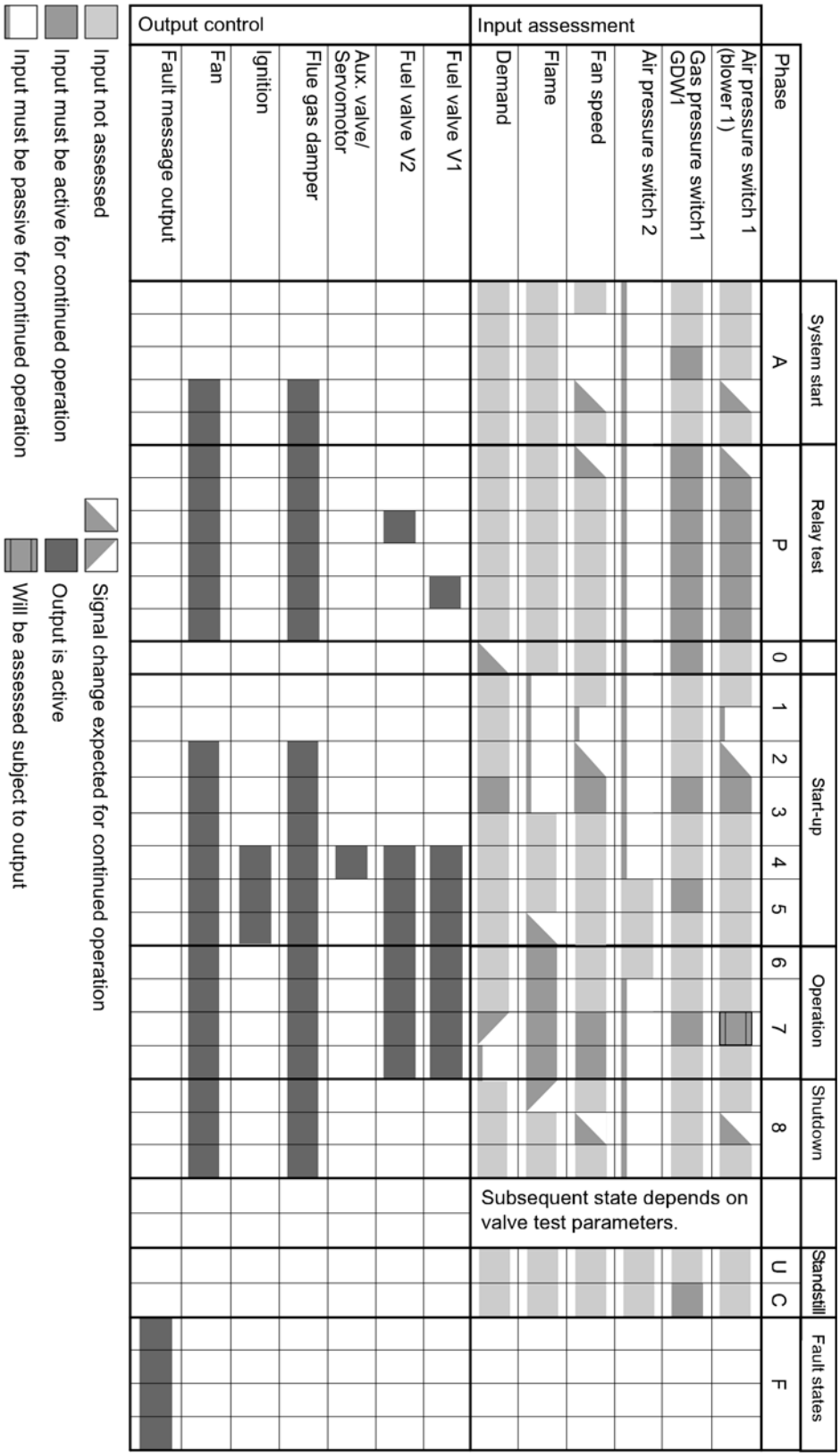
Manual Mode and Service Display

The burner must be running to call up the service display and for manual mode. The service display shows the current level of modulation in %.

Press the following keys:

1. ▼/**S** together for longer than 2 seconds. The burner changes to manual mode, a "P" will be shown under Status and the current modulation level will flash under Service.
2. ▼ for lower heating output, until "0" is shown under Service.
3. ▲ for upper heating output, until "100" is shown under Service.
4. ▼/**S** together for longer than 2 seconds. The burner returns to modulating mode.

