

High efficiency steel boiler

Natural gas

Class D oil

Dual fuel

340 kW

to

7000 kW



- **Seasonal efficiency of over 84% for outputs of 340 kW and above gives compliance with ADL2B 2013 for gas-fired boilers without the need for additional heating credits**
- **Combustion chamber welding detail minimises thermal stress**
- **Very low stand-by losses**
- **Wide range of 2-stage gas and oil, dual-fuel and modulating gas burners available**

Contents	Page
General information	2 & 3
Dimensions	4 - 8
Technical Data	4 - 8
Installation requirements	9 & 10
Boiler wiring	11 & 12

General information

Operating principles

Ellprex are a range of reverse-flame steel boilers, with the third pass through tubes fitted with turbulators to maximise heat exchange (see fig 2 below). For models 340 to 630, the combustion chamber is welded to both the front and rear plates. For models 760 to 7000, the combustion chamber is attached only to the front plate by a double-bevel butt weld (as per EN 303-1 Table 2). This allows the combustion chamber to freely expand and so minimises metallurgical stress.



Fig 1 Ellprex boiler

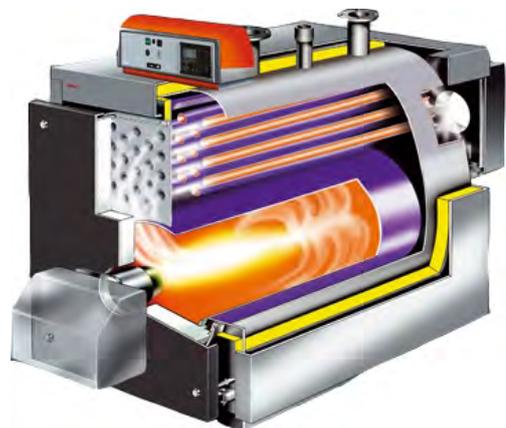
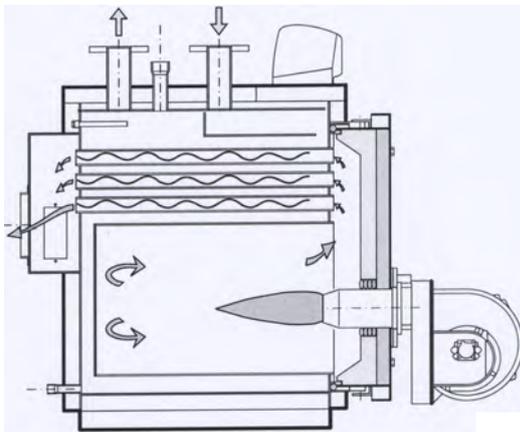


Fig 2 Passage of flue gases

Standby loss and operating loss

Standby losses are the sum of heat losses by radiation and convection from the boiler when the burner is not operating. Reducing these losses makes a significant contribution to high seasonal efficiencies. Ellprex boilers have 80 mm of glass wool insulation mattress with mineral fibre backing to minimise these losses.

General information

Application

The Ellprex range are reverse-flame steel boilers, manufactured and tested in accordance with EN 303 -1. The carbon steel sheet used is to EN 10025 and the boiler tubes are of ST 37.0 steel to DIN 1626. Ellprex are tested in accordance with the Boiler Efficiency Directive 92/42/EEC. They are suitable for use in LTHW or MTHW heating systems with a maximum operating pressure of 6.0 bar or 10 bar to special order (see Technical data). Maximum system operating temperatures are 90°C for LTHW systems and 105°C for MTHW systems.

Ellprex boilers are supplied with Natural gas, Class D oil or Dual fuel burners with 2-stage operation. Modulating burners are optionally available.

The boiler is suitable for use in either open vented or pressurised heating systems. It is not suitable for use as a direct water heater. Where wholesome water is required, a matching calorifier or plate heat exchanger must be provided in the system.

Statutory requirements

Ellprex boilers are CE marked and must be fired by a compatible burner certified to EN676 (gas firing) or EN267 (oil firing) to comply with the Boiler (Efficiency) Directive 1993.

The installation and commissioning of the boiler must be carried out by a qualified engineer in accordance with the instructions provided.

Gas supplies and gas burners must be installed and commissioned by a qualified person, eg. a Gas Safe registered engineer.

Handling

Offloading, dry storing and placing of equipment in the boiler room is the responsibility of the installer. Lifting hooks are attached to the boiler.

Equipment must be dry stored and protected from frost. Cartons must not be crushed or otherwise damaged.

Commissioning

Carnot Consult Ltd undertake commissioning of boilers. Commissioning charges do not include servicing during the guarantee period, although this may be carried out under service contract or to specific order. Boilers should be commissioned in line with CIBSE Commissioning Code B.

Servicing

The importance of regular maintenance cannot be over-emphasised if maximum efficiency is to be maintained. Customers are strongly advised to place the equipment under service contract immediately commissioning is complete.

Guarantee

Subject to correct handling, installation and operation, all equipment is guaranteed for twelve months from the date of despatch. Boiler heat exchangers are guaranteed for a period of two years from the date of despatch.

The guarantee is not valid if the boiler is not installed in accordance with these instructions, becomes blocked with debris and/or carbonate deposits from the system water and/or there is no documented evidence of commissioning by a competent engineer.

Boiler Log book

A boiler log book that provides a permanent record of commissioning and servicing data and measurements is supplied with every boiler. It is recommended that the owner ensures that this log book is kept safe and brought up to date on every occasion that routine or emergency work is carried out on the boiler.

Installation requirements

Electrical supply (Refer Fig 3)

A 400V 3PH supply is required for most standard burners offered. The boiler control panel requires an additional 230V 1PH supply.

If a 230V 1PH burner is being used, the fused supply should be taken to the boiler control panel only. The harness and connector supplied by Carnot will feed the burner.

The electricity supplies to the burner and boiler control panel must be wired in accordance with IEE Regulations. A separate supply and isolating switch is required for each boiler in the plant room.

