



Installation manual



Turbomat 320/500

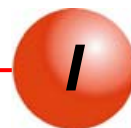


Read and follow the installation instructions and safety information

Edition: 09/2004



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Dear Installer,

Please confirm that you have received the product in good condition.

Please send Fröling a copy of the enclosed shipping document, completely filled out and signed by the customer.

Thank you!

1 Notes on installation

IMPORTANT	
Assembly and installation by untrained personnel.	
	Hazard: Personal injury and damage to property.
<input type="checkbox"/> The product must be assembled and installed by suitably qualified and skilled personnel. Skilled personnel are defined as Fröling technicians, Fröling-approved heating engineers and electricians.	

For additional precautions and instructions, see the operating manual.

[↪ See the Operating Manual for the Turbomat 320](#)

1.1 Standards

Boiler installation and start-up must be carried out in compliance with local fire and building regulations and the following standards:

1.1.1 Marketing, commissioning tests, service testing

European Union directives and standards

EU IVU Directive	European Council Directive 96/61/EC of 24.09.1996, Integrated pollution prevention and control.
EC Air Quality Framework Directive	European Council Directive 1996/62/EC of 27.09.1996, Ambient air quality and management.
1st daughter directive to EC Air Quality Framework Directive	European Council Directive 1999/30/EC of 22.04.1999, Limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air.
European Council Directive on the Incineration of Waste	European Council Directive 2000/76/EC of 04.12.2000 on the Incineration of Waste
ÖNORM / DIN EN 303-5:1999	Heating boilers - Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW - Terminology, requirements, testing and marking

Austrian national and regional standards

Agreements as per Art. 15a of the Austrian Constitutional Law between Austrian regional governments.

Austrian national energy regulations

FAV - Heating plant regulations	BMwA regulations relating to the construction, operation, installation and permitted emissions of heating equipment fired by solid, liquid or gas fuel in commercial plant (nominal thermal output ≥ 50 kW)
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Austrian regional energy and clean air laws and regulations:

Bgld. LHG 1999	Burgenland Region clean air and heating plant law 1999
Bgld. LHG-VO 2000	Burgenland Region clean air and heating plant law 2000

K-HeizG 1998	Kärnten Region heating plant law 1998
NÖ Bauordnung 1996	North Austria building regulations 1996, LGBl. 8200
NÖ BTV 1997	North Austria building regulations 1997, LGBl. 8200/7
Oö. LuftREnTG 2002	Upper Austria clean air and energy law 2002
Szbg. LRHG 1994	Salzburg clean air law for heating plant 1994
Szbg. HeizV 2001	Salzburg heating plant regulations 2001
Stmk. FAnIG 2001	Steiermark Region heating plant law 2001
Stmk. HeizV 1993	Steiermark Region heating plant law 1983
T-HeizG 2000	Tirol Region heating plant law 2000
T-HeizV 2000	Tirol Region heating plant regulations 2000
Vbg. LRHG 1994	Vbg. clean air law 1994
Vbg. LRHV 1994	Vbg. clean air regulations 1994
Wr. FP-LRHG 2000	Vienna fire regulations and clean air law 2000
Wr. AGEGWV 1989	Vienna exhaust gas and emission limit regulations 1989

Austrian national construction standards

ÖNORM M 7550:2002	Boilers for central heating up to 100°C – terms, requirements, inspections, standard markings
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Austrian national standards for site testing

ÖNORM M 9466:1998	Limitation for emissions from furnaces for wood fuel with a rated thermal output of up to 50 kW - requirements and testing on the premises.
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German Federal Republic and German Regions

Federal German emission protection regulations

BImSchG 1990	Federal emission protection law 1990
1.BImSchV	1. Implementation of the Federal emission protection law (Regulations for small heating plant - wood fired: < 1MW).
4.BImSchV	4. Implementation of the Federal emission protection law (Regulations for plant requiring approval - wood fired: 1 to 50 MW).
TA Luft 2002	First general guidelines to Federal emission protection law (technical guidelines for clean air - wood fired: 1 to 50 MW).
17.BImSchV	17. Implementation of the Federal emission protection law (Regulations on waste and similar combustible material - wood with HSM or PVC coating).

German national standards (DIN):

DIN 4702-1:1993	Heating boilers – terms, requirements, inspection, marking
DIN 4702-2:1993	Heating boilers - rules for inspection
DIN 4702-4:1990	Heating boilers - heating boilers for wood, straw and similar fuels, terms, requirements, inspections

1.1.2 Structural engineering

Chimney stacks and flues

EU standards and directives

ÖNORM / DIN EN 13384-1:2002	Chimneys - Thermal and fluid dynamic calculation methods - Part 1: Chimneys serving one appliance
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Austrian national standards and directives

ÖNORM M 5861-1:1993	Measurement of dust content in gas flows, gravimetric method; measurement flange for measuring total dust concentration.
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German national standards and directives:

DIN 4705-1:1993	Calculating chimney dimensions for heating systems
DIN 18160-1:2001	Exhaust gas systems - planning and construction

Water and heating installation

EU standards and directives

ÖNORM / DIN EN 12828:2003	Heating systems in buildings - Design of water-based heating systems
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Austrian national standards and directives:

ÖNORM H 5195-1:2001	Protection against corrosion and scaling damage in closed hot water heating systems with operating temperatures to 100°C.
ÖNORM B 8131	Safety devices in closed hot water heating systems with operating temperatures to 100°C.
ÖNORM M 7425:2001	Temperature control and temperature limiting devices for heating equipment.

German national standards and directives:

DIN 4751	Heating systems. Safety equipment for hot water heating with flow temperatures up to 110°C.
VDI 2035	Protection against damage and scaling in closed hot water heating systems with operating temperatures to 100°C.

Electrical installation and equipotential bonding

EU standards and directives

Low Voltage Directive	European Council Directive 73/23/EC, Electrical drives.
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Austrian national standards and directives:

ÖVE-EN 1	Design of electrical power equipment up to 1000V AC / 1500V DC.
ESV 2003 - Electrical safety regulations	BMWA safety regulations to protect the health and safety of employees from electrical hazards.

German national standards and directives:

VDE 0100	Design of electrical power equipment under 1000V.
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1.1.3 Fuels**EU standards and directives:**

CEN TC 335	Solid bio-fuel - Fuel specifications and classes.
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Austrian national standards and directives:

ÖNORM M 7132	
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ÖNORM M 7133	
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ÖNORM M 7135	
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ÖNORM M 7531	Smoke pot number as per Bacharach (for oil-fired only).
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German national standards and directives:

1. BImSchV	1. Implementation of the Federal emission protection law (Regulations for small heating plant - wood fired: < 1 MW).
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1.2 Design information**1.2.1 Chimney, chimney pot and flue**

Correctly sizing the chimney is important for ensuring trouble-free operation of the system. The dimensions must be calculated according to the standard

➤ See "1.1 Standards"

The dimensioning and calculation of the flue gas system must be carried out by a specialist company. The flue gas values to be used for the calculations should be taken from the technical specifications.

- The connection to the chimney should be as short as possible and should slant upwards with an angle of 30 to 45°.
- The chimney and the flue gas pipe connection must be perfectly sealed. (Soot door).
- Insulate the flue gas pipe connection.
- We recommend that you fit a draught limiter.
Fitting point for a draught limiter:
Directly under the entry to the flue gas line; there is sufficient underpressure at this point.

1.2.2**Ventilating the boiler room**

The supply and exhaust air openings should be arranged as nearly opposite each other as possible to achieve a good thermal draught effect.

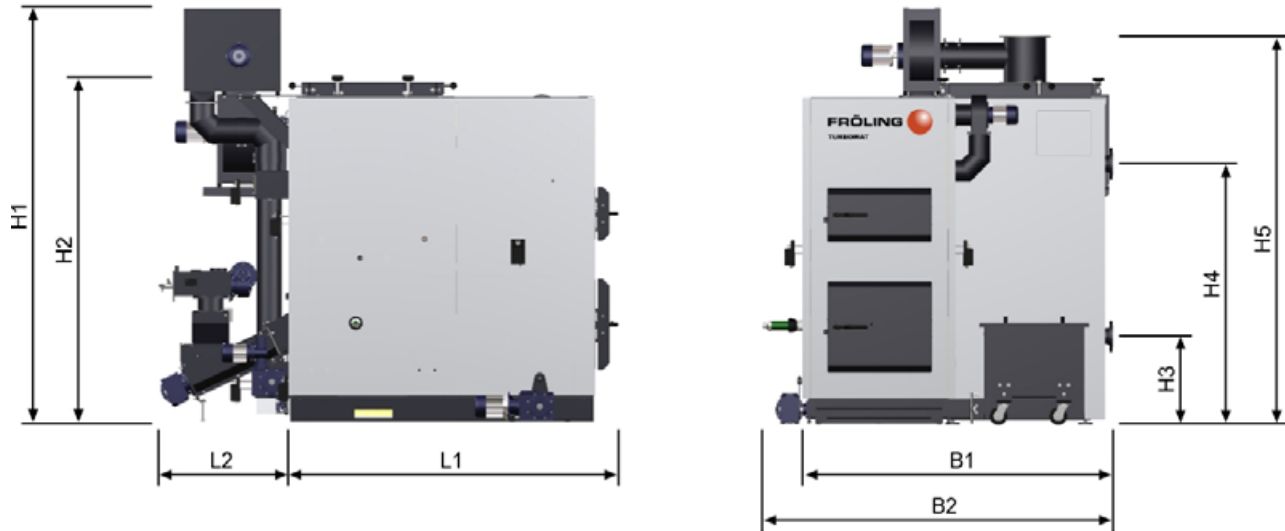
- Draw in the supply air directly from outside. Expel the exhaust air directly to the outside.

Calculate the supply and exhaust air openings according to the relevant standards.

➤ See "1.1 Standards"

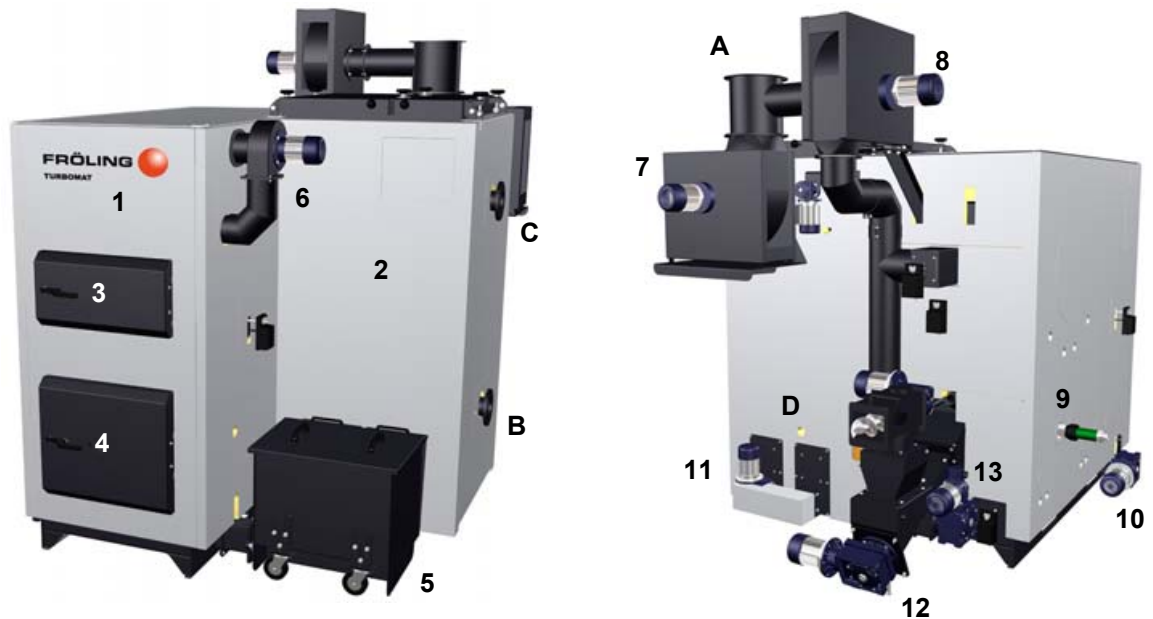
2 Technology

2.1 Dimensions



Dimension	Description	Unit of measurement	320	500
H1	Total height with flue gas return (FGR option)	mm	2940	3072
H2	Total height without flue gas return		2440	2605
H3	Height of return feed connection		620	690
H4	Height of outfeed connection		1830	1980
H5	Height of flue gas pipe connection		2730	2910
B1	Width of boiler	mm	2170	2550
B2	Total width including components and fittings		2600	2980
L1	Length of boiler	mm	2325	2590
L2	Length of stoker unit		925	1010

2.2 Components and connections



Pos.	Description	Unit of measurement	TM 320	TM 500
A	Flue gas pipe diameter	mm	300	350
B	Boiler outfeed connection	DN / PN	100 / 16	
C	Boiler return feed connection			
D	Heat exchanger drainage connection	Inch	1 IG	
Not shown	Safety battery outfeed/return feed connection		¾ AG	
1	Combustion chamber			
2	Heat exchanger			
3	Tunnel door			
4	Combustion chamber door			
5	Ashcan: - 1 piece mobile ashcan for combustion chamber - 2 pieces Ashcan for heat exchanger			
6	Combustion air blower fan			
7	Induced draught fan			
8	Flue gas return (FGR option)			
9	Automatic igniter (option)			
10	Drive for combustion chamber ash removal screw			
11	Drive for two heat exchanger ash removal screws			
12	Drive for stoker screw			
13	Drive for conveyor grate			

2.3 Technical specifications

Description	Unit of measurement	TM 320	TM 500
Rated thermal output (with W20 and wood waste as per Austrian Standards).	kW	320	500
Weight – refractory material	kg	2150	2700
Weight – chamber		1450	1900
Weight – heat exchanger		1470	2200
Heat exchanger water capacity	l	560	750
Maximum permitted operating temperature	°C	110	
Minimum return feed temperature		65	
Flow rate at $\Delta T = 20K$	m ³ /h	13,78	21,49
Maximum permitted operating pressure	bar	6	6
Upstream resistance	Pa	-	-
Quantity of fuel required (wood waste W20)	kg/h	110	172
Flue gas temperature at rated load	°C	140	
Flue gas flow rate at rated load	m ³ /h / kg/h	2200 / 1828	3440 / 2860
Draught requirement at chimney inlet	Pa	2	
Min. supply air opening as per Austrian Standard H5170	cm ²	754	1178
Min. exhaust air opening as per Austrian Standard H5170		400	580

3 Assembly

3.1 Delivery

☞ Consult the delivery information on the packaging.