Burner Control Unit Flow Diagram

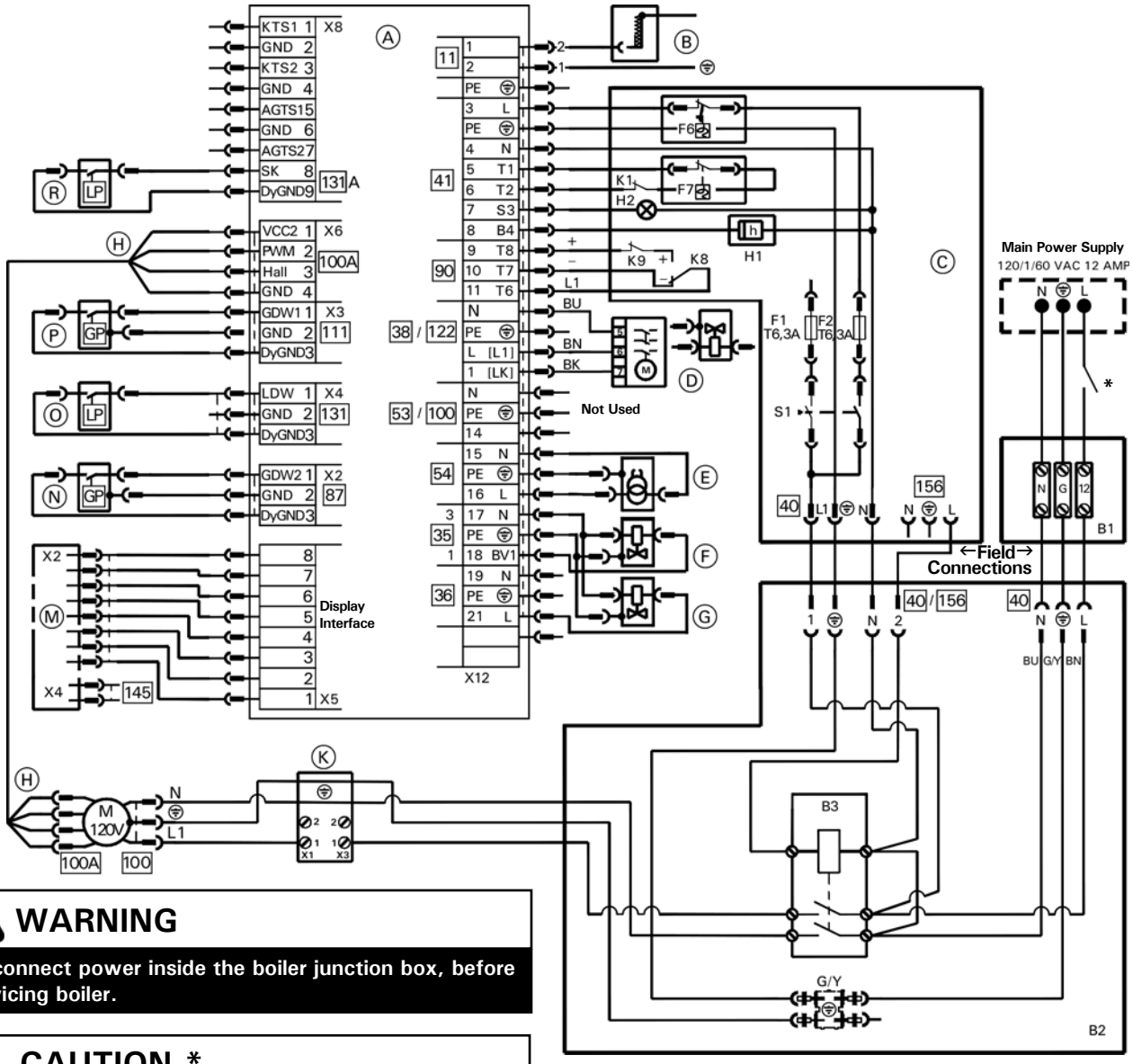


Burner Control Unit Flow Diagram *(continued)*

State description:

Phase	Display	Description	Duration
System start	**"A"**	System start	10 seconds
		Initialization of fault meter	0.1 second
		Test power, gas pressure	1 second
		Fan ramp-up, system start	max. 20 seconds
		Forced ventilation, system start	20 seconds
Relay test	**"P"**	Fan ramp-up for test	max. 20 seconds
		Safety relay test	0.9 second
		Disable relays BV1 and BV2	0.9 second
		Relays BV1 and BV2 test	0.9 second
		Ignition relay test	0.9 second
		Disable safety relay	0.9 second.
		Start-up meter, initialization	0.1 second
Standby	**"0"**	Standby	0 ... seconds
Start-up	**"1"**	Flame signal amplifier, test	max. 50 seconds
		Gas fan and air pressure switch test	max. 20 seconds
	"2"	Fan ramp-up	max. 20 seconds
	"3"	Pre-purge	~30 seconds
		Adjusting start-up load, test APS1	1.9 seconds
	"4"	Pre-ignition	2 seconds
	"5"	Ignition safety time	2.3 seconds
		Flame detection safety time	max. 51 seconds
Operation	**"6"**	Flame stabilizing time	15 seconds
	"7"	Start-up partial load	20 seconds
		Modulating operation	0 to 24 hours
		Adjusting shutdown load	0.1 seconds
Shutdown	**"8"**	Reheat, test APS2	max. 10 seconds
			max. 60 seconds
		Fan ramp-up, post-purge	max. 20 seconds
		Post-purge	10 seconds
Standstill	**"U"**	Waiting for restart	1 minute
	"C"	Undervoltage condition exists or gas pressure too low (inlet pressure switch open).	5 minute
Fault states	**"9"**	Forced ventilation fault	20 seconds
	"10"	Flame loss	0 ... seconds
	"11"	Safety shutdown	0 ... seconds
	"F"	Fault shutdown	0 ... seconds

Burner Control Unit Connection Diagram



WARNING

Disconnect power inside the boiler junction box, before servicing boiler.

CAUTION *

Provide disconnect means and overload protection as required.

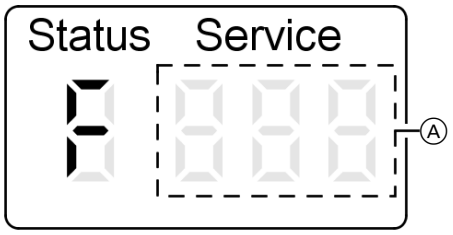
Ⓐ Burner control unit interface VUC 310/base
Ⓑ Flame sensor 11
Ⓒ Vitotronic control unit
Ⓓ Servomotor for burner inlet (models 246/311) damper or 2/2-way solenoid valve (Model 186) 38/122
Ⓔ Ignition unit 54
Ⓕ Gas valve V1 35
Ⓖ Gas valve V2 36
Ⓗ Fan motor with PWM control and feedback 100A
Ⓚ AC-EMI suppression filter device
Ⓜ Burner display and programming unit
Ⓝ Gas pressure switch (outlet pressure at first valve seat) 87 GDW2
Ⓞ Inlet fan pressure switch 131
Ⓟ Inlet gas pressure switch 111 GDW1
Ⓡ Overfire pressure switch 131A

F1 Fuse
F2 Fuse
F6 Fixed high limit
F7 Adjustable high limit (AHL)
H1 Hours run meter, modulation (Vitotronic control)
H2 Fault message (Vitotronic control)
S1 ON/OFF switch (only to the boiler control, line voltage still present at burner base)
145 KM-BUS (not used)
41 Boiler control wiring to burner
40 Power supply, 120 VAC, 60Hz
40 /156 Boiler control to burner base wiring
90 Burner modulation controller "+" Up
"-" Down
B1 Boiler junction box
B2 Burner base
B3 Burner contactor

Faults

Fault display

The fault display is activated automatically if the burner control unit switches to a fault state. The most recent fault will then be displayed. The fault LED is also illuminated in case of a non-lockout shutdown or flashes together with the fault code in case of a lockout shutdown.



