

The Concord CXC 48/116

Natural gas condensing boiler 48kW to 116kW



COMPLIES
WITH
BUILDING
REGULATIONS
2000

i Ideal BOILERS

Commercial products technical data

Keeping a lid on fuel bills is a top priority for every commercial building owner. Condensing boiler technology offers a proven route to lower energy costs. Backed by our 90 years experience at the leading edge of boiler technology our latest generation of fully condensing atmospheric gas boilers are designed to attain the highest levels of efficiency.

“The ultimate in fuel efficient commercial heating”

- *Fully condensing high efficiency
85% at 80°C flow, 93% at 60°C flow*
- *Compact, space saving design*
- *Fully automatic ignition*
- *High/low operation*
- *Unique electronic controls*
- *High efficiency robust cast iron primary heat exchanger*
- *Top mounted aluminium secondary heat exchanger*
- *Integral low NOx design*
- *Easy to install and service*
- *Proven reliability*
- *Striking new appearance*

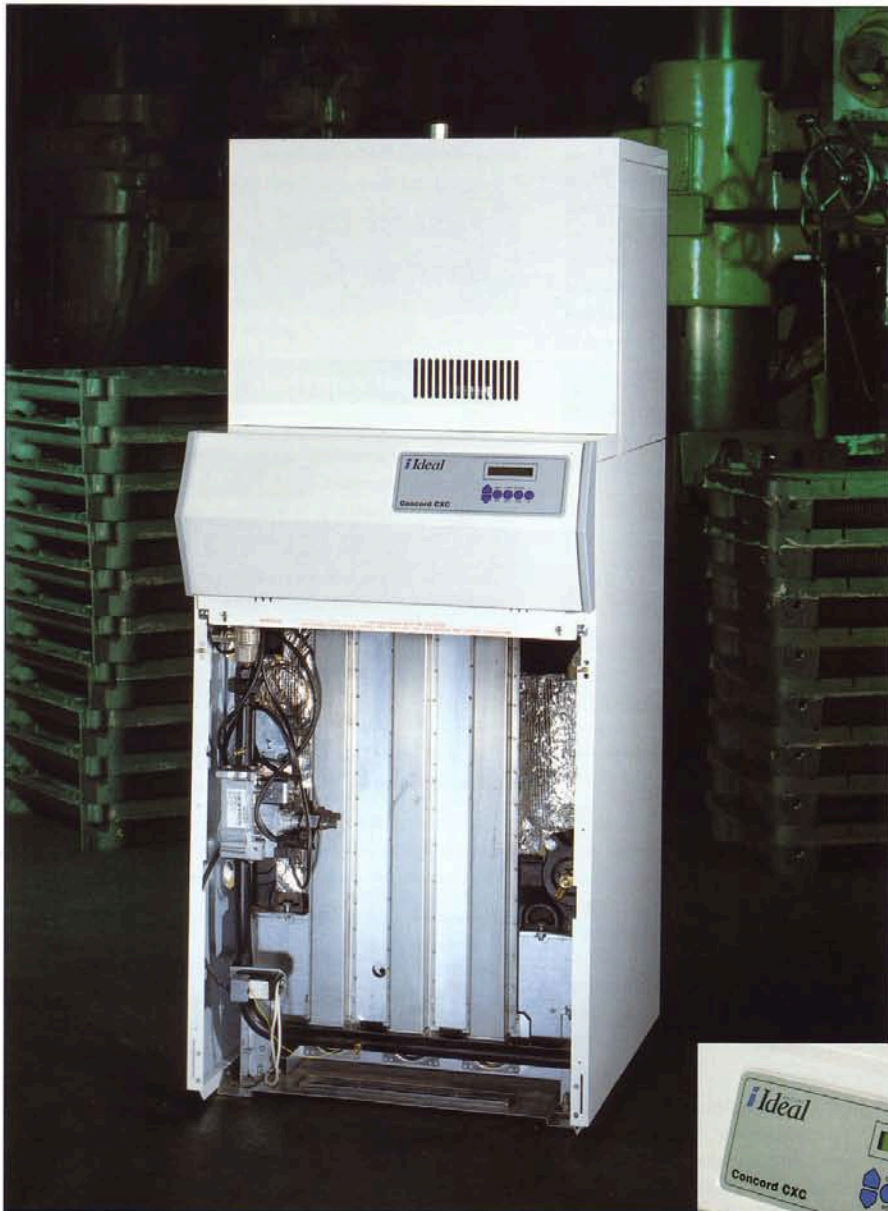
The new Ideal Concord CXC 48/116 range builds on the strengths of the recently launched Ideal Concord CXD 40/100. It incorporates the re-designed cast iron heat exchanger, the toughest, most reliable, and most efficient in production. An integral low NOx design for reducing harmful flue gas emissions. Fully automatic ignition and high/low operation for improved performance. The CXC 48/116 incorporates a “user friendly” electronic control system featuring a simple to understand LED panel. This system offers touch button flow temperature control, full fault finding diagnostics, and a pump overrun facility to enhance the boiler’s already high

