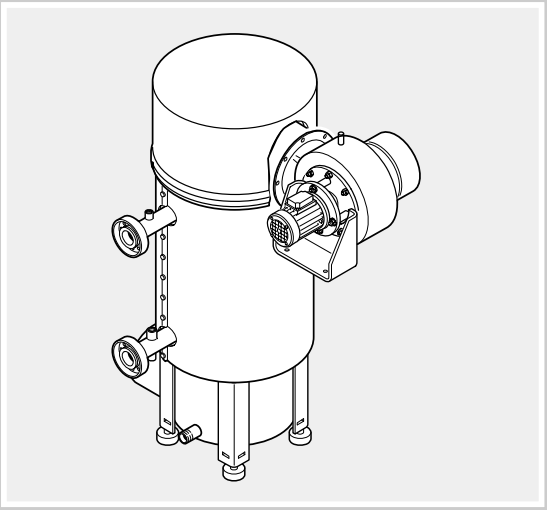
MENU

THE IDEAL INSTALLATION & SERVICING MANUAL



Ideal GT Condenser

RCI 300 - 400 - 500

RCI 300V - 400V - 500V

(Suitable for pressurised gas fired Ideal GT & GTE Boiler ranges)

Ideal BOILERS

Installers guide to commercial central heating boilers

MENU

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INTRODUCTION

General

The Ideal GT Condenser range of secondary heat exchangers are designed for use with gas-fired boilers of output between 180kW and 986kW.

The following boilers are suitable:

Ideal Harrier GT

Ideal Viceroy GT

Ideal Viscount GT and GTE

Ideal GT Condensers are designed to increase the efficiency of these boilers by up to 16%. This is dependant on the method of application together with system return and flue gas temperatures.

To maximise fuel savings system designs should keep the return temperature to the GT Condenser as low as possible. (Condensation will commence at around 54ºC - 55ºC. Above this temperature the efficiency gain is of the order of 5 - 8%. Beneath this temperature the latent heat of condensation is also gained and the lower the temperature the more this gain (13 - 16% at 30ºC return, dependant on model). This is achieved by gaining heat from the flue gases which is normally lost to atmosphere.

The GT Condenser consists of a tubular stainless steel heat exchanger with upper and lower flue units also in stainless steel.

Flue and system water connections can be positioned for maximum convenience as the upper and lower flue units can be rotated about the heat exchanger.

The GT Condenser is available as two model ranges.

- RCI ... V Condenser with fan

  These three output models are available with a fan at the Condenser flue inlet, for cases where the pressure loss of the Condenser cannot be overcome by the boiler burner, or where a parallel flue circuit is used. The fan orientation is variable through three positions. The fan motor is 230/400V 3 phase.

- RCI Condenser without fan

  These three output models without fan are for use where the flue has a fan or the boiler burner is capable of overcoming the GT Condenser pressure loss.

  Three output models are available in each type for different boiler outputs:

  RCI 300V and RCI 300 180kW to 459kW

  RCI 400V and RCI 400 230kW to 670kW

  RCI 500V and RCI 500 390kW to 986kW

Fuel

The range of GT Condensers are suitable for:

1. Gas fired boilers
2. Dual fuel boilers - only when firing on gas. (A parallel flue bypass arrangement is required.)

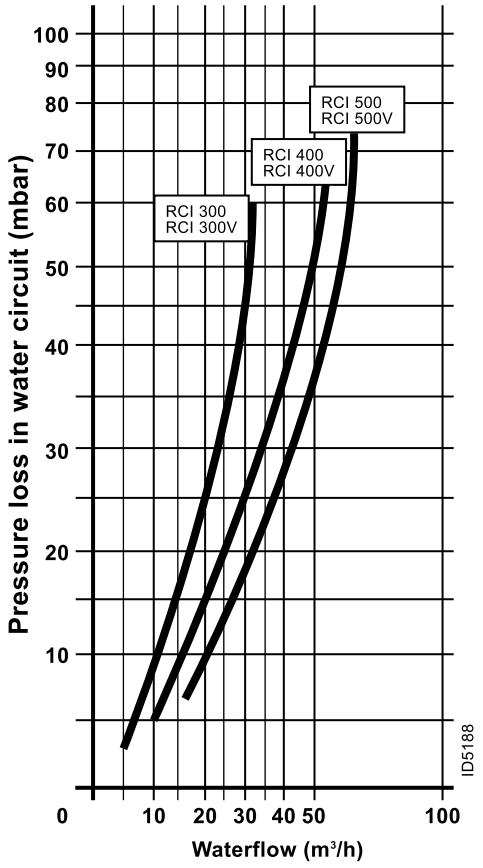
They are NOT suitable for oil fired boilers.

GENERAL

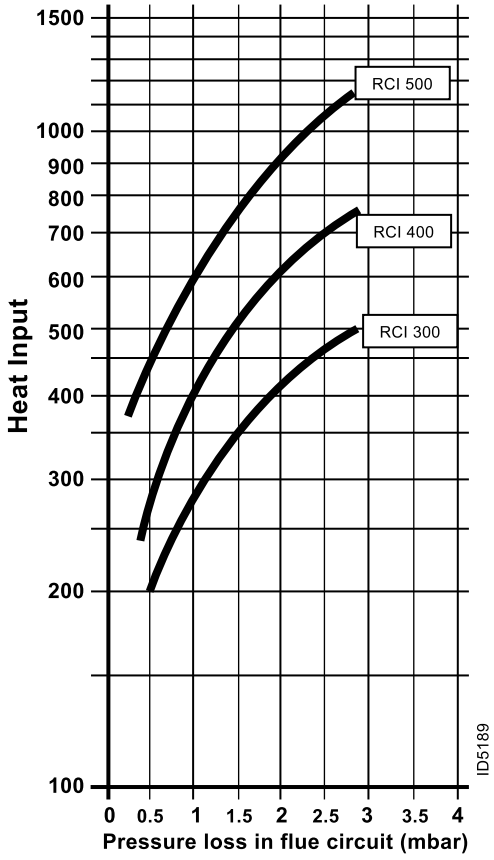
Table 1 - Performance Data

Model		RCI 300	RCI 300V	RCI 400	RCI 400V	RCI500	RCI 500V
Boiler Heat Input	kw	199 to 501		253 to 747		433 to 1096	
Boiler Heat Output	kw	180 to 450		230 to 670		390 to 986	
Pressure losses - flue circuit	mbar	0.5 to 2.7		0.3 to 2.5		0.4 to 2.7	
Nominal water flow rate	m^3/h	9 to 25		12 to 36		19 to 58	
Minimum water flow rate	m^3/h	1 to 2.5		1.2 to 3.6		1.9 to 5.8	
Maximum water flow rate	m^3/h	27 to 75		36 to 108		57 to 174	
Pressure loss - water circuit	mbar	8 to 35		7 to 33		8 to 50	
Water capacity	litres	86		114		190	
Maximum working pressure	bar	6		6		6	
Maximum service temperature	ºC	110		110		110	
Power consumption	W	-	250	-	550	-	1100
Fan speed	rpm	-	1500	-	1500	-	1500
230V - 3 phase	A	-	1.50	-	2.85	-	4.70
400V - 3 phase	A	-	0.85	-	1.65	-	2.70
Net weight	kg	153	180	210	233	312	348
Delivery weight	kg	177	229	238	286	342	373