Ⓐ Fault code of the most recent fault (see table from page 47)

1. Correct the fault. For fault codes and measures, see from page 47. Carry out measures in the indicated order.
2. Press reset button R for longer than 0.5 seconds
   The operating display is shown again and the burner control unit is reset.

Fault memory

The ten most recent faults are saved and may be called up. The order of scans ranges from the most recent to the earlier fault codes. The fault memory display is terminated automatically if no key is pressed within 20 seconds.

Note: If the burner does not start up due to a non-lockout fault without displaying a fault code, the fault memory may be able to indicate the cause.

To call up the fault codes, press the following keys:

1. **S** longer than 2 seconds "🔧" flashes.
2. ▲ until "4" is shown under Service.
3. **S** "4" will be displayed under Status.
4. ▲/▼ to scroll through the fault memory display.

Service	**Description**
1	Display fault codes
2	Detail fault codes *
3	Clear fault memory

5. **S** the selected fault memory display will appear under Status.
6. ▲/▼ to scroll through the fault codes.

To clear the fault memory from the operating display, press the following keys:

1. **S** longer than 2 seconds "🔧" flashes.
2. ▲ until "4" is shown under Service.
3. **S** "4" will be displayed under Status.
4. ▲ until "3" is shown under Service.
5. **S** "1" is shown under Status and "dEL"under Service.
6. **S** to confirm the deletion. If deleted successfully, "1" will be shown under Service, "0" if it failed.
7. **S** to change to the operating display.

* *Detail fault codes for factory use only*.

5607 706 - 04

Fault Codes

General process errors

Fault display on the display interface and programming unit on the burner.

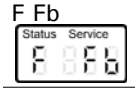
Note: Carry out measures in the described order. All fault codes are saved to the fault memory and the last 10 can be called up.

Displayed Fault Code	System Characteristics	Cause	Measures
F b7	Burner control unit in a fault state; system cools down; burner control unit locked out	Coding card not inserted in the burner control unit; incorrect or faulty coding card	Insert coding card; check coding card; replace if required
	Type of coding card	Coding card does not match burner control unit	Replace coding card or burner control unit ⚠ **Danger** Plug-in terminals on the burner control unit are 'live'. Only replace the coding card when the power has been isolated from the burner control unit (inside the junction box).
F E1	Gas pressure switch GDW2 activated (closed on pressure rise)	1st gas valve seat leaking/ GDW2. Gas pressure switch activated/burner test firring valve closed.	Check cable, check gas pressure switch, open burner test firing valve, replace gas valve.
F E2	Gas pressure switch GDW2 did not close during control self diagnostics	Gas pressure switch/GDW2 electrical connection open (switch did not close during relay test)	Check cables, check gas pressure switch, replace gas valve
F E4	Burner shuts down	Multiple detection of undervoltage	Check the power supply
F E5	Burner control unit in a fault state	Internal fault of the burner control unit and during test of ionization input	Replace burner control unit
F EE	Burner control unit in a fault state	Internal error in feedback from gas safety valves; output relay does not respond	Reset burner control unit; replace burner control unit
F EF	Burner control unit in a fault state	Internal error in feedback from gas safety valves; output relay does not respond	Reset burner control unit; replace burner control unit
F F3	Ionization flame monitor reports faulty flame signal during start-up or after the post-purge	Gas valve leaking (flame present); incorrect coding card	Check ionization path; replace coding card; replace gas valve
F F4	No flame formation during safety time; ionization flame monitor reports no flame signal	Ionization electrode incorrectly adjusted; ionization electrode not plugged in. Ground fault of electrode or cable	Insert plug of ionization electrode; check cables; adjust ionization electrode (see page 19)
	No flame formation during safety time; ionization flame monitor reports no flame signal	Ignition electrode not set correctly; earth leakage of electrodes; ignition unit faulty; burner control unit faulty	Adjust ignition electrodes (see page 19); replace ignition unit; replace burner control unit
	No flame formation during safety time; ionization flame monitor reports no flame signal	Insulation body of ignition or ionization electrode cracked	Replace ignition or ionization electrode

Fault Codes *(continued)*

Displayed Fault Code	System Characteristics	Cause	Measures
F F4	Poor start-up characteristics, rotary damper does not close, solenoid valve does not switch	Servomotor faulty, servomotor connecting cable faulty, solenoid valve faulty, burner control unit output relay faulty	Replace connecting cable; replace servomotor; replace solenoid valve; replace burner control unit
	No flame builds during safety time; ionization flame monitor reports no signal	Incorrect gas type selected	Adjust gas type (see page 9)
	No flame builds during safety time; ionization flame monitor reports no signal	Gas valve does not open	Check the connecting cable; check the gas valve and replace if required
	No flame builds during safety time; ionization flame monitor reports no signal	Combustion characteristics not ideal	Adjust the burner (see from page 15, if necessary, also adjust the setting screws when the burner is OFF to be able to start the burner)
F F5	Air pressure switch 1 shows no air pressure, fan does not operate 131	Air pressure switch 1 faulty, incorrectly connected or incorrectly set	Replace air pressure switch 1, connect or set correctly
	Air pressure switch 1 switches off during operation	Flue gas back pressure; condensate built up; air pressure switch 1 hose faulty; connecting hose leaking	Remove flue gas back pressure; check if condensate banked up; reset burner control unit; replace hose
F F6 	Gas pressure switch shows no gas pressure	Gas shut-off valve closed; gas pressure switch faulty; multiple problems with gas supply	Open gas shut-off valve; check gas flow pressure; replace gas filter if required; reset burner control unit; replace gas valve
F F7	Fan pressure is created during the idle state check of air pressure switch 1	Wind influence on fan	Check flue outlet or (chimney)
	Contact of air pressure switch 1 not closed in idle state	Air pressure switch 1 faulty	Replace air pressure switch 1
F F8	Flame extinguishes during operation	Incorrect gas type selected	Adjust gas type (see page 9)
	Flame extinguishes during operation	Burner gauze assembly faulty	Check burner gauze assembly; replace if damaged
	Flame extinguishes during operation	Combustion characteristics not ideal	Adjust burner (see from page 15)
F F9	Fan not running; fan speed not reached	Fan faulty; cables are faulty or broken	Check cables; replace fan if required
	Status duration too long, fan ramp-up	Internal fault; fan cannot reach its set value	Replace fan or burner control unit
	Varying fan speed	Fan faulty, cable "100A" faulty or broken	Check cable; replace cable "100A" or fan if required
	No fan feedback	Fan faulty; external power supply to fan not connected or faulty; cable "100A" faulty or broken; fan blocked (possibly by a foreign object)	Check cable "100A", check external power supply; replace cable or fan; remove foreign object