High performance without the hassle

fuel efficiency and operating performance even further. The CXC 48/116 also includes a whole host of design changes, making boiler installation and servicing the simplest yet.

Compact in design, the CXC 48/116 has its secondary aluminium heat exchanger mounted above the primary boiler body. Full condensing efficiency in the minimum floor space. Available in a choice of four natural gas versions – 48, 68, 92, and 116 kW outputs. The new Ideal Concord CXC 48/116. Optimum, high efficiency performance with the minimum of hassle.





The Concord CXC



Control panel



Conforms with all relevant European standards and requirements

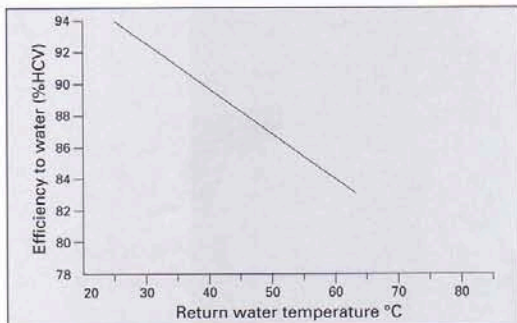
BOLLERS

Ideal



Performance

Tested and certified by British Gas to pr EN656, the new European Standard governing safety and performance of Commercial/Industrial gas boilers, the CXC offers high efficiency performance. At its heart, the CXC has re-profiled heat exchanger fins and a re-aligned distribution tube to produce better heat transfer. The efficiency of the Ideal Concord CXC range of boilers is related to the return water temperature of the boiler. This graph shows that, in order to achieve maximum efficiency at any given load, the system controls should be used in a manner which maintains the lowest return temperature commensurate with system performance and cost. The graph is based on 20°C temperature difference across the boiler.



Construction

The Ideal Concord CXC boiler consists of two basic parts: a conventional Ideal Concord CXD boiler plus an additional heat exchanger. The CX boiler body is constructed from cast iron sections insulated by a foil backed fibreglass blanket. This is mounted on an insulated sheet steel combustion chamber. A combined flue collector hood and condensate sump is fitted on top of this heat exchanger and is manufactured from stainless steel. This supports the secondary heat exchanger which is constructed from aluminium finned tubes with aluminium and cast iron headers.

Between the primary and secondary heat exchanger an induced draught fan is fitted capable of overcoming the resistance of a significant length (up to 30 metres) of 150mm flue pipe. The boiler is supplied with header pipework between the primary and secondary heat exchanger. Within this pipework, a 'shunt' pump is provided to ensure an adequate flow through the primary heat exchanger, independently of the system pump. This pump also ensures that a sufficient temperature is maintained in the primary heat exchanger to prevent corrosion. The combined boiler bodies are enclosed in a white, stove enamelled casing which incorporates a control panel fascia.

The casing is specially designed to ensure easy access for both servicing and cleaning of both heat exchangers. The Ideal Concord CXC is provided with Rc 2 flow and return connections at the rear of the boiler.

Note: Loose sections, individual components and sub-assemblies for site assembly of the boiler can be supplied to special order.

Gas controls

The gas control consists of two class B valves. High/low operation is offered as standard together with direct burner ignition. The safety device consists of a flame rectification system sensing the burner flame.

*Tested and certified by
British Gas to pr EN656*

Electrical controls

The CXC incorporates an advanced microprocessor based control system which operates all electrical functions of the boiler including ignition, flame detection, thermostatic control, and high/low operation. In addition, the microprocessor has onboard servicing and commissioning instructions and a fault diagnosis program.

*The most advanced
boiler control*

As with the Ideal Concord CXD, the electronic control thermostat can be adjusted to operate up to 95°C (203°F).

The illuminated LCD display gives a continual read-out of the boiler status and functions, but in the unlikely event of a fault condition, will display the fault areas.