All isolating switches and fuses must be provided by the installer. Burner start/run currents for fuse specification are available on request. Burner wiring diagrams and technical data are also available on request.

All connections between the boiler control panel and the burner are made through harnesses with matching plugs and sockets, supplied as standard.

Note: Fig 3 is only diagrammatic. Double pole switches with the required minimum separation must always be used.

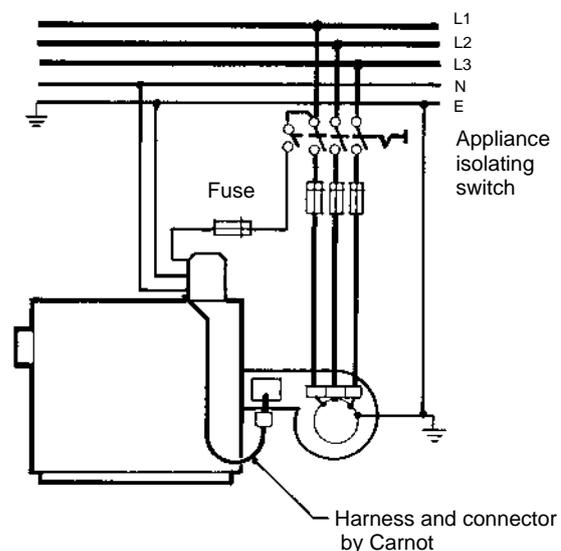
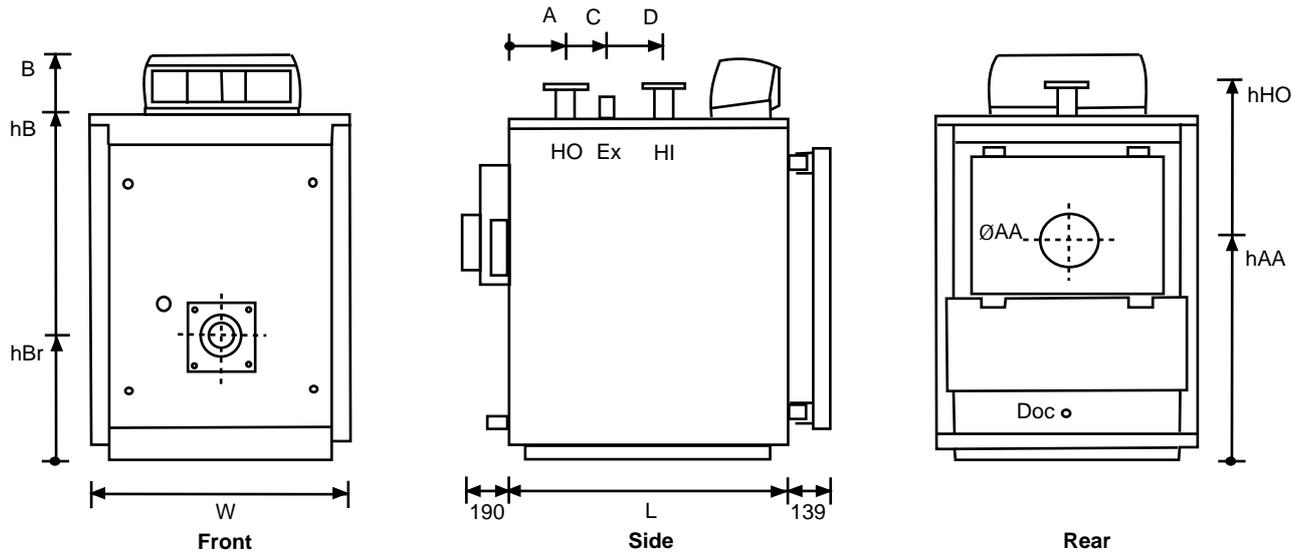


Fig 3 - Electricity supply

Dimensions and Technical data



Dimensions

Boiler model			340	420	510
Overall length	L	mm	1112	1177	1372
Overall width	W	mm	860	890	890
Overall height	B	mm	1372	1542	1542
Boiler height	hB	mm	1182	1352	1352
Burner height	hBr	mm	400	440	440
Boiler flow connection	HO	DN	80	100	100
Boiler return connection	HI	DN	80	100	100
Expansion vessel connection	Ex	Rp	2	2	2
Connection height	hHO	mm	1310	1485	1485
HO centre from rear	A	mm	215	255	255
Ex centre from rear	C	mm	555	540	735
HI centre from rear	D	mm	805	855	1050
Flue spigot (inside dimension)	AA	DN	250	250	250
Flue spigot height	hAA	mm	708	748	748
Drain off cock	Doc	Rp			

Technical data

Nominal heat output (full load)	kW	340	420	510
Nominal heat input (full load) ncv	kW	371	459	557
Efficiency at 100% load (ncv)	%	91.6	91.5	91.5
Efficiency at 30% load (ncv)	%	93.6	93.9	93.9
Boiler seasonal efficiency (1)	%	84	84.2	84.2
Oil consumption (ncv)	kg/h	31.3	38.7	47
Natural gas consumption (gross cv)	m ³ /h	38.3	47.4	57.5
Dry weight	kg	629	796	919
Water content	l	298	398	462
Gas side resistance	Pa	333	284	421
Flue gas temperature rise Class D oil	°C	164	166	165
Flue gas mass flow (Max)	kg/h	568	702	852
Flue gas temperature rise Natural gas	°C	152	154	153
Flue gas mass flow (Max)	kg/h	557	689	837
CO ₂ in flue gas Class D oil	%	12.8	12.8	12.8
CO ₂ in flue gas Natural gas	%	9.8	9.8	9.8
Maximum hydraulic working pressure	bar			

