



Vitotherm



Instruction
manual

Automatic forced draught burner

MONO-jet | LowNOx

AUTOFLAME[®]

EN (English) original instructions

Burner type

VGI-sXXXX MONO-jet for gaseous fuels

VOI-sXXXX MONO-jet for liquid fuels

Original instructions

The original manual is written in UK English. All other language versions are translations of the original manual.

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Disclaimer of liability

The manufacturer cannot be held responsible for personal injury, damage to the burner or property damage caused by incorrect use, foreseeable misuse or failure to follow the instructions in this manual. This also applies to unauthorised modifications of the burner and the use of non-approved spare parts, tools or accessories.

The manufacturer reserves the right to modify this manual without notification beforehand.

Customer service

Our customer service department is available 24 hours a day to provide any required technical information and support.

Please have the burner plate information of the burner available when you contact our customer service department (see §3.7).

+31 (0) 15 369 47 57

Warranty

The equipment supplied by Vitotherm has a one-year warranty covering materials from date of commissioning against defective parts, limited to the delivery of parts only. Warranty is only valid when the installation has been realised in accordance with our instructions and commissioning is executed by a Vitotherm engineer or by Vitotherm authorised personnel.

During the period of the warranty any failures to Vitotherm equipment will be repaired within 10-14 days. Our local service expert for future regular maintenance will be at our daily rate.

Table of Contents

1	Introduction	3	4	Installation	39
1.1	About this document	3	4.1	Checking the delivery	39
1.2	Relevant documentation	3	4.2	Installing the combustor	40
1.3	Symbols and labels	3	4.3	Installing the fan housing	45
1.4	Used terms and definitions	4	4.4	Installing the boiler thermostat set	49
1.5	Conformity	5	4.5	Electrical connections	50
2	Safety	7	4.6	Installing the gas line adapter	50
2.1	Introduction	7	4.7	Installing the Vitopack	52
2.2	Intended use	7	4.8	Installing the oil pump or firing set	56
2.3	Reasonably foreseeable misuse	7	5	Commissioning	61
2.4	Qualification of personnel	8	6	Operation	63
2.5	Protective measures	8	6.1	Control panel	63
2.6	Residual risks	9	6.2	Frequency drive	65
2.7	Warning labels	10	6.3	Emergency shut down	65
2.8	Emergency measures	11	7	Troubleshooting	67
2.9	Safety precautions	12	8	Maintenance	71
3	Design and function	15	8.1	Pre-emptive parts replacement schedule	71
3.1	Combustor	17	8.2	Annual Periodic Maintenance	72
3.2	Gas train (<500 mbar)	18	8.3	Maintenance of the burner	74
3.3	Control panel	19	8.4	Testing the safety components	77
3.4	Boiler thermostat set	20	9	Decommissioning and disposal	81
3.5	Modulating oil firing set	21	9.1	Decommissioning	81
3.6	Optional components	22	9.2	Dismantling the burner	81
3.7	Burner plate	30	9.3	Disposal	82
3.8	Dimensions	32	10	Transport and storage	85
3.9	Performance data	35	10.1	Transport	85
			10.2	Storage	87



1 Introduction

1.1 About this document

This manual contains instructions and safety information for operation, installation, commissioning and maintenance of the Vitotherm Automatic forced draught burner.

This manual is intended for:

- the owner of the burner system;
- the worker that operates the burner system;
- the qualified technician that performs the installation of the burner system;
- the engineer that is authorized by Vitotherm to perform (re)commissioning, adjustments, troubleshooting, maintenance and repairs of the burner system.

1.2 Relevant documentation

This manual contains references to external documents that are part of the burner's technical file:

NOTICE

The technical file is provided on a USB-drive, located inside the control panel.

- Order confirmation; a document that contains essential information about your specific burner system configuration
- Electrical wiring diagram
- OEM manuals & documentation
- Commissioning report
- Installation overview; a 3D drawing of the setup of your specific burner system configuration

1.3 Symbols and labels

1.3.1 Safety warnings

This manual contains safety warnings that may result in injury when ignored. Each safety warning is indicated with a signal word. The signal word corresponds with the level of risk of the described hazardous situation:

Signal word	Level of risk	If not avoided
⚠ DANGER	High	Will result in death or serious injury
⚠ WARNING	Medium	Could result in death or serious injury
⚠ CAUTION	Low	Could result in moderate or minor injury

Safety warnings given at the start of a section apply to the entire section.

Format example of a safety warning:

 **WARNING**

Contact with live parts can cause electric shocks, burns or even death.

- ▶ Only perform work on electrical equipment if you are an authorised electrician.
- ▶ Before you start working on electrical equipment: Switch off and lock out the power supply isolator and verify that no voltage is present.

1.3.2 Notices

Messages that are not hazard-related are indicated with the signal word **NOTICE**. These messages do not have a safety alert symbol.

Format example of a message that is not hazard-related:

NOTICE

Operating the engine at an oil level below the minimum limit value can damage the engine.

- ▶ Regularly check the oil level and refill when necessary.

1.3.3 Other symbols



This symbol identifies a reference to an external document, such as an OEM manual.

1.4 Used terms and definitions

Term	Definition
Burner	MONO-jet burner unit, which includes the fan and combustor.
Burner system	Complete burner assembly as delivered, including gas train and control panel.
Boiler	The heating appliance to which the burner system is connected. A water boiler is the most common type of heating appliance and will be used as the main example in this document.
Boiler house	The building in which the burner system and boiler are installed.
OEM manual	User manual of the original equipment manufacturer.

1.5 Conformity

Vitotherm gas burners carry the CE and EAC marks as a proof of compliance to the following EU directives:

1. GAR 2016-426-EU
2. MD 2006-42-EG
3. PED 2014-68-EU
4. EMC 2014-30-EU
5. LVD 2014-35-EU
6. CE-PIN: 2009/142/EC

See Appendix B for the full declaration of conformity.



2 Safety

2.1 Introduction

Observe the instructions in this manual before you start working with the burner. If you fail to follow the instructions from this manual you can put persons, surroundings, the environment and the burner at risk. Store this manual in an accessible place near the burner for future reference.

- ▶ Always comply with the information, such as labels and the burner plate, attached directly to the burner and keep the information in a legible condition.
- ▶ Always comply with applicable local laws and regulations.

The burner is equipped with several safety components that ensure safe working with the burner.

2.2 Intended use

The Vitotherm Automatic forced draught burner is a burner for intermittent firing and continuous firing of a boiler or other heating appliance.

The range of applications and type of fuels that the delivered burner type can handle are explained in the Declaration of Conformity. Other fuels must be confirmed by Vitotherm BV.

- The burner must only be operated with the type of fuel as indicated on the burner plate and in the order confirmation.
- The fuel supply pressure must not exceed the pressure given on the burner plate.
- The burner must not be operated outside its operating range (see load values on the burner plate).
- The burner must only be used for an application in compliance with the requirements in the order confirmation.
- The burner must only be used under ambient conditions in compliance with the requirements in the order confirmation.
- The burner must only be used in compliance with applicable local laws and regulations.

Safe use of the burner is only guaranteed if it is used as intended.

2.3 Reasonably foreseeable misuse

The following is considered foreseeable misuse:

- Operation and use of the burner that deviates from the intended use as described in the previous section.
- Failure to comply with the instructions in this manual.
- Failure to eliminate faults, malfunctions or defects of the burner that impose safety risks.
- Failure to carry out the inspections and maintenance operations as described in this manual.
- Unauthorized removal or modification of parts or safety components of the burner.
- Use of spare parts or accessories that have not been approved by the manufacturer.
- Operation in a closed-off or poorly ventilated room.

2.4 Qualification of personnel

Only authorised personnel is allowed to operate and clean the burner. They must possess the following qualifications:

- are legal of age;
- are familiar with and abide by the safety instructions and sections of this manual related to operating the burner;
- are familiar with and abide by the applicable local, national and international laws and regulations;
- are officially trained and certified by Vitotherm B.V.
- have received adequate training to operate and clean the burner;
- have obtained authorisation to access the burner.

Only authorised technicians are allowed to perform installation and maintenance of the burner. They must possess the following qualifications:

- are legal of age;
- are familiar and abide by the safety instructions and sections of this manual related to installation and maintenance of the burner;
- are familiar with and abide by the applicable local, national and international laws and regulations;
- are able to recognize the possible dangers of the burner and take the necessary measures to protect persons and property;
- have received adequate training in the safe maintenance of the burner;
- have obtained authorisation to access the burner.

2.5 Protective measures

2.5.1 Personal protective equipment (PPE)

Personnel that operates the burner must equip themselves with the following:

Technicians that install or perform maintenance on the burner must equip themselves with the following:



Wear foot protection



Wear foot protection



Wear eye protection



Wear eye protection



Wear ear protection (above 80 dB)



Wear protective gloves



Wear head protection (during lifting work)

2.5.2 Organizational measures

The owner is responsible for carrying out the necessary organizational measures to ensure safe use. Amongst other measures this is achieved by, but not limited to:

- Training and authorising personnel. Vitotherm is responsible for distributing passwords to authorised personnel only.
- Performing hazard assessments of the complete system that incorporates the burner and informing personnel of the possible dangers and protective measures.
- Performing good housekeeping in the facility that houses the burner.
- Running a preventive maintenance program.

2.6 Residual risks

Despite the safe design and construction of the burner and the prescribed protective measures, the burner poses residual risks. This manual provides safety messages to indicate these risks. The formatting and appearance of safety messages that are dedicated to a particular section or sentence are explained in §1.3.1. Overall safety messages are grouped in the following sections.

2.6.1 Combustible materials

⚠ WARNING

The burner system contains pressurized components and piping containing combustible fuels.

- ▶ Install pipework in accordance with the applicable rules and standards.
- ▶ Protect pipework against corrosion and mechanical forces.
- ▶ Take fire prevention and control measures in accordance with governmental rules and regulations.
- ▶ Provide proper means of emergency escape.
- ▶ Store the fuel in accordance with governmental rules and regulations.
- ▶ Always consider your own safety, that of others and the risks for the environment that may arise due to fuel escaping.

2.6.2 Combustion process

⚠ WARNING

An incomplete combustion process can produce toxic gases.

- ▶ Equip the boiler house with properly sized vents. The boiler must have a gas-tight gas flue to the outside in accordance with locally applicable standards.
- ▶ Make sure that the burner is always supplied with sufficient clean combustion air.
- ▶ Do not store or process anything near the air intake vents.
- ▶ Make sure that fan opening is never blocked (e.g. by a loose object such as pieces of paper).
- ▶ Provide proper means of emergency escape.

2.6.3 Electricity

WARNING

Contact with live parts can cause electric shocks, burns or even death.

- ▶ Only perform work on electrical equipment if you are an authorised electrician.
- ▶ Perform the work on electrical equipment in accordance with the local safety standards.
- ▶ Do not make changes to the burner system if you are not qualified to do so.
- ▶ Before you start working on electrical equipment: Switch off and lock out the power supply isolator and verify that no voltage is present.
- ▶ Use fuses that correspond with the installed power of the burner.
- ▶ Regularly check the electrical wiring for loose connections and damage and repair them without delay.

2.6.4 Mechanical

WARNING

The burner system contains moving, pressurized and sharp parts that can crush, cut or hit.

- ▶ Do not operate the burner with covers or guards removed.
- ▶ Do not operate the burner with missing pipework or components.
- ▶ Never touch the air damper box during operation.
- ▶ Be aware of sharp edges.

2.6.5 Temperature

CAUTION

The interior parts and surfaces of the burner that reach high temperatures cannot be reached under normal operating conditions.

- ▶ Do not expose and/or touch interior parts and surfaces of the burner during operation or shortly after operation.
- ▶ Properly isolate hot surfaces of the burner system.

2.7 Warning labels

Always comply with warning labels and information signs on the burner. The warning labels and information signs must be kept legible and must be replaced if necessary. For this purpose, contact the manufacturer.

2.8 Emergency measures

The following emergency situations require special measures to be taken:

2.8.1 Gas leak

For VGI

The smell of gas nearby the burner can indicate a leak in the gas supply of the burner system.

⚠ WARNING

Gas leaking from the burner system is highly flammable.

- ▶ Switch off or remove any potential sources of ignition when a potential gas leak is detected.
- ▶ No smoking! Avoid open flames and sparks.
- ▶ Open doors and windows of the boiler house.
- ▶ Close the gas shut-off valve.
- ▶ Shut down the burner system.

To fix a gas leak:

Use gas leak spray or a gas detection device to trace/detect the leak.

NOTICE

Gas leaks usually occur at the gaskets or couplings of the gas train.

If the leak occurs at a gasket or coupling:

1. Switch off the gas supply.
2. Replace the gasket or coupling.
3. Tighten all nuts, bolts and flanges.
4. Apply a soap solution to the new gasket or coupling.
5. Pressurize the gas train.
6. Check for any soap bubbles.

2.8.2 Oil leak

For VOI

Oil leaks can be dealt with similarly to gas leaks. The main difference is that oil leaks can be visually detected.

⚠ CAUTION

Oil flows through the installation at pressures of up to 30 bar.

- ▶ Always keep a safe distance from an oil leak.

2.8.3 Fire

When fire is detected on or around the burner, take the following measures:

⚠ WARNING

Fires on or around a burner system can lead to a gas explosion.

- ▶ Always store a fire extinguisher close to the burner.
-

1. Call the emergency number.
2. Use the control switch on the control panel to close the fuel supply to the burner.
3. Use the manual emergency shut-off switch outside the boiler house to close the gas supply to the boiler house.
4. Use the fire switch outside the boiler house to cut off the power to the burner.

2.9 Safety precautions

A burner system is equipped with several safety components that help prevent dangerous situations.

For more information about safe use of the burner, see chapter 2.6.



For more information about the integration of the safety components into the system, please refer to the electrical wiring diagram.

2.9.1 Flame sensor

The flame sensor monitors the intensity of the flame. In case the flame intensity does not correspond with the control mode and sequence, the system is switched off and an alarm is activated.

2.9.2 Gas safety valve

The gas safety valve is an integrated hydraulic component that automatically closes the fuel supply when a low intensity or absent flame is detected.

2.9.3 Gas leak detection system

The gas leak detector is an integrated system that checks the gas safety valves for internal leaks via a 2-fase test.

2.9.4 Low water level cut-off system

The low water cut-off system consists of a low water sensor in the boiler and a cut-off relay in the control panel. The sensor is part of the boiler thermostat set (see §3.4).

The cut-off system shuts down the burner when the water level in the boiler is too low.

2.9.5 Max. thermostat

The maximum temperature thermostat (fail safe) boiler shuts down the burner if the water temperature exceeds the boiler design temperature.

The thermostat is part of the boiler thermostat set (see §3.4).

2.9.6 Air sensor

The minimum air pressure switch shuts down the burner if the produced pressure by the combustion air fan is too low.

The air pressure switch is part of the burner (see §).

2.9.7 Proximity sensor

The proximity sensor shuts down the burner if the combustion air fan motor is out of range concerning its rpm. The proximity sensor is located on the fan motor (see §).

2.9.8 Gas sensor

The minimum gas pressure switch shuts down the burner if the gas supply pressure is too low. The maximum gas pressure switch shuts down the burner if the gas supply pressure is too high.

The gas pressure switches are part of the gas train (see §3.2).

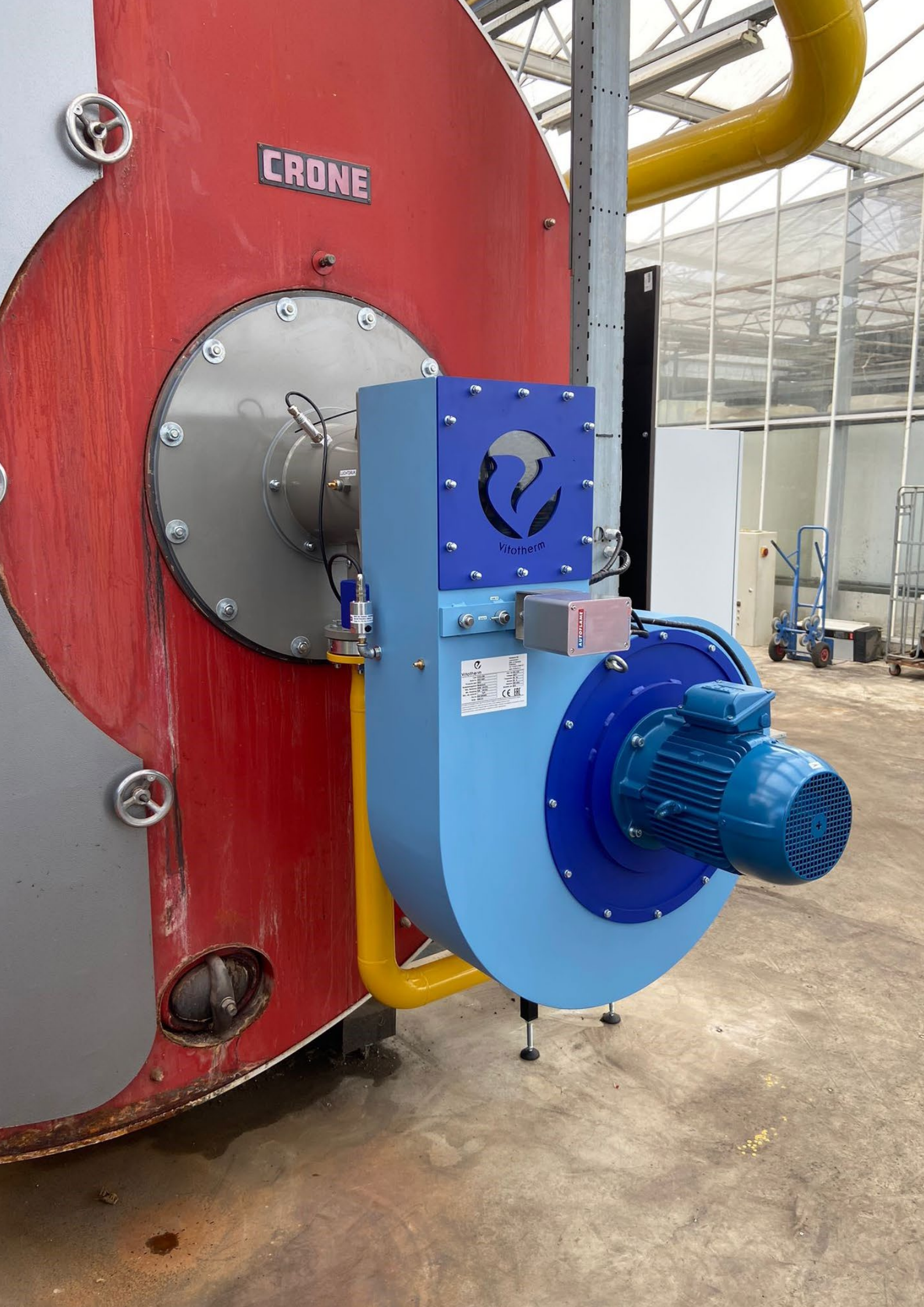
2.9.9 Gas relief valve

A relief valve is located on the gas train (see §3.2). The valve can be opened with a wrench to reduce the pressure inside the gas train or vent the gas train.

2.9.10 Manual deaeration valves

For VOI

A manual deaeration valve is located on the oil buffer of the modulating oil firing set (see §3.5) and the back-up oil firing set (see §). The valve can be opened by hand to reduce the pressure inside the oil buffer or vent the oil buffer.



CRONE



Vitotherm
Technical specifications
CE mark

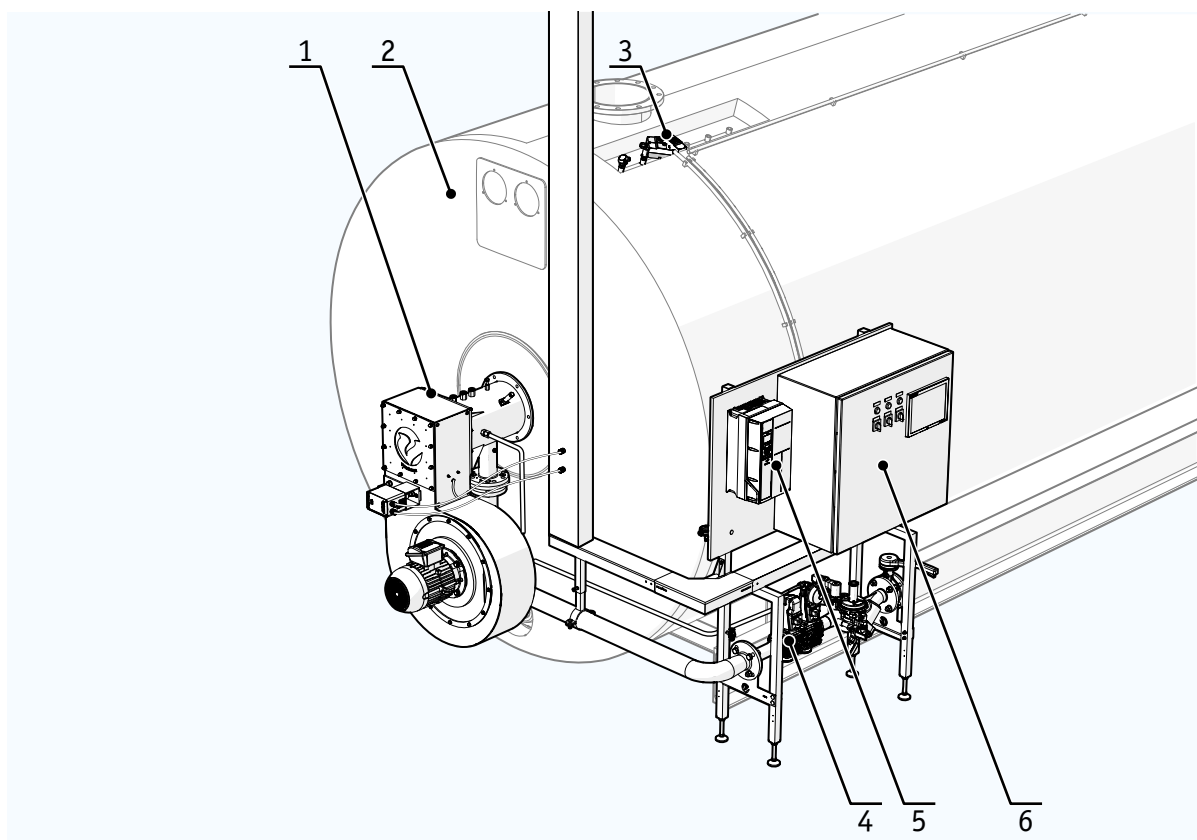


3 Design and function

The Vitotherm Automatic forced draught burner consists of a MONO-jet burner unit and a low NOx burner head. The standard burner system consists of the following components:

NOTICE

The illustrations shown in this manual show a VGI burner system configuration with a Vitopack and an Autoflame control system. Your specific burner system configuration may differ from these illustrations.



- | | |
|--------------------------|--------------------|
| 1. Burner | 4. Gas train |
| 2. Boiler | 5. Frequency drive |
| 3. Boiler thermostat set | 6. Control panel |

The exact configuration of the burner depends on the following factors:

Control system

Autoflame

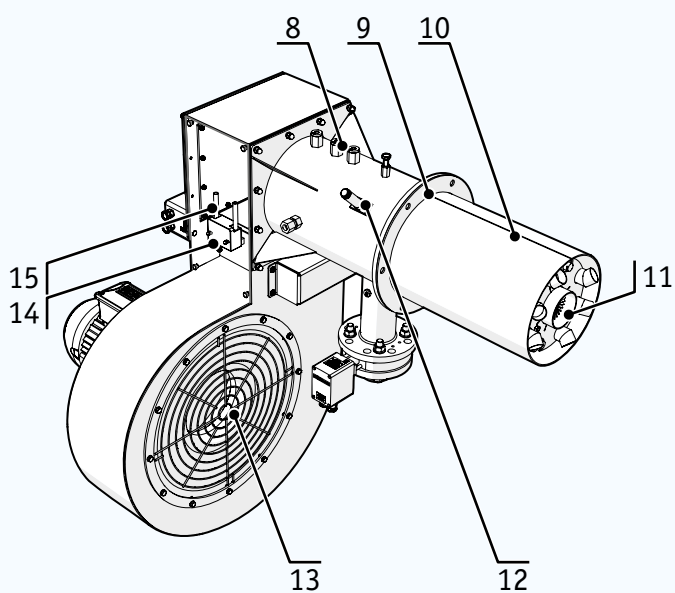
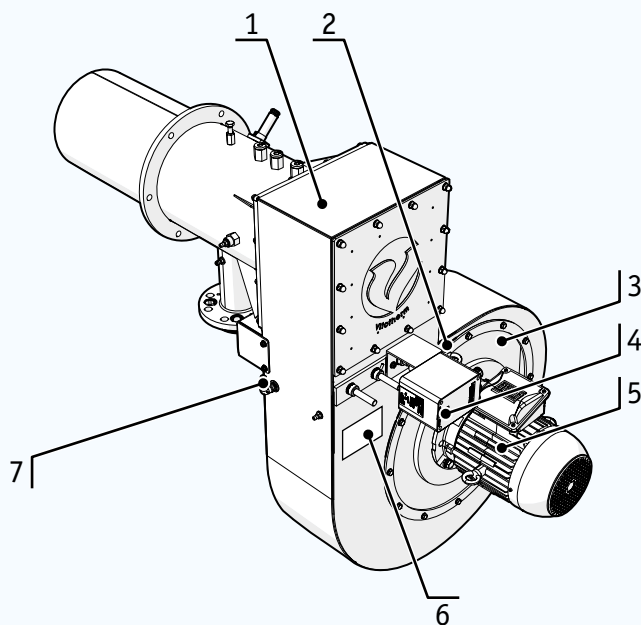
Optional components

See §3.6

Fuel type(s)

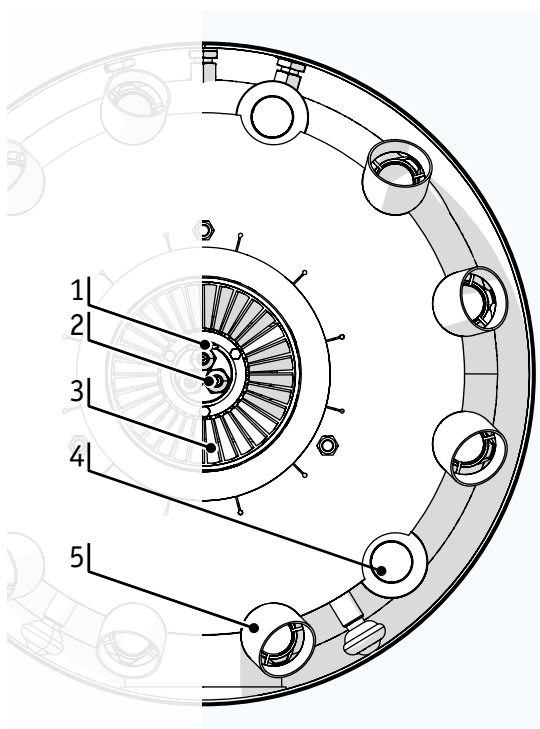
VGI (gas)

VOI (oil)