1 HYDRAULIC PRESSURE LOSSES - GT CONDENSER ONLY



2 FLUE CIRCUIT PRESSURE LOSSES - GT CONDENSER ONLY



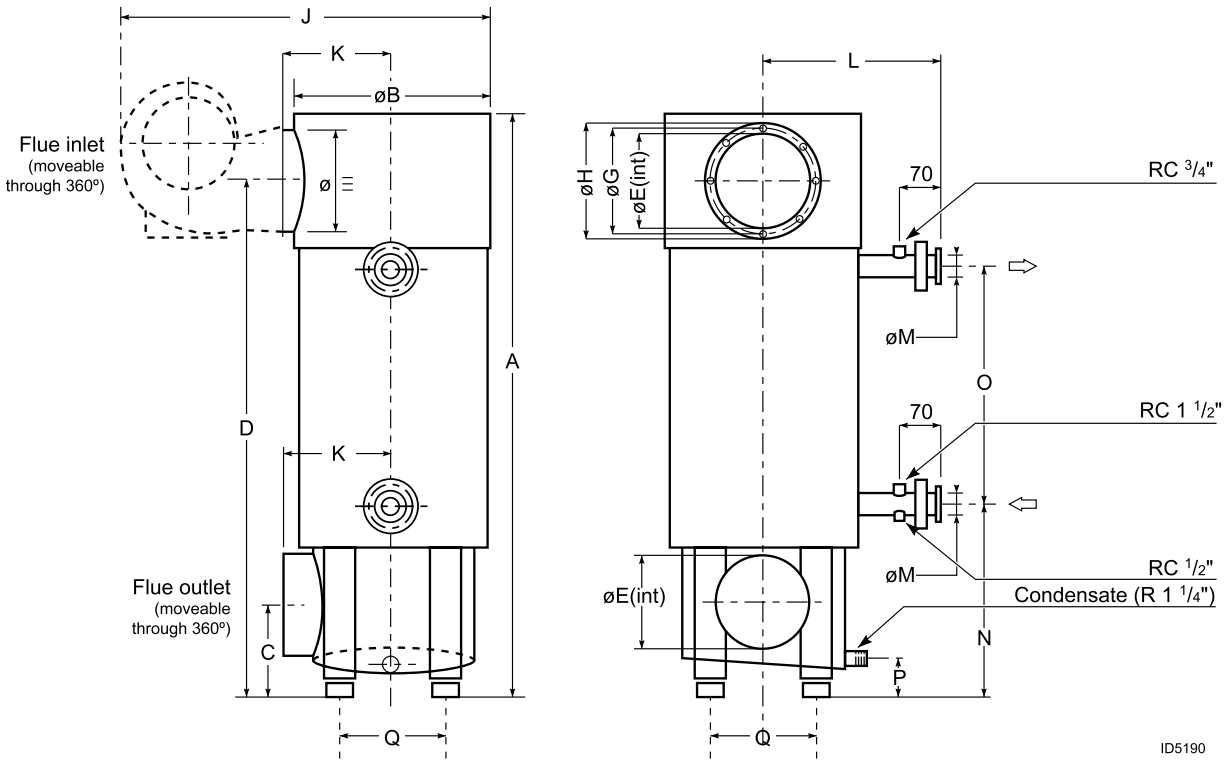
Temperatures at inlet of RCI ≈ 200ºC

- CO2: 10%
- Depression at flue outlet RCI: 0.05mbar

Table 2 - GT Condenser Resistance Table

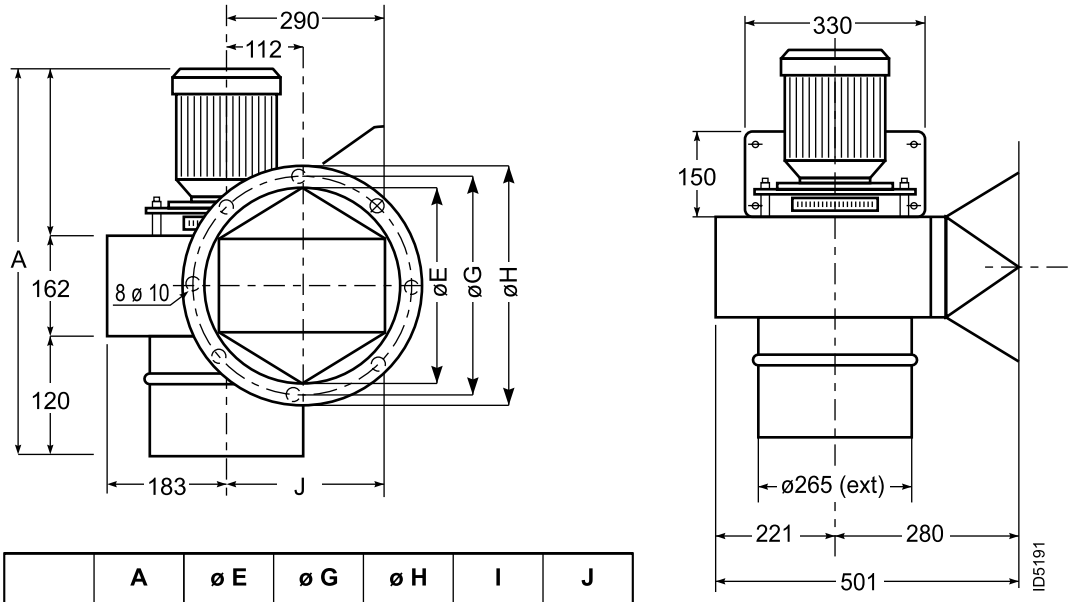
Boiler	Boiler Heat Output (kW)	Boiler Heat Input (kW)	GT Condenser Output (by Temp)			Press. Drop Flue Circuit RCI Only (mb)	Press. Drop Water Circuit RCI Only (mb)
			45/30C (kW)	60/45C (kW)	75/60C (kW)		
RCI 300 or RCI 300V							
Harrier 6	180	199	29	20	13	0.6	10
Harrier 7	230	253	35	24	15	0.9	13
Harrier 8	280	309	45	32	21	1.5	19
Harrier 9	330	361	54	39	25	1.6	21
Viceroy 8	390	433	65	46	30	2.2	31
Viceroy 9	450	501	74	53	34	2.8	41
RCI 400 or RCI 400V							
Harrier 7	230	253	35.5	24.5	15.5	0.5	8
Harrier 8	280	309	45.5	32.5	21	0.7	9
Harrier 9	330	361	54	40	26	0.9	13
Viceroy 8	390	433	67	49	32	1.1	17
Viceroy 9	450	501	78	56	38	1.4	20
Viceroy 10	540	598	93	68	45	1.9	25
Viceroy 11	600	669	103	75	50	2.3	29
Viceroy 12	670	747	112	83	55	3	33
RCI 500 or RCI 500V							
Viceroy 8	390	433	66	48	32	0.5	12
Viceroy 9	450	501	78	56	37	0.8	15
Viceroy 10	540	598	94	68	45	1.1	19
Viceroy 11	600	669	106	76	51	1.2	23
Viceroy 12	670	747	118	90	58	1.4	27
Viceroy 13	720	803	126	92	62	1.5	29
Viceroy 14	780	870	135	104	68	1.8	32
Viscount 14	812	902	143	105	71	1.9	33
Viscount 15	870	967	154	113	76	2	39
Viscount 16	928	1031	164	120	81	2.3	41
Viscount 17	986	1096	174	127	86	2.6	46