Fault Codes *(continued)*

Displayed Fault Code	System Characteristics	Cause	Measures
F FA	Fan runs without demand; burner control unit in a fault state	Fan has not stopped; cable "100A" faulty; fan faulty; burner control unit faulty	Wind influence on fan; check flue outlet and fan; replace cable "100A", replace fan; replace burner control unit
F Fb 	Combustion chamber pressure too high; burner control unit in a fault state	Flue gas path or condensate path blocked off	Check flue gas path or condensate path and clean if required

Internal system fault

Internal system faults are created if a correct program sequence can no longer be guaranteed.

Displayed Fault Code	System Characteristics	Cause	Measures
FD	Fault within burner control unit	No gas, exhaust recirculation, fan not operating, air pressure sensor defective	Check each component, reset burner control unit. Replace the burner control unit if the fault persists.

Faults Without Fault Display

Fault	Cause	Measures
Combustion fault through pulsation	Excessive gas input	Adjust gas input in accordance with rated boiler heating output
	Insufficient or excessive air	
	Condensate build up in flue system	Check condensate drain.
	Incorrect flue outlet	Check flue outlet and flue system.
Thermo-acoustics/ combustion noise	Incorrect CO_2 settings; insufficient or excessive air	Adjust burner in accordance with the details on page 15.
CO_2 content too low	Incorrect setting	Check that burner has been adjusted for the correct gas type, and change gas restrictor if required (see from page 9). Adjust burner in accordance with the details on page 15.
CO is formed or burner is very sooty	Insufficient or excessive air	Adjust correctly. Check ventilation of installation room.
	Insufficient draught in flue system	Check flue system.
Flame extinguishes during operation	Inlet strainer of gas valve contaminated	Remove flange and clean strainer.
Excessive flue gas temperature	Excessive gas throughput	Adjust gas throughput in accordance with rated boiler heating output. Check condition of secondary heating surfaces of the boiler, and clean if required.

Adjusting Coding Addresses at the Control Unit



See Vitotronic Service Instructions in conjunction with the following control units:

- Vitotronic 100, type GC1
- Vitotronic 300, type GW2

Coding Address	Boiler model CM2			Coding Card
	186	246	311	
02	2	2	2	1041
05	0	0	0	
08	94	57	26	
09	1	2	3	
0A	20	20	20	
15	38	46	40	

Parts Lists

Model No. **Serial No.**
CM2 186 Boiler 7499084□□□□□□□□□
CM2 246 Boiler 7499085□□□□□□□□□
CM2 311 Boiler 7499086□□□□□□□□□

Ordering Replacement Parts:

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

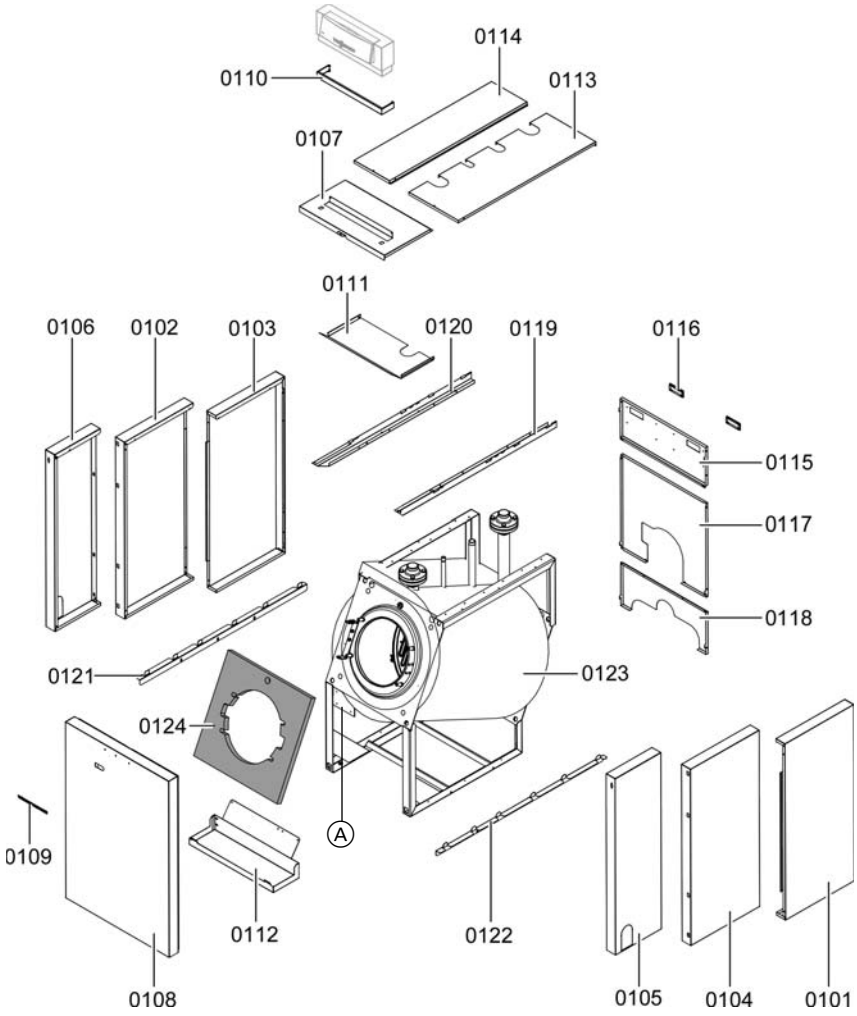
Boiler Parts

0101 Side panel, right rear
0102 Side panel, left middle
0103 Side panel, left rear
0104 Side panel, right middle
0105 Side panel, front right
0106 Side panel, front left
0107 Front panel, top
0108 Front panel (with 109 nameplate)
0109 Nameplate “Vitocrossal 200”
0110 Cover strip
0111 Top shield panel
0112 Bottom panel
0113 Top panel, right
0114 Top panel, left
0115 Rear panel, top (with 116 edge molding)
0116 Cover edge molding
0117 Rear panel, middle
0118 Rear panel, bottom
0119 Guide rail, top, right
0120 Guide rail, top, left
0121 Guide rail, bottom, left
0122 Guide rail, bottom, right
0123 Insulation blanket
0124 Insulation blanket, front

Other Parts (not illustrated)

0130 Touch-up spray paint, silver
0131 Touch-up paint stick, silver
0132 Accessory pack, small parts for insulation
0500 Electrical junction box with all necessary wiring harnesses
0600 Air intake kit

Ⓐ ASME rating plate



5607 706 - 04

Parts Lists *(continued)*

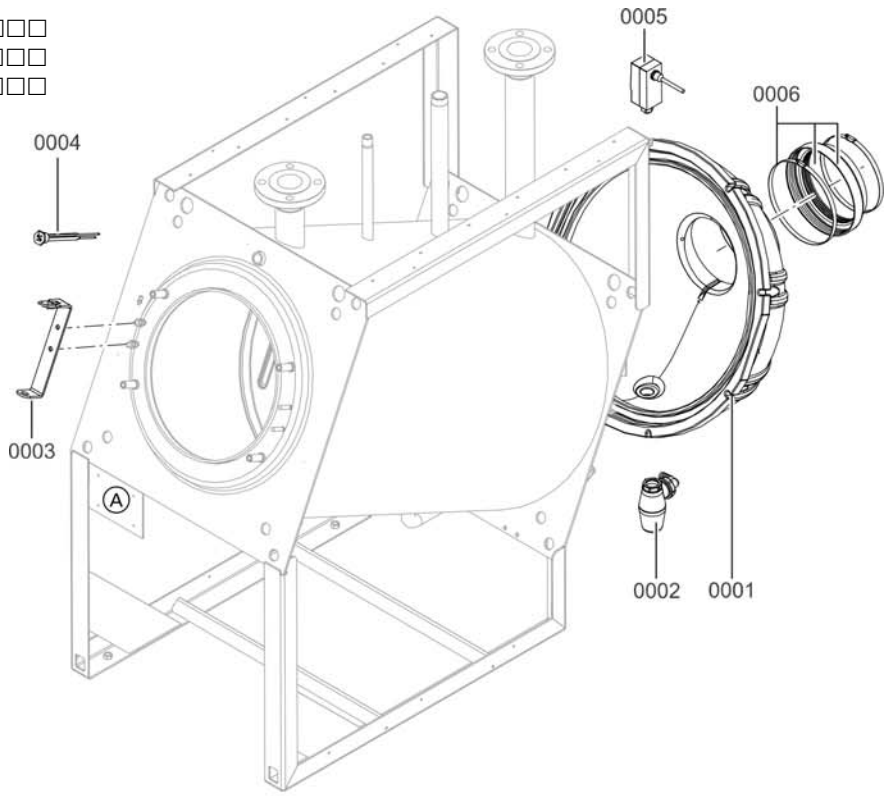
Model No.		Serial No.
CM2 186	Boiler	7499084□□□□□□□□□
CM2 246	Boiler	7499085□□□□□□□□□
CM2 311	Boiler	7499086□□□□□□□□□

Ordering Replacement Parts:

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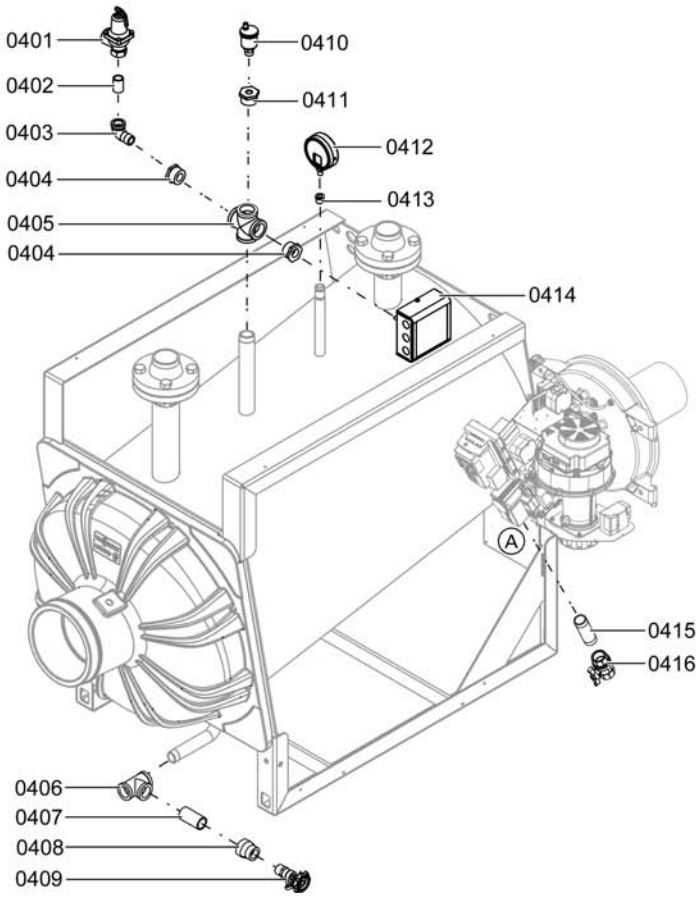
Boiler Parts