Other features of the control are as follows:

- On/standby button
- LCD illuminated display
- Adjustable boiler temperature
- Programmer/timer (7 days 3 on/off periods)
- Weather compensation (optional)
- Commissioning/servicing instructions
- Fault diagnostics
- Hours run log
- Pump overrun
- Anti-cycle device
- Time, day, date display
- Frost protection (boiler only).

Option kits

Remote indication board (volt free)

This provides the ability for remote indication of alarm and run conditions.

Outside sensor

This allows the weather compensation feature on the boiler to be used.



Duty

The CXC boiler provides central heating and indirect hot water for a range of systems.

Open Vented Systems

All boiler sizes:

- Combined pumped domestic hot water and pumped central heating
- Pumped central heating only
- Pumped domestic hot water only systems.

Pressurised Or Sealed Systems

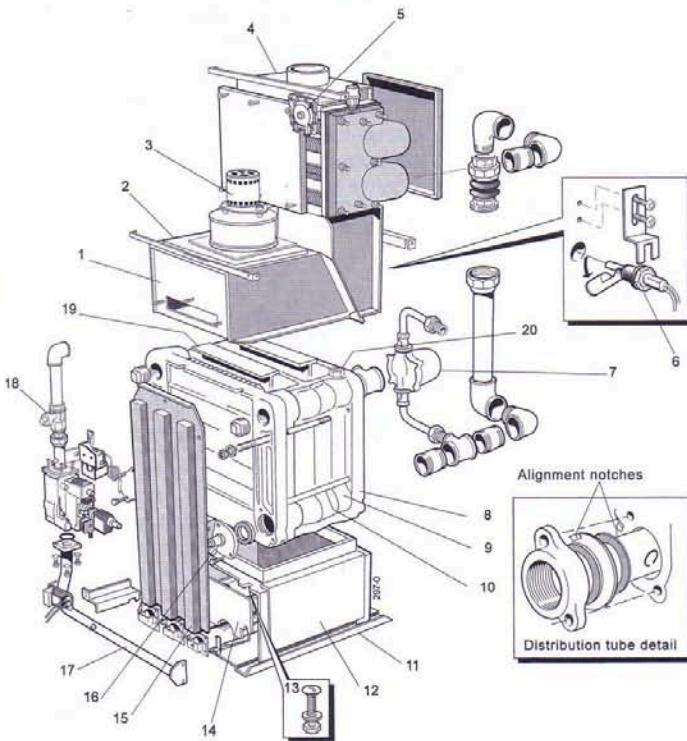
Fully pumped systems as above.

Note: The CXC is not suitable for direct hot water supply or gravity heating/hot water systems.

Thermostat pockets

It is essential that the phial pockets for the electronic thermostat and the high limit thermostat are fitted to the 1/2" BSP tapped holes in the top rear section and are positioned strictly in accordance with information provided in the Installation and Servicing Instructions supplied with the boiler.

Boiler assembly



1. Collector hood
2. Cleanout cover
3. Fan
4. Secondary heat exchanger
5. Air pressure switch
6. Float switch (shown inset for detail)
7. Pump
8. End section
9. Middle section
10. Tie rod
11. Base tray (heat shield)
12. Combustion chamber
13. Section bolt
14. Front plate
15. NOx assembly
16. Drain cock
17. Gas control
18. Gas cock
19. Baffle
20. Thermostat pocket
Distribution tube
(shown inset for detail)

Quality

All boilers are manufactured to the highest standards of quality at our Hull production facility. World class manufacture is carried out to meet all relevant standards.

ISO 9001: 1987

EN 29001: 1987

BS 5750: Part 1: 1987

Industrial classification 3284

*Assurance
of Quality*

Packing

Factory assembled boilers are dispatched from the works in three packages mounted on a wooden base:

- Assembled boiler body crated on a wooden pallet
- Carton containing the casing, fastenings, flue brush, and instruction book
- Carton containing the upper front panel/control box

Note: Loose sections and platework for site assembly can be supplied to special order.



System design

The water efficiency of this range of boilers is higher than conventional boilers, at any water temperature, because of the increased heat exchange area.