- 1 Fan housing
- 2 Hoisting eye
- 3 Burner fan
- 4 Air damper servomotor
- 5 Blower motor
- 6 Burner plate
- 7 Air tube connection
- 8 Oil supply connection (VOI only)
- 9 Combustor mounting flange
- 10 Combustor housing
- 11 Low-NOx burner head
- 12 UV cell flame sensor
- 13 Air inlets
- 14 Ignition transformer
- 15 Air valves

3.1 Combuster



- 1 Ignition pin
- 2 Oil nozzle(s):

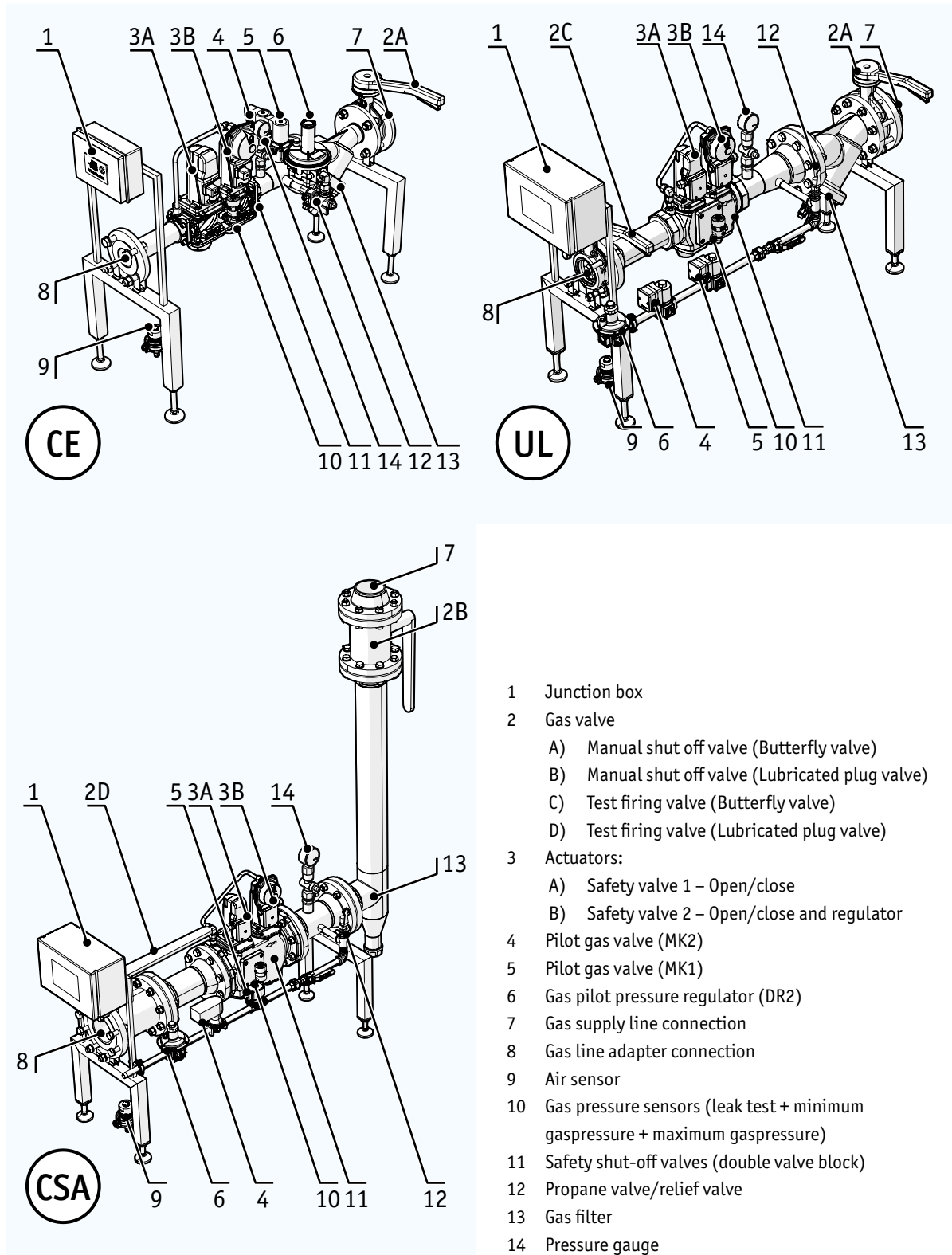
burner	nozzles		
	1	2	3
For VOI	●		

- 3 Air swirler pilot flame
- 4 Stabilising gas nozzle (VGI only)
- 5 Gas firing nozzle (VGI only)

NOTICE

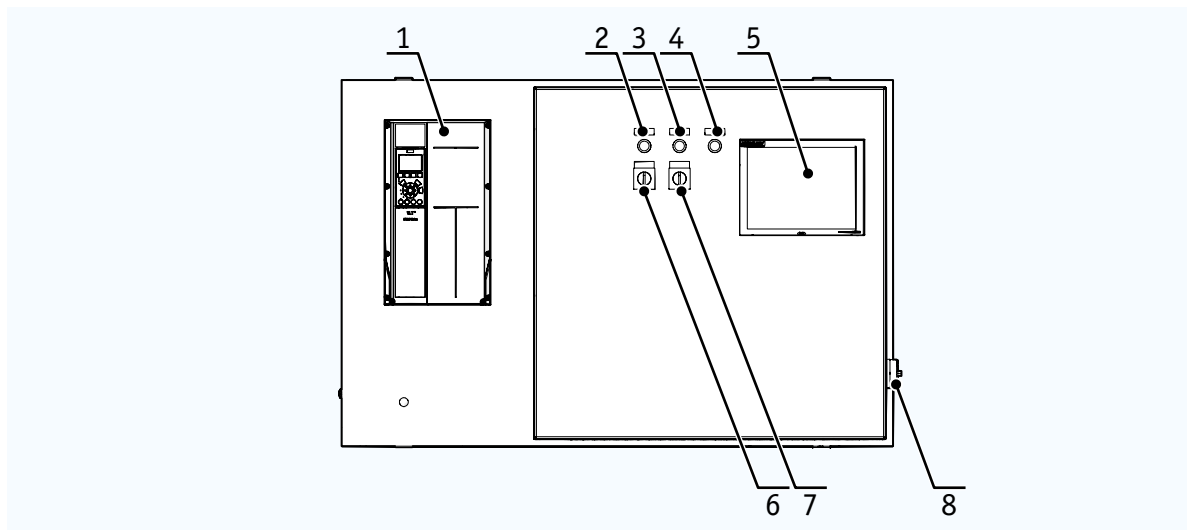
For the spacing between the ignition pins, see Appendix E.

3.2 Gas train (<500 mbar)



3.3 Control panel

The burner is supplied with a control panel. The control panel is equipped with one display, operation switches, and indicator lights.



The following switches and lights are available on a standard control panel:

No.	Description		Function
1	Frequency drive		Controls the speed of the burner fan
2	Computer functional light		Lights green when the external computer is active
3	Failure light		Lights red when a system failure is active
4	Reset button		Resets the complete burner system
5	Burner management display		Display system failures and manual burner controls
6	Control switch	Computer	Switches control to external computer
		Off	Switches control off
		Manual	Switches control to burner management system
7	Mode switch	Automatic	Switches to automatic burner control
		Low	Sets the burner to low flame state
8	Main power switch		Activates the control panel

Depending on the configuration of the burner system, the control panel may have additional buttons, lights and displays. For more information, please refer to the electrical wiring diagram.



For more information about the burner management display, please refer to the OEM manual.

3.3.1 Frequency drive

The fan motor is frequency driven. A separate frequency controller is mounted next to the control panel.



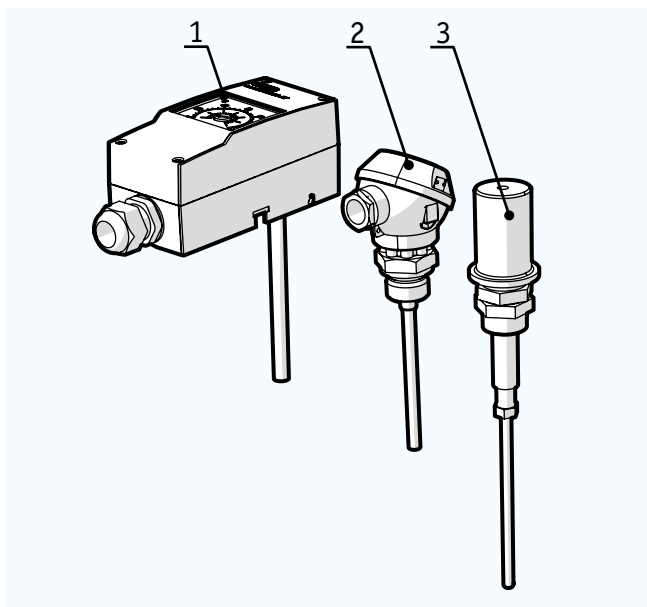
For more information and instructions, please refer to the OEM manual or §6.2 of this manual.

3.3.2 Servomotors

The combined control of the gas supply valve and the air damper by servomotors regulate the gas and air flow for the burner. The servomotors have limit switches, which can be used to adjust the stroke rate. If a servomotor reaches the cam limit, it switches off electronically.

3.4 Boiler thermostat set

The boiler thermostat set consists of three components:



- 1 Max. boiler temperature thermostat
- 2 Temperature sensor (pt1000)
- 3 Low water level sensor

The low water level sensor is connected to a cut-off relay in the control panel to form a low water cut-off system (see §2.9).

The boiler thermostat set is not yet installed upon delivery. For installation instructions, see §4.4.

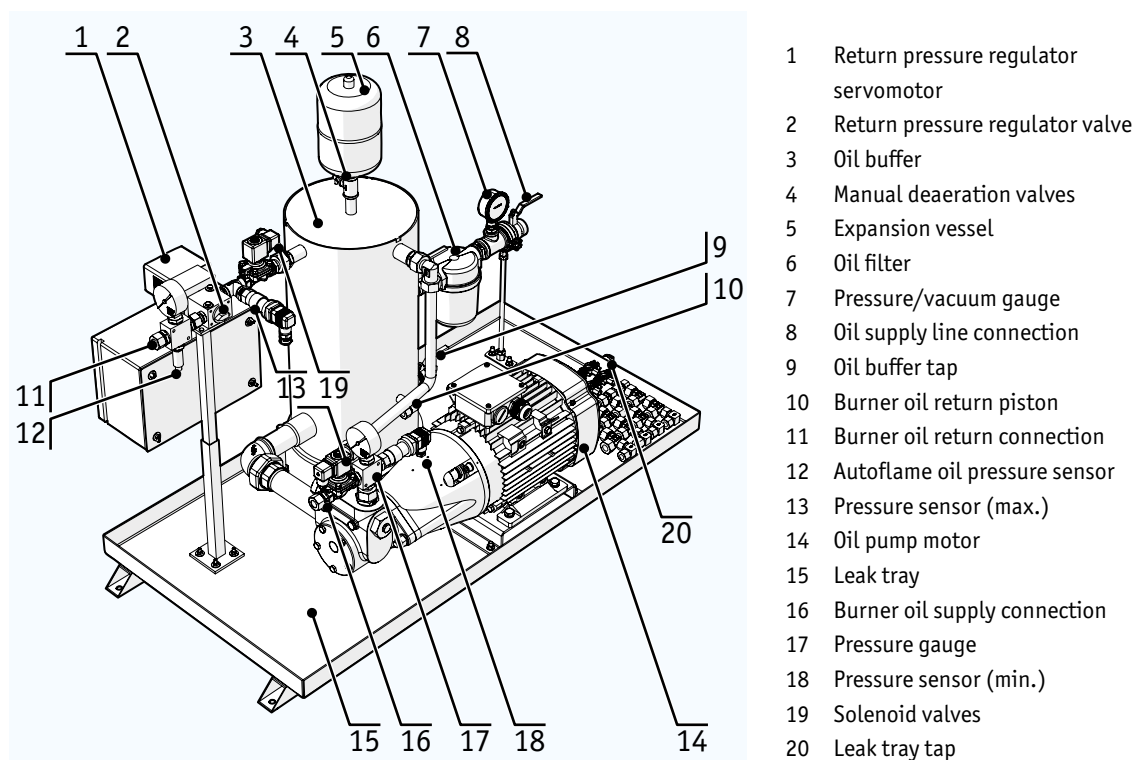


For more information, please refer to the OEM manuals (JUM0).

3.5 Modulating oil firing set

For VOI

The modulating oil firing set enables the burner to run partially or completely on oil for long periods of time. The oil supply is automatically controlled based on the return pressure.

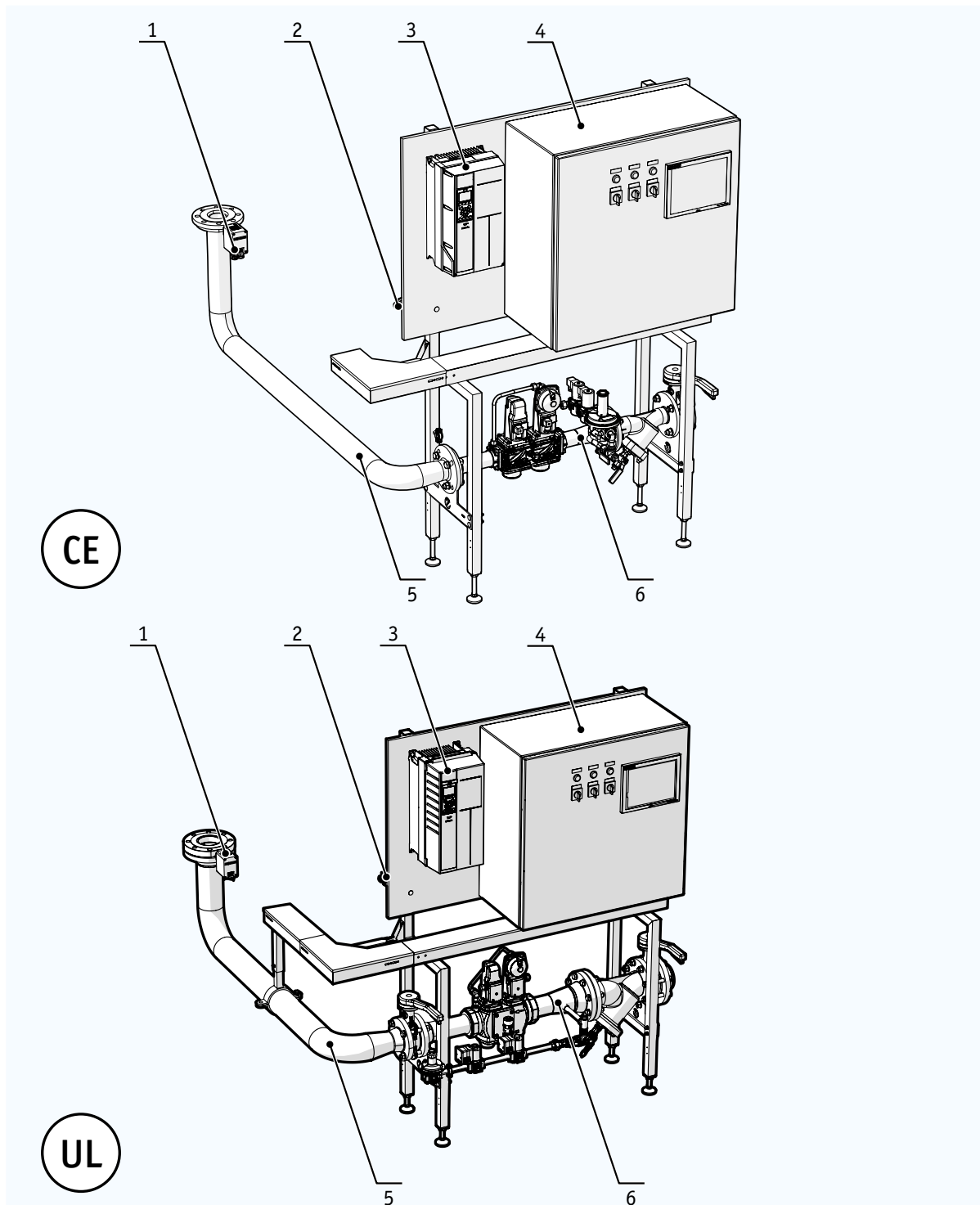


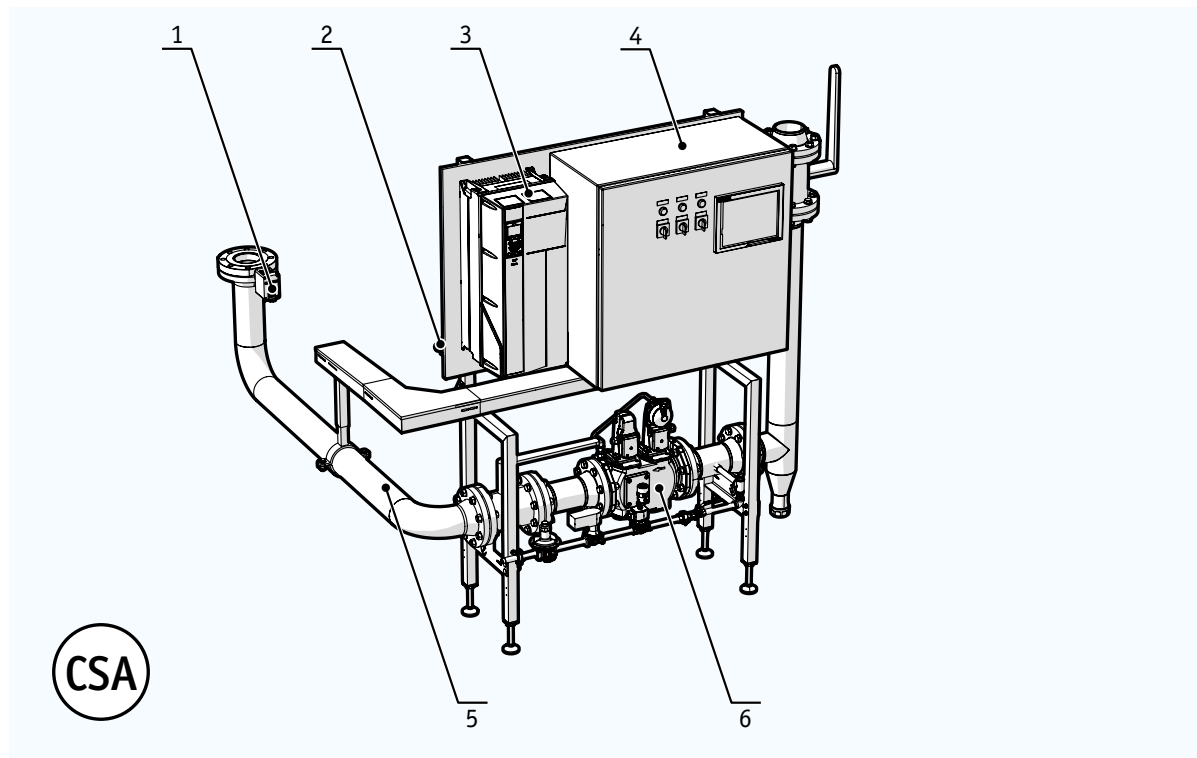
3.6 Optional components

Optional components can be added to the burner to adapt it to special circumstances or add new functions. For an overview of a burner system with all optional components, see Appendix A.

3.6.1 Vitopack

The Vitopack is a premade installation that integrates a gas train, a gas line adapter with butterfly valve, a control panel, and a frequency drive.





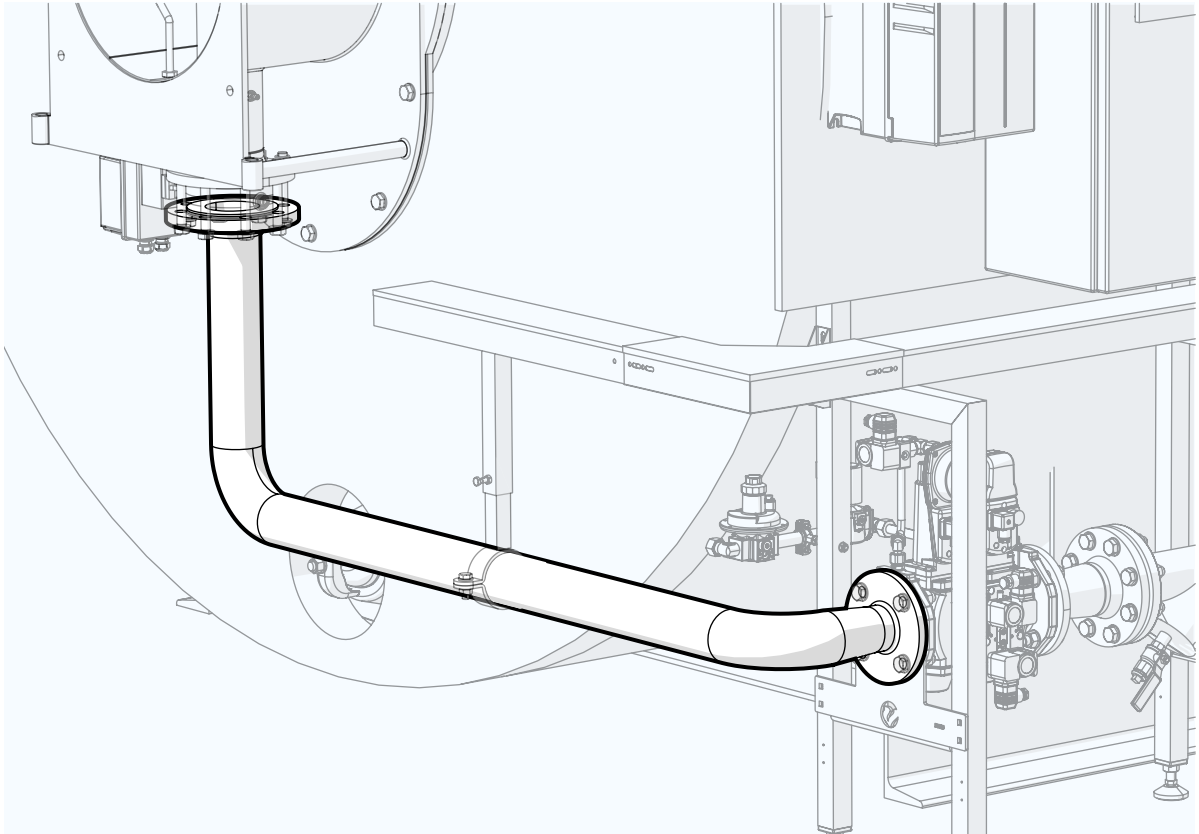
- | | |
|----------------------------|--------------------------|
| 1. Butterfly control valve | 4. Control panel |
| 2. Air pressure sensor | 5. Gas line adapter |
| 3. Frequency drive | 6. Gas train (<500 mbar) |

Vitopack 1 is the standard configuration. Vitopack 2 is also available, and includes a blast tube mounting with refractory and pre-wiring of the boiler. Both configurations come with the option of being fully pre-wired, with connections to all parts of the burner system.

3.6.2 Vitotherm gas line adapter

A Vitotherm gas line adapter connects the gas train to the burner head. Vitotherm offers the option of a custom design that fits your installation.

The gas line adapter is made of powder-coated steel. A standard delivery includes all components necessary for installation (bolts, nuts, rings, gaskets). For instructions on how to install this component, see §4.6.



NOTICE

A flexible section can be mounted between the gas line adapter and burner to allow for some movement.

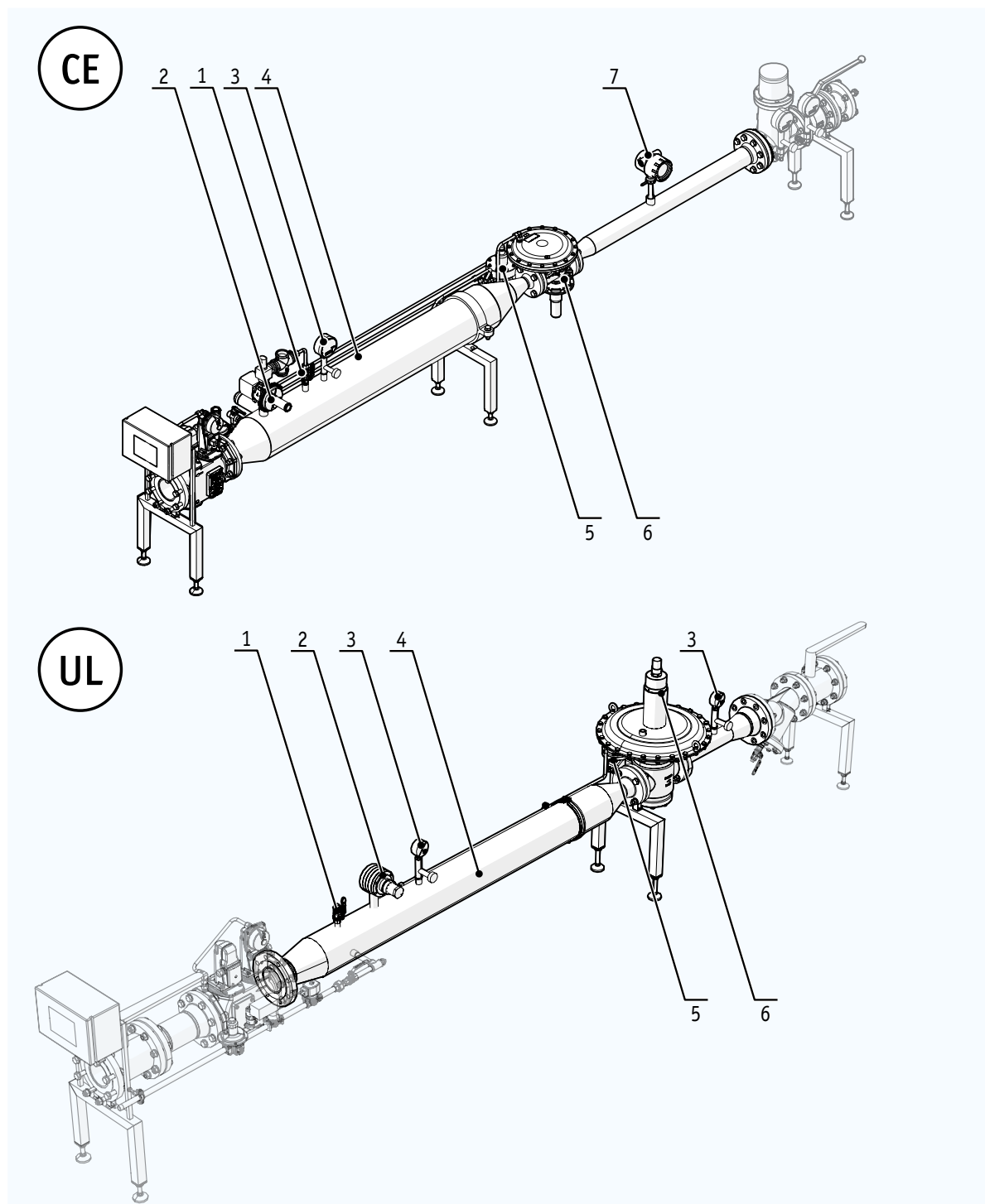


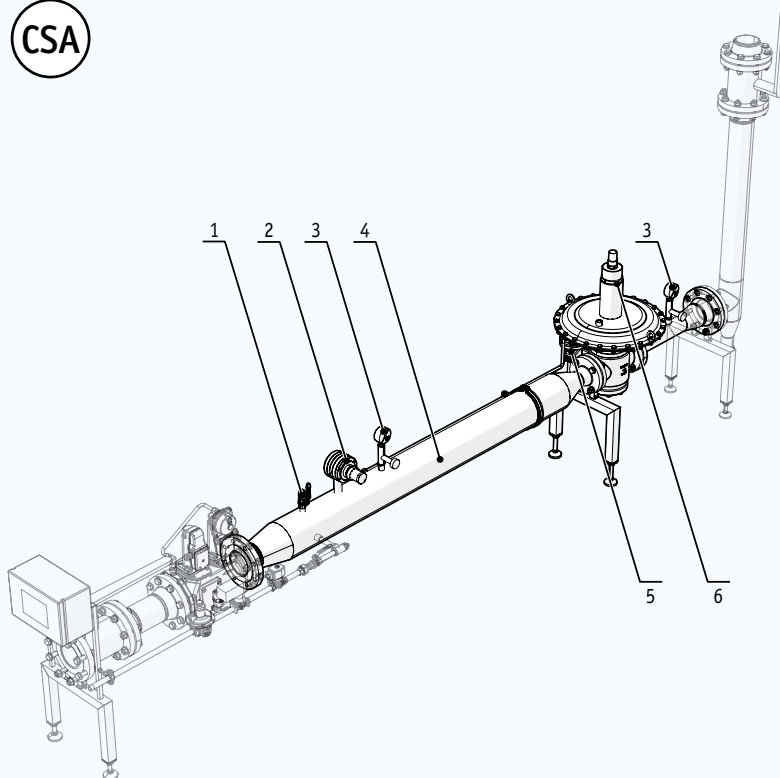
Vitotherm

3.6.3 High pressure gas regulator set

4-8 bar to 200-300 mbar

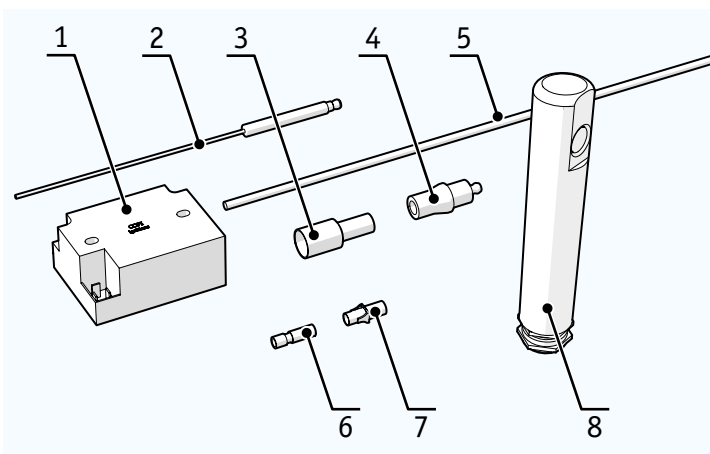
A high pressure gas regulator set can be added to a standard gas train to adapt it to higher gas supply pressures. The set can reduce supply pressures of 4-8 bar to 200-300 mbar.





