

ECOflo

Installation guide, operation and maintenance manual

High Efficiency Condensing Storage Water
Heaters for Natural Gas and Propane (LPG)

EC230/600, EC230/700, EC230/960, EC380/740,
EC380/980, EC380/1220, EC380/1400, EC380/1900

LEC230/600, LEC230/700, LEC230/960, LEC380/740,
LEC380/980, LEC380/1220, LEC380/1400, LEC380/1900



Working towards
a cleaner future





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Andrews Storage Water Heaters have been designed and manufactured to comply with current international standards of safety. In the interests of the health and safety of personnel and the continued safe, reliable operation of the equipment, safe working practices must be employed at all times. The attention of UK users is drawn to their responsibilities under the Health and Safety Regulations 1993.

All installation and service on Andrews Water Heaters must be carried out by properly qualified personnel and, therefore, no liability can be accepted for any damage or malfunction caused as a result of intervention by unauthorised personnel.

Andrews Water Heaters' policy is one of continuous product improvement and, therefore, the information in this manual, whilst completely up to date at the time of publication, may be subject to revision without prior notice.

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**THE ANDREWS WATER HEATERS COVERED IN THIS MANUAL
ARE FOR USE WITH NATURAL GAS OR LPG (PROPANE) GAS ONLY**

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GENERAL AND SAFETY INFORMATION

The Andrews Water Heater has been designed for use with NATURAL GAS OR LPG and is manufactured to give an efficient, reliable and long service life.

To ensure the continued, trouble-free operation of your heater at maximum efficiency, it is essential that correct installation, commissioning, operation and service procedures are carried out strictly in accordance with the instructions given in this manual. By law, installation and commissioning of the heater must be carried out by properly qualified personnel.

The heater(s) must be installed in accordance with the following requirements:

The current GAS SAFETY (INSTALLATION AND USE) REGULATIONS

The current BUILDING REGULATIONS

The WATER SUPPLY (WATER FITTINGS) REGULATIONS 1999

Additionally, installation should be performed in accordance with all relevant requirements of the Gas Supplier, Local Authority and recommendations of the British Standards and Codes of Practice detailed below.

BRITISH STANDARDS AND CODES OF PRACTICE

BS 6700: 1997 Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. This standard supersedes the following British Standards and Codes of Practice: CP99, CP310, CP324, 202, CP342 Part 2, Centralised Hot Water Supply.

BS 5440:1990 Installation of flues and ventilation for gas appliances of rated output not exceeding 60kW.

Part 1 Specification for installation of flues.

Part 2 Specification for installation of ventilation for gas appliances.

BS 5546:1990 Installation of gas hot water supplies for domestic purposes.

BS 6891 Installation of low pressure gas pipework of up to 28mm in domestic premises.

BS 6644 Installation of gas fired water boilers of rated inputs between 60kW and 2mW

BS 7206:1990 Specification for unvented hot water storage units and packages.

I/M2 Purging procedures for non-domestic gas installations.

I/M5 Soundness testing procedures for industrial and commercial gas installations.

I/M11 Flues for commercial and industrial gas fired boilers and air heaters.

I/M16 Notes on installation of gas pipework (excluding 25mm and below).

LPGA Code of practice 7:

Storage of full and empty LPG cylinders and cartridges. Highly Flammable Liquids and Liquid Petroleum Gases Regulations 1972.

IGE/UP/10 Part 1 Edition 2:

Installation of Gas Appliances in Industrial and Commercial Premises.

Terms:

- a. Andrews Water Heaters accepts no liability for any damage resulting from failing to accurately follow the instructions.
- b. When replacing parts during maintenance, only original parts from Andrews Water Heaters should be used; these can be recognised by the name of the manufacturer printed on them.

HEALTH AND SAFETY REGULATIONS 1993

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

Andrews Water Heaters should only be used in the manner and purpose for which they are intended and in accordance with the instructions in this manual. Although the heaters have been manufactured with paramount consideration to safety, certain basic safety precautions highlighted in this manual must be observed by the user.

It is imperative that all users of the heaters must be provided with all the information and instruction necessary to ensure correct and safe operation.

EFFECTIVENESS IN COMBATING LEGIONELLA

Water systems in buildings have been associated with outbreaks of Legionnaires' Disease, particularly in health care facilities where occupants are significantly more susceptible to infection.

In recognition of the risks in hospitals, a Code of Practice for the Control of Legionella in Health Care premises has been issued by the Department of Health (1991). Codes of Practice applicable to other premises have been published by other organisations, principally the Health and Safety Executive (HS)(G70) and the Chartered Institute of Building Services Engineers (CIBSE, TM13).

All Codes of Practice draw attention to the design and operation of water systems with reference to avoidance of factors that favour colonisation by Legionella bacteria. These factors include stagnation, lukewarm conditions (20°C to 45°C) and the accumulation of debris, scale and corrosion in the base of tanks and calorifiers.

Andrews Water Heaters have commissioned an independent evaluation of their products to investigate their resistance to build-up of Legionella bacteria.

Experiments were conducted to determine whether, following a substantial challenge by legionella pneumophila. After overnight and stagnation, the system was rendered free from viable recoverable legionella. It was found that at 61°C, following a challenge of approximately 107 organisms per litre, within one hour, more than 99.999% of organisms had been killed. After a subsequent stagnation period, sampling did not reveal any residual contamination. The design of the base of the water heater precludes legionella colonisation, even after build-up of debris. The burner positioning ensures that the water at the bottom of the heater reaches the same, or higher, temperatures as in the rest of the heater.

Based on data obtained through experiment, the Andrews Water Heater can be described as legionella resistant as it is considered unlikely that, at the temperature tested, the organism would colonise the water heater and present a possible health risk.

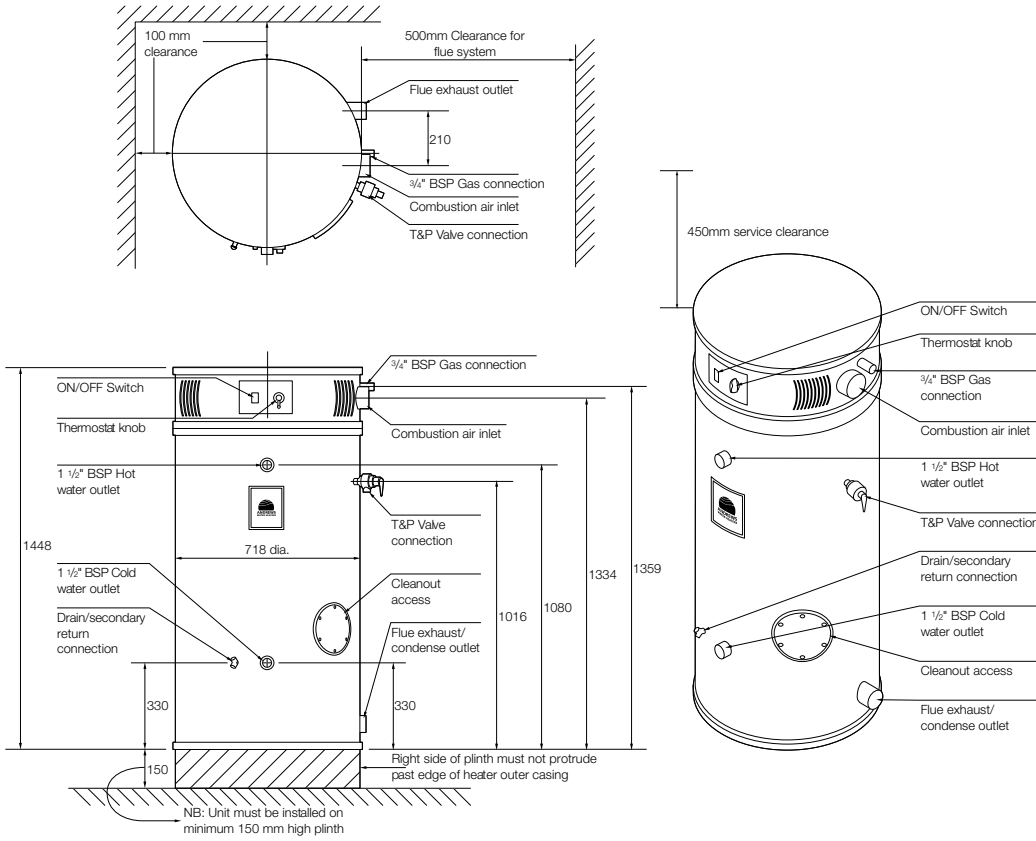
TECHNICAL DETAILS

Model Reference – Natural Gas	EC230/600	EC230/700	EC230/960	EC380/740	EC380/980	EC380/1220	EC380/1400	EC380/1900
Natural gas, category I ²H								
Gas consumption G20	3.41m ³ /h	4.09m ³ /h	5.43m ³ /h	4.09m ³ /h	5.43m ³ /h	6.82m ³ /h	7.92m ³ /h	11.33m ³ /h
Heat input gross	36.6 kW	43.9 kW	58.3 kW	43.9 kW	58.3 kW	73.2 kW	85.0 kW	118.7 kW
Heat output	35.1 kW	41.3 kW	54.2 kW	43.0 kW	57.1 kW	71.0 kW	79.1 kW	116.0 kW
Supply pressure	20 mbar	20 mbar	20 mbar	20 mbar	20 mbar	20 mbar	20 mbar	20 mbar
Gross thermal efficiency (NG)	96%	94%	93%	98%	98%	97%	93%	94%
Model Reference – Propane	LEC230/600	LEC230/700	LEC230/960	LEC380/740	LEC380/980	LEC380/1220	LEC380/1400	LEC380/1900
Propane, category I ³P								
Gas consumption G31	1.39m ³ /h	1.67m ³ /h	2.22m ³ /h	1.67m ³ /h	2.22m ³ /h	2.78m ³ /h	3.12m ³ /h	4.46m ³ /h
Heat input gross	36.6 kW	43.9 kW	58.3 kW	43.9 kW	58.3 kW	73.2 kW	85.0 kW	117.2 kW
Heat output	35.1 kW	41.3 kW	54.2 kW	43.0 kW	57.1 kW	71.0 kW	79.1 kW	111.2 kW
Supply pressure	37 mbar	37 mbar	37 mbar	37 mbar	37 mbar	37 mbar	37 mbar	37 mbar
Gross thermal efficiency (propane)	96%	94%	93%	98%	98%	97%	96%	94%
Technical details (Natural Gas & Propane)								
NO _x Level	25ppm	25ppm	25ppm	25ppm	25ppm	25ppm	25ppm	25ppm
	44mg/kW	44mg/kW	44mg/kW	44mg/kW	44mg/kW	44mg/kW	44mg/kW	44mg/kW
Noise level (a)	51dBA	51dBA	51dBA	51dBA	51dBA	51dBA	51dBA	51dBA
Recovery rate thru' 50°C	600 ltrs/hour	700 ltrs/hour	960 ltrs/hour	740 ltrs/hour	980 ltrs/hour	1220 ltrs/hour	1400 ltrs/hour	1900 ltrs/hour
Storage recovery time @ 50°C rise	23 mins	20 mins	14 mins	31 mins	23 mins	19 mins	16 mins	12 mins
Concentric flue size (b)	100/150mm	100/150mm	100/150mm	100/150mm	100/150mm	100/150mm	100/150mm	100/150mm
Maximum flue run (concentric) (b)	16 metres	16 metres	16 metres	16 metres	16 metres	16 metres	16 metres	16 metres
Cold inlet water connection	1½"BSP	1½"BSP	1½"BSP	1½"BSP	1½"BSP	1½"BSP	1½"BSP	1½"BSP
Hot outlet water connection	1½"BSP	1½"BSP	1½"BSP	1½"BSP	1½"BSP	1½"BSP	1½"BSP	1½"BSP
Drain port connection	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP
Secondary return connection	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP
Operating pressure (unvented)	3.5 bar	3.5 bar	3.5 bar	3.5 bar	3.5 bar	3.5 bar	3.5 bar	3.5 bar
Maximum working pressure (vented)	10.3 bar	10.3 bar	10.3 bar	10.3 bar	10.3 bar	10.3 bar	10.3 bar	10.3 bar
Maximum test pressure	20.7 bar	20.7 bar	20.7 bar	20.7 bar	20.7 bar	20.7 bar	20.7 bar	20.7 bar
Gas connection (gas cock supplied)	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP	¾"BSP	1"BSP
Electrical supply	230V/50Hz	230V/50Hz	230V/50Hz	230V/50Hz	230V/50Hz	230V/50Hz	230V/50Hz	230V/50Hz
Power consumption	120W	120W	210W	120W	210W	210W	210W	210W
Fuse	5amp	5amp	5amp	5amp	5amp	5amp	5amp	5amp
Weight empty	225kg	225kg	225kg	385kg	385kg	385kg	385kg	385kg
Weight full	450kg	450kg	450kg	760kg	760kg	760kg	760kg	760kg
Shipping weight	259kg	259kg	259kg	408kg	408kg	408kg	408kg	408kg
Shipping dimension – depth	889mm	889mm	889mm	889mm	889mm	889mm	889mm	889mm
Shipping dimension – width	819mm	819mm	819mm	819mm	819mm	819mm	819mm	819mm
Shipping dimension – height	1664mm	1664mm	1664mm	2197mm	2197mm	2197mm	2197mm	2197mm

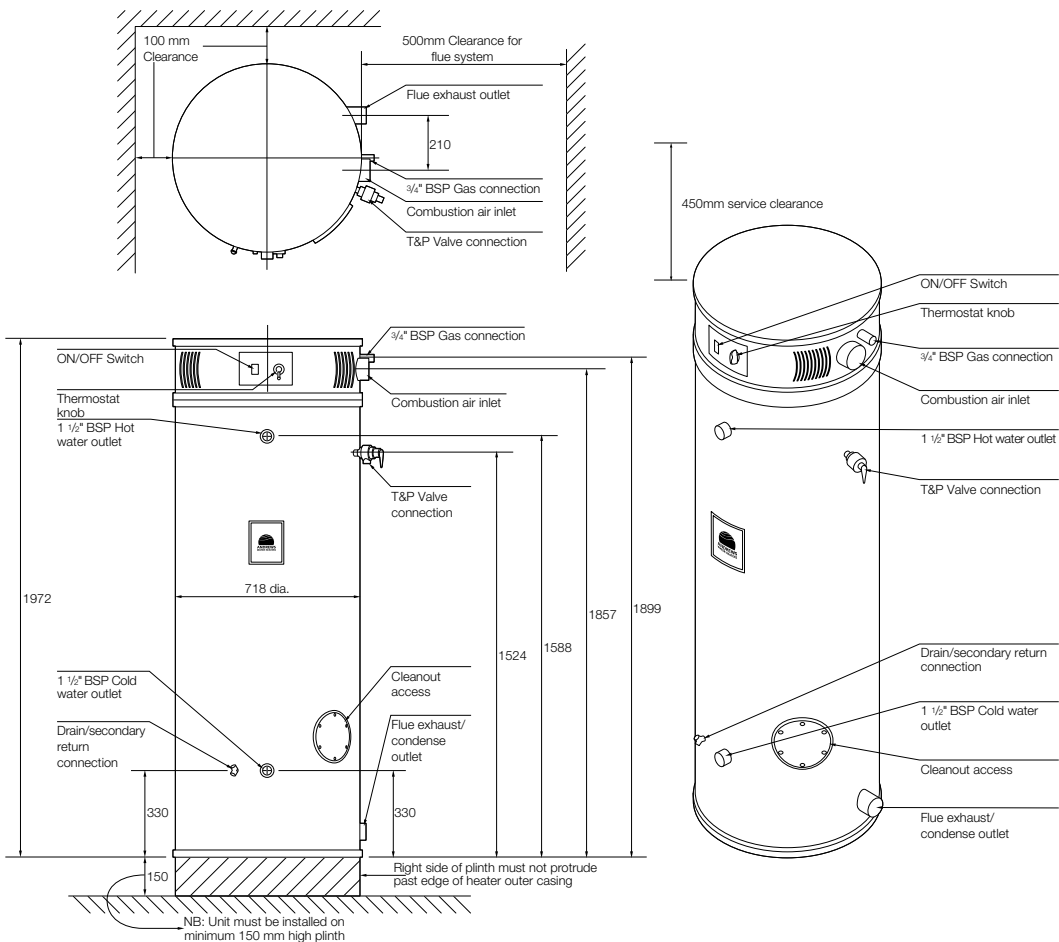
(a) Noise level measure at 2m from flue terminal.

(b) Reduce flue length by 1.2m for 90° bend, 0.7m for 45° and 1.5m for condense trap.

ECOFLO MODELS EC230/600, EC230/700, EC230/960



ECOFLO MODELS EC380/740, EC380/980, EC380/1220, EC380/1400, EC380/1900



INSTALLATION

INTRODUCTION

THE LAW REQUIRES THAT INSTALLATION IS CARRIED OUT BY A PROPERLY QUALIFIED PERSON

Installations must be carried out in accordance with Gas Safety (Installation and Use) Regulations 1998, Building Regulations, The Water Supply (Water Fittings) Regulations 1999 and any requirements of the local Gas Supplier, Local Authority, Water and Fire Authorities and the current British Standards and Codes of Practice listed in Section 1.

LOCATION

The location selected for installation of the water heater must allow the provision of a satisfactory flue, adequate air supply, drain facilities and must be well illuminated.

A purpose built boiler room or compartment is strongly recommended.

A manual valve for isolation of the plant room should be installed in the gas supply; it should be clearly identified and readily accessible for use at all times.

If a purpose built plant room is not available, measures should be taken to protect the water heater from damage and prevent any extraneous matter from being stored on or around the water heater. See BS 6644 Clauses 4, 5 and 6 for details.

The water heater must not be installed in any location which contains a bed, bath or shower. There must be easy access to the plant room and water heater at all times.

The water heater must be located in an area where leakage from the tank, water connections or the combination temperature and safety valve will not result in damage to the area adjacent to the water heater. When such locations cannot be avoided, a suitable drain tray must be installed under the water heater. The drain tray must be no deeper than 38mm (1.5in) and have a minimum length and width of 100mm (4in) wider than the heater. The drain tray must be piped to an adequate drain using 20mm (0.75in) diameter pipe, angled for proper drainage.

Access must be provided around the water heater to provide adequate clearance for its servicing and operation.

The floor and plinth on which the heater is installed must be flat, level and of sufficient strength to withstand the

weight of the heater when filled with water, and should satisfy the requirements of the Local Authority & Building Regulations.

Any combustible material adjacent to the heater must be placed and shielded as to ensure that its temperature does not exceed 66°C (150°F).

All service clearances for the water heater must be maintained as specified in this Installation Manual.

FEATURES

ECOflo is the latest addition to the Andrews range of condensing storage water heaters and is designed for large domestic, commercial and industrial applications.

The high efficiency units incorporate Vitraglas® silica glass lined tanks to provide protection against the corrosive effect of hot water and therefore a longer working life.

The condensing glass-lined ultra high thermal efficiency storage water heater features a low NO_x pre-mix power burner that is quiet in operation, a 98% gross efficiency that keeps running costs to a minimum and flueing arrangements that offer unsurpassed installation flexibility.