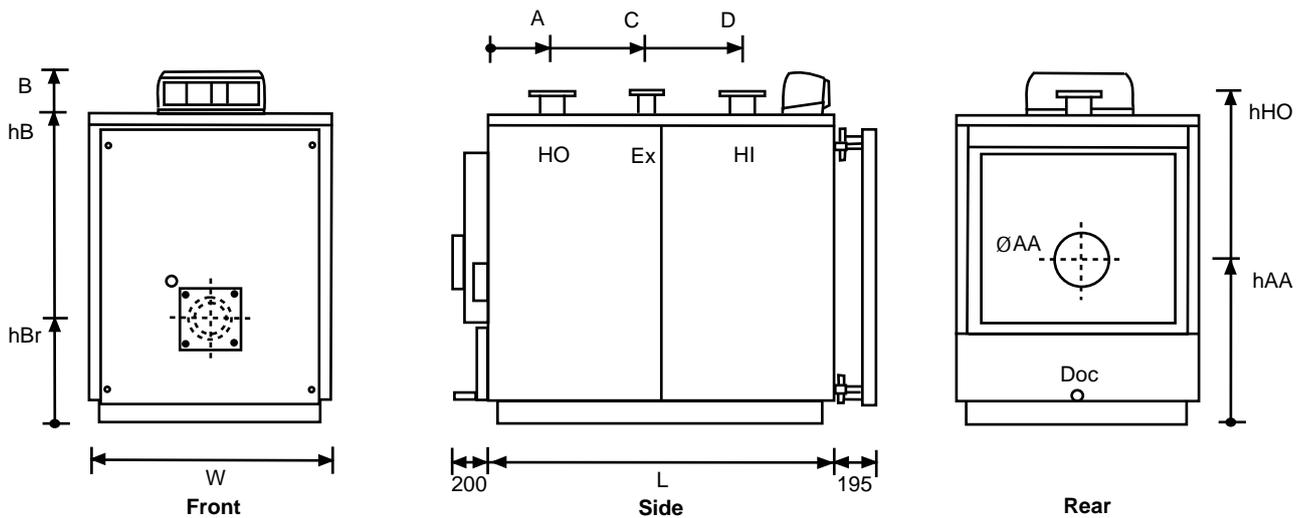
Notes: (1) Calculated from the non-domestic building services compliance guide for conformance with ADL2A and ADL2B 2013 using the formula $n_{\text{seasonal}} = 0.81n_{30\%} + 0.19n_{100\%}$

Water flow rates and hydraulic resistances

Water flow rate at 15°C temp. rise	l/s	5.4	6.7	8.1
Hydraulic resistance at 15°C temp. rise	kPa	2.74	1.67	2.45
Min water flow rate (2)	l/s	2.1	2.6	3.1
Hydraulic resistance at min flow rate	kPa	1	1	1

Notes: (2) Minimum boiler return temperature is 55°C

Dimensions and Technical data



Dimensions

Boiler model			760	870	970
Overall length	L	mm	1605	1800	1995
Overall width	W	mm	1122	1122	1122
Overall height	B	mm	1622	1622	1622
Boiler height	hB	mm	1432	1432	1432
Burner height	hBr	mm	480	480	480
Boiler flow connection	HO	DN	125		
Boiler return connection	HI	DN	125		
Expansion vessel connection	Ex	DN	65		
Connection height	hHO	mm	1540	1540	1540
HO centre from rear	A	mm	298	298	298
Ex centre from rear	C	mm	733	928	1123
HI centre from rear	D	mm	1173	1368	1563
Flue spigot (inside dimension)	AA	DN	350		
Flue spigot height	hAA	mm	765	765	765
Drain off cock	Doc	Rp	1¼		

Technical data

Nominal heat output (full load) ncv	kW	760	870	970
Nominal heat input (full load) ncv	kW	830	950	1060
Efficiency at 100% load (ncv)	%	91.5	91.5	91.5
Efficiency at 30% load (ncv)	%	93.9	93.9	93.9
Boiler seasonal efficiency (1)	%	84.2	84.2	84.2
Oil consumption (ncv)	kg/h	70	80.1	89.4
Natural gas consumption (gross cv)	m³/h	85.7	98.1	109.5
Dry weight	kg	1341	1447	1553
Water content	l	671	753	836
Gas side resistance	Pa	500	559	480
Flue gas temperature rise Class D oil	°C	173	172	177
Flue gas mass flow (Max)	kg/h	1271	1454	1632
Flue gas temperature rise Natural gas	°C	161	160	165
Flue gas mass flow (Max)	kg/h	1247	1428	1593
CO ₂ in flue gas Class D oil	%	12.8	12.8	12.8
CO ₂ in flue gas Natural gas	%	9.8	9.8	9.8
Maximum hydraulic working pressure	bar	6		

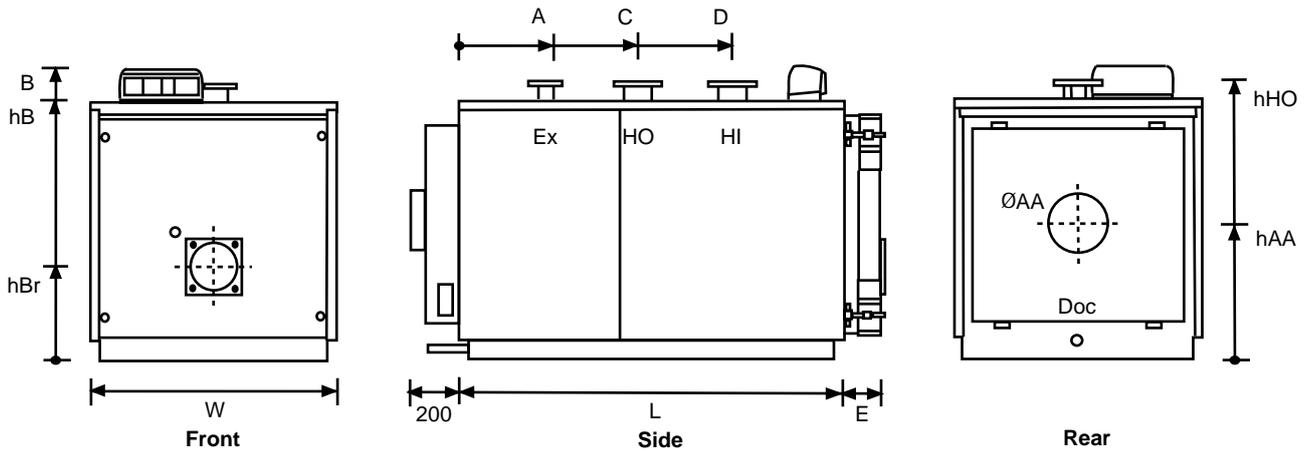
Notes: (1) Calculated from the non-domestic building services compliance guide for conformance with ADL2A and ADL2B 2013 using the formula $n_{\text{seasonal}} = 0.81n_{30\%} + 0.19n_{100\%}$