- | | |
|--|--------------------------|
| 1. Relief valve | 5. Pressure regulator |
| 2. Safety pressure relief valve | 6. Safety shut-off valve |
| 3. Pressure gauge | 7. Gas gauge (optional) |
| 4. Pressure stabilising section (outflow tube) | |

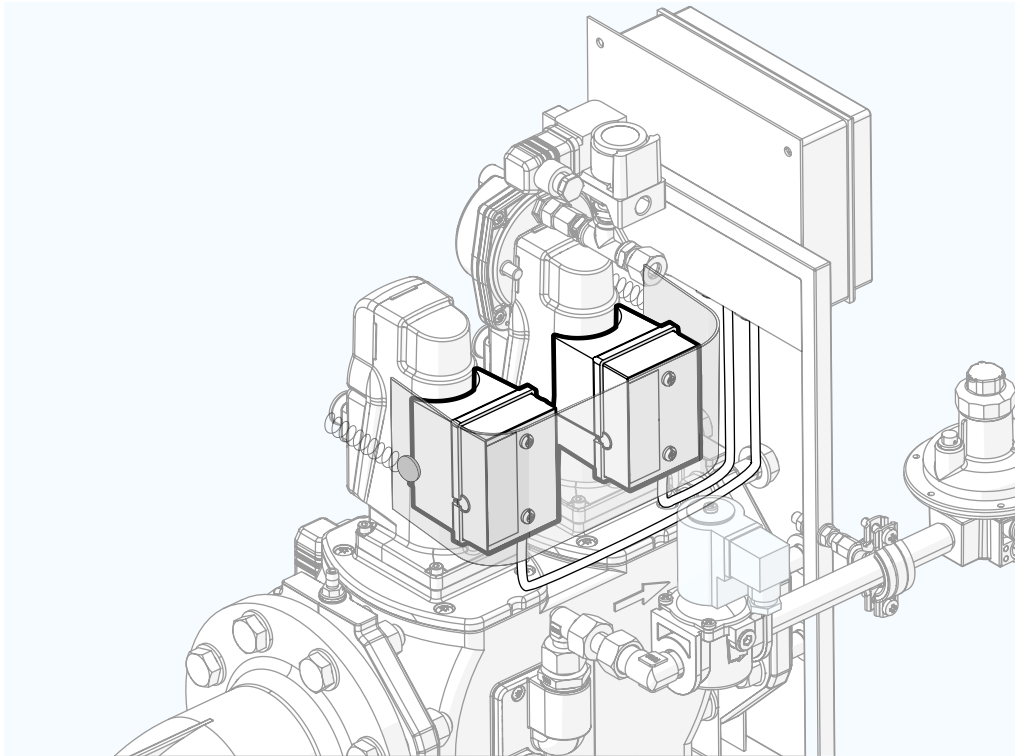
3.6.4 Spareparts set



- | | |
|---|--------------------------|
| 1 | Ignition transformer |
| 2 | Ignition electrode |
| 3 | Cable connector (female) |
| 4 | Cable connector (male) |
| 5 | Ignition cable |
| 6 | Ignition cable connector |
| 7 | Rajah clamps |
| 8 | UV cell flame sensor |

3.6.5 Gas train actuator heating elements

Heating elements can be placed on the actuator of the gas train. The heating elements keep the hydraulic oil in the actuator up to temperature in cold environments. Vitotherm recommends to include this option in an outdoor burner system or in a cold boiler house.



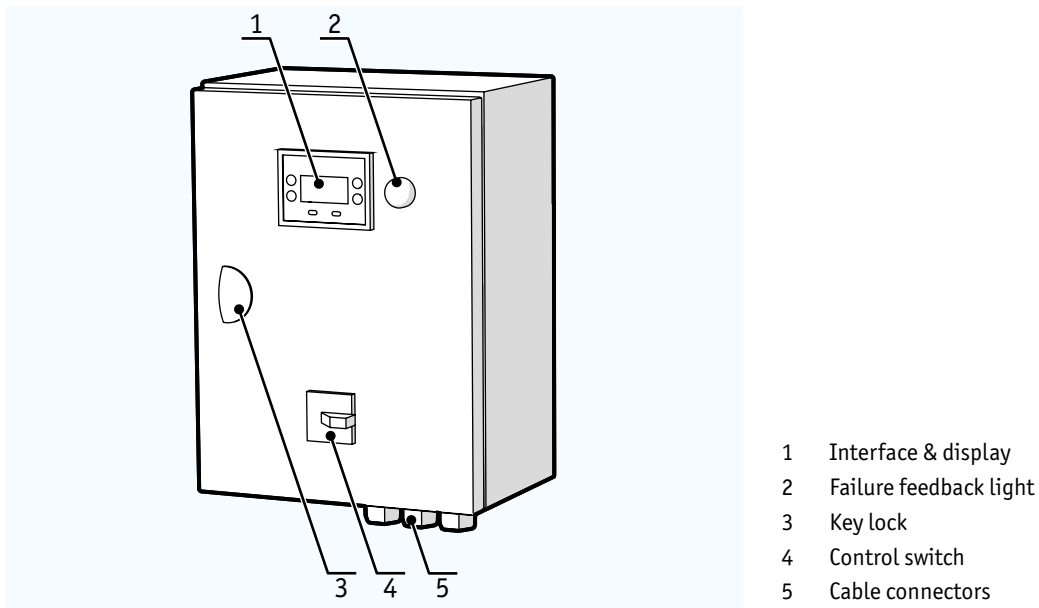
3.6.6 Flue gas valve circuit

A flue gas valve circuit controls the flue gas valve of CO₂ systems equipped with a CO₂ collector with multiple CO₂ sources. The circuit closes the flue gas valve in the flue gas outlet to the CO₂ collector when CO is detected in the flue gas of the system (e.g. when the burner is activated). This prevents CO from entering the CO₂ collector.

3.6.7 Vitotherm CO detector

type VCD2 with sampling pump

A Vitotherm CO detector checks the flue gas that is transported from the burner to external applications (e.g. greenhouses) for carbon monoxide. The CO detector is mounted near the flue gas exhaust.



For more information, please refer to the Vitotherm CO detector user manual.

3.6.8 O₂ controller

EGA

An O₂ controller regulates the amount of O₂ that is added to the fuel mixture. This compensates for differences in gas quality (caloric value) and improves the efficiency of the burner.



For more information, please refer to the OEM manual.

3.6.9 Remote access monitoring

DTI

A server solution is available that enables remote access to information about the burner (e.g. measurement data, logs, error codes). This enables Vitotherm to monitor the burner and provide improved technical support.

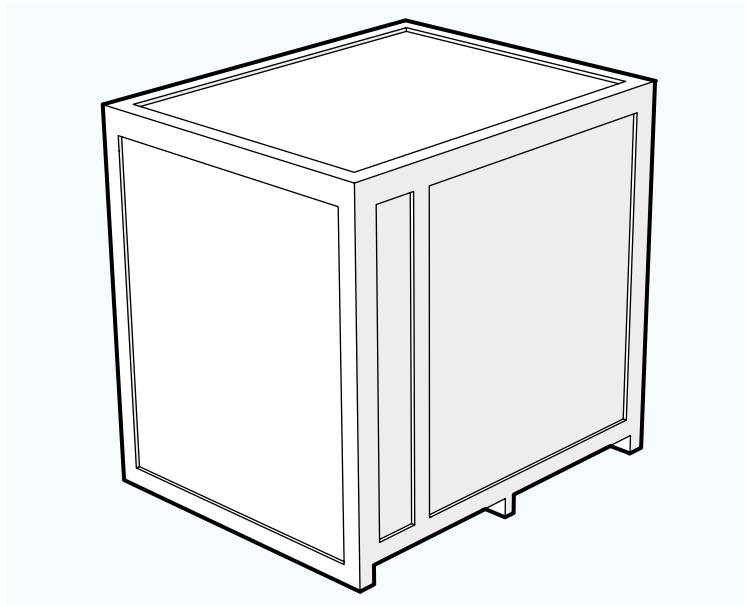
Remote access monitoring is recommended for burners in remote locations.



For more information, please refer to the OEM manual.

3.6.10 Seaworthy packaging

If the burner needs to be well protected or shipped overseas, it can be packed in wooden crates.



3.7 Burner plate



Vitotherm

Vitotherm BV
 Lorentzstraat 1
 2665 JG Bleiswijk
 The Netherlands
 ☎ +31(0)15-3694757
 www.vitotherm.nl

1 —● Type: 2 —● Serial nr.: 3 —● Production year: 4 —● Destination country: 5 —● Max. Input-gas: kW (Hi): 6 —● Min. Input-gas: kW (Hi) 7 —● Max. Input-oil: kg/h 8 —● Gas pressure mbar 9 —● Design altitude m Gas cat. 10 Burner cat. B23 11 Voltage V 12 Frequency Hz 13 Current A 14 Pin no 0461BR0858 15 NoBo 1312/23 16 Fan type 17 Fan motor kW 18	CE EAC 19
---	---

This burner must be installed according to the rules in force, and should be used only in a well ventilated area.

Before the burner is installed and put into operation, the instruction manual must be read.

The electrical part of the burner is built according to the EN 60529, the voltage and amperage is as indicated on the nameplate of the burner.

When servicing the burner the main switch and the gas supply must be switched off at all times.

CE

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Burner type 2. Serial number 3. Year of manufacture 4. Country of destination 5. Maximum load (kW) 6. Minimum load (kW) 7. Maximum oil consumption (kg/h) 8. Gas pressure (mbar) 9. Design altitude (m) 10. Gas category | <ol style="list-style-type: none"> 11. Burner category 12. Voltage (V) 13. Frequency (Hz) 14. Current (A) 15. Pin number 16. Notified body 17. Fan type 18. Fan motor (kW) 19. CE and EAC markings |
|--|---|



Vitotherm

UL & CSA



Vitotherm

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1	Type		Gas cat.		12
2	Serial number		Burner cat.	B23	13
3	Production year		Voltage	V	14
4	Destination country		Frequency	Hz	15
5	Max. Input-gas	MMBTU (LHV)/ kW (Hi)	Current	A	16
6	Min. Input-gas	MMBTU (LHV)/ kW (Hi)	Pin no	0461BR0858	17
7	Manifold fuel press. max.	PSI / mbar	NoBo	1312/23	18
8	Manifold fuel press. min.	PSI / mbar	Fan type		19
9	Max. Input-oil	lb/h / kg/h	Fan motor	kW	20
10	Gas pressure	PSI / mbar			
11	Design altitude	ft / m			



This burner must be installed according to the rules in force, and should be used only in a well ventilated area.

Before the burner is installed and put into operation, the instruction manual must be read.

The electrical part of the burner is built according to the EN 60529, the voltage and amperage is as indicated on the nameplate of the burner.

When servicing the burner the main switch and the gas supply must be switched off at all times.

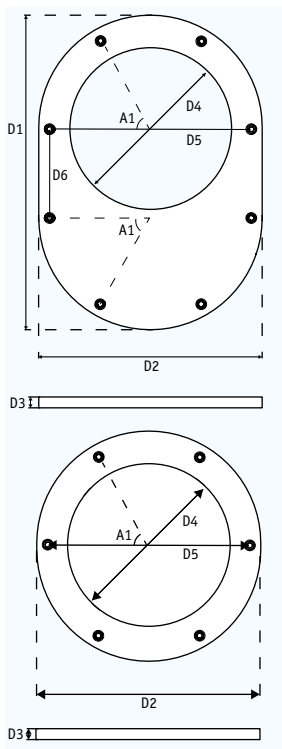
- | | |
|--|-------------------------|
| 1. Burner type | 12. Gas category |
| 2. Serial number | 13. Burner category |
| 3. Year of manufacture | 14. Voltage (V) |
| 4. Country of destination | 15. Frequency (Hz) |
| 5. Maximum load (MMBTU and kW) | 16. Current (A) |
| 6. Minimum load (MMBTU and kW) | 17. Pin number |
| 7. Maximum manifold fuel pressure (PSI and mbar) | 18. Notified body |
| 8. Minimum manifold fuel pressure (PSI and mbar) | 19. Fan type |
| 9. Maximum oil consumption (lb/h and kg/h) | 20. Fan motor (kW) |
| 10. Gas pressure (PSI and mbar) | 21. CE and EAC markings |
| 11. Design altitude (ft and m) | |

3.8 Dimensions

This section contains the standard dimensions of a MONO-jet burner. For technical data regarding your specific burner system configuration, please refer to the burner plate (see §3.7) or the order confirmation.

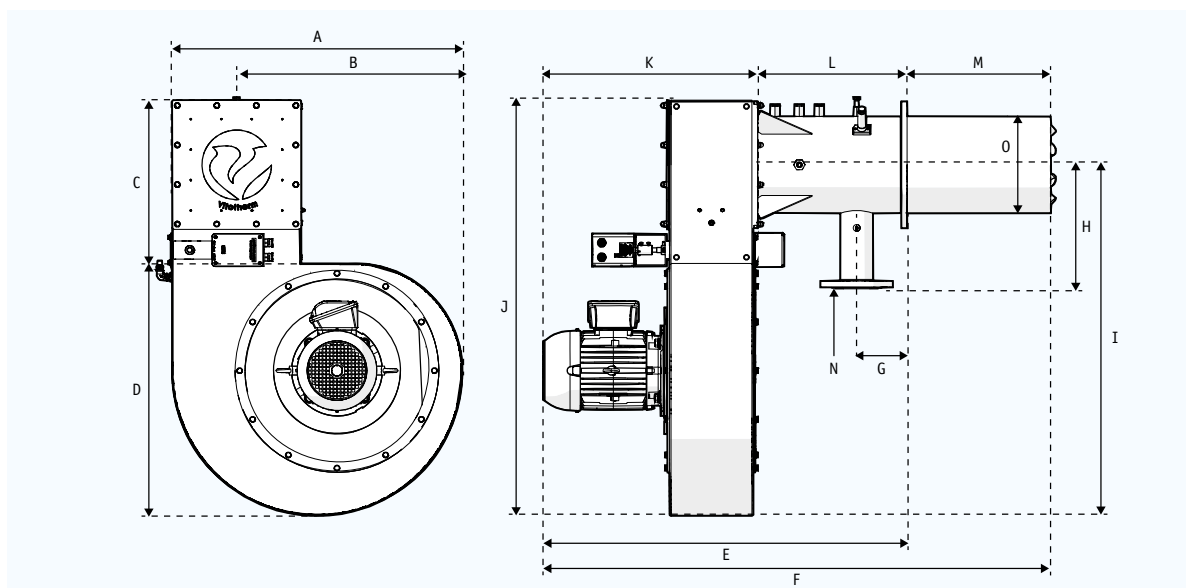
3.8.1 Combustor mounting flange

The combustor must be mounted on a boiler by using a mounting flange. The design and dimensioning of this mounting flange depends on the heating capacity of the burner:



Art.Nr.	Burner type	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)	D5 (mm)	D6 (mm)	A1 (deg)	Thread (ISO)
100165	V...Is-450-500	675	475	12	360	415	200	60	M16
100164	V...Is-350-400	675	475	12	315	415	200	60	M16
100163	V...Is-200-250-300	-	350	12	275	315	-	60	M12
100162	V...Is-150	-	350	12	240	315	-	60	M12
100161	V...Is-100	-	350	12	210	315	-	60	M12
	V...Is-50								

3.8.2 MONO-jet

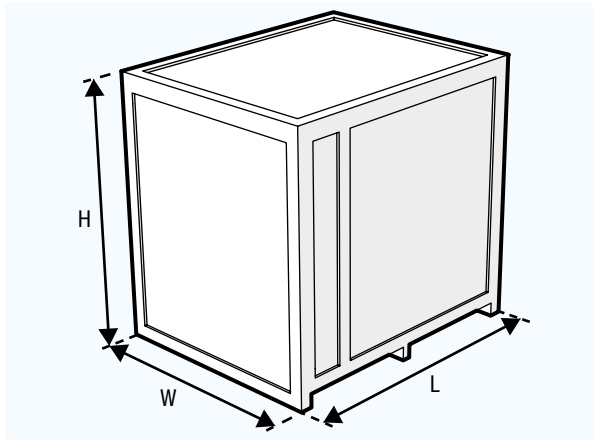


Burner type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)
V...Is-50									
V...Is-100	801	623	450	696	1002	1402	135	287	968
V...Is-150	801	623	450	696	1002	1402	135	300	968
V...Is-200	801	623	450	696	1077	1477	135	340	968
V...Is-250-300	931	753	450	801	1067	1467	135	340	1073
V...Is-350-400	1032	807	450	935	1200	1588	135	359	1167
V...Is-450	1032	807	450	935	1200	1588	135	381	1167
V...Is-500	1032	807	450	935	1244	1632	135	381	1167

Burner type	J (mm)	K (mm)	L (mm)	M (mm)	N (DN/ANSI)	O (Ø mm)	Weight (kg)
V...Is-50							
V...Is-100	1146	582	420	400	50	201	
V...Is-150	1146	582	420	400	50	231	
V...Is-200	1146	657	420	400	65/80	267	
V...Is-250-300	1251	647	420	400	65/80	267	
V...Is-350-400	1385	778	420	400	65/80	306	
V...Is-450	1385	778	420	400	65/80	351	
V...Is-500	1385	822	420	400	65/80	351	

*P (mm) is the required minimal free distance around the burner in all directions.

3.8.3 Seaworthy packaging



Burner type	L (mm) *	W (mm) *	H (mm) *
VG(0) Is-100-500	t.b.d.	t.b.d.	t.b.d.
Vitopack configuration	t.b.d.	t.b.d.	t.b.d.
*Actual sizes may vary.			

NOTICE

When optional features are included in the burner system (e.g. Vitopack, high pressure gas regulator set), the packaging is put together specifically for this project.

3.8.4 Boiler furnace dimensions

Type	Blast tube diameter	Inner boiler diameter	Boiler length (without reversal chamber)
	mm	mm	mm
VGIs-50			
VGIs-100	195	585	1300
VGIs-150	261	783	2130
VGIs-200	261	783	2700
VGIs-250	261	783	3300
VGIs-300	261	783	3700
VGIs-350	300	900	3950
VGIs-400	300	900	4150
VGIs-450	345	1035	4350
VGIs-500	345	1035	4500

3.9 Performance data

This section contains the standard performance data of a MONO-jet burner in metric units.

For technical data regarding your specific burner system configuration, please refer to the burner plate (see §3.7) or the order confirmation. For performance data in imperial units, please refer to Appendix C of this manual.

3.9.1 MONO-jet low NO_x gas burner

Type	Boiler capacity ($\eta = 93\%$)		Burner input	Control	Gas pressure	Max. boiler backpressure	Motor/drive power	Turn down	Consumption	Max. height
	MCal	kW								
			kW	Gas	mbar	mbar	kW	Gas	Gas (m ³)	m
VGIs-50	500	582	625	Modulating	100-300	6	2,2	1 : 5	61	100
VGIs-100	1000	1163	1250	Modulating	100-300	10	2,2	1 : 5	142	100
VGIs-150	1500	1745	1875	Modulating	100-300	10	4,0	1 : 5	213	100
VGIs-200	2000	2326	2500	Modulating	100-300	10	4,0	1 : 5	284	100
VGIs-250	2500	2908	3125	Modulating	100-300	10	5,5	1 : 5	355	100
VGIs-300	3000	3489	3750	Modulating	100-300	12	7,5	1 : 6	426	100
VGIs-350	3500	4071	4375	Modulating	100-300	12	7,5	1 : 6	487	100
VGIs-400	4000	4652	5000	Modulating	100-300	12	11,0	1 : 6	568	100
VGIs-450	4500	5234	5625	Modulating	100-300	12	11,0	1 : 6	639	100
VGIs-500	5000	5815	6250	Modulating	100-300	12	15,0	1 : 7	710	100

3.9.2 MONO-jet low NOx oil burner

Type	Boiler capacity (n = 93%)		Burner input	Control	Max. boiler backpressure	Motor/drive power	Turn down	Max. height	
	MCal	kW						Oil (kg/h)	m
VOIs-50	500	582	625	Modul.	6	2,2	1 : 4	53	328
VOIs-100	1000	1163	1250	Modul.	10	2,2	1 : 2	84	500
VOIs-150	1500	1745	1875	Modul.	10	4,0	1 : 2	126	500
VOIs-200	2000	2326	2500	Modul.	10	4,0	1 : 2	168	500
VOIs-250	2500	2908	3125	Modul.	10	5,5	1 : 2	210	500
VOIs-300	3000	3489	3750	Modul.	12	7,5	1 : 2	252	500
VOIs-350	3500	4071	4375	Modul.	12	7,5	1 : 2	294	500
VOIs-400	4000	4652	5000	Modul.	12	11,0	1 : 6	336	500
VOIs-450	4500	5234	5625	Modul.	12	11,0	1 : 2	378	500
VOIs-500	5000	5815	6250	Modul.	12	15,0	1 : 2	420	500

3.9.3 Maximum recommended overfire

⚠ CAUTION

Overfire occurs when more fuel is supplied to the burner than accounted for in the design of the burner. Excessive overfire may cause damage to the burner head or the boiler.

- The maximum recommended overfire of the burner is equal to 110% of the burner input in MMBTU.



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4 Installation

This chapter provides instructions for the basic installation of a burner system onto a boiler or other heating appliance. For information about custom set-ups, please contact Vitotherm.

⚠ CAUTION

The burner system may only be installed by qualified personnel. Handling the burner unit and supporting components without the required knowledge and experience may damage the burner system or cause hazardous situations during installation and use.

⚠ WARNING

The burner system may only be installed in a sufficiently ventilated boiler house.

NOTICE

The burner system must always be installed according to national and local laws and regulations.

NOTICE

The components shown in this chapter may differ from your specific burner system configuration.

4.1 Checking the delivery

Required tools:

- Forklift truck with adequate lifting capacity.

To check the delivery:

1. Transport the crate(s) to an accessible place near the boiler.
2. Remove the lid of the crate(s).
3. Remove the sides of the crate(s).
4. Remove the lashing straps and packaging materials.
5. Remove any screws that connect parts to the bottom of the crate(s).
6. Check if all parts have been delivered according to the agreed scope. If a part is missing, contact Vitotherm immediately.
7. Check all delivered parts for damage.

⚠ WARNING

Damaged parts can affect the correct and safe functioning of the burner system.

- ▶ Do not install damaged parts.
- ▶ If any parts are damaged upon delivery, please contact Vitotherm.

8. Check if the minimum and maximum load of the burner is within the operating range of the boiler. The load values are found on the burner plate of the burner.
9. Check if the delivered burner will fit in the designated area of the room. For the dimensions of the burner, see §3.8.