To move the unit into the boiler room:

- Use a crane or suitable lifting equipment. Attach the lifting equipment to the hoisting points indicated.

To move the unit around inside the boiler room:

- Use a fork-lift truck or rollers under the stationary main frame.

To prevent damage:

- Move the components, especially the combustion chamber, around with care avoiding sharp knocks and impacts.

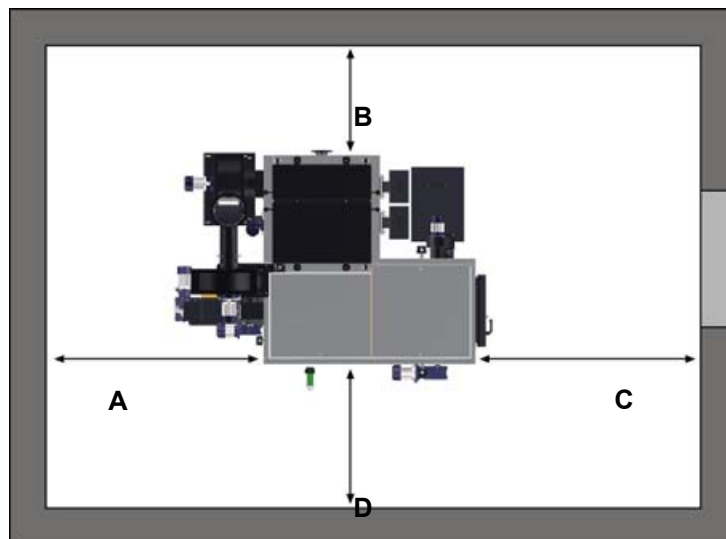
3.1.1 Temporary storage

If the installation is going to be done at a later time:

- Store the boiler, insulation, and control unit indoors in a protected dust-free, dry place.
 - ➔ Dampness reduces the effectiveness of insulation, causes corrosion and can damage electronic components and refractory material.

3.2 Positioning the unit in the boiler room

☞ Position the boiler as per the relevant standards and regulations.



Dimensions	Description	Unit of measurement	TM 320	TM 500
A	Minimum distance from back of boiler to wall	mm	1400	1600
B	Minimum distance from heat exchanger to wall		700	750
C	Minimum distance from front of boiler to wall		1500	1750
D	Minimum distance of left-hand side of boiler to wall		970	1050

3.3 Assembling the boiler

NOTE

Flange connections without sealing cord.



Reduction in performance due to air leakage.

- Sealing cord must be used on all the flanged connections of the following components: infeed; ash removal; pressure ducting; air ducts for primary, secondary and tertiary air; ducting for combustion air blower; flue gas and flue gas return piping.

3.3.1 Material supplied

Overview

The boiler is delivered disassembled on a number of pallets. Pallets with the following components are delivered together with the combustion chamber and the heat exchanger:



- A** Insulated panels for the boiler cover and the insulating cover.
- B** Combustion chamber ash removal unit, infeed unit, back-fire flap or rotary valve, automatic igniter (optional), feed screws for fuel infeed, chamber ash removal and heat exchanger ash removal.
- C** Insulation for combustion chamber and heat exchanger.
- D** Fittings for combustion chamber and heat exchanger (see page 13, [Fittings and small components](#)).
- E** Jacket cooling and burner pivoting unit (optional).

- F** Heat exchanger motor (optional) and flue gas return (FGR optional) without FGR blower fan (on pallet **I**).
- G** Switch gear cabinet complete with cabinet key, emergency stop switch and documentation for assembly, installation and operation.
- H** Heat exchanger ash removal unit complete with ashcan (optional), without ash screws (on pallet **B**).
- I** Induced draught bracket, induced draught blower fan, FGR blower fan (optional).

Fittings and small components



<p>A Combustion chamber temperature sensor.</p> <p>B Torque brackets for servo-motors.</p> <p>C Servo-motors for sliding air valve.</p> <p>D Set of boiler screws.</p> <p>E Sensor set.</p> <p>F Combustion chamber overpressure sensor.</p> <p>G Water valve, AVTB 20.</p> <p>H Lambda probe.</p> <p>I Underpressure controller.</p> <p>J Secondary air sliding air valve.</p>	<p>K Sliding air valve for primary and tertiary air (2 pcs).</p> <p>L Safety temperature limiter (STB).</p> <p>M Assorted fasteners.</p> <p>N Grate thermostat.</p> <p>O Spacer tube, grate thermostat.</p> <p>P Spacer tube, combustion chamber overpressure sensor.</p> <p>Q Fröling adhesive name plate.</p> <p>R Temperature sensor, Bunker TÜB.</p> <p>S Set of fittings for boiler doors.</p>
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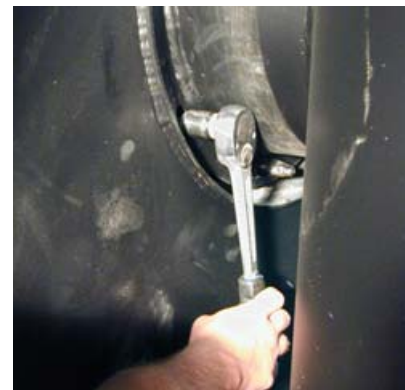
3.3.2 Assembly steps

Fit the heat exchanger to the combustion chamber

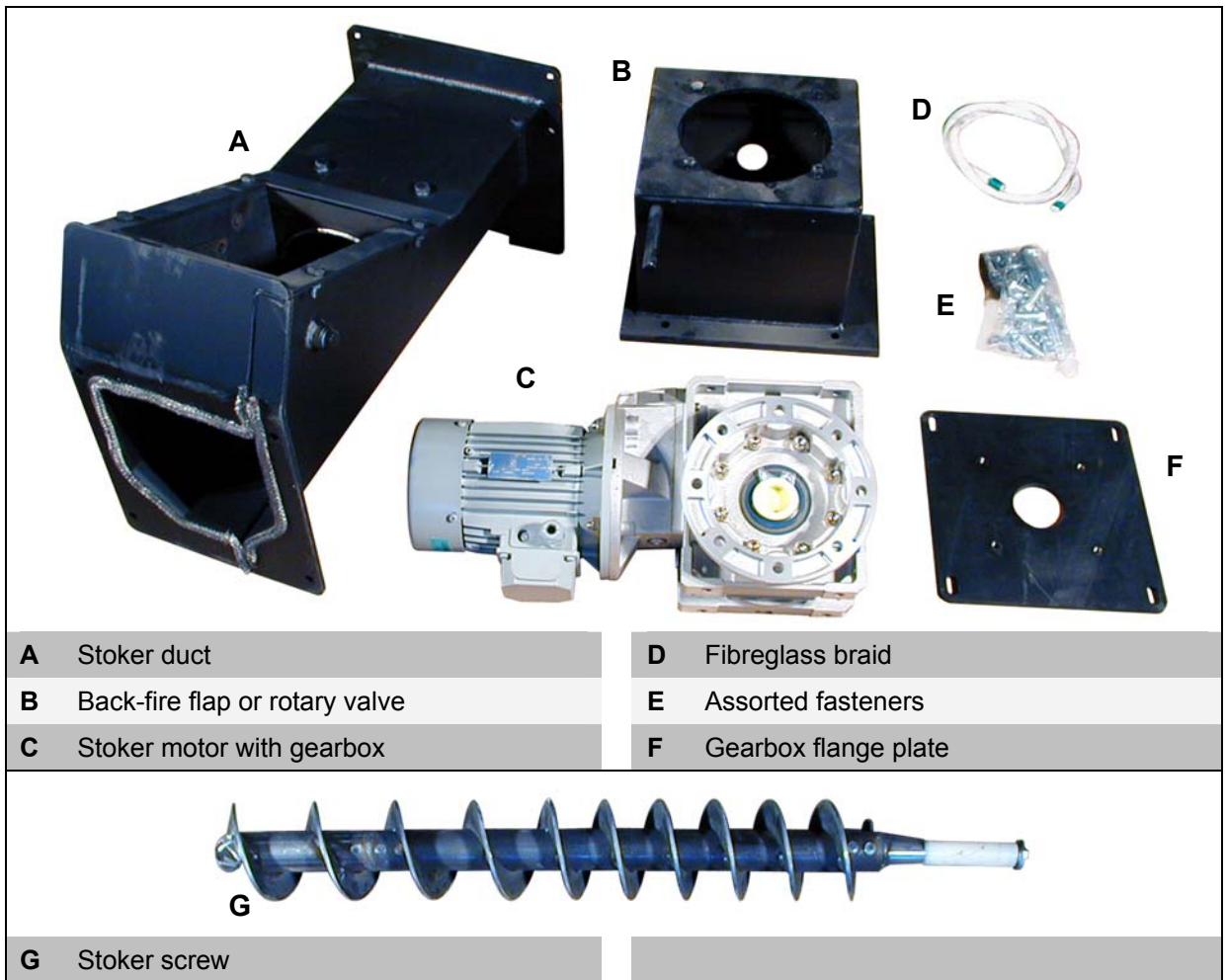
- ❑ Position the combustion chamber as per the layout plan.
- ❑ Level the combustion chamber horizontally.
- ❑ Position the heat exchanger on the combustion chamber.
 - 👉 Ensure that the locating pins are correctly inserted.



- ❑ Check the caps on the end of the grate shafts (1); if necessary, tighten to the stop.
- ❑ If necessary, adjust the feet until they are at the same height.
 - Use an open-ended spanner size SW 30 mm.
- ❑ Fix the heat exchanger to the flange with the four M12 nuts and washers.
 - Use a socket spanner size SW 19 mm.
 - 👉 Tighten the nuts so that the flange ring is seated inside the cord seal channel.
 - 👉 The insert of the lower locating pin must be seated in the recess on the combustion chamber.
- ❑ Level the complete assembly by adjusting the feet.
 - Use a spanner size SW 30 mm.
 - 👉 Check that none of the adjustable feet are loose.



Assemble the stoker unit



- Fix the stoker duct (**A**) to the water-cooled infeed duct with four M10x40 bolts and M10 nuts.
- Use a spanner size SW 17 mm.



- Fit the flange plate (**1**) using four M10x20 bolts and M10 nuts.
- Use a spanner size SW 17 mm.

- Position the rotary valve (**2**) or the back-fire flap (**B**) (depending on the version) and fix in place using four M12 screws and nuts.
- Use a spanner size SW 19 mm.



- Fit the back-fire flap so that the pivot point of the flap is on the side opposite the boiler.

- ❑ Slide in the stoker screw (**G**).
- ❑ Fit the flange plate (**F**) and align it with the stoker duct flange.
 - 👉 Check that the stoker screw can turn freely.
- ❑ Secure the flange plate using four M10x40 bolts and M10 nuts.
 - Use a spanner size SW 17 mm.



- ❑ Remove the protective tape and the key.
- ❑ Grease the shaft stub.