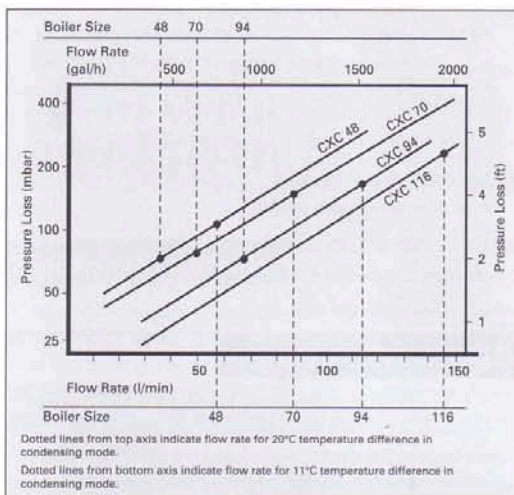
At return temperatures of 55°C and below the differences become more marked because the water in the flue gases starts to condense releasing its latent heat. In general, the lower return temperature (down to its minimum temperature of 35°C to protect the primary heat exchanger) the better the water efficiency.

In new systems it is best to design for the lowest flow and return temperatures that are practical (subject to the lower limit mentioned above). Of course, the lower the mean water temperature the greater must be the heating surface area.

See outer back cover for system design notes.

Pump selection

The choice of pump should take account of hydraulic resistance given in the graph below.



Open systems

Maximum static head 45.7 metres

The CXC range has a minimum static head requirement of 4 metres (8' approx) depending on the particular characteristics of the system design (see diagram).

The information provided is based on the following assumptions:

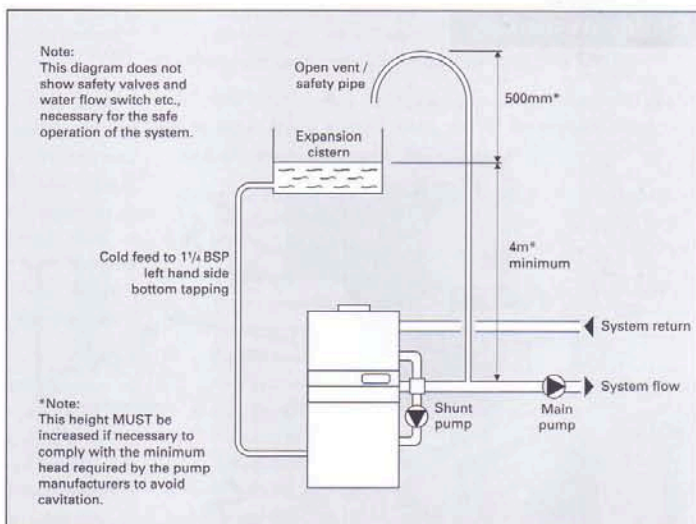
- An independent open vent/safety pipe connection is made to the redundant boiler flow tapping or is positioned immediately after the system flow-pipe connection to the header, as shown.

- An independent cold feed/expansion pipe connection is made to the redundant boiler return tapping. Cold feed/expansion pipe connections made to the system return will create an increase in static head requirements, brought about by the additional resistance of the distributor tube. Surging may also increase.

- The maximum flow rate through the boiler is based on a temperature difference of 11°C (20°F) at full boiler output with the circulating pump positioned in the flow of the system.

- The boiler is at the highest point of circulation in the system. Systems designed to rise above the flow tappings will, of course, automatically require a minimum static head higher than shown.

- The position of the open vent/safety pipe above the expansion cistern water level is given as a guide only. The final position will depend upon particular characteristics of the system. Pumping over of water into the expansion cistern should be avoided.



Cold Feed/Open Vent

The independent cold feed and the open vent must comply with BS 6644 and be of the following minimum size:

Boiler size	Cold Feed	Open Vent
CXC 48	3/4"	1"
CXC 68 - 116	1"	1 1/4"



Sealed (pressurised) systems

Maximum working pressure 4.5bar

Particular reference should be made to BS 6644: Section 2; Subsection 11 and Guidance note PM5 "Automatically controlled steam and hot water boilers" published by the Health and Safety Executive.

The information and guidance given below is not intended to override any requirements of either of the above publications or the requirements of the Local Authority, gas or water undertakings.

In general, commercial closed pressurised systems are provided with either manual or automatic water make up.

In both instances it will be necessary to fit automatic controls intended to protect the boiler circulating system and ancillary equipment by shutting down the boiler plant if a potentially hazardous situation should arise.

Examples of such situations are low water level and operating pressure or excessive pressure within the system. Depending on circumstances, controls will need to be either manual or automatic reset. In the event of shut down, both visual and audible alarms may be necessary.

Pressure vessels used must comply with BS 4814 and must be sized on the basis of the total system volume and initial charge pressure.

Initial minimum charge pressure should not be less than 0.5 bar (7.2psi) and must take account of static head and specification of the pressurising equipment. The maximum water temperatures permissible at the point of minimum pressure in the system is specified in Guidance Note PM5.