Water flow rates and hydraulic resistances

Water flow rate at 15°C temp. rise	l/s	12.1	13.9	15.5
Hydraulic resistance at 15°C temp. rise	kPa	2.55	3.23	4
Min water flow rate (2)	l/s	4.6	5.3	5.9
Hydraulic resistance at min flow rate	kPa	1	1	1

Notes: (2) Boiler minimum return temperature is 55°C

Dimensions and Technical data



Dimensions

Boiler model			1100	1320	1570	1850	2200	2650
Overall length	L	mm	1952	2292	2282	2652	2692	3014
Overall width	W	mm	1352	1352	1462	1462	1622	1622
Overall height	B	mm	1622	1622	1732	1732	1892	1892
Boiler height	hB	mm	1432	1432	1542	1542	1702	1702
Burner height	hBr	mm	595	595	640	640	690	690
Boiler flow connection	HO	DN	150	150	175	175	200	200
Boiler return connection	HI	DN	150	150	175	175	200	200
Expansion vessel connection	Ex	DN	80	80	100	100	125	125
Connection height	hHO	mm	1540	1540	1650	1650	1810	1810
HO centre from rear	A	mm	461	461	561	561	661	662
Ex centre from rear	C	mm	791	1131	1071	1441	1331	1652
HI centre from rear	D	mm	1291	1631	1621	1991	2031	2352
Projection of door	E	mm	207	207	227	227	258	258
Flue spigot (inside dimension)	AA	DN	400	400	450	450	520	520
Flue spigot height	hAA	mm	810	810	880	880	950	950
Drain off cock	Doc	Rp	1¼					

Technical data

Nominal heat output (full load)	kW	1100	1320	1570	1850	2200	2650
Nominal heat input (full load) ncv	kW	1200	1442	1715	2020	2400	2890
Efficiency at 100% load (ncv)	%	91.6	91.5	91.5	91.5	91.6	91.6
Efficiency at 30% load (ncv)	%	93.9	93.9	93.9	93.9	93.9	93.9
Boiler seasonal efficiency (1)	%	84.2	84.2	84.2	84.2	84.2	84.2
Oil consumption (ncv)	kg/h	101.2	121.6	144.6	170.3	202.4	243.7
Natural gas consumption (gross cv)	m³/h	123.9	148.9	177.1	208.6	247.8	298.4
Dry weight	kg	1821	2030	2780	3280	4145	4465
Water content	l	1040	1242	1418	1617	2086	2324
Gas side resistance	Pa	510	657	588	715	637	745
Flue gas temperature rise Class D oil	°C	175	179	177	178	176	175
Flue gas mass flow (Max)	kg/h	1837	2208	2626	3093	3675	4425
Flue gas temperature rise Natural gas	°C	163	166	165	166	164	163
Flue gas mass flow (Max)	kg/h	1803	2167	2577	3036	3607	4344
CO ₂ in flue gas Class D oil	%	12.8	12.8	12.8	12.8	12.8	12.8
CO ₂ in flue gas Natural gas	%	9.8	9.8	9.8	9.8	9.8	9.8
Maximum hydraulic working pressure	bar	6					

Notes: (1) Calculated from the non-domestic building services compliance guide for conformance with ADL2A and

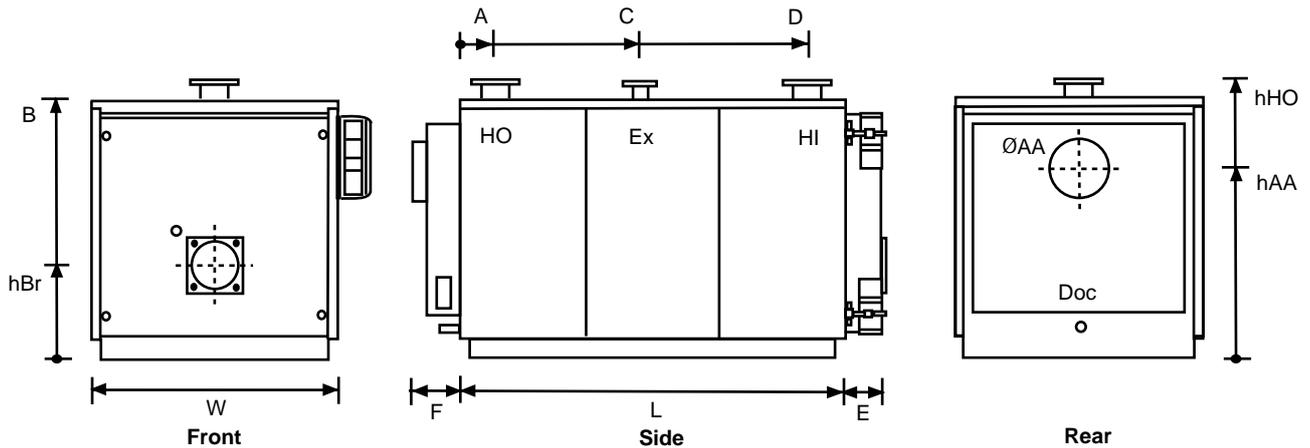
ADL2B 2013 using the formula $n_{seasonal} = 0.81n_{30\%} + 0.19n_{100\%}$