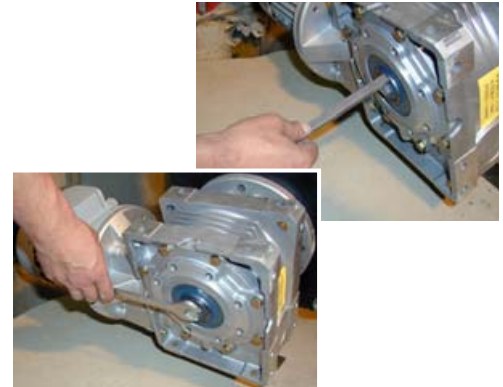
- ❑ Remove the transport clamp from the stoker gearbox and fit the vent screw.
 - Use an Allen key size SW 5 mm.
 - Use a spanner size SW 10 mm.
- ❑ Slide the stoker gearbox onto the stoker screw. Secure it to the flange plate with four M10x40 screws.



- ❑ Fit the adjustable feet (M16x150 screws) to the stoker duct flange and tighten slightly.
- ❑ Fix in position by tightening the lock nuts.
 - Use a spanner size SW 24 mm.



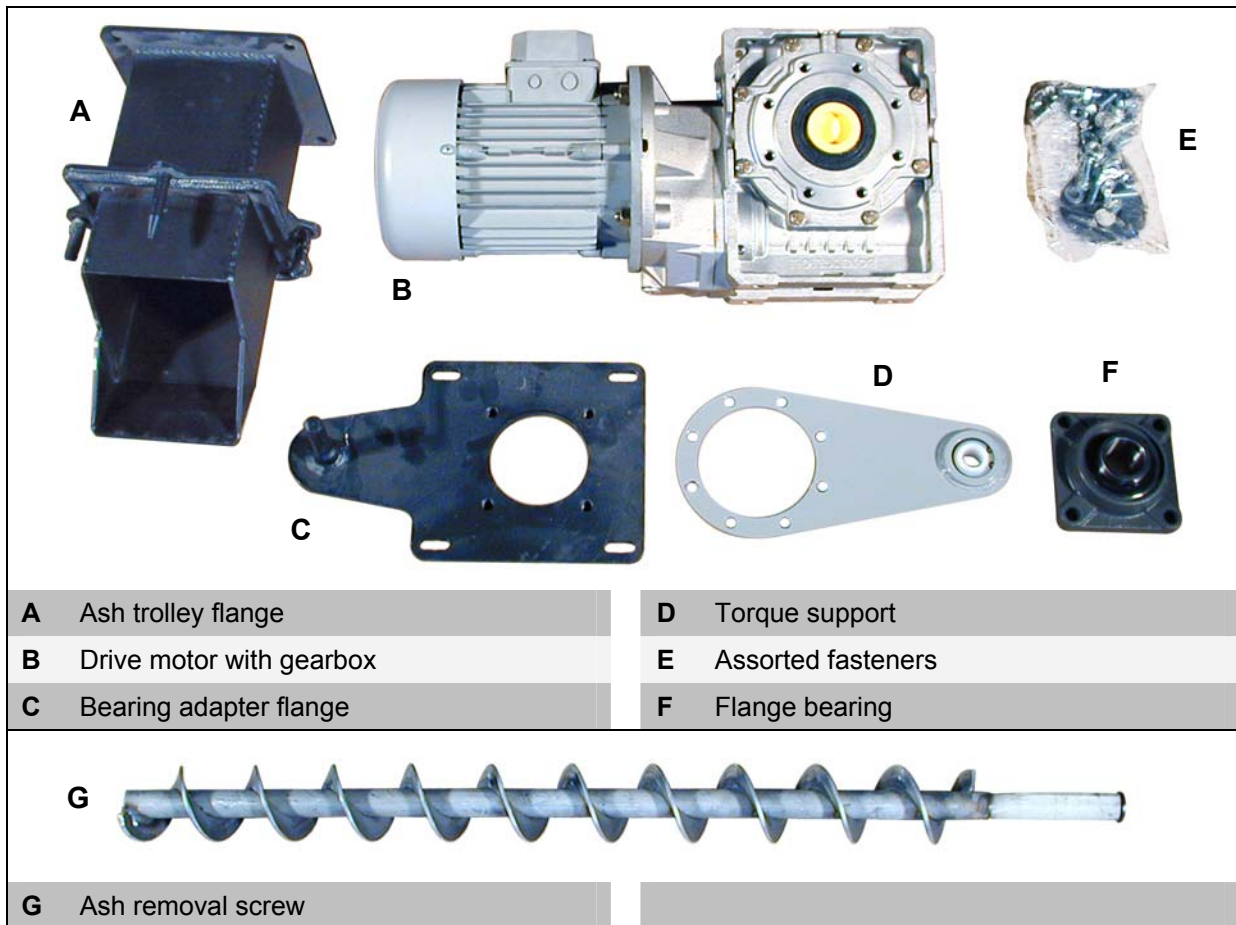
- ❑ Insert the key in its groove on the shaft and motor and secure with the shaft circlip.



Assemble the grate drive

- ☞ Units with FGR option: Fit the grate drive motor opposite the heat exchanger.
- ❑ Remove the protective tape and the key from the shaft stub.
- ❑ Unscrew the bolts on the flange plate.
- Use a spanner size SW 19 mm.
- ❑ Grease the shaft stub.
- ❑ Slide the motor onto the shaft stub and fix it to the flange plate.
- Use spanner size SW 19 mm.
- ❑ Tap in the key and secure it with the shaft circlip.



Assemble the combustion chamber ash removal unit


- Slide in the ash removal screw (**G**).



- Position and align the ash trolley flange (**A**) on the ash trolley side (see the layout diagram).
 - The edges must be flush.



- Secure the flange with four M10x25 bolts and M10 nuts.
 - Use a spanner size SW 17 mm.



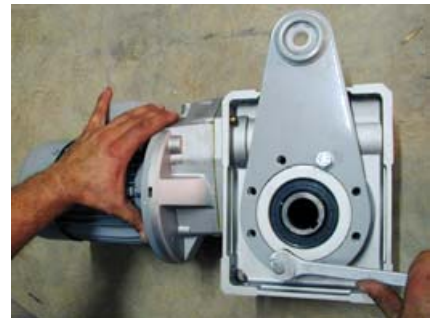
- ❑ Screw the grease nipple into the bearing (F).
- ❑ Fit the bearing to the flange plate (C) with four M12x25 bolts.
 - Use a spanner size SW 19 mm.
- 👉 The grease nipple must pointing forward when the flange has been mounted.

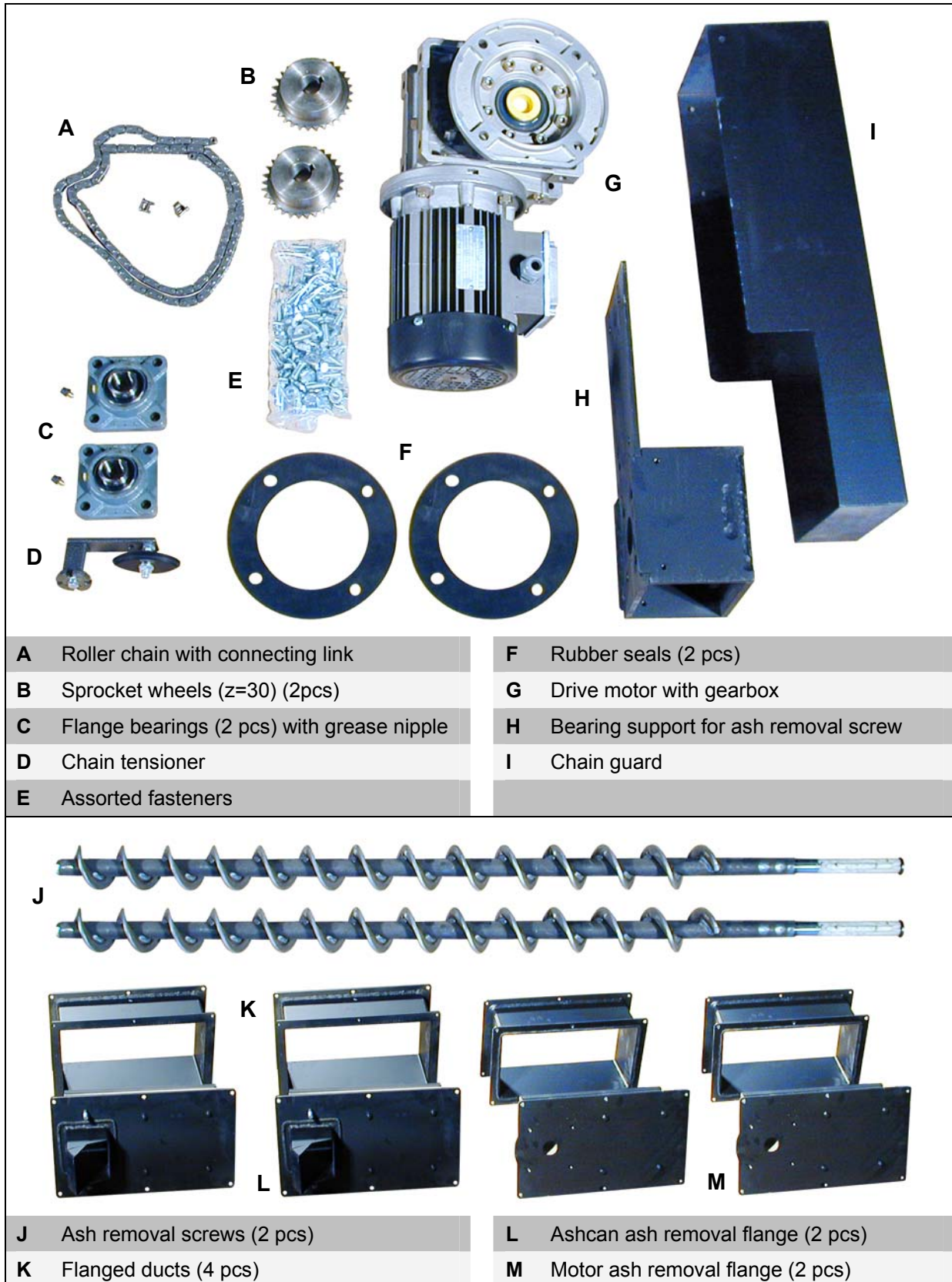


- ❑ Attach the flange and ensure that it is flush.
- ❑ Secure the flange plate with four M10x30 bolts and M10 nuts.
 - Use a spanner size SW 17 mm.
- ❑ Remove the protective tape and the key.
- ❑ Grease the shaft stub.



- ❑ Fit the torque support (D) to the gear motor with eight M10x20 screws.
 - Use a spanner size SW 17 mm.
- ❑ Position the gear motor on the shaft and on the locating pins of the flange plate.
- ❑ Tap the key into its groove and secure with the shaft circlip.



Assemble the heat exchanger ash removal unit (optional)


- ❑ Fit the four flanged ducts (**K**) using six M8 bolts for each duct.
 - Use a spanner size SW 13 mm.



- ❑ Insert the ash removal screws (**J**).
 - ☞ Ensure that the shaft stub is pointing to the rear.



- ❑ Fit the ashcan ash removal flange (**L**) on the front side with six M8 bolts to the flanged ducts.
 - Use a spanner size SW 13 mm.



- ❑ Slide the motor ash removal flange (**M**) onto the ash removal screw and secure with six M8 screws.
 - Use a spanner size SW 13 mm.



- ❑ Remove the protective tape and the keys.
- ❑ Grease the shaft stub.

- ❑ Slide the gear motor (**G**) and the rubber seal (**F**) onto the shaft.
 - ☞ The motor must point outwards.



- Fix the gear motor with four M10x25 screws.
- Tap the key into the groove.



- Fit the grease nipple to the flange bearing (C).
- Fix the flange bearing to bearing support (H) using four M10 screws.
 - Use a spanner size SW 17 mm.



- Grease the shaft stub.
- Slide the bearing assembly onto the ash removal screw.
 - ☞ Do not forget to fit the rubber seal (F).



- Secure the bearing support assembly to the flange with four M10 bolts and washers.
 - Use a spanner size SW 17 mm.



- Tighten the grub screw on the flange bearing.
- Grease the shaft stub.



- ❑ Fit the sprocket wheels (**B**) and tap in the short key on the flange bearing side.



- ❑ Mount the roller chain (**A**) and join the two ends with the connecting link.



- ❑ Fit the chain tensioner (**D**) to its support.
- Use a spanner size SW 10 mm.



- ❑ Fit the chain guard (**I**) and secure in place with two screws.



Remove the blanking plugs



- ❑ Remove the blanking plugs for
- combustion chamber temperature sensor (**1**)
- underpressure sensor cartridge (**2**)
- grate thermostat (**3**)
- combustion chamber overpressure sensor (**4**).

