



## **ECONOFLAME R2200 GAS FIRED BOILERS**

**INSTALLATION, OPERATION & MAINTENANCE  
DOCUMENTATION**

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We aim to achieve continuous improvement in our products. Therefore, specifications are subject to change without prior notice.

Due to changes the product can deviate from the information specified in this document. Therefore STOKVIS rejects any responsibility for the differences between the product delivered and the information mentioned in this document.

## R2200 TECHNICAL DATA

Type		2207	2210	2213	2216	2220	2224	2228
Heat output	kW	81,3	116,4	151,5	186,7	233,9	280,9	328,5
Heat input	kW	88,2	126,0	163,8	201,6	252,0	302,4	352,8
Maximum gas rate	m <sup>3</sup> /h	9,3	13,3	17,3	21,3	26,7	32,0	37,3
Gas pressure (inlet)								
natural gas minimum	mbar	20	20	20	20	20	20	20
natural gas maximum	mbar	120	120	120	120	120	120	120
Water capacity	dm <sup>3</sup>	6,2	6,9	7,7	8,5	9,6	10,5	11,4
Maximum working pressure	bar	6	6	6	6	6	6	6
Gas connection (G)		1"	1¼"	1¼"	1¼"	1¼"	1½"	1½"
Water connection (W)		DN50 PN6	DN50 PN6	DN50 PN6	DN50 PN6	DN50 PN6	DN65 PN6	DN65 PN6
Chimney diameter (D)	mm	150	180	200	200	250	250	300
Safety valve	connection	½"	½"	¾"	¾"	1"	1"	1"
	blow-off	½"	½"	¾"	¾"	1¼"	1¼"	1¼"
	standard setting	bar	3	3	3	3	3	3
Electrical supply	V	230	230	230	230	230	230	230
Frequency	Hz	50	50	50	50	50	50	50
Fuse	A	6	6	6	6	6	6	6
Max. electrical consumption								
	boiler	kW	0,10	0,10	0,12	0,12	0,15	0,15
	pump maximum	kW	0,07	0,14	0,20	0,24	0,30	0,35
	total	kW	0,17	0,24	0,32	0,36	0,45	0,59
Boiler weight empty	kg	165	200	245	285	340	375	440
Sizes	height (H)	mm	1440	1440	1440	1440	1440	1440
	width (B)	mm	786	786	786	786	786	786
	length (L)	mm	1016	1226	1436	1646	1926	2486

Table 1 Technical Data

22IP22/T0001EE

- Heat output measured at : 60 - 80 C.
- Gas consumption at : 1013 mbar, 15 C, dry.
- Gas specification : I<sub>2H</sub>.
- Appliance category : B14
- Protection degree : IP20

22IP22/000103DE

Pump and by pass = option

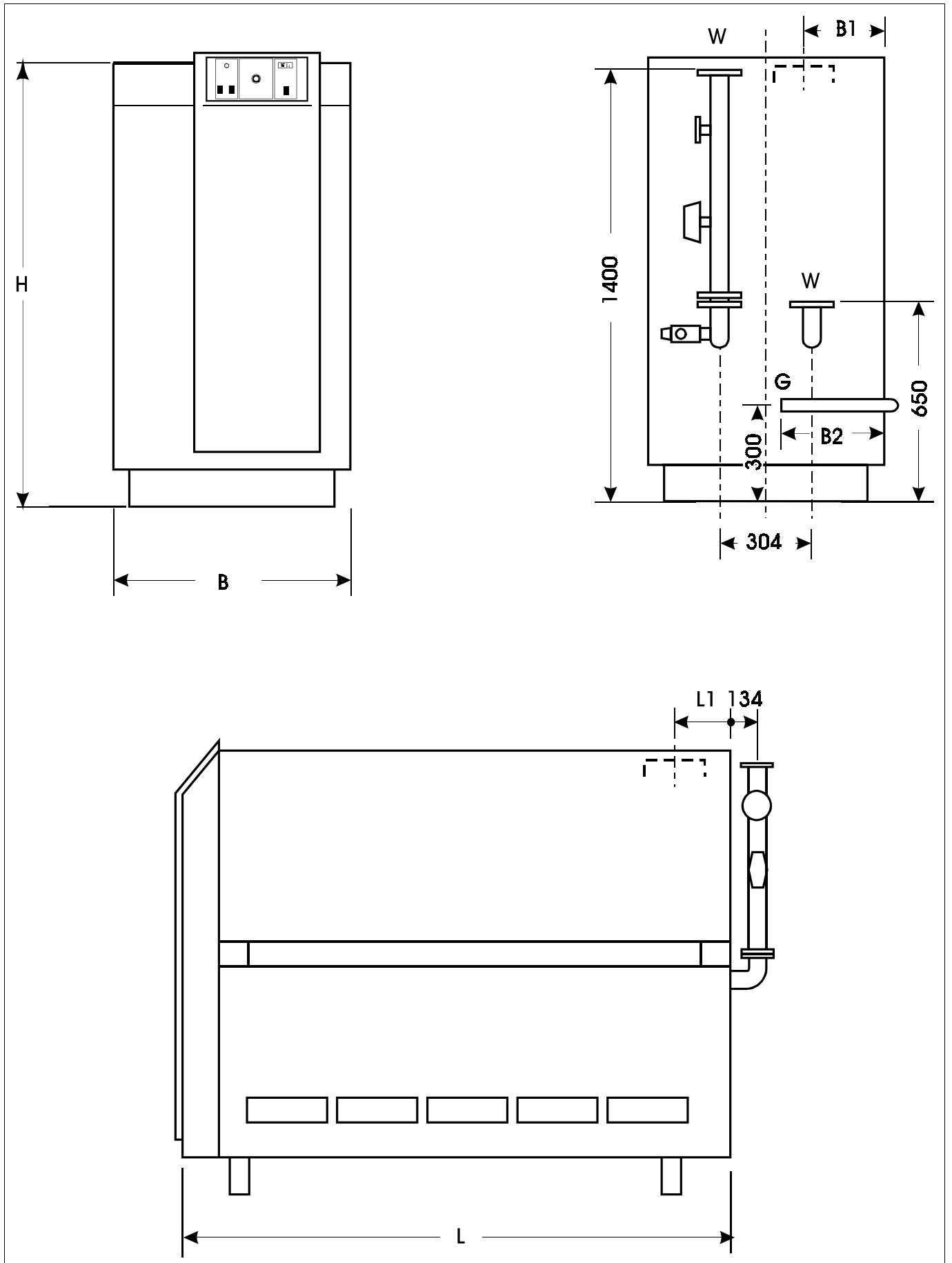


Fig. 1 Dimensions

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## Dimensions

Type		2207	2210	2213	2216	2220	2224	2228
B	mm	786	786	786	786	786	786	786
B1	mm	318	318	298	298	292	292	292
B2	mm	420	420	420	420	420	420	420
D	mm	150	180	200	200	250	250	300
G		1"	1¼"	1¼"	1¼"	1¼"	1½"	1½"
H	mm	1440	1440	1440	1440	1440	1440	1440
L	mm	1016	1226	1436	1646	1926	2206	2486
L1	mm	153	153	163	163	174	174	174
W		DN50 PN6	DN50 PN6	DN50 PN6	DN50 PN6	DN50 PN6	DN65 PN6	DN65 PN6

Table 2 Dimensions in mm

22CV22/T0002BE

### *Changes in specifications and dimensions*

The manufacturer reserves the right to change the above mentioned dimensions without prior notice. Because of manufacturing tolerances, the above mentioned dimensions can vary slightly.

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The R2200 unit is also available as a left-handed model.

This means that the burner assembly can be removed from the left-hand side of the unit.

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# 1 INTRODUCTION

- 1.1 General** Through their unique construction, these central heating units renowned for their:
- high thermal efficiency
  - environmental friendliness
  - light weight and small dimensions
  - durability
  - low noise production
  - large regulating range
  - available with many different options.

Continual research and development means that Stokvis remains at the forefront of boiler and water heater technology.

101001AE

- 1.2 Supplier** **StokvisEconoflame** boilers are sold throughout the United Kingdom by:

**Stokvis Energy Systems**

96R Walton Road

East Molesey

Surrey KT8 0DL

Telephone: 08707707747

Facsimile: 08707707767

For advice or more information with regard to our products contact Stokvis.

22IP22/102001BE

- 1.3 This manual** This documentation has been to aid the following target groups:
- the consulting engineer
  - the heating installer
  - the service engineer
  - the user.

Because these target groups require mostly similar information and also specific information, our technical documentation has been integrated to provide these target groups with the necessary general and specific information to install, service and operate this product.

The supplier (see 1.2) will be able to provide any further or supplemental information.

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The following aspects will be explained:

- general description
- technical specifications
- necessary services for system design and unit installation
- example systems
- maintenance instructions.

Operating instructions for the user can be found on the unit.  
See also chapter 7.

**1.4 Service** For commissioning and assistance in maintenance matters, please contact your supplier's service department. For more details see section 1.2.

**1.5 Reservation** It is the law that the installation be carried out by a competent person. The boiler should be installed in accordance with the British Standards and Codes of Practice referred to in this manual, the Gas Safety (installation & use) Regulations 1994, Building Regulations, Model Water Bye-laws and any Requirements of the Local Gas Supplier, Local Authority, Water and Fire Authorities and I.E.E. Regulations.

***Health & Safety at Work Act, 1974***

Under Section 6 of the above Act, it is the duty of manufacturers and suppliers of products for use at work to ensure, so far as it is reasonable practicable, that such products are safe and without risk to health when properly used and to make available to users of such products adequate information about their safe and proper operation.

Stokvis boilers should only be used in the manner and purpose for which they were intended, and in accordance with the recommendations detailed in this manual. Our heaters have been designed, produced and inspected with safety in mind, but there are certain basic precautions, which should be taken by the user and, in particular attention is drawn to the safety precautions in this manual and to the operating instructions on the boiler.

It is imperative, therefore, that all persons who make use of our heaters have all the information and instructions they require to ensure that they are fully aware of any hazard, and that they know both the purpose and correct manner of use of our heaters.

**The manufacturer can alter its products without any preceding notification and is therefore not obliged to adapt earlier delivered products.**

22CV22/150001BE



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## 2

## DESCRIPTION

### 2.1 General information

The R2200 is a gas-fired boiler with an atmospheric burner with HIGH/LOW/OFF regulation.