ECOflo – A NEW STANDARD IN CONDENSING STORAGE WATER HEATING

The ECOflo range comprises eight models in two storage capacities – 230/380 litres – with heat outputs ranging from 35kW to 79kW and recovery rates of up to 1400 litres/hour through a temperature rise of 50°C.

A thermal efficiency rate of up to 98% gross puts ECOflo at the top of the class and leads to greater economy. In addition to outstanding performance characteristics, all ECOflo models can be flued either vertically or horizontally as room sealed balanced flue appliances, using concentric flue components supplied by Andrews, offering the ultimate in siting and installation flexibility. All models incorporate Correx Powered (maintenance free) Anodes as standard which substantially reduce service time and costs. The factory fitted Hydrojet® sediment reduction system on the cold inlet connection helps to prevent sediment build-up at the base of the tank, giving a longer and more efficient working life.

INSTALLATION

This water heater contains the following features:

MAIN POWER ON/OFF SWITCH

The front panel of this water heater has an illuminated ON/OFF switch, which is lit when the main power is turned on to indicate power to the water heater.

COMBUSTION SYSTEM

The ECOflo is equipped with a self-compensating, negative pressure pre-mix combustion system. As the blower operates, air is drawn in through the air intake and into a venturi, which pulls gas from the gas valve. The gas and air is then mixed in the combustion blower and sent

through the transition tube into the burner. The Hot Surface Ignition System (HSI) then ignites the gas/air fuel mixture to produce the flue products (combustion). The flame sensor signals the ignition module, (described below) that a flame is present.

IGNITION MODULE

The ignition module provides the timing for the combustion system. A sequence of operation (SOP) is described in “Section 5 – Operating Instructions.” As the combustion system progresses through the SOP, LED's illuminate, allowing accurate trouble-shooting should the need arise. If a failure occurs, the system will “blink” the LED that corresponds to the failure as described in the “Section 6 – Troubleshooting Guide.”

ADJUSTABLE THERMOSTAT

The ECOflo is equipped with an adjustable thermostat to control water temperature. Hot water temperatures required for kitchen sinks, sluices, cleaners' sinks and washdown applications can cause scald burns resulting in serious personal injury and/or death.

The temperature may be adjusted from approximately 27°C to 82°C. It is recommended that lower temperatures be used to avoid the risk of scalding. (Refer to the “Warnings” and the section on SCALDING in “Section 3 – Water Connections.”) It is further recommended, in all cases, that the water temperature be set for the lowest temperature, which satisfies hot water needs. This will also provide the most energy efficient operation of the water heater and minimises scale formation.

The top immersion well of the single bulb controller also contains the high limit (energy cut-off) sensor. The high limit switch interrupts the main burner gas flow should the water temperature reach approximately 93°C.

Should the high limit switch activate, it must be manually reset. This can be accomplished by depressing the red button on the control panel once the water temperature of the tank has dropped below 71°C.

Please contact Andrews Water Heaters (details listed on the Data Plate) if continued high limit switch operations occur.

CONDENSATE DRAIN

The ECOflo is a condensing type unit and requires a drain to be located in close proximity to allow the condensate to drain safely. The condensate drains from the unit at the base of the exhaust tee piece located near the bottom of the unit. The exhaust tee is provided with a 32mm dia connection. A condensate siphon is supplied in the flue kit which should be connected to the 32mm connection at the base of the exhaust tee. The siphon outlet must be connected to a 40mm dia OD plastic waste system. If the

condense is allowed to build-up then the exhaust outlet will become blocked and cause improper operation of the water heater. The water heater will need to be raised off the floor, on a concrete slab or base, to utilise a low profile condensate pump to allow free drainage of condensate from the outlet fitting. The condensate plastic drain pipe installation should slope to a suitable drain.

CLEANOUT

All models are equipped with a cleanout opening to aid the removal of hard water deposits from the tank bottom. If this water heater operates under hard water conditions, the following should be performed at least every 3 months: Turn off water supply and drain the water heater. Remove the cleanout jacket cover and tank cover. When cleaning the tank, care must be taken to avoid trying to break deposits loose as this could damage the glass lining and shorten the life of the water heater. After cleaning, re-install the cleanout tank cover and jacket cover, and refill with water. Refer to the section, "Section 6 – Maintenance" in this Installation and Operating Instruction manual for the procedures for filling and draining the water heater.

ELECTRICALLY POWERED ANODES

All models are supplied complete with Andrews' Correx Powered Anode system. The anodes are non-sacrificial and therefore do not require any maintenance or replacement. For this reason, the service clearance required above the water heater can be reduced quite significantly. Correx anodes require a permanent power supply, this is all pre-wired and the anode system can be located at the top of the heater, beneath the top cover.

SERVICE PANEL

The service panel is located behind the service panel access cover, which is located by the exhaust outlet tee piece near the bottom of the water heater. This panel contains a pressure switch to monitor for excess pressure in the exhaust pipe from a blocked vent condition. A collector high limit switch is used to monitor the ambient temperature between the first pass collector and the exhaust collector. This is a manually re-settable switch. If this switch continues to trip, please contact Andrews Water Heaters.

ACCESS LID

Access for servicing the water heater from the top is easy. Remove the two latches and the metal screw at the front centre of the top to remove the lid for accessing the heater controls. The lid must be replaced and re-latched upon completion of servicing.

TECHNICAL DETAIL

Thermal Efficiency up to 98.0% – Fully condensing design.

Three Pass Flue System – The three pass flue system keeps the hot combustion gases moving at a high velocity. The combination of high turbulence and velocity causes an enormous rate of heat transfer into the water.

Low NOx Premix Power Burner – Developed for the ECOflo Range, a turbulent flame shoots down the submerged combustion chamber. This turbulence causes a thorough mixing of the gas and air for optimum combustion and high heat transfer efficiencies.

Submerged Combustion Chamber – Submerging the combustion chamber in the centre of the water storage tank minimizes radiant heat loss and improves efficiency.

Non-CFC foam insulation – Surrounds the tank surface, saving energy by reducing heat loss.

Electronic Controls – Adjustable electronic thermostat 27°-82°C recycling Energy Cut Off (E.C.O) shuts off all gas in event of an overheat condition.

Zero Inch Clearance – The ECOflo external jacket is cool to the touch and is approved for zero inches to combustibles for unsurpassed installation flexibility.

Vitraglas® lined tank – Andrews Water Heater tanks are protected from the corrosive effects of hot water by an exclusive ceramic porcelain-like coating. Our high silica Vitraglas® lining provides a tough interior surface.

Electrically powered anodes – Each ECOflo product is supplied with a factory fitted Andrews Correx Powered Anode system. This significantly reduces service time due to the anodes being maintenance free.

Factory installed Hydrojet® Sediment Reduction System – Cold inlet sediment reduction device made of stainless steel for increased durability. Helps prevent sediment build up in tank.

Factory installed dielectric fittings – All heaters are equipped with special water heater nipples for longer heater life. No special dielectric fittings to buy.

Flexible Venting – The ECOflo range can be flued vertically or horizontally with the Andrews 100/150mm concentric flue pipe system.

The maximum flue run length is sixteen metres from the appliance connector to the terminal.

The overall length is reduced if an elbow or condensate trap is fitted (see below).

Determining required flue length –

1. Determine the total length of straight concentric flue pipe (in metres) required for the installation.
2. Add 1.2 metres of flue for every 90°C elbow.
3. Add 0.7 metres of flue for every 45°C elbow.
4. Add 1.5 metres for condensate trap.
5. Total flue length cannot exceed “Maximum Length” in the above paragraph.

NOTICE: Do not include the flue terminals in determining maximum flue installation length.

Three year limited warranty on storage tank

– Heavy gauge steel automatically formed, rolled and welded to assure a continuous seam for glass lining.

One year limited warranty on parts

IGNITION SYSTEM COMPONENTS

Fenwal 35-655305-121 Hot Surface Ignition Control, CE listed. 3 Trials for Ignition, 15 second pre-purge timing, 15 second igniter heat up time, 4 second trial for ignition, 24 volt input to control.

Omron G2R-1A-T-AC24 relays (VDE listed) used for high voltage switching of hot surface igniter and combustion blower from the 24 volt outputs of the Fenwal control.

Saint Gobain 230 volt hot surface mini igniter.

Honeywell VK8115 gas valve (negative pressure regulator) with matched venturi sizes for mixing gas with combustion air.

EBM RG130 (36-6 and 43-9 kW/hr input sizes) and RG148 (58-3 through 85-0 kW/hr. inputs) pre-mix combustion blowers. 230 volts, 50/60 Hz.

Burner: Acotech (Bekaert Combustion Technology) Pre-mix burner with stainless steel mesh outside knit.

Blocked Vent Pressure Switch: Honeywell IS20378-5770 normally closed pressure switch. Contacts open in the event of a severe blockage of the flue outlet.

THERMOSTAT AND HIGH LIMIT CONTROLS

Honeywell L6189A 2043B aquastat. Temperature adjustment range: Below 40°C to maximum of 82°C (dial stop to limit maximum temperature). Differential set to 4°C Capillary bulb inserts into well in top of tank. Thermostat dial adjustable on top front section of water heater jacket.

Honeywell L6189C 2023 1 High limit control. Set point fixed to 93°C with screw. Mounted to control panel inside control compartment. Capillary bulb inserts into separate well in top of tank. Manual reset control button accessible through clearance hole in control panel.

HEAT EXCHANGER

Burner fires down into 8" diameter flue tube transferring the radiant heat from the burner flame into the tank water.

1st Pass Flue Collector: At the bottom of the tank, a refractory lined heavy gauge flue collector re-directs the flue gases from the 8" flue tube to pass through two 4" diameter flue tubes to the top of the tank.

4" diameter flue tubes have stainless steel baffles to turbulate the flue gases to improve heat transfer.

2nd Pass Flue Collector: At the top of the tank, the flue gases from the 4" flue tubes collect in a heavy gauge steel collector to redirect the flue gases down eight 2" diameter flue tubes.

2" diameter flue tubes are glass lined on the inside as well as outside to prevent corrosion from flue gas condensate. Stainless steel flue baffles inside the 2" flue tubes turbulate the flue gases to aid heat transfer. Flue temperatures are reduced from 260-340°C from the second pass collector to 54°C or less in the flue exhaust.

3rd Pass Collector: The flue gases from the bottom of the 2" flue tubes are collected at the bottom of the tank in a stainless steel flue collector, where the exhaust gases and condensate exit out through a short Stainless Steel pipe extending outside the jacket that connects to the coaxial concentric flue system.

VENTING SYSTEM

A condensate tee with a silicone seal is connected to the plastic exhaust pipe and interfaces with the flue system. The tee connection has a 32mm condensate drainpipe connection to allow the siphon to be fitted. The waste pipe will then be taken from the siphon outlet to drain.

A section of aluminium flue pipe will run to the top of the water heater to connect to the air intake tee.

The intake tee adapts to the concentric flue pipe and has an elbow to connect to the combustion air intake pipe.

The 100/150 mm dia. Andrews' concentric flue pipe will then run to the horizontal or vertical flue terminal.

Maximum concentric flue for this product is 16 metres. Each additional 90° elbow is equivalent to a reduction of 1.2 metres of straight flue pipe.

Each additional 45° elbow is equivalent to a reduction of 0.7 metres of straight flue pipe. If a condensate trap is installed, this is equivalent to a reduction of 1.5 metres of straight flue pipe.

WATER CONNECTIONS

Front hot and cold 1½" BSP (male) water supply connections.

GAS CONNECTIONS

¾" Gas Inlet Nipple for BSP connection to gas supply.
1" Gas Inlet Nipple for BSP connection to gas supply for the EC380/1900 model.

UNPACKING

INSPECT SHIPMENT CAREFULLY FOR ANY SIGNS OF DAMAGE

1. All equipment is carefully manufactured, inspected and packed.
2. Any claims for damage or shortage in shipment must be filed immediately with Andrews Water Heaters as detailed on the warranty card.

LOCATION

Locate water heater in front of final position before removing crate.

1. LOCATE so the flue installation connections will be as short and direct as possible
2. THIS WATER HEATER IS NOT SUITABLE FOR INSTALLATION ON A COMBUSTIBLE FLOOR. Do not install this water heater on carpeting.
3. FOR EVERY INSTALLATION, provide a solid level elevated base such as concrete or other suitable pad to raise the water heater at least 150mm to provide a slope for the condensate waste to run to a suitable drain.
4. Minimum clearance to combustible material is 0" for the Top, Sides and Rear of this water heater. However, it is recommended that at least 450mm from the Top, 600mm from the Front, 100mm from the Left Side and Rear, and 500mm from the Right Side edge of the water heater be provided for servicing and ease of installation. See Section 2, page 5 for diagram. Clearance for servicing may be reduced down to minimum clearance to combustible material, but service time and effort may be greatly increased.

REMOVE CRATE

1. Remove all banding and pry off crate sides carefully so as not to damage the water heater.
2. Carefully roll/lift the water heater from the crate base.

MOVE WATER HEATER TO PERMANENT POSITION

by sliding or walking. Place on plinth/base as detailed previously.

LOCATION

KEEP APPLIANCE AREA CLEAR AND FREE OF COMBUSTIBLE MATERIALS, PETROL AND OTHER FLAMMABLE VAPOURS AND LIQUIDS.

This water heater MUST be installed indoors.

This water heater MUST be located in an area where the general public does not have access.

CHEMICAL VAPOUR CORROSION

Corrosion of the internal flue ways and concentric flue system will occur if air for combustion contains certain chemical vapours. Such corrosion may result in poor combustion and create a risk of asphyxiation, as well as reducing the life of the water heater. Spray can propellants, cleaning solvents, refrigerator and air conditioning refrigerants, swimming pool chemicals, calcium and sodium chloride, waxes and process chemicals are corrosive. Products of this sort should not be stored near the water heater or outside by the air intake (if applicable).

SCALDING

This water heater can deliver scalding temperature water at any outlet in the system. Be careful whenever using hot water to avoid scalding injury. To protect against injury, you should install approved mixing valves in the water system. This valve will reduce point of discharge temperature by mixing cold and hot water in branch supply lines. Such valves are available from your local plumbing supplier.

CAUTION

Do not drop water heater. Do not bump water heater jacket against floor.

Do not bump exhaust flue pipe against crate or other objects. This will damage the heater and cause it to be inoperable or create nuisance problems.

TYPICAL PROPANE BULK STORAGE TANK INSTALLATION

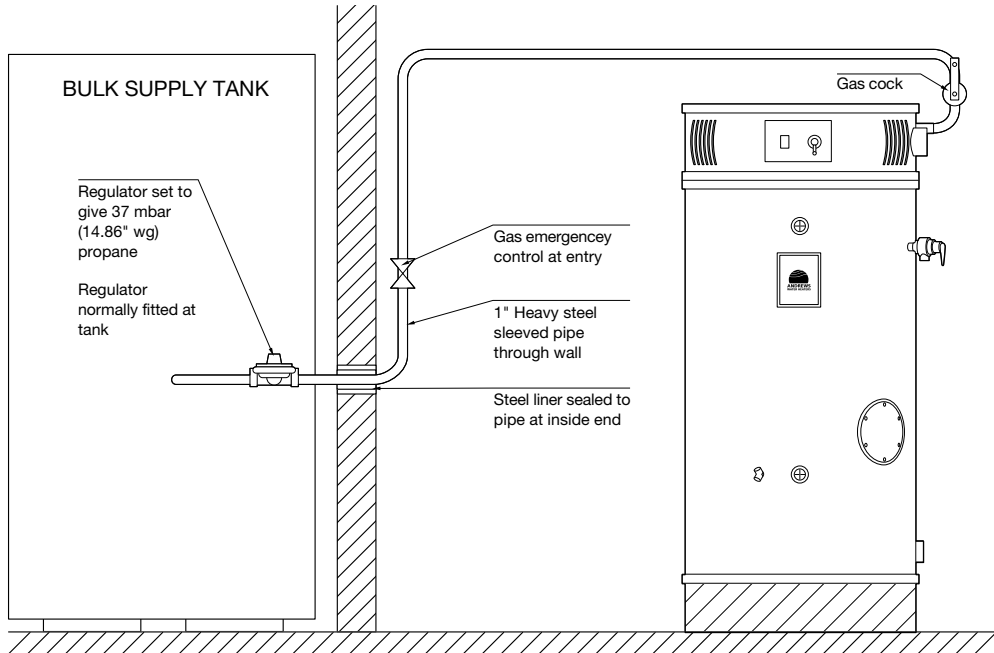


Fig. 1

TYPICAL PROPANE CYLINDER INSTALLATION

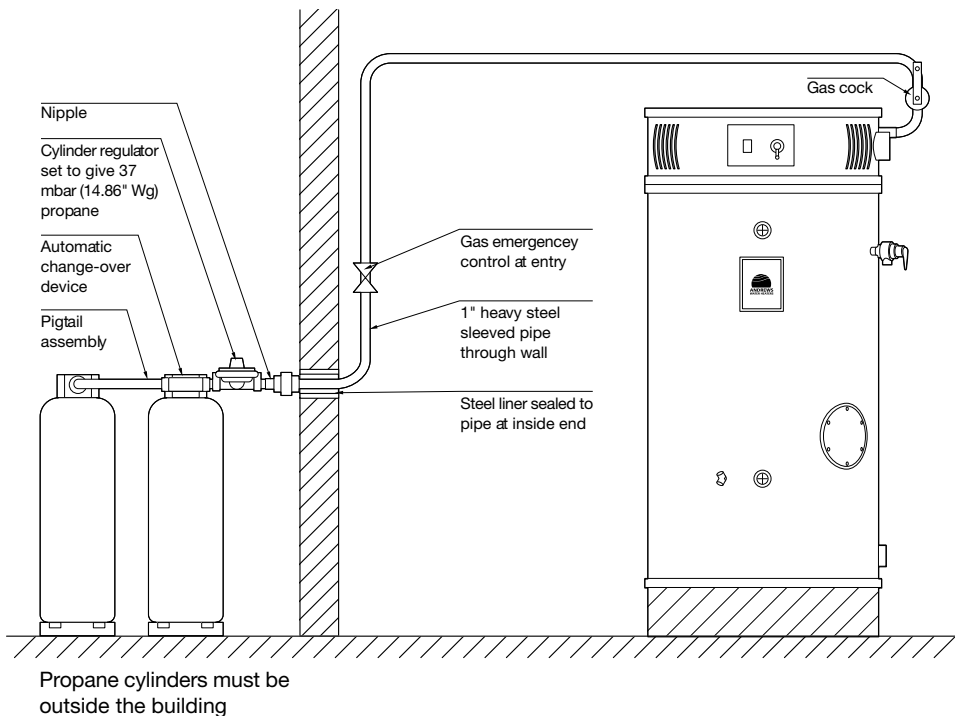


Fig. 2

Important: These drawings show a schematic representation only and should not be used for installation purposes. Contact your gas supplier for authorised installation drawings.

APPROXIMATE TIME/TEMPERATURE SCALD CHART

The following chart details the relationship of water temperature and time with regard to scald injury. This may be used as a guide in determining the safest water temperature for the installation.