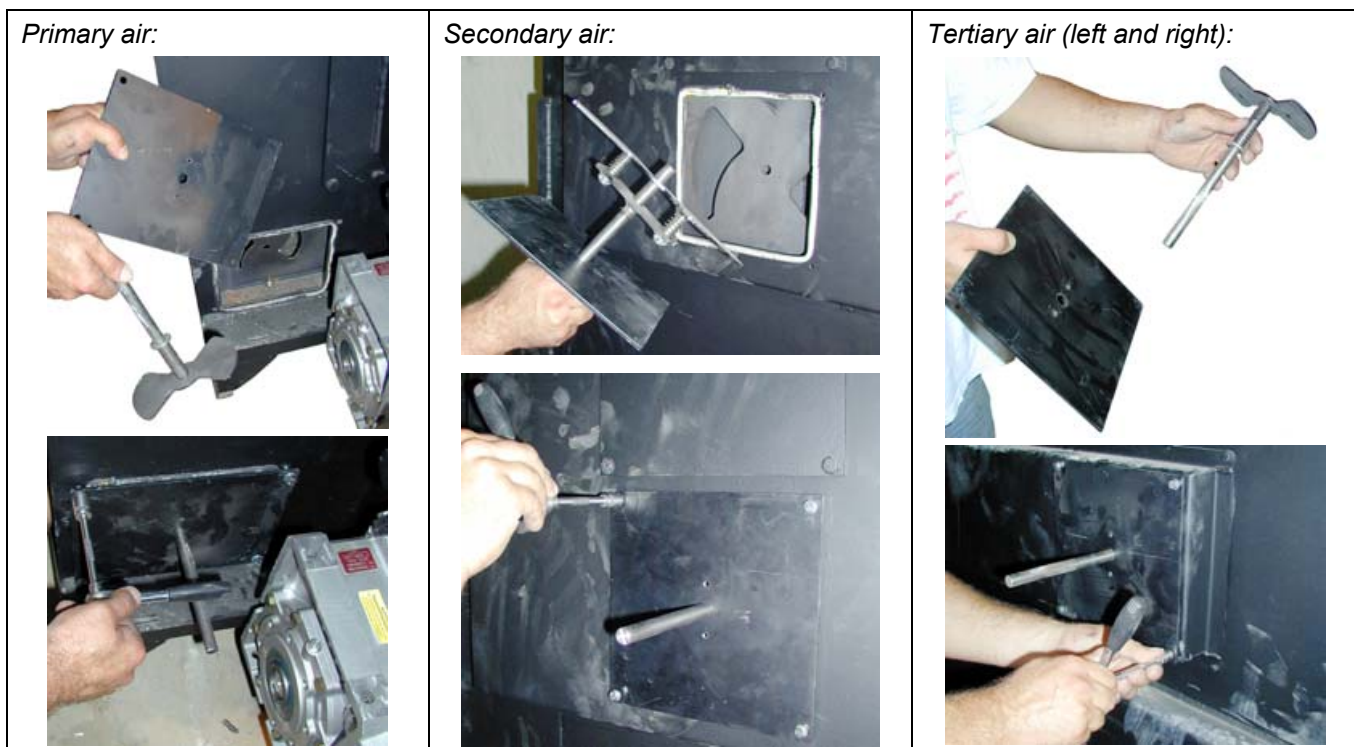


Assemble the igniter tube for the automatic igniter (optional)

For this assembly step you will need the following parts:

➤ See page 52, [Assemble the automatic igniter \(optional\)](#)

- ❑ Remove the blanking plate from the combustion chamber.
 - Use a spanner size SW 13 mm.
- ❑ Slide in the automatic igniter tube as shown in the photo.
 - 👉 The straight edge of the tube flange must be at the top.
- ❑ Secure the igniter tube with the pre-mounted screws.


Assemble the sliding air valve for the air control system


- ❑ Remove the cover plate from the combustion chamber.
- ❑ Insert the sliding air valve (see [page 13, Fittings and small components](#)) through the hole in the cover plate.
- ❑ Refit the cover plate, now complete with the sliding air valve assembly.
 - 👉 Ensure that the air valve shaft is correctly inserted in the hole in the air box.
 - 👉 Next, check that the valve operates smoothly.

Assemble the FGR primary air box (optional)



For this assembly step you will need the following parts:

➤ See page 45, Assemble the flue gas return (FGR) (optional)

Start on the side where the heat exchanger is fitted:

- Remove the blanking plate.
- Position the FGR primary air box on the holes and secure it in place with the bolts from the blanking plate.
- Insert the primary air slider valve.
 - ☞ Ensure that the air valve shaft is correctly inserted in the hole in the air box.
- Mount the cover plate complete with seal on the shaft and fix in place with four M8 hex. screws.
 - Use a socket spanner size SW 13 mm.



Assemble the FGR secondary air box (optional)

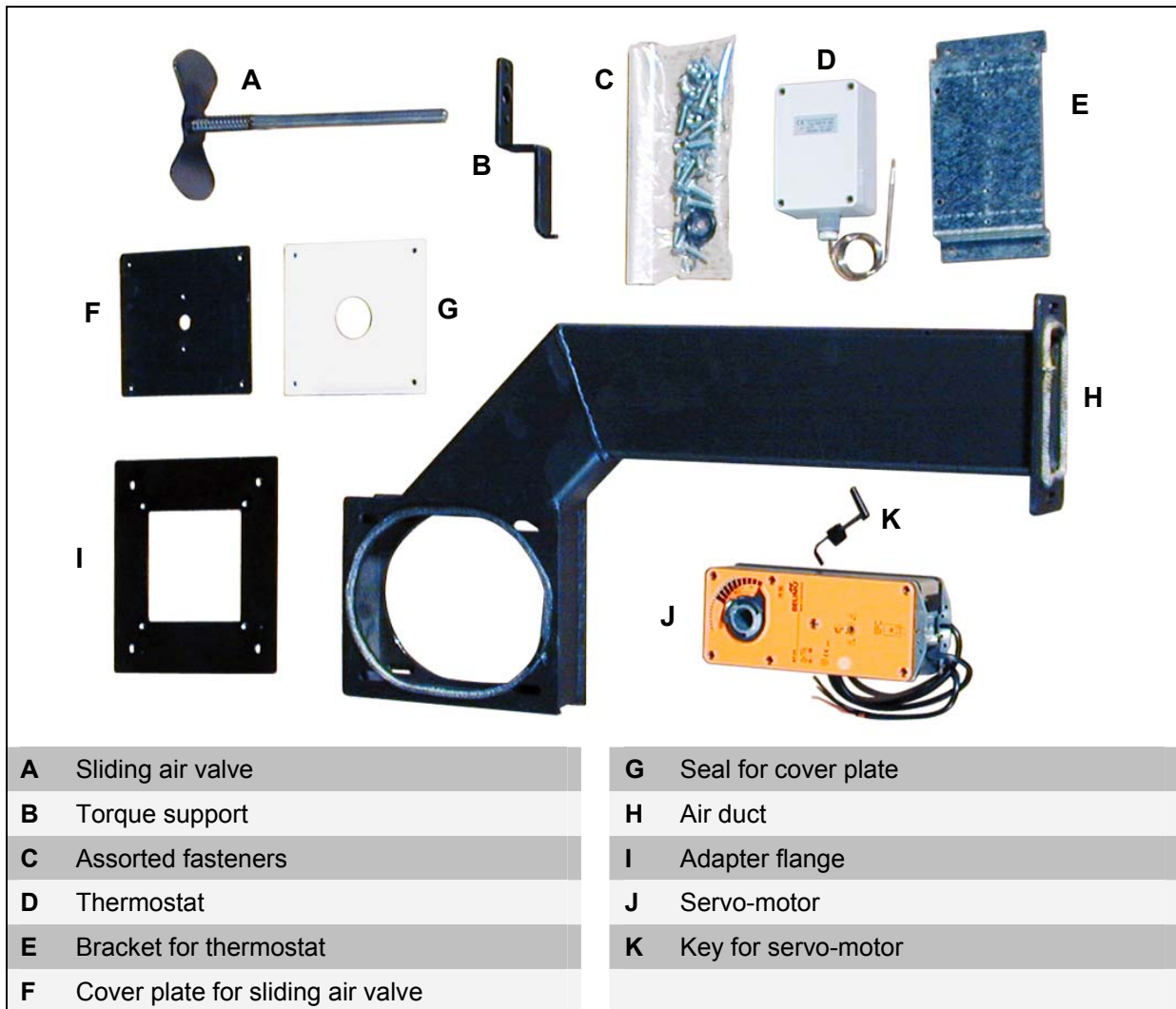


For this assembly step you will need the following parts:

➤ See page 45, Assemble the flue gas return (FGR) (optional)

- Remove the blanking plate.
- Position the FGR secondary air box on the holes and secure it in place with the bolts from the blanking plate.
 - ☞ Ensure that the supports point towards the heat exchanger.
- Insert the secondary air slider valve.
 - ☞ Ensure that the air valve shaft is correctly inserted in the hole in the air box.
- Mount the cover plate complete with seal on the shaft and fix in place with four M8 hex. screws.
 - Use a socket spanner size SW 13 mm.



Assemble the cooling jacket


- Remove the blanking plates from the combustion chamber and the heat exchanger.
- Use a spanner size SW 13 mm.



- ❑ Position the cooling jacket duct (**H**) as a connecting piece between the combustion chamber and the heat exchanger.
- ❑ Fix the duct to the slots on the heat exchanger with four M8 bolts.



- ❑ Fix the duct to the combustion chamber with two M8 bolts.

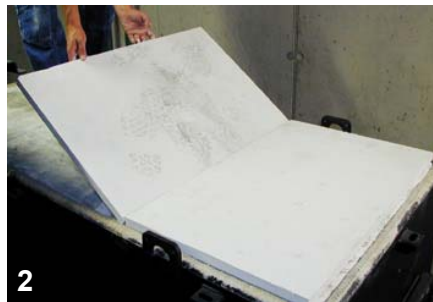


- ❑ Mount the adapter flange (**I**) with four M8 bolts.
- Use a socket spanner size SW 13 mm.

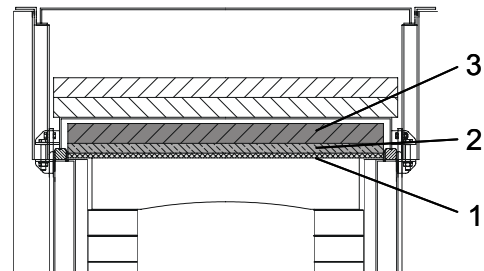


- ❑ Mount the sliding air valve (**A**), the insulating plate (**G**) and the sliding air valve cover plate (**F**) with four M6 bolts.
- Use a socket spanner size SW 10 mm.



Assemble the combustion chamber insulation


- Position the following three pieces:
 - ceramic fibre mat, 12 mm (1)
 - insulation panel, 25 mm (2)
 - rock wool panel, 50 mm (3)
 on the combustion chamber.




- Position and align the boiler cover.
 - ☞ Ensure that the boiler cover sits uniformly on the seal.



- Secure the boiler cover with eight M12x60 bolts and nuts.
 - Use a socket spanner size SW 19 mm.
 - Use a spanner size SW 19 mm.



Assemble the insulation holders



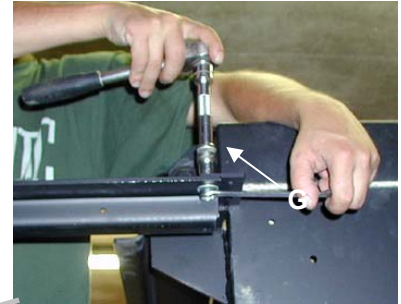
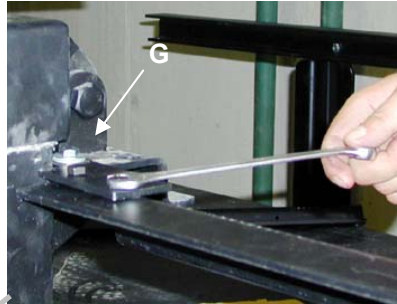
The image shows various components for assembling insulation holders, labeled A through J. A: Three black mounting brackets. B: Two short black Z-profiles. C: Two black supports for the heat exchanger top. D: One long black Z-profile. E: One short black Z-profile. F: Six blue L-shaped insulation holders for the combustion chamber. G: Two black connecting plates for the Z-profile. H: Two silver insulation holder bolts. I: A bag of assorted fasteners. J: Two blue L-shaped insulation holders for the heat exchanger.