The R2200 is fitted with a 2-stage thermostat control working at 100% or approx. 50% boiler capacity.

The R2200 series of boilers are available in 8 types: R2207, R2210, R2213, R2216, R2220, R2224 and R2228.

The last two digits of the type number indicate the number of burner bars present in the burner assembly. The load at nett calorific value is approx. 13 kW per burner.

All boiler types are fitted with a 9-pipe heat exchanger of the 2 pass type.

The use of extruded copper fin pipes in the heat exchanger leads to higher efficiency.

Thermal radiation losses are minimized by the optimal construction of the combustion chamber in which high-grade insulation is integrated.

The advanced construction of the R2200 enables swift assembly and disassembly, which simplifies maintenance and inspection.

#### **The boiler conforms to the strongest European environmental regulations.**

The R2200 is fitted with a draught diverter and a flue gas extractor fan which results in a small chimney diameter.

The draught diverter is fitted with a pressure difference switch for the monitoring of flue gas flow.

The R2200 has an **electronic protection and ignition system**, indicated by **E**.

The **thermostatic control version**, using a 2-stage thermostat to maintain constant flow temperature is indicated by a **T**.

The **weather compensation version** controlled by a simple to operate digital regulator is indicated in the **W version**.

22CV22/210001BE

Appliance category B14.



The R2200 series is CE approved for the following countries: Great Britain, the Netherlands, Belgium, France, Ireland and Italy under Product Identification Number 0063AR3702.

22CV22/210003DE

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## 2.2 Main components

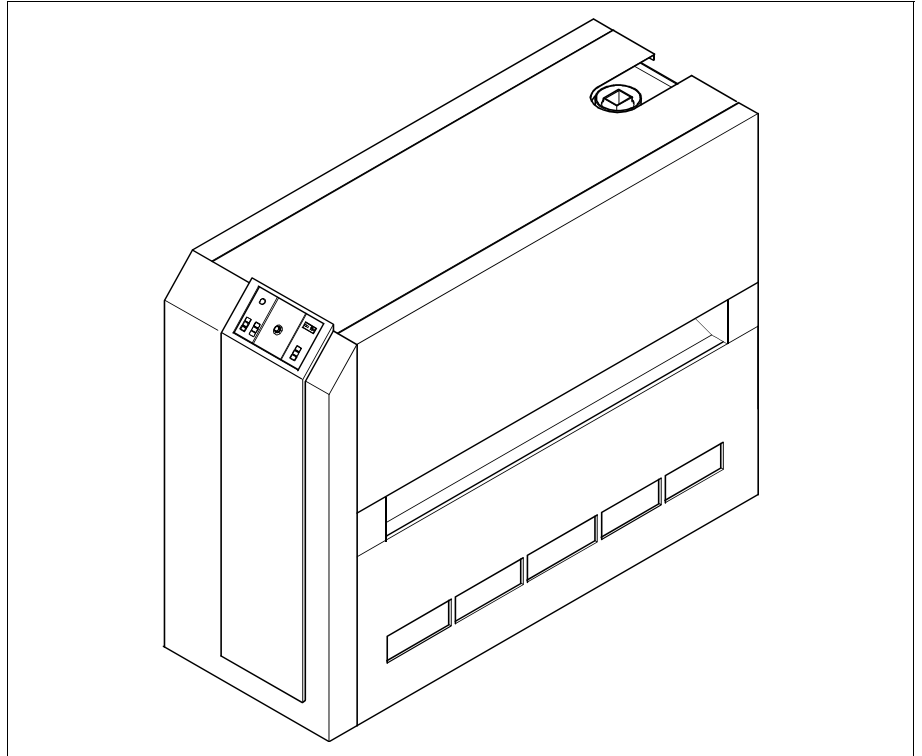


Fig. 2 R2200

### ***Draught diverter***

The R2200 is fitted with a draught diverter with a flue gas extractor fan. It is possible to connect the flue outlet connection on the top cover with a standard flue pipe.

The inside of the draught diverter is made of aluminium.

The galvanized panel work is easily removed without the use of any special tools by means of a click system.

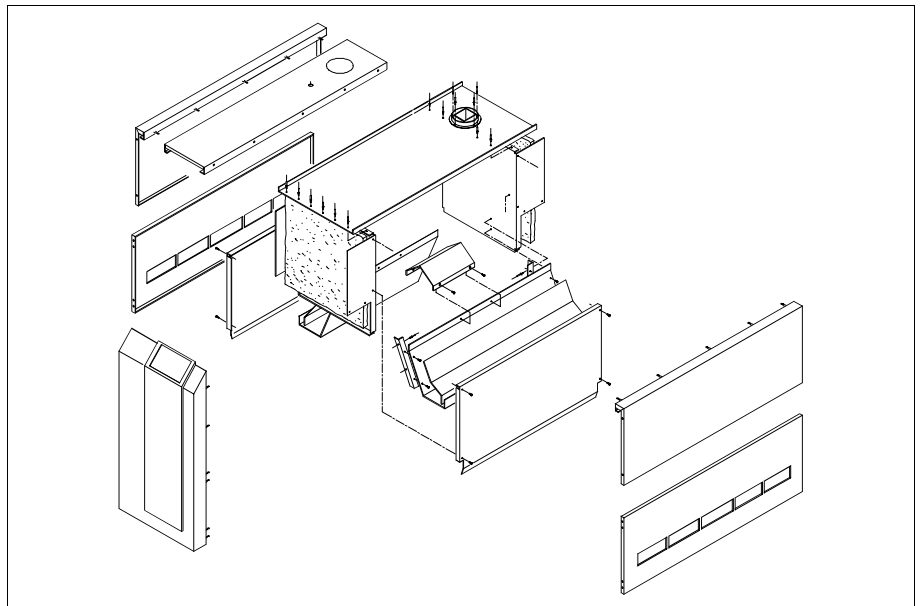


Fig. 3 Draught diverter

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### **Combustion chamber**

The chassis consists of two side frames with steel supports. Dura blanket type thermal insulation is sandwiched between the vermiculite refractory blocks and front, rear and side panels of the combustion chamber housing. These vermiculite refractory blocks are mounted so as to allow freedom of expansion. The refractory blocks backed with Dura blanket insulation form the combustion chamber.

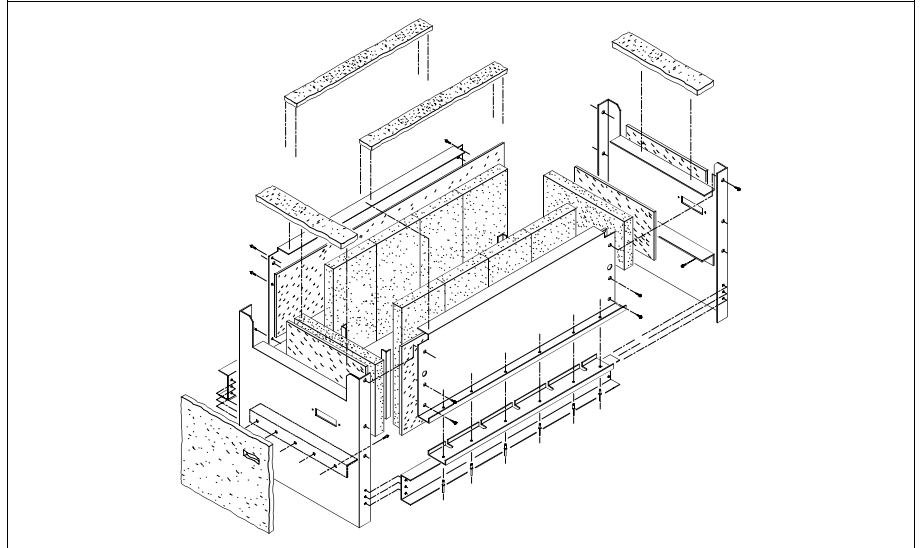


Fig. 4 Combustion chamber

### **Heat exchanger**

The heat exchanger (2-pass type) is mounted on the chassis. To ensure proper heat transfer of the combustion gases, the fin pipes are arranged side by side and expanded laterally into a mounting plate. The baffles on the fin pipes optimize the efficiency of the heat exchanger. The supply and return pipes together with the steel water manifolds form the heat exchanger and is pressure tested at 16 bar.

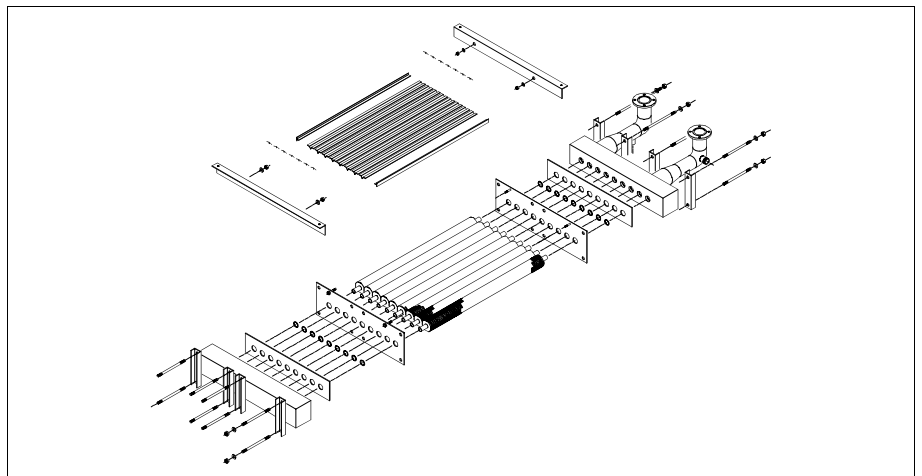


Fig. 5 Heat exchanger

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### **Burner**

The burner is mounted under the combustion chamber in the chassis. The burner bars, mounted in the burner tray are manufactured from stainless steel. Each burner bar is supplied by its own injector nozzle mounted on the gas manifold. A bottom plate is mounted under the burner bars. **This pre-mix burner has a very low NO<sub>x</sub> emission.**

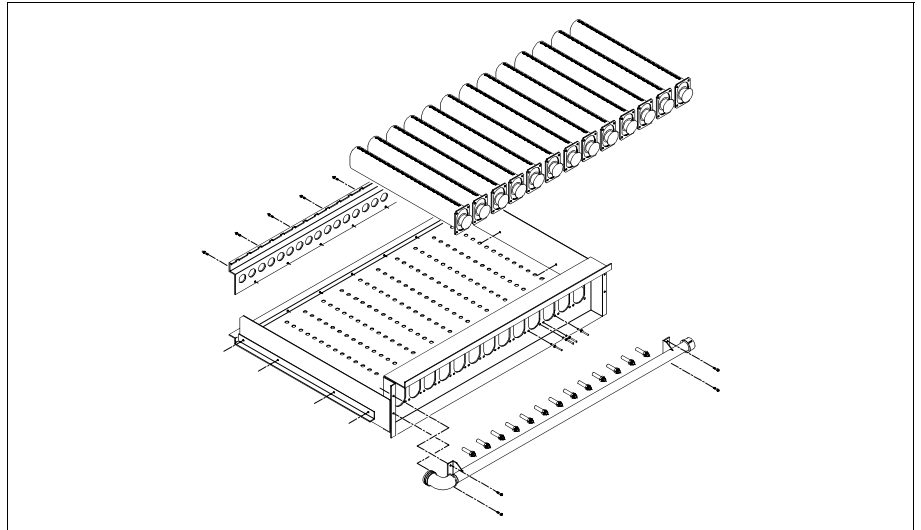


Fig. 6 Burner

### **Gas train**

The gas train consists of a two-stage gas valve, which is mounted on the gas distribution manifold.