Water flow rates and hydraulic resistances

Water flow rate at 15°C temp. rise	l/s	17.5	21.1	25	29.5	35.1	42.3
Hydraulic resistance at 15°C temp. rise	kPa	2.94	3.43	3.23	4.41	3.33	4.7
Min water flow rate (2)	l/s	6.7	8.1	9.6	11.3	13.4	16.2
Hydraulic resistance at min flow rate	kPa	1	1	1	1	1	1

Notes: (2) Boiler minimum return temperature is 55°C

Dimensions and Technical data



Dimensions

Boiler model			3000	3500	4000
Overall length	L	mm	3230	3194	3594
Overall width	W	mm	1720	1970	1970
Overall height	B	mm	1830	2090	2090
Burner height	hBr	mm	772	915	915
Boiler flow connection	HO	DN	200	200	250
Boiler return connection	HI	DN	200	200	250
Expansion vessel connection	Ex	DN	125		
Connection height	hHO	mm	1990	2271	2271
HO centre from rear	A	mm	325	377	377
Ex centre from rear	C	mm	1425	1437	1837
HI centre from rear	D	mm	2755	2717	3257
Boiler door projection	E	mm	295	325	325
Flue hood projection	F	mm	340	390	360
Flue spigot (inside dimension)	AA	DN	570	620	620
Flue spigot height	hAA	mm	1315	1535	1535
Drain off cock	Doc	Rp	1½		

Technical data

Nominal heat output (full load) ncv	kW	3000	3500	4000
Nominal heat input (full load) ncv	kW	3280	3825	4371
Efficiency at 100% load (ncv)	%	91.4	91.4	91.5
Efficiency at 30% load (ncv)	%	93.9	93.9	93.9
Boiler seasonal efficiency (1)	%	84.2	84.2	84.2
Oil consumption (ncv)	kg/h	276.6	322.5	368.5
Natural gas consumption (gross cv)	m³/h	338.7	395	451.3
Dry weight	kg	5110	6700	7500
Water content	l	2667	4142	4455
Gas side resistance	Pa	588	764	784
Flue gas temperature rise Class D oil	°C	180	180	179
Flue gas mass flow (Max)	kg/h	5022	5861	6693
Flue gas temperature rise Natural gas	°C	167	167	166
Flue gas mass flow (Max)	kg/h	4930	5754	6570
CO ₂ in flue gas Class D oil	%	12.8	12.8	12.8
CO ₂ in flue gas Natural gas	%	9.8	9.8	9.8
Maximum hydraulic working pressure	bar	6		

Notes: (1) Calculated from the non-domestic building services compliance guide for conformance with ADL2A and

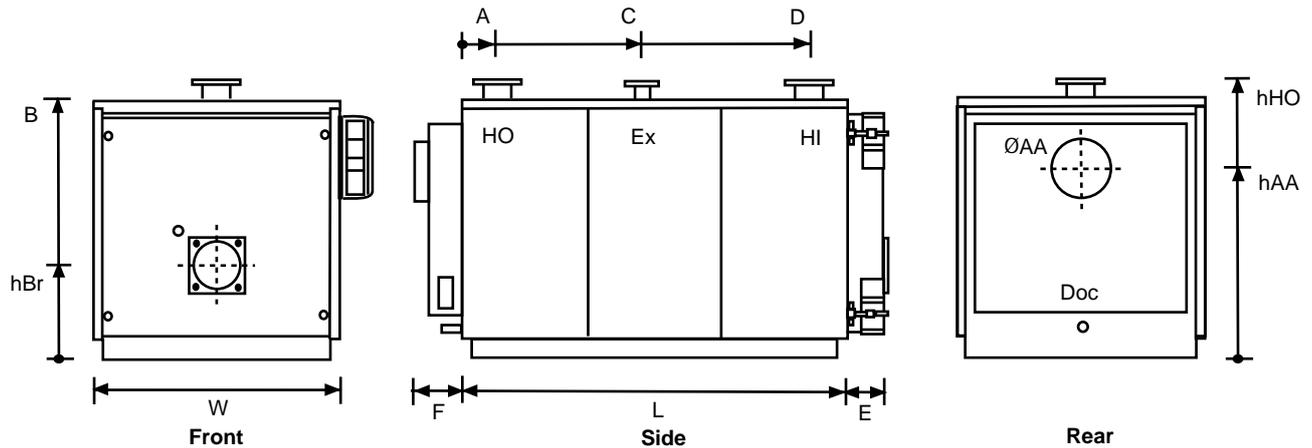
$$ADL2B 2013 \text{ using the formula } \mathbf{n_{seasonal} = 0.81n_{30\%} + 0.19n_{100\%}}$$

Water flow rates and hydraulic resistances

Water flow rate at 15°C temp. rise	l/s	47.8	55.8	63.8
Hydraulic resistance at 15°C temp. rise	kPa	6.1	8.23	8.33
Min water flow rate (2)	l/s	18.3	21.4	24.4
Hydraulic resistance at min flow rate	kPa	2	2	2

Notes: (2) boiler minimum return temperature is 55°C

Dimensions and Technical data



Dimensions

Boiler model			4500	5000	5500	6000	6500	7000
Overall length	L	mm	3820	3820	3970	3970	4380	4380
Overall width	W	mm	2088	2088	2214	2214	2380	2380
Overall height	B	mm	2533	2553	2663	2663	2860	2860
Burner height	hBr	mm	987	987	1007	1007	1100	1100
Boiler flow connection	HO	DN	250	250	250	250	250	250
Boiler return connection	HI	DN	250	250	250	250	250	250
Expansion vessel connection	Ex	DN	125	125	125	125	125	125
Connection height	hHO	mm	2253	2253	2653	2653	2860	2860
HO centre from rear	A	mm	320	320	320	320	325	325
Ex centre from rear	C	mm	2025	2025	2175	2175	2920	2920
HI centre from rear	D	mm	1665	1665	1815	1815	670	670
Projection of door	E	mm	445	445	465	465	595	595
Flue spigot (inside dimension)	AA	DN	660	660	660	660	720	720
Flue spigot height	hAA	mm	1437	1437	1550	1550	1650	1650
Drain off cock	Doc	Rp	1 1/2					