APPROXIMATE TIME/TEMPERATURE RELATIONSHIPS IN SCALDS

48.8°C	More than 5 minutes
51.6°C	1½ to 2 minutes
54.4°C	About 30 seconds
57.2°C	About 10 seconds
60.0°C	Less than 5 seconds
62.8°C	Less than 3 seconds
65.6°C	About 1½ seconds
68.4°C	About 1 second

CAUTION

The water heater and individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressures in excess of 35mbar/14.0 in wg. The water heater must be isolated from the gas supply piping system by closing its manual shut off valve during any pressure testing of the gas supply system at test pressures equal or less than 35mbar/14.0 in wg. The supply line must be capped when not connected to the water heater.

GAS METER SIZE NATURAL GAS ONLY

Be sure that the gas meter has sufficient capacity to supply the full rate gas input of the water heater as well as the requirements of all other gas fired equipment supplied by the meter. If the gas meter is too small, ask the gas company to install a larger meter having adequate capacity.

GAS PRESSURE REGULATION

Main line gas pressure to the water heater should be maximum 35mbar/14.0 in wg. The inlet gas pressure must not exceed the maximum value. In some installations, a regulator sized for the input rating of the water heater will need to be installed just ahead of the inlet gas connection to the water heater to reduce excess gas pressure or surges in gas pressure.

GAS SUPPLY – NATURAL GAS

The installation of the gas supply must conform, depending on its size, to the requirements of British Standards and Codes of Practice listed in Section 1 of this manual.

A gas meter will be connected to the service pipe by British Gas plc or its authorised contractor.

The meter and service pipe should be checked by British Gas, or its authorised contractor, to ensure that they are adequate to deal with the gas supply to the water heater(s) in addition to any existing or additional requirements.

Fit the service gas cock (supplied) to the gas connection on top of the water heater using a suitable jointing compound and connect to the gas supply.

The water heater is not intended for operation at higher than 35mbar (14.0 in wg) supply gas pressure. Higher gas supply pressures require supplemental reducing service regulator. Exposure to higher gas supply pressure may cause damage to the gas controls, which could result in fire or explosion. If overpressure has occurred, such as improper testing of gas lines or emergency malfunction of the supply system, the gas valve must be checked for safe operation.

Where the water heater(s) is (are) installed in a water heater house or purpose built compartment, a manually operated valve for the water heater house must be fitted in accordance with the Gas Safety (Installation and Use) Regulations 1998. The valve must be easily identified and readily accessible.

After installation, the system should be pressure tested for soundness and purged in accordance with BS 6891 or IM/2 and IM/5 as appropriate.

GAS SUPPLY – PROPANE

Contact Calor Gas who will provide the appropriate type and size of LPG supply vessel and ensure its safe location and installation.

The installation of the gas supply must conform to LPGA Code of Practice, 22 LPG Piping Systems: Design and Installation, plus the requirements of British Standards and Codes of Practice listed in Section 1 of this manual.

Andrews Water Heaters are unregulated and a second stage regulator must be installed to give an inlet pressure to the appliance as follows:

PROPANE: 37mbar (14.86 in wg)

When using propane cylinders, connect a minimum number of 47kg cylinders, as listed below, together with a manifold before connecting to the union.

Use a minimum pipe size of ¾in bore.

Two 47kg Cylinders	LEC230/600, LEC230/700 and LEC380/740
Three 47kg Cylinders	LEC230/960 and LEC380/980
Four 47kg Cylinders	LEC 380/1220 and LEC380/1400 LEC 380/1900

WARNING! PROPANE CYLINDERS MUST BE USED AND STORED IN ACCORDANCE WITH 'THE HIGHLY FLAMMABLE LIQUIDS AND LIQUIFIED PETROLEUM GASES REGULATIONS 1972', AND SHOULD COMPLY WITH LPG CODE OF PRACTICE 7, 'STORAGE OF FULL AND EMPTY LPG CYLINDERS AND CARTRIDGES'.

ELECTRICAL SUPPLY

External wiring to the water heater(s) must be installed in accordance with current I.E.E. Regulations for the wiring of buildings and to any Local Regulations that may apply.

The ECOflo range is designed to operate from a 230V, single phase supply. The fuse rating is 5 amps.

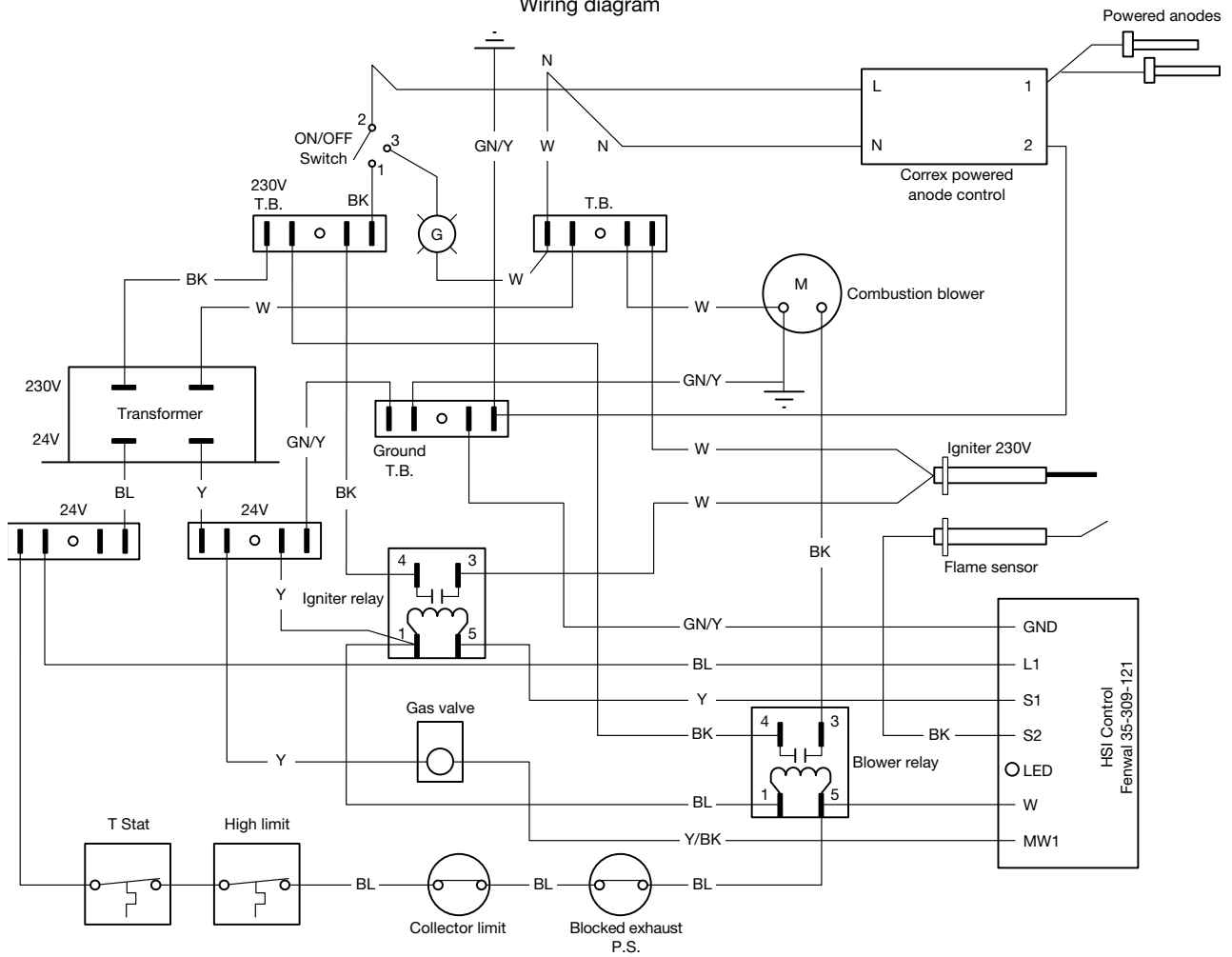
The method of connection to the mains electrical supply should facilitate complete electrical isolation of the appliance, preferably by use of a fused double pole switch or fused spur box serving only the heater. The disconnection of the supply shall have a contact separation of 3mm on all poles. The double pole switch for the water heater electrical supply must be located where it can be easily reached under all circumstances.

The point of connection to the mains electrical supply should be readily accessible through a cable entry gland at the rear of the appliance on the combustion assembly surround.

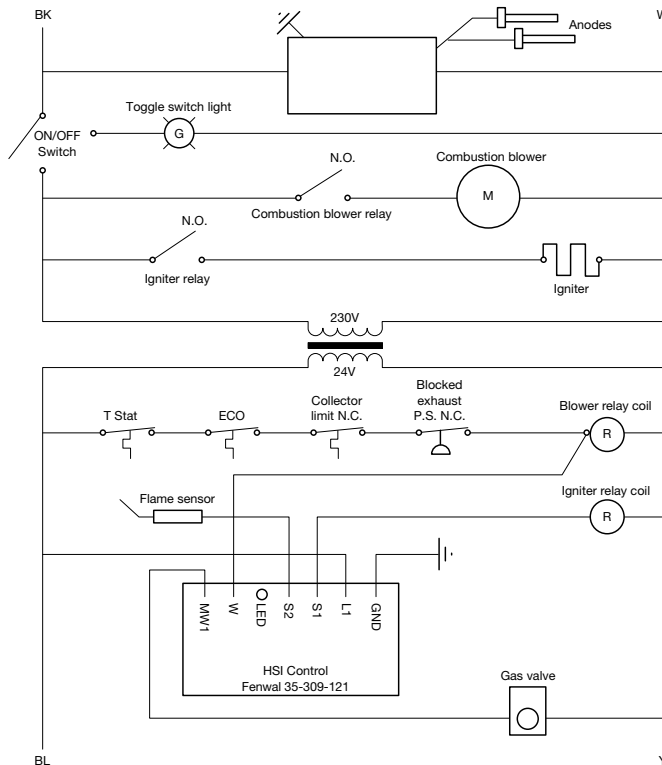
Connect the electrical supply to the main control panel terminal block via the cable gland. Mains input cable should be 0.75mm² 3 core and should be connected to the mains supply as detailed above.

Mains Voltage: 230V – IP 20
Frequency: 50Hz
Fuse: 5 Amps

Wiring diagram



Schematic



FLUE SYSTEMS

Andrews Water Heaters' ECOflo is a Balanced Flue, Gas Water Heater where all air for combustion is obtained from the outside atmosphere and all flue gases are discharged to the outside atmosphere. The flue system is a single concentric (pipe within pipe) design where the flue products are discharged through the inside flue tube and the combustion air supply surrounds the flue surrounded by the outside pipe. The flue system incorporates both combustion air supply and the flue exhaust. The flue system component which is outside the building, takes in the combustion air supply and discharges the flue products (whilst keeping them separate) is referred to as the 'direct flue terminal'.

WARNING!

The direct flue systems MUST be properly installed. Failure to do so could result in property damage or personal injury. DO NOT install any damaged components. Contact Andrews Water Heaters for replacement parts. The flow of combustion air must not be restricted. Keep direct flue terminal openings clear of any objects likely to cause flow restriction.

Direct Flue Terminal

Shall terminate at least 1.5m (5ft) above any forced air inlet located on the same wall. This provision does not apply to the combustion air intake of a direct flue appliance or the circulating air inlet and flue gas discharge of listed outdoor appliances.

Shall be installed with at least a 300mm (12in) flue termination clearance from any air opening into a building.

The bottom of the direct flue terminal shall be located at least 300mm (12in) above ground.

Consideration should be given to the location of the flue terminal. The flue terminal should be located where the discharge of flue products does not cause a nuisance. Consideration should also be given with regard to noise that may be emitted by this flue system. In all cases the flue termination must meet the requirements of BS6644.

A suitable terminal guard must be fitted if less than 2 metres above ground level.

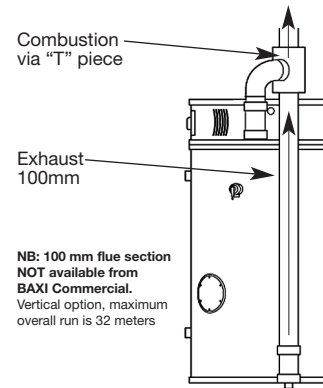
OPTIONAL CONVENTIONAL FLUE (OPEN FLUE)

This is an open flued arrangement where the air is drawn into the appliance from within the plant room (boiler house). Permanent ventilation is required to allow correct operation of the appliance (refer to BS 6644). Alternatively, the ventilation can be supplied by running

fresh air ducting (150mm) direct from outside, terminating with a suitable terminal.

The maximum 'combined' flue run is 32 metres. The use of 90° and 45° bends will reduce the allowed overall length by 1.2m per 90° and 0.7m per 45° bend used along the flue run.

Conventional Flue Option



NOTE: The overall length does not include the 1m terminal. The 1m terminal is not to be included in determining the overall length of the flue.

Maximum Flue Distances (Horizontal or Vertical)

Number of 90° Elbows	Maximum length of straight pipe (excluding flue terminal) to exterior wall
0	16m (52ft 6in)
1	14.8m (48ft 6in)
2	13.6m (44ft 7in)
3	12.4m (40ft 7in)

NOTE: Each 45° elbow reduces the maximum flue distance by 700mm (2ft 3in).

IMPORTANT: Do not exceed the flue distances or the number of elbows listed above. This may cause heater malfunction or unsafe conditions.

HORIZONTAL AND VERTICAL FLUE KITS

INSTALLATION PROCEDURE

Determine location of flue exit.

1. The Horizontal or Vertical flue kit that has been delivered includes the components as listed below and on page 21. The concentric flue pipe system includes both the flue exhaust (inside pipe) and combustion air (outside pipe). The flue pipe may be cut on the unflared end (end without gasket) as required for installation.
2. Determine if additional flue components are required for installation. Refer to the flue component information on pages 21 and 55 for available optional flue components.
3. Ensure that the flue terminal location complies with requirements described within this manual and the Local Codes of Practice.
4. Measure the vertical and horizontal distance from the water heater flue connection to determine the number of components required.

HORIZONTAL FLUE KIT/FITTINGS PACK – 230 LITRE MODELS AWH PART No: B291 SUPPLIED COMPONENTS

Part Description	Part Number
Exhaust Outlet Tee c/w Condense Outlet (82500)	E860
100mm to Concentric Exhaust Connector (75412)	E861
Air intake Tee Piece Connector (82501)	E862
Condense Syphon (87436)	E863
Horizontal Flue Terminal, 100/150mm (87990)	E236
90° Elbow c/w clamp, 100/150 (87890)	E205
Gas Cock – 3/4" BSP	C498
Drain Valve – 3/4" BSP	C381
Drain Valve Socket – 3/4" BSP	C103
Installation, Operation and Maintenance Manual	E864

VERTICAL FLUE KIT/FITTINGS PACK – 230 LITRE MODELS AWH PART No: B293 SUPPLIED COMPONENTS

Part Description	Part Number
Exhaust Outlet Tee c/w Condense Outlet (82500)	E860
100mm to Concentric Exhaust Pipe (75412)	E861
Air intake Tee Piece Connector (82501)	E862
Condense Syphon (87436)	E863
Vertical Flue Terminal, 100/150mm (87969)	E866
Gas Cock – 3/4" BSP	C498
Drain Valve – 3/4" BSP	C381
Drain Valve Socket - 3/4" BSP	C103
Installation, Operation and Maintenance Manual	E864

VERTICAL FLUE KIT/FITTINGS PACK – 380 LITRE MODELS AWH PART No: B292 SUPPLIED COMPONENTS

Part Description	Part Number
Exhaust Outlet Tee c/w Condense Outlet (82500)	E860
100mm to Concentric Exhaust Pipe (75413)	E865
Air intake Tee Piece Connector (82501)	E862
Condense Syphon (87436)	E863
Horizontal Flue Terminal, 100/150mm (87990)	E236
90° Elbow c/w clamp, 100/150 (87890)	E205
Gas Cock – ¾”BSP	C498
Drain Valve – ¾”BSP	C381
Drain Valve Socket – ¾”BSP	C103
Installation, Operation and Maintenance Manual	E864

VERTICAL FLUE KIT/FITTINGS PACK – 380 LITRE MODELS AWH PART No: B294 SUPPLIED COMPONENTS

Part Description	Part Number
Exhaust Outlet Tee c/w Condense Outlet (82500)	E860
100mm to Concentric Exhaust Pipe (75413)	E865
Air intake Tee Piece Connector (82501)	E862
Condense Syphon (87436)	E863
Vertical Flue Terminal, 100/150mm (87969)	E866
Gas Cock – ¾”BSP	C498
Drain Valve – ¾”BSP	C381
Drain Valve Socket – ¾”BSP	C103
Installation, Operation and Maintenance Manual	E864

FLUE SYSTEMS**Optional Components for 100/150mm dia (concentric) Flue**

Quantity	Flue Length	Part Description	Part Number
1	1000mm (40in)	Flue pipe with clamp	E202
1	1000mm (40in)	Cutable flue pipe with clamp	E203
1	500mm (20in)	Flue pipe with clamp	E204
1		90° Elbow	E205
1		45° Elbow	E206
1		Flat roof flashing for vertical flue terminal with adjustable cap	E207
1		Roof flashing for pitched roof to suit 150mm (6in) dia flue size	E208
1		Wall clamp 150mm (6in) dia.	E209
1		Flue condense trap	E210
1		Syphon	E211
1		Condensate trap pipe kit to syphon	E261

Model		EC230/600	EC230/700	EC230/960	EC380/740	EC380/980	EC380/1220	EC380/1400
Flue size (concentric)	mm	100/150	100/150	100/150	100/150	100/150	100/150	100/150
Max flue run – room sealed (a)	m	16	16	16	16	16	16	16

Reduce flue length by 1.2m for 90° bend, 0.7m for 45° bend and 1.5m for a condensate trap.

The ventilation requirements for room sealed flue systems are given on pages 29 and 30.

ECOflo 380/1900**HORIZONTAL FITTINGS PACK – Part No: B292**

Part No.	Description	Qty
E910	Concentric measure point	1
E860	Exhaust outlet Tee	1
E865	100mm concentric exhaust pipe	1
E862	Air intake "T" piece	1
E863	Condense syphon	1
E236	Horizontal terminal 100/150 mm	1
E205	90° elbow/clamp	1
G167	1" BSP M&F gas cock	1
G028	½" Drain cock	1
G029	¾" x ½" reducing bush	1
C103AWH	¾" drain valve socket	1

ECOflo 380/1900**VERTICAL FITTINGS PACK – Part No: B294**

E910	Concentric measure point	1
E860	Exhaust outlet Tee	1
E865	100mm concentric exhaust pipe	1
E862	Air intake "T" piece	1
E863	Condense syphon	1
E866	Vertical terminal 100/150mm	1
G167	1" BSP M&F gas cock	1
G028	½" Drain cock	1
G029	¾" x ½" reducing bush	1
C103AWH	¾" drain valve socket	1

GENERAL

Flue terminals must be installed in accordance with the Clean Air Act to ensure the results of combustion are properly dispersed. The drawing on page 25 shows some minimum clearances for the flue terminal. In addition, the flue terminal should be positioned where it will not cause a nuisance from noise or from the combustion waste accumulating. Please contact Andrews Technical Support Department if advice is needed for a particular installation.