A Mounting brackets (3 pcs)	D Long Z-profile for side opposite the heat exchanger
B Short Z-profile for front and rear (2 pcs)	E Short Z-profile for heat exchanger side
C Supports for heat exchanger top (2 pcs)	
F Insulation holders for combustion chamber (6 pcs)	I Assorted fasteners
G Connecting plates for Z-profile (2 pcs)	J Insulation holders for heat exchanger (2 pcs)
H Insulation holder bolts (2 pcs)	

- ❑ Fit the three mounting brackets (**A**) to the combustion chamber using two M8 bolts for each bracket.
Use a spanner size SW 13 mm.



- ❑ Position the long (D) and short (E) Z-profiles on the mounting brackets and tighten them slightly.
- ☞ For the fastening to the heat exchanger, use the connecting plates (G).
- ❑ Position the front and rear Z-profiles (B), align the frame and then tighten the bolts.



- ❑ Fit eight M6 press-on fasteners with nuts on the Z-profiles.
 - Use a spanner size SW 10 mm.
 - ☞ Fit 2 pieces on the front.
 - Fit 2 pieces on the heat exchanger side.
 - Fit 4 pieces on the side opposite the heat exchanger.
- ❑ Fit six insulation holders (F) to the combustion chamber.
 - Use a socket spanner size SW 10 mm.
 - ☞ Fit 2 pieces on the heat exchanger side.
 - Fit 4 pieces on the side opposite the heat exchanger.



- ❑ Fit two insulation holders (**J**) to the heat exchanger.
 - Use a socket spanner size SW 10 mm.



- ❑ Fit one insulation holder bolt (**H**) to the front of the heat exchanger and one insulation bolt to the rear.
 - Use a spanner size SW 10 mm.



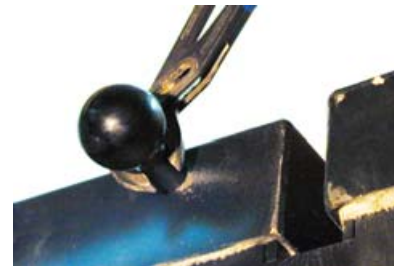
Fit the sensors to the heat exchanger



- ❑ Insert the 3 bushes for the boiler sensor (**1**), the safety temperature limiter (STB) (**2**) and the return feed sensor (**3**).
- ❑ Drill out the bush for the return feed sensor.
 - Use a 6 mm drill bit.
- ❑ Insert the sensors in their bushes.

Complete the heat exchanger cover


- Fit two ball grips (**B**) on each of the heat exchanger covers.



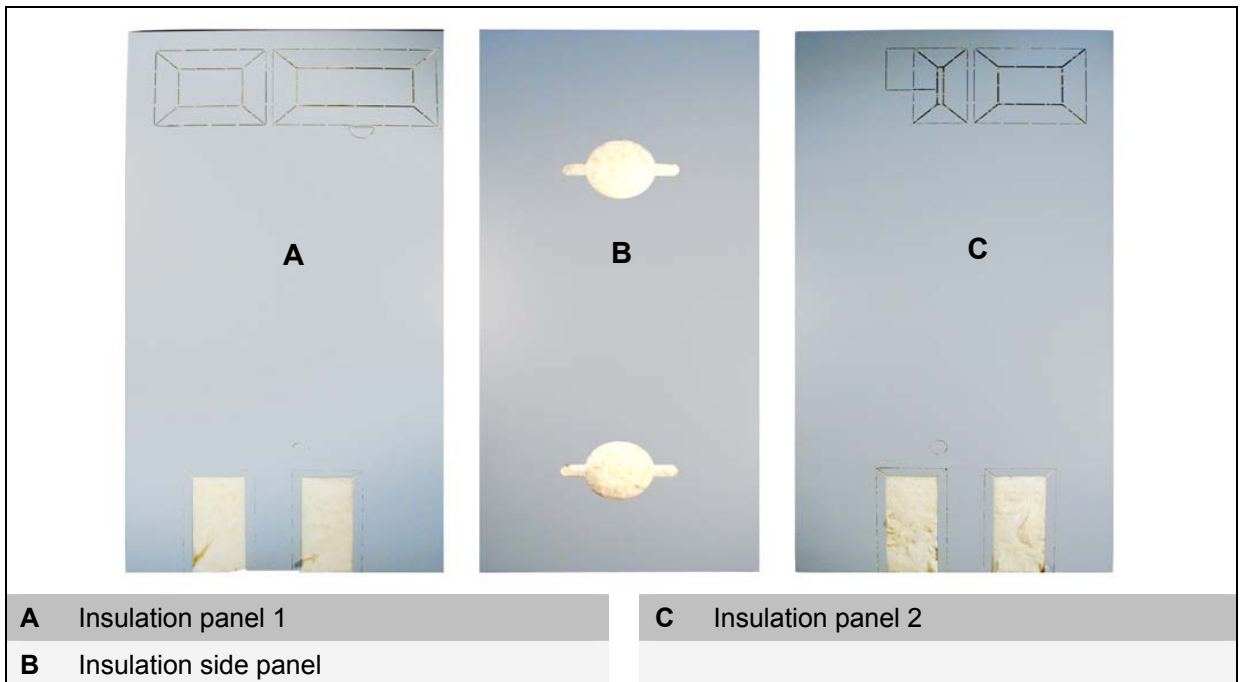
- Fit two handwheels (**A**) complete with washers on the outside of each of the heat exchanger covers.



- Fit two handwheels with the large washers between the heat exchanger covers.



Assemble the heat exchanger insulation



- Position the top of the insulation side panel (**B**).
- Pass the safety temperature limiter and the sensor cable through the cutouts.
- Position the bottom of the insulation side panel on the insulation holders.
- Remove the pre-punched cutouts for the insulation panels 1 and 2 (**A and C**); these are for the flanged ducts of the heat exchanger ash removal unit.
- Cut out the insulation wool.



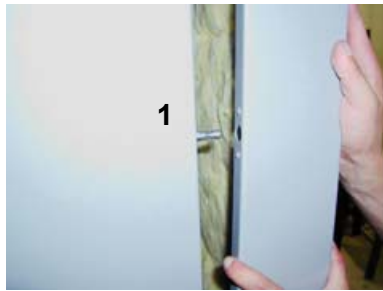
☞ If the heat exchanger is mounted on the left, fit the insulation panel 1 (**A**) to the front.

- Remove the pre-punched cutouts for the safety battery and the air vent connections.
- Cut out the insulation wool for the slide valve shaft if your unit is fitted with the optional jacket cooling.



☞ The figure shows insulation panel 1 (**A**). If the heat exchanger is mounted on the right, take the shaft out through insulation panel 2 (**B**).



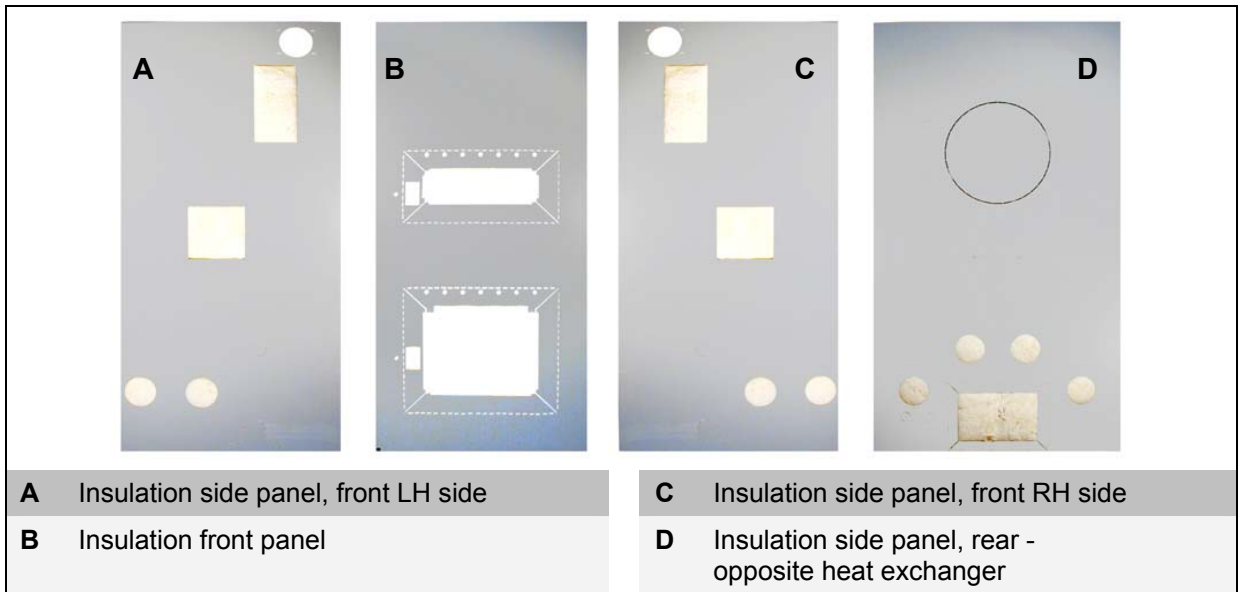


- Attach the insulation panel to the front.
 - ☞ Insert the press-on fasteners (1) with care.

- Fit the other insulation panel to the back.
 - ☞ Insert the press-on fasteners with care.



Assemble the combustion chamber insulation



- Open the boiler door.
- Press the pre-punched clips of the boiler door onto the insulation front panel and bend the assembly clips 90° downwards.
- Lay the cable of the door contact switch in the insulation front panel from the switch opening to the hole on the bottom end (see arrow).

For this operation you will need the following parts:

➤ [Page 41, Assemble the combustion chamber door fittings](#)

- Attach the insulation front panel above the doors and insert it in the insulation holders at the bottom of the boiler.
- Push the top of the insulation front panel onto the press-on fasteners.
- Fix the insulation to the combustion chamber using the clips.
- Fit the air supply pipe of the combustion blower fan to the side with four M8 bolts.
- Use a socket spanner size SW 13 mm.

- 👉 In the standard version the combustion blower fan is assembled on the heat exchanger side. However, on versions with jacket cooling, the combustion blower fan should be mounted on the opposite side in order to ensure better through flow.



- ❑ Remove the pre-punched cutouts for the ash removal motor from the LH or RH insulation side panel.
 - 👉 Only remove the cutout from the side panel where the motor will be mounted.
- ❑ Cut out the insulation wool.



- ❑ Fit the LH front insulation side panel (**A**).
 - 👉 Insert this into the insulation holder at the bottom.
 - 👉 Insert the press-on fasteners with care.



- ❑ Fit the RH front insulation side panel (**C**).
 - 👉 Insert this into the insulation holders at the bottom.
 - 👉 Insert the press-on fasteners with care.

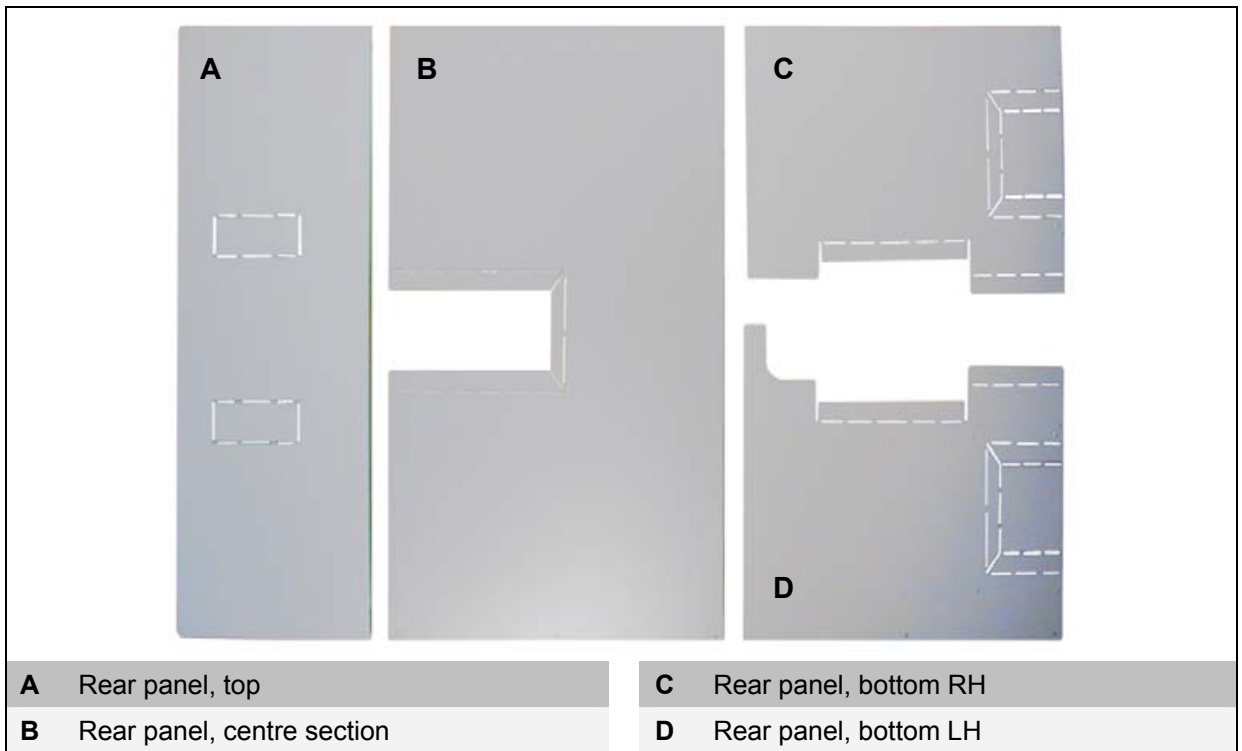


On versions fitted with the optional oil burner flange:

- ❑ Remove the pre-punched cutouts for the burner swivel unit.
- ❑ Cut out the insulation wool.
- ❑ Fit the rear insulation side panel (**D**).
 - 👉 Insert this into the insulation holders at the bottom.
 - 👉 Carefully insert the press-on fasteners.



