



CPx

User, Installation & Servicing Manual

Issue 3.2 Apr 2020



Users, Installation and Servicing Instructions

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Powrmatic oil fired heaters are only designed for operation with either **certified Gas Oil to BS2869 Class A2 or D**, (also referred to as '35 sec Oil' or 'Red Diesel') and **Kerosene to BS2869 Class C2**, (also referred to as '28 sec Oil').

Powrmatic are not able to confirm the suitability of any alternative blended Industrial Heating Oil (IHO) used to fuel their appliances and as such will affect the warranty on the appliance.

User Instructions



If the heater has not been left operational proceed as follows.

A) Checks before operating the Air Heater

The following preliminary checks should be made before lighting the heater(s)

- Ensure that the ELECTRICAL supply to the heater is switched OFF.
- Check that any warm air delivery outlets are open.
- Check that the thermostat is set.
- Check that the clock control is set to an ON period.
- Check that any other controls are calling for heat.

B) Operating the Air Heater

1) Gas-Fired Heaters

- Switch on the electrical supply at the isolator.
- The burner air fan will run and after a pre purge period of approximately 30 seconds the ignition spark will be generated.

CPx 30 - 90

The main gas valves will open and the main burner will be established

CPx 120 - 300

The start gas valves will be opened and a start gas flame established. When a start gas flame is established the main gas valves will be energized and the start gas flame will expand to main flame.



NOTE: If the burner fails to light it will go to lockout and the lockout indicator / reset button on the burner control box will be illuminated. To restart the burner push the reset button.



IMPORTANT: If the unit will not light after four or five attempts then shutdown the unit and call in a service engineer.



WARNING: If the main burner or a start gas flame fails to establish the burner will go to lockout and the lockout indicator / reset button on the burner control box will be illuminated. To restart the burner push the lockout reset button. Additional, more easily accessible, controls may be fitted that mimic the lockout indicator and reset button functions. If the unit will not light after four or five attempts then shut down the unit and call in a service engineer.

2) Oil-fired Heaters



IMPORTANT: If it is not possible to light the heater after 2/3 attempts contact the local service company.

- Switch on the electrical supply at the isolator.
- The burner air fan will run and after a pre purge period of approximately 30 seconds the ignition spark will be generated and the oil valve opened. The main burner will then fire.



NOTE: If the burner fails to light it will go to lockout and the lockout indicator / reset button on the burner control box will be illuminated. To restart the burner push the reset button.



If the unit will not light after two to three attempts then shutdown the unit and call in a service engineer.

C) To Shut Down the Air Heater

1) For Short Periods:

Turn the room thermostat to the OFF, or set to it's lowest setting.

2) For Long Periods:

Complete step 1 above. Wait for 5 minutes and then turn OFF the electrical supply at the isolator.

D) Description of Operation

Important: All heaters must be controlled by the fitted external controls and not by use of the main switch in the electrical supply to the heater.

The burner start up sequence will commence when the controls e.g. timeclock, room thermostat etc. call for heat. The burner air fan will run and after a pre purge period the burner will light.

Approximately 2/3 minutes after the burner lights the heater fan will automatically start.

When the external controls are satisfied the burner will be turned off and approximately 4 to 5 minutes later the heater fan will automatically stop.

1) Summer / Winter Modes

Certain types of external controls will provide for two modes of operation i.e.

- Summer: The heater fan alone will run at the dictate of the external controls to provide air movement.
- Winter: The heater will operate normally.

E) Fan and Limit Control

The fan and limit controls are mounted towards the top of the air heater upper front panel.

i) Main Air Fan MAN/Auto

When the white button is pushed to MAN the fan will run continuously i.e not controlled by any external controls e.g. Timeclock. When the white button is pulled out the fan will start and stop automatically in conjunction with the burner.

ii) Limit Thermostat

This operates if high temperatures within the heater are detected, the burner is turned off and a red indicator light on the front of the heater is illuminated. The fault condition must be identified and rectified and the thermostat manually reset.

When the unit has cooled push the reset switch on the front of the heater to reset the limit thermostat interlock relay, the red indicator light will go out and the unit is operational again.



NOTE: The limit thermostat(s) can only be reset once the unit has cooled down. Unless the cause of the fault condition is readily obvious, for example a power cut whilst the heater was operating, a service engineer should be contacted.

F) Maintenance

Regular servicing is essential to maintain efficient, reliable and safe operation of the heater. Users are strongly recommended to have the heater serviced at least annually and preferably at the end of the heating season.



IMPORTANT

Free access must be maintained to and around the heater for servicing purposes and the air supply to the heater must not be restricted in any way. Combustible materials must not be stored adjacent to the heater.



IMPORTANT

All Powrmatic heaters use either gas or oil plus electricity to power them, they may also contain moving parts such as pulleys and belts. It would be hazardous to tamper with or attempt to service unless you are a competent person in the field of Gas and Electrical work.



Danger: Electricity



Warning: Flammable Materials



Warning: Hot Surfaces



Warning: Contains Moving Parts



Read and understand this Service Manual Instructions before operating or servicing this appliance

If you have any safety questions reference the servicing and installation of any of our heaters please do not hesitate to contact our head office for expert advice. Your safety is paramount to us.



For gas fired heaters only:

If at any time a gas leak is suspected turn OFF the gas supply - DO NOT USE A NAKED FLAME - and contact the National Gas Emergency number immediately.

Gas Safety (Installation & Use) (Amendment) Regulations



It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations.

Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer

1.1 Introduction

The Powrmatic CPx range of closed flue, fanned circulation air heaters cover a heat output range of 30 kW to 290kW and are intended primarily for heating commercial or industrial premises.

They are B23 type appliances fitted with either a gas fired forced draught burner or a pressure jet oil fired burner.

Fuel Types

Gas fired units are certified for use on Natural Gas, Group H - G20, Group L - G25 and Propane - G31.

Oil fired units are supplied as standard for use with **certified Gas Oil to BS2869 Class A2 or D**, (also referred to as 35 sec Oil' or 'Red Diesel') and can be supplied for use with **Kerosene to BS2869 Class C2**, (also referred to as '28 sec Oil'). as an option.



IMPORTANT: Powrmatic are not able to confirm the suitability of any alternative blended Industrial Heating Oil (IHO) used to fuel their appliances and as such will affect the warranty on the appliance.

CPx heaters have a centrifugal fan assembly fitted upstream of the combustion chamber / heat exchanger assembly to circulate the air being heated and are available in three styles:

Standard Style

Suitable for internal applications only and available in /UF, /UD, /HD, /HF, /CF and /CD variants (see below). /UF and /UD models are floor standing, /HD, /HF, are horizontally mounted on purpose design supports. /CD models can be plinth mounted at floor level. /CF and /CD models can be mounted at high level on purpose design supports.

CPx/NCA Style

Suitable for internal applications only and having an extended casing that encloses the burner. Available in /UF and /UD variants only(see below).

CPx/EA Style

Casing is extended to enclose the burner. The heater is fully weatherproof and designed for external applications only. Available in /TD, /HD, /RT and /SD variants.

Variant types are:-

/UF - Upright heater with free blowing rotatable heads.

/UD - Upright heater with outlet duct spigot (inlet duct spigot optional).