If installed on a roof valley, the terminal should be at least 1m above the highest part of the roof structure and 2.5m from any adjacent structure.

The terminal must be fitted with a guard if less than 2m above ground level or in a position where it may cause injury to persons resulting from touching a hot surface. Guards can be ordered with flue components, see table on page 55.

WARNING:

The flue system must be properly installed. Ensure the inner flue is securely sealed at all the joints otherwise incomplete combustion may result.

Do not exceed maximum flue lengths including elbows.

ECOflo 230 & 380 LITRE FLUE SYSTEMS

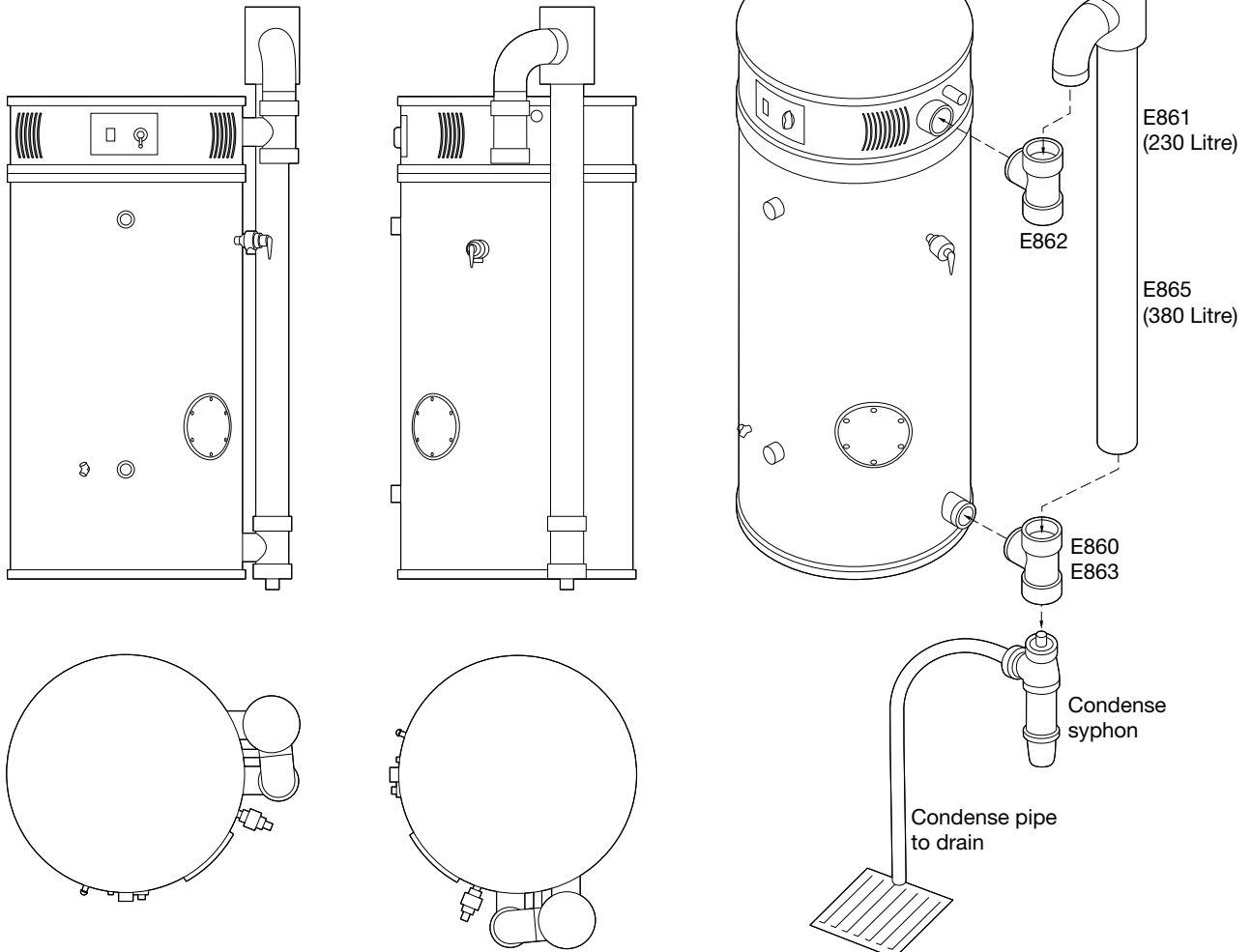
The ECOflo uses a concentric flue system, **150mm outside diameter with an inner flue of 100mm diameter.**

Flue components fit together with silicon sealing rings and the flues are retained with sealing clamps. Each heater can be ordered with either a horizontal or vertical flue kit. Flue assembly instructions are also included.

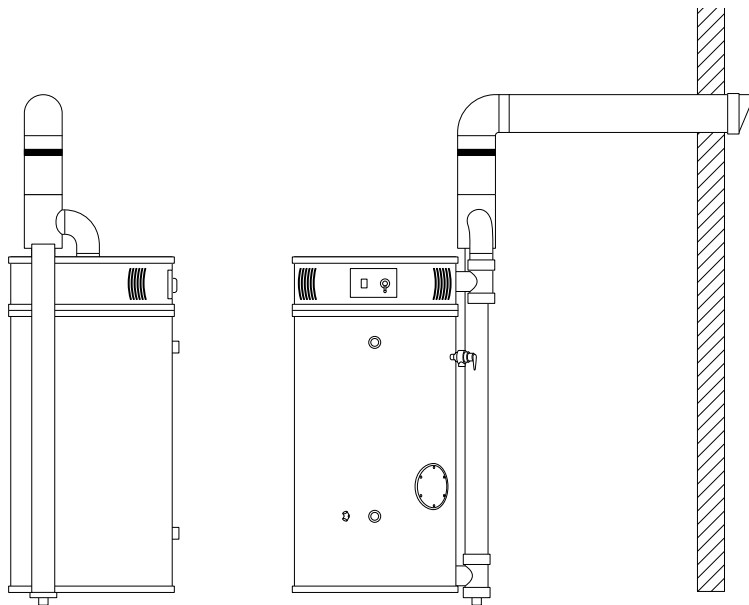
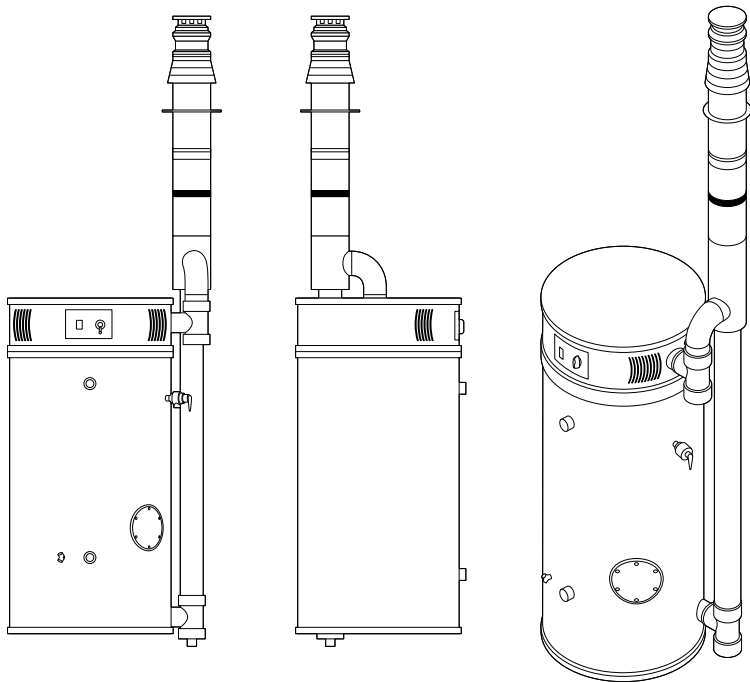
Prior to installing the concentric flue system and terminal, the following must be carried out:

- 1) Fit item E860 to the stainless steel exhaust outlet connection on the appliance and ensure that the condense connection is at the base of the tee piece.
- 2) Fit item E862 to the PVC air intake connection on appliance and ensure that the open end is at the top of the tee piece.
- 3) Fit item E861 or E865 (depending on the model) to both previously fitted E860 and E862. Ensure that both connectors are located correctly. Secure the 100mm dia. vertical section of item E861 or E865 to heater outer casing with brackets supplied. Ensure that internal cable is not damaged during installation.
- 4) Fit item E863 condense syphon to 32mm connection at base of condense tee (E860).
- 5) Install 40mm OD plastic waste system from syphon outlet to suitable drain.

A minimum downward slope of between 3mm to 6mm per 300mm length of water pipe must be adhered to.



ECOflo 230 & 380 VERTICAL/HORIZONTAL FLUE SYSTEMS



Height of concentric section above heater	205mm
Height of concentric sample point	115mm (+/- 5mm)
Height of centre line of 90° bend	178mm (+/- 5mm)
Total height to centre line of bend	500mm (+/- 10mm)
Total height to centre line of bend including EC230 heater:	1948mm (+/- 10mm)
Note: Total height to top of bend	573mm (+/- 10mm)
Total height to top of bend including EC230 heater	2021mm (+/- 10mm)
Total height to centre line of bend including EC380 heater	2472mm (+/- 10mm)
Total height to top of bend including EC380 heater	2525mm (+/- 10mm)

Heights are given from bottom of heater and EXCLUDE a plinth

FLUE SYSTEMS

TYPICAL INSTALLATION

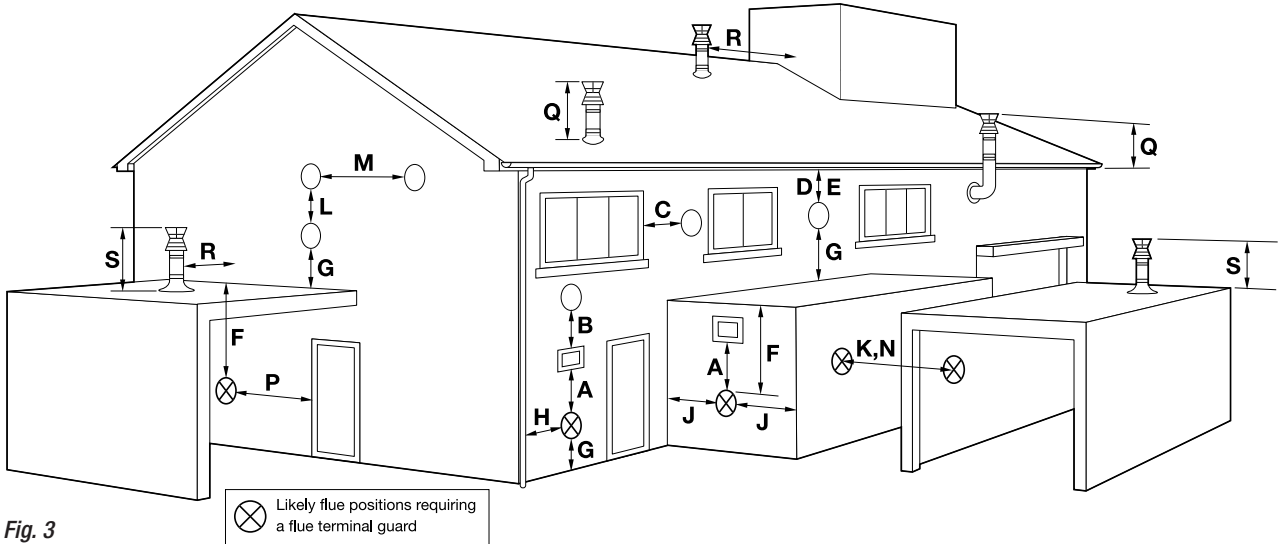


Fig. 3

⊗ Likely flue positions requiring a flue terminal guard

Terminal Positions with Minimum Distance		mm
A	Directly below an opening, air brick, opening window etc.	300
B	Above an opening, air brick, opening window etc	300
C	Horizontal to an opening, air brick, opening window etc.	300
D	Below a gutter or sanitary pipework	75
E	Below the eaves	200
F	Below a balcony or carport roof	200
G	Above ground, roof or balcony level	300
H	From vertical drain/soil pipework	150
J	From an internal or external corner	300
K	From a surface or boundary facing the terminal	600
L	Vertically from a terminal on the same wall	1500
M	Horizontally from a terminal on the same wall	(up to 70kW) 300 (above 70kW) 600
N	From a terminal facing the terminal	1200
P	From an opening in a carport (e.g. door, windows) into the building	1200
Q	Above roof	500
R	From a vertical structure on a roof	500
S	Above flat roof	1000

FLUE SYSTEMS

INSTALLING THE HORIZONTAL FLUE TERMINAL

NOTE: The horizontal flue terminal supplied may be used through outside walls up to 600mm (24in) thick.

1. Horizontal flue Terminal (Through the Wall) supplied
 - a) Cut an opening of at least 165mm (6.5in) diameter through to the outside.

- b) Slide the flue terminal through the wall opening to the rib closest to the intake air openings of the terminal and even with the outside wall.

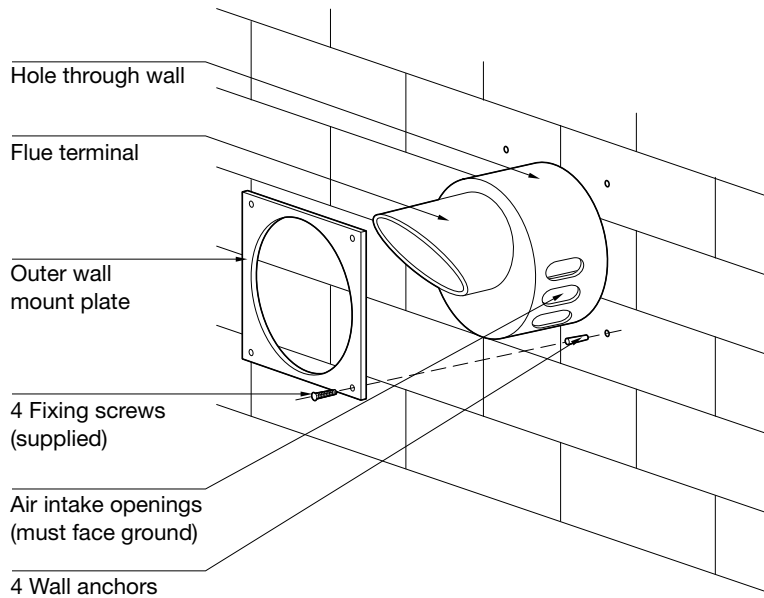


Fig. 4

- c) Slide the outside wall plate over the flue terminal and fasten to the wall with four screws. Depending on the wall construction, wall anchors may be required to reinforce the screws.

- d) Install inside wall plate on the inside wall and secure with four screws. Depending on wall construction, wall anchors may be required to reinforce the screws.

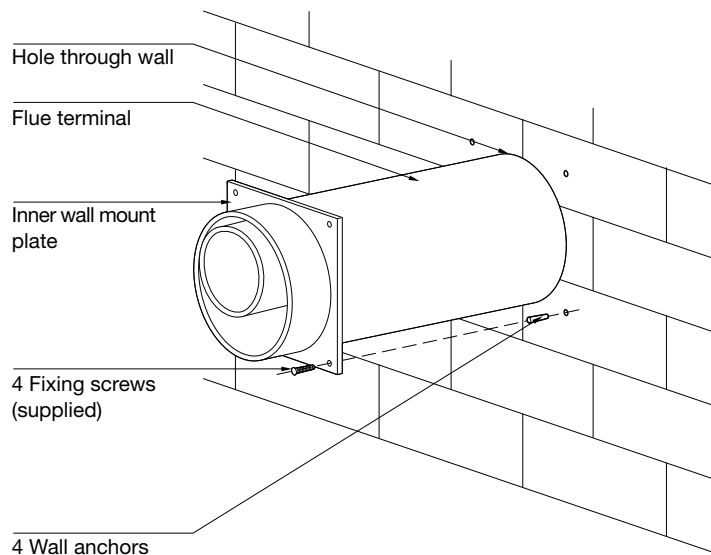


Fig. 2

FLUE SYSTEMS

INSTALLING THE VERTICAL FLUE TERMINAL

2. Vertical Flue Terminal (Through the Roof)
 - a) Determine the exact location where the roof flue terminal will exit the roof, ensuring the flue system clears all obstructions. For pitched roofs, the flue cap must be the distance above the roof line as specified (300mm to base of Flue Clamp, minimum). The top of the roof terminal may extend up to 760mm (2.5ft) above the roof line as required.
 - b) Run the concentric flue system to the proper distance below the roof sheathing required for the correct distance of the roof terminal above the roof surface. See the following sections on installing the rest of the flue system.
 - c) Cut a minimum 165mm (6.5in) diameter hole for the flue centred in the desired location for the roof terminal, see Fig. 6.
 - d) Centre the roof flashing over the hole using either the flat roof flashing or universal flashing for pitched roofs.
 - e) Slip the storm collar supplied with the roof flashing kit over the outside of the flue terminal and align with the flue pipe end below roof opening. Insert the terminal into the flue pipe.
 - f) Fasten the roof flashing with nails. Seal the flue terminal and flashing to the roof.
 - g) Install the gasketed clamp around the joint between the flue terminal and flue pipe.

INSTALLING FLUE PIPING SECTIONS FOR BOTH APPLICATIONS

- a) The coaxial flue pipe sections are designed to fit tightly together and seal with the integral flue pipe seal and supplied pipe clamps. No silicone caulk or special tools are required.
- b) All flue sections and fittings come complete with silicone flue pipe gaskets and outside gasketed pipe clamps for making air tight connections between the flue pipe connections.
- c) Raise the flue pipe to the flue terminal connection with the gasketed end of the flue pipe towards the flue terminal. Insert the flue pipe into the flue terminal connection and grasp the end of the flue pipe while twisting and pushing the pipe until inserted all the way into the flue terminal.
- d) Connect the outside pipes together using the gasketed clamps provided. The flue pipes have ribs located near each end. When the flue piping is connected, the gasketed clamps shall cover the ribs and joints of the connecting flue tubes. Support each pipe section with hangers attached to the supporting joints in the wall or ceiling.
- e) Continue connecting pipe sections together with clamps and supporting with hangers.