22CV22/220001HE

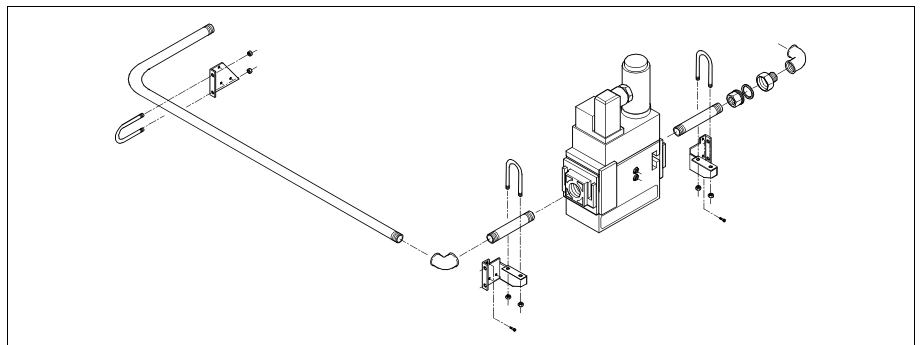


Fig. 7 Gas train

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## 2.3 Principle of regulation

The flow temperature can be constant or influenced by weather compensation. Several boilers can be connected by using cascade switching. In order to reduce electricity consumption both boiler and boiler pump can be switched off by the cascade switch box.

22CV22/240001AE

### ***Thermostatic control version (T)***

The R2200 has a thermostatic temperature control, providing constant flow temperature by using a 3-step thermostat.

Only two steps are used:

I        low  
III      high

By omitting the second step, a specific switching differential is created. The following options are therefore available:

A) + 3°C/ - 3°C step I-II

B) + 3°C/ - 6°C step I-III

22IP22/230002AE

### ***Weather-compensated version (W)***

The W option is a two stage fired boiler controller, for direct weather compensated regulation. The flow temperature is compared to the programmed heating curve. The regulator is fully digital. All functions are easily read by using standard symbols.

The regulator includes a clock with:

- 99 days holiday mode
- automatic summer/winter switching
- programmed for 8 years.

### ***Standard functions***

- boiler regulation
- heating circuit with sliding temperature control
- extra heating circuit regulation (via servo-valve)
- tap water priority switching
- protection against legionnaires disease
- pump kick
- pump switching
- protection against freezing
- unit return temperature protection
- unit emission control possibilities
- remote control.

As standard, the unit is supplied with a flow temperature sensor and outside temperature sensor.

22CV22/230003GE

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**2.4 Boiler protection** The R2200 is protected by the following systems:

*minimum water flow switch*

The water flow switch is installed in the flow and monitors continuously the minimum water flow. If the flow falls below a preset level, the burner is shut down. The water flow switch is factory set and should not be adjusted.

*high limit thermostat (E.C.O.)*

In the event of failure of the control thermostat, a preset high limit thermostat will shut down the burner.

*pressure relief valve*

The maximum operating pressure of the R2200 boiler is 6 bar. The standard safety valve supplied is **set to 3 bar**. If a different pressure setting is required this should be specified and will be set at the factory.

*flame failure control*

Flame safeguard relay with alpha numeric read out flame ionisation control. Internal memory for the purpose of:

- operating hours (high and low)
- cycling time
- historical lock outs.

*flue gas flow control*

In the event that the flue gas extractor fan fails or the flue gas flow is lower than the preset level the pressure difference switch will shut down the burner.

22CV22/240001FE

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## SAFETY

### ***Installation requirements***

Please read these requirements before commencing installation.

The product should be installed according to relevant codes of practice as mentioned in the "Supplement".

The installation procedure should only be used for heating systems with a maximum water temperature of 100 °C.

22CV22/300001BE

We emphasize that you should always give priority to the above mentioned standards and regulations and that the installation regulations should be considered as an addition to these standards and regulations.

### ***Explanation of the icons used in this manual***



Instruction of extreme importance in order to guarantee proper functioning of the boiler.



Not following the operation procedures can cause serious damage to the boiler, personal injuries or environmental pollution.



Electric shock hazard.



Useful information.

300002AE

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## **MAINTENANCE**

Work on the electrical installation should only be carried out by approved technicians and in accordance with the electro technical regulations.

Work on the gas and hydraulic systems should only be carried out by approved technicians and in accordance with the safety regulations for gas and hydraulic installations.



Keep unauthorized people away from the installation. Do not place any objects on the boiler. Keep away from the hot water connections in order to prevent burns.

Always disconnect the boiler from the electric mains and close the gas service cock in the gas supply pipe before commencing maintenance and servicing operations.

Check the system for leaks afterwards.



In addition to the information in this documentation, always follow the standard safety regulations to prevent accidents. Cover panels should only be removed for maintenance and servicing tasks. Replace all panels after completing these maintenance and servicing tasks.

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### ***Safety precautions***

The installation should never be switched on with panels removed or when boiler protection devices are not operational.

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### ***Instruction and warning stickers***

Never remove or cover any of the instruction and warning stickers. They should always be legible throughout the life span of the boiler.

Immediately replace any damaged or illegible stickers.

22IP22/300005AE

### ***Modification***

Modification of the installation should only be carried out after obtaining prior written permission from the manufacturer.

300006AE

### ***Danger of explosion***

Follow the health and safety regulations for working in hazardous areas when working in the boiler room.

22IP22/300007AE



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### ***Installation***

The product should be installed according to relevant codes of practice as mentioned in the “Supplement”.

Make sure that you follow all safety instructions properly.

22IP22/300008DE

### ***Operation***

In case of gas leakage, switch off the boiler and close the gas service cock.

Open doors and windows, and notify the proper authorities.

Follow the instructions in the manual when you use the boiler again.

22IP22/300009AE

### ***Technical specifications***

Do not exceed the specifications as laid down in the installation and maintenance instructions.

300010AE

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## 4 DELIVERY AND TRANSPORT

**4.1 Delivery** Before delivery, the R2200 boiler is fully assembled and tested in the factory. The R2200 is mounted on a pallet and covered in a "heat-shrink" protective wrapper.

Check for damage after removing the boiler's protective covering.

Check whether the boiler conforms to the order requirements.

Check whether the circuit diagram and gas-train diagram number is in accordance with the offer, order confirmation and the data on the boiler's data number plate.

22IP22/410001BE

**4.2 Unit protective packaging** The boiler is mounted on a wooden pallet. For transportation the boiler is covered in a "heat-shrink" protective covering. The panel-work is also covered in a protective polyethylene layer. Before final installation in the boiler room the boiler must be removed from the pallet and all protective coverings removed. The protective coverings should be disposed of in an environmentally friendly way. Contact your local authority.

22IP22/420001BE

**4.3 Transport** Refer to the technical specifications on weight and dimensions when transporting the boiler.



WARNING:



- Incorrect moving or lifting of the boiler may cause damage to the boiler
- Remove the protective covering **after** transport and after installation in the boiler room.

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### **Pallet cart and/or forklift truck**

When moving the boiler with a pallet cart or forklift truck, the forks should be placed at a side of the boiler.

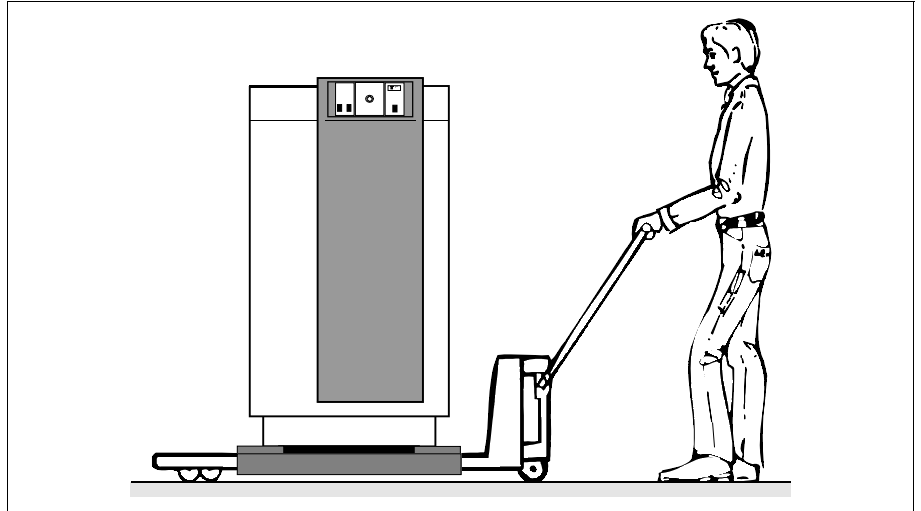


Fig. 8 Moving



### **Using a crane**

- Never swing the load over bystanders.
- Always use special lifting harnesses which should be placed on the boiler
- Make sure that during lifting the harness does not damage the draught diverter.