/HF - Horizontal heater with free blowing rotatable heads.

/HD - Horizontal heater with outlet duct spigot (inlet duct spigot optional).

/CF - Counterflow heater with free blowing rotatable heads.

/CD - Counterflow heater with outlet duct spigot (inlet duct spigot optional).

/TD - Rooftop heater with top outlet duct spigot (inlet duct spigot optional).

/RT - Rooftop heater with outlet duct spigot on the underside (inlet duct spigot optional).

/SD - Upright heater with side outlet duct spigot (inlet duct spigot optional).

Other options include High/Low or modulating burners, uprated main fan motors, flue support bracket, deep V filters, flat panel filters, proportional air dampers, combustion air inlet adaptors and inlet and outlet duct spigots.

Each air heater must be connected to a closed flue system only.



IMPORTANT Service and Maintenance Engineers shall ensure that replacement items are fitted, adjusted and set in accordance with the data and detail set out in these instructions. If in doubt consult Powrmatic Technical Department.

For gas fired heaters only.



Gas Safety (Installation & Use) Regulations It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the latest edition of the above regulations. Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer

Model		30	45	60	90(gas)	90(oil)	120	150	175	200	250	300	360	440	590		
Output		kW	30	45	60	90	90	120	150	175	200	250	290	366	440	586	
Input (nett CV)	G20 Gas	kW	32.6	48.9	65.2	97.8	n/a	130.4	163.0	190.2	217.4	271.7	315.2	399.0	479.6	638.7	
	35sec Oil	kW	31.9	48.7	64.3	n/a	97.7	130.5	160.3	190.3	213.3	269.4	316.1	391.6	470.8	627.0	
Old Powmatic Reference		CP	100	150	200	300	300	400	500	600	700	800	1000	1250	1500	2000	
Thermal Efficiencies (Nett CV)		%	Min 91.5%														
Airflow	Volume		m³/s	0.97	0.86	1.01	2.11	1.50	2.30	3.15	3.36	3.84	4.49	5.76	6.49	7.88	10.5
	Heads	UF / HF	No.	2	2	3	3	3	4	4	4	4	4	4	4	8	8
		Size	mm	203	254	254	305	305	305/358	305/358	358	406	457	457	457	457	457
	Throw	UF / HF	m	15	21	19	24	24	24	29	29	29	41	48	48	30	40
	Fan Static	Standard	Pa	188	222	270	250	200	180	185	290	250	140	150	300	300	300
Up-rated		Pa	250	250	400	500	450	350	400	500	500	450	500	600	600	600	
Electrics	Supply	Standard	V/ph/Hz	230/1/50					400/3/50								
		Optional	V/ph/Hz	400/3/50					230/1/50			n/a					
	Standard Fan	Motor	kW	0.55	0.55	1.1	1.5	1.4	1.4	3.0	4.0	4.0	4.0	7.5	11.0	11.0	15.0
		Run	amp	4.3	5.7	5.3	10.0	9.6	6.4	6.7	7.1	8.6	8.4	14.5	21.3	21.3	28.9
		Start	amp	8.1	17.1	16.1	25.5	28.1	12.4	23.45	23.0	19.7	28.2	50.1	127.2	127.2	182.4
	Uprated Fan (L.H.P.)	Motor	kW	0.75	0.75	2.2	2.2	1.5	3.0	4.0	5.5	5.5	5.5	11.0	15.0	15.0	18.5
		Run	amp	5.3	5.3	12.6	12.6	9.2	6.3	8.3	11.0	11.0	11.0	21.6	28.9	28.0	35.0
		Start	amp	15.9	15.9	37.8	37.8	27.6	22.05	29.05	38.5	38.5	38.5	75.6	182.4	182.4	221.2
	Fuel	Connection	Oil	BSP/Rc	¾"	¾"	¾"	n/a	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	½"
Gas			BSP/Rc	½"	½"	¾"	¾"	n/a	¾"	1½"	1½"	1½"	1½"	1½"	1½"	1½"	
Minimum Inlet Pressure		Nat Gas	mbar	17.5					n/a								
		LPG	mbar	37.0					n/a								
Consumption Standard Outputs		Oil	l/h	3.16	4.83	6.38	n/a	9.70	12.95	15.90	18.89	21.17	26.73	31.36	38.82	47.45	63.62
		Nat Gas	m³/h	3.45	5.17	6.89	10.34	n/a	13.79	17.23	20.11	22.99	28.73	33.33	41.41	50.61	67.86
	LPG	m³/h	1.34	1.98	2.64	4.01	n/a	5.31	6.64	7.72	8.84	11.00	12.84	16.00	19.56	26.23	
Overall Dimensions	UF Upright Freeblowing	Height	mm	2024	2072	2494	2585	2585	2821	2821	3054	3174	3307	3307	3657	4107	4407
		Width	mm	669	669	744	744	744	904	904	904	904	1104	1104	1260	1330	1330
		Depth (Excludes burner)	mm	732	732	927	927	927	1200	1200	1399	1399	1599	1599	1915	2165	2715
Installation Clearances	UF Upright Freeblowing	Front	mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
		Side	mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
		Blank Side	mm	150	150	150	150	150	150	150	150	150	150	150	n/a	n/a	n/a
		Rear	mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Flue Diameter		mm ø	125	125	150	150	150	150	175	175	175	200	200	250	300	300	
Combustion Air Spigot		mm ø	150	150	150	150	150	150	150	150	150	150	150	150	175	175	
Maximum Combustion Duct Length *		m	34	34	21	21	21	12	8	6	4	3	2	3	2	2	
Noise Level (See Note Below)		dB(A)	56	61	61	63	63	70	62	73	74	75	77	78	80	82	
Nett Weight (See Note Below)		kg	168	173	231	241	241	341	386	530	530	556	556	1012	1380	1720	
Model		30	45	60	90(gas)	90(oil)	120	150	175	200	250	300	360	440	590		