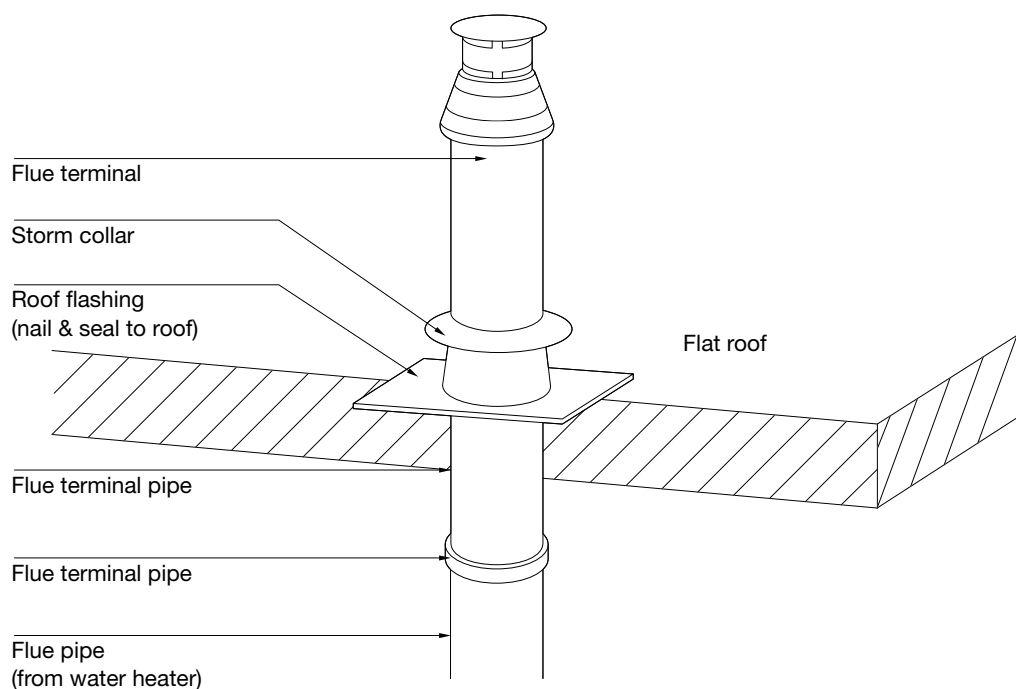
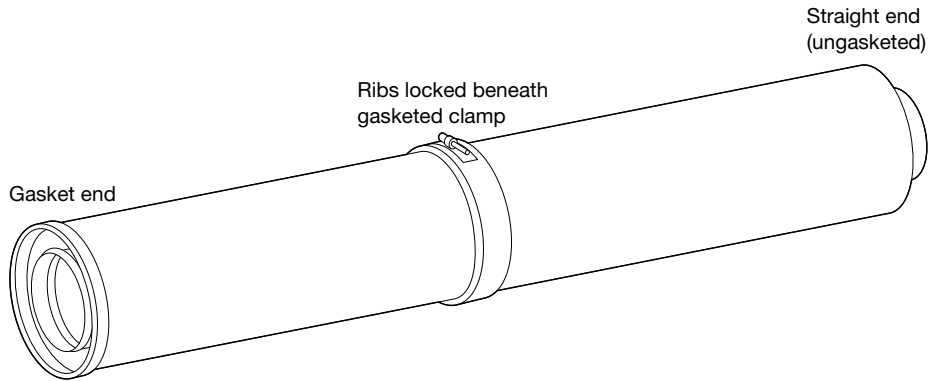


Fig. 6

Fig. 7



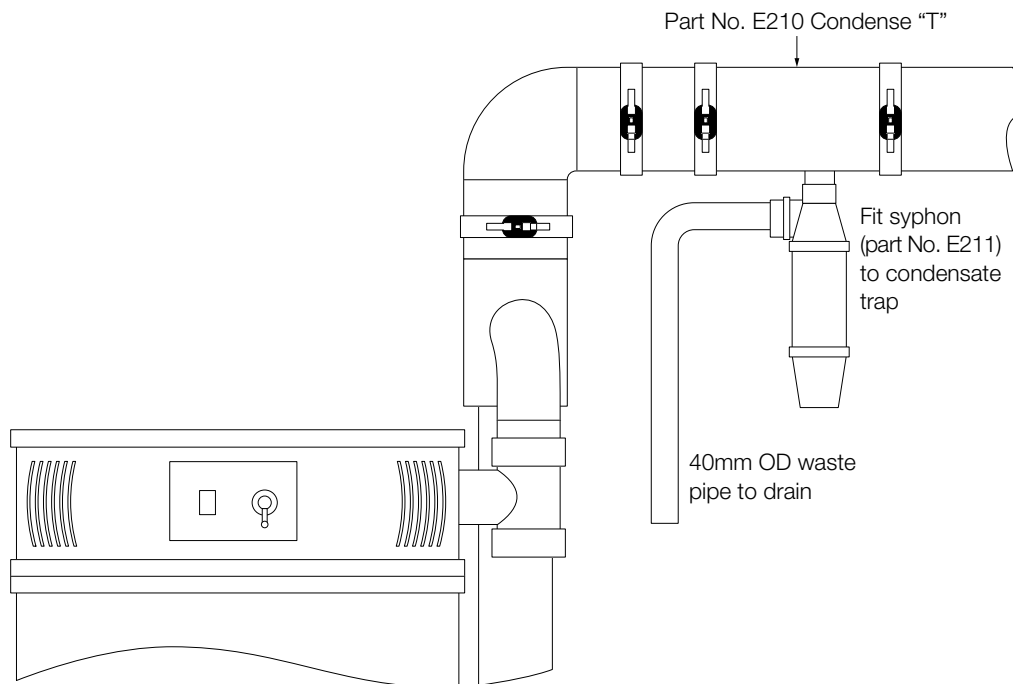
g) The last pipe section may be cut to fit the distance required to reach the water heater flue connections. If a flue condensate trap is specified, install the supplied tap with crimped end into the gasketed end of the elbow (horizontal flue installations) and clamp the condensate tee and elbow together. Install the crimped end of the elbow into the flue connection of the water heater. On vertical installations, install the crimped end of the condensate trap directly onto the water heater flue connection.

IMPORTANT! In order for the condensate trap to collect and dispose of the condensate from the flue pipe, the flue system must have a downward slope of 21mm per metre (0.25in/ft) towards the condensate trap. The condensate trap must be installed as close as possible to the flue adaptor to prevent condensate from accumulating and draining back into the base of the water heater.

- h) Carefully measure the length of straight flue pipe needed, allowing for about 50mm (2in) insertion into the elbow. Mark the ungasketed end of the pipe to be cut and carefully make a straight cut on the outside pipe to the desired length. Make sure the inside tube is not cut. Cut the inside flue pipe about 50mm (2in) more than the outside pipe so that the flue pipe protrudes slightly beyond the outside pipe. Connect the flue pipe and clamp at each end.
- i) Use the clamp supplied in the flue kit with the stepped gasket to seal the elbow or condensate trap to the concentric flue connector.
- j) Condensate disposal: Connect syphon (part no. E211) to the 32mm slip joint condensate trap connector and install 40mm OD waste pipe suitable drain, (see fig.8).

Note: On all flue installations, for distances over 1.5 metres, we recommend that a condensate trap is fitted.

Fig. 8



AIR SUPPLY AND VENTILATION CONCENTRIC FLUE SYSTEMS

The following notes are intended to give guidance:
Where the heater is to be installed in a room, NO VENTS ARE REQUIRED.

Where the heater is to be installed in a COMPARTMENT, permanent air vents are required in the COMPARTMENT at high and low level. These air vents must either communicate with a room or internal space or be direct to outside air.

The minimum effective areas of the permanent air vents required in the compartment are as follows:

Air vents should have negligible resistance and must not be sited in any position where they are likely to be easily blocked, flooded or in any position adjacent to an extraction system which is carrying flammable vapour.

Consideration must be given to the position of the high level ventilation opening. A high level vent must not be sited within 300mm measured vertically of the flue terminal.

Grilles and louvres should be so designed that high velocity air streams do not occur within the space housing the heater(s).

The grilles should have a total minimum free area for the water heater(s) in addition to any other requirements as follows:

• Low level (inlet)

540cm² plus 5cm² per kilowatt in excess of 54kW total net input.

• High level (outlet)

270cm² plus 2.5cm² per kilowatt in excess of 54kW total net input.

Air Vents Areas

Position of Air Vents	Air from Room for Internal Space	Air Direct from Outside
High Level	10cm ² per kW Net input	5cm ² per kW Net input
Low Level	10cm ² per kW Net input	5cm ² per kW Net input
In a Room or Internal Space	No requirement for Ventilation	No requirement for Ventilation

Note: Both air vents must communicate with the same room or internal space or must both be on the same wall to outside air.

IMPORTANT:

- The effective area requirements specified in the table are related to the maximum heat input of the heater(s), and are equivalent to those specified in BS6644.
- The free area of the grilles should not be less than the size of the recommended ventilation opening.
- The supply of air to a space housing the heater(s) by mechanical means should be;
 - Mechanical inlet with natural extraction.
 - Mechanical inlet with mechanical extraction.

NOTE: Natural inlet with mechanical extraction must not be used.

Where a mechanical inlet and mechanical extraction system is used, the design extraction rate must not exceed one third of the design inlet rate.

All mechanical ventilation systems must be fitted with automatic gas shut off safety systems which cut off the supply of gas to the heater(s) in the event of failure of either the inlet or extract fans.

The requirements for air supply by mechanical ventilation are given in BS6644 Clause 19.3. and in IGE/UP/10 Pt.1.

The permanent air vents shall be sited away from the extractor fans. It may be necessary to increase the ventilation area to compensate for the extractor fan.

WATER QUALITY AND TREATMENT

Where extreme conditions of water hardness exist, scale can form in any water heating equipment, especially when the heater is working under conditions of constant heavy demand and at high temperatures.

In hard water areas, scale formation can occur in hot water systems and hot water heaters. The higher the temperature and volume of water used, the more problematic the scale build-up can be. Water treatment is normally recommended when the hardness reaches 100 – 150ppm (7 – 10 degrees Clark) and above. This problem can be minimised by reducing the water temperature in the heater and by fitting suitable water pre-treatment equipment.

When installing Andrews Water Heaters in hard water areas we would recommend that a water treatment specialist is consulted.

Each Andrews ECOflo Water Heater includes two factory fitted Correx™ Powered Anodes as standard. **These anodes do not need maintenance or replacement.**

The potentiostat which regulates the current to the Correx™ anode features an indicator light which shows green to indicate the correct function and red to indicate a malfunction. The anodes and potentiostat are available as spare parts if required, (see page 52 for part numbers).

The ECOflo water heater is fitted with the Hydrojet Total Performance System incorporated in the cold inlet nipple. The system is designed to increase turbulence and reduce sediment build-up, reduce thermal stacking and increase delivery.

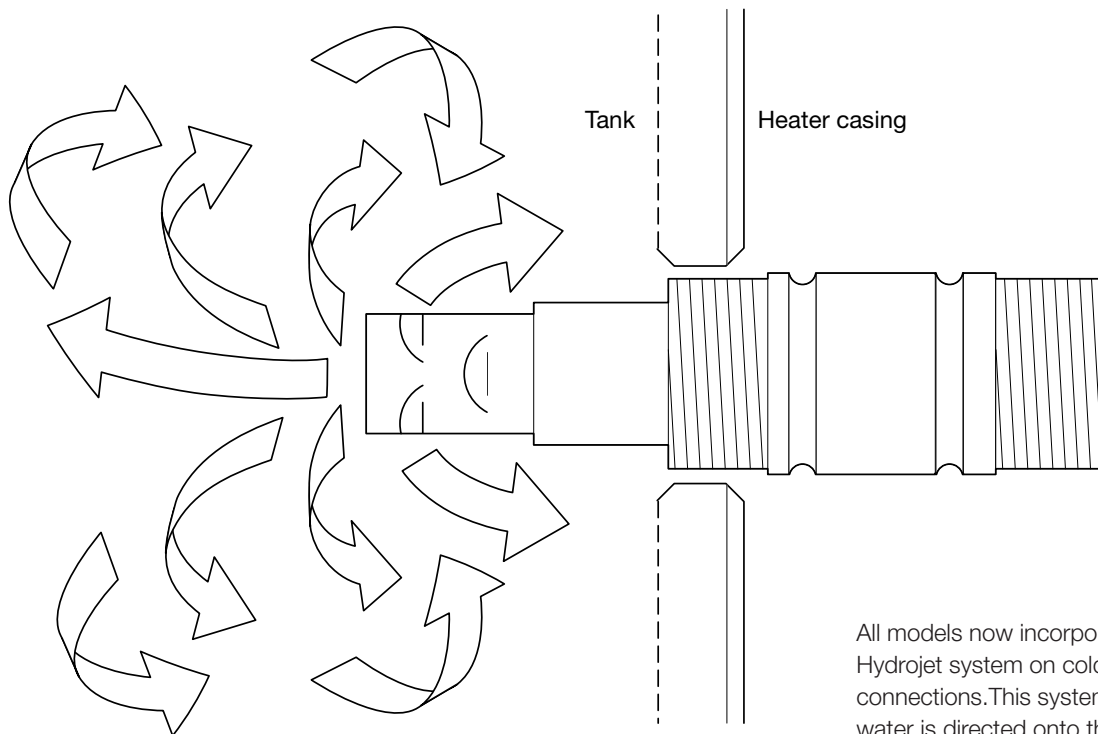


Fig. 9

All models now incorporate the new Hydrojet system on cold inlet side connections. This system ensures water is directed onto the tank base which minimises sediment build-up from day one of installation.

WATER CONNECTIONS VENTED SYSTEMS

The water heater can be fed from a cold water feed cistern or static water tank.

A safety valve must be fitted as specified in BS 6644 Clause 9.

Minimum 1 bar water pressure is required to allow correct operation.

The safety valve must be fitted either directly to an upper tank tapping or not further than one metre along the outlet flow pipe, size not less than the safety valve.

There must be no valve separating the heater from the safety valve.

The size of the discharge pipe must not be less than the nominal size of the safety valve outlet. It should be self-draining. Any water discharged must be visible and create no hazard to persons in or about the building.

A low pressure open vented system can be used or, where the natural circulating pressure is insufficient, pumped circulation can be employed.

The heater must be fitted with an open vent pipe which is not valved and which rises continuously to the open vent. It should be sized with reference to Technical Data, BS 6644 Clauses 9 and 10 and CP 342. Local Regulations and Bye-Laws must be observed when installing the system.

Front Cold inlet / Front Hot outlet water connections

Assemble onto the 1½" hot water outlet (front) the required fitting using a suitable jointing compound.

Assemble onto the ¾ BSP thread, the ¾ BSP coupler socket and drain cock using a suitable jointing compound.

Water draw-off dead legs should comply with CP 342 Part 2, Table 1 and BS 6700.

NOTE:

When using a secondary return circuit, see Fig. 10 for the location of the return tapping.

It is recommended that all water connections be made to the heater(s) using union fittings for ease of servicing. Pipe support intervals should comply with CP 342, Part 2 Table 4.

After installation of the water system, open the main water supply valve, flush the system and fill the heater. Open the hot taps to allow air to escape from the system. When the system is free of air, close the taps and check for leaks at the thermostats, drain cock and pipe connections on the heater.

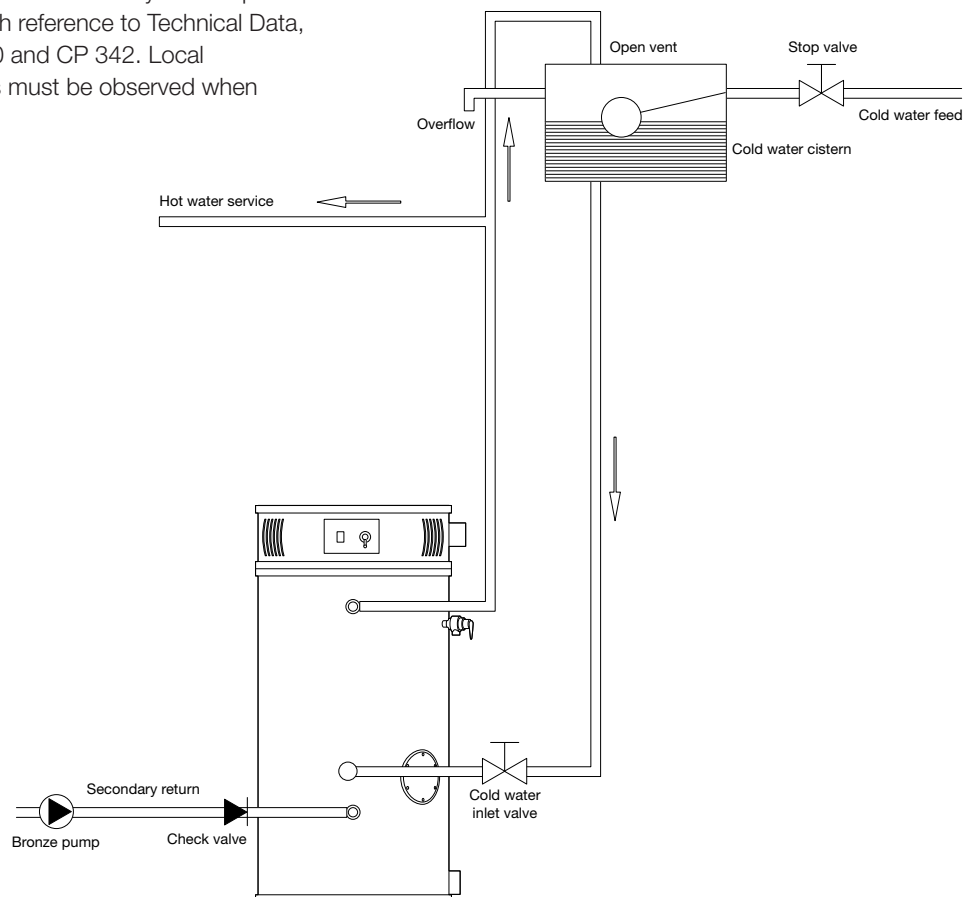


Fig. 10

WATER CONNECTIONS
UNVENTED SYSTEMS

Unvented Systems should be fitted by an Approved Installer.

The water heater can be used on unvented hot water storage systems with the addition of an Unvented Systems Kit, part number B290, available from Andrews Water Heaters.

See Parts List on page 44. The wall bracket assembly (shown below) is available as an **optional extra (AWH Part No – B173).**

When used in an unvented system, the ECOflo will supply hot water at a pressure of 3.5bar (51lbf/in²), provided that this pressure is available at the mains feed. During conditions of no-flow, system pressure may rise to a maximum of 6 bar (87lbf/in²) whilst the burner is operating. When testing the system, it is recommended that a maximum test pressure of 8.6 bar (125lbf/in²) is employed.

The expansion vessel C4 supplied is suitable for the stored volume of the water heater.
FOR SYSTEMS WITH LARGER PIPE VOLUMES OR ADDITIONAL STORAGE, EXPANSION VESSELS WITH MORE CAPACITY ARE AVAILABLE – CONTACT THE ANDREWS SALES OFFICE FOR FURTHER DETAILS.

The combined temperature and pressure relief valve C5, must be installed into the horizontal 1” dia. male tapping. A 1” dia. socket (not supplied) is required as the T&P valve is also a male fitting. The discharge pipe from items C3 and C5 must be connected into tundish C6.

When assembling items C1 and C2, ensure that the flow arrows marked on the components are pointing in the direction of flow, i.e. towards the water heater.
The cold water for services may be drawn from the 22mm compression port on item C2(a). The water pressure at this point will be similar to that available at the hot water outlet of the water heater. If port (a) is not used, it should be sealed with the blanking plug supplied.