Technical data

Nominal heat output (full load)	kW	4500	5000	5500	6000	6500	7000
Nominal heat input (full load) ncv	kW	4838	5421	5914	6506	6989	7590
Efficiency at 100% load (ncv)	%	93	92.2	93	93	93	92.2
Efficiency at 30% load (ncv)	%	93.65	92.22	93	92.22	93	92.2
Boiler seasonal efficiency (1)	%	84.27	83.09	83.79	83.22	83.79	83.07
Oil consumption (ncv)	kg/h	407.9	457	498.6	548.5	589.2	639.9
Natural gas consumption (gross cv)	m ³ /h	499.5	559.7	610.6	671.7	721.6	783.6
Dry weight	kg	8310	8310	9300	9300	12600	12600
Water content	l	6012	6012	7058	7058	7909	7909
Gas side resistance	Pa	863	1078	980	1176	1029	1176
Flue gas temperature rise Class D oil	°C	180	180	180	180	180	180
Flue gas mass flow (Max)	kg/h	7409.6	8302.5	9056.1	9963.1	10702.7	11623.5
Flue gas temperature rise Natural gas	°C	170	170	170	170	170	170
Flue gas mass flow (Max)	kg/h	7273.3	8149.8	8889.5	9779.7	10505.8	11409.7
CO ₂ in flue gas Class D oil	%	12.8	12.8	12.8	12.8	12.8	12.8
CO ₂ in flue gas Natural gas	%	9.8	9.8	9.8	9.8	9.8	9.8
Maximum hydraulic working pressure	bar	6					

Notes: (1) Calculated from the non-domestic building services compliance guide for conformance with ADL2A and ADL2B 2013 using the formula $n_{\text{seasonal}} = 0.81n_{30\%} + 0.19n_{100\%}$

Water flow rates and hydraulic resistances

Water flow rate at 15°C temp. rise	l/s	71.5	79.5	87.4	95.4	103.3	111.3
Hydraulic resistance at 15°C temp. rise	mh ₂ o	0.85	1.05	1.15	1.35	1.5	1.75
Hydraulic resistance at 15°C temp. rise	kPa	8.3356525	10.296983	11.277648	13.238978	14.709975	17.161638
Min water flow rate (2)	l/s	35.8	39.8	43.8	47.7	51.7	55.7
Hydraulic resistance at min flow rate	kPa	2	2	2	2	2	2

Notes: (2) Boiler minimum return temperature is 55°C

Installation requirements

Boiler location (See fig 4)

The location chosen for the boiler(s) must be frost free, provide for a satisfactory flue system and an adequate air supply for combustion and ventilation. Adequate access is necessary for boiler and burner servicing.

Boilers must not be installed in areas where inflammable vapours are likely to be present. To avoid damage to the boilers, contamination of the combustion air by high levels of dust or halogenated hydrocarbons (eg. Solvents, spray can propellants, cleaning agents, adhesives, etc) must be avoided.

Boilers should be installed on a plinth which is at least 50mm high and is smooth and level. The plinth must support the entire boiler base, eg minimum dimensions will be W x L from pages 4 to 7. (NB : For some burners with acoustic shrouds the plinth may need to be higher - refer Clyde Sales Office).

Burners

Boilers can be supplied with two stage Natural gas, Class D oil or Dual fuel burners. Modulating burners are also available with load-matching control equipment. A choice of burner makes is available.

Fuel specification

Natural gas (GCV 38.76 MJ/m³) with a minimum gas inlet pressure according to the burner model specified.

BS2869 Class D oil (35 sec). Advice should be sought from the oil supplier regarding the storage of Class D oil.

Fuel supply pipework

Install gas or oil supply pipe(s) and service valve(s) so as to allow free access to the boiler and full opening of the furnace door without removing the burner from the boiler door (see below).

Commissioning of the gas supply pipework and components must be carried out by a qualified person, eg, a Gas Safe registered engineer. The gas meter and supply must be sited in accordance with the requirements of BS6400.

Plant room layout

When planning the layout of the boiler room, allowance must be made for opening the boiler door, boiler cleaning and maintenance. The boiler door may be hinged from the right (as illustrated) or the left.

The table below shows the minimum clearances around the boiler.

Dimension W2 = length of burner + 200mm.

Dimension L1 = length of boiler (recommended) for cleaning

Dimension W1 = 1000mm for access to rear of boiler

Dimension W3 = minimum 600mm

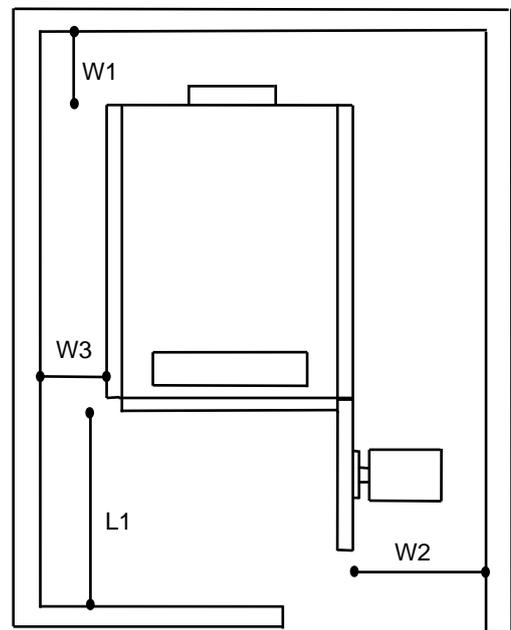


Fig 4 Boiler clearances

Installation requirements

Air supply

Air for ventilation and combustion must be provided for gas fired boilers in accordance with either BS 6644:2011 or IGE/UP/10. Air supply for oil fired boilers must conform to BS 5410 : Part 2.

Chimney design

The Ellprex boiler is designed to operate with a pressurised combustion chamber and the chimney is not required to assist the burner in overcoming the boiler resistance. The chimney must cater for the total internal resistance of the flue system from each boiler outlet and not impose an additional load on the burner.