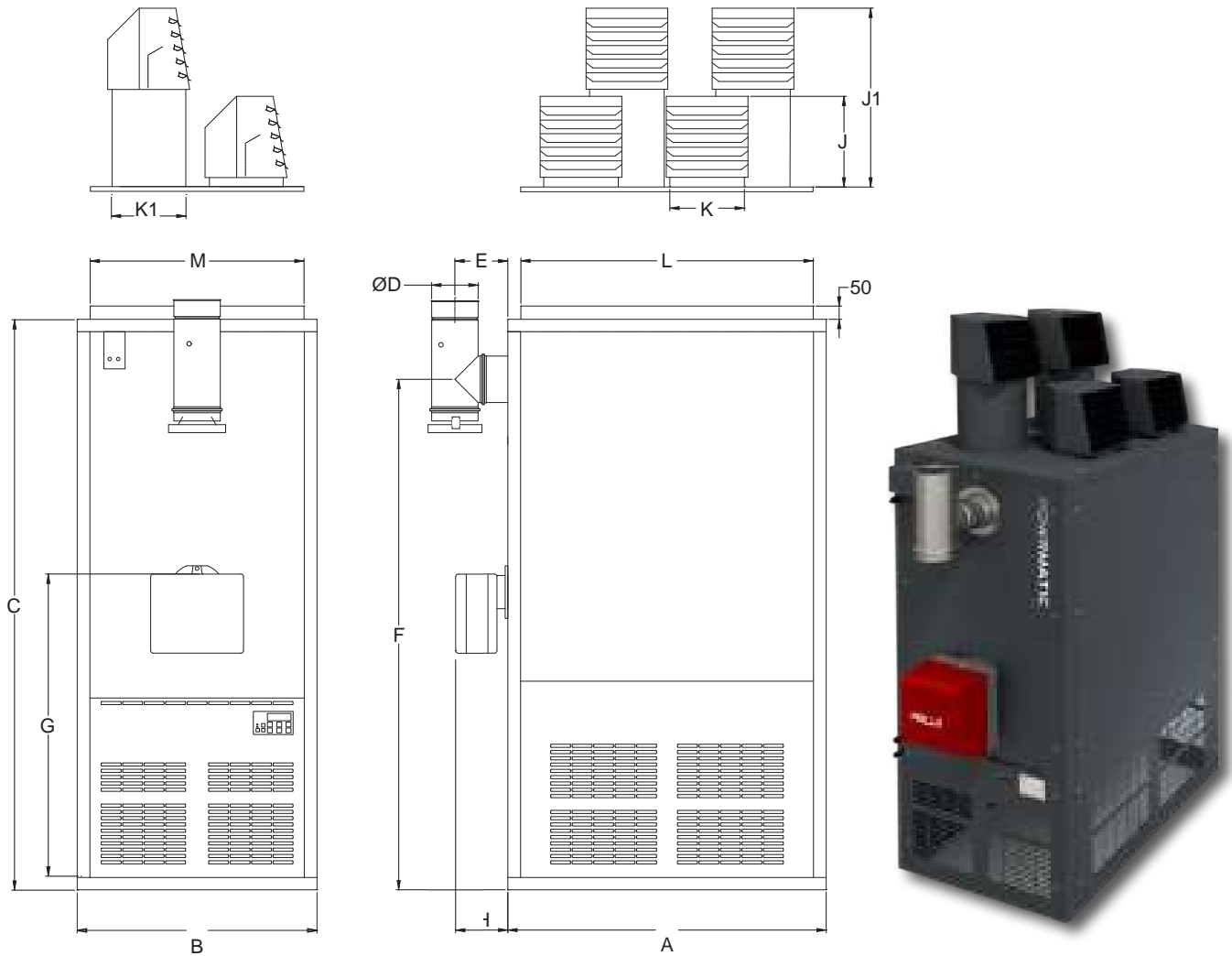
* For extended combustion duct lengths please contact Powmatic

Notes –

- Fuel consumption and output figures based upon nett calorific values as follows
 - Class D light distillate fuel oil nett CV 36.28 MJ/l
 - Natural gas (G20) nett CV 34.02 MJ/m³
 - Propane (G31) nett CV 88.00 MJ/m³
- CPx heaters comply with the seasonal efficiency and NOx limits requirements of the Ecodesign regulation (EU) 2015/1188, Directive 2009/125/EC – Lot 21 Tier 1
- Air handling data is assessed at room ambient conditions
- Throw figures provide the distance to the point where the terminal velocity degrades to 0.25 m/s
- Overall vertical heater height include heads or extended heads where appropriate
- Standard height heads can be specified where site height is restricted
- Blank and louvred lower side panels are interchangeable
- Dimensions in table above refer to upright heaters only - for horizontal and counterflow heater dimensions refer to dimensions page
- Noise levels are applicable to standard UF models and are measured 5m from appliance and in free field conditions
- Motor kW, run and start amps apply to standard electrical supply as stated. For optional data contact sales office
- Nett weight figures apply to standard upright CPx heaters only
- It is the responsibility of the installing contractor to ensure that ductwork is correctly sized and balanced when installing a ducted unit.

Dimensions

CPx UD/UF Upright Free Blowing Upright Ducted (30-300)



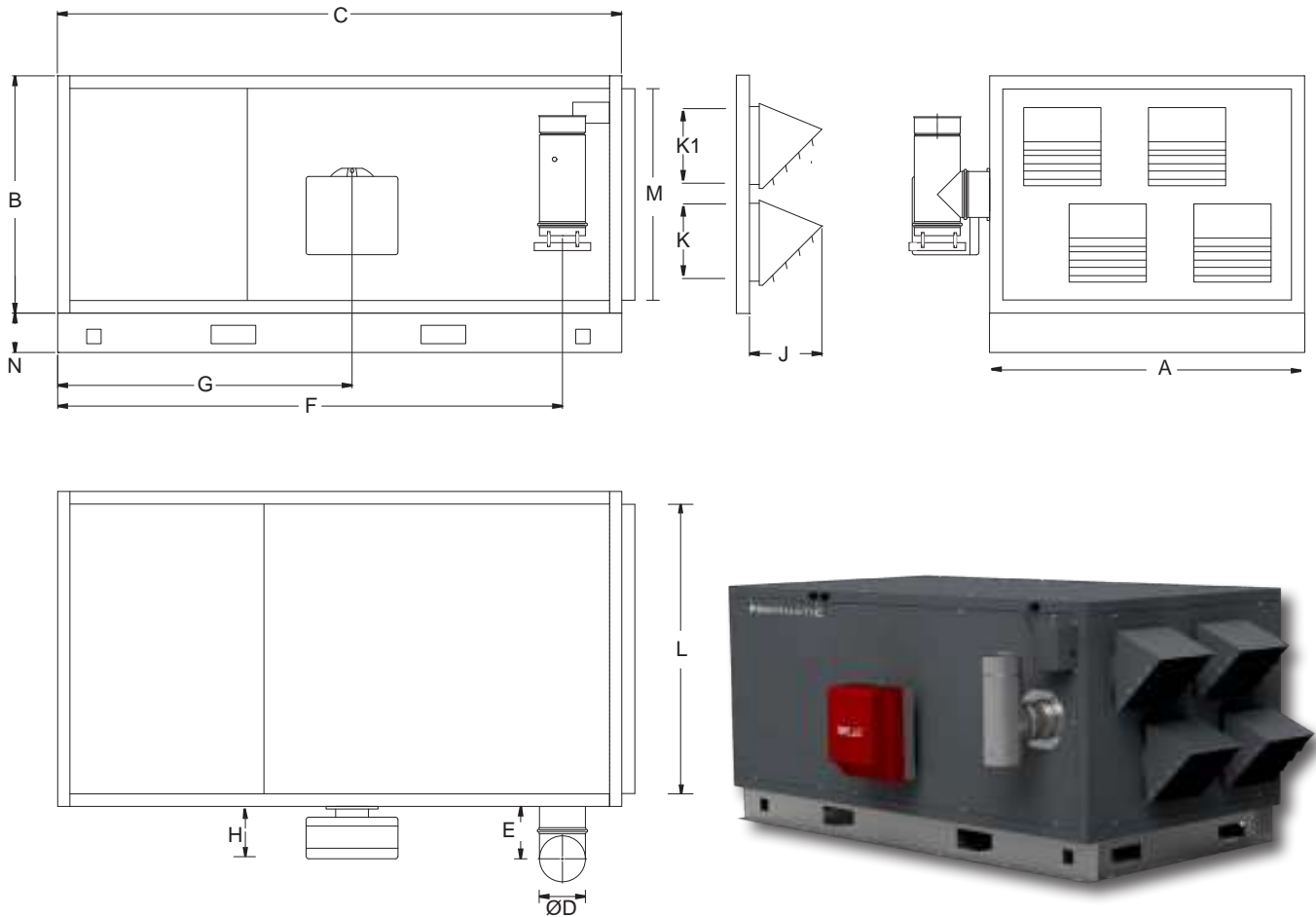
Notes -

- Flue tee provided as standard.