When make up water is not provided automatically it will be necessary to fit controls which shut down the plant in the event of the maximum system pressure approaching to within 0.35bar (5psi) of the safety valve setting.

Other British Standards applicable to commercial sealed systems are:

- BS 6880: Part 2
- BS 1212
- BS 6281: Part 1
- BS 6282: Part 1
- BS 6283: Part 4

Minimum water flow

System design must allow for adequate internal circulation and sufficient heat release from the boiler body whenever the burner is firing or during pump overrun. See flow rate table

below for details. Additionally, the system must be controlled so that part of the load is available during the pump overrun period to dissipate heat.

Model		CXC 48	CXC 70	CXC 94	CXC 116
Normal Water Flow Rate Temperature Difference 11°C (20°F)	l/s	1.04	1.52	2.03	2.52
	gal/m	13.7	19.9	26.8	33.2
Minimum Water Flow Rate Temperature Difference 30°C (54°F)	l/s	0.37	0.54	0.72	0.90
	gal/m	4.9	7.2	9.6	11.9



Installation

For safety, a competent CORGI (Council for the Registration of Gas Installers) registered installer must fit this appliance. CORGI requires its members to work to satisfactory standards.

Boiler installation should comply with relevant British Standard Specifications, Codes of Practice, and current Building Regulations, together with any special regional requirements of the Local Authorities, Gas Supplier, and Insurance Company, and in particular:

CP 331.3 low pressure installation pipes, BS 6644 Installation of Gas Fired Boilers, CP 341 300-307 Central Heating by low pressure hot water, CP 342.2 Centralised hot water supply, British Gas publications IM/II Flues for commercial and industrial gas fired boilers and air heaters.

All electrical wiring must comply with IEE Regulations for the electrical requirement of buildings.

Manufacturer's notes must not be taken as overriding statutory obligations.

Simple to assemble condensing "top box"

Minimum clearances from walls or other fixed objects to allow for installation, maintenance, the free access of combustion air, and correct functioning of the draught diverters are shown in the boiler clearance diagram.

Foundation

The boiler must stand on a non-combustible floor (ie concrete or brick). This surface must be flat, level, and of a suitable load bearing capacity to support the weight of the boiler (when filled with water) and any ancillary equipment. If the boiler is mounted on a plinth, the dimensions must exceed the plan area of the boiler by at least 75mm (3") on each side.

Gas

If there is any doubt concerning the capacity of the gas meter, available gas pressure, adequacy of existing pipes, or the size required for new service pipes, contact the gas supplier for advice. Installation pipework should be fitted and tested for gas soundness in accordance with CP 331.3. The local gas supplier must be consulted if a gas pressure booster is needed.

Ventilation

Safe, efficient, and trouble-free operation of conventionally flued gas boilers is vitally dependent on the provision of an adequate supply of fresh air to the room in which the appliance is installed.

Ventilation by grilles communicating directly with the outside air is required at both high and low levels. The minimum free areas of these grilles must be according to the scale below. The use of an extractor fan in the same room as the boiler (or in an adjacent room in communication) can, in certain conditions, adversely affect the safe operation of the boiler. Where such a fan is already fitted, or if an extractor fan is likely to be installed at a later date, then the advice of the gas supplier should be obtained. Tests for spillage of products from the draught diverter when the extractor fan is running and all doors and windows are shut should be carried out after installation. If spillage is detected, the area of permanent ventilation must be increased.

Total gross input rating of boilers	Position of air vents	Air vent areas (Air direct from outside)
Up to 2 MW	High Level	270 cm ² plus 2.25 cm ² per kW in excess of 60 kW total rated input
Up to 2 MW	Low Level	540 cm ² plus 4.5 cm ² per kW in excess of 60 kW total rated input



Flue systems

To ensure safe and satisfactory operation, the boiler must be connected to a chimney system capable at all times of adequately evacuating the combustion products (see performance data table on page 10 for approximate volumes).

The flue design recommendations contained in BS 6644 should be strictly observed.

A 150mm (6") flue must be provided in stainless steel or material of equivalent corrosion resistance. Flue insulation is not required but all joints must be impervious to condensate leakage.

Integral fan

The CXC is supplied complete with an integral fan, which is fully matched to the boiler in each case to provide correct combustion air flow. The power of this fan is such that there is a large reserve of pressure available to overcome a significant length of the flue without affecting the combustion performance of the boiler. The pressure available at the base of the flue to overcome flue resistance is 0.25 mbar (0.1 w.g.). This is sufficient to overcome the resistance of approximately 30 metres of 150mm diameter smooth, straight flue pipe.