22IP22/430001AE

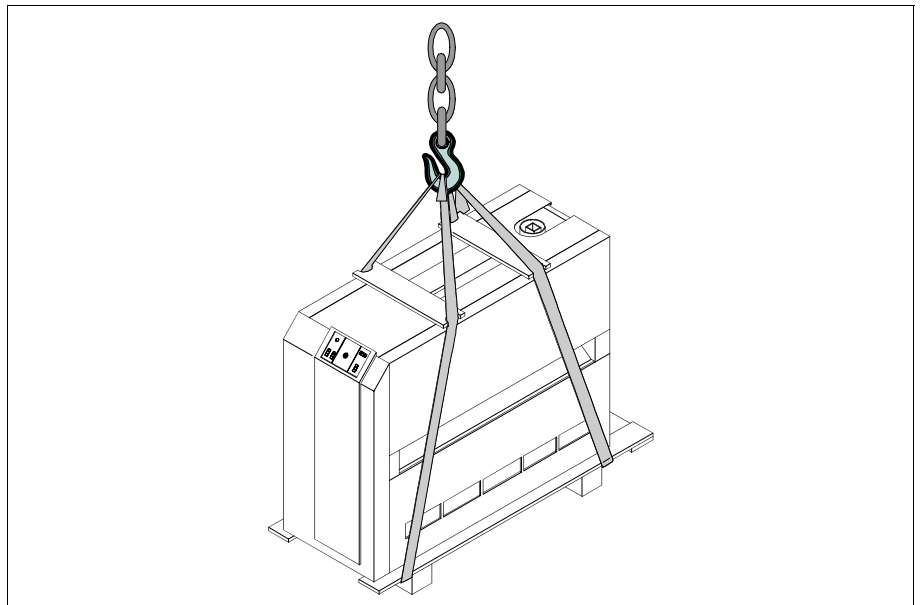


Fig. 9 Lifting

## 5 INSTALLATION

**5.1 Boiler room** The R2200 should be installed according to relevant codes of practice as mentioned in the “Supplement”.

22IP22/510001CE

**5.1.1 Siting** Install the boiler as close to the chimney as possible. A flue base is not required.



To maintain ease of access and therefore ease of maintenance, the following minimum dimensions are recommended between the R2200 and the boiler room walls:

Front with control panel	1000 mm
Rear side with water connections	350 mm
Left-hand side	350 mm
Right-hand side due to burner	550 mm

In case of a left-handed model:

Left-hand side due to burner	550 mm
Right-hand side	350 mm

If these dimensions are not met, maintenance operations could be seriously inhibited.

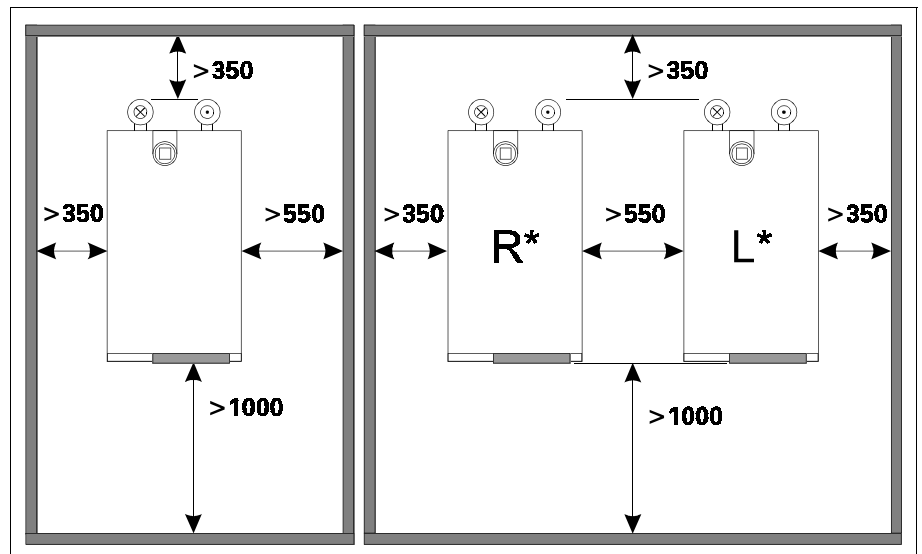


Fig. 10 Minimum dimensions

\* Right-hand model (R): standard  
Left-hand model (L): option.

22IP22/511001EE

**5.1.2 Boiler room ventilation** The product should be installed according to relevant codes of practice as mentioned in the “Supplement”.

22IP22/501001AE



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### **External control**

It is possible to externally control the unit. The following terminals on the terminal block have the following functions:



1	-	2*	1st stage on-off
3	-	4*	2nd stage high-low
7	-	8*	lock out, minimum gas pressure switch
9	-	10*	blocking, low water level protection
11	-	12	outgoing alarm signal (230 V)
13	-	14*	blocking, high gas pressure switch
21	-	22	outgoing cascade signal (230 V)

\* remove jumper.

### **Pump switching**



The boiler's circulation pump must be in operation before the boiler is switched on. When the boiler is switched off, the circulation pump should continue to run for several minutes in order to reduce the amount of heat present in the boiler. If the pump is switched off too soon, the water temperature can rise above the maximum water temperature, as a result of which the maximum thermostat will cause the boiler to fall into "Lock out".

22IP22/502201BE

### **Hydraulic options**



- A boiler pump complete with bypass (see fig. 14 and 15)
- B Boiler pump only (see fig. 16 and 17)

If one of these options is selected a separate water flow fault indication and a pump operation selector switch (manual/-automatic) will be installed.

22IP22/502202AE

## 5.2.3 Hydraulic connections

This product has to be installed by a recognized installer fully according to the current national and local demands, norms and standards.

The supply and return pipes are found on the rear side of the boiler. As standard all boiler types are fitted with a pressure relief valve **set to 3 bar**.

If requested the manufacturer can also install relief valves which are set to between 3 and 6 bar.

Heavy supply and return pipes should be supported from underneath.

22IP22/523001EE

Flues **Flue gas volumes/dimensions**

You can use the following flue dimensions to assist in flueing:

Type	Q flue m <sup>3</sup> /h	Chimney diameter mm	Pressure loss Pa/m
2207	333	150	2,4
2210	477	180	2,0
2213	620	200	1,8
2216	764	200	2,6
2220	954	250	1,4
2224	1145	250	1,8
2228	1336	300	1,2

Table 3 Flue gas amounts

Heat input:	100 %
Flow temperature:	90 °C
Return temperature	70 °C
Flue gas temperature:	100 °C
CO <sub>2</sub>	7 %
Maximum flue resistance:	0,6 mbar = 60 Pa.

22IP22/T5001DE

Average flue pipe resistance coefficients of various flue pipes. See also manufacturers information.	
bend 90 (R/D= 1,0)	$\zeta = 0,5$
bend 90 (right angle)	$\zeta = 1,3$
bend 45 $\zeta = 0,5$	
T-piece	$\zeta = 2,0$
outlet	$\zeta = 1,5$

Table 4 Average flue pipe resistance coefficients

T5007AE

**Flue condensation**

Flue gases transfer heat when they pass through the chimney. If the flue gas temperature falls below dew-point, condensation will occur in the flue. Under normal conditions condensation will not occur. To prevent condensation the flue should be insulated. Because a flue gas extractor fan is used, it is not possible to connect more than one unit to each flue.

22IP22/524001CE

**Water quality** *Regular system replenishment*

Water losses can occur under certain circumstances, such as regular bleeding of the radiators, the use of warm water for other purposes or leakage in the pipes.

When an installation is regularly replenished with hard water, a water softener should be used.



In areas with extreme hard water, precautions should be taken to control water hardness, ie. a water softener. Contact the service department of Stokvis Energy Systems for more information about the required water quality necessary for the R2200 series.

Very soft water is generally aggressive and is able to erode steel pipes, radiators, or even the zinc of brass fittings. In this situation the use of chemicals is necessary. From our vast experience we know that the R2200's heat exchanger will not be effected.

**The commissioning of systems with large water volumes and multiple boilers.**

During the construction of large installations, one boiler will often be in operation. Regularly new heating circuits will be connected which involves filling of fresh water. In case of leakage, heating circuits should be disconnected, repaired and refilled.

As one boiler is operating at maximum capacity, boiler scaling is likely to form in such installations. If the water is not softened, it is essential to clean the heat exchanger internally (with acids), before boiler commissioning (or hand over).

22CV22/503001AE

As the heat exchanger only has a small volume, minimum water flow is absolutely necessary. This water flow is secured by the water flow switch.

There is a relationship between the maximum water flow temperature, the system pressure and the water volume which flows through the boiler per unit time at a specified boiler load.



In case of high water flow temperature, low water velocity in the heat exchanger and low pressure, steam forming may occur. Figure 13 shows the relationship between water volume and differential pressure in the heat exchanger.

22CV22/503002EE



## 5.4 Hydraulic system **System pressure**

By system pressure is meant, the water pressure measured at the heat exchanger in cold condition. With a correctly sized expansion system the system pressure will not change very much under variable temperature conditions.

22CV22/540001GE

5.4.1 Flow and resistance The next figure shows an example of a hydraulic system. System pressure is calculated using the following formula:

$$p = p \text{ exp.} + H - Rk.$$

$p$  = water flow temperature

$p \text{ exp.}$  = pressure expansion vessel

$H$  = pump head

$Rk$  = pressure loss boiler

22CV22/541001BE

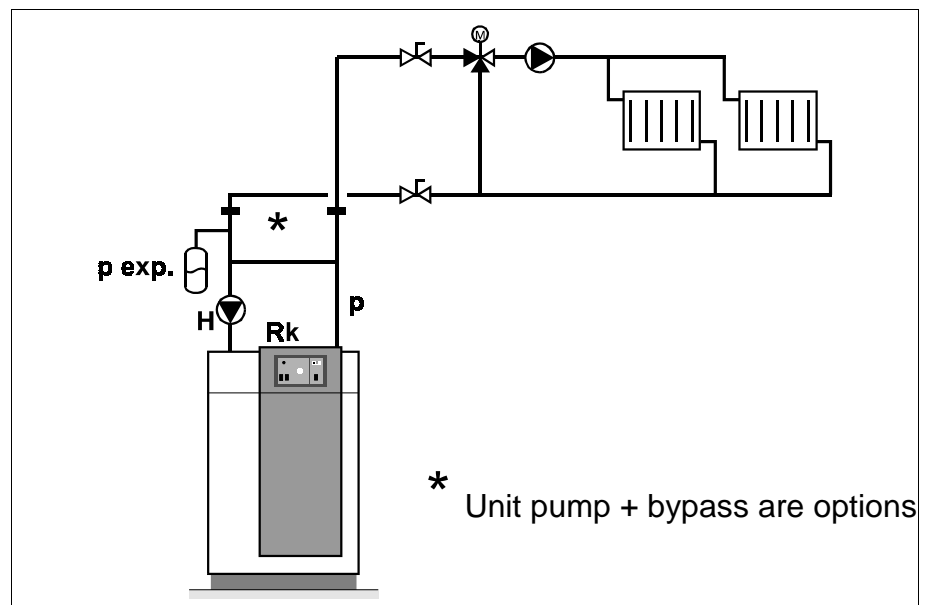


Fig. 12 Example of a hydraulic system

**Minimum and maximum water volume per hour**

A too low flow rate through the fin tubes can lead to cavitation. Also, a too high flow rate can cause erosion. To protect the heat exchanger from these two extremes, the flow rate (Q) should be set using the table below.