Water circulation (See figs 5 & 6)

The flow water temperature from the boiler must reach 60°C (gas firing) or 55°C (oil firing) within 10 minutes of the boiler being brought into operation. Thereafter, water circulation should be maintained through the boiler such that the boiler flow water temperature is always above 60°C (gas firing) or 55°C (oil firing). A pump overrun facility is necessary to ensure that water circulation is maintained for at least three minutes after the boiler is switched off. It is also important that a minimum flow be maintained through the boiler at all times - see Technical

data on pages 4 to 7. A pump overrun facility is necessary to ensure that water circulation is maintained for at least three minutes after the boiler is switched off.

The minimum return water temperature for the boiler is 55°C.

There are several ways of providing boiler protection and minimum flow rates, eg shunt pumps, primary loops, etc. A typical boiler pump and 3-port valve arrangement is shown in fig 5.

For multi-boiler systems a 'reverse return' pipework configuration is required to ensure equal distribution of water flow through the boilers.

Water treatment

Whenever a new boiler is connected to an existing system, the pipework must be thoroughly cleaned and flushed. Cannot recommend that a permanent means of filtration be fitted into the return pipework, such as a sludge trap, hydrocyclone or full flow duplex filters. The boiler guarantee will be invalid if waterways are blocked by debris or carbonate deposits. Long term water treatment is essential to the economic operation and life of both new and refurbished heating systems.

For full information on cleaning, flushing and protecting hot water systems, refer to BSRIA Application Guide AG 1/2001.

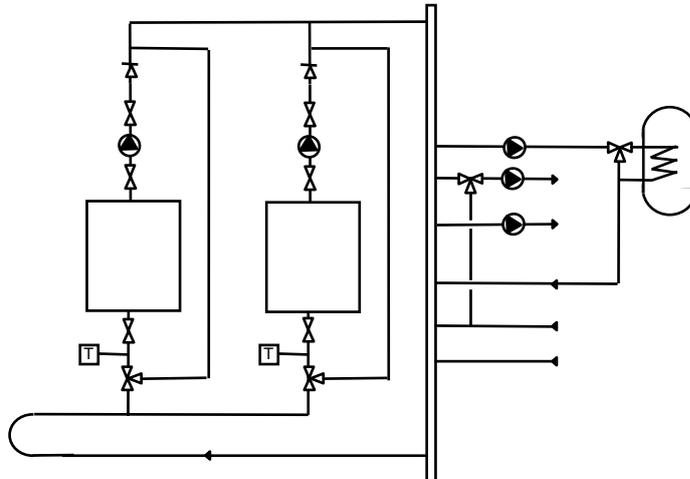


Fig 5 Multiple boilers with individual pumps

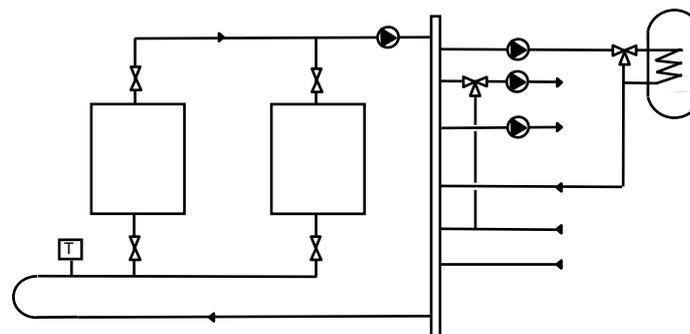


Fig 6 Alternative arrangement for boiler protection with a primary loop

Boiler control panel

Control panel 21057 (see fig 7) provides either 1-stage burner control for on/off, modulating or LFS operation or 2-stage burner control for high/low operation via a dual-thermostat with a fixed differential of 6°C. There is an overheat limit thermostat and a switch for control of a circulating pump via a relay (not supplied). If this pump control is used, there is a minimum temperature thermostat within the module that will hold back the pump until the boiler reaches 55°C.

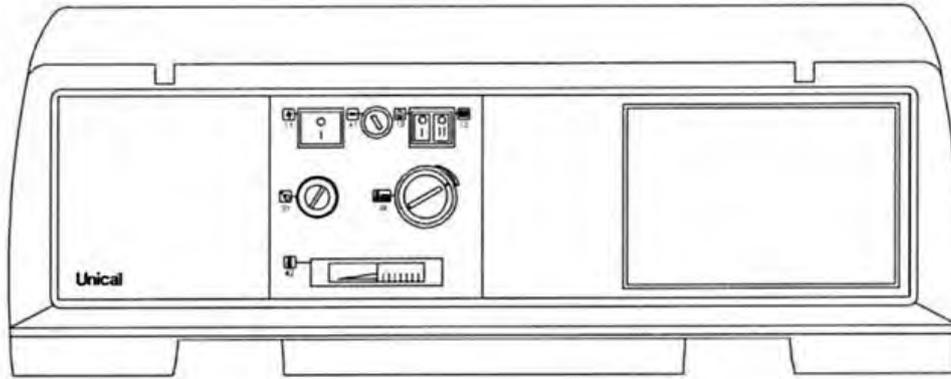


Fig 7 Boiler control panel 21057

Control panel 21057 standard components

Illuminated on/off switch
4A fuse

Overheat limit thermostat and manual reset
Boiler on/off switch

Circulating pump on/off switch (relay required)
Control thermostat (range 60°C to 90°C)
Thermometer