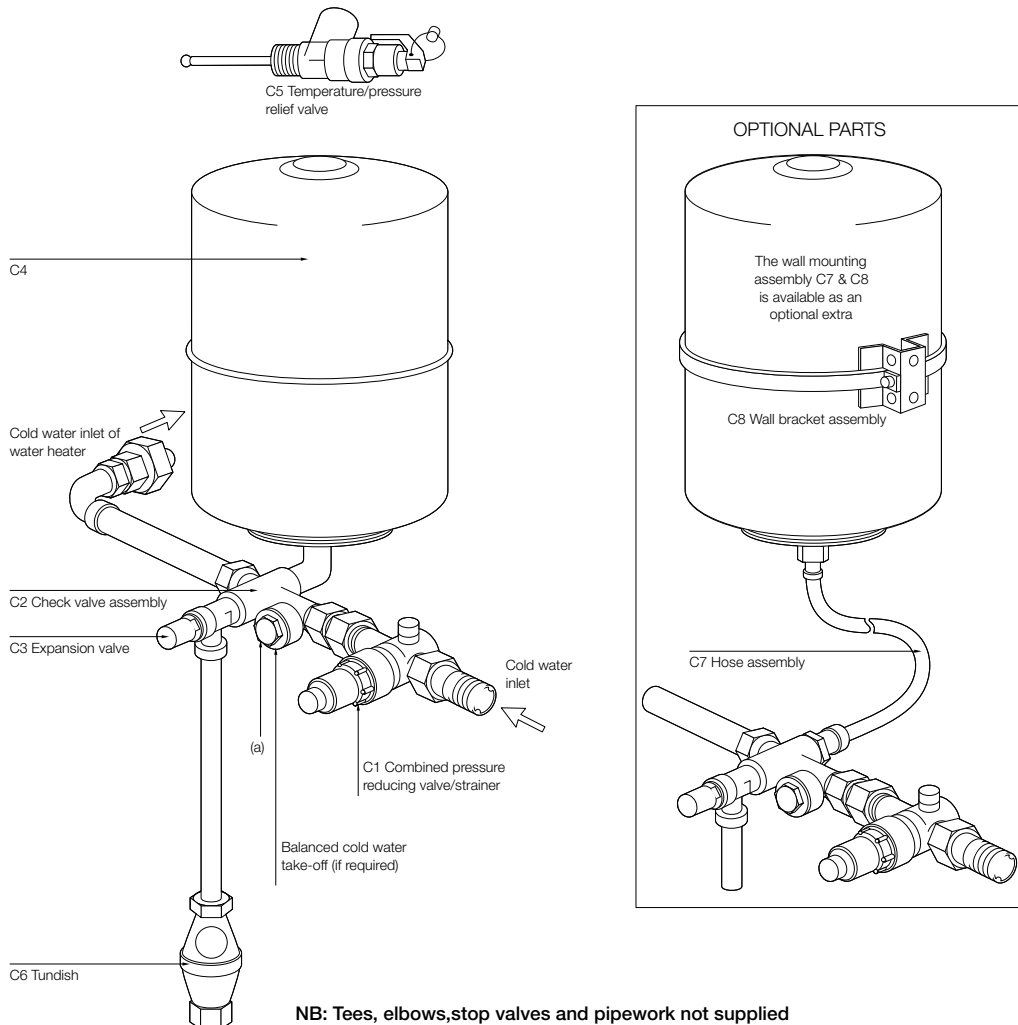


Fig. 11

NB: Tees, elbows, stop valves and pipework not supplied

If higher flow rates are required for the cold water services, a suitable tee fitting should be fitted to the pipework upstream of item C1.

The pipework fitted to the tundish outlet should be one size larger than the outlet pipe of the safety device and should be terminated at a suitable drain.
(See Building Regulations 1992 Approved Document G3).

All fittings and materials must be suitable for use with drinking water and listed in the current Water Research Centre "Materials and Fittings Directory".

Installation of unvented storage hot water systems must comply with Part G3 of the Building Regulations 1992.

Typical water service layout for unvented system is shown in Fig 12.

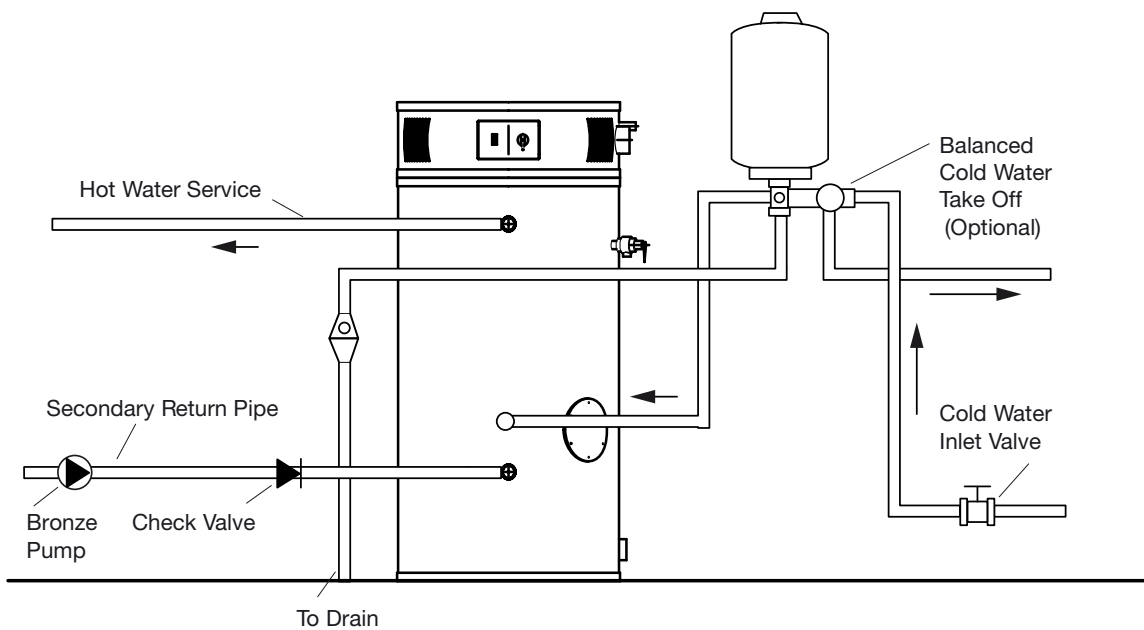


Fig. 12

COMMISSIONING

CAUTION! DO NOT OPERATE THE WATER HEATER UNTIL THE STORAGE VESSEL IS COMPLETELY FILLED WITH WATER, WITH WATER RUNNING FROM ALL HOT TAPS.

Open the main gas supply cock after all connections to the gas control are completed. Test all connections, using propriety leak detection fluid.

Filling the Heater with Water

1. Close the water heater drain valve.
2. Open the cold water supply valve.
3. Open several hot water taps to allow air to escape from system.
4. When a steady stream of water flows from the taps, the heater is filled.
5. Close the taps and check for leaks at the drain valve, temperature/pressure relief valve and the hot and cold water connections.

USER'S SAFETY GUIDE

For your safety, read this section prior to lighting the appliance.

WARNING

1. Always follow manufacturer's instructions when lighting the appliance. Failure to do so may result in damage to property, personal injury or loss of life.
2. Before lighting, check all around the appliance area for gas. Be sure to check at low level because some gas (i.e. LPG) is heavier than air and will settle on the floor.
3. **DO NOT** make any attempt to re-light the appliance if the main burner has extinguished. Wait at least 5 minutes to allow for any unburnt gas to disperse. Ventilate the area if possible.

FOR YOUR SAFETY IF YOU SMELL GAS

1. Turn off gas supply and open windows.
2. Do not operate electrical switches.
3. Extinguish any naked flames.
4. Contact gas supplier if the smell of gas persists.

FOR YOUR SAFETY

Do not store or use petrol, aerosol or other flammable vapours or liquids in the vicinity of this or any other gas appliance.

AIR/GAS MIXTURE ADJUSTMENT

The water heater gas/air mixture is adjusted at the factory for the proper mixture for optimum combustion and ignition for the type of gas listed on the rating label. The water heater should operate properly without requiring adjustment with the gas type shown on the rating label. The following is a guide for the correct mixture adjustment settings in case the gas content is different from the rating label or ignition is not satisfactory. A combustion analyser is necessary for making gas/air mixture adjustments to determine the correct setting.

The water heater cannot be converted from natural to L.P. gas or L.P. gas to natural gas, without changing the gas valve/venturi assembly. Using L.P. gas on a water heater set up for natural gas will result in rough ignitions and dangerous levels of carbon monoxide.

Do not attempt to adjust the venturi screws without a properly calibrated CO₂/CO combustion analyser. Making the mixture richer without an analyser to monitor the adjustments can result in dangerous levels of carbon monoxide.

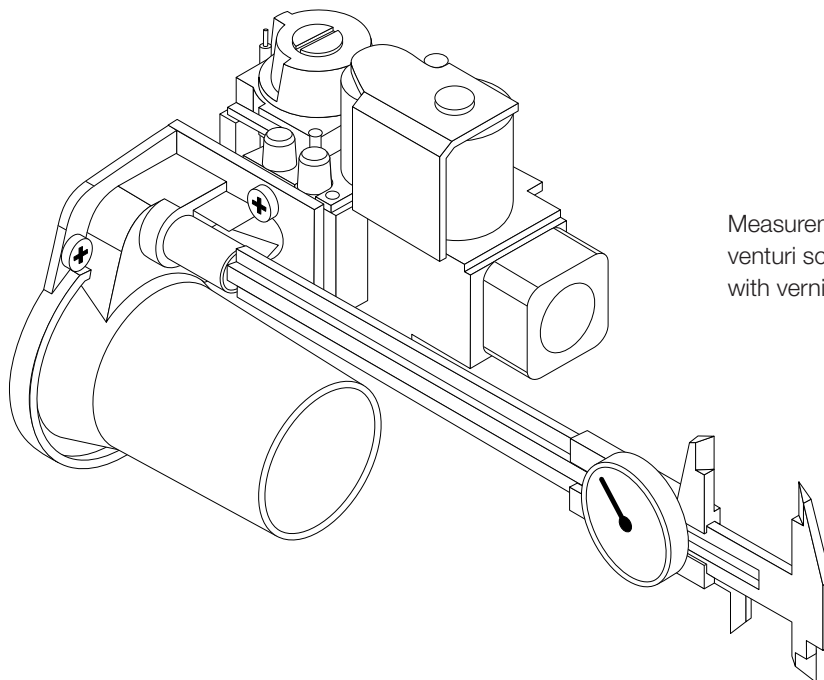
G20 (NATURAL GAS, MOSTLY METHANE) FAMILY

The venturi screw depth, when measured with a set of callipers (see fig. 13), should be approximately 13.0 – 13.5mm. The CO₂ range should be set as detailed in Table 1.

The CO content should be less than 50ppm. If the CO₂ content is above the correct percentage, turn the venturi screw (see fig. 14), clockwise half a turn and recheck combustion. Repeat, if necessary, until the correct reading is achieved. Turn the venturi screw anti-clockwise if the CO₂ reading is less than the stated figure or the ignitions are not smooth.

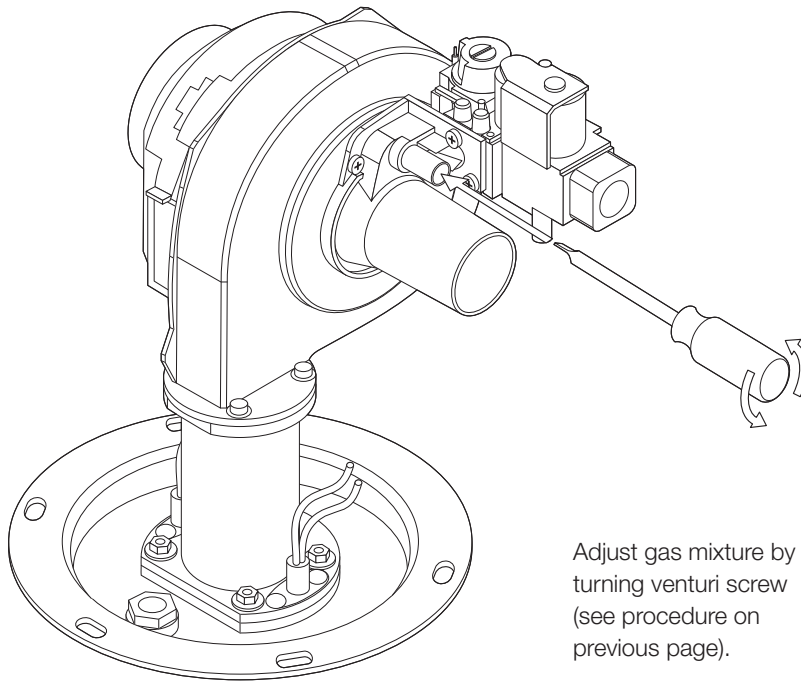
PROPANE GAS MODELS

The burner assembly is factory adjusted for Propane Gas on LPG models. The nominal venturi screw setting is the same as G20 Natural Gas, i.e. 13.0 – 13.5mm screw depth. A gas inlet orifice is used on LPG models to use the same venturi screw setting. The CO₂ range for propane should be set as shown in Table 1, and adjustment carried out as detailed above. The CO content should be less than 50ppm.



Measurement of venturi screw depth with vernier calipers.

Fig. 13



Adjust gas mixture by turning venturi screw (see procedure on previous page).

Fig. 14

CO² PERCENTAGE

Model Reference	Input rating kW/hr	Combustion CO ₂ /CO	Flue Gas Volume Cubic metres/hr	Vent Temperature °C
EC230/600	36.6	11.0%/10 ppm	40	50 – 60
EC230/700	43.9	10.3%/20 ppm	49	50 – 60
EC230/960	58.6	9.7%/10 ppm	63	55 – 60
EC380/740	43.9	10.4%/15 ppm	49	45 – 50
EC380/980	58.6	9.8%/15 ppm	63	50 – 55
EC380/1220	73.2	10.6%/15 ppm	75	50 – 60
EC380/1400	85	11.0%/15 ppm	86	55 – 60
EC380/1900	118.7	11.0%/15 ppm	117	55 – 60

OPERATING INSTRUCTIONS

WARNING

Water heaters are heat-producing appliances. To avoid damage or injury, there must be no materials stored against the water heater or flue system and proper care must be taken to avoid unnecessary contact (especially by children) with the water heater and flue system. UNDER NO CIRCUMSTANCES SHOULD FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNER BE USED OR STORED IN THE VICINITY OF THIS WATER HEATER OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE WATER HEATER.

Installation or service of this water heater requires ability equivalent to that of a licensed tradesman in the field involved. Plumbing, air supply, flueing, gas supply and electrical work are required.

Light the unit in accordance with the operating instructions label attached to the water heater.

Under no circumstances should the input rate exceed the input rate shown on the water heater rating plate. Over firing could result in damage or sooting of the water heater.

If the unit is exposed to the following, do not operate water heater until all corrective steps have been made by a factory authorized, independent service contractor or qualified service professional.

1. Flooding to or above the level of the burner controls
2. External firing
3. Damage
4. Firing without water
5. Sooting

NEVER OPERATE THE WATER HEATER WITHOUT FIRST BEING CERTAIN IT IS FILLED WITH WATER AND A TEMPERATURE AND PRESSURE RELIEF VALVE IS INSTALLED IN THE RELIEF VALVE OPENING OF THE WATER HEATER (UNVENTED INSTALLATIONS ONLY).

GENERAL INSTRUCTIONS

TO FILL THE WATER HEATER

1. Close the water heater drain valve by turning the knob or valve stem clockwise. If alternative water connections are provided but not used, make certain they are plugged (i.e. side connections).
2. Open the cold water supply shut-off valve.
3. Open several hot water taps to allow air to escape from the system.
4. When a steady stream of water flows from the taps, the water heater is filled. Close the taps and check for water leaks at the water heater drain valve, combination temperature and pressure relief valve and the hot and cold water connections.

SEQUENCE OF OPERATION

1. A call for heat from thermostat
2. Blower ON
3. Pressure switch contacts closed (no exhaust pipe blockage)
4. Blower pre-purge
5. Igniter warm-up
6. Main burner ON
7. Flame signal confirmed
8. Thermostat satisfied
9. Main burner OFF
10. Blower post-purge

LIGHTING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

B. BEFORE OPERATING smell all around the appliance for gas. Be sure to smell near to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance
- Do not touch any electric switch

- Do not use any telephone in the building
- If you cannot reach your gas supplier, call the fire brigade.

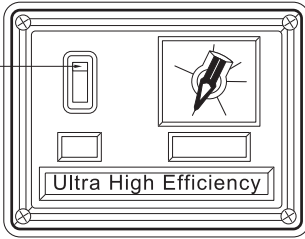
C. Turn off mains power to the water heater.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance. Replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS

1. STOP! read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electrical power to the appliance.
4. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

5. Turn off the main power switch.
6. Wait 5 minutes to clear out any gas. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you do not smell gas go to the next step.
7. Set the thermostat to the desired setting.
8. Turn on main power.



Illuminated main power switch

TO TURN OFF GAS TO THE APPLIANCE

1. Set the thermostat to lowest setting.

2. Turn off main power switch

Fig. 15

TEMPERATURE ADJUSTMENT

During the winter season or any cold period, you may desire a higher temperature setting to adjust for the cold incoming water. This adjustment, however, may cause additional condensation to form on the colder tank surface. This does not mean the tank is leaking. During summer months, the warmer incoming water temperatures will benefit the performance of your water heater and reduce the amount of condensation developed.

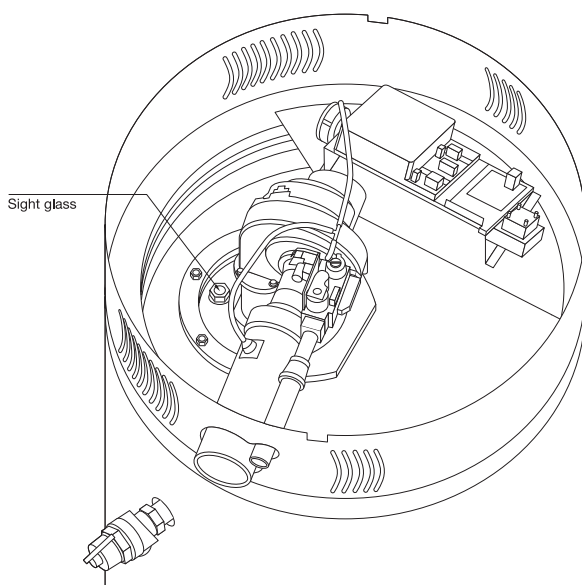
Condensation does not mean your tank is leaking. Most of reported tank leaks on installation's are proven to be condensation. To avoid unnecessary inconvenience and expense, make sure the tank is actually leaking before contacting Andrews Water Heaters.

CAUTION

This water heater is equipped with an energy cut out device to prevent overheating. Should overheating occur or if the gas supply fails to shut off, turn off the manual gas control valve to the appliance and call a qualified service company.

BURNER FLAME CHECK

If the water heater is to remain idle for 30 days or more, or is subjected to freezing temperatures while shut off, the water heater and piping should be fully drained and the drain valve should be left fully open. Refer to the relevant section of the Installation and Operating Instructions Manual for the procedure on draining the water heater.



When properly installed and adjusted, the heater will require minimal attention. Should it become necessary to completely drain the heater, follow instructions given in Section 4, Commissioning.

ECO (ENERGY CUT-OFF)

The heater is equipped with an ECO (Energy Cut-Off) device, fitted to the control thermostat. It is a temperature sensitive switch which opens at high temperature, shutting off gas to the burner in an overheat condition. When the water has cooled sufficiently, the manual reset on the ECO needs to be depressed to allow the heater to be re-lit. If the burner shuts down and is associated with high water temperature, the ECO is probably operational and the cause of overheating should be investigated.