Assemble the combustion chamber rear insulation sheet steel panels



☞ During the following assembly steps you must also lay the remaining sections of insulating wool.

- Lay the insulation panel measuring 930 x 1135 x 80 mm around the stoker duct.
- Lay the insulation panel measuring 800 x 930 x 40 mm above the stoker duct.

- Fit the LH and RH bottom rear panels to the left and right of the stoker duct; use self-tapping screws.

- Position the rear panel centre section in the rebate on the bottom rear panels and then fix in place with self-tapping screws.



The following steps are only necessary on units with the optional FGR:

For the parts used in this step, see:

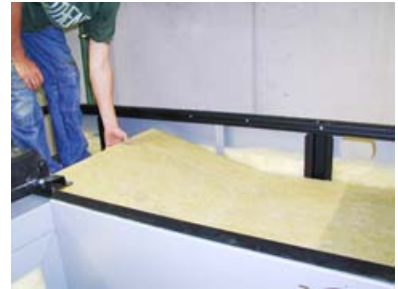
➤ [Page 45, Assemble the flue gas return \(FGR\) \(optional\)](#)

- ❑ Remove the hinge pin from the rear heat exchanger cover on the combustion chamber side.
- ❑ Lift the heat exchanger cover and insert the FGR bracket lug.
- ❑ Secure the FGR bracket to the heat exchanger cover hinge and the rear Z-profile using six M8 bolts, washers and nuts.
 - Use a spanner size SW 13 mm.
- ❑ Unscrew and remove the pre-assembled bolts for the brace on the boiler.
- ❑ Remove the pre-punched cutout for the brace on the rear panel; remove the cutout upwards.
- ❑ Insert the brace through the upper part of the rear panel and bolt it to the FGR bracket.
 - Use two M10 bolts, washers and nuts.
- ❑ Secure the brace to the slots on the combustion chamber using the bolts removed previously.
 - Use a socket spanner size SW 17 mm.
- 👉 During this step also level the FGR platform and ensure that it is horizontal.
- ❑ Secure the top rear panel with self-tapping screws.



Assemble the insulating cover

- ❑ Position the following four insulation panels in the two positions on the boiler cover:
 - Insulation panel 870 x 95 x 50 mm (2 pcs)
 - Insulation panel 870 x 625 x 50 mm (6 pcs)



- ❑ Position the rear and front insulation panel covers.



Fit the air control servo-motors

Fit the following servo-motors:

- Primary air (1 pc)
- Secondary air (1 pc)
- Tertiary air (2 pcs)

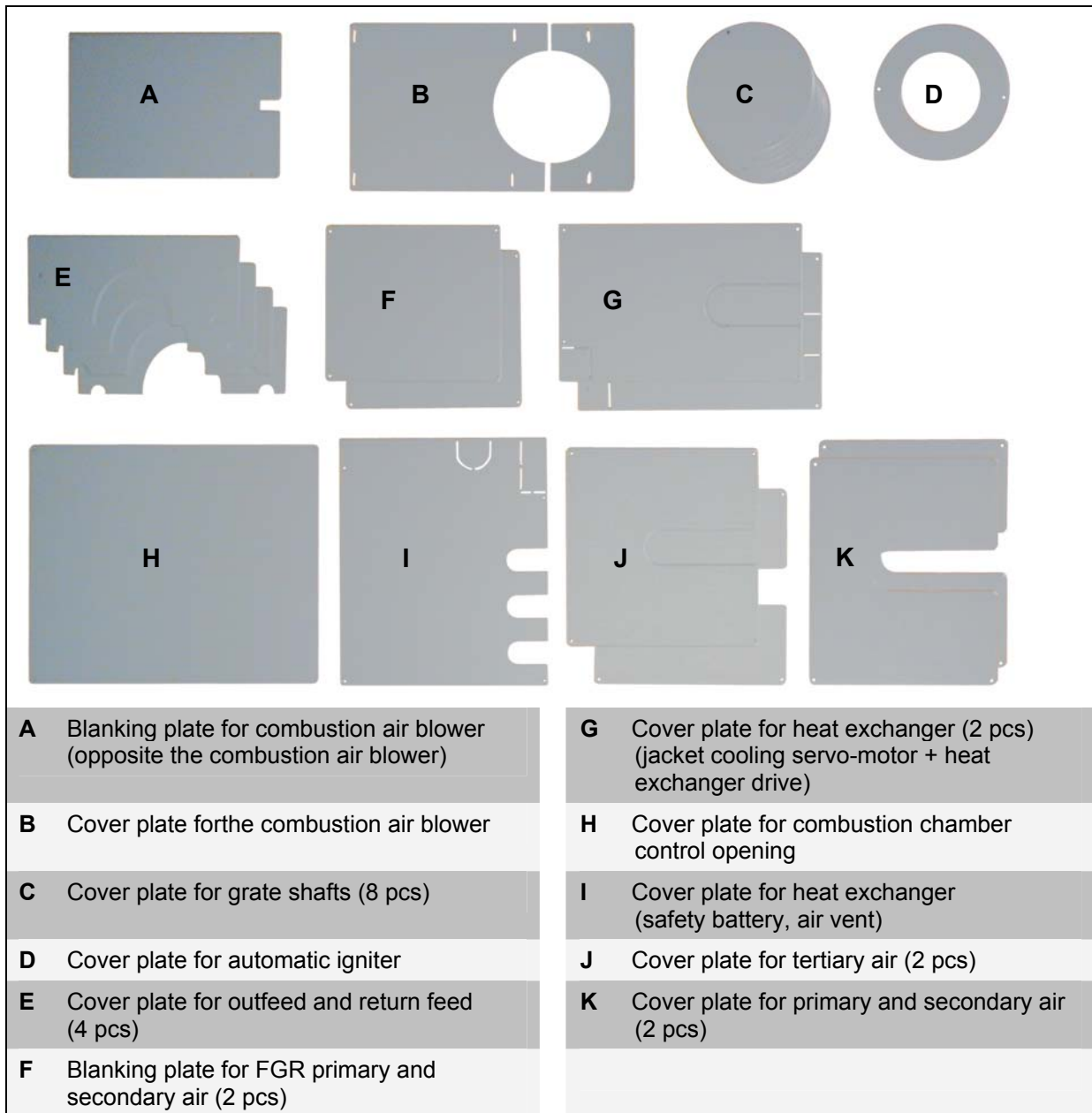
- ❑ Fit the torque supports for the sliding air valves.



- ❑ Fit the cover plates over the sliding air valves.

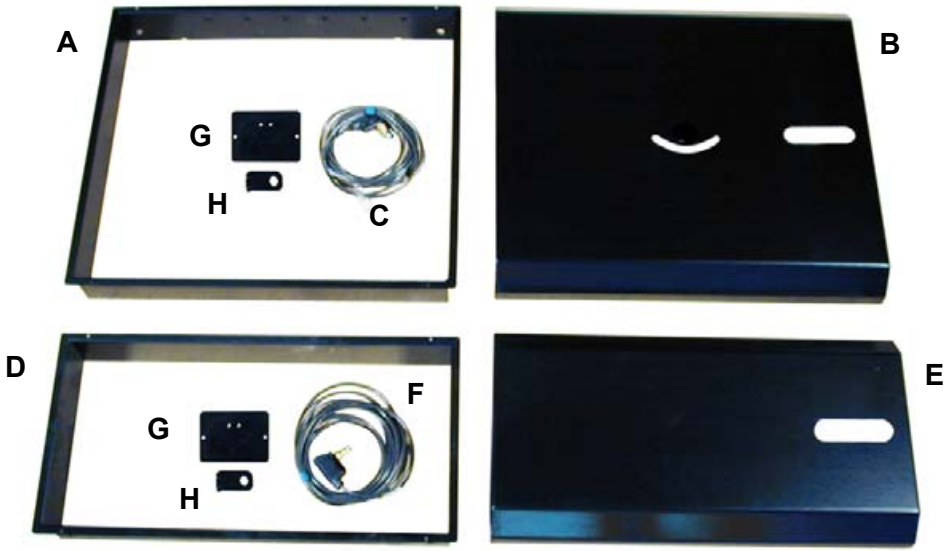
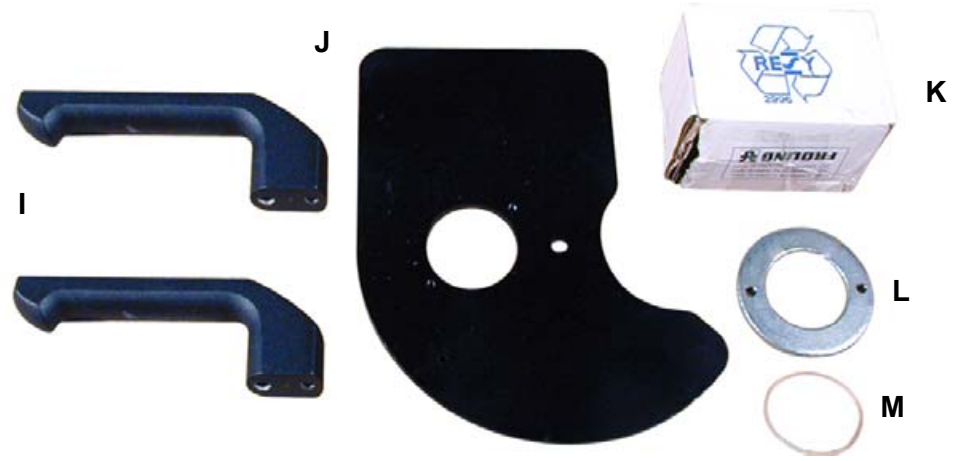
- ❑ Turn the servo-motor to the left-hand endstop.
- ❑ Turn the sliding air valve shaft to the left-hand endstop.
- ❑ Attach the servo-motor to the torque support and secure it to the shaft with the clamp.



Assemble the insulation cover plates


- Secure the cover plates to their positions using self-tapping screws.

Assemble the combustion chamber door fittings

	
A Frame for combustion chamber door	E Steel cover for tunnel door
B Steel cover for combustion chamber door	F Door contact switch for tunnel door
C Door contact switch for combustion chamber door	G Cover plate (2 pcs)
D Frame for tunnel door	H Holder for door contact switch (2 pcs)
	
I Door handle (2 pcs)	L Retaining ring
J Inspection glass holder	M Inspection glass
K Assorted fasteners	

☞ The cables for the two door contact switches (C and F) were positioned during assembly of the insulation.

➡ See page 35, Assemble the combustion chamber insulation

- Open the combustion chamber door.
- Fit the door frame over the combustion chamber door.
- Insert the door contact switch through the cutout.
- Insert the door frame.

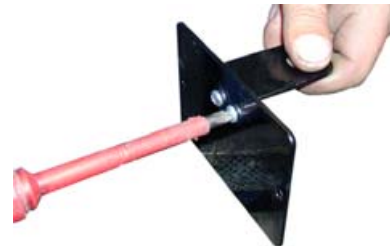


- Mark the positions of the door frame holes on the insulation. Drill the holes.
- Use a \varnothing 3 mm drill bit.



- Screw the door frame to the insulation with cross-head screws.

- Fit the door contact switch holder to the cover plate.



- Secure the door contact switch to the holder using the pre-assembled nuts.



- Insert the door contact switch into the opening in the side of the door frame.
 - The contact roller should project from the bore by approx. 1 cm.
- Fit the complete assembly to the door frame.



- ❑ Mount the inspection glass complete with its retaining ring to the inspection glass holder.



- ❑ Gently tap the pin into the holder using a hammer.

- ❑ Fit the entire assembly to the combustion chamber door and lock the screws.
- Use a spanner size SW 13 mm.