0001 Flue gas collector cover with gasket
0002 Condensate siphon
0003 Hinge bracket
0004 Sensor well, 4-point
0005 Flue gas temperature switch
0006 Flue gas adaptor with clamps ∅ 200/236



Installation Fittings

0401 Pressure releif valve, 75 psi
0402 Nipple, ¾ in. x 1 ½ in.
0403 90º Street elbow, ¾ in.
0404 Hex bushing,1¼ in. x ¾ in.
0405 Cross, 1¼ in.
0406 Tee, 1 in.
0407 Nipple, 1 in. x 2 in.
0408 Reduction coupling, 1 in. x ¾ in.
0409 Sediment faucet, ¾ in.
0410 Air vent with shut-off base
0411 Hex bushing, 1¼ in. x ⅜ in.
0412 Pressure gauge
0413 Hex bushing, ½ in. x ¼ in.
0414 Low water cut-off
0415 Nipple,
0416 Gas ball valve



Other Parts (not illustrated)

0417 Thermometer (Winters) 5" 0-250 °F **1*
0420 Installation Instructions
0421 Operating Instructions
0422 Service Instructions
0423 Parts List, Vitocrossal 200 Boiler
0424 Parts List, Cylinder Burner
0425 Parts List, Installation Fittings

Ⓐ ASME boiler rating plate

**1* Install anywhere in the supply piping near boiler

Parts Lists *(continued)*

Model No. **Serial No.**
CM2 186 Burner 7164855□□□□□□□□□
CM2 246 Burner 7164856□□□□□□□□□
CM2 311 Burner 7164857□□□□□□□□□

Ordering Replacement Parts:

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

Burner Parts

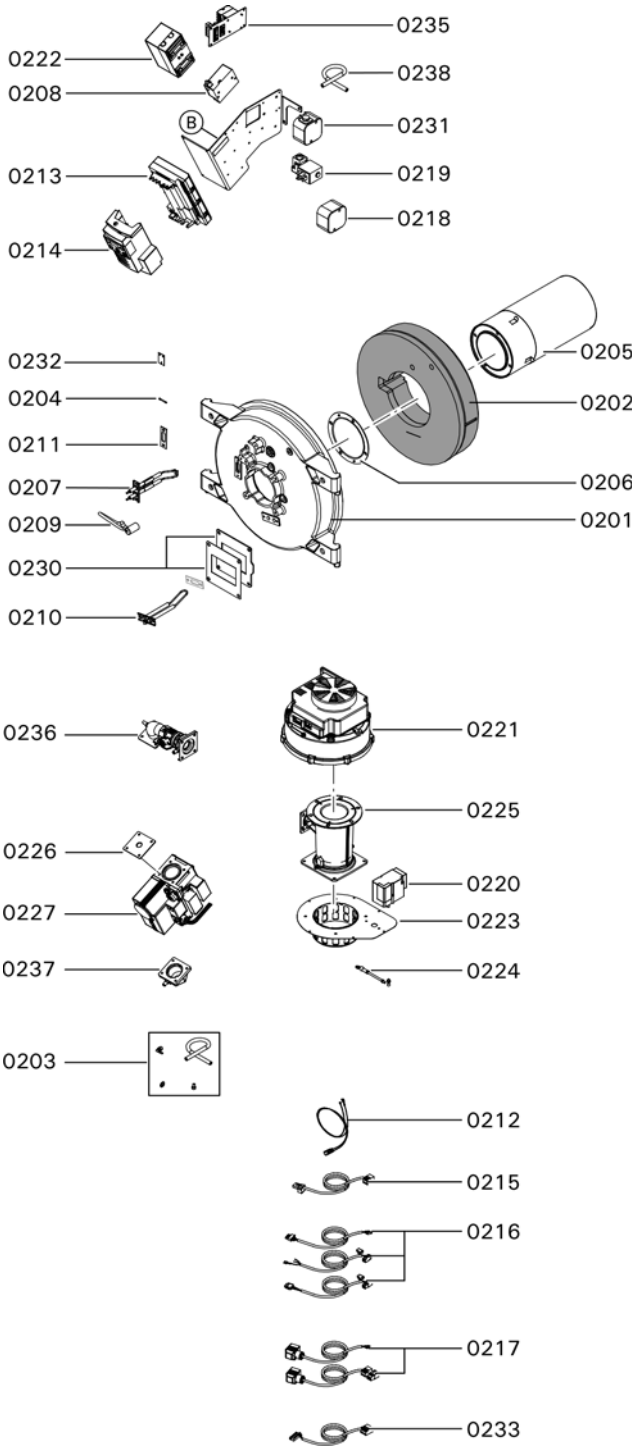
0201 Combustion chamber door (with 202 refactory)
0202 Combustion chamber door refactory
0203 Accessory pack, small parts for burner
0204 Accessory pack, small parts for mounting
0205 Cylinder burner
0206 Burner gasket
0207 Ignition electrode block
0208 Ignition transformer
0209 Ignition cable
0210 Ionization electrode block with gasket
0211 Gasket for ignition electrode
0212 Wiring harness for ionization/ground
0213 Burner control VUC310-B10.001
0214 Programming unit HI201-B02.001 with LED display
0215 Ignition cable “54”
0216 Wiring harness for fan
0217 Wiring harness for gas valve
0218 Pressure switch for fan inlet with “131” harness
0219 2/2-way solenoid valve (only for model 186)
0220 Servomotor STA 120V (only for models 246 and 311)
0221 Fan, G1G170, 120/1/60
0222 AC-EMI suppression filter device
0223 Inlet damper (only for models 246 and 311)
0224 Linkage M5 (only for models 246 and 311)
0225 Venturi mixing pipe
0226 Oriface LPG (sold as a conversation kit)
0227 Gas valve, VR4730
0230 Fan gaskets
0231 Pressure switch for overfire with “131A” harness
0232 Coding card
0233 Wiring harness for step-motor (only for models 246 and 311)
0234 Wiring harness “38” (for 2/2-way solenoid valve) (only for model 186)
0235 Plug console with relay contactor
0236 Gas manifold with shut-off
0237 Flange for gas valve
0238 Silicone tubing