4.2 Installing the combustor

Connection materials:

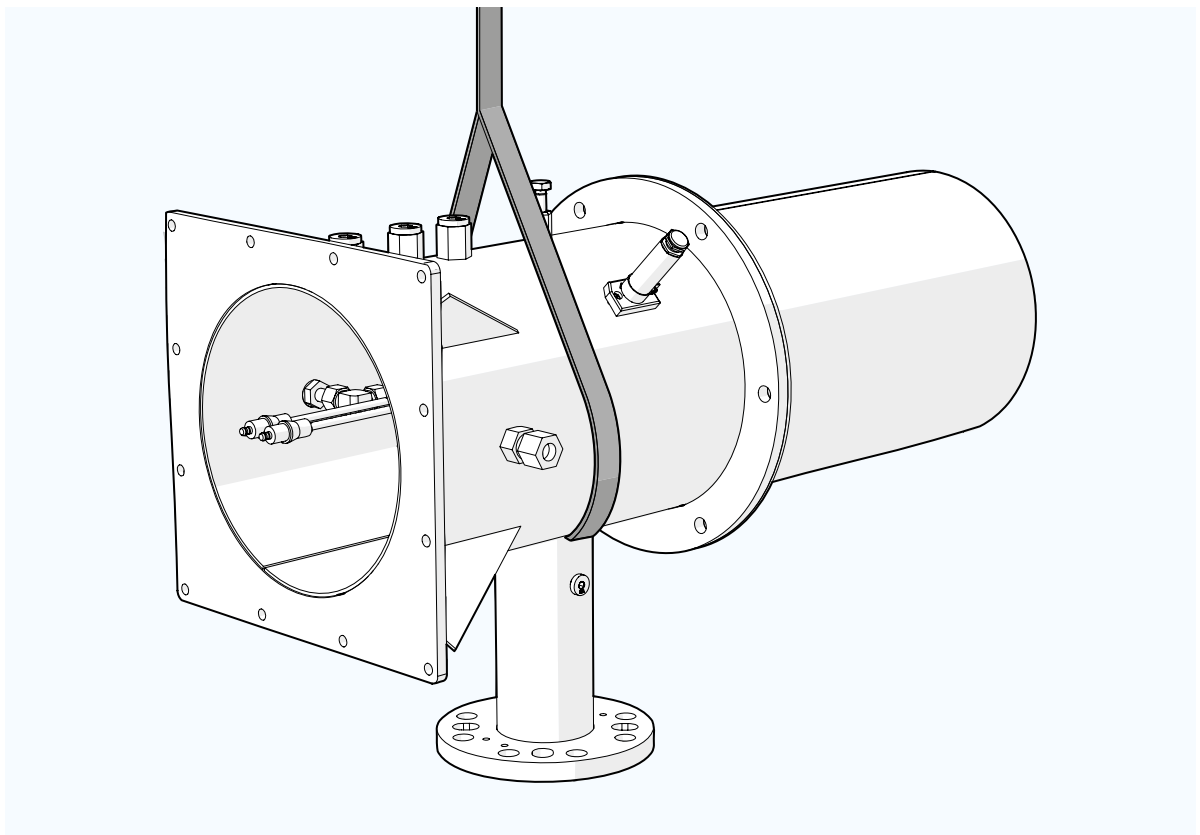
- Nuts and bolts (19 or 24 mm)
- Gaskets

Required tools:

- Mobile crane with adequate lifting capacity.
- Suitable hoisting sling.
- Ring wrench (19 or 24 mm) or adjustable spanners

To install the combustor:

1. Collect the bag with fastener materials that is taped to the combustor.
2. Attach a hoisting sling around the combustor pipe section between the connection plates.

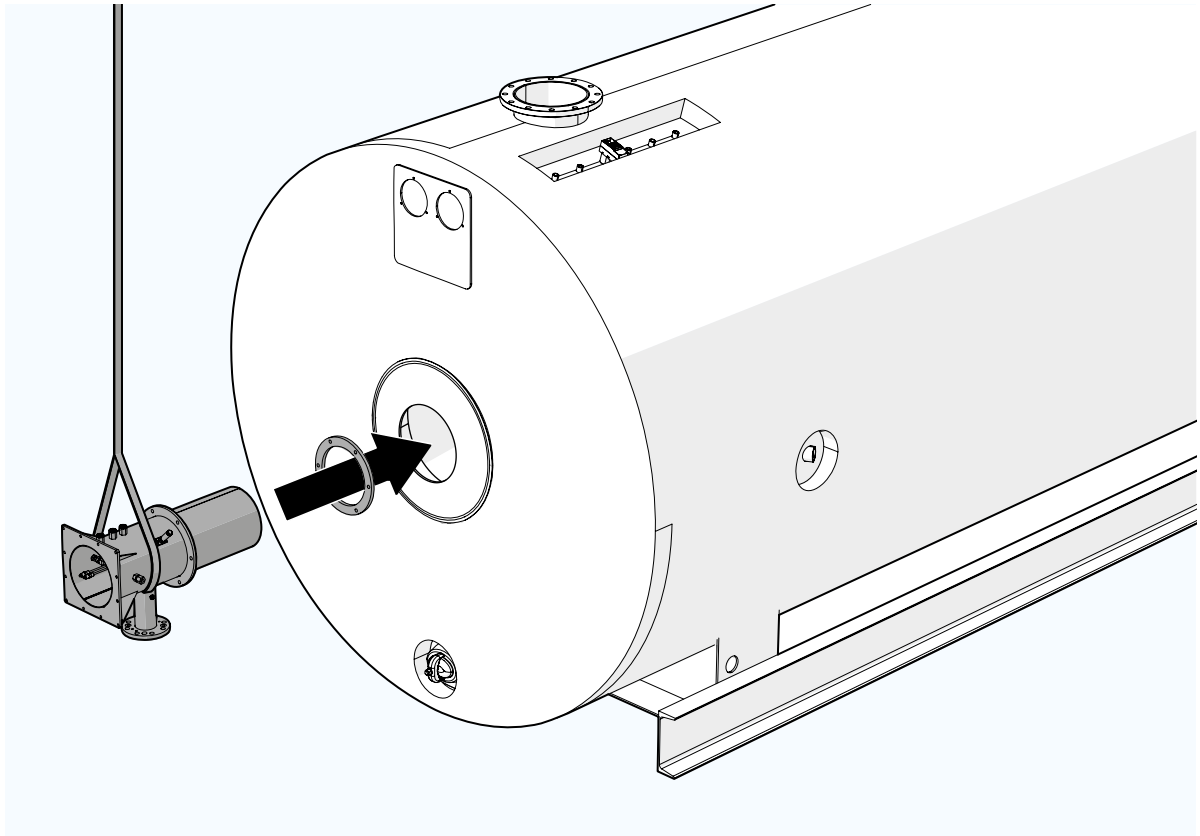


⚠ WARNING

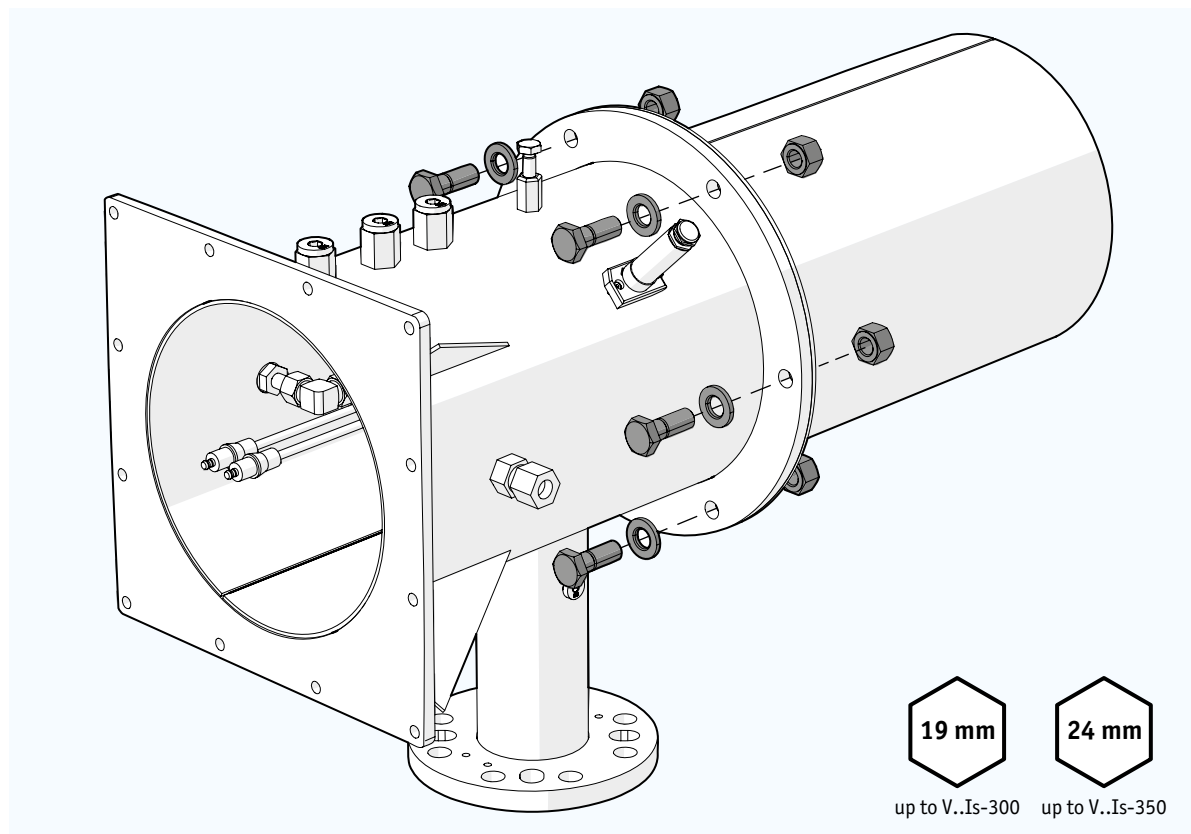
Slings might shift due to hoisting movements, causing unforeseen movement or toppling of the combustor.

- ▶ Make sure that the sling is trapped in the combustor construction and cannot slide off.
- ▶ Do not attach slings to the open front section of the combustor, where the sling might slide off, or to the reinforcement bars.

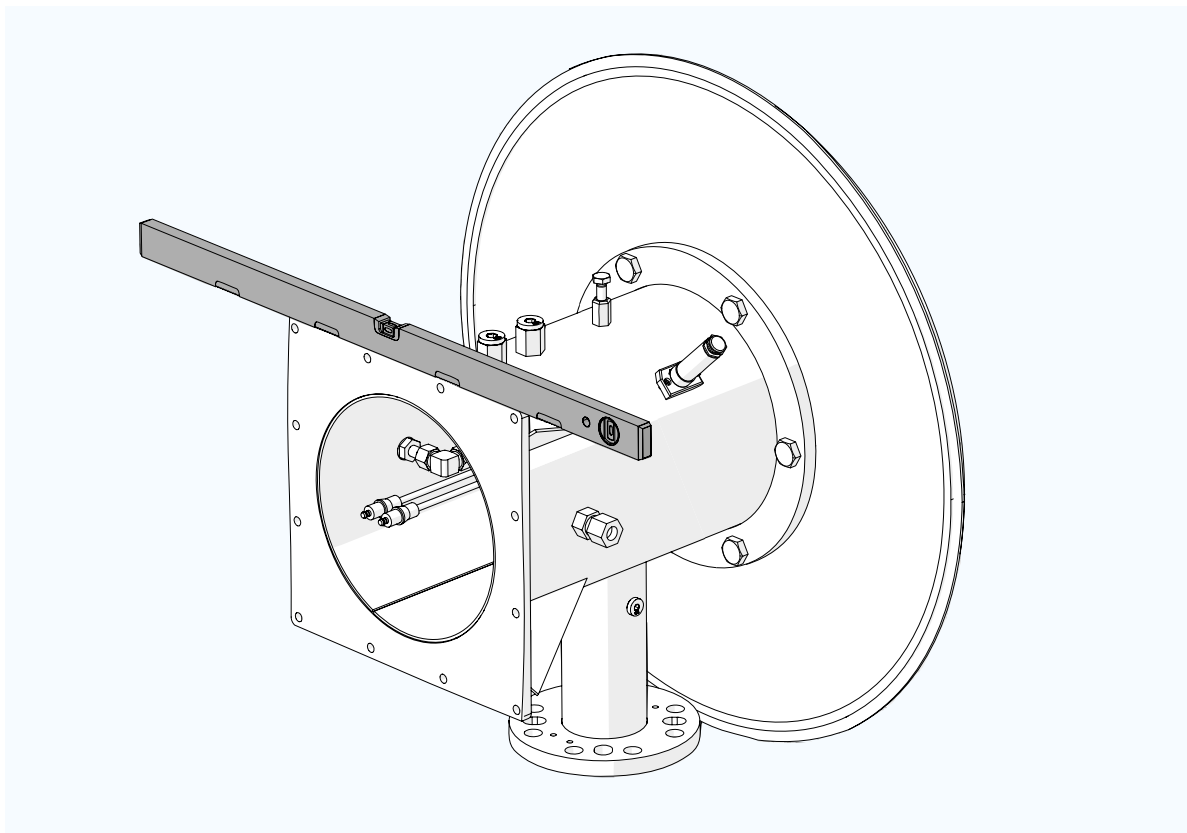
3. Carefully lift the combustor.
4. Place the silicon gasket.
5. Carefully place the combustor into the boiler entrance.



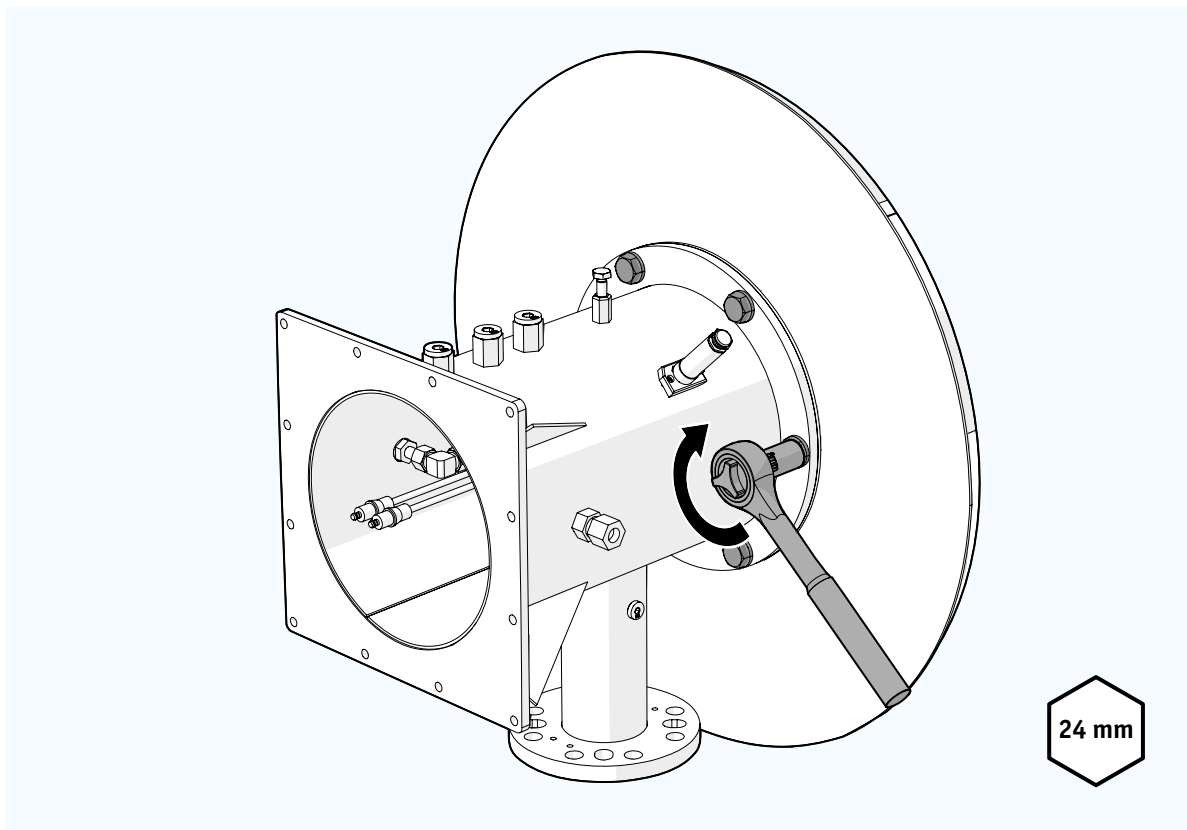
6. Place the provided bolts and loosely tighten them. Use the provided nuts if the flange holes of the boiler are not threaded.



7. Level the combustor.



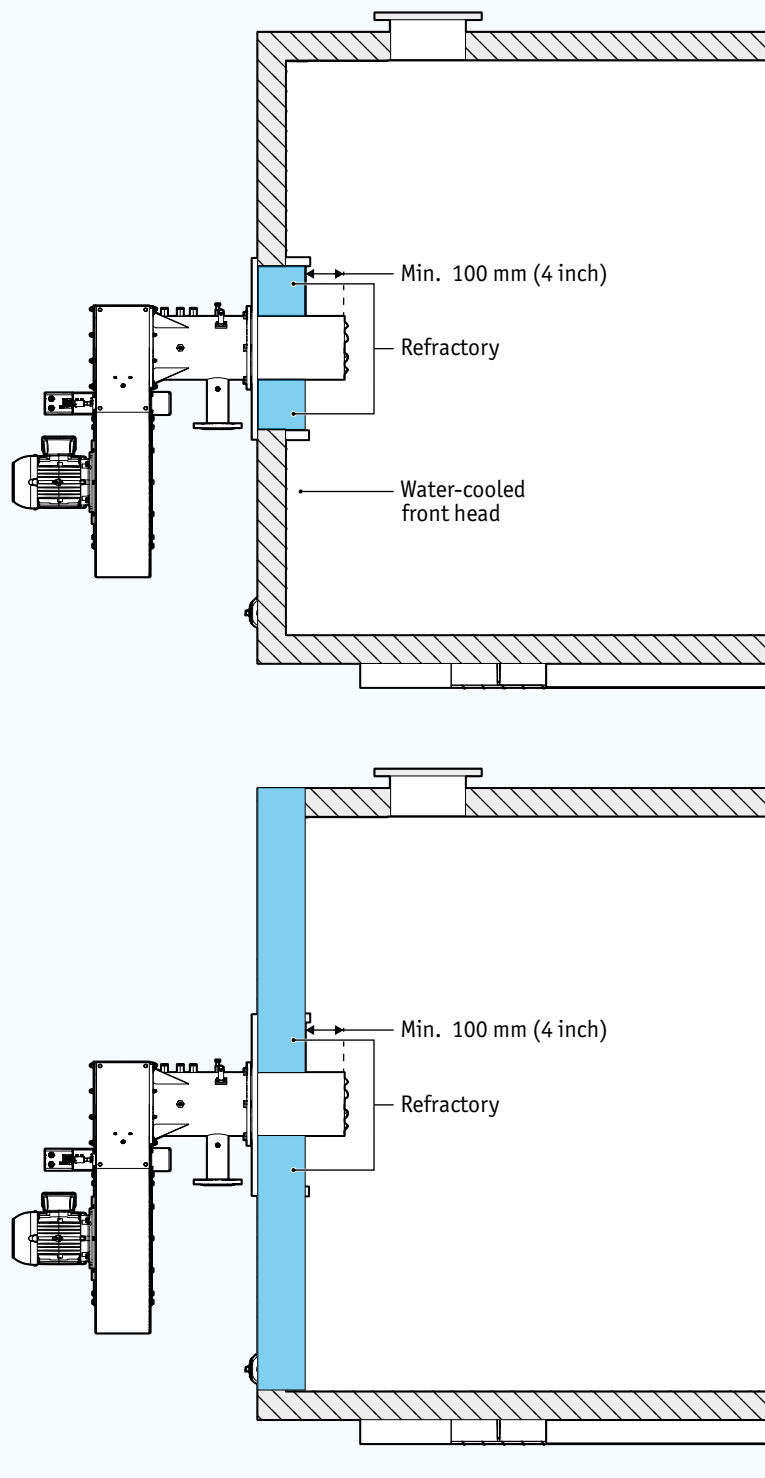
8. Tighten the bolts. Work in a crosswise pattern to make sure the gasket is compressed evenly.



9. Remove the hoisting sling.
10. Inside the boiler, fill the ring-shaped gap between the combustor pipe and the chamber front head with refractory bricks.

NOTICE

Make sure that the refractory does not protrude the end of the combustor pipe. Keep the refractory at a distance of 10 cm inwards.



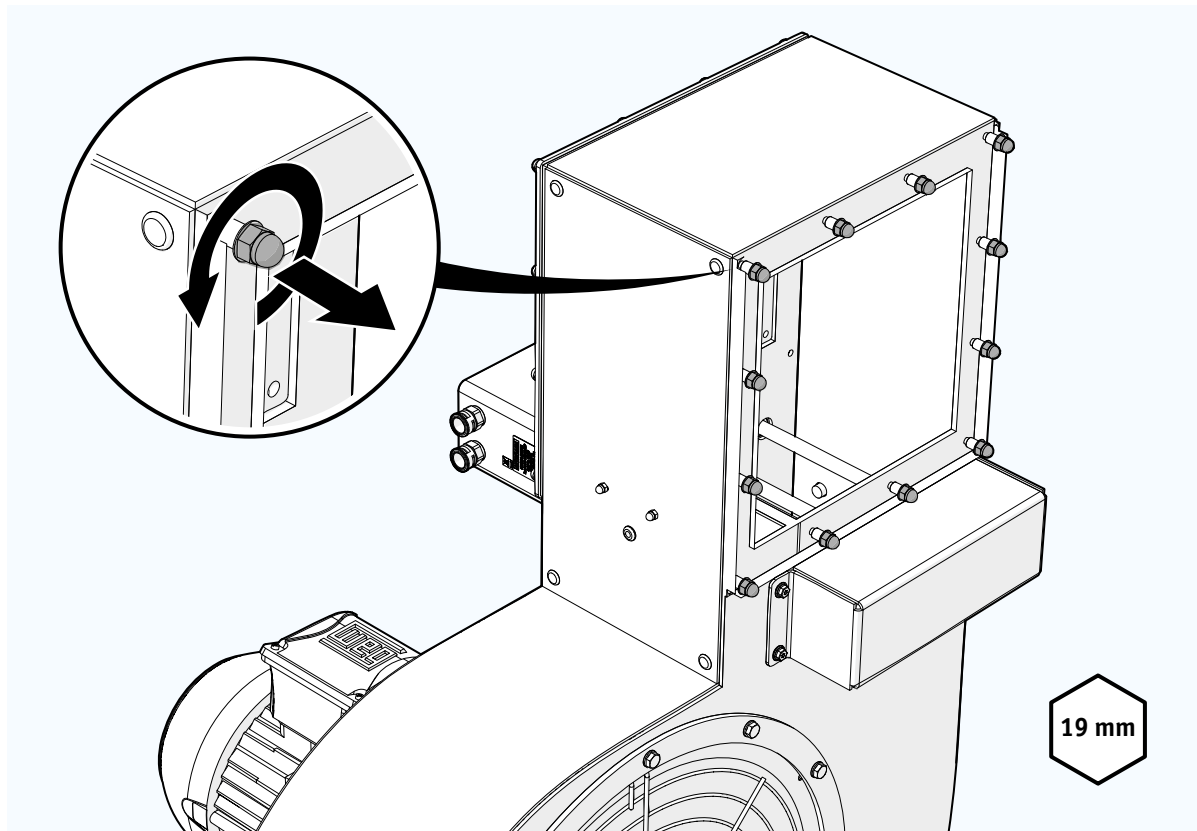
4.3 Installing the fan housing

Required tools:

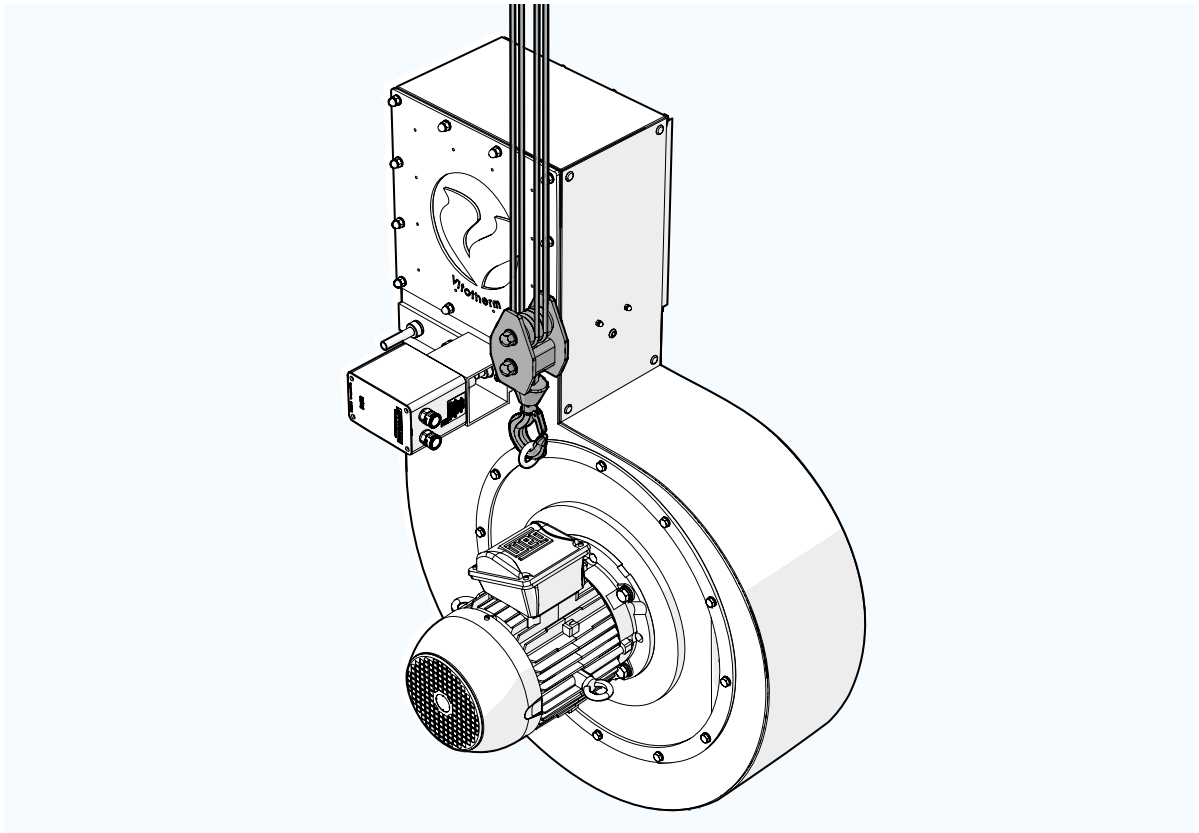
- Mobile crane with adequate lifting capacity.
- Round sling
- Suitable hoisting equipment:

To install the fan housing:

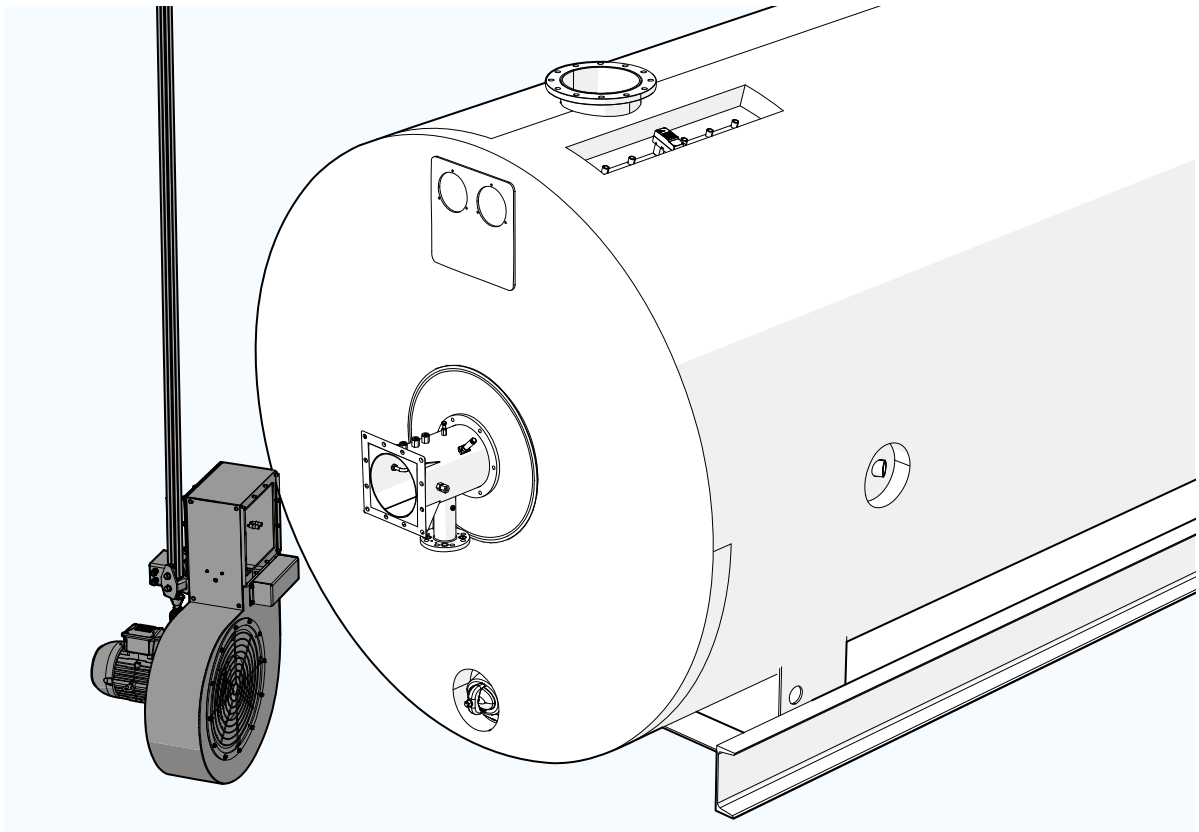
1. Remove the bolts and washers.