- 👉 The inspection glass assembly should be easy to rotate. Do not leave too large a clearance between the assembly and the pipe. (air leakage)



- ❑ Fit the door handle with two M8 hex. bolts.
- Use a spanner size SW 13 mm.

- ❑ Fit the door cover and secure on the left and right with two M8 bolts.

- 👉 Adjust the travel of the door contact switch.



- ❑ Attach the knob to the inspection glass pin.



Assemble the tunnel door fittings

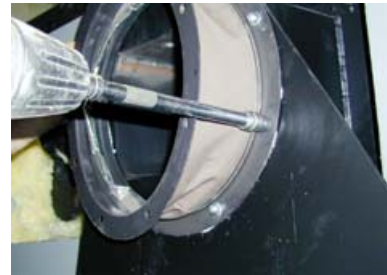
- ☞ The procedure for assembling the tunnel door fittings is the same as that for the combustion chamber door with the exception that there is no inspection glass.

Assemble the induced draught unit

- ☐ Align the induced draught unit bracket horizontally with the flue gas flange and fix it with six M8 bolts.
 - Use a socket spanner size SW 13 mm.



- ☐ Fit the smoke flue pipe adapter with the pre-assembled bolts and nuts.
 - Use a socket spanner size SW 13 mm.
- ☞ Fit the seal cord.



- ☐ Fit the four rubber buffers to the induced air unit platform.
 - Use a socket spanner size SW 13 mm.
- ☐ Lower the induced draught unit onto the rubber buffers and fasten with four M8 nuts.
 - Use a spanner size SW 13 mm



- ☐ Fix the smoke flue pipe adapter in place with the pre-assembled bolts and nuts.
 - Use a socket spanner size SW 13 mm
- ☞ Fit the seal cord.



Assemble the flue gas return (FGR) (optional)



The air boxes (**H**, **I**, **J**, **K**, **O** and **P**) must be fitted before assembly of the insulation:

➤ See page 25, Assemble the FGR primary air box (optional) or Assemble the FGR secondary air box (optional)

The FGR bracket and brace (**Q** and **M**) must be fitted before assembly of the rear panel:

➤ See page 37, Assemble the combustion chamber rear insulation sheet steel panels

- ❑ Fit the four rubber buffers to the FGR bracket using the M8 nuts.
 - Use a spanner size SW 13 mm.

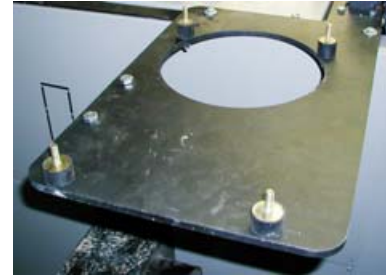
- ❑ Position the FGR blower fan unit on the rubber buffers on the bracket and fix with four M8 bolts and washers.
 - Use a spanner size SW 13 mm

- ☞ If the heat exchanger is mounted on the left, the pressure side flange of the FGR blower fan must project through the opening in the FGR bracket.
- ☞ If the heat exchanger is mounted on the right, the FGR blower fan is rotated and projects to the rear of the FGR bracket and points downwards.

- ❑ Dismantle the flange ring on the FGR blower fan.
- ❑ Fix the smoke flue adapter with the pre-assembled bolts and nuts to the FGR blower fan.
 - Use a spanner size SW 13 mm.
- ☞ Fit the seal cord.

- ❑ Position the FGR connector pipe on the induced draught fan unit and adjust the smoke flue adapter to size accordingly.
- ❑ Cut the FGR connector pipe to size and weld on the flange ring of the FGR blower fan.
- ❑ Position the FGR connector pipe to the upper flange of the induced draught fan and fix it in place with six M10 bolts and nuts.
 - Use a socket spanner size SW 17 mm.
- ☞ Before you tighten the bolts, align the pipe with the FGR blower fan.

- ❑ Fasten the connector pipe to the smoke flue pipe adapter of the FGR blower fan using the pre-assembled bolts and nuts.
 - Use a socket spanner size SW 13 mm



- ❑ Attach the smoke pipe clip to the primary air box and fix the section of pipe in place.

- ❑ Align the pipe branch with the secondary air box and fix it in place with a pipe clip.
- Use a socket spanner size SW 13 mm.



- ❑ Fit the flue gas elbow to the lower flange of the FGR blower fan.



- ❑ Fasten the smoke flue pipe elbow, the flue gas elbow and the pipe section to each other with the pipe clips.
- Use a socket spanner size SW 13 mm.





FGR primary air

FGR secondary air

- Turn the servo-motor to the left-hand endstop.
- Turn the sliding air valve shaft to the left-hand endstop.
- Attach the servo-motor to the torque support and secure it to the shaft with the clamp.

Assemble the heat exchanger motor (optional)

 The figures below show assembly of the motor on the rear of the heat exchanger. If the unit has no jacket cooling, the motor will be mounted on the front of the exchanger because there is less heat at this point.

- Remove the safety screw and the key from the drive shaft.
- Grease the shaft stub
- Slide the heat exchanger motor onto the drive shaft and fix it with four hexagon bolts to the heat exchanger bracket.
- Tap the key into its groove on the shaft and fix it in place with the safety screw.



Assemble the combustion air blower fan

- ❑ Remove the pre-assembled grill from the combustion air blower fan.
 - Use a cross-head screwdriver.



- ❑ Fit the connector supports using the screws removed from the grill previously.



- ❑ Position the combustion air blower fan on the air supply pipe.



- ❑ Fix the blower fan to the air supply pipe with four M8 bolts and nuts.
 - Use a spanner size SW 13 mm.



- ❑ Lift the insulation cover and slide it to one side.
- ❑ Fix the connector supports to the slots in the insulation side panel with four M4 cheese head bolts, washers and nuts.
 - Use a slotted screwdriver.
 - Use a socket spanner size SW 7 mm.
- ❑ Return the insulation cover to its original position.

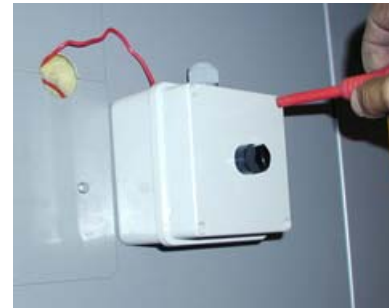


Assemble the flue gas sensor and the lambda probe

- Screw in the brass bush for the flue gas sensor (1).
- Use a socket spanner size SW 22 mm.
- Insert the flue gas sensor and fix it in place with the retaining screw.
- Screw in the brass bush for the lambda probe (2).
- Use a socket spanner size SW 30 mm.
- Screw in and finger tighten the lambda probe.


Assemble the safety temperature limiter box

- Attach the safety temperature limiter box to the insulation side panel of the heat exchanger insulation. Use four cross-head screws.


Assemble the jacket cooling servo-motor (optional)

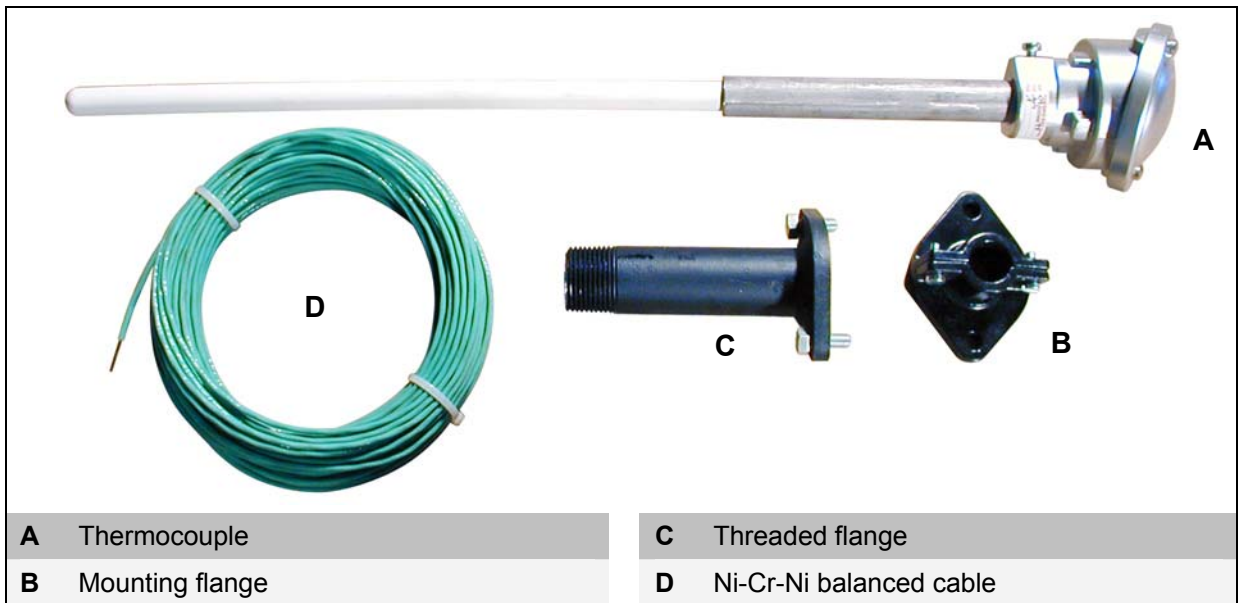
For this assembly step you will need the following parts:

➤ [See page 26, Assemble the cooling jacket](#)

- Attach the jacket cooling servo-motor to the shaft of the sliding air valve and then to the torque support.
- Clamp it to shaft.



Assemble the combustion chamber temperature control system



- Screw the mounting flange and the threaded flange together.
- Screw this assembly into the combustion chamber.
- Insert the thermocouple and fix it in position using the clip on the mounting flange.
 - The thermocouple should project out of the refractory material and into the combustion chamber by approx. 5 cm.
 - The balanced cable will be connected up during electrical installation later.



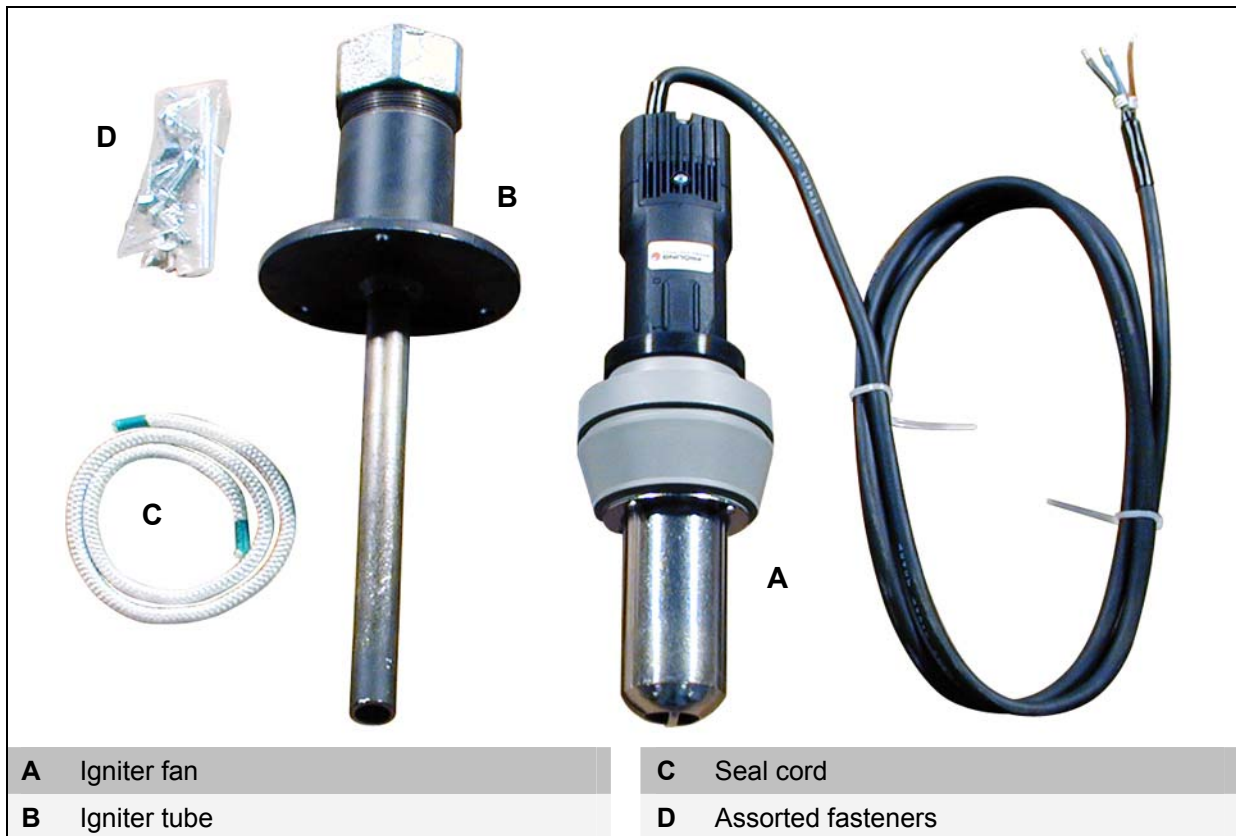
Assemble the combustion chamber overpressure sensor

For this assembly step you will need the following parts:

➤ See page 13, Fittings and small components

- Screw the threaded bushing into the combustion chamber.
- Screw the brass bush into the threaded bushing.
- Slide the overpressure sensor into the bushing and fix in place with the retaining screw.