Type	Water volume Q m <sup>3</sup> /h		
	min.	max.	nom.
2207	3.5	14	5
2210	5	22	7
2213	6.5	24	9
2216	8	24	11
2220	10	24	14
2224	12	24	16
2228	14	24	19

Table 5 Water volume

22CV22/T5002CE

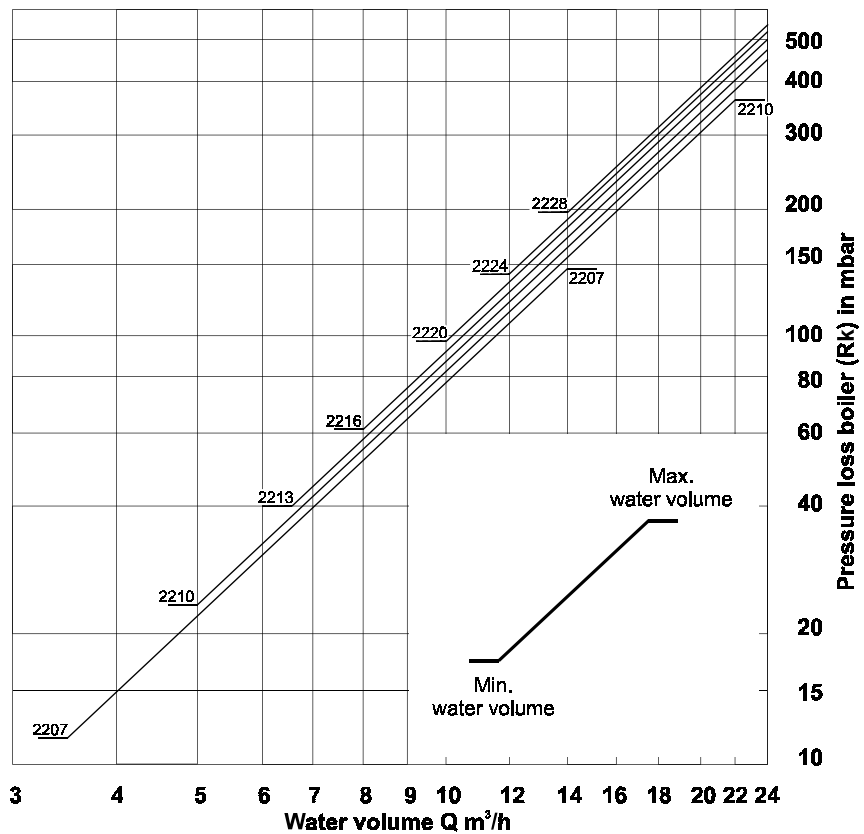


Fig. 13 Water volume



**Q min** applies to a minimum pressure at the supply side of **2 bar** and a maximum temperature of **80° C**.

**Q nom** applies to a minimum pressure at the supply side of **1.5 bar** and a maximum temperature of **90° C**.

22CV22/541002EE

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### ***Positioning the pump and expansion vessel***

We advise that the pump should be mounted in the return pipe in the following order: expansion vessel, pump, boiler.



If you mount the pump in the supply pipe, the lifespan of the pump will be reduced.

Always connect the expansion vessel to the suction side of the boiler pump.

If the boiler is installed on the roof, you should take into account of the maximum permitted pressure in radiators on the ground floor.

22CV22/541003BE

### ***Pump switching***

It is necessary to electrically switch the boiler in such a manner that it will never operate before the installation and boiler pump are running. If one of the in 5.2.2 mentioned pump options is selected this will be standard.

22CV22/541004BE

### ***The effect of flow velocity of the installation on boiler water temperature***



ALWAYS MOUNT FLOW REGULATORS POWERED BY SERVOMOTORS IN THE SECONDARY WATER CIRCUIT WITH AN OPENING TIME OF AT LEAST 120 SECONDS!

Fast acting regulators in the secondary water circuit may give the boiler regulator insufficient time to make proper corrections. This may lead to an unacceptable high temperature, as a result of which the maximum thermostat will lock out the boiler.



Such a problem may also occur if all flow governors close simultaneously. The flow governors should therefore close one after the other.

The sudden disconnection of an important warm air heating unit may cause the same problem.

If a large fan can be switched off immediately, you should consider switching off the boilers first (temporarily if necessary), and subsequently the fan using a time relay.

When the flow governors are opened for night time temperature reduction for example, it is essential that **the return water temperature of the heat exchanger does not fall below 36 °C** (as condensation may occur).

If an installation is optimized, the primary water circuit, consisting of boilers, boiler pumps and open header, should be started first before the system is switched on. Open the groups subsequently one after the other by using a return water temperature regulator for example, adjusted to 36 °C. Switch on the secondary pumps one after the other.

The primary circuit must have a low water volume. This enables faster heating and reduces the condensing time of the boiler after for example night time temperature reduction.



The recommended maximum volume of the primary circuit per 100 kW installed boiler capacity is 200 litres. When the installation is switched off, the boilers must be switched off first. After approximately 5 minutes the boiler pumps and the heating groups can be switched off.

22CV22/541005CE

5.4.2

Examples hydraulic system

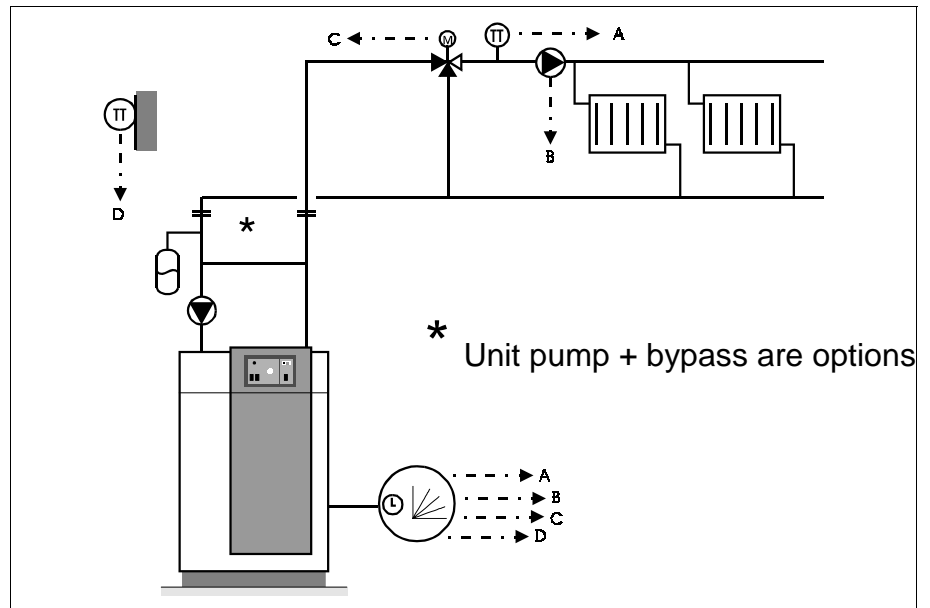


Fig. 14 R2200 unit with outside temperature compensation and heating zone regulation.

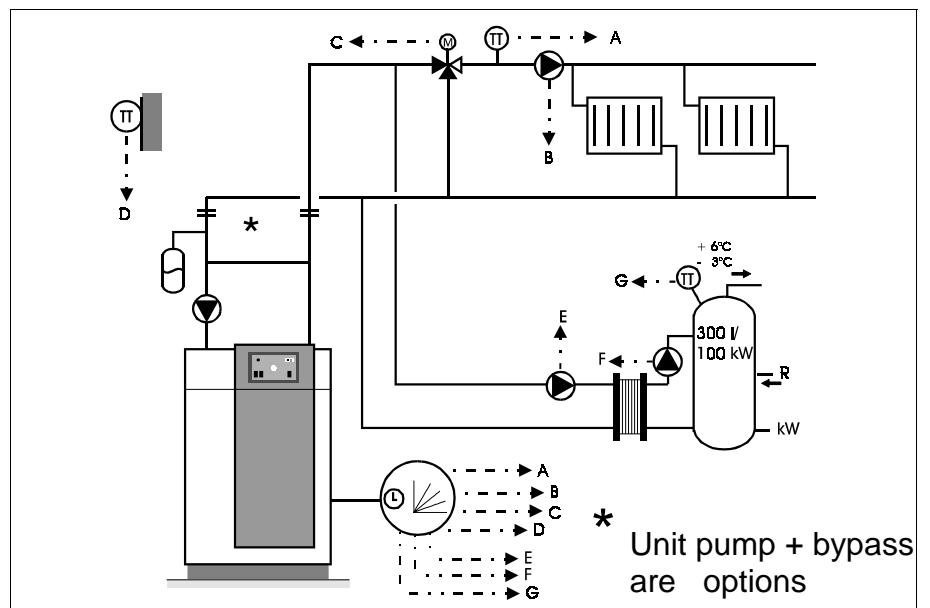


Fig. 15 R2200 unit with outside temperature compensation, heating zone regulation and hot water priority switching.