3 MAIN DIMENSIONS - RCI



	A	B	C	D	ø int. E	ø G	ø H	J	K	L	M	N	O	P	Q
RCI 300	1687	610	270	1476	300	330	360	1156	350	540	DN65	569	671	80	380
RCI 400	1777	698	300	1546	350	380	410	1250	400	645	DN 80	630	658	90	455
RCI 500	1883	830	330	1623	400	430	460	1376	460	630	DN 100	657	634	95	550

4 MAIN DIMENSIONS - FAN FOR RCI ... V MODELS



	A	ø E	ø G	ø H	I	J
V 300	531	300	330	360	249	262
V 400	555	350	380	410	273	287
V 500	555	400	430	460	273	312

5 SYSTEM DESIGN

GT Condensers can be applied to suitable boilers in new or existing systems and may be fitted in heating only or heating and hot water systems.

A wide variety of system design can therefore utilise a GT Condenser and it is not possible to provide examples of all.

The following points should be noted for system design:

- The Condenser must be water cooled to ensure correct operation.
- A tapping is provided on the flow connection for a safety valve. This can be used if there are any valves which may isolate the Condenser.
- Design should ensure the lowest temperature supply to the Condenser to maximise condensation and thus efficiency.

6 WATER CIRCULATION

- GT Condenser in series in flue circuit

  The flow through the Condenser can equal that through the boiler. It is acceptable to use a bypass to reduce hydraulic pressure loss, through the Condenser if required. Minimum flow should be not less than 10% of boiler flow.

- GT Condenser in parallel in flue circuit

  The Condenser can be linked to a single boiler or series of boilers with a total heat input greater than the maximum heat input of the Condenser in that situation. The maximum heat input of the Condenser (see page 3) is used to calculate permitted water flow rate through it.

Example:

Total Boiler(s) Heat Input = 2000 kW
Max input RCI 500V = 1100 kW
Max output of RCI 500V at 92% efficiency = 1012 kW
Water Flow through GT Condenser Q = $\frac{0.86 \times 1012}{15}$ = 58m³/h.

A tapping is provided on the Condenser return pipe for a flow switch.

In the event of no water flow, the flow switch must be able to

1. stop burner when RCI connected in series in flue circuit
2. stop fan when RCI ... V connected in parallel in flue circuit
3. stop burner and fan when RCI ... V connected in series in flue circuit.

SYSTEM DESIGN EXAMPLES

There are many possible system designs that may use a Condenser:

- heating only circuits (constant and variable temperature)
- heating and hot water circuits
- Preheat of hot water

The three examples given below cannot cover all installations which may be encountered. Their purpose is to provide basic guidance and suggest some possible GT Condenser applications.

In all cases, standard installation practices, along with national and local regulations currently in force, must be respected.

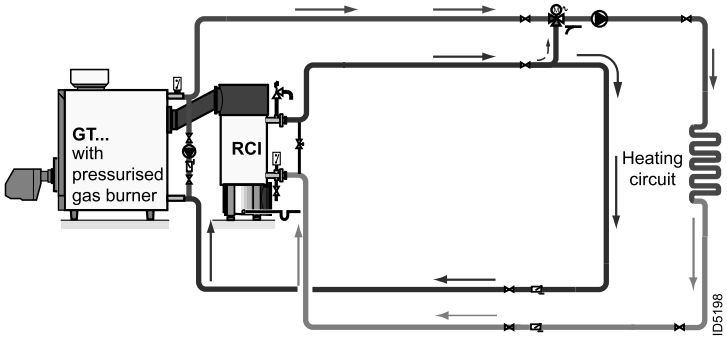
1. Single Circuit (Heating Only)

The GT Condenser is fitted in series with the boiler flue circuit, the flue system design allowing for the Condenser pressure drop.

The system variable temperature return is piped to the Condenser inlet to give low return temperatures and therefore increase energy savings. The heated Condenser flow passes to the boiler and is then raised to desired system temperature.

In this layout the GT Condenser may be sized to suit the maximum boiler output.

If constant temperature circuits are also within such a system the GT Condenser can be sized to suit the variable temperature circuit(s) only with suitable system layout to maintain low GT Condenser inlet temperatures.

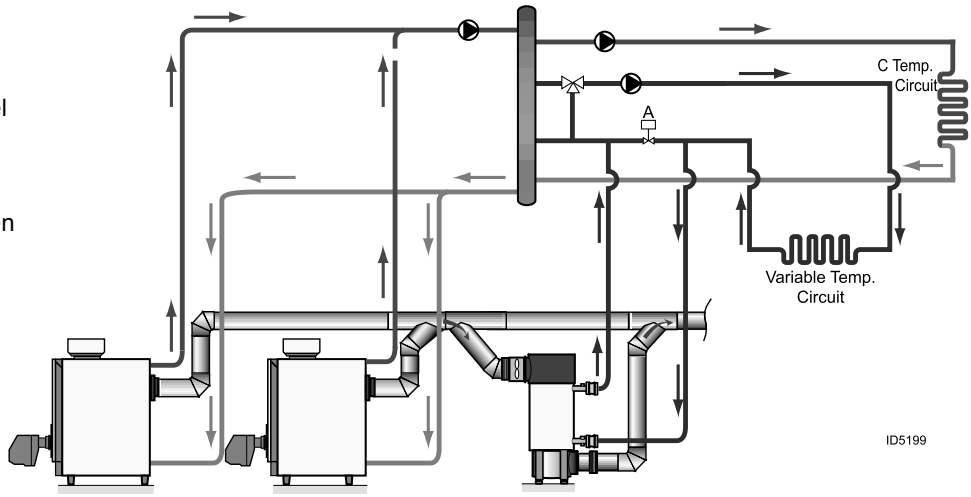


2. Multiple Heating Circuit - Multiple Boilers

The GT Condenser is fitted in parallel to the boilers flue circuit to be independent of number of boilers firing. Both constant and variable temperature circuits are present taken from a vertical header.