Assemble the automatic igniter (optional)


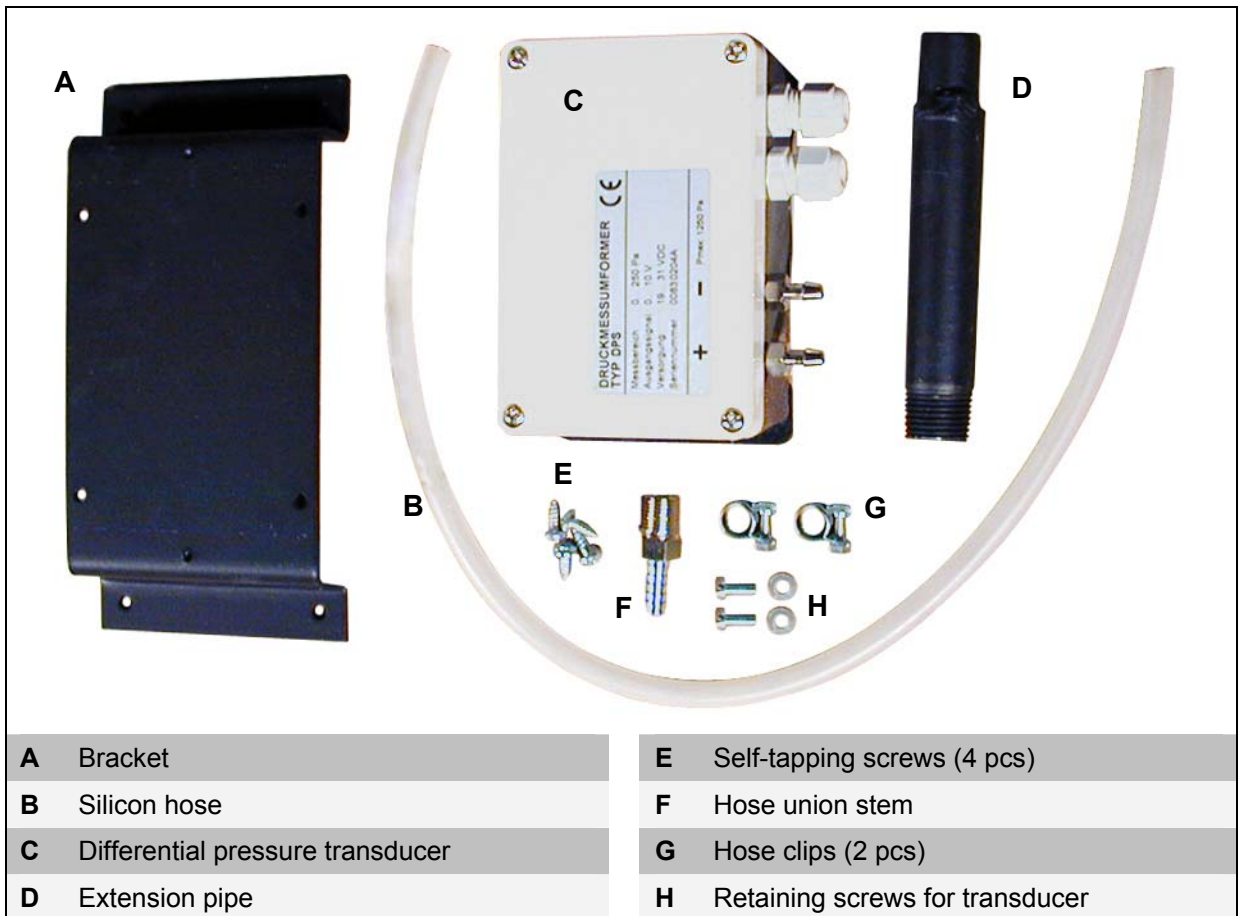
☞ The igniter tube (**B**) must be fitted before the insulation is mounted.

➤ See page 24, [Assemble the igniter tube for the automatic igniter](#)

- Screw the igniter tube nut onto the fan.
- Fit the seal cord as shown in the figure.
- Attach the fan to the igniter tube and fix in place with the nut.



Assemble the underpressure controller



- Screw the pressure transducer onto its bracket.
- Fix the bracket to the position indicated on the boiler. Use the four self-tapping screws provided.



- Screw in the extension pipe.
 - Use water pump pliers.
- Screw the hose union stem into the extension pipe
 - Use a spanner size SW 11 mm.



- ❑ Clamp the silicon hose to the hose union stem using the hose clips.
- ❑ Lay the silicon hose to the pressure transducer and connect it to the Minus nipple using the hose clamps.



Assemble the grate thermostat

For the parts used in this step, see:

➤ [Page 13, Fittings and small components](#)

- ❑ Screw the threaded bushing into the combustion chamber.
- ❑ Screw the brass bush into the combustion chamber.
- ❑ Slide the thermostat into the bushing and fix it in place with the retaining screw.



Assemble the ashcan (optional)

- ❑ Attach the two-piece ashcan to the flange on the heat exchanger ash removal duct. Fix the ashcan in place with the two wing nuts.



- ❑ Position the mobile ashcan at the combustion chamber ash removal duct.
- ❑ Adjust for any difference in height by adjusting the castors.
- ❑ Push the ashcan onto the flange pin and clamp it in place with the wing nuts.

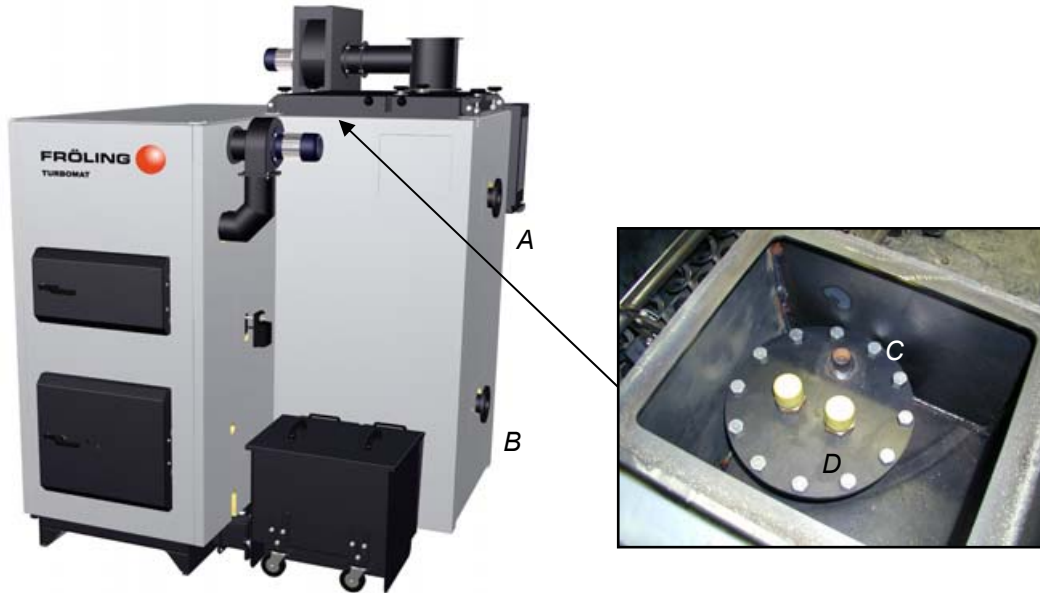


3.3.3 Water supply connection

Connect up the water supply as per the connection diagram for your unit.

➤ See the connection diagram inside the switch gear cabinet.

The main connections are:



A ... Boiler outfeed
B ... Boiler return feed

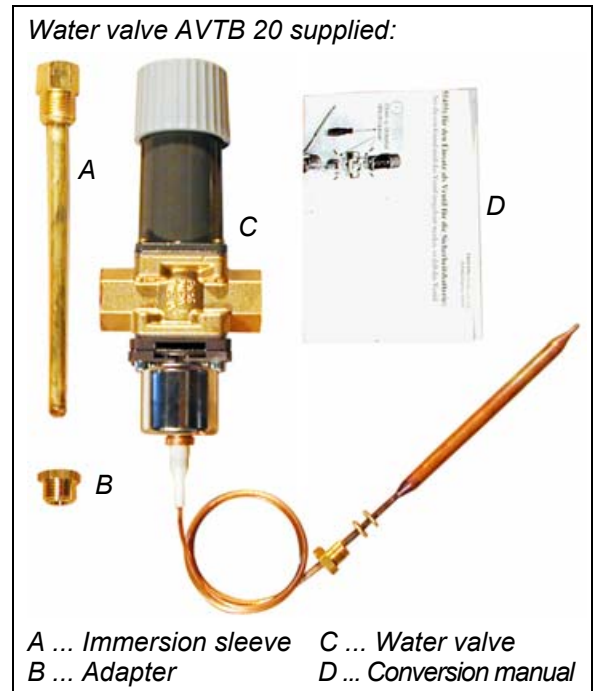
C ... Air venting
D ... Safety battery connection

Modify the water valve AVTB 20

🔗 The water valve AVTB 20 (Art. no.55455) operates as a safety valve for the safety battery.

The valve as supplied is set so that it closes as temperature rises. This valve must therefore be modified.

☐ Modify the valve as per the instructions in the Conversion Manual (D).



A ... Immersion sleeve C ... Water valve
B ... Adapter D ... Conversion manual

3.3.4 Electrical connections

IMPORTANT

Working on electrical components.



Hazard - Risk of electric shock

- Work on electrical components must only be carried out by authorised skilled electricians.

For instructions on connecting up the cables between the switch gear cabinet and the field devices see the circuit diagram.

➤ [The circuit diagram is inside the switch gear cabinet.](#)

Equipotential bonding

This equipment must be fitted with equipotential bonding. Earthing must comply with current directives, regulations and standards.

➤ [See “1.1 Standards”](#)

4 Starting-up / Shutting down

4.1 Starting up for the first time / Boiler set-up

When you start the boiler for the first time you must set it up for your heating system.

NOTE

☞ The first start-up must be performed by an authorised installer or by a technician from the Fröling customer service department.

Before you start heating with the boiler for the first time:

- Set the controller to match your heating system.

For the control button layout and instructions for setting and changing parameters, see the “Lambdatronic H 3000” instruction manual provided.

4.2 Out of service for long periods

If the boiler is to remain out of service for more than several weeks (e.g. during the summer), we recommend that you perform the following maintenance tasks:

- Thoroughly clean the boiler.
- Place approx. 5 kg of loose lime in the combustion chamber.
 - ➔ Loose lime absorbs moisture and thereby prevents corrosion when the boiler is out of service.
- Completely close all doors and flaps.

If the boiler is to remain out of service during the winter:

- Call a service technician and ask them to drain the system completely or fill it with anti-freeze.

☞ Before the boiler can be returned to service, it must be refilled by a heating engineer in accordance with Austrian Standard ÖNORM H5159.

4.3 Disassembly

To disassemble the boiler, perform the assembly steps in reverse order.

4.4 Disposal

- Dispose of all waste in an environment-friendly manner and in accordance with waste disposal regulations.
- Separate and clean recyclable materials and send them to a recycling centre.

5 Delivery Certificate

Customer no.		
Customer address:	Installer:	
Telephone number:		
Turbomat	<input type="checkbox"/> 320 kW	
	<input type="checkbox"/> 500 kW	
Optionals	<input type="checkbox"/> Flue gas return (FGR)	
	<input type="checkbox"/> Automatic ash removal	
	<input type="checkbox"/> Automatic igniter	
	<input type="checkbox"/> Lambda probe	
	<input type="checkbox"/> Jacket cooling	
	<input type="checkbox"/> Oil burner flange	
	<input type="checkbox"/> Heat exchanger system	
	<input type="checkbox"/>	
<input type="checkbox"/> System operation discussed	<input type="checkbox"/> System maintenance discussed	
<input type="checkbox"/> Safety information discussed	<input type="checkbox"/> Residual risks discussed	
<input type="checkbox"/> Test heating performed	<input type="checkbox"/> No defects found	
<input type="checkbox"/> Other:		
Date	Customer	Installer
<p>Please complete this form, ask the customer to sign it and return it as confirmation to FRÖLING Ges.m.b.H. Fax: 0043 (0)7248 606 600</p>		