Model			30	45	60	90	120	150	175	200	250	300
A	All	mm	732	732	927	927	1200	1200	1399	1399	1599	1599
B	All	mm	669	669	744	744	904	904	904	904	1104	1104
C	All	mm	1767	1767	1895	1895	2149	2149	2265	2265	2265	2265
D	All	mm ø	125	125	150	150	150	175	175	175	200	200
E	All	mm	150	150	150	150	150	200	200	200	240	240
F	All	mm	1535	1535	1661	1661	1923	1923	2021	2021	2021	2021
G	All	mm	864	864	944	944	1122	1122	1122	1122	1122	1122
H	Gas	mm	276	276	252	280	280	280	300	300	300	508
	Oil	mm	196	202	202	228	228	228	228	247	247	508
J	All	mm	238	286	286	340	340	340	400	442	558	558
J1	All	mm	n/a	n/a	581	672	672	672	788	875	1007	1007
K	All	mm	180	234	234	287	287	287	333	381	431	431
K1	All	mm	n/a	n/a	n/a	n/a	333	333	n/a	n/a	n/a	n/a
L	Duct	mm	632	632	824	824	1100	1100	1299	1299	1499	1499
M	Spigot	mm	569	569	644	644	804	804	804	804	1004	1004
Head Plan			1	1	2	2	3a	3a	3b	3b	3b	3b

Dimensions

CPx HD/HF Horizontal Free Blowing Horizontal Ducted (30-300)



Notes -

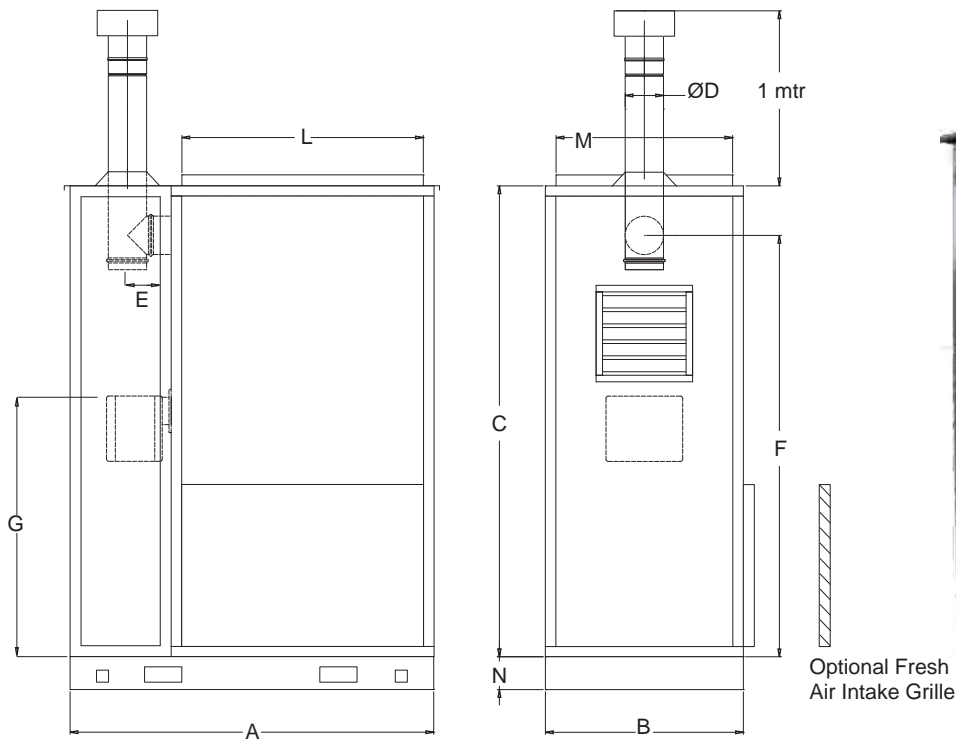
- Flue tee provided as standard.
- Screened air intake (SAI) fitted as standard on HF models. Duct spigot option available.
- Direction of airflow to be specified at time of order. Left to Right (L-R when looking at the burner) airflow shown above.

Model			30	45	60	90	120	150	175	200	250	300
A	All	mm	732	732	927	927	1200	1200	1399	1399	1599	1599
B	All	mm	669	669	744	744	904	904	904	904	1104	1104
C	All	mm	1767	1767	1895	1895	2151	2151	2265	2265	2265	2265
D	All	mm ø	125	125	150	150	150	175	175	175	200	200
E	All	mm	150	150	150	150	150	200	200	200	240	240
F	All	mm	1535	1535	1661	1661	1923	1923	2021	2021	2021	2021
G	All	mm	864	864	944	944	1122	1122	1122	1122	1122	1122
H	Gas	mm	276	276	252	280	280	280	300	300	300	508
	Oil	mm	196	202	202	228	228	228	228	247	247	508
J	All	mm	227	227	260	260	260	260	297	297	367	367
K	All	mm	180	234	234	287	287	287	333	381	431	431
K1	All	mm	n/a	n/a	n/a	n/a	333	333	n/a	n/a	n/a	n/a
L	Duct Spigot	mm	632	632	824	824	1100	1100	1299	1299	1499	1499
		mm	569	569	644	644	804	804	804	804	1004	1004
N	All	mm	125	125	125	125	150	150	150	150	150	150
Head Plan			1	1	2	2	3a	3a	3b	3b	3b	3b

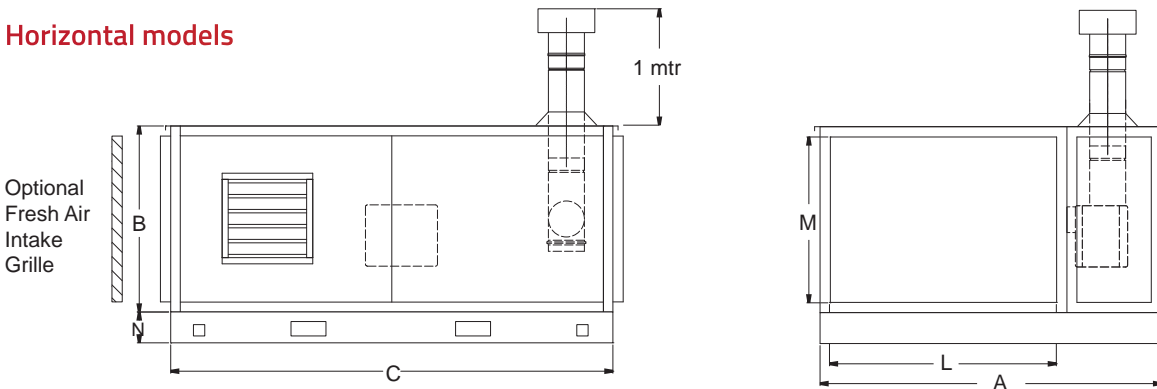
Dimensions

CPx-EA External Cabinet Heaters (30-300)