TEMPERATURE STRATIFICATION (STACKING)

When small amounts of hot water are drawn repeatedly, the thermostat responds to each feed of cold water and activates the main burners. Each time this occurs, more heat may be put back in the tank than was drawn off. As this continues, water in the upper level of the tank gets hotter than the thermostat setting. The hotter water does not mix completely with the cold inlet water, but rises in a 'chimney effect' to the top of the tank. Many repetitions of this over a short time results in accumulation of excessively hot water in the upper part of the tank, even when the thermostat control is within limits. This is known as stacking.

To counter this condition, an upper thermostat phial is fitted which senses abnormally hot water and shuts down the main burner until the water cools. Most modern commercial pipe installations include a pumped secondary return system which keeps hot water moving continuously throughout the heater. This stabilises temperatures in the water heater tank and throughout the pipe system.

Fig. 16

MAINTENANCE / SERVICE

INTRODUCTION

Servicing must be carried out by a properly qualified person.

Whilst giving these instructions for the care of the ECOflo, it is recommended that checks are carried out by the installer or local gas service engineer at least annually. Ensure good ventilation by keeping the heater free of extraneous materials and clear of dust and lint. Keep pipework, flue and tops of heaters clear of any combustible materials. A water softener or scale inhibitor should be employed in hard water areas. The heater should be inspected every few months via the hand hole cleanout and scale or silt deposits removed. Failure to do so will shorten heater life and may invalidate the warranty.

PRE-SERVICE OPERATIONS

Before servicing, carry out the following operations.

- 1) Turn off the gas service cock.
- 2) Turn off the cold water supply to the heater.
- 3) Turn on the hot water draw-off taps served by the water heater, or, for multiple installations, turn off the hot water outlet connection valve and secondary return valve.
- 4) Drain down using the drain valve on the heater.

MAINTENANCE SCHEDULE

Following are the instructions for performing some of the recommended maintenance. Unit inspection and adjustment should be performed by a competent qualified engineer.

COMPONENT	OPERATION	INTERVAL	REQUIRED
Tank	Sediment Removal	Every 6 months	Flushing
Relief Valve	Check Operation	Every 6 months	Proper Operation
Exhaust & Air Intake System	Inspect	Every 3 months	Joints should be sealed
Ignition System	Inspect	Annually	Clean off dust and dirt
Flue Vent Terminal	Clean Inlet Screen	As Required	Soft Brush
Flue Terminal – Horizontal or Vertical	Free of Shrubs & Debris	Monthly	Remove object that caused restriction
Combustion System	Inspect	Monthly	Confirm S-OP
Condensate Waste Pipe	Inspect	Monthly	Remove restriction

CORREX POWERED ANODES

As Correx Powered Anodes are fitted as standard to this appliance, no maintenance is necessary.

ANNUALLY

Annual checks of the ignition systems, temperature controls and any other controls are necessary to ensure continued safe and efficient operation.

The entire combustion system must be sealed for this water heater to function correctly. Ensure that the burner access panel is kept tightly sealed. The combustion air supply tee piece at the side of the heater must be tightly clamped to the elbow and concentric flue adaptor. Replace any damaged parts.

The entire exhaust flue system and combustion air supply must be inspected at least annually for integrity of all joints and gaskets.

GENERAL

KEEP APPLIANCE AREA CLEAR AND FREE FROM COMBUSTIBLE MATERIALS, PETROL AND OTHER FLAMMABLE VAPOURS AND LIQUIDS.

Water heater maintenance includes periodic tank flushing and cleaning, and removal of lime scale. The unit should be inspected and adjusted to maintain proper combustion. Refer to Fig. 17 below, “Suggested Maintenance Schedule”. A periodic inspection of the flue installation system should be made.

FLUSHING WATER HEATER

1. Turn OFF the water heater electrical disconnect switch.
2. Open the drain valve and allow water to flow until it runs clean.
3. Close the drain valve when finished flushing.
4. Turn ON the water heater electrical disconnect switch.

DRAINING WATER HEATER

The water heater must be drained if it is to be shut down and exposed to freezing temperatures. Maintenance and service procedures may also require draining the water heater.

1. Turn off the water heater electrical disconnect switch.
2. Connect a hose to the drain valve.
3. Locate hose's discharge in an area where hot water will not cause any damage or injury.
4. Close the cold water inlet valve to water heater.
5. Open a nearby hot water tap to vent the system.
6. Open the heater drain valve.
7. If the water heater is being drained for an extended shutdown, it is suggested the drain valve be left open during this period.

FILLING WATER HEATER

1. Close the water drain valve by turning the knob or valve stem clockwise. If alternative water connections are provided but not used, make certain they are plugged (i.e. side connections).
2. Open the cold water supply shut-off valve.
3. Open several hot water taps to allow air to escape from the system.
4. When a steady stream of water flows from the faucets, the water heater is filled. Close the faucets and check for water leaks at the water heater drain valve, combination temperature and pressure relief valve and the hot and cold water connections.

SEDIMENT AND LIMESCALE

Waterborne impurities consist of the particles of soil and sand, which settle out and form a layer of sediment on the bottom of the tank.

The amount of calcium carbonate (scale) released from water is in direct proportion to water temperature and usage. The higher the water temperature or water usage, the more scale deposits are dropped out of the water. This is the limescale, which forms in pipes, water heaters and on cooking utensils.

Scale accumulation not only reduces the life of the equipment but also reduces efficiency of the water heater and increases fuel consumption.

The usage of water softening equipment greatly reduces the hardness of the water. However, this equipment does not always remove all of the hardness (scale). For this reason it is recommended that a regular schedule of de-scaling be maintained.

The depth of the build-up should be measured periodically. Water heaters will have about 3 inches of scale build-up when the level of scale has reached the bottom of the cleanout opening or about 1 inch of scale build-up if it has reached the drain valve opening. A schedule for de-scaling should be set up, based on the amount of time it would take for a ½ inch build-up of scale.

Example: Initial inspection shows ½ inch of scale accumulation. Therefore, the water can be de-scaled once a year.

TO REMOVE SEDIMENT AND LIMESCALE

1. Drain the heater. Refer to DRAINING THE WATER instructions in this section.
2. Remove outer cover plate from lower side of water heater jacket.
3. Remove cover and gasket from cleanout opening.
4. Remove lime scale or sediment taking care not to damage the glass-lining.
5. Inspect cleanout plate gasket: Replace gasket if necessary (refer to parts list on page 52).
6. Install gasket and cleanout plate. Be sure to draw plate up tight by tightening bolts securely.
7. Close the drain valve. Open a hot water fixture to allow air to escape. Open the cold water supply to water heater and allow the tank to fill. Follow the lighting instructions.
8. Check for water leakage.
9. Install outer jacket cover plate.

TO REPLACE A CORREX ANODE

The Correx Powered Anodes on this water heater are easily accessible from the top of the water heater, under the insulation, towards the front of the appliance by the burner assembly, making replacement (if necessary) simple and quick. Use the following procedure to replace the anodes.

1. Drain the heater. Refer to DRAINING THE WATER HEATER instructions in this section.
2. Flush the heater. Refer to FLUSHING THE WATER HEATER instructions in this section.
3. Remove the combustion surround top by unlatching.
4. Locate the hexagonal head of the anode(s) beneath the tank insulation.
5. Remove the anode using a socket of the appropriate size. Do not use an impact wrench.
6. Replace the anode as required. No pipe tape or sealant is required when reinstalling the anode.
7. Close the drain valve. Open a hot water fixture to allow air to escape. Open the cold water supply to water heater and allow the tank to fill.
8. Check your anode and drain valve for leaks.
9. Replace insulation previously removed.
10. Replace combustion surround top and latch it securely in place.
11. Follow the lighting instructions.

DRAIN VALVE AND TANK ACCESS PANEL

The water heaters are equipped with a $\frac{3}{4}$ inch drain valve. An access panel covers the cleanout opening in the tank, which is sealed by a gasket and cover.

CLEANING THE STORAGE VESSEL

The storage vessel should be checked and cleaned annually

Scale formation in the base of the vessel may occur, particularly in hard water areas, and is normally associated with high usage and high water temperatures. It is characterised by a rumbling noise when the main burner is lit. Scale formation in the base of the vessel will affect the efficiency of the water heater and reduce the life of the storage vessel.

It should be noted that the failure of the storage vessel due to scale formation on the base will not be covered by the terms of the warranty.

Any scale formation which cannot be removed by normal means of cleaning should be removed by chemical descaling. See below.

DESCALING

When descaling the heater, attention is drawn to the following guidelines.

CAUTION: DUE TO THE CORROSIVE NATURE OF DESCALING FLUID, IT IS ESSENTIAL THAT SUITABLE PROTECTIVE CLOTHING IS USED AND ADEQUATE VENTILATION AVAILABLE.

1. Turn gas control to OFF and isolate gas supply.
2. Close water inlet valve and drain heater tank.
3. Remove magnesium anode(s). It is recommended that new anode(s) is (are) fitted.
4. Add suitable hydrochloric acid based descale fluid. The requirement is normally 10 litres or more dependent on the amount of limescale present.
5. After a minimum of one hour, restore gas supply and turn on main gas burner for 2 minute maximum.
6. Isolate gas supply and drain descale fluid through drain port.
7. Open cold water feed valve and fill heater tank.
8. Drain and flush out heater for 20 minutes minimum.
9. Replace anode(s)
10. Restore gas supply and re-light heater.

IMPORTANT

Remove Correx Powered Anodes if fitted and plug off the connections using $\frac{3}{4}$ " BSP plugs.

Re-fit the Correx Powered Anodes when the descaling operation is complete.

RESTART

Re-light and carry out commissioning checks as detailed in Section 4, Commissioning. Set the thermostat control to the required user setting.

COMBINED TEMPERATURE / PRESSURE RELIEF VALVE

At least twice a year, the temperature and pressure relief valve should be checked to ensure that it is in operating condition. To check the relief valve, lift the lever at the end of the valve several times. The valve should sit properly and operate freely.

If water does not flow, remove and inspect for obstructions or corrosion. Replace with a new valve of the recommended size as necessary. A thorough inspection of the valve should be performed at least every three years by removing the temperature and relief valve from the tank. Do not attempt to repair the valve as this could result in improper operation and a tank explosion. In areas with poor water conditions, it may be necessary to inspect the T&P valve more often than the recommended maintenance schedule.

CAUTION

Before manually operating the valve, make sure that a drain line has been attached to the valve to direct the discharge to an open drain. Failure to take this precaution could mean contact with extremely hot water passing out the valve during this checking operation.

If the temperature and pressure relief valve on the water heater discharges periodically or continuously, it may be due to thermal expansion of water in a closed water supply system or due to a faulty relief valve.

Thermal expansion is the normal response of water when it is heated. In a closed system, thermal expansion will cause the system pressure to build until the relief valve actuation pressure is equalled. The relief valve will then open allowing some water to escape, slightly lowering the pressure.

COMBUSTION SYSTEM INSPECTION

Inspect the operation of the combustion system monthly. Use the following procedure to inspect the combustion system.

1. Turn off the main power switch of the water heater.
2. Adjust the thermostat to the Min. setting.
3. Remove the top of the combustion surround by unlatching it.
4. While observing the ignition module, turn on the main power switch.
5. Adjust thermostat to the Max. setting.
6. Watch the LED's light as the controller goes through the S-OP as previously described.
7. Upon ignition, observe the main burner flame.
8. Readjust thermostat to previous setting.
9. Replace combustion surround top and latch it securely in place.

FAULT FINDING

MAIN POWER LIGHT IS NOT LIT

Make sure that the water heater is plugged in.

When the switch is on, is there 230V between L1 and N on the terminal block? If not, check for loose wire connections on the "Power Switch Wire Harness." If connections are ok, replace the switch.

If there is voltage between L1 and N, the light on the switch is burnt out. Replace switch.

THERMOSTAT DOES NOT CALL FOR HEAT

Make sure that the temperature of the tank is cool.

If the thermostat does not call for heat, check the PRIMARY voltage across the "Transformer". If there is voltage across the PRIMARY, check the voltage across the SECONDARY leads of the "Transformer".

Install a jumper wire from N.O. terminal to the COM terminal on the "Thermostat PC Board." If the thermostat calls for heat after installing a jumper wire, replace the "Thermostat Sensor Probe".

If the 'Sensor Probe' is replaced and the unit still does not operate, check "Potentiometer" for the proper resistance. If the readings are correct, replace the "Thermostat PC Board". Otherwise, replace the "Potentiometer."

IGNITION MODULE "POWER" LED IS NOT LIT

Check for 230 VAC at the ignition module on "230 VAC IN." If there is voltage, check the secondary (24 volt terminals) voltage across the transformer as previously described. If there is no voltage from the secondary plug from the transformer, replace the transform or wire harness. If the control has 230 and 24 volt input, replace the control.

BLOWER DOES NOT ENERGIZE

Check for voltage to the blower leads. If 230 volts is present, replace the blower. If no voltage is present, check the blower relay, thermostat/high limit switch and collector unit switch. If the limit switch trips, call our technical support department.

IGNITOR DOES NOT GLOW

Is there voltage to the "Hot Surface Ignitor"? Check for 230VAC to the ignitor from the ignition module when the ignition LED is lit. If not voltage to the ignitor, replace ignition control or the ignitor relay.

Check the resistance value across the "Hot Surface Ignitor". If over 2000 ohms, then replace hot surface ignitor.

MAIN VALVE DOES NOT TURN ON

Put your hand on the gas valve – can you feel it energize? If not, check the voltages at the ignition module across pins MV on the plug GND.

If there is a 24 VAC problem, check to see if the "Rectifier Harness" is secure. If it is secure, replace the "Gas Valve".

If you can feel the gas valve energize, check the main gas supply is not in the off position.

BURNER FLAME KEEPS GOING OUT

Is there minimum gas supplied to water heater as stated on the rating plate? If not, increase the supply pressure to the water heater.

Measure the mircoAmps through the flame sensor using a multimeter. Is there at least 4 microAmps? If not, replace the "Flame Sensor" or flame sensor wire.

THERMOSTAT DOES NOT SATISFY

Is the tank temperature above the temperature set point?

Does the T&P relief valve leak? If yes, replace "Thermostat PC Board."

BLOWER DID NOT POST PURGE

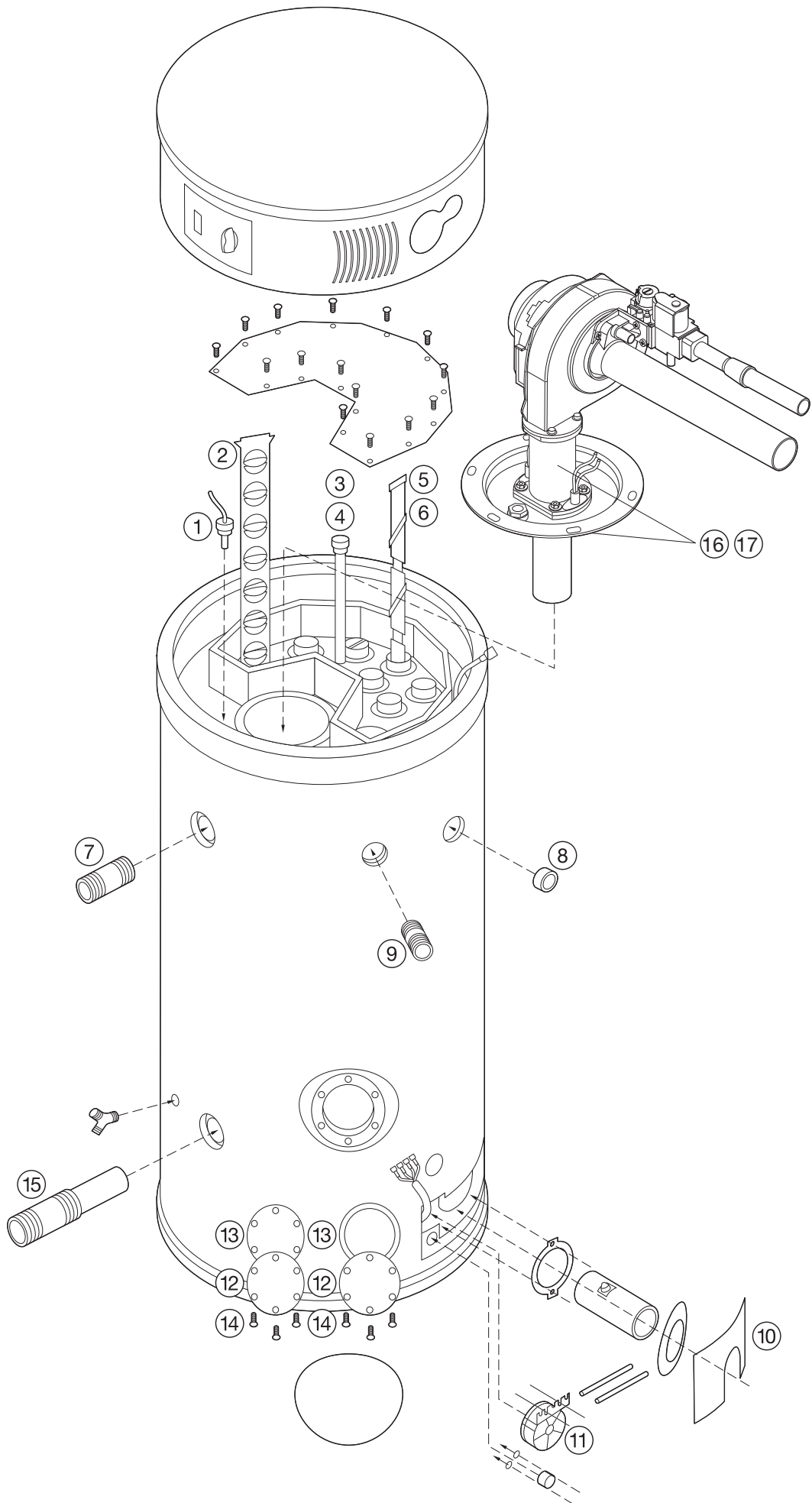
Check "Pressure Switch" (exhaust pressure switch) as previously mentioned.

Check "Collector Limit Switch" as previously mentioned.

If the above switches are functioning, please contact the Technical Support Department at Andrews Water Heaters for further assistance.