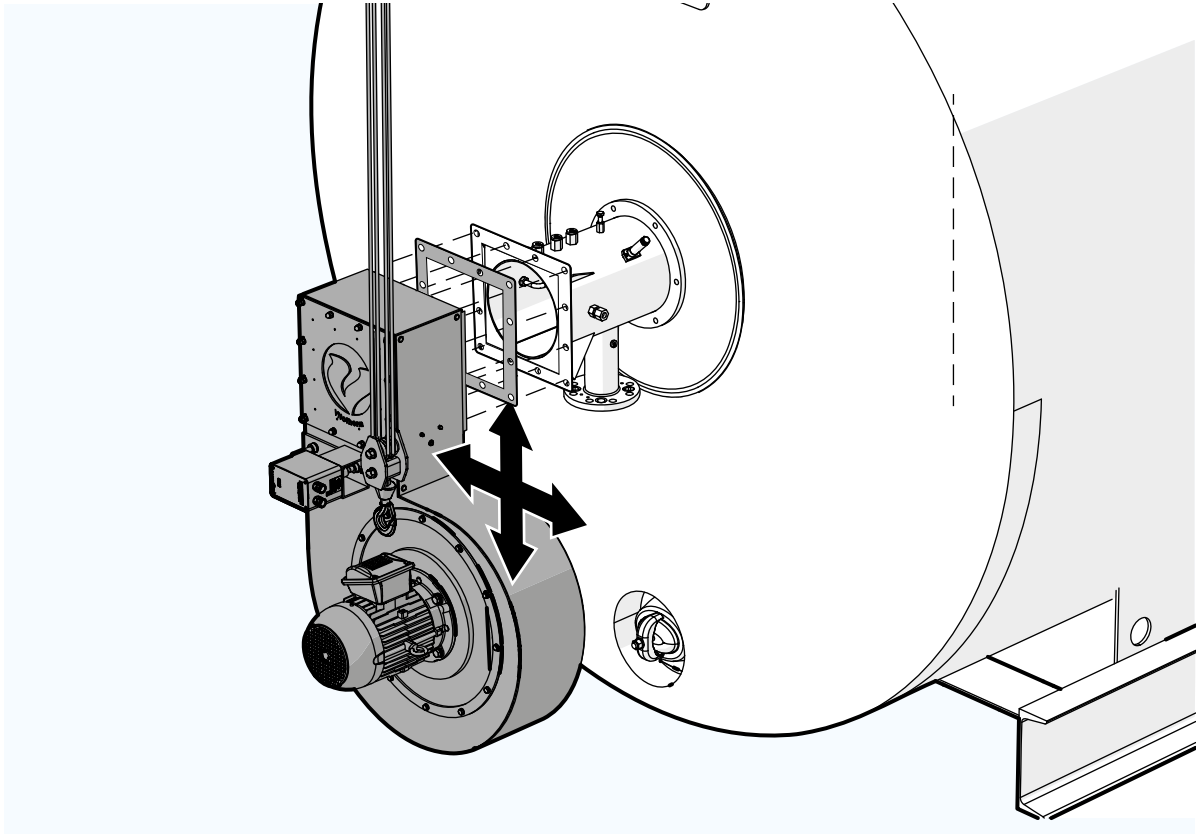
2. Connect your hoisting equipment to the hoisting eye.



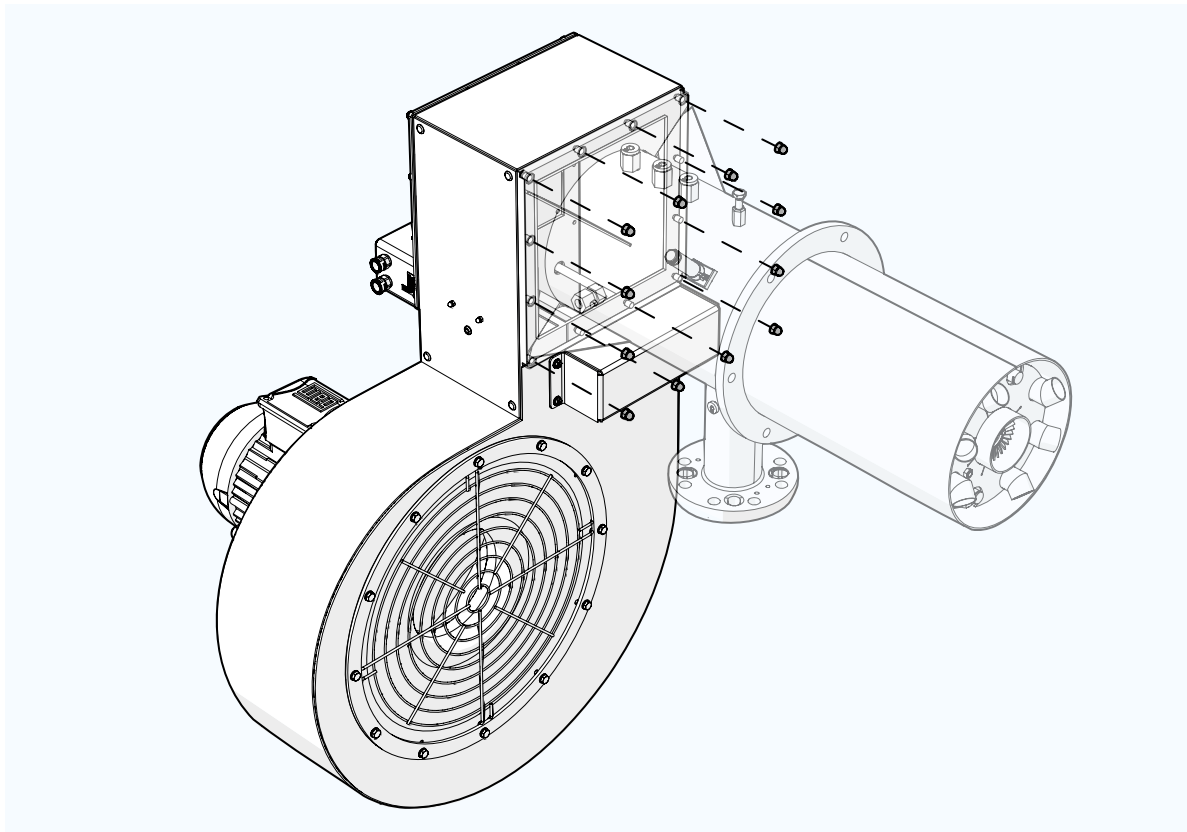
3. Carefully lift the fan housing close to the boiler.



4. Carefully align the fan housing holes with the holes of the combustor.
5. Place the silicon gasket.



6. Place the washers.
7. Place and tighten the bolts.



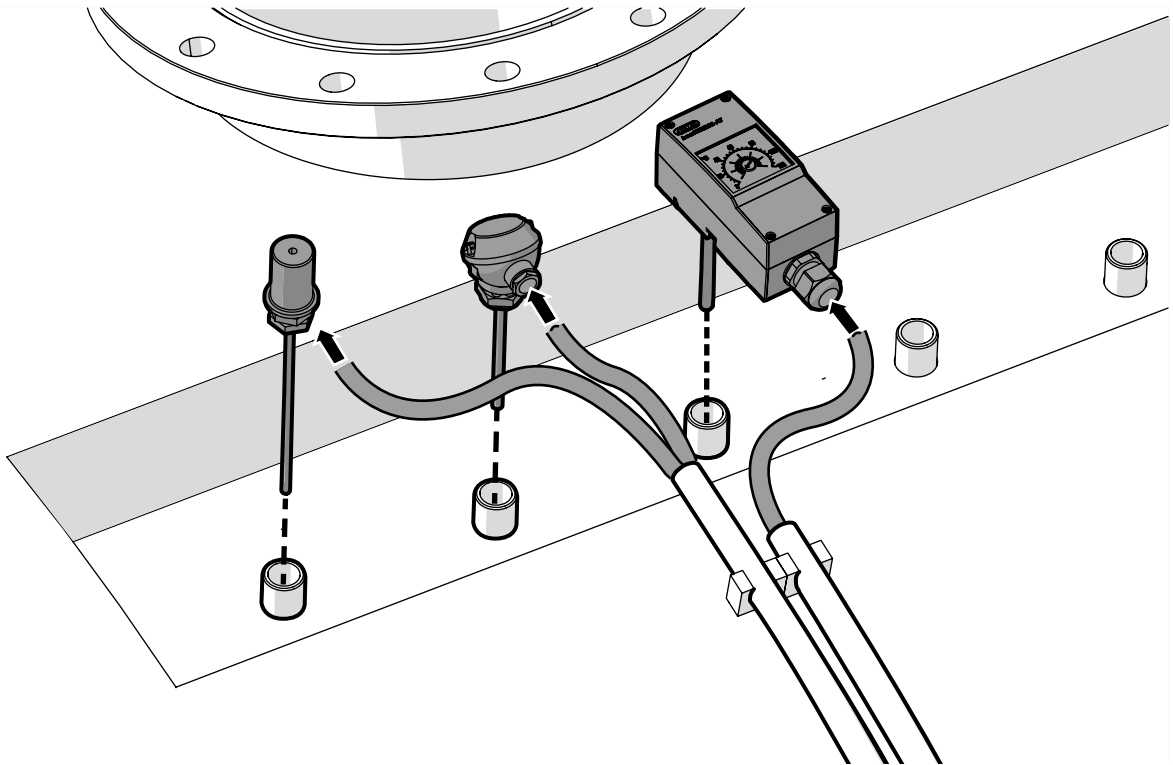
8. Connect the ignition cables of the combustor to the fan housing.
9. Remove the hoisting cables.

4.4 Installing the boiler thermostat set

The components of the boiler thermostat are installed directly onto the boiler.

To install the boiler thermostat set:

1. Connect cabling to each of the components.



2. Insert the components into the connection points of the boiler.
3. Connect the cabling to a junction box. For more information, please refer to the electrical wiring diagram.



For more information, please refer to the OEM manual of each component.

4.5 Electrical connections

All electric cabling of the control panel is pre-wired. During installation, this cabling must be connected to the following components:

- Parts on the fan housing (see §)
- Boiler thermostat set (see §4.4)
- Junction box on the gas train (see §3.2)

NOTICE

For all electrical connections, the applicable local standards and the connection requirements must be taken into account.



For more information about the electrical connections and integrated circuits, please refer to the electrical wiring diagram.

4.6 Installing the gas line adapter

Optional

The gas line adapter can be installed to connect the gas train to the burner.

Connection materials:

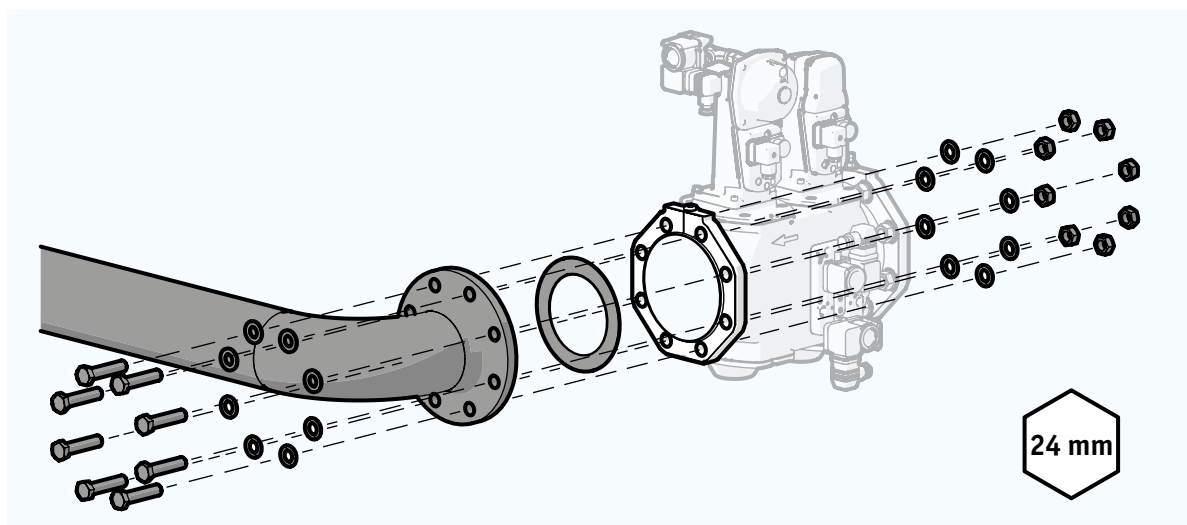
- Nuts and bolts (24 mm)
- Gaskets

Required tools:

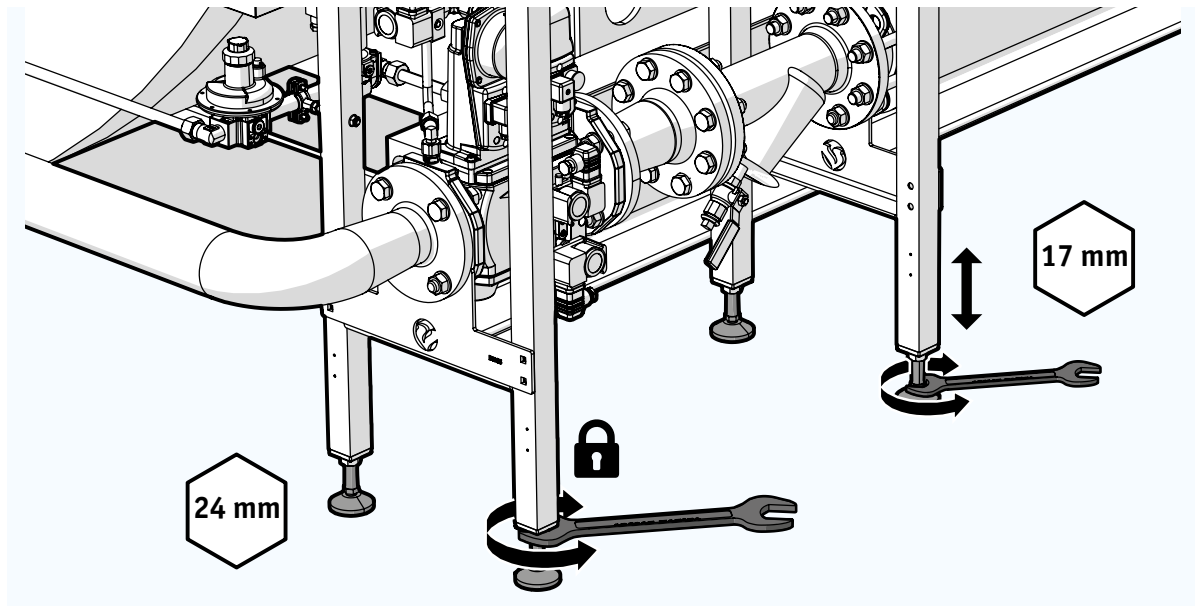
- Ring wrench (24 mm) or adjustable spanners

To install the gas line adapter:

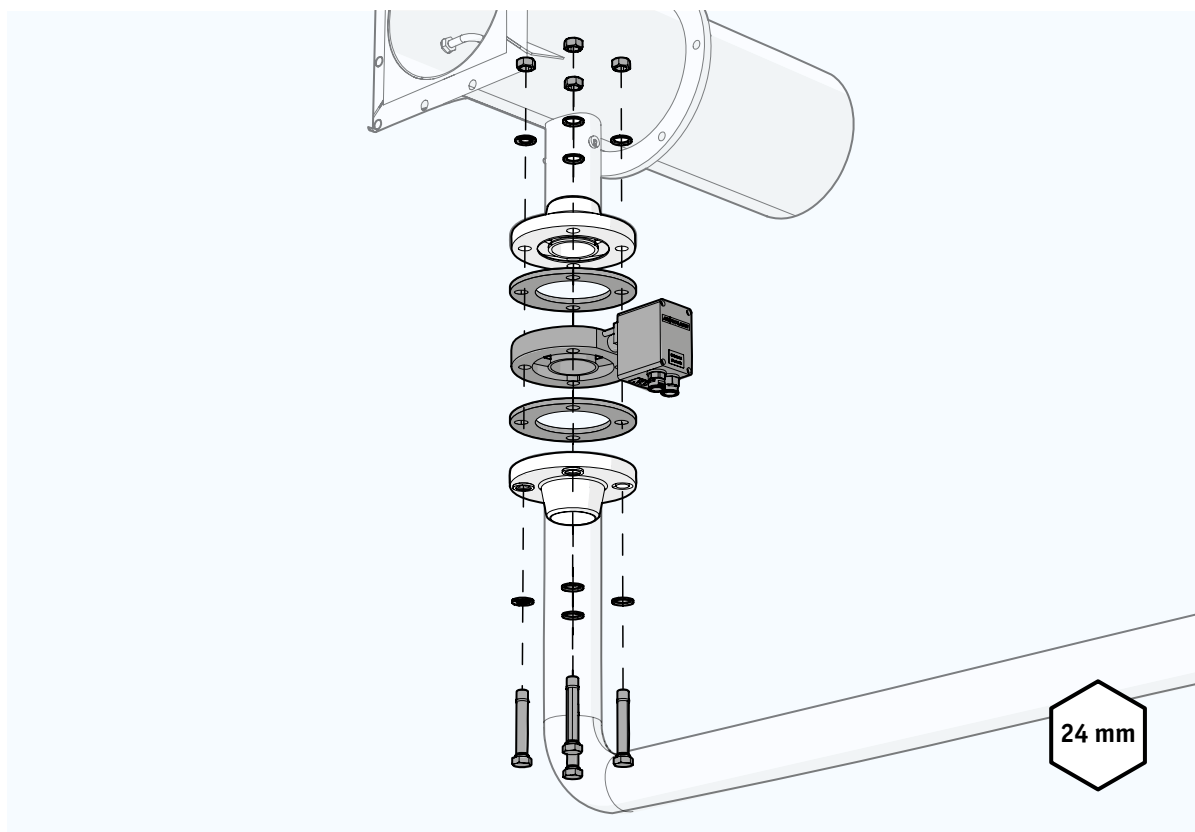
1. Place a gasket and connect one end of the gas line adapter to the double valve block of the gas train.



2. If necessary, adjust the height and location of the gas train to align the gas line adapter with the gas inlet on the combustor.



3. Disassemble the flange on the gas inlet of the combustor.
4. Place two gaskets and connect the other end of the gas line adapter to the combustor.



4.7 Installing the Vitopack

Optional

Connection materials:

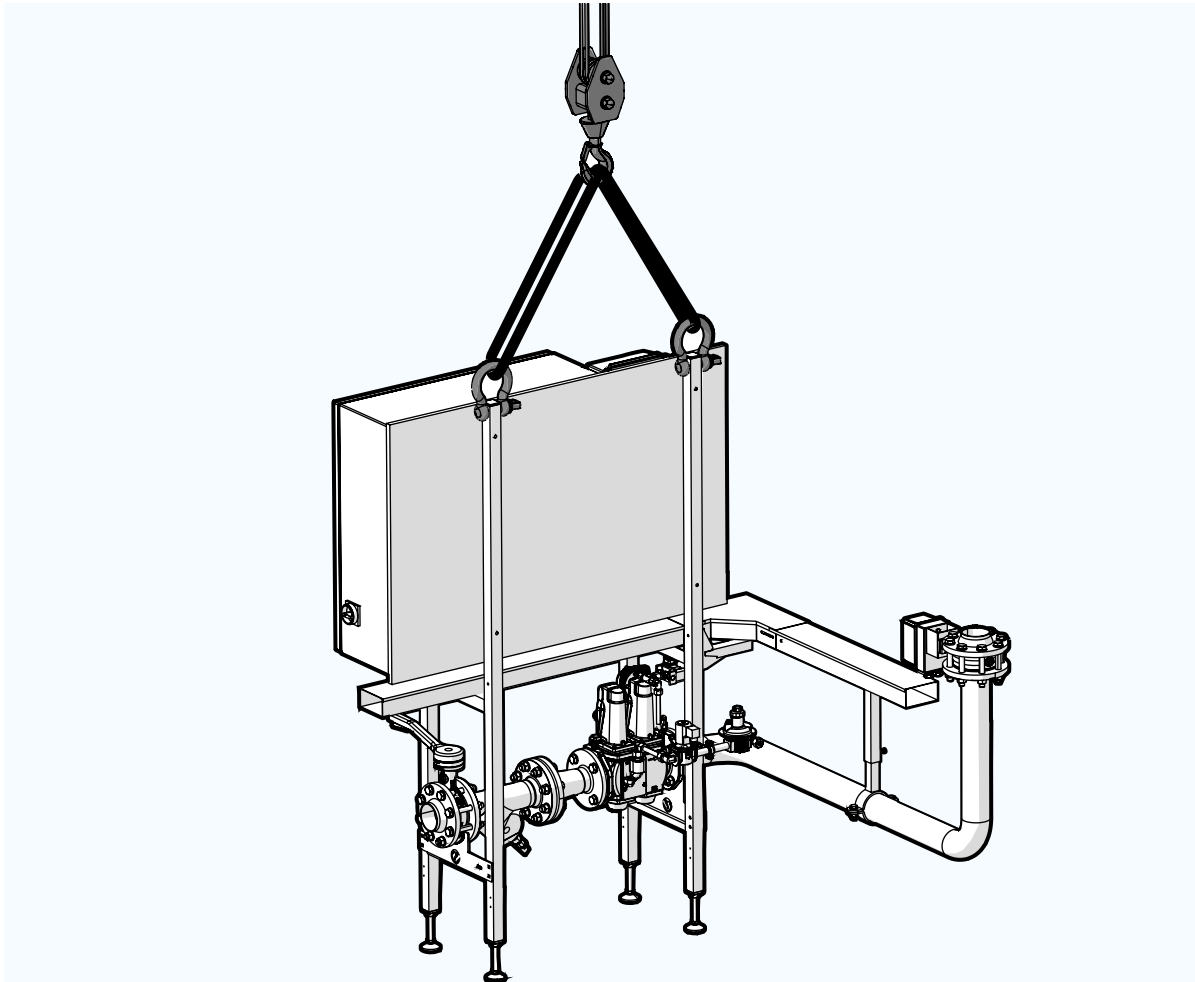
- Nuts and bolts (24 mm)
- Gaskets
- Gas line (15 mm) and connector pieces

Required tools:

- Mobile crane with adequate lifting capacity.
- Suitable hoisting equipment:
 - D-shackles
 - Round sling
- Ring wrench (24 mm) or adjustable spanners

To install the Vitopack:

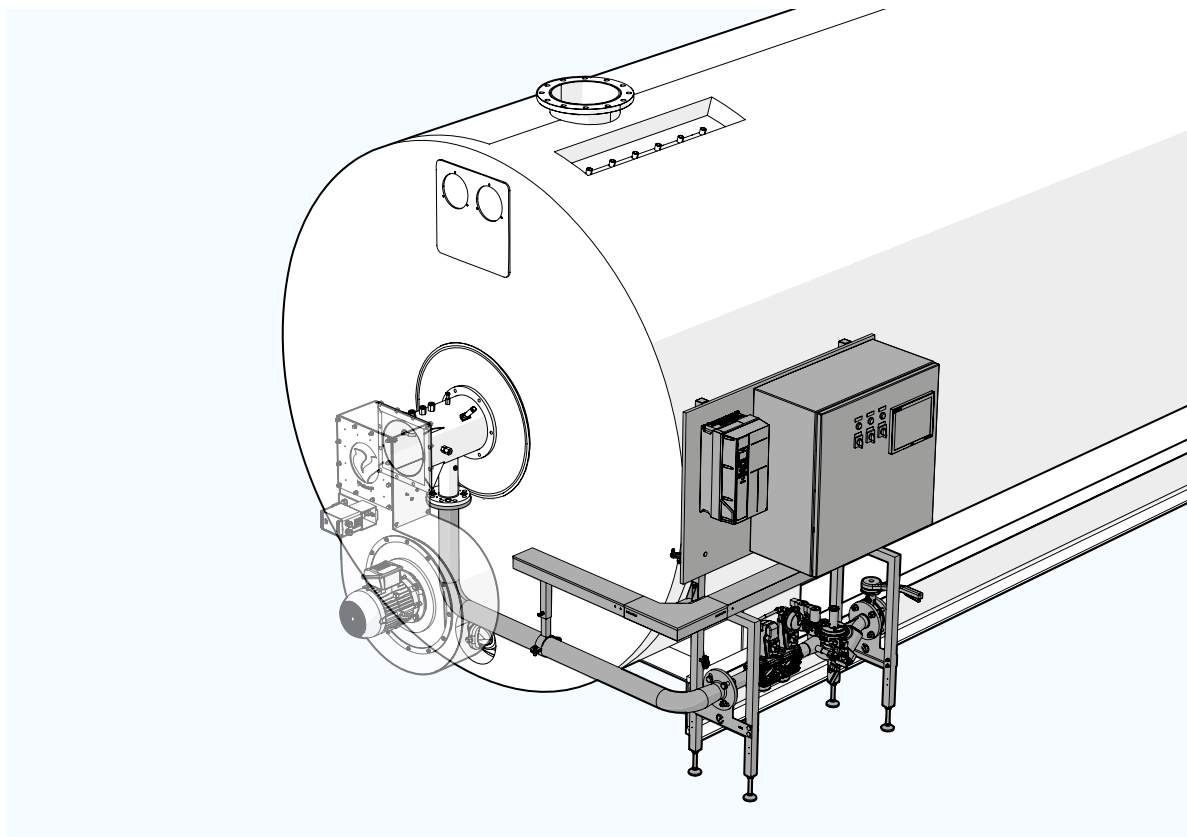
1. Attach hoisting cables to the hoisting rings on top of the frame.