Upright models



Horizontal models



Notes -

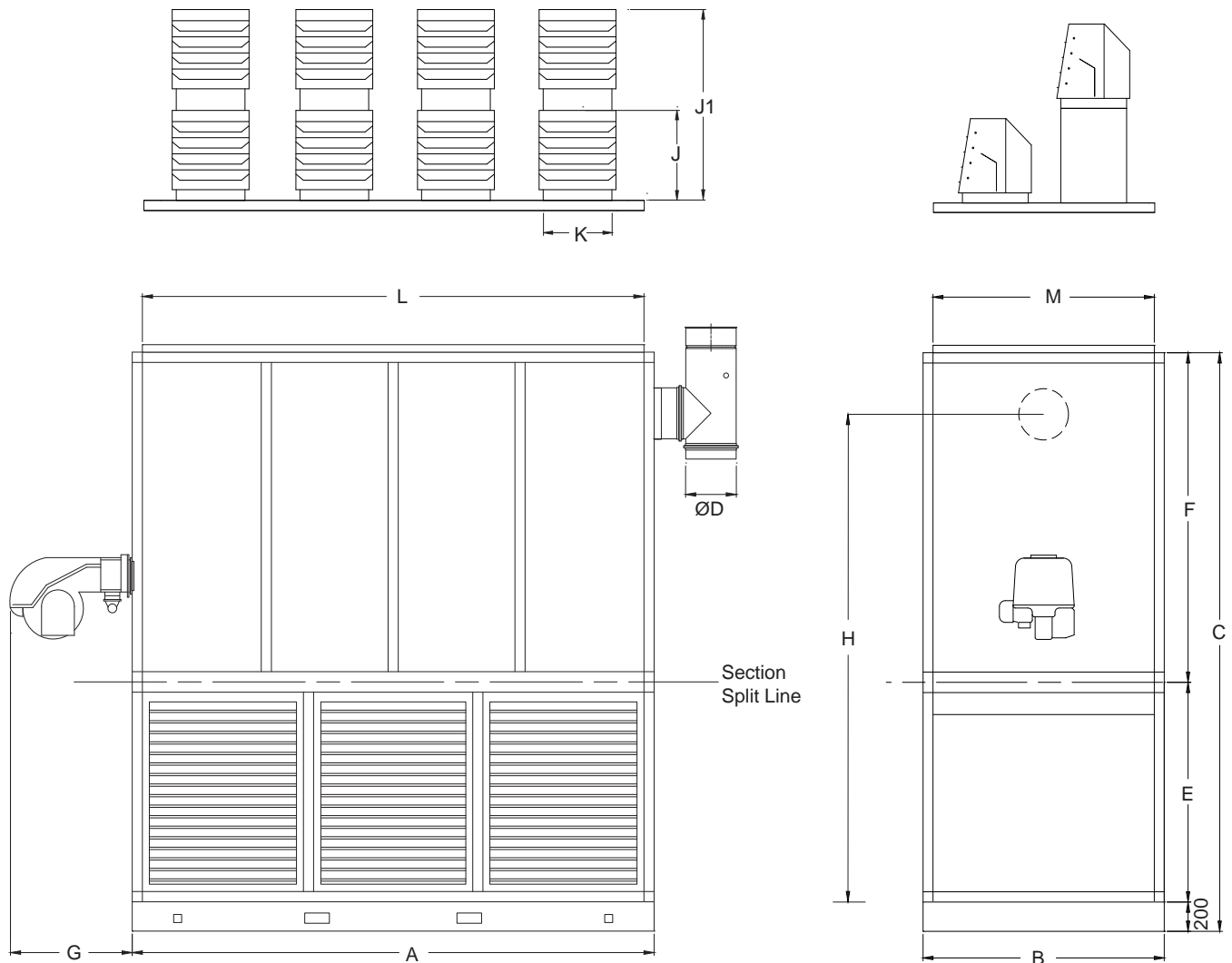
- Direction of airflow to be specified at time of order. Left to Right (L-R when looking at the burner) airflow shown above.
- Inlet and Outlet duct spigots have the same dimensions (Horizontal units only)
- Primary flue length, cowl and flashing provided as standard.

Model	30	45	60	90	120	150	175	200	250	300		
A	All	mm	1184	1184	1379	1379	1692	1692	1891	1891	2280	2280
B	All	mm	669	669	744	744	904	904	904	904	1104	1104
C	All	mm	1767	1767	1895	1895	2149	2149	2265	2265	2265	2265
D	All	mm ø	125	125	150	150	150	175	175	175	200	200
E	All	mm	150	150	150	150	150	200	200	200	240	240
F	All	mm	1535	1535	1661	1661	1923	1923	2021	2021	2021	2021
G	All	mm	864	864	944	944	1122	1122	1122	1122	1122	1122
L	Duct Spigot	mm	632	632	824	824	1100	1100	1299	1299	1499	1499
M		mm	569	569	644	644	804	804	804	804	1004	1004
N	All	mm	125	125	125	125	150	150	150	150	150	150

Dimensions

CPx UD/UF Upright Free Blowing Upright Ducted (360-590)