The Condenser is located on the variable temperature circuit to utilise low return system temperatures and effectively preheat the header return. It should be sized to the variable temperature circuit load.

In fully mixed state, then valve 'A' should be open.

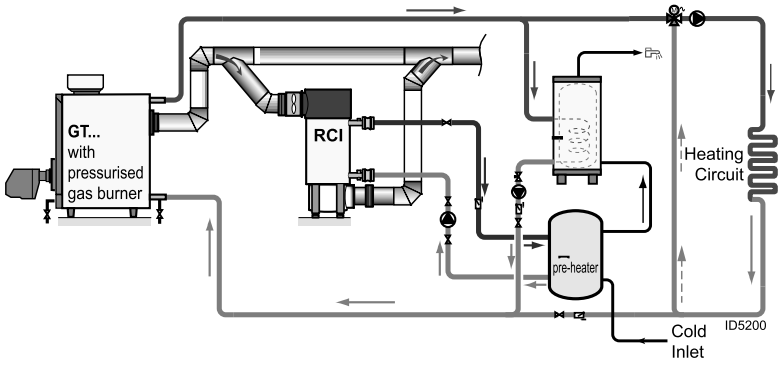


3. Heating installation (1 Circuit) and sanitary hot water with **pre-heating unit**, linked to boiler flue - RCI in parallel (dynamic):

The system uses a preheater for the D.H.W. calorifier. The GT Condenser is connected to the preheater to achieve energy savings on D.H.W. use by utilising boiler flue heat.

The heating circuit is laid out as required, not being connected to the Condenser circuit.

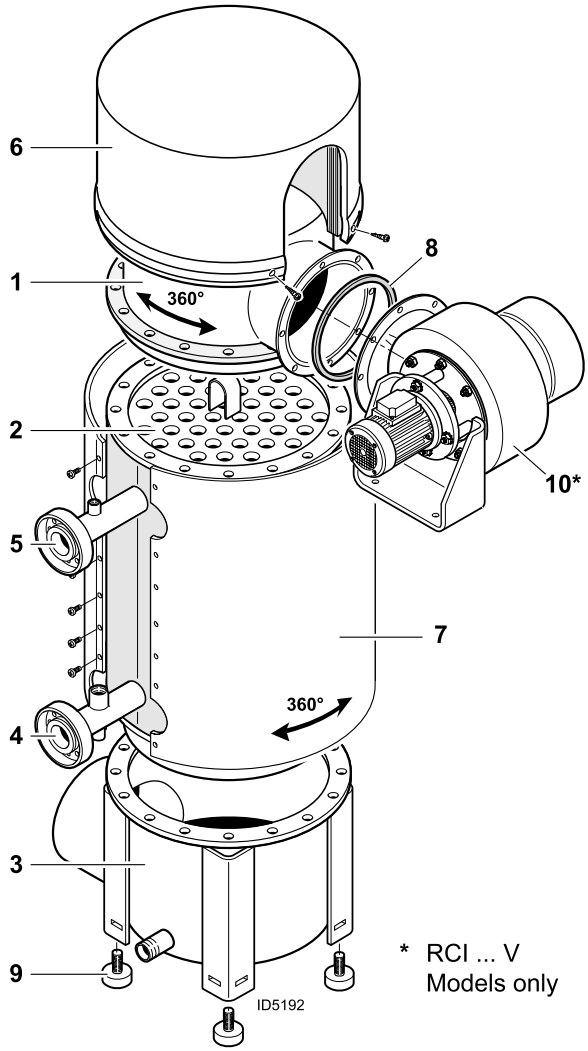
The Condenser is installed in a loop design in the building. It is better to choose the RCI...V version connected as a by-pass to the flue so as to be able to control the water temperature by stopping the fan without having to stop the boiler.



8 CONDENSER - Exploded View

The GT Condensers are manufactured entirely in stainless steel 316L. They comprise the following parts:

1. Upper flue casing (entirely stainless) mounted on a circular flange, rotatable round 360^0.
2. Stainless heat exchanger with removable flue baffles and a lifting hook.
3. Lower flue casing (entirely stainless and bolted on a flange), which can be turned round 360^0 and mounted on four welded feet.
4. System (inlet): Stainless steel, return pipe with the flow switch and drain connections. The pipes have a shaped collar and a rotatable flange PN 10.
5. System (outlet): Stainless steel, flow pipe with connection for a safety valve. The pipes have a shaped collar and a rotatable flange PN 10.
6. Metal casing for the upper flue case, lagged with rockwool.
7. Sheet metal jacket for the exchanger body, lagged with insulation.
8. Teflon gasket (delivered with RCI in the instruction leaflet).
9. 4 “Silentbloc” padded feet for screwing under the RCI feet.
10. Motorised fan unit for optional RCI … V models with extractor motor, fan and stainless steel fan casing.
    - 230/380 V 3-phase motor with cooling fan, single speed, fixed with B5 connector, IP55 protection class F.



9 UNPACKING

Siting and Access

GT Condensers are delivered on wooden pallets no wider than 800 mm for models RCI 300 and RCI 400 so that they can easily pass through a boilerhouse door. The RCI 500 has a pallet width of 920 mm.

They are easily separated into 3 parts (if required): upper flue case, heat exchanger, lower flue case. The exchanger is equipped with a hook enabling it to be mechanically lifted.

The siting of the Condenser will be dependent on the space available in the boilerhouse. Nevertheless, the flue connection between the boiler and the Condenser must be as short as possible and insulated in order to reduce heat losses at this point.

Clearances

There must be a minimum space left around the Condenser so that maintenance operations can be carried out (350 mm minimum is necessary above the upper flue casing so that it can be lifted when the exchanger is cleaned).

Allowance must be made for condensate drain arrangements from the GT Condenser. If necessary install the Condenser on a plinth.