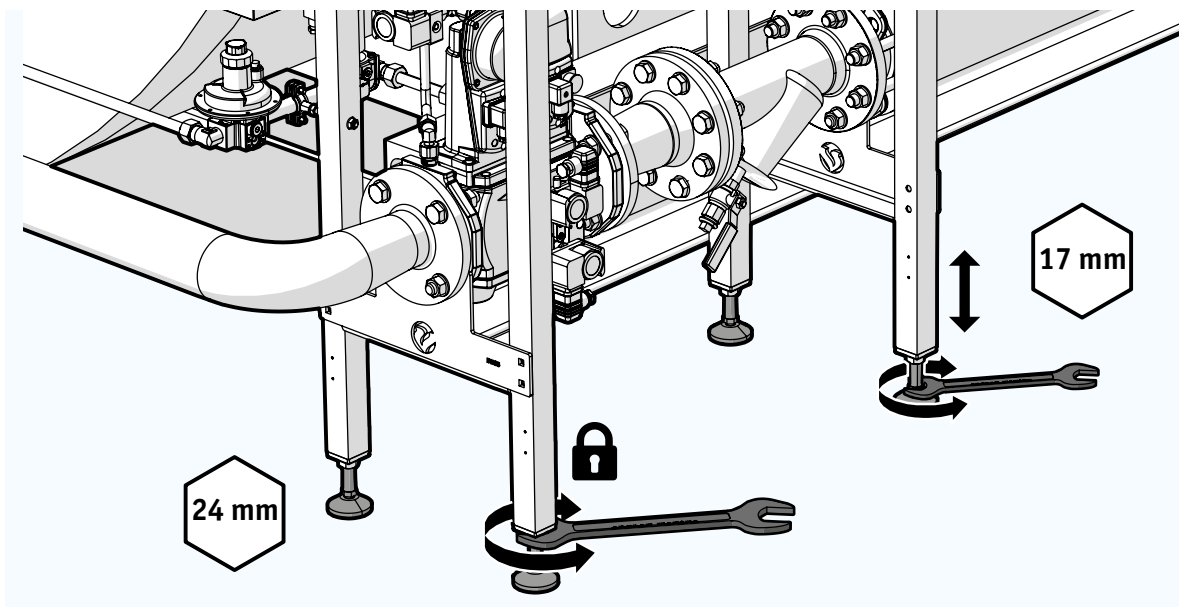
2. Carefully lift the Vitopack.
3. Place the Vitopack at the designated location, on either side of the boiler.

NOTICE

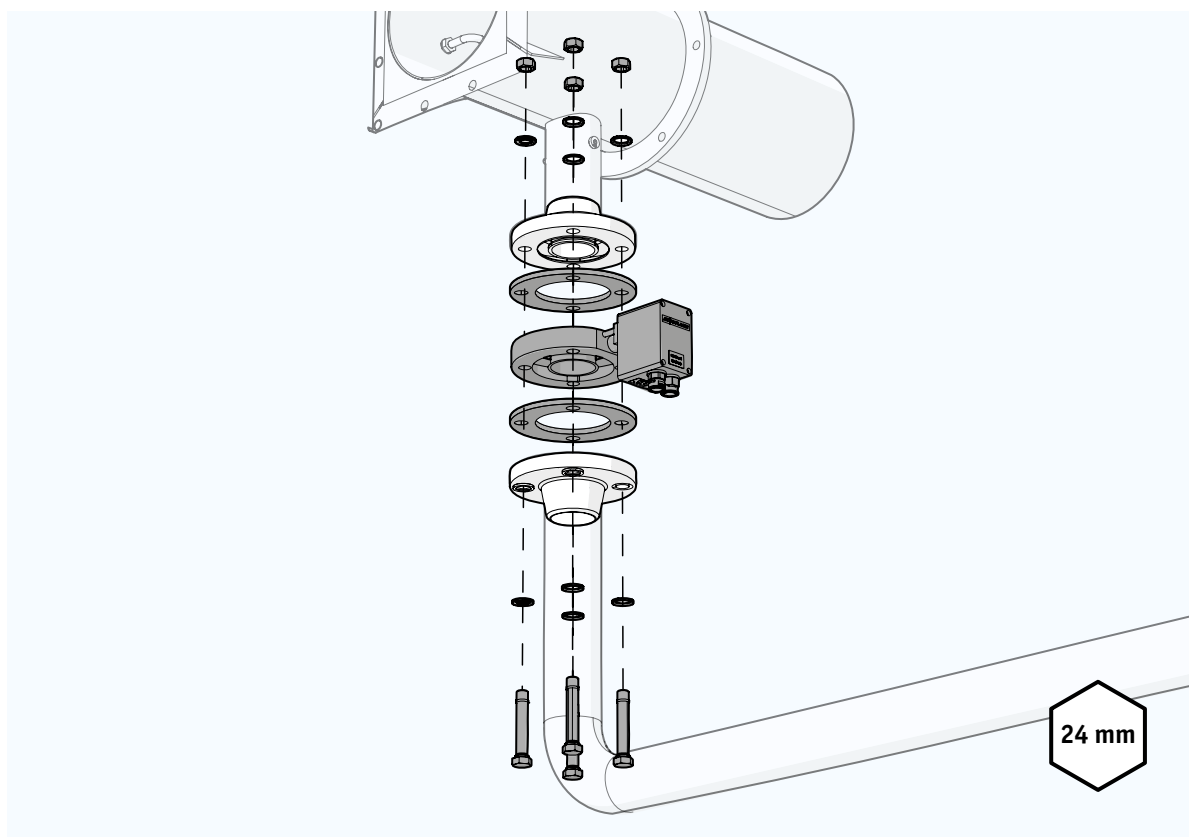
Make sure the gas line adapter aligns with the gas inlet on the combustor.



4. Level the Vitopack by adjusting the feet.



5. Remove the placeholder flange from the end of the gas line adapter.
6. Connect the gas line adapter to the gas inlet of the combustor. Place gaskets between this connection.



7. Attach the supply pipe to the gas train. Place gaskets between this connection.

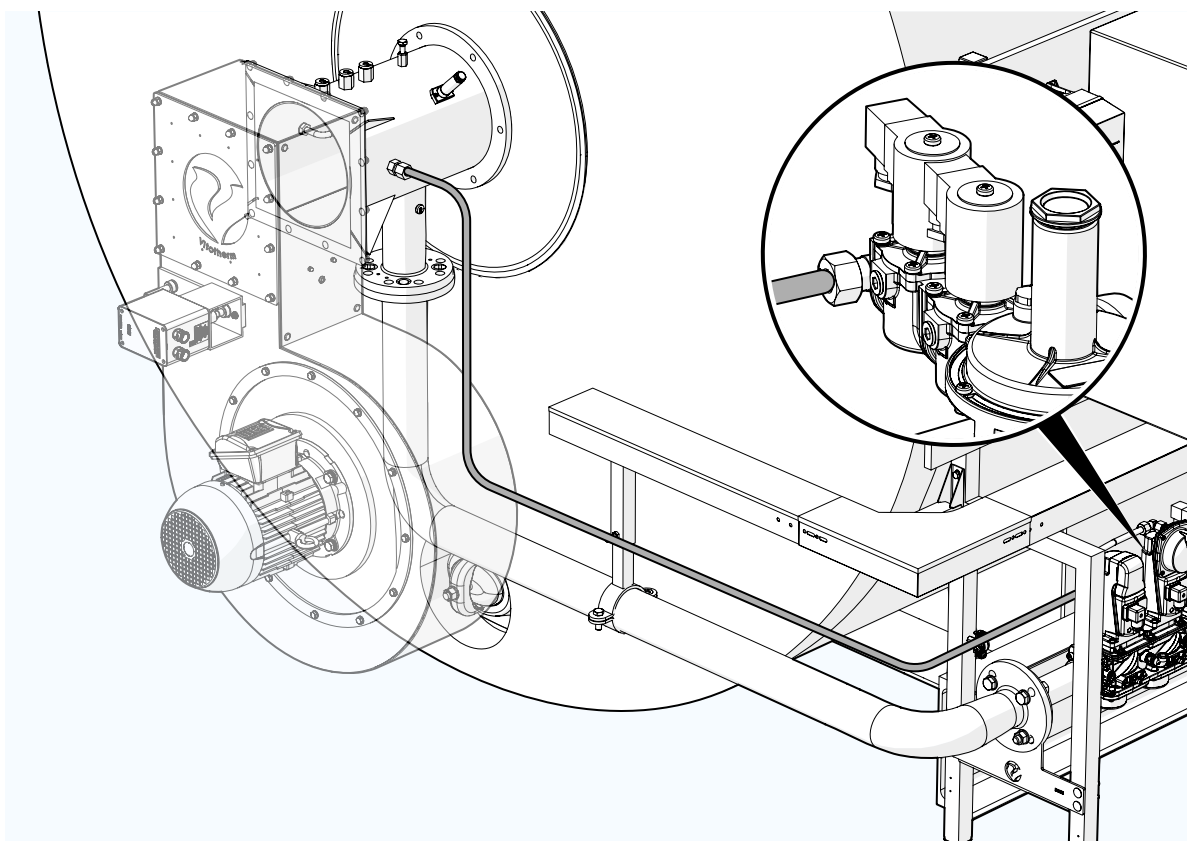
NOTICE

Check that the supply line is clean so that the gas filter will not become blocked and that damage to the gas train cannot occur.

8. Install the ignition gas line.



Vitottherm



NOTICE

The gas line connection on the combustor can be changed by swapping around the air measure pipe and the pilot gas pipe inside the combustor housing.

4.8 Installing the oil pump or firing set

For VOI

This section provides instructions for installing an oil pump or oil firing set.

⚠ CAUTION

When opening the oil supply valve(s):

- ▶ Check for leaks on the supply line(s) and components.
- ▶ Do not tamper with the unit or controls.
- ▶ Call your service person. Regular maintenance shall be provided to the unit by service personall at least once a year.

NOTICE

While the illustrations in this section only show the installation for a standard oil pump, the instructions apply to the oil firing sets as well.

Connection materials:

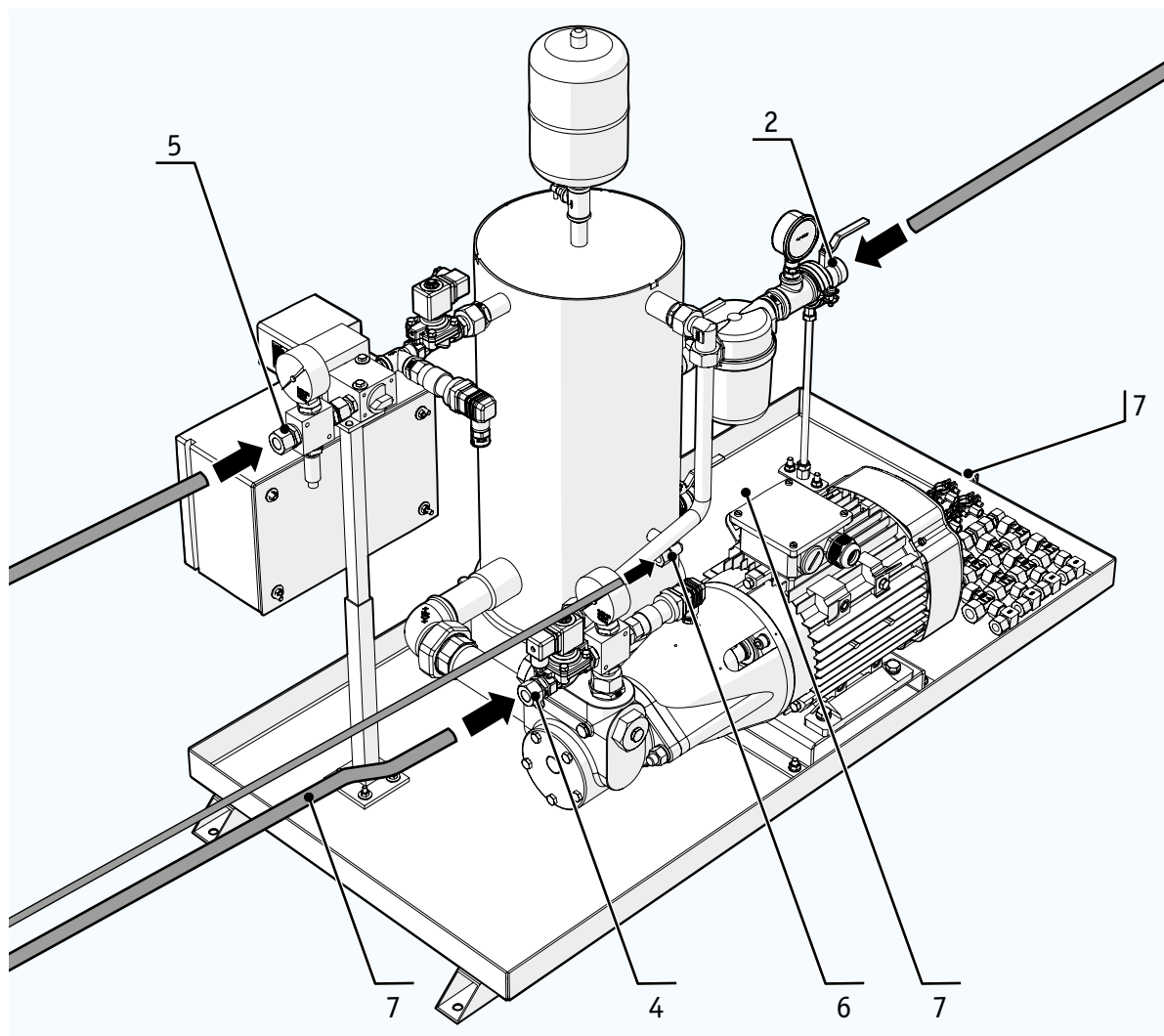
- Oil line (15 mm + $\frac{1}{2}$ " or $\frac{3}{4}$ ")
- Connector pieces

Required tools:

- Ring wrenches or adjustable spanners

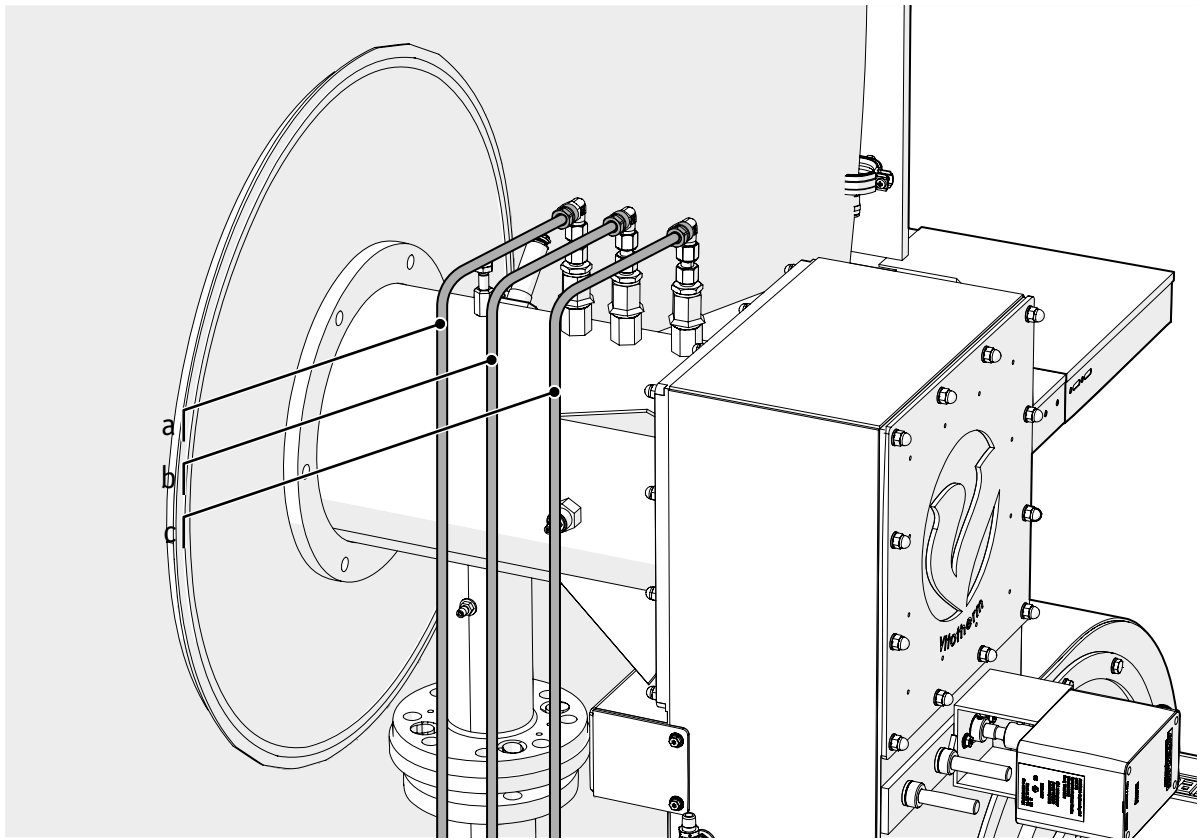
To install the **modulating oil firing set**:

1. Place the firing set next to the boiler, within range of the burner.
2. Connect the oil line to the oil supply line connection of the oil pump.
The width of the oil line depends on the size of the oil filter.
3. Connect the other end of the oil line to an external oil supply.
4. Connect the oil supply line to the burner to the burner oil supply connection of the oil pump.
5. Connect the oil return line from the burner to the burner oil return connection.
6. Connect the oil return piston line to the burner oil return piston connection.
7. Connect a tap line to the oil buffer tap connection and to the leak tray tap connection.



Oil line		Inner diameter
No.	Name	V..Is 50-500
2	Oil supply	$\frac{1}{2}$ "
4	Oil supply to the burner	15 mm
5	Oil return from the burner	15 mm
6	Oil return piston	12 mm
7	Oil buffer tap	$\frac{1}{2}$ "
	Leak tray tap	

8. Connect the modulating oil firing set to the combustor:
- Connect the oil supply line.
 - Connect the oil return line.
 - Connect the oil return piston line.



9. Fix the oil lines in the oil line supports on a stable surface.

4.8.1 Suitable oil grades

The following oil grades can be used in VOI burners:

- Fuel oil No.2 (CA & USA)

CAUTION

The use of unsuitable oil may damage the burner and reduce the quality of the combustion process.

- Do not supply a VOI burner with gasoline, crankcase oil or any oil containing gasoline.



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5 Commissioning

Before commissioning the burner system, make sure it meets the requirements below.

⚠ WARNING

All mechanical screw connections (e.g. gas/oil line, flange connections, oil valves, electrical terminals) must be retightened prior to commissioning.

⚠ WARNING

All components must be sealed with an appropriate sealant prior to commissioning.

NOTICE

Commissioning of a Vitotherm installation may only be performed by certified personnel.

NOTICE

A commissioning report is created after the burner system has been successfully commissioned. Keep this report near the burner for future reference.

- ☐ The burner system is completely installed according to the instructions in this manual, including:
 - ☐ Gas- and front pipes
 - ☐ Relief valve discharge tubes
 - ☐ Regulating pressure pipes
 - ☐ Explosion hatch
 - ☐ Refractory
 - ☐ Pilot gas tube
 - ☐ Oil pipe lines to pump and burner
- ☐ Electrical wiring is completed according to the provided electrical wiring diagram, free of errors, so that the electrical pre-start condition circuit (safety chain) is closed. Completion of electrical field wiring to the:
 - ☐ Gas train
 - ☐ Control panel
 - ☐ Boiler thermostat set
 - ☐ Control and safety equipment
- ☐ Electrical power is available on the boiler, burner, buffer and pumps (if applicable).
- ☐ The boiler is completely assembled, filled with a sufficient amount of heating medium, vented and ready for use.
- ☐ The water circuit to the boiler is tested and approved.
- ☐ Fuel inlet and outlet valves are closed.
- ☐ Fuel lines are purged free of air.
- ☐ Gas and/or oil pressure is available up to the burner A1 gas/oil valve.
- ☐ The gas supply pressure does not exceed the maximum permitted gas pressure as indicated on the burner plate (see §3.7).
- ☐ Safety components are functioning correctly and ready for operation (see §2.9).
- ☐ Equipment supplied by third parties that is present in the electrical burner panel (not related to burner control such as the pressure vessel) must be adjusted and programmed.
- ☐ Sufficient fresh air is available.
- ☐ Flue outlets are not obstructed.
- ☐ A blow-off facility is present and adjusted to the maximum boiler capacity.
- ☐ A demand for heat is present in the system.
- ☐ Possibility of heat release is present and controlled/supervised by local site supervisor.
- ☐ The necessary local work permits are available.
- ☐ Qualified personnel is available for instructions, system transfer and site acceptance test.
- ☐ A safe workspace is available, according to health and safety regulations and realistic common sense.



6 Operation

This chapter describes the main operational procedures of the burner system.

6.1 Control panel

The burner is controlled via the control panel. This panel has several standard control switches and feedback LEDs, as well as controls that can be added to control optional features (e.g. an oil firing set). See §3.3 for an overview of the standard components of the control panel.

6.1.1 Main power switch

The control panel is activated by using the main power switch on the side of the panel.

6.1.2 Internal components

The control panel can be opened with a key to gain access to:

- Relays and fuses
- A power outlet and modbus connection for a service laptop
- The USB drive with the technical file of the burner system
- This instruction manual

6.1.3 Switching the burner on or off

The burner is switched on or off with the main switch. This switch has three options:

- 1 = Computer: ON - automatic controls.
- 0 = Off.
- 2 = Autoflame: ON - manual controls.

To operate the main switch:

- Set the main switch to 1 to cue the burner system to modulate based on the computer.
- Set the main switch to 2 to enable manual operation via the Autoflame interface.
- Set the main switch to 0 to shut the burner system down.

⚠ CAUTION

Do not attempt to start the burner when:

- ▶ excess oil has accumulated;
- ▶ the furnace or boiler is full of vapour;
- ▶ the combustion chamber is very hot.

⚠ CAUTION

When a VOI burner is shut down for an extended period of time, always shut off the fuel oil supply valve on the oil pump or firing set (see §3.5).

6.1.4 Manually operating the burner

The burner system can be manually operated via the Autoflame interface on the control panel.



For more information, please refer to the OEM manual.

6.1.5 Performing a system reset

A system reset must be performed after a failure in the burner or external boiler system has been resolved. This procedure allows the burner system to be put back into operation.

To reset the burner system:

- Press the reset button on the control panel.

6.1.6 Controlling the flame

The burner flame can be set to two different modes with the mode switch:

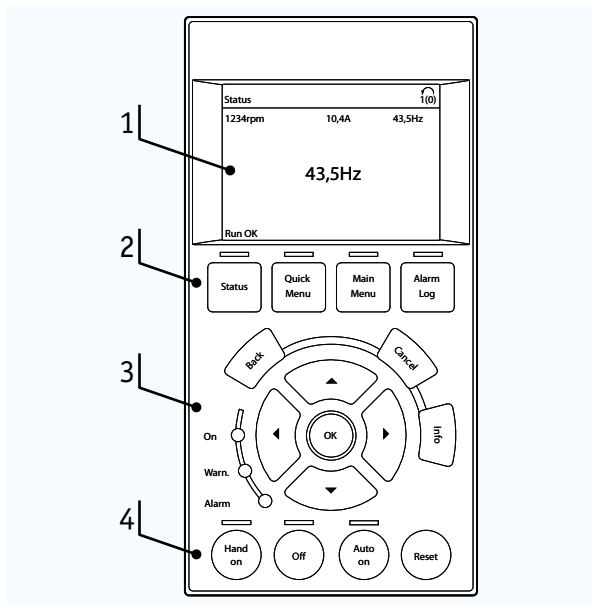
- 1 = Automatic - modulating flame
- 2 = Low flame - flame at lowest capacity (e.g. during inspection/maintenance)
- 3 = Manual - manual burner control

6.2 Frequency drive

The frequency drive is located next to the control panel and is used to control the motor of the burner fan. The frequency drive is operated via the interface in the top left corner.

NOTICE

The factory settings of the frequency drive have been set by Vitotherm.



- 1 Graphical display with status information
- 2 Menu buttons and indicator LEDs
- 3 Navigation buttons and indicator LEDs
- 4 Operation buttons and indicator LEDs



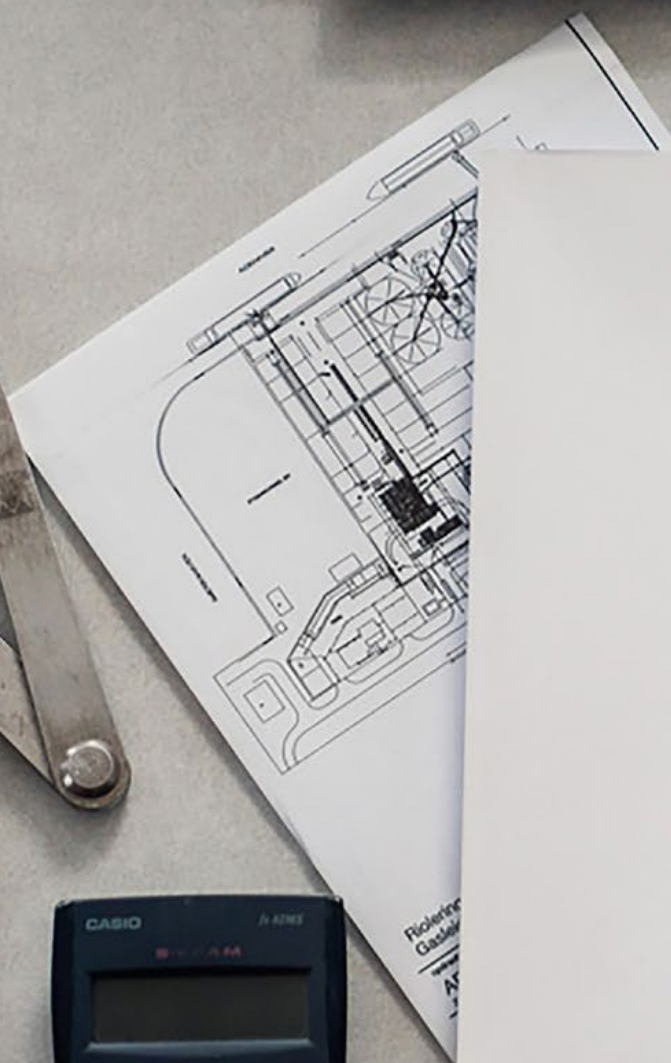
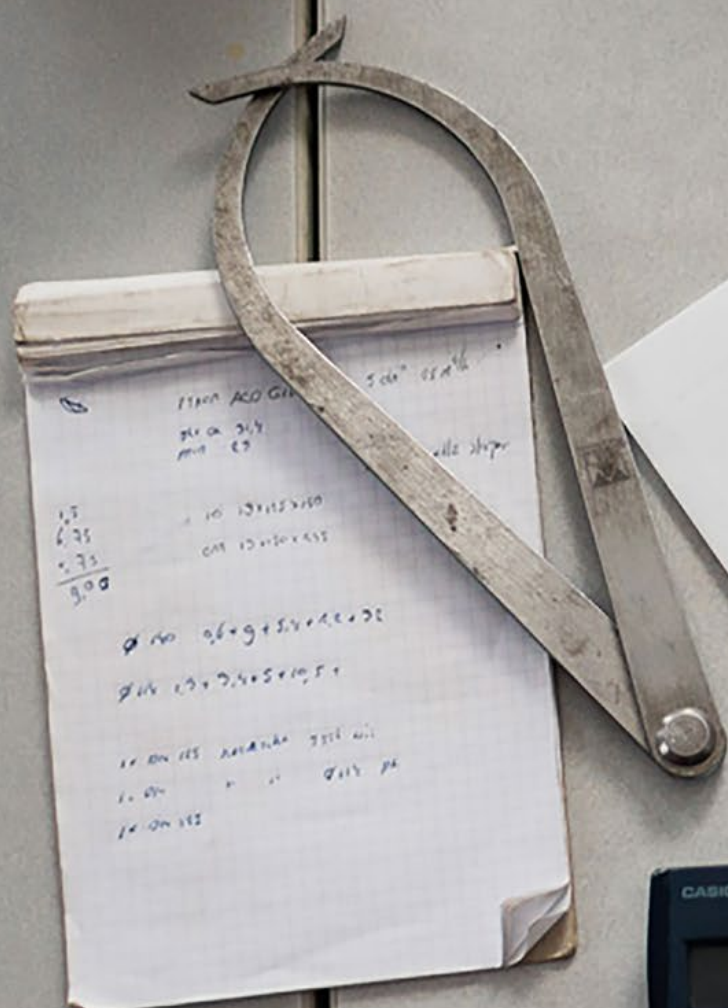
For more information, please refer to the OEM manual.