Upright models



Notes -

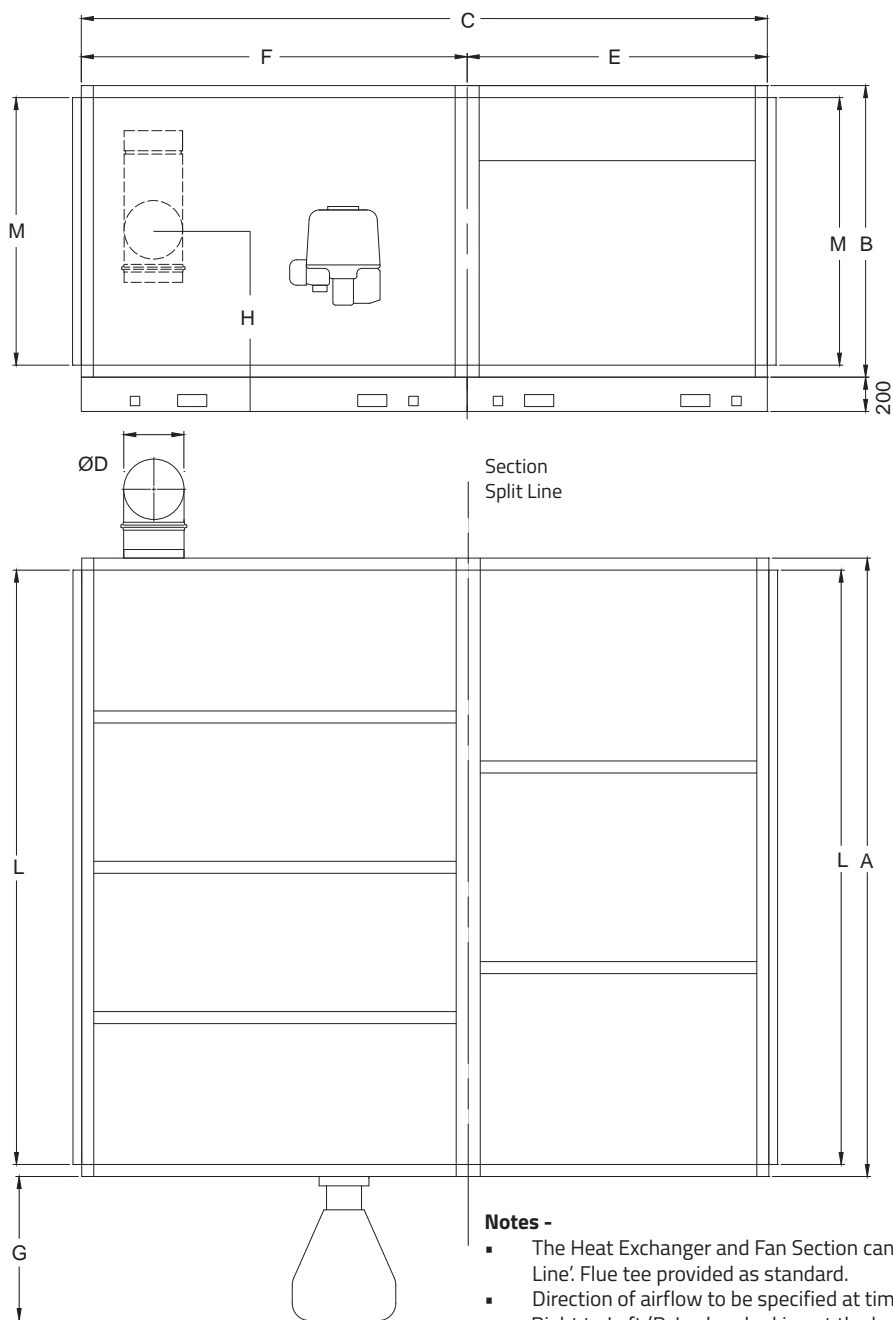
- The Heat Exchanger and Fan Section can be split on the 'Section Split Line'.
- Flue tee provided as standard.

Model		360	440	590	
A	All	mm	1915	2165	2715
B	All	mm	1260	1330	1330
C	All	mm	2615	3065	3365
D	All	mm ø	250	300	300
E	All	mm	865	965	1265
F	All	mm	1550	1900	1900
G	Gas	mm	508	580	840
	Oil	mm	508	468	680
H	All	mm	2152	2537	2837
J	All	mm	558	558	558
J1	All	mm	1007	1007	1007
K	All	mm	431	431	431
L	Duct Spigot	mm	1815	2065	2615
M		mm	1160	1230	1230
Head Plan			3b	4	4

Dimensions

CPx HD/HF Upright Free Blowing Upright Ducted (360-590)

Horizontal models

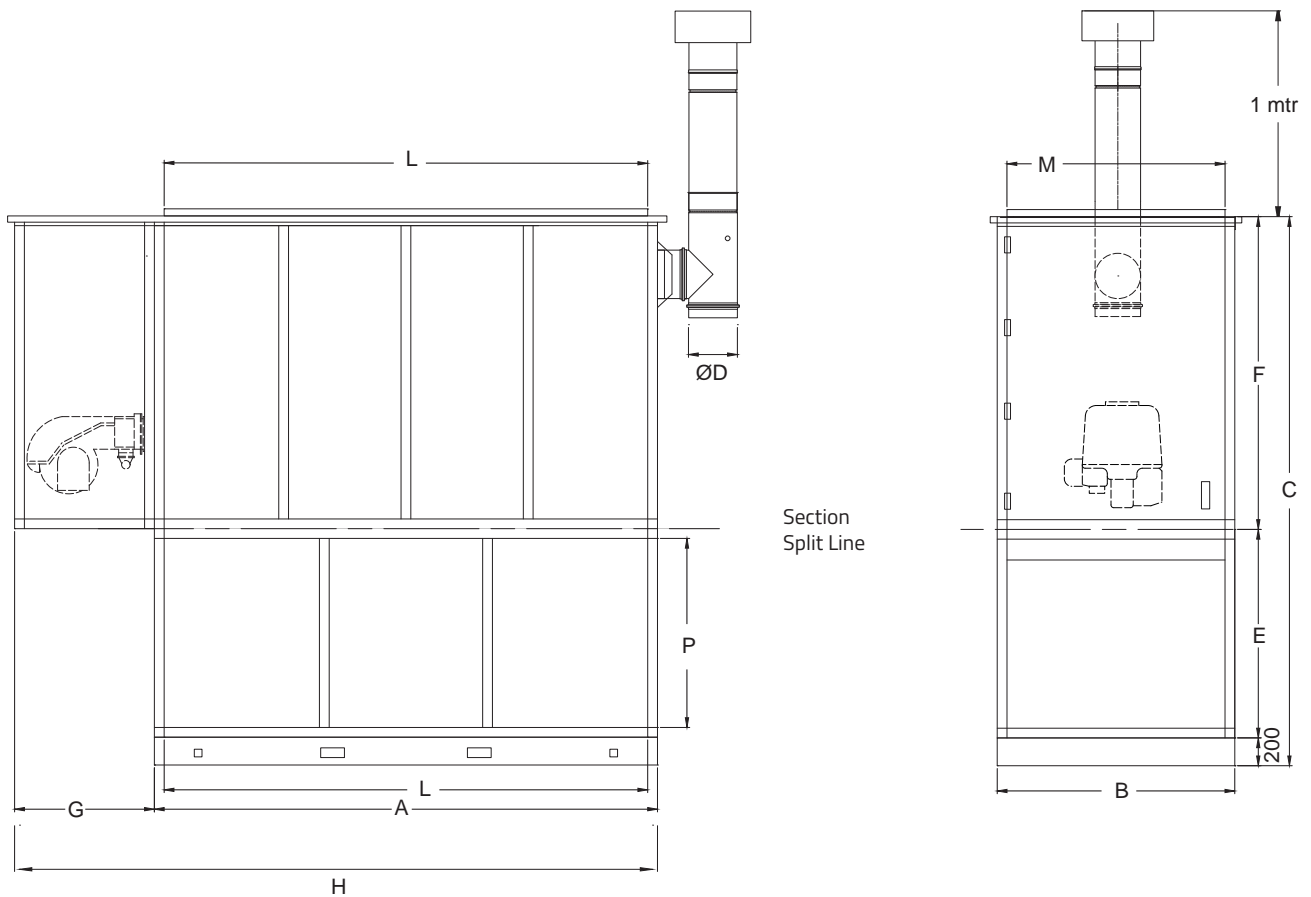


Model			360	440	590
A	All	mm	1915	2165	2715
B	All	mm	1260	1330	1330
C	All	mm	2800	3250	3600
D	All	mm \varnothing	250	300	300
E	All	mm	1250	1350	1700
F	All	mm	1550	1900	1900
G	Gas	mm	580	580	840
	Oil	mm	468	468	680
H	All	mm	830	865	865
L	Duct Spigot	mm	1815	2065	2615
M		mm	1160	1230	1230
Head Plan			3b	4	4

Dimensions

CPx-EA External Cabinet Heaters (360-590)