WARNING. Please note that boilers and Condensers installed in or near premises where the atmosphere can be polluted with chlorine or fluorine compounds, may be subject to corrosion.

For example: hairdressing salons, industrial premises with solvents, refrigeration equipment etc …

Condensers installed in such locations shall not be covered by the warranty.

Before installation of the GT Condenser, check the table below to confirm that all parts for a given pack are there.

Description	Pack no	RCI 300	RCI 300 V	RCI 400	RCI 400 V	RCI 500	RCI 500 V
Condenser RCI 300	DZ 1	1	1				
Condenser RCI 400	DZ 2			1	1		
Condenser RCI 500	DZ 3					1	1
Fan V 300	DZ 10		1				
Fan V 400	DZ 11				1		
Fan V 500	DZ 12						1

Note.
The GT Condenser pack contains the RCI complete in its jacket, 4 “silentbloc” padded feet packed in a plastic bag and placed in the lower flue casing, and 1 Teflon gasket for the connecting joint (upper flue casing) in the instruction leaflet sachet.

10 INSTALLATION

The GT Condenser is delivered in a box and fixed on a pallet by 4 right-angled brackets **(1**).

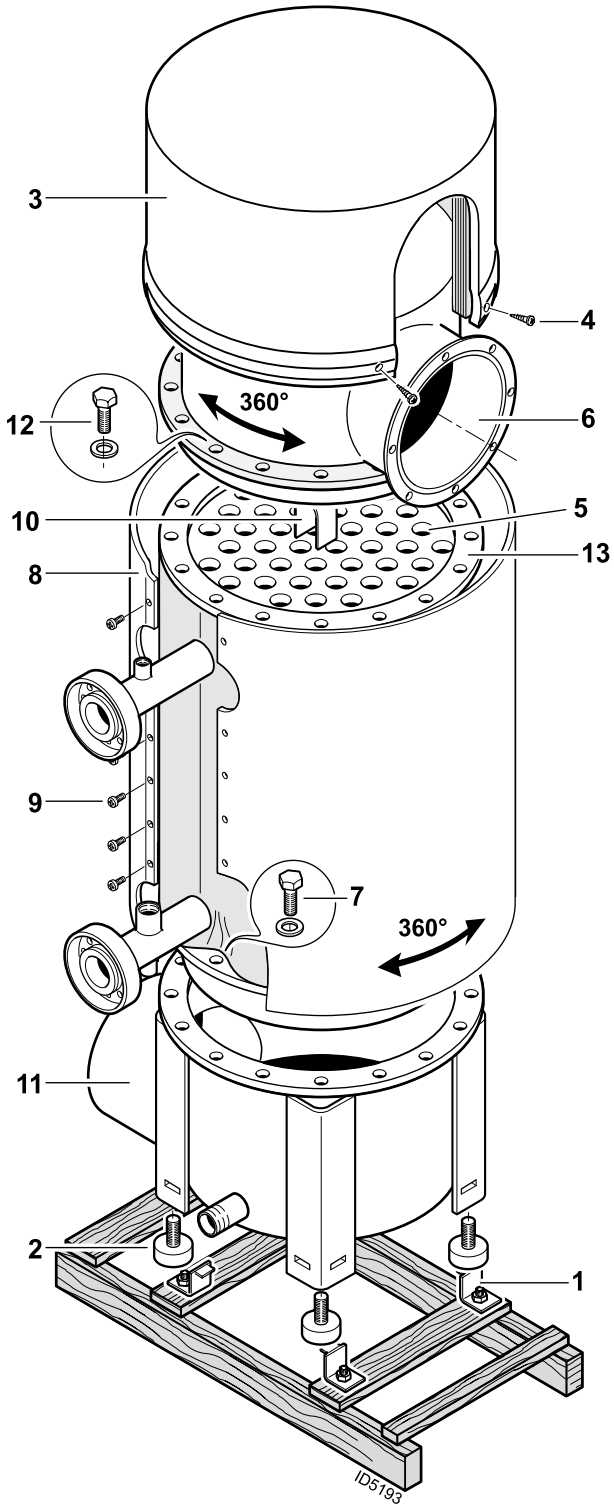
1. Unscrew the 4 brackets **(1)**
2. For ease of handling and to position the Condenser, a lifting hook is provided.

   To gain access:

   - Lift the casing **(3)**
   - Take off the upper flue unit **(6**) by unscrewing the bolts **(12**).
3. To rotate the lower flue unit **(11)** in relation to the system connection pipes (if required) :

   - Take off the jacket **(8)** by unscrewing the securing screws **(9)**, carefully open the jacket and lift it away
   - Take off the exchanger **(13)** by unscrewing the bolts **(7)** (taking off the exchanger by means of the hook **(10)** so as not to damage the waterproof joint)
   - Screw the 4 “silentbloc” padded feet under the lower flue unit **(11)**
   - Place the lower flue unit **(11**) in the correct orientation taking account of the bolt positions **(30⁰ for model RCI 300 and 20⁰ for models RCI 400/500)**
   - Refit the exchanger **(13)**, positioning the system connections in the required position and tighten the bolts so as to ensure a watertight fit
   - Replace the outer jacket **(8)**
4. If Section 3 was not required. Screw the 4 “silentbloc” padded feet under the lower flue unit **(11)**
5. Replace the upper flue unit **(6)** in the required position and tighten the bolts **(12)**
6. Replace the casing **(3)**
7. Drill the jacket **(8)** with two holes 3.8 mm in diameter, in line with the two holes in the upper casing **(3)**, insert the 2 screws **(4)*** and tighten

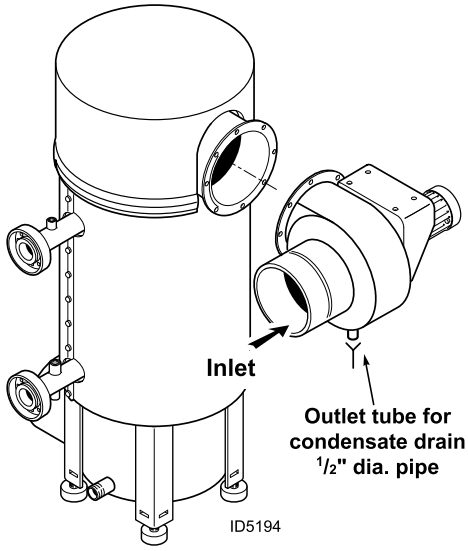
* The 4 “silentbloc” pads **(2)** along with the screws **(4)** are in a plastic bag packed in the lower flue unit