6.3 Emergency shut down

Certain hazardous situations require an emergency shut down of the burner system (see §2.8).

To perform an emergency shut down:

1. Use the control switch on the control panel to close the fuel supply to the burner.
2. Use the manual emergency shut-off switch outside the boiler house to close the gas supply to the boiler house.
3. Use the fire switch outside the boiler house to cut off the power to the burner.



7 Troubleshooting

System failures are displayed on the interface of the control panel or frequency drive. The table below can be used to identify and solve the failure.



For more detailed information about these system failures, please refer to the OEM manual of the Autoflame operating system.

Description	Instructions
VPS Air Proving Fail / VPS Gas Proving Fail	A leak is detected between the main or pilot gas valves. All valves must be checked by a specialist to identify the leaking valve. This valve must be replaced.
Frequency controller failure	Check the display of the frequency drive and read out the failure. Use the OEM manual to solve the problem.
Electronic low water level boiler failure	Check the water level of the boiler to see if the level is high enough.
Low water level boiler failure	Remove any air in the system that may cause this problem.
Max. boiler water temperature failure	Check the water temperature of the boiler. Make sure that the water temperature inside the boiler is below the boiling point.
Gas Pressure Low	Check if the gas pressure to the burner corresponds with the required pressure mentioned on the burner plate (see §3.7). Adjust if necessary.
Gas Pressure High	Check if the gas pressure to the burner corresponds with the required pressure mentioned on the burner plate (see §3.7). Adjust if necessary. Check if the maximum capacity has not been exceeded.
Max. water temperature condenser failure	Check the water temperature of the condenser system. Make sure that the condenser is below 95 °C and that the pump is running.
Maximum pressure condenser	Check the condenser or economiser for any flue gas blockage or leakage.
Emergency stop	The emergency stop is engaged. Evaluate the situation and restart the burner.
No Air Proving	Check the display of the frequency drive for failures. Check the air intake for blockage. If the combustion air fan is still producing the needed pressure for the operation, compare the air pressure to the commissioned value. Adjust if necessary.
Oil pump failure	Check if the supply power corresponds with the value on the burner plate (see §3.7). Make sure all the manual valves are open.

Description	Instructions
Failure start conditions oil firing	When switched over to emergency oil operation, check the condensor bypass valve. The bypass valve has to make sure that the flue gases are bypassed on the condensor to prevent blockage and corrosion when operating on oil.
Minimum pressure expansion vessel	Check the water level of the boiler system to see if the level is ok.
Maximum pressure boiler	Remove any air in the system that can cause this problem. Check the water pressure in the heating system of the boiler.
Flame failure	Check the flame sensor. Check the complete ignition. Check the pilot and main gas valves. Check the flame stability and combustion.
Internal fault	Check the screen of the Autoflame burner control and read out the failure. Check the OEM manual of the burner control to solve the problem.
Chimney valve not closed	Check if the CO ₂ fluegas valve in the chimney to the CO ₂ collector is closed during the start-up procedure of the burner.



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8 Maintenance

8.1 Pre-emptive parts replacement schedule

Certain parts of the burner system should be replaced every X years to prevent failure of vital components. The table below gives an overview of these maintenance activities and the frequency with which they should be performed.

NOTICE

A set of the most commonly replaced parts is available (see §3.6.4). To order this set or other replacement parts, please contact Vitotherm or your supplier.

Task	Interval (years)							To be carried out by
	1	2	5	8	10	15	20	
Burner								
Ignition pins	●							
UV-cell		●						
Ignition cable		●						
Rajah clamps		●						
Pressure switch					●			
End switches					●			
Oil nozzles		●						
Flexible oil hoses			●					
Gas valve train								
Actuators (Siemens SKP15)						●		
Actuators (Siemens SKP25)						●		
Pneumatic pressure hose (blue)		●						
Control panel								
Pneumatic timers					●			
Main power relay motor fan							●	
Interface relay					●			
Electronic timers					●			
Auxiliary relay					●			
VCD								
Pump		●						
CO sensor			●					
3-way valve			●					
Boiler / condenser								
HD condenser			●					
Maximum thermostat boiler				●				

8.2 Annual Periodic Maintenance

To guarantee the quality and safety of the burner system, Vitotherm advises annual Periodic Maintenance (PM) to be performed by their own certified service engineers.

⚠ CAUTION

To guarantee the quality and safety of the burner system, Vitotherm advises annual Periodic Maintenance (PM) to be performed by their own certified service engineers.

NOTICE

This section contains maintenance instructions for the standard components of a burner system. For maintenance instructions for any other (optional) components, please refer to the corresponding OEM manual.

A checklist of maintenance activities during Periodic Maintenance can be found in Appendix D of this manual.

8.2.1 Control panel

The following aspects of the control panel should be inspected:

- All electrical connections;
- The cables, for any sign of overload or burns;
- The circuit breaker fuses, for a correct rating;
- All switches and lights, for correct functioning;
- The cam timers, for correct functioning;
- The alarm display;
- The fuel interlocks.

8.2.2 Burner unit

To perform Periodic Maintenance on the burner unit, do the following:

1. Perform a visual check of all components for correct functioning.
2. Clean and check:
 - the burner ignition system, including the HT lead and cap;
 - the igniters. Reset if necessary;
 - the condition of the atomizer cup, including concentricity;
 - the cup shroud. Ensure it is set correctly;
 - the splash wheel, for noise;
 - the primary air casing, for any signs of oil;
 - the condition of the burner quarrel and flame baffle;
 - the flame control sensor (UV-cell or ionization probe).
3. Replace the ignition pins.

8.2.3 Moveable parts

The linkages and moveable parts of the burner system require the following maintenance activities:

- Clean and check:
 - the operation of the linkage and cam unit, for wear free movement;
 - the modulation of the motor and clutch;
 - the operation of low and high fire micro switches;
 - the secondary air dampers, for free movement;
 - the primary air butterfly, for free movement.

8.2.4 Gas

For VGI

- Check the gas supply to the burner for leaks and correct pressure;
- Check and test the gas train for correct functioning;
- Check the combustion performance for optimal efficiency for CO₂ and heat output.
 - Adjust if necessary.

8.2.5 Oil

- Perform a visual check of:
 - the installation for oil leaks;
 - the wiring and connections;
 - the condition of flexible oil hoses (if applicable), replace every 5 years;
 - the oil meter.
- Check and test:
 - the solenoid valves for correct functioning;
 - the test block heater and trace heat tape for correct functioning;
 - the thermostat for operational oil temperature;
 - the oil for correct temperature and pressure.
- Check the combustion performance for optimal efficiency for CO₂ and heat output.
 - Adjust if necessary.

8.2.6 Flue gas measurements

The concentration of the following gases in the flue gas must be measured and compared to the commissioning report:

- CO
- O₂
- NO_x

If the concentration of (one of) these gases differs from the values in the commissioning report, adjust back to the original settings.

8.3 Maintenance of the burner

This section provides information and instructions on how to perform maintenance on the MONO-jet burner.

⚠ WARNING

Make sure the burner system is completely shut down before performing maintenance on the burner:

- ▶ Use the control switch on the control panel to close the fuel supply to the burner.
- ▶ Interrupt the mains power supply to the burner system.

⚠ WARNING

All mechanical screw connections (e.g. gas/oil line, flange connections, oil valves, electrical terminals) must be retightened prior to every Periodic Maintenance.

⚠ CAUTION

To guarantee the quality and safety of the burner system, Vitotherm advises annual Periodic Maintenance (PM) to be performed by their own certified service engineers.

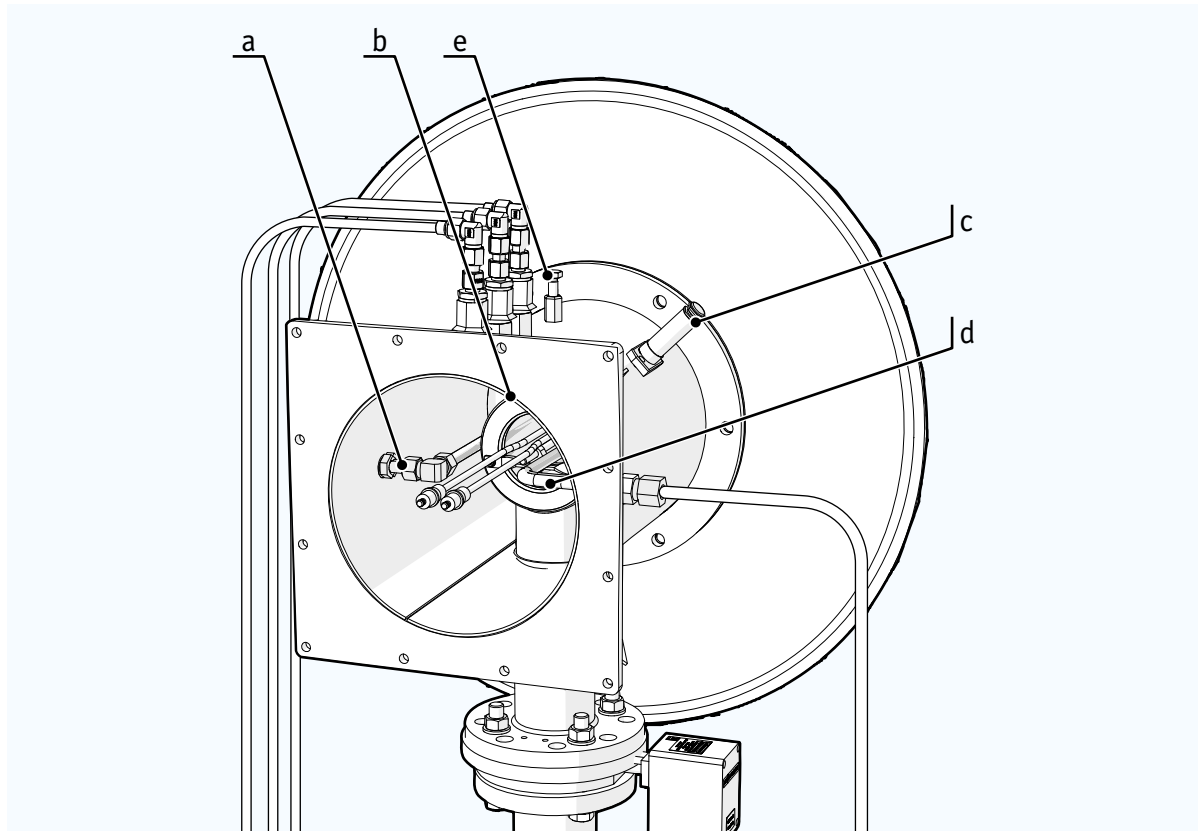
Required tools:

- Ring wrenches or adjustable spanners

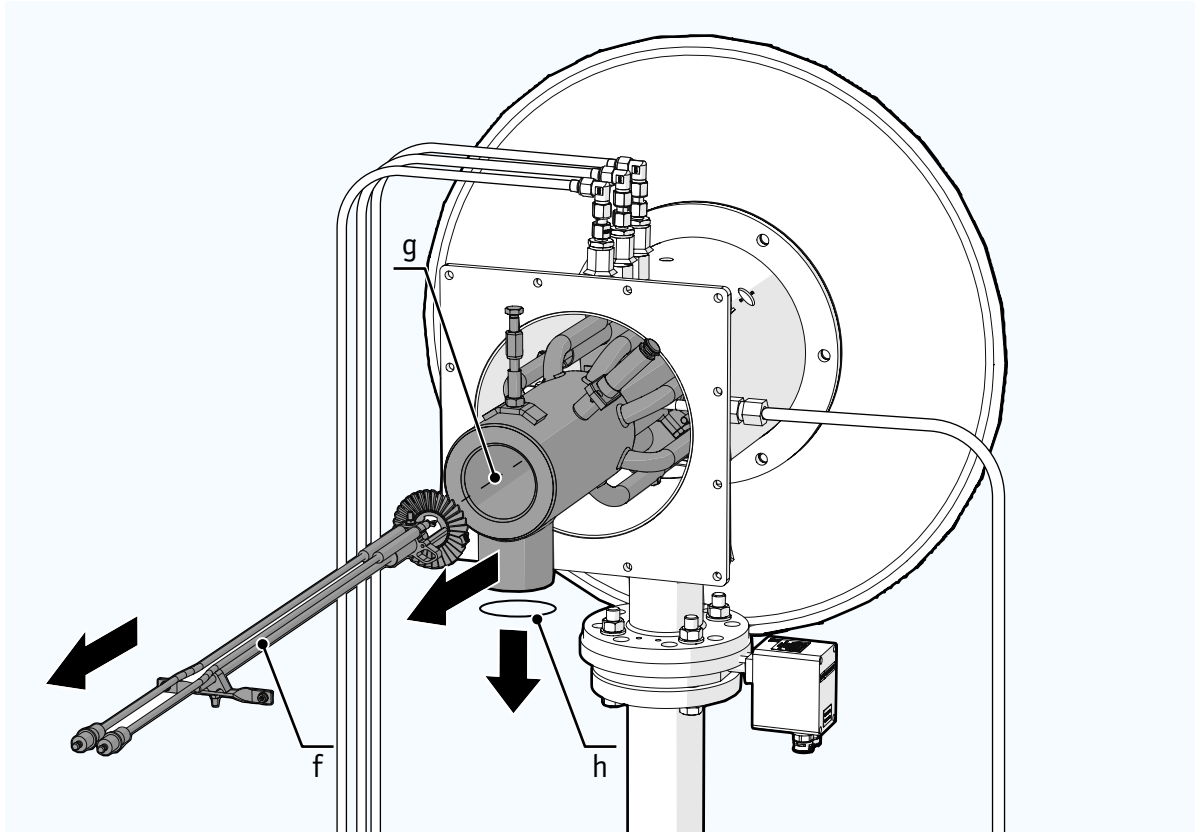
To perform maintenance on the burner:

1. Perform maintenance on the fan housing:
 - a. Check the fan for any dirt or defects
 - b. Check the fan motor for any defects and clean if necessary.
2. Remove the fan housing to access the combustor:
 - a. Connect your hoisting equipment to the hoisting eye.
 - b. Disconnect the ignition cables.
 - c. Remove the bolts.
 - d. Carefully lift the fan housing away from the boiler.
3. Check the following combustor components for any dirt or defects:
 - The air measure pipe
 - The UV cell
 - The pilot burner
 - The ignitors
 - The high voltage cable and the connectors for the ignitors
 - The combustor housing
 - If necessary, clean or replace the components above.
4. Check if the air valves are clean and open smoothly.
 - Clean the valves and the axles if necessary.

5. Disassemble the combustor:
- a. Disconnect the air measure pipe.
 - b. Disconnect the oil lines (VOI only)
 - c. Pull out the UV cell.
 - d. Disconnect the pilot gas pipe.
 - e. Remove the burner head locking bolt and the bracket it holds into place.



- f. Disconnect and remove the complete pilot burner with oil lances and pilot gas line
- g. Lift the burner head out of the combustor.
- h. Remove the gasket.



6. Check the following components of the burner head for any dirt or defects:
 - Burner head gasket
 - Flame plate and connections
 - Inner tube
 - Gas pipes
 - Mixer tubes
 - If necessary, clean or replace the components above.
7. Reassemble the burner.

8.4 Testing the safety components

A burner system is equipped with several safety components that help prevent dangerous situations.

These safety components must be tested every year to make sure they function correctly.

8.4.1 Flame sensor (UV cell)

The flame sensor must be tested in two ways.

To test the flame sensor when the burner system is in use:

1. Remove the flame sensor from the combustor.
2. Check if the alarm No Flame Signal is shown on the Autoflame display on the control panel.
 - a. If so, the sensor functions correctly.
 - b. If not, the sensor must be replaced.

To test the flame sensor when the burner system is not in use:

1. Hold a flame next to the flame sensor.
2. Check if the alarm Simulated flame is shown on the Autoflame display on the control panel.
 - a. If so, the sensor functions correctly.
 - b. If not, the sensor must be replaced.

The flame sensor is part of the combustor, see §3.1.

8.4.2 Gas safety shut-off valves & Gas leak detection system

To test the gas safety shut-off valves and gas leak detection system:

1. Use a hand pump to increase the pressure inside the double valve block of the gas train, between actuators VA1 and VA2.
2. Check if the pressure between the gas supply line connection and the double valve block stays constant.
 - a. If so, the VA1 actuator functions correctly.
 - b. If not, the actuator must be replaced.
3. Check if the pressure between the gas line adapter connection and the double valve block stays constant.
 - a. If so, the VA2 actuator functions correctly.
 - b. If not, the actuator must be replaced.

The gas safety valve and gas leak detection system are part of the gas train, see §3.2.

8.4.3 Low water level cut-off system

To test the low water level cut-off system:

1. Drain water from the boiler until the water level drops below the minimum level.
2. Check if the alarm Low water alarm is shown on the Autoflame display on the control panel.
 - a. If so, the sensor functions correctly.
 - b. If not, the sensor must be replaced.

The low water level sensor is part of the boiler thermostat set, see §3.4.

8.4.4 Boiler max. thermostat

The boiler max. thermostat sensor must be tested in two ways.

To test the boiler max. thermostat sensor when the burner system is in use:

1. Increase the power of the burner.
or
1. Stop taking heat from the boiler.
2. Check if the alarm **Maximum temperature boiler** is shown on the Autoflame display on the control panel.
 - a. If so, the sensor functions correctly.
 - b. If not, the sensor must be replaced.

To test the boiler max. thermostat sensor when the burner system is not in use:

1. Remove the sensor from the immersion pipe.
2. Submerge the sensor in oil.
3. Heat the oil just above the maximum temperature of the boiler water.
4. Check if the alarm **Maximum temperature boiler** is shown on the Autoflame display on the control panel.
 - a. If so, the sensor functions correctly.
 - b. If not, the sensor must be replaced.

The boiler max. thermostat sensor is part of the boiler thermostat set, see §3.4.

8.4.5 Min. air pressure sensor

To test the min. air pressure sensor:

1. Obstruct the air inlet of the burner. Less air will enter the burner and the internal air pressure will drop.
2. Check if the alarm No Air Proving is shown on the Autoflame display on the control panel.
 - a. If so, the sensor functions correctly.
 - b. If not, the sensor must be replaced.

8.4.6 Gas relief valve

US only

To test the gas relief valve:

1. Open the gas relief valve. Use a ring wrench or adjustable spanner.
2. Connect a calibrated pressure gauge to the measuring point on the double valve block.
3. Check if the gas pressure inside the gas train drops.
 - a. If so, the valve functions correctly.
 - b. If not, the valve must be replaced.

The gas relief valve is part of the gas train, see §3.2.

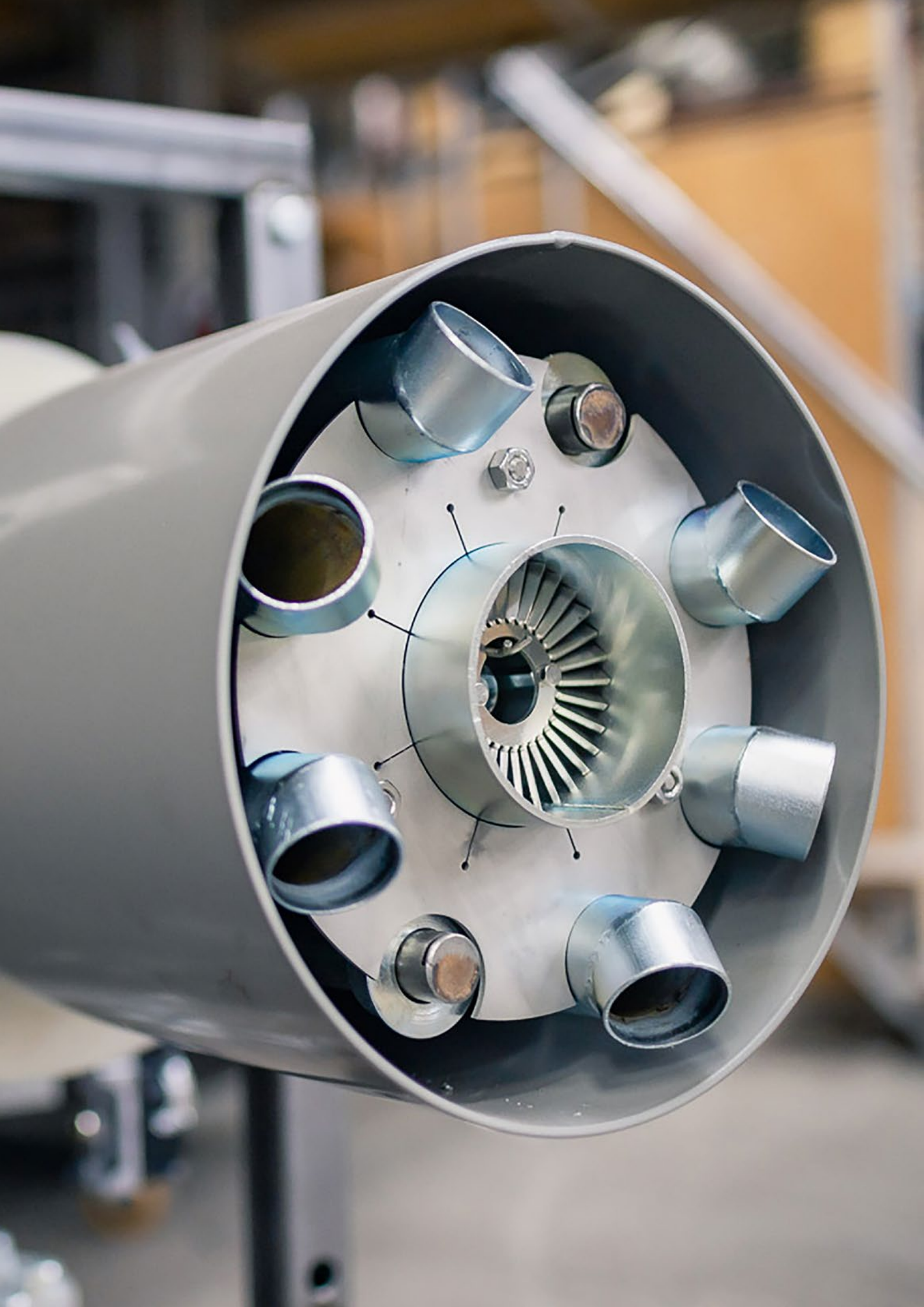
8.4.7 Manual deaeration valve

For VOI

To test the manual deaeration valve:

1. Open the valve by hand.
2. Check if the pressure inside the oil buffer drops.
 - a. If so, the valve functions correctly.
 - b. If not, the valve must be replaced.

The manual deaeration valve is part of the oil firing set, see §3.5.



9 Decommissioning and disposal

This section contains instructions and information on how to properly decommission and dispose of the burner.

⚠ CAUTION

The burner system may only be installed by qualified personnel. Handling the burner unit and supporting components without the required knowledge and experience may damage the burner system or cause hazardous situations during installation and use.

9.1 Decommissioning

To decommission the burner system:

1. Use the control switch on the control panel to switch the burner off.
2. Close the gas and oil supply to the burner.
3. Cut off the power to the burner.

9.2 Dismantling the burner

Required tools:

- Mobile crane with adequate lifting capacity.
- Ring wrenches or adjustable spanners.
- Suitable hoisting equipment:
 - Round sling

To dismantle the burner:

1. Disconnect the cabling from the:
 - a. Fan housing
 - b. Gas train
 - c. Control panel
 - d. Boiler thermostat set
2. Disconnect the oil supply line from the combustor.
3. Disconnect the gas line adapter from the combustor.
4. Remove the combustor from the boiler.
5. Remove the boiler thermostat set.
6. Remove the Vitopack.
or
Remove the control panel and gas train.

9.3 Disposal

⚠ CAUTION

Separate and dispose the components of the burner into the applicable waste streams based on their material, in accordance with local regulations.

NOTICE

All structural components of a Vitotherm automatic forced draught burner are made of powder-coated steel and should be disposed of accordingly.



For more information on how to properly dispose of supplier parts, please refer to the OEM manual.

[illegible]



10 Transport and storage

This section contains instructions and information on how to properly transport and store the burner.

10.1 Transport

When transporting the components of the burner system separately, use suitable hoisting or lifting equipment.

⚠ WARNING

Heavy objects such as the fan housing and combustor may drop or topple when transported incorrectly.