NO additional diverter, stabiliser, or draught break should be installed in the chimney system without prior consultation with Caradon Ideal.

Condensate drain

The Ideal Concord CXC boiler will produce condensate whenever the temperature of the return water from the system is below approximately 55°C (the dew point of the combustion products).

Natural Gas condensate is mildly acidic with a pH value of about 4 and therefore corrosion resistant materials must be used in the construction of the condensate drain. Standard PVC pipe is suitable for this purpose and should be connected to the plastic drain fitted on the boiler.

The condensate drain should include a trap and may be led directly into the normal drainage system. The pipe should be installed with an adequate slope (eg 1 in 50) and consideration should be given to frost protection.

Water treatment

Water contained in all heating and indirect hot water systems, particularly open vented systems, requires basic treatment. It is wrong to assume that because boilers are operating in conjunction with what is an apparently closed circuit, an open vented system will not under normal circumstances allow damage or loss of efficiency due to hardness salts and corrosion once the initial charge of water has been heated several times. One millimetre of lime reduces the heat conversion from flame via metal to water by 10%. In practice the accumulation of these salts is liable to cause noises from the boiler body or even premature boiler failure. Corrosion and the formation of black iron oxide sludge will ultimately result in premature radiator failure.

Open vented systems are not completely sealed off from the atmosphere because it is necessary to provide a tank open to atmosphere if proper venting and expansion of system water is to be achieved. The same tank is used to fill the system with water and it is through the cold feed pipe that system water expands into the tank when the boiler passes heat into the system. Conversely, when the system cools, water previously expanded is drawn back from the tank into the system together with a quantity of dissolved oxygen.

Even if leakage from the heating and hot water system is eliminated there will be evaporation losses from the surface of the tank. Depending on ambient temperature these may be high enough to evaporate a large portion of the system water capacity over a full heating season.

Corrosion will always occur within a heating/hot water system to a greater or lesser degree irrespective of water characteristics, unless the initial fill water from the mains is treated. Even the water in closed systems will promote corrosion unless treated.

For these reasons, Caradon Ideal strongly recommends that when necessary the system be thoroughly cleaned prior to the use of a stable inhibitor which does not require continual topping up to combat the effects of hardness, salts, and corrosion on the heat exchanger of the CXC and its associated systems.

Because the secondary heat exchanger is constructed from aluminium, extreme care should be taken in the selection of any water treatment or cleaning chemicals used. The selection of an unsuitable chemical treatment can seriously affect the life of this appliance.

The company advises direct contact with major water treatment specialists such as Betz Dearborn Ltd, Sentinel Division, Widnes, Cheshire, WA8 8UD Telephone: 0151 495 1861 or Fernox Manufacturing Company Ltd, Britannica Works, Clavering, Essex, CB11 4QZ Telephone: 01799 550811.



Performance data

Model		CXC 48	CXC 70	CXC 94	CXC 116	
No. of sections		3	4	4	5	
Boiler input, low rate	gross	kW	31.5	45.06	60.42	75
		Btu/h	107,500	153,700	206,200	255,900
	nett	kW	28.4	40.6	54.44	67.58
		Btu/h	96,900	138,500	185,800	230,600
Boiler input, high rate	gross	kW	52.5	75.1	100.7	125
		Btu/h	179,100	256,200	343,600	426,500
	nett	kW	47.3	67.67	90.73	112.6
		Btu/h	161,400	230,900	309,600	384,200
Boiler output, high rate condensing	kW	48.83	69.84	93.65	116.25	
	Btu/h	166,600	238,300	319,500	396,600	
Boiler output, high rate non-condensing	kW	44.63	63.84	85.6	106.3	
	Btu/h	152,300	217,800	292,100	362,700	
*Gas rate	m ³ /h	4.4	7.0	9.4	11.6	
	ft ³ /h	172	247	331	411	
Approx flue gas volume (non condensing), high rate	8.0% CO ₂ & 60°C m ³ /s	0.023	0.033	0.045	0.056	
	8.0% CO ₂ & 104°F ft ³ /m	49	70	95	119	
Manifold setting pressure, low rate	mbar	3.9	3.9	3.8	4.1	
	in.w.g.	1.6	1.6	1.5	1.6	
Manifold setting pressure, high rate	mbar	11.7	11.8	10.7	12.1	
	in.w.g.	4.7	4.7	4.3	4.8	

*Note: The gas rates quoted are for NATURAL GAS and assume a C.V. of 38.7 (MJ/m³). The gas rate at calorific values differing from that figure may be calculated by dividing the calorific value of the gas into the figure given in the 'GROSS INPUT' column of the table above.