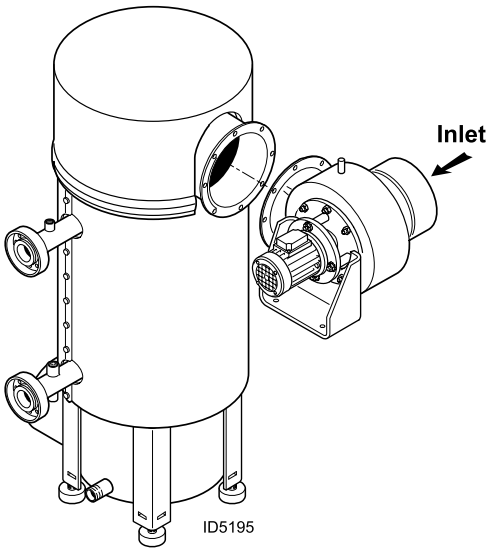
LEGEND

1. Packing brackets
2. Silentblock feet
3. Upper flue casing
4. Casing screws
5. Flue baffles
6. Upper flue unit
7. Fixing bolts (lower)
8. Jacket
9. Jacket screws
10. Lifting hook
11. Lower flue unit
12. Fixing bolts (upper)
13. Heat exchanger

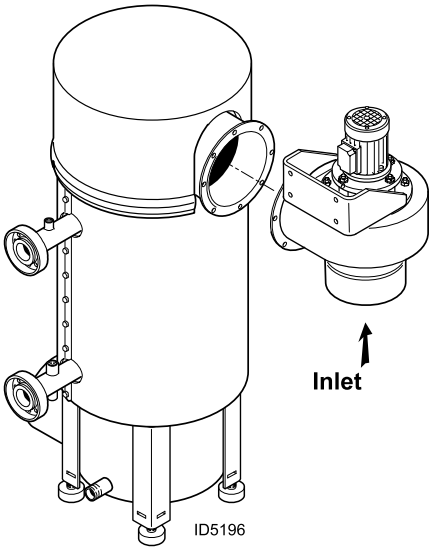
11 FAN FLUE INLET ON LEFT



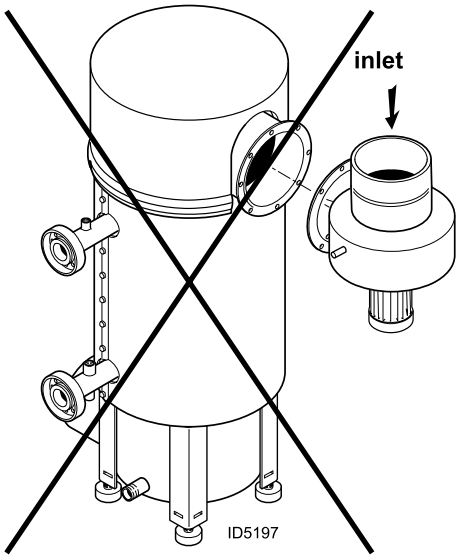
12 FAN FLUE INLET ON RIGHT



13 FAN FLUE INLET FROM BELOW



14 FAN FLUE INLET ON TOP



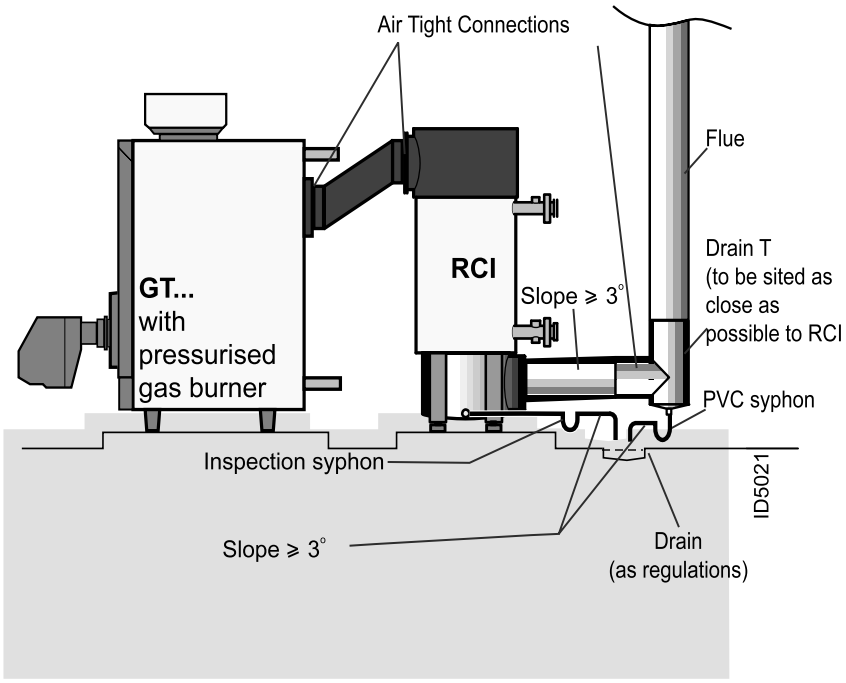
15 FLUE SYSTEM DESIGN

The use of a Condenser leads in most cases to flue temperatures comparable to those obtained with dedicated condensing boilers. The flue temperature is about 15ºC above that of the return heating water. In all cases, it will not be less than 40ºC.

Reminder of a few important, practical rules:

- limit the number of boiler Condenser groups connected to the same flue.
- minimise the number of elbows.
- drainage of condensate must be at the base of the flue and at the lowest points of the lower flue box. Drain pipes **must** be in corrosion resistant material and of a constant diameter.

The type of flue pipe used should conform to BS715 Section 2, Stainless Steel or be of equivalent corrosion resistance. All joints or connections in the flue system must be impervious to condensate leakage.



16 RCI WITHOUT FAN INSTALLED IN SERIES IN THE BOILER'S FLUE

In this case, check:

- that the boiler's burner is capable of overcoming the additional Condenser (including that of the connecting flue between the boiler and the Condenser) pressure loss.

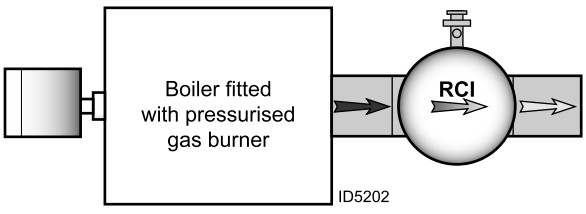
  or

- that there is a fan fitted on the flue capable of overcoming that additional pressure loss.

If this is not the case, it will be necessary to consider:

- either adapting the burner or replacing it,
- or, if the installation allows, reduce the boiler output.

If the above is not possible an RCI... V with fan unit must be used.