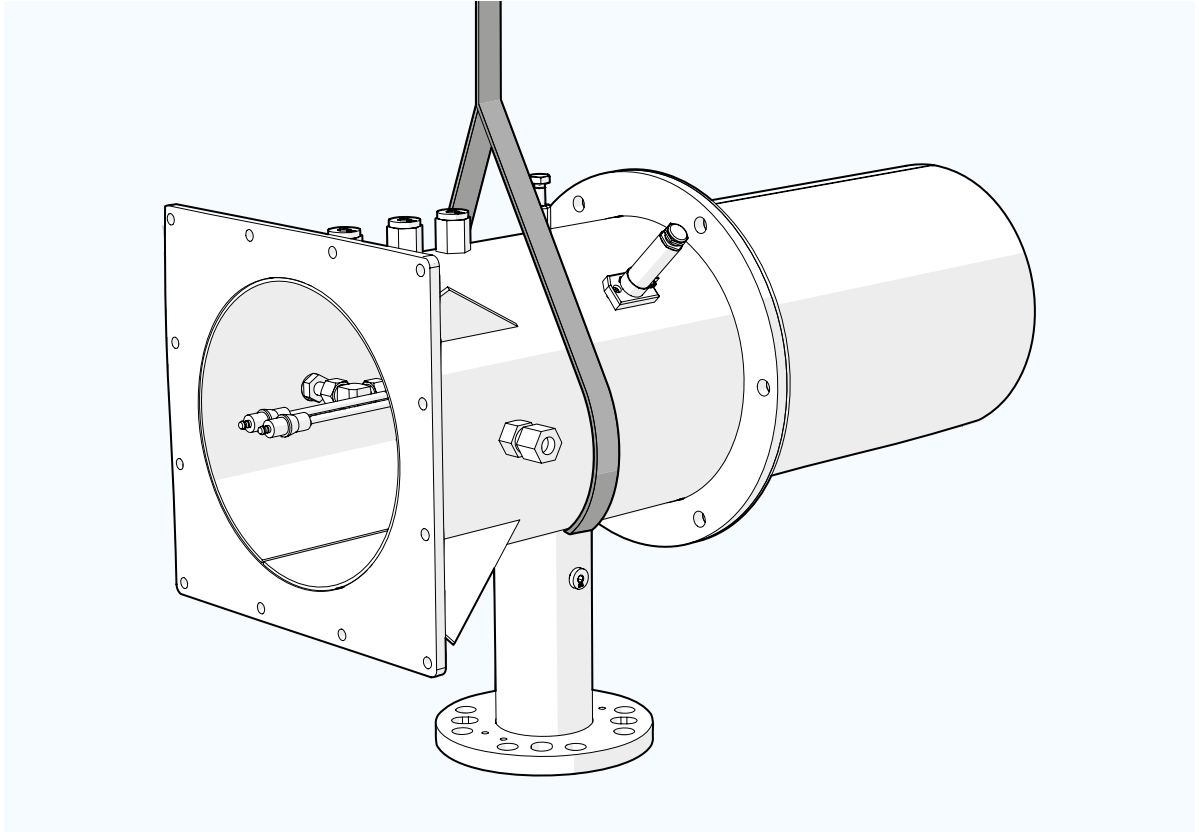
- ▶ Use suitable lifting or hoisting equipment.
 - ▶ Make sure no personnel is below or near the object when lifting or hoisting.
-

10.1.1 Fan housing

The fan housing of the burner is equipped with a lifting eye, located above the centre of gravity. The hoisting eye can be used to attach round slings to hoist the housing.

10.1.2 Combustor

The combustor can be lifted with a hoisting sling. This sling should be attached to the housing of the combustor, between the flange and the back plate.



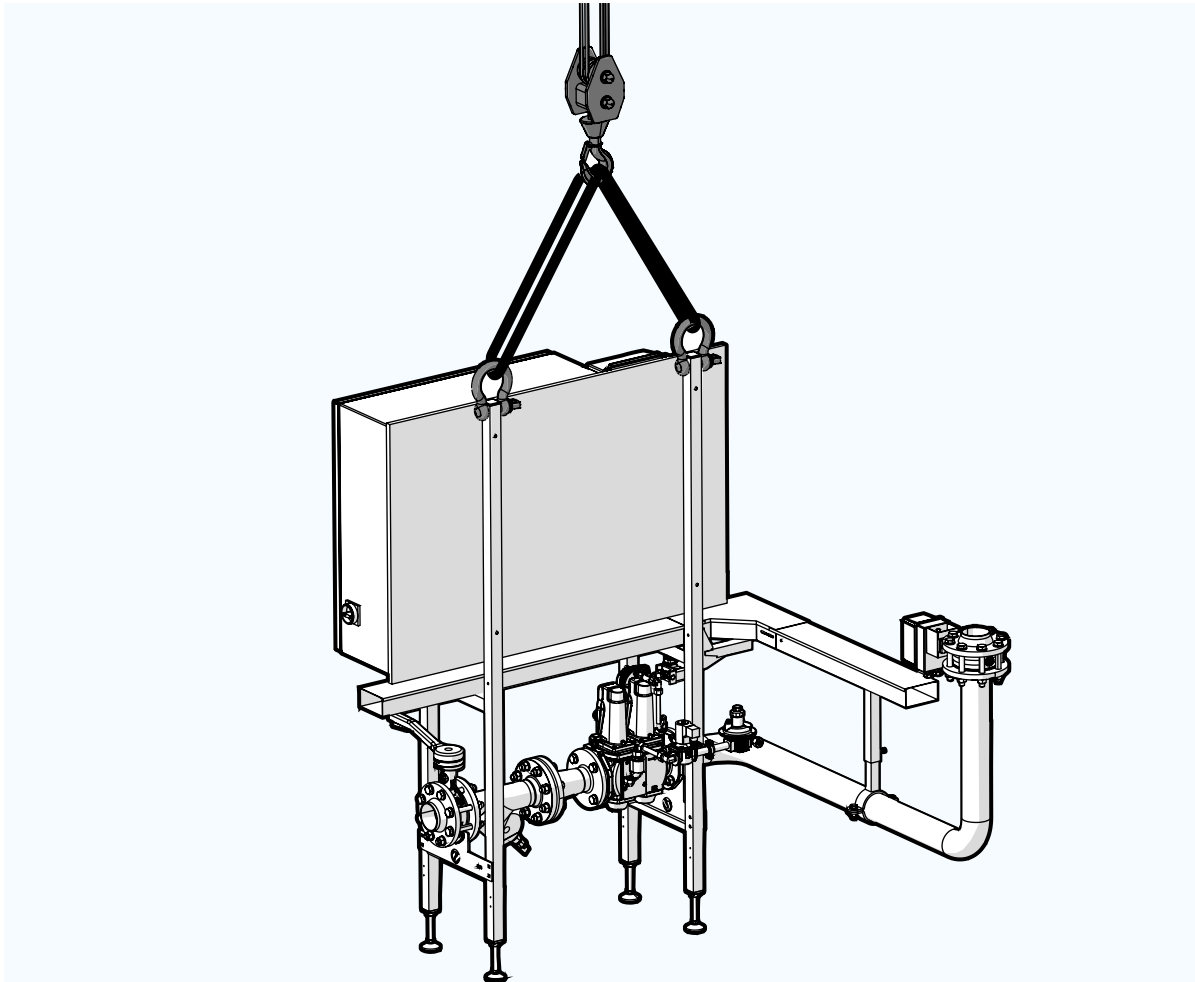
⚠ WARNING

Slings might shift due to hoisting movements, causing unforeseen movement or toppling of the combustor.

- ▶ Make sure that the sling is trapped in the combustor construction and cannot slide off.
- ▶ Do not attach slings to the open front section of the combustor, where the sling might slide off, or to the reinforcement bars.

10.1.3 Vitopack

The Vitopack is equipped with two holes at the top of the frame. These holes can be used to attach D-shackles and round slings to hoist the installation.



10.2 Storage

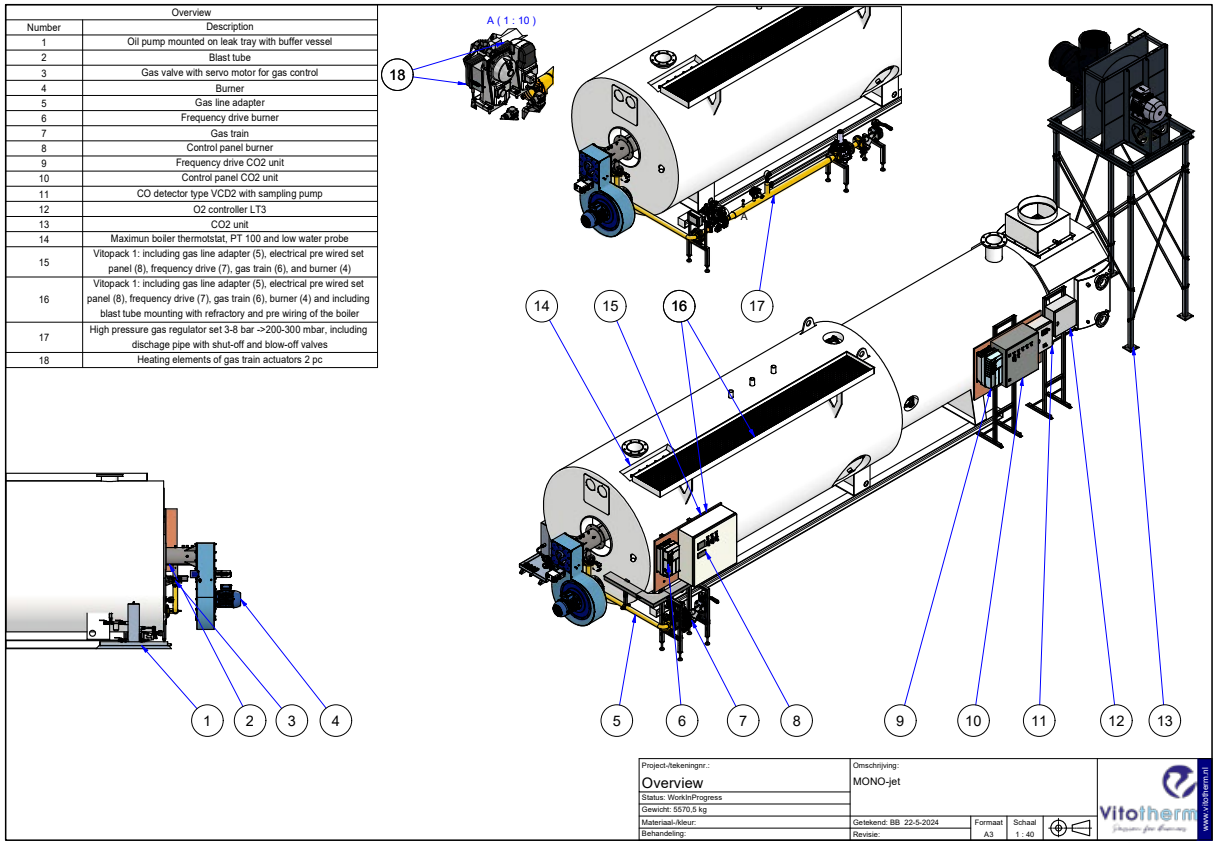
⚠ CAUTION

The steel components of the burner are sensitive to corrosion damage.

- ▶ Always store the burner in a dry, indoor location.
- ▶ Do not unpack the burner from the crate until you are ready to install it.

Appendices

A Burner system overview



B Declaration of conformity

Declaration of conformity

Manufacturer:	VITOTHERM B.V.						
Address:	Lorentzstraat 1 2665 JG Bleiswijk						
Products:	Force draft burners						
Type:	VITOTHERM B.V. burner types:						
<i>Gas burners:</i>	VGIs-100	VGIs-150	VGIs-200	VGIs-250	VGIs-300	VGIs-350	VGIs-400
	VGIs-500	VGIs-600	VGIs-700	VGIs-800	VGIs-1000	VGIs-1250	VGIs-1500
<i>Gas/oil burner:</i>	VGOIs-100	VGOIs-150	VGOIs-200	VGOIs-250	VGOIs-300	VGOIs-350	VGOIs-400
	VGOIs-500	VGOIs-600	VGOIs-700	VGOIs-800	VGOIs-1000	VGOIs-1250	VGOIs-1500
<i>Oil burner:</i>	VOIs-100	VOIs-150	VOIs-200	VOIs-250	VOIs-300	VOIs-350	VOIs-400
	VOIs-500	VOIs-600	VOIs-700	VOIs-800	VOIs-1000	VOIs-1250	VOIs-1500
<i>Fuels:</i>	Natural gas	LPG	LNG	BIO-gas	Light oil	BIO-oil	
	The suitability of fuels of different quality must be confirmed in advance by VITOTHERM B.V.						
Applications:	VITOTHERM BURNERS are suitable for intermittent firing and continuous firing on:						
	Warm-water / Hot-water Boilers , direct and indirect fired Steam Boilers Air Heaters direct and indirect fired Process applications						
Standards:	Mentioned products are in compliance with the following technical standards:						
	EN 267 EN 676 EN 746						
Directives:	Mentioned products are according the following European directives:						
	GAR 2016-426-EU MD 2006-42-EG PED 2014-68-EU EMC 2014-30-EU LVD 2014-35-EU CE-PIN 2009/142/EC						
NOx emission	VITOTHERM B.V. declares that the mentioned Products comply with the following standards:						
	BEMS 1. BImSchV NOx class 3						
Protection class IP:	Degree of protection						
	IP54 IP - EN 60529						
Marking of type plate:	The burners are labelled with:						
	CE mark CE Pin nr Identification No. of Notified Body EAC						

C Dimensions (Imperial)

Combustor mounting flange

Art.Nr.	Burner type	D1 (inch)	D2 (inch)	D3 (inch)	D4 (inch)	D5 (inch)	D6 (inch)	A1 (deg)	Thread (ISO)
100165	V...Is-450-500	26 ⁴ / ₇	18 ⁵ / ₇	1 ¹ / ₂	14 ¹ / ₆	16 ¹ / ₃	7 ⁷ / ₈	60	M16
100164	V...Is- 350-400	26 ⁴ / ₇	18 ⁵ / ₇	1 ¹ / ₂	12 ² / ₅	16 ¹ / ₃	7 ⁷ / ₈	60	M16
100163	V...Is-200-250-300	-	13 ⁷ / ₉	1 ¹ / ₂	10 ⁵ / ₆	12 ² / ₅	-	60	M12
100162	V...Is- 150	-	13 ⁷ / ₉	1 ¹ / ₂	9 ⁴ / ₉	12 ² / ₅	-	60	M12
100161	V...Is- 100	-	13 ⁷ / ₉	1 ¹ / ₂	8 ¹ / ₄	12 ² / ₅	-	60	M12
	V...Is-50								

MONO-jet

Burner type	A (in)	B (in)	C (in)	D (in)	E (in)	F (in)	G (in)	H (in)	I (in)
V...Is-50									
V...Is-100	31 ¹ / ₂	24 ¹ / ₂	17 ⁵ / ₇	27 ² / ₅	39 ⁴ / ₉	55 ¹ / ₅	5 ¹ / ₃	11 ² / ₇	38 ¹ / ₉
V...Is-150	31 ¹ / ₂	24 ¹ / ₂	17 ⁵ / ₇	27 ² / ₅	39 ⁴ / ₉	55 ¹ / ₅	5 ¹ / ₃	11 ⁴ / ₅	38 ¹ / ₉
V...Is-200	31 ¹ / ₂	24 ¹ / ₂	17 ⁵ / ₇	27 ² / ₅	42 ² / ₅	58 ¹ / ₇	5 ¹ / ₃	13 ² / ₅	38 ¹ / ₉
V...Is-250-300	36 ² / ₃	29 ² / ₃	17 ⁵ / ₇	31 ¹ / ₂	42	57 ³ / ₄	5 ¹ / ₃	13 ² / ₅	42 ¹ / ₄
V...Is-350-400	40 ⁵ / ₈	31 ⁷ / ₉	17 ⁵ / ₇	36 ⁴ / ₅	47 ¹ / ₄	62 ¹ / ₂	5 ¹ / ₃	14 ¹ / ₇	46
V...Is-450	40 ⁵ / ₈	31 ⁷ / ₉	17 ⁵ / ₇	36 ⁴ / ₅	47 ¹ / ₄	62 ¹ / ₂	5 ¹ / ₃	15	46
V...Is-500	40 ⁵ / ₈	31 ⁷ / ₉	17 ⁵ / ₇	36 ⁴ / ₅	49	64 ¹ / ₄	5 ¹ / ₃	15	46

Burner type	J (in)	K (in)	L (in)	M (in)	N (DN/ANSI)	O (Ø in)	Weight (lbs)
V...Is-50							
V...Is-100	45 ¹ / ₈	23	16 ¹ / ₂	15 ³ / ₄	50	8	
V...Is-150	45 ¹ / ₈	23	16 ¹ / ₂	15 ³ / ₄	50	9	
V...Is-200	45 ¹ / ₈	25 ⁶ / ₇	16 ¹ / ₂	15 ³ / ₄	65/80	10 ¹ / ₂	
V...Is-250-300	49 ¹ / ₄	25 ¹ / ₂	16 ¹ / ₂	15 ³ / ₄	65/80	10 ¹ / ₂	
V...Is-350-400	54 ¹ / ₂	30 ⁵ / ₈	16 ¹ / ₂	15 ³ / ₄	65/80	12	
V...Is-450	54 ¹ / ₂	30 ⁵ / ₈	16 ¹ / ₂	15 ³ / ₄	65/80	13 ⁵ / ₆	
V...Is-500	54 ¹ / ₂	32 ¹ / ₃	16 ¹ / ₂	15 ³ / ₄	65/80	13 ⁵ / ₆	

*P (in) is the required minimal free distance around the burner in all directions.

Boiler furnace dimensions

Type	Blast tube diameter	Inner boiler diameter	Boiler length (without reversal chamber)
	inch	inch	inch
VGIs-50			
VGIs-100	$7 \frac{43}{64}$	$23 \frac{1}{32}$	$51 \frac{3}{16}$
VGIs-150	$10 \frac{9}{32}$	$30 \frac{53}{64}$	$83 \frac{55}{64}$
VGIs-200	$10 \frac{9}{32}$	$30 \frac{53}{64}$	$106 \frac{19}{64}$
VGIs-250	$10 \frac{9}{32}$	$30 \frac{53}{64}$	$129 \frac{59}{64}$
VGIs-300	$10 \frac{9}{32}$	$30 \frac{53}{64}$	$145 \frac{43}{64}$
VGIs-350	$11 \frac{13}{16}$	$35 \frac{7}{16}$	$155 \frac{33}{64}$
VGIs-400	$11 \frac{13}{16}$	$35 \frac{7}{16}$	$163 \frac{25}{64}$
VGIs-450	$13 \frac{37}{64}$	$40 \frac{3}{4}$	$171 \frac{17}{64}$
VGIs-500	$13 \frac{37}{64}$	$40 \frac{3}{4}$	$177 \frac{11}{64}$

D Performance data (Imperial)

MONO-jet low NO_x gas burner

Type	Boiler capacity (n = 93%)	Burner input	Control	Gas pressure	Max. boiler backpressure	Motor/drive power	Turn down	Consumption	Max. height
	HP	MMBTU	Gas	PSI	"wc	HP	Gas	Gas (ft ³)	ft
VGIs-50	500	2	Modulating	1,45-4,35	2,4	3,0	1 : 5	2160	328
VGIs-100	119	4	Modulating	1,45-4,35	4,0	3,0	1 : 5	5015	328
VGIs-150	178	6	Modulating	1,45-4,35	4,0	5,4	1 : 5	7522	328
VGIs-200	237	9	Modulating	1,45-4,35	4,0	5,4	1 : 5	10029	328
VGIs-250	296	11	Modulating	1,45-4,35	4,0	7,5	1 : 5	12537	328
VGIs-300	356	13	Modulating	1,45-4,35	4,8	10,2	1 : 6	15044	328
VGIs-350	415	15	Modulating	1,45-4,35	4,8	10,2	1 : 6	17198	328
VGIs-400	474	17	Modulating	1,45-4,35	4,8	15,0	1 : 6	20059	328
VGIs-450	534	19	Modulating	1,45-4,35	4,8	15,0	1 : 6	22566	328
VGIs-500	593	21	Modulating	1,45-4,35	4,8	20,4	1 : 7	25073	328

MONO-jet low NO_x oil burner

Type	Boiler capacity (n = 93%)	Burner input	Control	Max. boiler backpressure	Motor/drive power	Turn down	Max. height
	HP	MMBTU	Oil	"wc	HP	Oil	ft
VOIs-50	59	2	Modul.	2,4	3,0	1 : 4	328
VOIs-100	119	4	Modul.	4,0	3,0	1 : 2	328
VOIs-150	178	6	Modul.	4,0	5,4	1 : 2	328
VOIs-200	237	9	Modul.	4,0	5,4	1 : 2	328
VOIs-250	296	11	Modul.	4,0	7,5	1 : 2	328
VOIs-300	356	13	Modul.	4,8	10,2	1 : 2	328
VOIs-350	415	15	Modul.	4,8	10,2	1 : 2	328
VOIs-400	474	17	Modul.	4,8	15,0	1 : 2	328
VOIs-450	534	19	Modul.	4,8	15,0	1 : 2	328
VOIs-500	593	21	Modul.	4,8	20,4	1 : 2	328

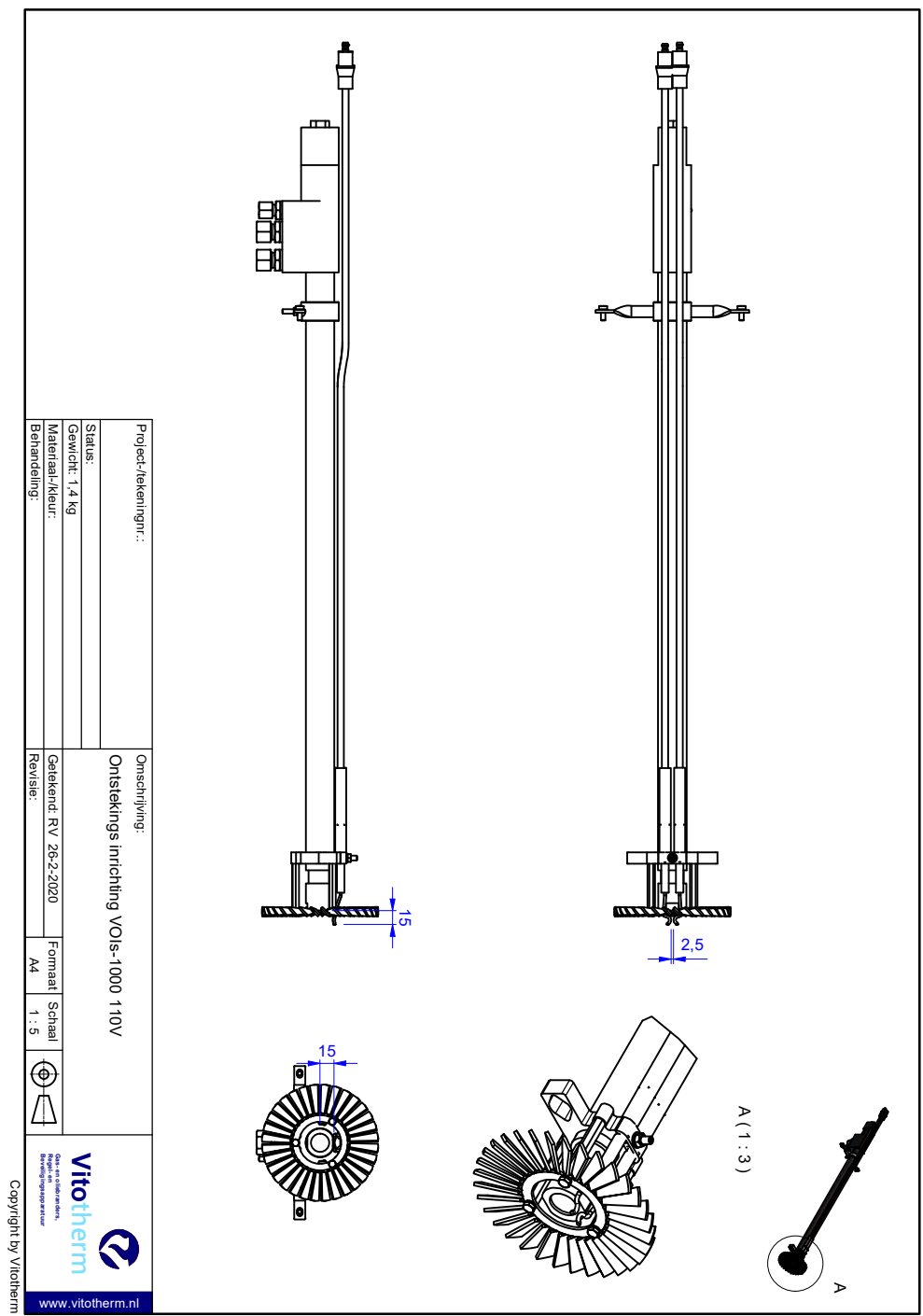


Vitotherm

E Checklist Periodic Maintenance

		Vitotherm B.V. Lorentzstraat 1 2665 JG Bleiswijk tel: +31153694757 Netherlands www.vitotherm.nl		Location name: _____ Burner type: _____ Serial number: _____ Customer reference: _____ Executed by (name): _____ Date: _____
		General preventive guidelines (M&E) for a Vitotherm burner installation on a hot water boiler		
		Control panel Check status Burner flame controller unit Check status flame amplifier Check if copy of the program is made Check visual of electrical connections Check cables for any sign of overload / burning Check fuses circuit breakers rating correct Check for correct operation of timers Check operation of alarms on panel Check switch computer functional or manual use burner Check fuel interlocks Air transport Check modulation motor air damper Check free movement of air dampers Check and clean air dampers Check soundness shipments Converter Check display function Check if copy of settings is made Measuring nipples closed Checked ?	Burner unit Check all components are sure Check burner ignition system Check and clean igniters, replace if required Check condition of burner head Check injectors on condition Check connectors Check / clean oil nozzles Check ignition transformer Check and clean UV / IR scanner Check and clean wheel Check and clean air intake Check / remove status soundproofing material Check bearings (noise and flexibility) Check RPM sensor, mounting correct ? Motor Check general status gas train Check operation of gas train Check shutters and components for leak Check pilot valves on function Check main valves on function Check Leaktest Gastrain	
		High pressure Gas regulator Check if pressure output is stable Check Pressure relief setting and status Check Pressure exhaust setting and status	- mbar - mbar - mbar	
		Pressure switches Check LD Minimum gas pressure switch before gas valves Check LD1 minimum gas pressure switch after gas valves Check LD2-L Air pressure switch Check LD2-H Air pressure switch Check LT Leaktest control switch Check HD maximum gas pressure switch after gas regulator Check HD1 / Start maximum gas pressure switch after gas valves	- mbar - mbar - mbar - mbar - mbar - mbar - mbar	
Switches (if present) Check ES-1 next to butterfly gas valve. Check ES-2 in to the main gas valve Check ES-3 next to the air damper open position. Check ES-4 next to the air damper closed position.	- - - -	Setting < 10% closed position Setting < 2% above closed pos. Setting < 90% open position Setting < 10% closed position		
Boiler safety switches Check Maximum boiler temperature thermostat Check Minimum liquid level switch (low water probe) Check Maximum boiler pressure switch Check Minimum boiler pressure switch Check Shunt pump is running at burner release	- - - - -	Setting < 110 °C resistant Ω Setting < 3 Bar Setting > 0,2 Bar		
CO2 Check visual valve motor condition Check valve connection okay ? Check pipes connected well on the fan? Check Maximum temperature CO2 Check LD2-CO2 Air pressure switch Check Valve not closed ES6	- - - - -	Setting < 65°C mbar Setting < 15% closed position		
CO detection Check for correct operation and status Check pump operation Check sensor with 100 ppm CO gas Check pump pressure switch	- - - -	- - - -		
Condensor Check if condensation tray is clean Check if drain pipe is clean Check if damper is movable Check Maximum temperature condensor Check HD condensor maximum pressure switch by condensor Check Pump running at burner release	- - - - -	Setting < 95°C mbar		
Oil Check oil pump visual on status and running Check for leaks Check filter is clean Check operation of solenoid valves Check Maximum oil pressure switch Check Minimum oil pressure switch Check ES condensor valve position oil	- - - - - -	bar bar Setting < 85% open; Blocking oil function when chimney not open		
Flue gas emissions Check O2 Check CO Check NOx Check flue gas temperature	- - - -	>< % < ppm < ppm < °C		
Notes: _____ _____ _____ _____				

F Ignition electrodes spacing





This image shows a blank sheet of white paper with horizontal blue lines. The lines are evenly spaced and run across the width of the page, typical of notebook paper. There are no margins, text, or other markings on the page.

Notes

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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