General data

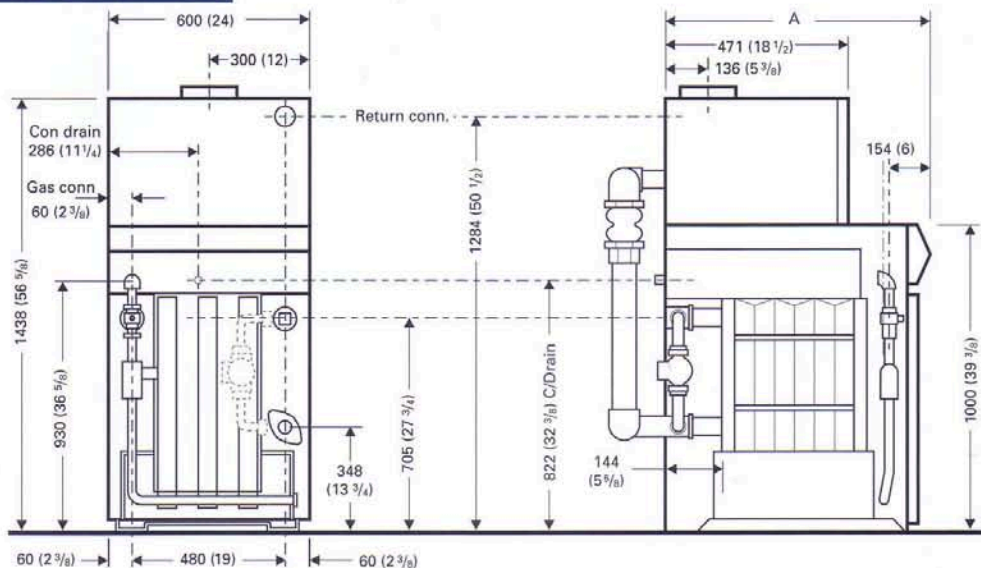
Model		CXC 48	CXC 70	CXC 94	CXC 116
No. of sections		3	4	5	6
Flow tappings	Rc	2 - 1 at rear	2 - 1 at rear	2 - 1 at rear	2 - 1 at rear
	in. BSP	2 - 1 at rear	2 - 1 at rear	2 - 1 at rear	2 - 1 at rear
Return tappings	Rc	2 - 1 at rear	2 - 1 at rear	2 - 1 at rear	2 - 1 at rear
	in. BSP	2 - 1 at rear	2 - 1 at rear	2 - 1 at rear	2 - 1 at rear
Maximum static water head	m	45.7	45.7	45.7	45.7
	ft	50	50	50	50
Maximum pressure	bar	4.5	4.5	4.5	4.5
	psi	65	65	65	65
Gas inlet connection	Rc	3/4	3/4	3/4	1
	in. BSP	3/4	3/4	3/4	1
Min. dynamic gas pressure required at the boiler inlet for the rated input	mbar (gauge)	15.0	15.0	16.2	15.0
	in.w.g.	6.0	6.0	6.5	6.0
Electricity supply		230 Volts - single phase 50 Hz fuse 5 A			
Nominal flue size (to BS 835)	mm	152	152	152	152
	in	6	6	6	6
Diverter outlet socket internal diameter	mm	154	154	154	154
	in	6 1/16	6 1/16	6 1/16	6 1/16
Length of burner bars (overall)	mm	377	497	497	617
	in	14.8	19.5	19.5	24.3
Main burner injectors	No. off	3	3	3	3
	size (mm)	3.4	4.12	4.86	5.3
Overheat thermostat		LANDIS & GYR RAK 21.4/3602			
Gas control (Honeywell)		1 x VR 4605 PB		1 x VR 4605 EB 1007	
		1 x VR 2003 PB		1 x VR 4605 AB 1019	
Approximate dry weight	kg	298	350	442	494
	lb	658	771	974	1090
Water content	l	28	36	43	51
	gal	6.2	8.0	9.5	11.2



Boiler control specification

Electricity supply	230V, 50Hz fuse 5A
Ignition	Five attempts followed by non-volatile lock-out
Gas valve	High/low and Off
Gas safety time	Maximum of 10 secs with 5 attempts with one min between attempts
Safety check	The control de-energises every four hours to check internal control functions
Pump	Pump overrun operates if the flow temperature is greater than 75°C
Boiler thermostat	The boiler thermostat hysteresis is a maximum of 3°C

Boiler dimensions



Model		CXC 48	CXC 70	CXC 94	CXC 116
'A' Dimension	mm	723	846	969	1092
	in	28 1/2	33 3/16	38 1/8	43

Boiler house clearances

Minimum clearances required from walls or other fixed objects to allow for the free access of combustion air are shown in the table.