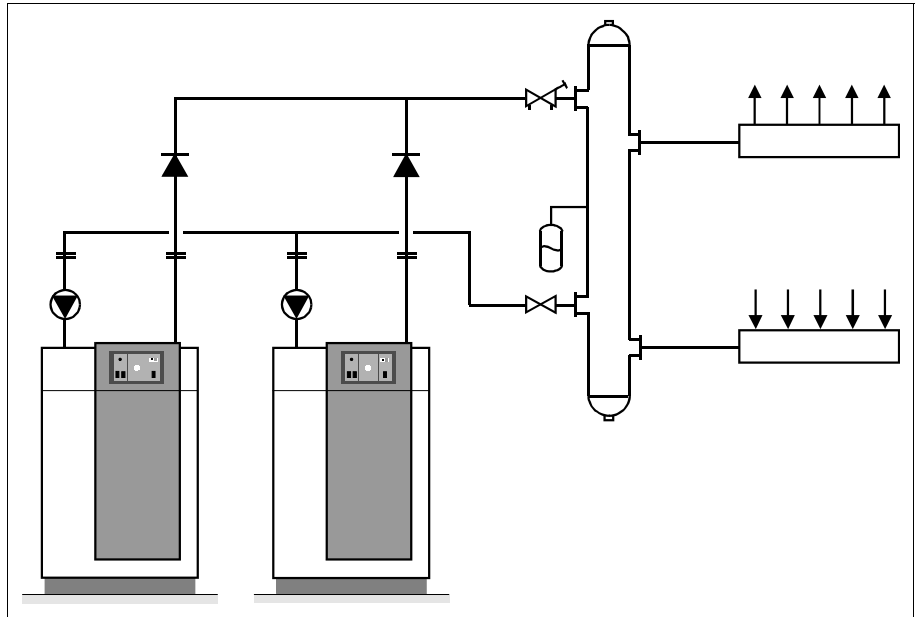
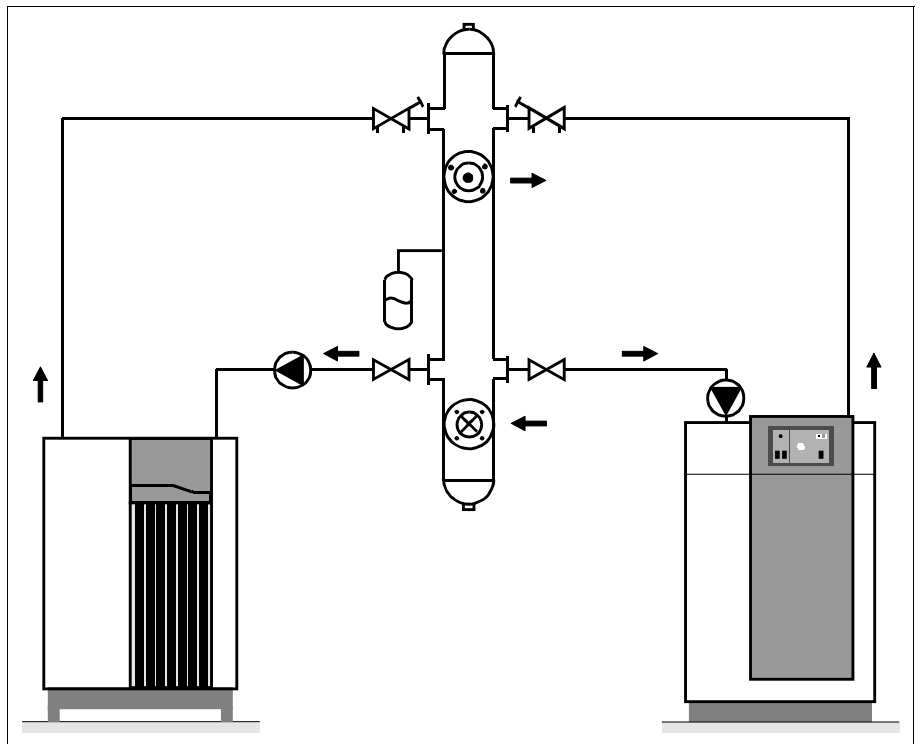


Fig. 16 R2200 units with constant flow temperature and cascade switching.



R2800 HR

R2200 VR

Fig. 17 Condensing / non condensing unit cascade switching and a zero-loss header.

These hydraulic systems are examples only and should not be used without specialist advice.

22CV22/542001AE

## COMMISSIONING

COMMISSIONING OF THE BOILER MUST BE CARRIED OUT BY PROPERLY QUALIFIED AND AUTHORISED PERSONNEL. OTHERWISE, THE GUARANTY WILL BECOME VOID.

Never deviate from the instructions in this manual.

### ***Flushing the system***

To prevent damage from rust, sand, metal particles etc., the system must be flushed thoroughly, before the system is switched on.

### ***Water heating system***

- fill the system up to the standard set pressure
- bleeding the system
- switch on all pumps and check for correct direction of rotation
- close the stop-valves in the secondary groups.

### ***Electrical connection***



- check the boiler electrical connection
- switch on the boiler with the ON/OFF switch
- adjust the temperature regulator to the desired flow water temperature.

### ***Gas connection***

- open the gas service cocks
- bleed the gas pipe. NB: Insure adequate ventilation during bleeding
- connect the measuring equipment to check:
  - \* pre-pressure
  - \* burner pressure
  - \* boiler ionisation

22IP22/600001BE

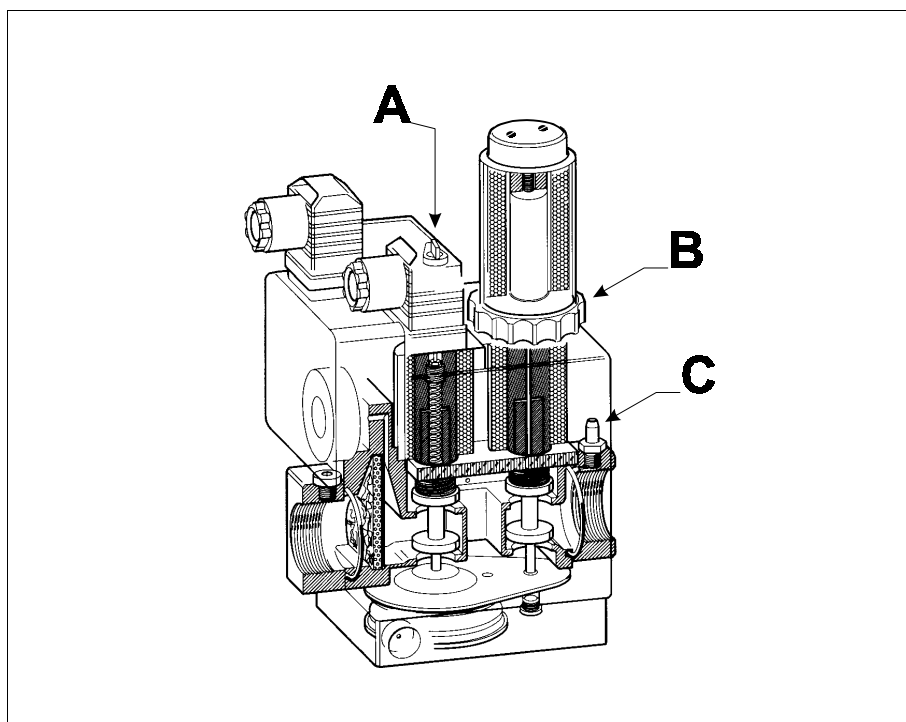


### ***Adjusting the burner pressure***

The burner pressure must be adjusted when the boiler has been running for 20 minutes at high load (state of equilibrium).

Gas	H (G20)
Gas service pressure mbar	20
Burner pressure, maximum (high fire) mbar	17.3
Burner pressure, minimum (low fire) mbar	8.3
Nozzle diameter mbar	2.75

Table 6 Burner pressure



*Fig. 18 Main gas valve adjustment*

The capacity of the R2200 is adjusted using the burner pressure method. The burner pressure can be read off a manometer connected to the pressure test point C on the outlet side of the main gas valve.

The main gas valve used, is of the Multibloc type, which has two stage firing adjustable with V1 and throughput adjustment on V2.

- Standard the gas volume is pre-set (V2) and the countersunk screw is sealed (don't tamper this seal).
- Maximum regulated burner capacity is adjustable using the set screw (A) under the gas valve protective cover on the gas valve housing.
- Low flame is adjustable using the adjuster ring (B) found at the base of the solenoid housing (indicating V1).
- The adjuster ring is locked in position with a slot cheese head screw.
- Loosen this screw only and adjust for the required minimum (low fire) value.
- Tighten the cheese head screw and seal to prevent from tampering.

22IP22/600002EE

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### ***Boiler failure***

In case of boiler failure the boiler will lock out. Reset the boiler with the reset button on the control panel. Repeat this several times if necessary. If the boiler still does not start, refer to chapter 'Boiler failure'.



### ***Measuring boiler ionisation***

In order to check ionisation a micro-ampere meter with a scale range from 0 to 50  $\mu\text{A}$  DC should be used. The threshold limit is 1  $\mu\text{A}$ .

22IP22/600003BE



# 7

## OPERATION AND FAULT INDICATION

- 7.1 Control panel**
- 1 On/Off switch
  - 2 7 segment program step display
  - 3 Lock out reset button
  - 4 Pump selector switch (manual/automatic)\*
  - 5 Central Alarm indicator
  - 6 Reset for 4-7-8-9-10-11\*
  - 7 Minimum gas pressure fault\*
  - 8 Maximum gas pressure fault\*
  - 9 Water flow fault\*
  - 10 Gas valve fault\*
  - 11 Spare
  - 12 High limit thermostat reset
  - 13 Control thermostat (fig. 19) or Logon weather compensation regulator (fig. 20).