Other Parts (not illustrated)

0229 Dampening orifice
0250 Conversion kit for NG *1
0251 Gas pressure switch C60VRT40040
0415 Nipple*2
0416 Gas ball valve*2

*1 Burner ships configured for NG with an LPG conversion kit. Order NG conversion kit to convert from LPG back to NG at a future date.

*2 Shipped with installation fittings.



Ⓑ Burner rating plate

5607 706 - 04

Maintenance Record

Setting and Test Values		Commissioning	Maintenance/Service
Static Pressure		*mbar/"w.c.*	
Supply Pressure (running pressure)			
❑ for natural gas NG		*mbar/"w.c.*	
❑ for liquid propane gas LPG		*mbar/"w.c.*	
Tick gas type			
Carbon Dioxide Content CO_2			
■ at the upper rated heating output	actual	*% by vol.*	
	set	*% by vol.*	
■ at the lower rated heating output	actual	*% by vol.*	
	set	*% by vol.*	
Oxygen Content O_2			
■ at the upper rated heating output	actual	*% by vol.*	
	set	*% by vol.*	
■ at the lower rated heating output	actual	*% by vol.*	
	set	*% by vol.*	
Carbon Monoxide Content CO	actual	*ppm*	
	set	*ppm*	

Flue Gas Temperature (gross)	actual	*°C*	
	set	*°C*	
Ionization Current			
■ at the upper rated heating output		*µA*	
■ at the lower rated heating output		*µA*	

Draught	actual	*hPa/"w.c.*	
	set	*hPa/"w.c.*	

Maintenance Schedule

The following is an overview of scheduled service steps.

Regular service work ensures reliable, energy-efficient, and environmentally friendly operation.

IMPORTANT

Keep boiler and boiler room clear and free from combustible materials, gasoline and other flammable vapors and liquids. Do not obstruct the flow of combustion and ventilation air. All inspection, maintenance, and service must be performed by a qualified heating technician.

IMPORTANT

The boiler must be cleaned at least once a year by a qualified heating technician or service agency.

Frequency	Performed by	✔	Service
Monthly	Owner / Operator		Check the system pressure frequently.
			Ensure proper operation of the boiler control. Refer to operating instructions of the control.
			Inspect all seals; retighten or replace as necessary.
			Ensure an adequate supply of combustion air and ventilation air into and out of the mechanical room is being maintained at all times.
			Ensure that nothing is obstructing the flow of combustion ventilation air, and no chemicals, garbage, gasoline, combustible materials, flammable vapors, or liquids are stored, not even temporarily, in the vicinity of the boiler.
			Check for water on the floor from the discharge pipe of pressure relief valve or any other pipe, pipe joint, valve, or air vent.
			Test pressure relief valve and check for proper operation. See instructions attached to pressure relief valve.
			Check all operational high limits for proper operation.
			Check for proper operation of the condensate neutralization system (if used).
			Check the condition and fill status of the neutralization media.
			Check the pH value of the flue gas condensate (min. 6.5).
			Check for moisture water on external vent pipe joints and appearance of ice on the vent pipe or chimney outlet in the winter time.

Maintenance Schedule *(continued)*

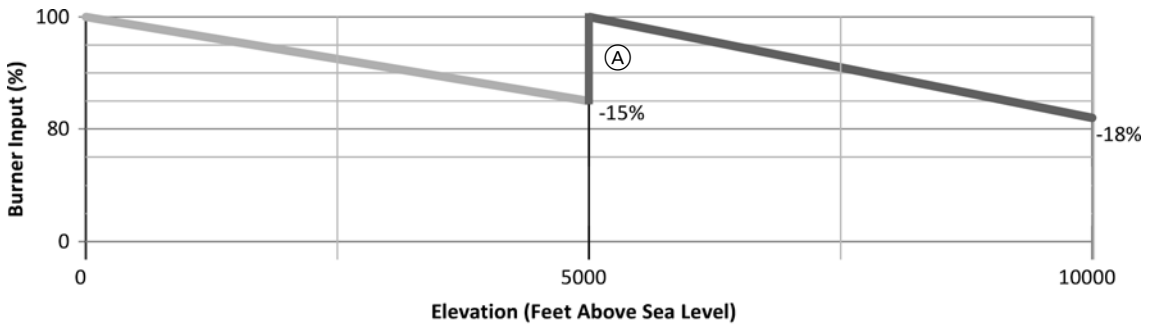
Frequency	Performed by	✔	Service
Annually	**Owner** / **Operator**		Ensure service work/test is conducted at least annually by qualified personnel, and that any deficiencies are corrected immediately.
	Heating **Technician**		Test functionality of safety high limits.
			Test and establish proper chemical makeup of system water.
			Check flue pipe condition, chimney connection and chimney itself.
			Check pressure relief valve and system pressure, and verify proper operation.
			Check heating pipe joints, valves, air vents, etc. System leaks must be corrected immediately to avoid further defects. The cause of defect must also be determined in order to avoid further problems.
			Check for proper combustion air supply and ventilation to boiler / mechanical room.
			Test high limits by dialing lower settings, then switching burner on/off to verify function. Test low water cut-off, check and verify proper function according to manufacturer's instructions.
			Check requirements for maintenance or lubrication of the circulation pumps according to manufacturer's instructions.
			Check for gas-tight connection of gas piping, unions, gas valve and manifold.
			Check proper ignition of the burner.
			Combustion test must be performed by a qualified heating **technician**.
Periodically	Heating **Technician**		Ensure functionality of low water cut-offs, including flushing of float types (if used) during operation. Refer to the manufacturer's instructions.
			Inspect low- and/or high pressure gas switch (if used).
			Inspect main burner flame and follow the instruction manual for detailed service and maintenance guidelines.
			All boilers and the boiler room must be kept free of high dust levels, high humidity, aggressive vapors and/or chemicals containing chlorine.
			Ensure proper boiler room ventilation.
			Valves, fittings and pipes not pressure tight must be repaired.
			Combustion chamber door, clean-out opening covers, and flanges may need to be retightened and resealed. Do not over tighten.