PARTS LIST AND ILLUSTRATIONS

Part Ref.	Description	Part Number	Qty
1	Control Thermostat	E883	1
2	Baffle 4" Flue	E881	2
3	Mag. Rod Assembly – 230	C288	1
4	Correx Anode	Z091	2
5	Baffle 2" Flue – 230	E879	8
6	Baffle 2" Flue – 380	E880	8
7	Plastisert Nipple 1½" NPT	E875	1
8	Plug	E902	1
9	Nipple	E874	1
10	Outer Door Service Panel	E899	1
11	Exhaust Pressure Switch	E909	1
12	Cleanout Access Cover	C300	1
13	Cleanout Gasket	C694	1
14	Screw 5/16 – 18 x 3/4 HH Grade 5	E483	6
15	Cold Water Inlet (Hydrojet) Assembly	E876	1
	ECO Switch – High Temperature	E878	1
16	EF Burner Assembly: 600/700/960/740/980	Z079	1
17	EF Burner Assembly: 1200/1400/1900	Z080	1



COMBUSTION SURROUND ASSEMBLY

Part Ref.	Description	Part Number	Qty
1	Ignition Control Assembly	E885	1
2	Switch Main Power	E884	1
3	Potentiometer	E889	1
	High Limit Thermostat	E886	

COMBUSTION ASSEMBLY

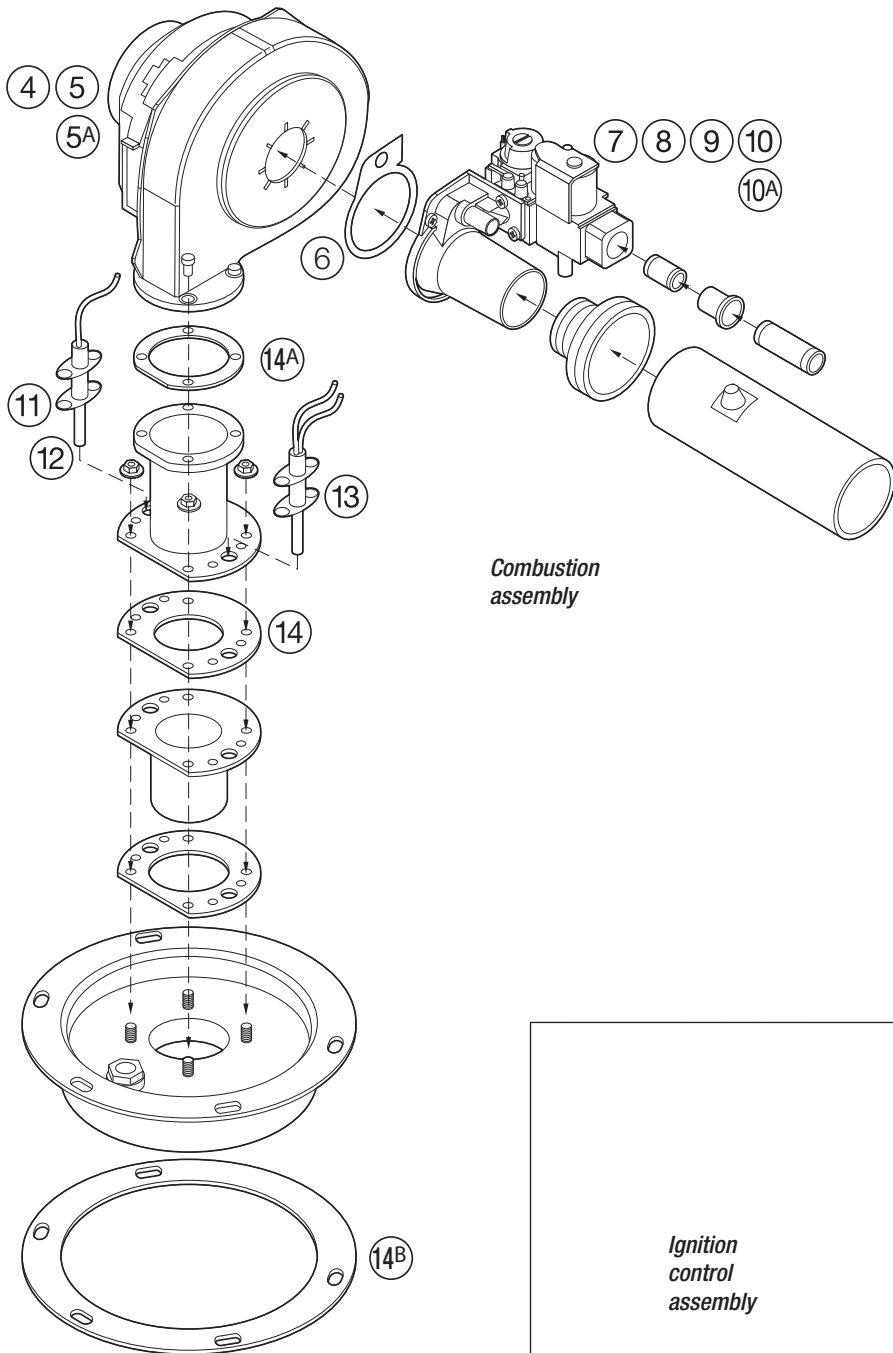
Part Ref.	Description	Part Number	Qty
4	Blower – EBM 600/700/740	E892	1
5	Blower – EBM 960/980/1220/1400	E893	1
5A	Fan Assembly 1900	Z040	1
6	Gasket & Screw	E898	1
7	Gas Valve 600	E894	1
8	Gas Valve 700/740/960/980	E895	1
9	Gas Valve 1220	E896	1
10	Gas Valve 1400	E897	1
10A	Gas valve 1900	G125	1
11	Gasket Flame Sensor	E891	1
12	Flame Sensor	E890	1
13	Hot Surface Ignitor	E877	1
14	Burner Mounting Gasket	E882	1
14A	Blower Transition Gasket	Z082	1
	LPG Gas Valve 600	E901	1
	LPG Gas Valve 700/740/960/980	E902	1
	LPG Gas Valve 1220	E903	1
	LPG Gas Valve 1400	E904	1
	LPG Gas Orifice 600	E905	1
	LPG Gas Orifice 700/740/960/980	E906	1
	LPG Gas Orifice 1220	E907	1
	LPG Gas Orifice 1400	E908	1
14B	Burner Gasket	G168	1

IGNITION CONTROL ASSEMBLY

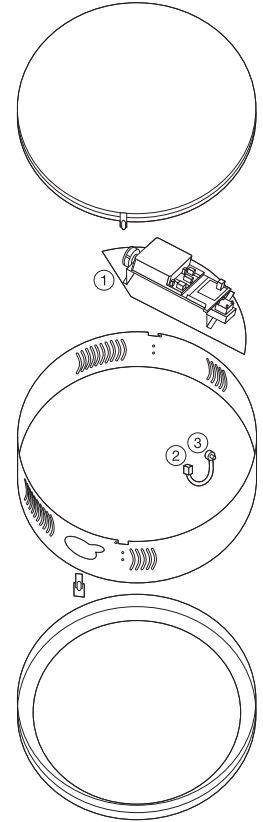
Part Ref.	Description	Part Number	Qty
15	Electronics Control Module	E887	1
16	Transformer – 120/24 VAC	E888	1

LPG GAS VALVE & FAN ASSEMBLY

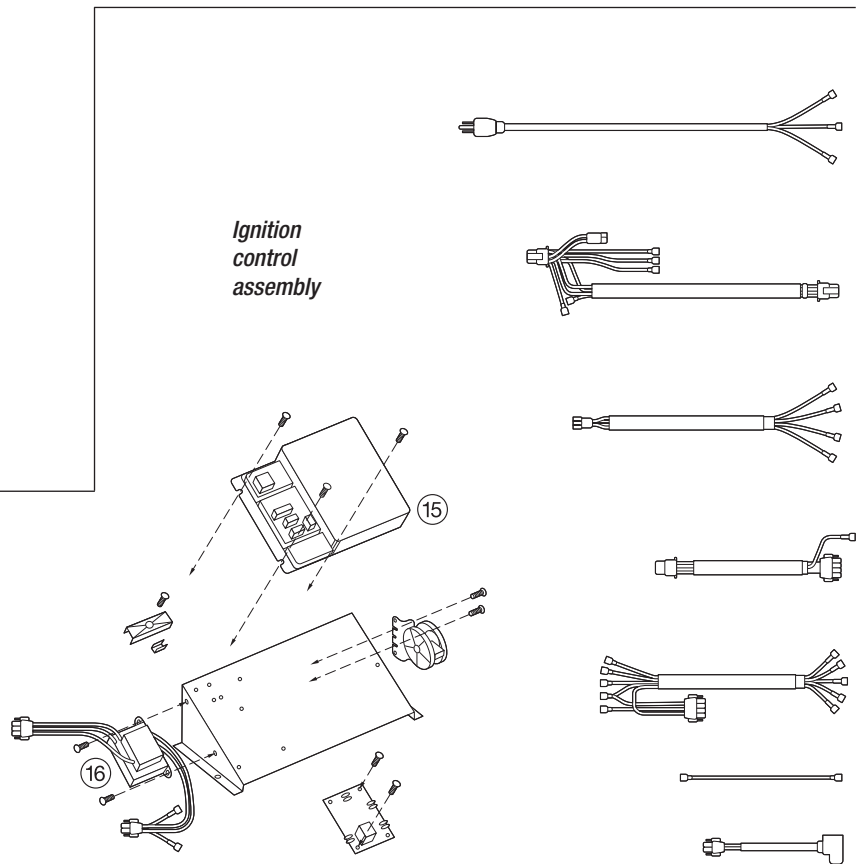
Part Ref.	Description	Part Number	Qty
18	LPG gas valve & fan assembly (Model no 230/600)	Z084	1
18	LPG gas valve & fan assembly (Model no 230/700, 380/740)	Z085	1
18	LPG gas valve & fan assembly (Model no 230/960, 380/980)	Z086	1
18	LPG gas valve & fan assembly (Model no 380/1220)	Z087	1
18	LPG gas valve & fan assembly (Model no 380/1400)	Z088	1
18	LPG gas valve & fan assembly (Model no 380/1900)	Z089	1



Combustion assembly



Combustion surround assembly

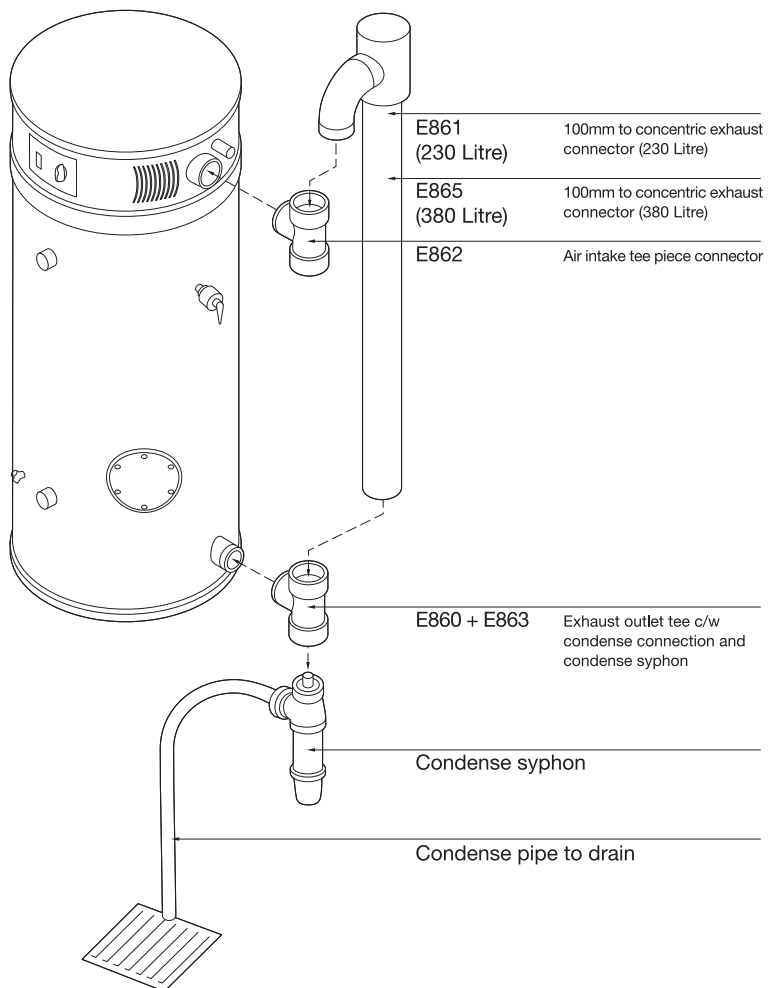
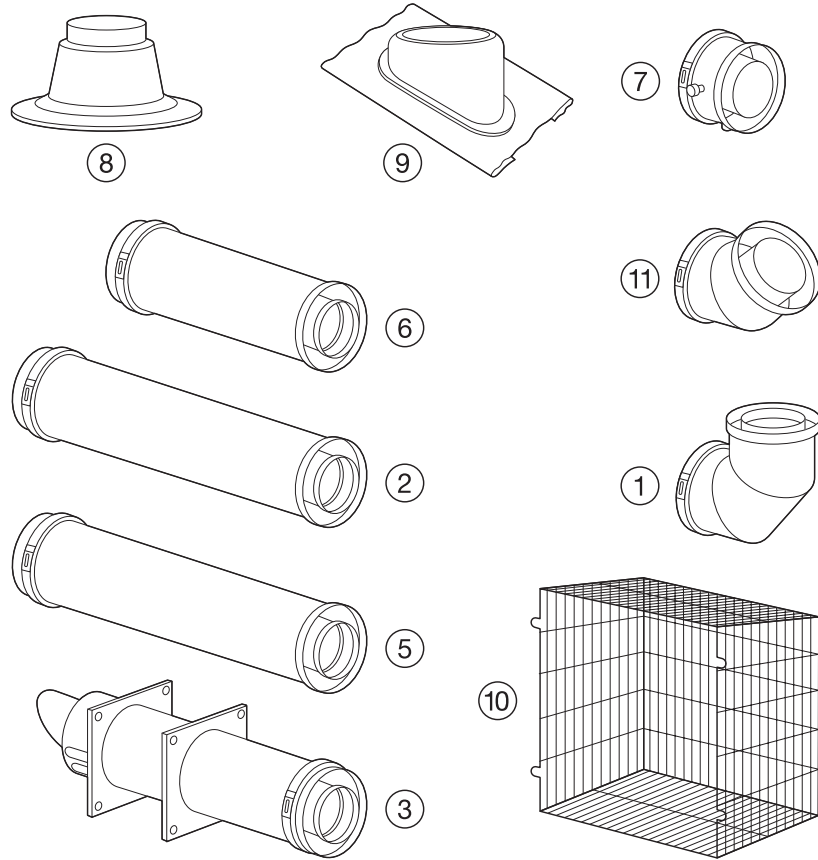


Ignition control assembly

ECOflo Concentric Flue Component List (100/150mm dia.)

Part Ref.	Description	Part Number
1	90° Elbow with Clamp	E205
2	1000mm Flue with Clamp	E202
3	Horizontal Flue Terminal	E236
4	Wall Clamp (not shown)	E209
5	1000mm Cutable Flue with Clamp	E203
6	500mm Flue with Clamp	E204
7	Condensate Trap Tee	E210
8	Flat Roof Plate	E207
9	Angled Roof Plate	E208
10	Horizontal Flue Outlet Terminal Guard	E105
11	45° Elbow with Clamp	E206

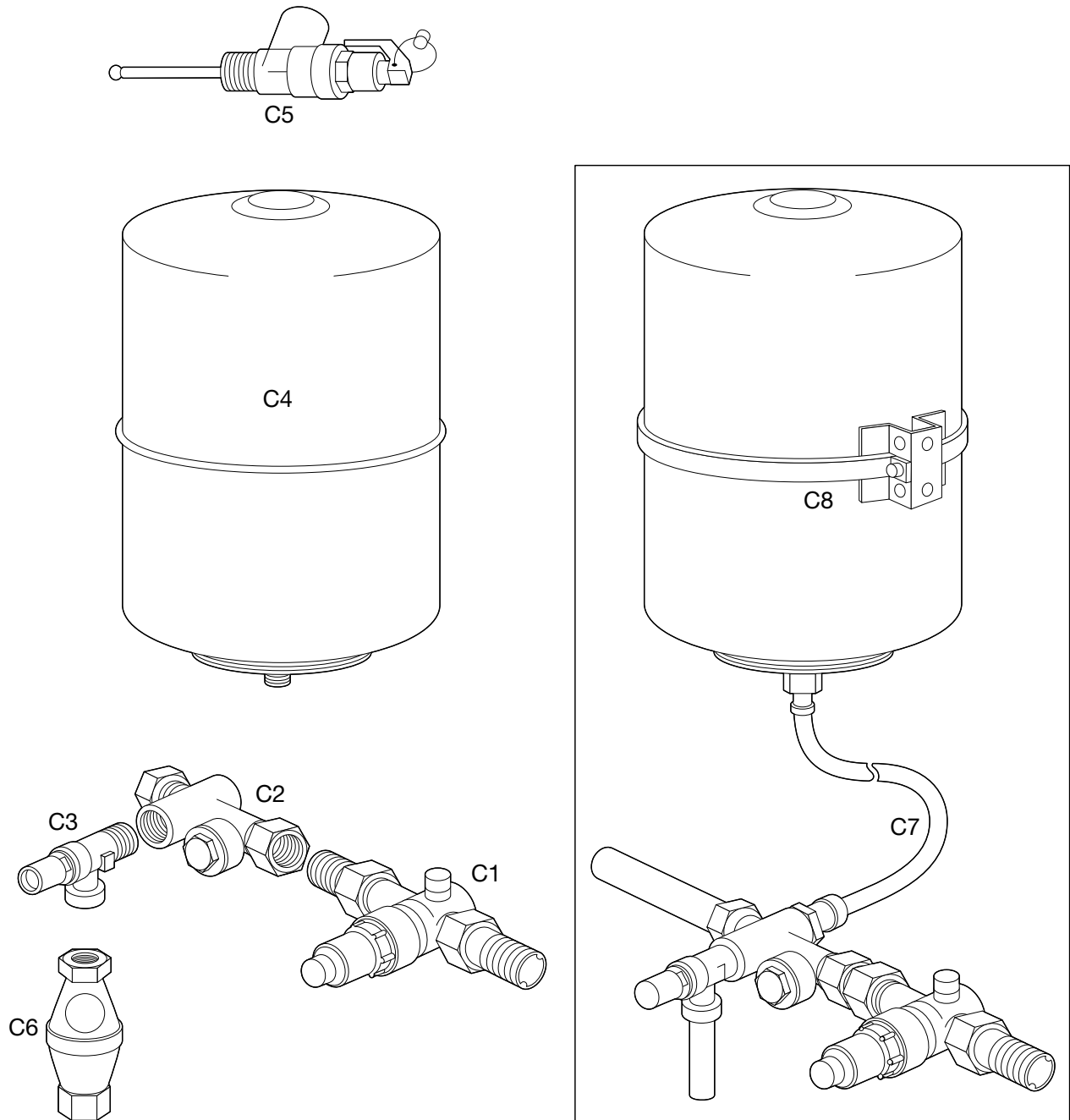
Note: Extra lengths of flue and elbows can be supplied to suit each installation requirement.



ECOflo Unvented System Kit B290 - Parts List

Part ref.	Part Number	Description	Qty
C1	C784	Combined Pressure Reducing Valve/Strainer	1
C2	C785	Check Valve Assembly	1
C3	C786	Expansion Valve	1
C4	C782	Expansion Vessel (25 Litre)	1
C5	C380	Temperature/Pressure Relief Valve 1"	1
C6	C384	Tundish from Expansion Valve and T/P Valve	1
	B173	Expansion Vessel Wall Mounting Kit (Optional)	
C7	C788	Hose Assembly	1
C8	C787	Wall Bracket Assembly	1
N/A	E923	Plinth 150mm	

Unvented system kit components



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