\* **Optional**

22CV22/810001DE

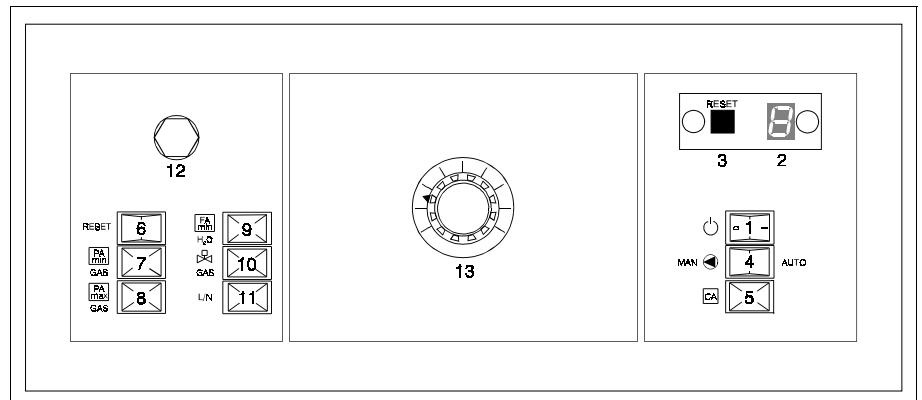


Fig. 19 Control panel with thermostatic regulation (version T)

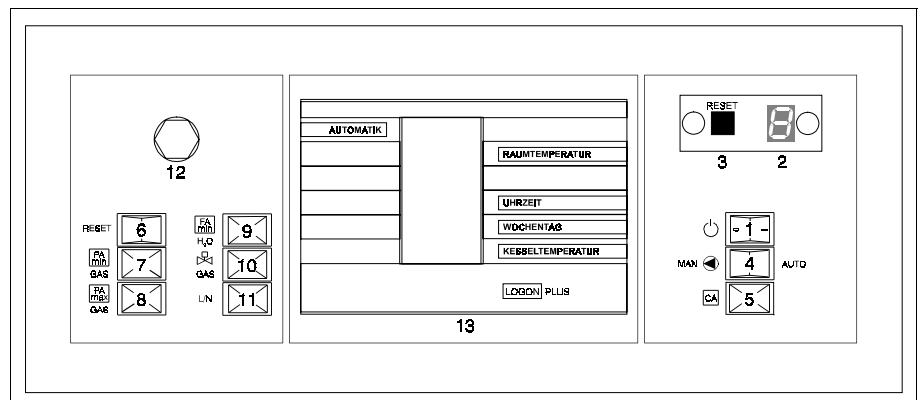



Fig. 20 Control panel with weather compensated regulation (version W)

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## **Display codes**

### *Boiler start-up codes:*

- 0 Boiler in stand-by mode, ready for heat demand.
- 1 Pressure difference switch not open. Boiler remains in stand-by mode.
- 2 Boiler pre-purge, awaits closing of pressure difference switch.
- 3 Boiler pre-purge in progress, pressure difference switch closed.
- 4 Ignition.
- 5 Boiler at start-load.
- 6 Boiler at maximum load.
- 8 Anti cycling time not yet elapsed.
- 9 Lock out, gas pressure switch opened. 

### *Boiler fault indication:*

Faults are indicated by a **flashing display**.

- 0 Maximum thermostat opened.
- 1 Pressure difference switch does not open after 5 minutes when fan is switched off.
- 2 Pressure difference switch does not close after 5 minutes when fan is switched on.
- 3 Pressure difference switch opens during operation.
- 4 No flame signal during start-up attempts.
- 5 Flame signal disappears during operation.
- 6 Flame simulation.

### Number **followed by a dot**.

- 6. Burner controller defective or gas valve system interrupted.
- 7. Burner controller defective.
- 8. Burner controller (display flashes).
- 9. Too many soft starts.

The number of faults are stored in the controller's semipermanent memory. This information remains in memory, even if the electrical voltage is disconnected, and can be accessed by means of a personal computer.

### **Communication codes**

During communication with the personal computer the following codes may appear:

### Number **followed by a dot**

- 3. Execute communication instruction.
- 4. Wait for communication instruction.
- 5. Incorrect instruction received.

22IP22/810002CE



### **Fuses**

- F1 Electrical supply 230 VAC.  
Protects the controller and its peripherals (gas valve and fan).  
Display is off during interruption.
- F2 Internal fuse.  
If this is blown, the controller must be replaced.  
Display is off during interruption.
- F3 Internal fuse.  
If this is blown, the controller must be replaced.  
Flashing display numbers 4, 5 or 6.

22IP22/810003CE

## **7.2**

### **Operation *Boiler start procedure***

- A Open gas service cock.
- B Switch on pumps.
- C Close secondary water systems in order to minimize the water volume in the primary circuit.
- D Switch on electrical voltage using the main switch on the boiler.
- E Disconnect burner controller from the boiler if necessary.
- F Set control thermostat to create a heat demand.
- G Use the stop-valves to open the water systems slowly one after the other. Do this in such a way that the return water temperature does not fall below 36 °C.

### ***Boiler operation***

When switching on the boiler without a heat demand or after resetting the boiler, the unit will self purge and then returns to stand-by. The stand-by position is indicated on the 7-segment program step display by a number *0*

If there is a heat demand and the boiler does not respond, the cause is indicated on the 7-segment program step display.

This lock out can be caused by:

- Pressure difference switch is not open.  
Indicated by a number *1*
- Anti cycling time has not elapsed.  
Indicated by a number *8*

A **flashing number** indicates that the **controller is locked out**.

---

The start-up procedure during heat demand is as follows:

At the start of the pre-purge time the pressure difference switch is checked in zero-position. Pre-purge is followed by ignition, which is switched on before the gas valve is opened (pre-spark-). After the pre-spark time the gas valve opens and the spark remains until the end of the safety time. If a flame signal is present at the end of the safety time, the controller switches to running mode. A few seconds after operation the HIGH/LOW thermostat is tested. The boiler always starts at maximum capacity and switches back in response to the heat demand. The boiler is now in operation (see display codes).

#### ***Switching off the boiler***

- A Switch off the electrical voltage using the main switch on the boiler.
- B Switch off the pump after approximately 5 minutes.
- C Close the gas service cock.

22IP22/820001BE

## **7.3**

### **Boiler failure**

In case of boiler failure, the cause of the problem should first be ascertained before resetting the boiler.

If the source of the problem cannot be found then contact Stokvis Energy Systems.



NEVER TRY TO REPAIR THE BOILER YOURSELF.

#### ***Flame control***

An ionisation fault will cause the boiler to lock out.

The program step display will flash 4 to indicate an ionisation fault during starting.

A flashing 5 indicates an ionisation fault during operation.

Flame simulation is indicated by a flashing 5

Reset using reset button 3.

#### ***Water flow-rate protection***

Insufficient water flow through the heat exchanger will cause the boiler to fall into lock out. The program step display will flash 4 the same as an ionisation fault.

A separate fault indication is optional. Lamp 9 will then be illuminated.

Reset using the boiler reset button 6 first, followed by pressing the burner controller reset button 3.

Without the option only reset using button 3.

#### ***High limit thermostat***

A water supply temperature above 110 °C will cause the high limit thermostat to fall into lock out.

---

This is indicated by the 7-segment program display with a flashing 0. The fan will continue to run for several minutes.

Resetting the maximum thermostat is done as follows:

- Remove the internal hex-head cover on the control panel with a 17 mm spanner.
- Push the green pin until you hear and feel a light click.
- Replace the internal hex-head cover.
- Unlock the controller by pressing reset button 3.

### **Pressure difference switch**

1\*

The pressure difference switch contact does not open in stand-by mode. After 5 minutes the controller falls into lock out, which is indicated by the program display with a flashing 1

2\*

The pressure difference switch contact does not open after the fan is started. After 5 minutes the controller falls into lock out, which is indicated by the program display with a flashing 2

2\*

The pressure difference switch contact opens during pre-purge.  
Briefly opens: pre-purge time restarts when the contact closes.  
Remains open: After 5 minutes the controller falls into lock out, which is indicated by the program display with a flashing 2



The pressure difference switch contact remains open for more than 1 second during operation. The gas valve closes. When the contact is closed, a restart procedure follows after the pre-purge time.

22IP22/830001DE

### **Flame control**

An ionisation fault will cause the boiler to fall into lock out.

4\*

The program step display will flash 4 to indicate an ionisation fault during initial starting.

5\*

A flashing 5 indicates an ionisation fault during operation.

6\*

Flame simulation is indicated by a flashing 6  
Reset using reset button 3.

\* = flashing number

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### ***Ignition attempts***

If the first attempt of igniting the burner is unsuccessful, a second attempt will follow.

The ignition procedure:

- The gas valve closes.
- The ignition switches off.
- The fan continues to run.
- Pre-purge is followed by the second attempt.

If this second attempt also fails, the controller will fall into lock out.

### ***Ignition attempts counter***

The counter which registers the number of ignition attempts is reset if a flame signal is present (during boiler operation).

The number of ignition attempts made by the burner controller can be accessed using a personal computer.

### ***Restart counter***

If the flame signal fades away during boiler operation then depending on the reading of the restart counter, either the controller will fall into lock out, or a restart will follow after pre-purge (fan continues to run).

If the pressure difference switch contact opens for more than 1 second, a restart will follow after the contact has closed and after pre-purge (fan continues to run).

The restart counter is updated in the following situations:

- If the pressure difference switch is opened during boiler operation.
- If the flame signal fades away during boiler operation.

If the maximum number of restarts (standard is two) is reached, the controller falls into lock out. The counter is then reset when the boiler no longer has a heat demand.

If the burner controller falls into lock out due to the maximum thermostat, no flame indication, or after unsuccessful start attempts, the fan will switch on for a pre-programmed period of time.



### ***Anti cycling time***

When the boiler no longer has a heat demand, the anti cycling function prevents the burner from being restarted too quickly.

The controller recognizes two different anti cycling functions. In this way it is possible to make an 'on the spot' choice between a long and short anti cycling time, depending on the central heating installation. The time is set by a jumper on the circuit board (marked by PRG1). The anti cycling time starts when the boiler no longer has a heat demand.

22IP22/830002CE

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### **Fault indication table**

(Indicated by the program display with a flashing number)

Fault	Possible cause	Solution
No fault indicated, yet boiler does not start.	No electrical voltage.  Fuse in the burner controller has blown.  Burner controller is defective.	Switch on electrical voltage.  Replace fuse.  Replace burner controller.
Flow temperature is too high.  <b>0</b>  Reset using reset button (3).	Regulator fuse has blown.  Temperature regulation does not work.  High limit thermostat activates.	Replace fuse.  Check regulation.  Readjust high limit thermostat. Closing time of mixing valve motor, operated by a Building management system, is too short. Replace the motors with slower running ones (minimum of 2 minutes). Use a step by step night time temperature reduction command when using several mixing valves.
Heat demand, boiler does not start.  <b>1</b>  See par. 7.3	Chimney draught too high.  Pressure difference switch not set.  Pressure difference switch defect.	Set flow switch.  Set pressure difference switch.  Replace pressure difference switch.