However, for maintenance purposes we suggest a minimum rear clearance of 200mm.

Model		CXC 48	CXC 70	CXC 94	CXC 116
At front	mm	750	750	750	750
	in	29 1/2	29 1/2	29 1/2	29 1/2
At rear*	mm	200	200	200	200
	in	8	8	8	8
At side	mm	50	50	50	50
	in	2	2	2	2

*Sufficient clearance should be given at rear of boiler for connection of gas and water pipework

Multiple boiler installations (The minimum installation clearances must conform to the dimensions given above)

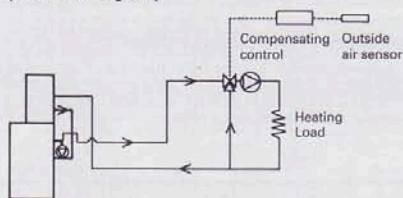
Model		CXC 48	CXC 70	CXC 94	CXC 116
Clearance between boilers	mm	50	50	100	100
	in	2	2	4	4
Clearance at both ends of multiple installation*	mm	50	50	100	100
	in	2	2	4	4

*Additional clearance is required for access at either end of the installation



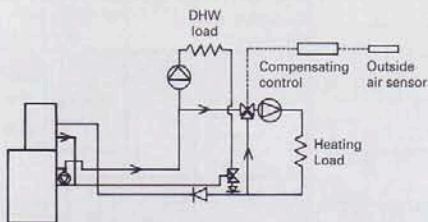
System design notes

Example A - Heating only



Example A shows the pipework arrangement when the boiler is used for heating only, using a conventional compensated mixing circuit where the low temperature return is fed back to the secondary heat exchanger. The flow temperature from the boiler is controlled by the boiler control thermostat which is set to provide water at the maximum design flow temperature of the system.

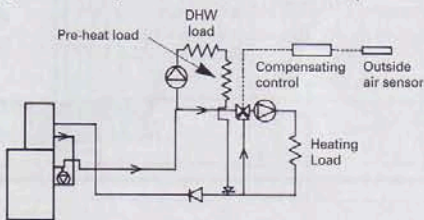
Example B - Heating plus domestic hot water



Example B shows the pipework arrangement required when the boiler is used for heating and domestic hot water. Where a conventionally sized calorifier is used, return temperatures may be significantly higher than the heating return under low load heating conditions. In order to avoid elevating the temperature of the return to the secondary heat exchanger and hence reducing efficiency, it is recommended that the pipework arrangement shown in example B is adopted. This incorporates a three-way valve and a return direct to the primary heat exchanger. In order to prevent isolation of the secondary heat exchanger when there is no flow to the heating circuit, an interlock must be provided to divert the domestic return into the heating return through the secondary heat exchanger.

The control thermostat setting on the boiler must be compatible with the maximum temperature required in either the heating or domestic hot water circuits. Where the domestic hot water load is small in proportion to the total load, the cost of the three-way valve and interlock arrangement may not be justifiable and therefore a system feeding direct to the common return, similar to example C, may be more appropriate.

Example C - Heating and domestic hot water with pre-heat



Example C shows the pipework arrangement which may be used to maximise the efficiency of the boiler when both heating and domestic hot water is required. This system involves the use of a pre-heat calorifier for the domestic hot water supply in addition to the standard unit. This type of system is most appropriate where the domestic hot water load forms a large proportion of the total load or where the heating circuit is designed to run at low temperatures, as it enables the temperature of the returns from each circuit to be closely matched thus minimising any losses of efficiency. The boiler control thermostat setting must be compatible with the maximum temperature requirements of either circuit.

Technical training

The Caradon Plumbing Solutions 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 0870 840 0036.

World Class Manufacturer

Ideal Boilers has been adjudged by IBM Consulting and The London Business School to be a World Class Manufacturer.

Customer care helplines

Helplines are open 7.30am to 6.00pm Monday to Friday. Comm/Ind product enquiries (all UK) please ring 0870 840 0063.

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