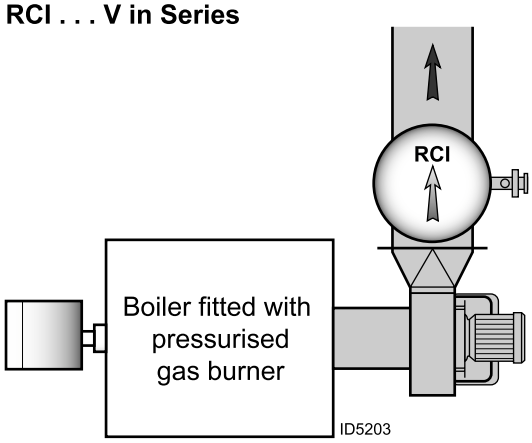
17 RCI...V WITH FAN

RCI…V with fan, installed in series or in parallel in the boiler's flue:

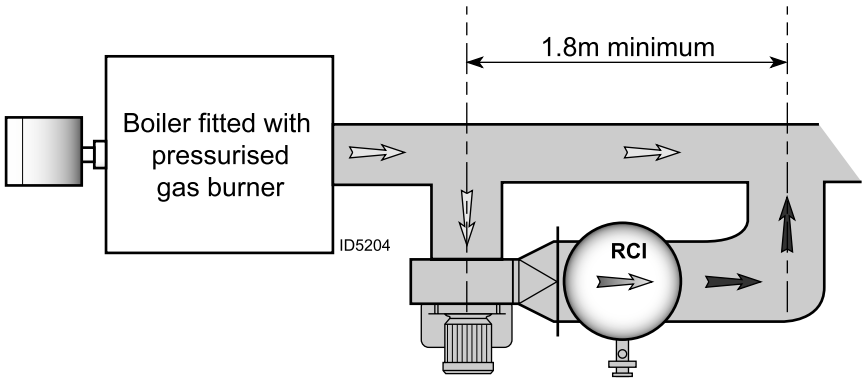
- **In series:** the effect of the fan is that it overcomes the pressure loss of the Condenser where the boiler or flue cannot provide sufficient draught.
- **In parallel:** this type of connection is only allowed if a fan is installed. The main advantages are:
  - it is independent of the output of the associated boiler.
  - it has an effect on all the boilers in a system in "cascade" formation, whatever the order of the cascade or the number of boilers in use.
  - it allows the boiler to function with the Condenser switched off. In particular, this may be desired in summer with D.H.W. only required. This simplifies the hydraulic connection of any domestic hot water boiler.
  - it allows dual fuel oil/gas burners to be used provided there is an interlock to prevent Condenser use when oil firing.

Note.
In the case of a common flue header for several boilers, ensure that this is not pressurised, whatever the number of boilers in use, so as to avoid any risk of backing-up in one of the boilers.

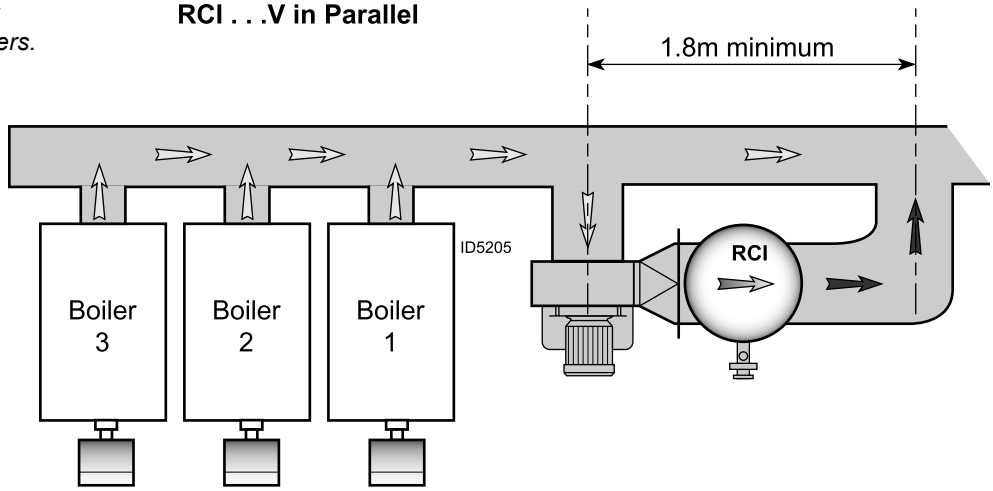
RCI . . . V in Series



RCI . . .V in Parallel



RCI . . .V in Parallel



18 CONDENSATE DRAIN CONNECTION

An R 1 1/4 outlet connection is provided on the lower flue casing. This must be connected via a deep sealed trap to a suitable waste, standard PVC or corrosion resistant material is suitable for this purpose. (Natural gas condensate is mildly acidic with a pH value of about 4).

A condensate drain should also be provided at the base of any appropriate flue connection (see Frame 15).

The maximum flow of condensate is of the order of 1 l per m^3 of gas used.

19 ELECTRICAL CONNECTIONS

WARNING. Connections must be made by a qualified electrician.

RCI Without Fan

A flow switch (not provided) is:

- connected in series with the control circuit of the burner where a standard control panel is used.

RCI...V (with Fan)

The fan must have a 230 or 400 Volt three phase supply. In all design layouts the operation of the fan **must** be interlocked to the boiler burner operation.

Where the system uses several boilers in cascade, connection of the RCI...V (installed in parallel in the flue circuit - see Frame 17) should be made so that the fan starts as soon as one boiler starts.

If a dual fuel boiler is installed using a parallel flue circuit for the RCI...V, then the Condenser fan operation **must** be interlocked to operate **only** when gas is being fired. Fan operation must stop on changeover to oil.

A water flow switch (not supplied) should be connected in series with the control circuit to prevent the burner firing in the event of low flow.

Note

The water flow switch (not)provided is connected to the boiler's control panel.

When the flow switch detects a flow which is too low (10% of nominal flow) the burner is stopped.