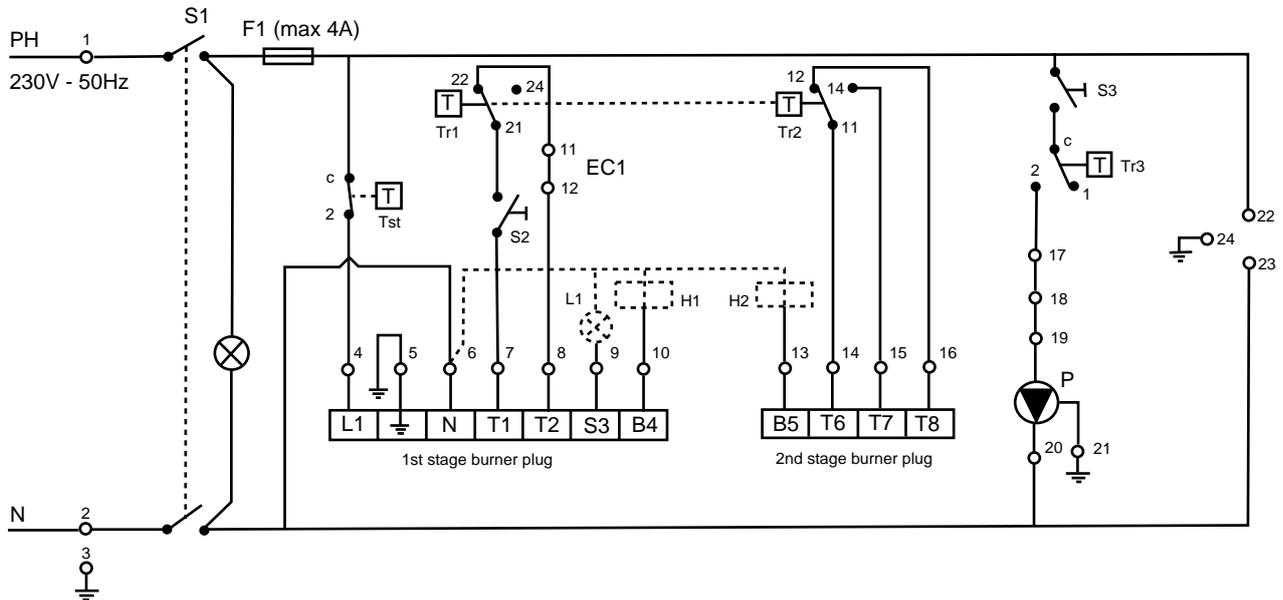


Fig 8 wiring schematic

Key to fig 8 wiring schematic

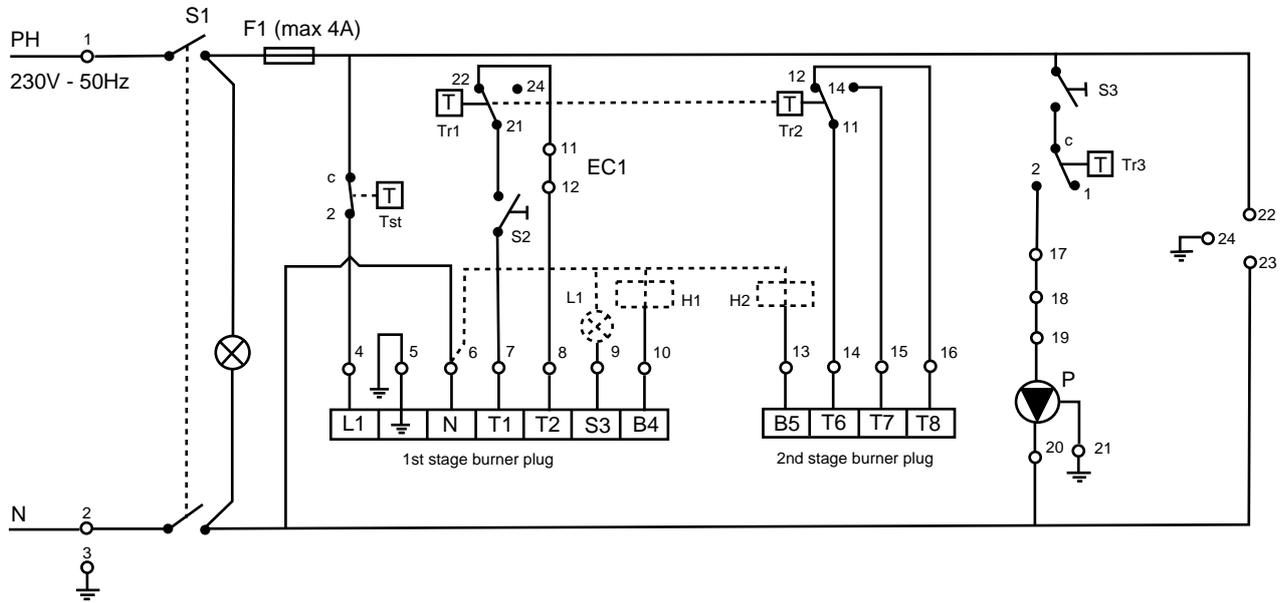
EC1 External volt-free control (eg timeclock)
H1 External stage 1 hours run counter
H2 External stage 2 hours run counter
L1 External remote lock-out lamp
P External circulating pump
S1 Panel on/off switch

S2 Burner on/off switch
S3 Circulating pump on/off switch
Tst Boiler overheat thermostat (100°C)
Tr1 Stage 1 thermostat (60°C to 90°C)
Tr2 Stage 2 thermostat (54°C to 84°C)
Tr3 Minimum temperature thermostat (50°C)

Boiler control panel with volt-free indicators

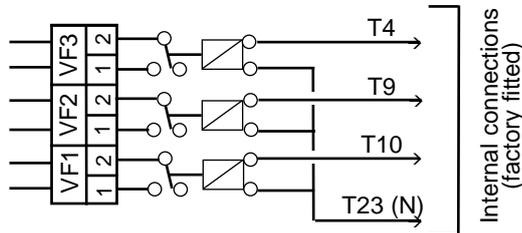
Control panel 21057 is optionally available with volt-free indicators for ;

- Boiler run / total hours run
- Burner lock-out
- Boiler high-temperature lock-out



- Volt-free indication boiler overheat (nc)
- Volt-free indication burner lockout (no)
- Volt-free indication total hours run (nc)

External wiring by installer



Optional volt-free relay module

Fig 9 wiring schematic with optional volt-free indicators

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