Upright models



Notes -

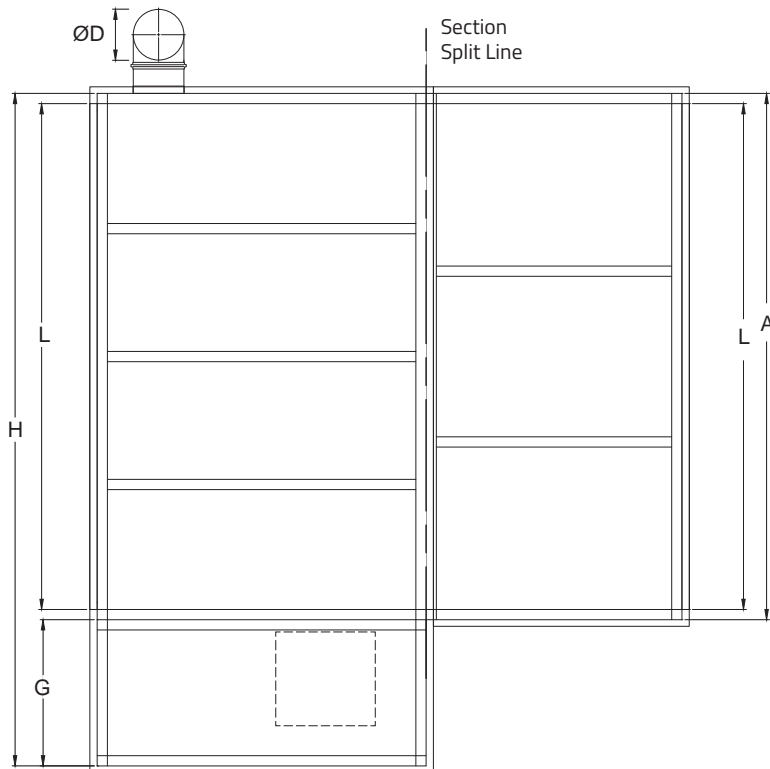
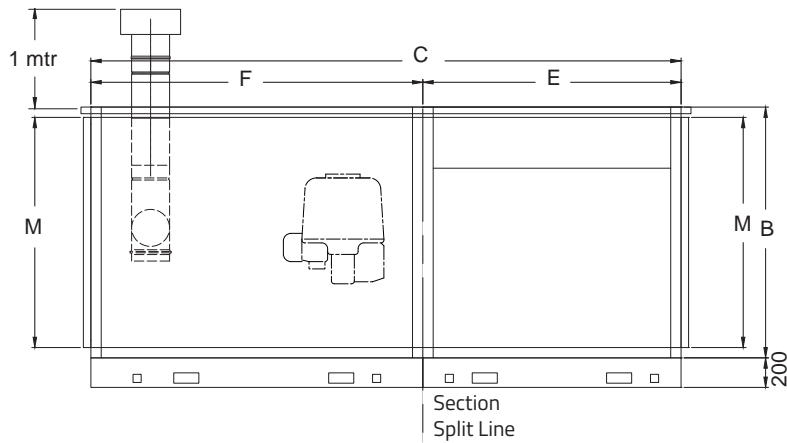
- The Heat Exchanger and Fan Section can be split on the 'Section Split Line'.
- Return air via inlet duct spigot is standard. Optional fresh air grille is available.
- Primary flue and cowl provided as standard.

	Model		360	440	590
A	All	mm	1915	2165	2715
B	All	mm	1260	1330	1330
C	All	mm	2615	3065	3365
D	All	mm ø	250	300	300
E	All	mm	865	965	1265
F	All	mm	1550	1900	1900
G	All	mm	650	650	950
H	All	mm	2565	2815	3665
L	Duct Spigot	mm	1815	2065	2615
M		mm	1160	1230	1230
P	All	mm	760	860	1160

Dimensions

CPx-EA External Cabinet Heaters (360-590)

Horizontal models

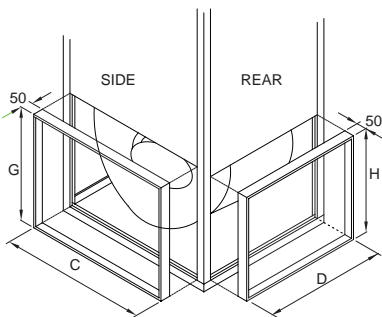


Notes -

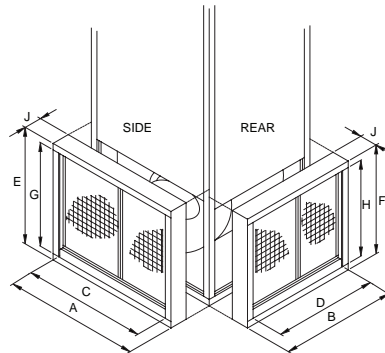
- The Heat Exchanger and Fan Section can be split on the 'Section Split Line'. Primary flue and cowl provided as standard.
- Direction of airflow to be specified at time of order. Right to Left (R-L when looking at the burner) airflow shown above.

	Model		360	440	590
A	All	mm	1915	2165	2715
B	All	mm	1260	1330	1330
C	All	mm	2800	3250	3600
D	All	mm Ø	250	300	300
E	All	mm	1250	1350	1700
F	All	mm	1550	1900	1900
G	All	mm	650	650	950
H	All	mm	2565	2815	3665
L	Duct Spigot	mm	1815	2065	2615
M		mm	1160	1230	1230

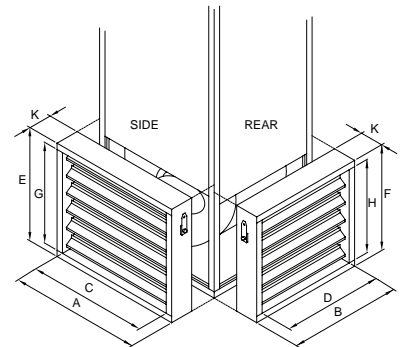
Side/rear Inlet Spigots



Filters



Dampers



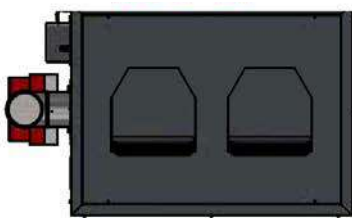
Model	30	45	60	90	120	150	175	200	250	300	360	440	590		
A	All	mm	732	732	927	927	1200	1200	1399	1399	1599	1599	1915	2165	2715
B	All	mm	669	669	744	744	904	904	904	904	1105	1105	n/a	n/a	n/a
C	All	mm	630	630	825	825	1098	1098	1300	1300	1500	1500	1815	2065	2615
D	All	mm	567	567	642	642	802	802	802	802	1003	1003	n/a	n/a	n/a
E	All	mm	685	685	738	738	838	838	838	838	838	838	865	965	1265
F	All	mm	627	627	677	677	775	775	775	775	775	775	n/a	n/a	n/a
G	All	mm	585	585	640	640	738	738	738	738	738	738	765	865	1165
H	All	mm	527	527	577	577	675	675	675	675	675	675	n/a	n/a	n/a
J	All	mm	136	136	136	136	136	136	136	136	136	250	250	250	