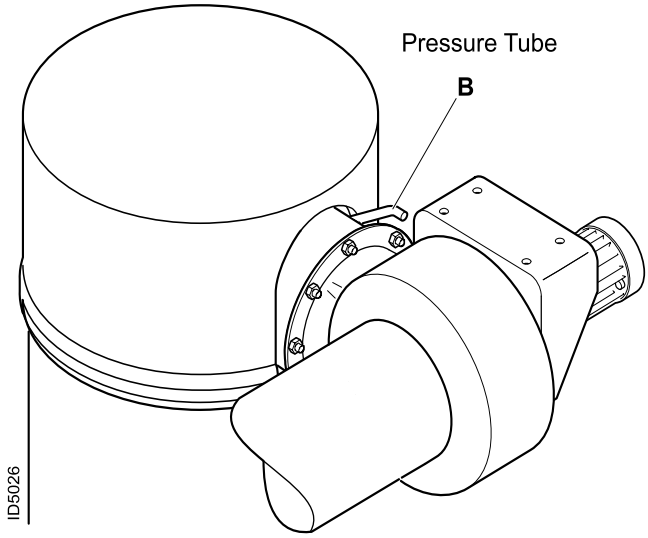
20 COMMISSIONING

Checks Before Commissioning

- Check that the various connections have been made according to the current standards and Regulations and to those in this leaflet.
- Check that the boiler and the GT Condenser have correct water flow rates.
- Check that any flue damper fitted is not fully closed.

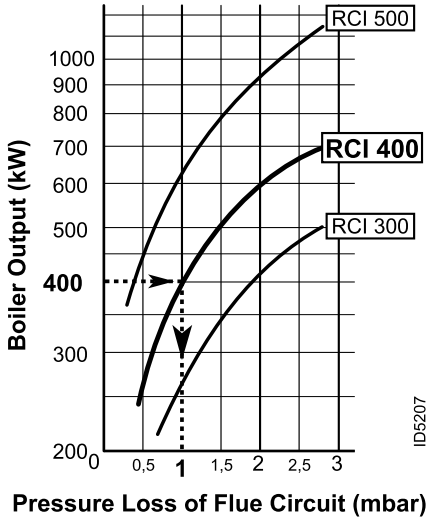
Where an RCI...V is connected in series in the flue circuit, the pressure drop must be adjusted as below.

- Check that the boiler installation has been completed according to the manufacturer's instructions.



Operate the boiler at normal working temperature. Where a flue damper is fitted to provide the correct pressure drop over the Condenser, set the damper until the pressure drop measured (in pressure tube B, see diagram above) inside the upper flue casing and a pressure tapping at the Condenser outlet, corresponds to the Condenser loss of pressure (see Table opposite).

Example: for an RCI400 and a Boiler output of 400kW, the pressure loss will be 1mb.



21 CLEANING THE GT CONDENSER

It is recommended that the cleaning is undertaken annually.

WARNING. All maintenance operations must be carried out with the boiler switched off and the electrical supply disconnected

22 CLEANING THE EXCHANGER

Upper Flue Box

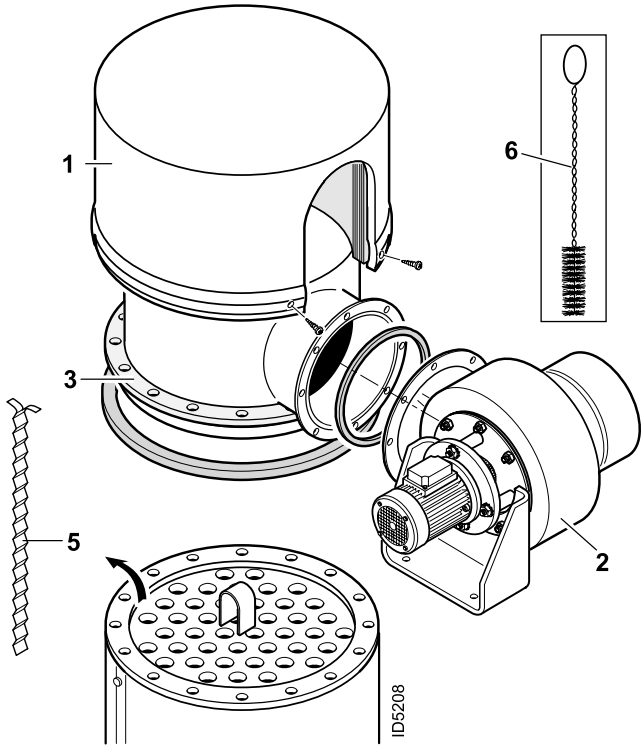
1. Take off the upper flue casing **(1)**.
2. Take off the fan unit (if fitted) **(2)**.
3. Unbolt and remove the upper flue unit **(3)**.
4. Take out the flue baffles **(5)**.

Using a steel brush **(6)** (60mm diameter) brush the inside of the flue tubes (smooth tubes) so that the debris falls into the lower flue unit.

Wash through the heat exchanger to remove any deposits left.

Having done this:

- replace the flue baffles
- replace the upper flue unit (check the condition of the gasket, change it if necessary)
- tighten the bolts of the upper flue unit
- re-connect the fan unit (check the condition of the gasket, change it if necessary)
- replace the upper flue casing.



23 CLEANING THE FAN

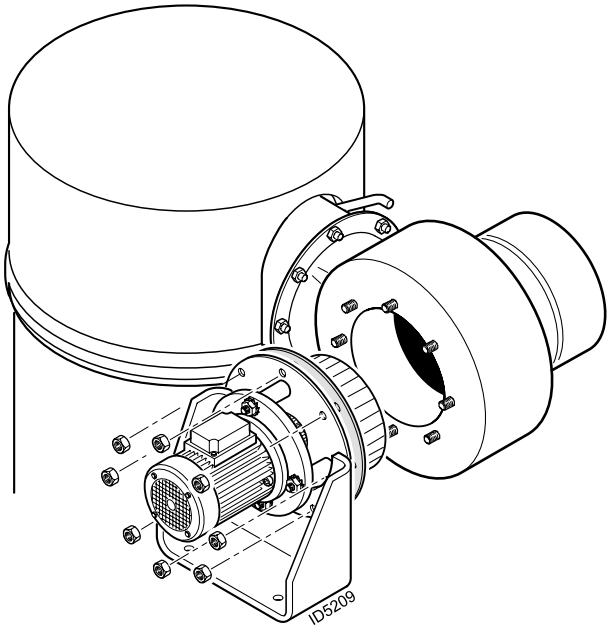
1. Take off the motor fan unit by unbolting the 8 bolts fixing it to the fan casing.
2. Clean the fan taking care not to pull out the balance weights.
3. Having done this, check the condition of the gasket (replacing it if necessary) and bolt the whole unit back into position.

Fan Maintenance

The fan motor has greased-for-life bearings and so requires no maintenance.

If used in very dusty conditions:

- take off the cooling fan protection cover
- clean the fan blades and the rear section of the motor
- replace the protection cover.



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Technical Training

The Ideal Boilers Technical Training Centre offers a series of first class training courses for domestic, commercial and industrial heating installers, engineers and system specifiers. For details of courses please ring: 01482 498 432

CERTIFIED PRODUCT
Manufactured under a BS EN ISO 9001: 1994 Quality System accepted by BSI

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