(Indicated by the program display with a flashing number)

Fault	Possible cause	Solution
Heat demand, boiler does not start. <p style="text-align: center;"><b>2</b></p> See par. 7.3	Pressure difference switch opened while boiler running.  Flue resistance too high.  Pressure difference switch defect.	Set pressure difference switch.  Set pressure difference switch.  Replace pressure difference switch.
Heat demand, boiler does not start. <p style="text-align: center;"><b>3</b></p>	Flue gas flow switch opened while boiler running.  Gust of wind.  Fan defect.	Reset using reset button 3.  Reset using reset button 3.  Replace fan.
Ionisation fault. <p style="text-align: center;"><b>4</b></p> Reset using reset button (3).	Main gas service cock is closed.  Air in gas pipe.  Gas regulator defective.  Bad contact in spark plug cap.  Ionisation electrode is damaged or dirty.  Condensate forming.  When the boiler is equipped with weather compensation.	Open main gas service cock.  Bleed gas pipe.  Replace gas regulator.  Clean contact.  Replace electrode.  When an optimizing system is used, a minimum temperature control thermostat should be fitted.  Check the setting of the return temperature controller. Default setting is 36 °C.



(Indicated by the program display with a flashing number)

Fault	Possible cause	Solution
Insufficient water flow.  <div style="text-align: center; font-size: 2em; font-weight: bold;">4</div>	No water flow through boiler.  Insufficient water flow.  Pump runs in wrong direction.  Insufficient water flow.	Switch on pump. Reset using reset button 3.  Check the water stop valves are open. Reset using reset button 3.  Change the electrical connection of the pump. Reset using reset button 3.  Regulate the water flow using a $\Delta p$ -meter.
In case of separate water flow lock out indication.  <div style="text-align: center; font-size: 2em; font-weight: bold;">4 + 9</div>		Restart using reset button 6 + 3. For solution see above.
Short circuit in the gas valve supply  <div style="text-align: center; font-size: 2em; font-weight: bold;">5.</div> (digit with dot)  Alone without separate water flow indicator.	The flow switch has operated before a heat demand.  Bad contact in the flow switch micro switch.  Defective burner controller.	Restore water flow through the unit. For more details see above.  Replace flow switch.  Replace the burner controller.

22IP22/T8001HE

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## 8 MAINTENANCE

- 8.1 Safety** Always wear the proper protective clothing and shoes when servicing the boiler. Wearing jewellery and loose clothing can contribute to unsafe situations.  
22IP22/710001BE
- 8.2 General information** In order to keep the R2200 in a safe working condition, the boiler should be inspected at least once every year and cleaned if necessary.
- Frost protection***  
When boiler is not in operation for a long period of time, the heat exchanger should be protected against frost. This can be achieved by draining water from the heat exchanger.  
22IP22/720001AE
- 8.3 Inspection** ***Inspecting the draught diverter***  
Remove the inner and outer access panels on the draught diverter to allow internal inspection of the draught diverter.
- Heat exchanger (external inspection)***  
As you inspect the inside of the draught diverter, the top of the heat exchanger can also be inspected. Check for dirt and soiling. For cleaning the heat exchanger, refer to chapter 'Cleaning'.
- After removing the burner, the combustion chamber and the underside of the heat exchanger can easily be inspected by using a mirror for example.
- Heat exchanger (internal inspection)***  
Internal inspection must be carried out by properly qualified and authorised personnel.
- Inspection opening***  
On the front and on the back of the boiler, inspection openings can be found. After removing the front and rear panels you can inspect for example:
- boiler ignition
  - combustion.

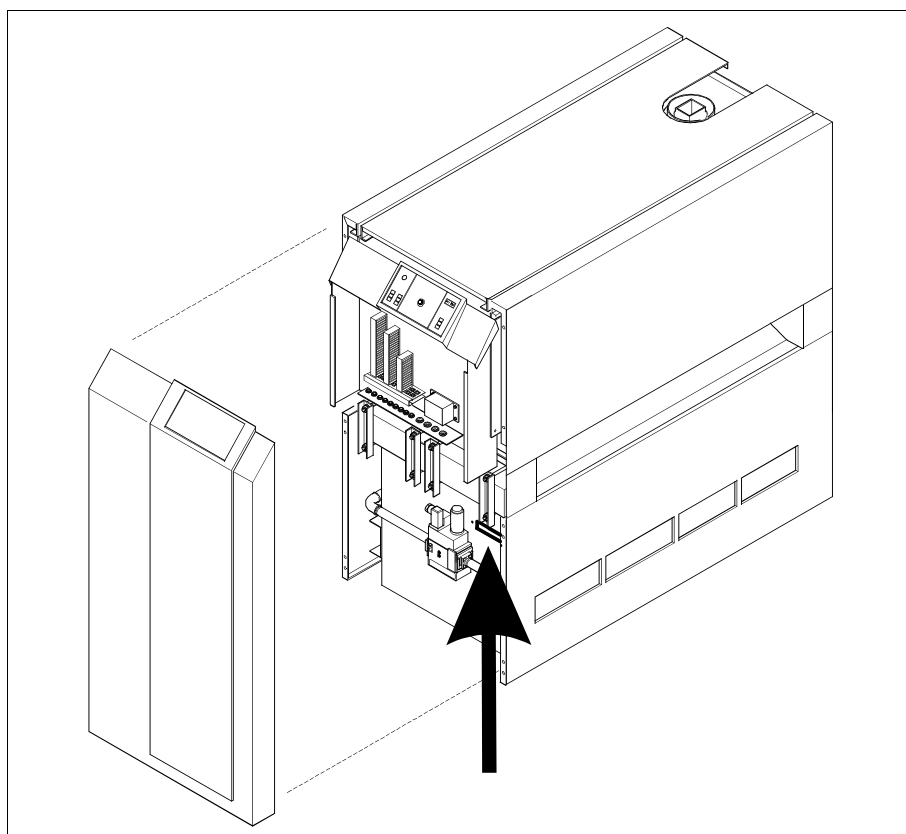


Fig. 21 Inspection opening

### **Burner tray**

The burner manifold and the gas regulator are connected by means of a coupling.

Remove the burner for inspection as follows:

- 1 Close the gas service cock and disconnect the burner manifold and gas regulator.
- 2 Release the two brackets which attach the burner to the boiler frame.
- 3 Disconnect the spark plug and ionisation caps, and remove the 'earth' lead.
- 4 Carefully withdraw the burner from the boiler unit. Check for dirt and soiling and clean the burner bars if necessary.

22IP22/830001AE

## **8.4**

### **Cleaning**

Before using chemicals and cleaning agents in the boiler, please contact Stokvis Energy Systems for advise.



Always read the instructions on the bottle of the cleaning agents before using them.

---

### ***Heat exchanger (external cleaning)***

Remove the baffles before cleaning the heat exchanger.

- Use compressed air when the heat exchanger is lightly soiled.
- Use a stiff brush and soap when the heat exchanger is very dirty. Protect refractory blocks against moisture.

NB.



The heat exchanger may become heavily soiled (soot for example), when the instructions are not followed properly.

This may be caused by:

- insufficient ventilation
- condensate on the heat exchanger

If this is the case, clean the complete heat exchanger, including the baffles. Furthermore, the cause of the problem should be ascertained and removed.

### ***Heat exchanger (internal cleaning)***

Descale the heat exchanger with the proper chemicals.

### ***Filter inspection***

When the pressure loss over the gas regulator gets too high, the burner pressure will decrease noticeably. A dirty filter may be the cause.

The filter should be inspected at least once every year.

To allow access to the filter element, first remove the side cover of the gas regulator assembly. Then remove the filter and replace it if necessary.

Replace the cover and check for leaks.

22IP22/740001BE

## **8.5**

### **Replacing *Fin-pipes***

Replacing the fin-pipes must be carried out by properly qualified and authorised personnel.



The fin-pipes in existing boilers are replaced by pipes, which have been 'definned' on one side to a length of 17.7 mm and on the other side to a length of 39 mm.

- Remove the stainless steel header and manifold
- Remove the inner and outer access panels of the draught diverter
- Remove the fin-pipes which have to be replaced
- Insert the definned pipes with a diameter of 39 mm into the pipe mounting plates.



### ***Fin-pipe flaring***

Always make sure that the ends of the fin-pipes protrude from the pipe mounting plate by approximately 6.5 mm. To prevent the fin-pipe from twisting during flaring, a small 1 mm thick plate should be placed between the fin-pipes. After flaring, insulate the defined area with rock wool. It is also necessary to replace the O-rings.

### ***Burners***

Withdraw the burner assembly from of the boiler. The burners are attached to the burner tray with rivets. Each burner is fed by a nozzle. The bottom plate is directly under the burners.

### ***Electrodes***

The ignition and ionisation electrodes are mounted at the front of the burner assembly and above the first and seventh burner bar.

22IP22/750001AE

## **8.6**

### **Service**

For service and maintenance the service department of Stokvis Energy Systems can be contacted.

### **Stokvis Energy Systems**

96R Walton Road  
East Molesey, Surrey  
KT8 0DL

Telephone: 08707 707 747

Facsimile: 08707 707 767

22IP22/760001AE

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## SUPPLEMENT

At the time of printing the following regulations and standards were taken into account:

### *British Standard*

1. **BS 5440** - parts 1 + 2 (fluing and ventilation).
2. **BS 6644** - Installation of gas fired water heaters (60 kW - 2 MW).
3. **BS 6700** - Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.
4. **BS 6891** - Installation of low pressure gas pipework.

### *The following British Gas publications may be helpful:*

- IM/2** - Purging procedures of non domestic gas installations
- IM/5** - Soundness testing procedures for industrial and commercial gas installations.
- IM/11** - Flues for commercial and industrial gas installations.
- IM/16** - Guidance notes on the installation of gas pipework boosters and compressors.

Any other requirements currently in force.

These boilers are tested to **BS 5978** part 1 by British Gas plc for use on natural gas.

### *The following regulations should also be taken into consideration:*

Gas Safety (Installation and Use) Regulations

Building Regulations

Local fire regulations

Regulations from the local gas distribution agency

New Water Regs - The water supply (water fittings) Regulation 1999

22IP22/000002BE