Technical Data

Boiler Model	CM2	186	246	311
Input	MBH	663	878	1112
	(kW)	(194)	(257)	(326)
Minimum Input	MBH	133	175	222
	(kW)	(39)	(51)	(65)
Output *1	MBH	643	851	1078
	(kW)	(188)	(249)	(316)
Net AHRI rating	MBH	559	740	937
	(kW)	(164)	(217)	(275)
Combustion efficiency *1	%	95	95	95
Thermal efficiency *1	%	97	97	97
Overall length(e)	in.	73	73	73
	(mm)	(1852)	(1852)	(1852)
Overall width (c)	in.	36½	36½	36½
(including insulation)	(mm)	(930)	(930)	(930)
Overall height (a) *2	in.	66	66	66
(including control unit)	(mm)	(1676)	(1676)	(1676)
Concrete boiler base				
Length	in.	40	40	40
	(mm)	(1005)	(1005)	(1005)
Width	in.	31	31	31
	(mm)	(800)	(800)	(800)
Thickness	in.	4	4	4
	(mm)	(100)	(100)	(100)
Weight				
Boiler body	lb	503	536	564
	(Kg)	(228)	(243)	(256)
Complete with the burner, control	lb	726	759	792
and thermal insulation	(Kg)	(329)	(344)	(359)

*1 Tested to AHRI, BTS-2000 Testing Standard Method to Determine Efficiency of Commercial Heating Boilers.
*2 Add 1⅝ in. (40 mm) when using seismic mounts (optional accessory).

Note: For altitude operation up to 4,999 ft (1524 m), derate the input capacity by 3%/1000 ft (3%/305 m). For operation from 5,000 to 10,000 ft (1524 to 3048 m), with the electronic altitude adjustment made, derate the input capacity by an additional 0.6%/1000 ft (0.6%/305 m). for a total derate of 18%.



Ⓐ Input capacity after electronic altitude adjustment is made.

5607 706 - 04

Technical Data

Boiler Model	CM2	186	246	311
Boiler Water Content	USG	81	77	74
	(L)	(306)	(292)	(279)
Heat exchanger surface	ft.2	73.2	90.4	114.1
water cooled	(m2)	(6.8)	(8.4)	(10.6)
Maximum Operating Temperature	°F	190	190	190
	(°C)	(88)	(88)	(88)
Maximum Operating Pressure	psig	75	75	75
	(kpa)	(517)	(517)	(517)
Boiler Connections				
Boiler supply and return (BS), (BR)	in.	2½	2½	2½
(ANSI flanges)	(mm)	(65)	(65)	(65)
Safety Supply	in.	1¼	1¼	1¼
	(mm)	(32)	(32)	(32)
Boiler Drain	in.	1	1	1
Condensate Drain	in.	¾	¾	¾
Vent pipe				
Internal Diameter	in.	8	8	8
	(mm)	(201)	(201)	(201)
Flue Gas Values temperature (at a return temperature of 86°F (30°C)				
at rated input	°F	136	132	130
	(°C)	(58)	(55)	(54)
at partial load	°F	95	95	95
	(°C)	(35)	(35)	(35)
Temperature (at a return temperature of 140°F (60°C)				
at rated input	°F	167	167	167
	(°C)	(75)	(75)	(75)
Mass flow rate (of flue gas)				
at rated input	lbs/h	593	785	994
	(kg/h)	(269)	(356)	(451)
at partial load	lbs/h	198	262	331
	(kg/h)	(90)	(119)	(150)
Pressure				
at boiler flue outlet	pa	70	70	70
at rated input	"w.c.	0.28	0.28	0.28
Standby loss at maximum input and steady state condition 180°F/80°F (82°C/27°C) supply and return water temperature	BTU/h (W)	862 (252)	1053 (308)	1334 (391)
	%	0.13	0.12	0.12
At boiler water temperature 158°F (70°C) [room temperature 68°F (20°C)]	BTU/h (W)	3315 (971)	3512 (1029)	4448 (1303)
	%	0.5	0.4	0.4

Cylinder Burner

Cylinder burner specifications

Boiler Model CM2		**186**	**246**	**311**
Product ID			see boiler	
Voltage	V	120	120	120
Frequency	Hz	60	60	60
Power consumption				
at max. input	W	225	278	368
at min. input	W	51	52	67
Version			modulating	
Dimensions				
Length	mm	450	450	450
Total length	mm	595	595	595
Length with burner hood	mm	510	510	510
Width	mm	550	550	550
Height	mm	480	480	480
Weight Burner with combination valve and burner hood	kg	33	33.5	35.5
Min. gas supply pressure				
Natural gas	"w.c.	4	4	4
Liquid propane gas	"w.c.	10	10	10
Max. gas supply pressure				
Natural gas	"w.c.	14	14	14
Liquid propane gas	"w.c.	14	14	14
Gas connection	NPT	1	1¼	1¼

Printed on environmenally friendly (recycled and recyclable) paper.

Technical information subject to change without notice.

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5607 706 - 04