Notes -

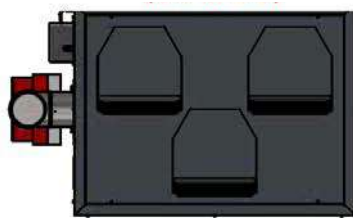
- All dimensions are outside dimensions
- Vertical units shown - for horizontal units please contact our sales office
- Standard filter specification is 10ppi
- Higher specification filters available on request - contact our sales team for more information
- Standard dampers are manual operation - motorised options available

Head Plans

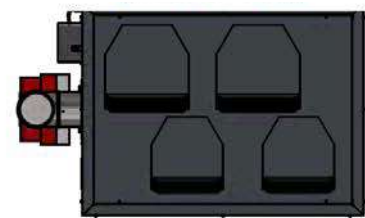
Head Plan 1
(30 & 45)



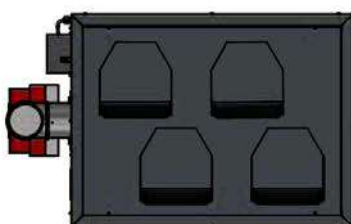
Head Plan 2
(60 & 90)



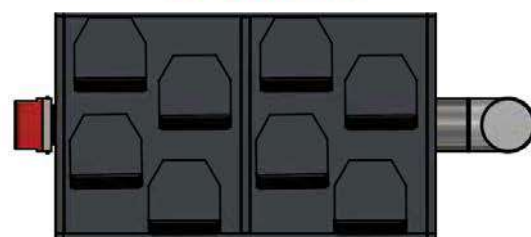
Head Plan 3a
(120 & 150)



Head Plan 3b
(75, 200, 250, 300 & 360)



Head Plan 4
(440 & 590)



1.2 Technical Data

Riello Burner Settings - Natural Gas - Group H - G20 Net CV (Hi = 34.02MJ/m³)

Nominal Inlet Pressure = 20mbar

Minimum Inlet Pressure = 17.5mbar

MODEL	Burner Type	Gas Control	High Fire		Low Fire	
			Burner Pressure	Gas Rate	Burner Pressure	Gas Rate
			mbar	m ³ /h	mbar	m ³ /h
CPx30	BS1D	MB405/2	3.4	3.45	1.5	2.11
CPx45	BS1D	MB405/2	5.7	5.00	2.3	2.85
CPx60	BS2D	MB407/2	5.8	6.89	2.5	4.32
CPx90	BS3D	MB407/2	4.2	10.34	1.9	6.82
CPx120	BS3D	MB407/2	6.0	13.47	2.6	8.61
CPx150	BS3D	MB410/2	9.1	17.23	3.3	10.02
CPx175	BS4D	MB410/2	8.3	20.10	3.5	13.90
CPx200	RS5D	MB410/2	6.9	22.99	4.1	16.15
CPx250	RS5D	MB412/2	9.3	28.46	5.8	14.38
CPx300	RS34 MZ	MBDLE415	tbc	tbc	tbc	tbc

MODEL	Head Setting no.	Combustion Air		Air Pressure Switch*	Flue Pressure Switch*	Nominal CO2 (±0.5)		Nox		Nett Flue Temp	
		High Fire	Low Fire			High Fire	Low Fire	High Fire	Low Fire	High Fire	Low Fire
		No.	No.			%	%	ppm	ppm	°C	°C
CPx30	1	2.8	1.0	2.1	40	9.2	8.75	24.7	26.8	132	74
CPx45	4	4.9	1.2	2.7	20	8.7	9.1	23.5	29.4	171	75
CPx60	4	2.0	1.0	2.0	120	8.75	9.0	27.9	28.8	145	78
CPx90	1	1.3	0.25	3.0	110	8.8	9.3	27.5	33.2	154	92
CPx120	5	2.1	1.0	5.0	280	9.2	8.8	34.5	31.9	174	102
CPx150	7	5.0	1.1	5.0	220	9.3	9.2	29.5	35.5	165	82
CPx175	7	5.3	1.8	3.6	270	9.3	8.6	28.4	32.3	158	89
CPx200	0	(39)	(22)	4.0	300	9.0	8.8	41.4	40.0	141	97
CPx250	10	(63)	(30)	4.0	300	8.8	8.4	44.0	44.3	142	79
CPx300	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc

Notes: CO2 values and Nett flue gas temperatures are given for guidance and measured values will depend on site conditions.

* Air Pressure Switch settings are given for guidance and measured values will depend on site conditions.

1.2 Technical Data

Riello Burner Settings - Propane G31 Net CV (Hi = 88.00MJ/m³)

Nominal Inlet Pressure = 37mbar

Minimum Inlet Pressure = 37mbar

MODEL	Burner Type	Gas Control	High Fire		Low Fire	
			Burner Pressure	Gas Rate	Burner Pressure	Gas Rate
			mbar	m ³ /h	mbar	m ³ /h
CPx30	BS1D	MB405/2	5.0	1.33	2.7	0.91
CPx45	BS1D	MB405/2	10.2	1.93	3.9	1.1
CPx60	BS2D	MB407/2	8.2	2.67	3.5	1.67
CPx90	BS3D	MB407/2	5.5	4.0	2.6	2.64
CPx120	BS3D	MB407/2	7.6	5.21	3.5	3.33
CPx150	BS3D	MB410/2	10.6	6.66	4.4	3.87
CPx175	BS4D	MB410/2	tbc	tbc	tbc	tbc
CPx200	RS5D	MB410/2	6.9	8.8	3.9	6.24
CPx250	RS5D	MB412/2	10.0	11.0	4.7	7.49
CPx300	RS34MZ	MBDLE415	tbc	tbc	tbc	tbc

MODEL	Head Setting no.	Combustion Air		Air Pressure Switch*	Flue Pressure Switch*	Nominal CO2 (±0.5)		Nox		Nett Flue Temp	
		High Fire	Low Fire			High Fire	Low Fire	High Fire	Low Fire	High Fire	Low Fire
		No.	No.			No.	mbar	Pa	%	%	ppm
CPx30	3	1.1	1.0	1.5	60	9.6	9.0	40.5	40.0	118	73
CPx45	4	6.0	1.4	2.7	100	10.9	10.3	35.4	40.4	166	82
CPx60	3	2.3	1.0	2	150	9.5	9.8	29.2	47.7	160	81
CPx90	2	1.3	0.5	3	110	10.5	9.95	46.2	48.8	148	94
CPx120	4	2.1	0.9	5	280	10.73	9.9	50.3	49.5	177	122
CPx150	6	3.6	1.0	4	220	10.9	10.26	46.8	48.0	137	73
CPx175	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc
CPx200	2	39	29	4	300	10.33	9.9	64	53.0	140	105
CPx250	7	50	21	3	300	11.1	11.1	74	75.0	125	72
CPx300	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc

Notes: CO2 values and Nett flue gas temperatures are given for guidance and measured values will depend on site conditions.

* Air Pressure Switch settings are given for guidance and measured values will depend on site conditions.

1.2 Technical Data

Riello Burner Settings - 35sec Oil - Diesel - Net CV (Hi = 42.69MJ/kg)

MODEL	Burner Type	Nozzle	High Fire			Low Fire		
			Burner Pressure		Fuel Input	Burner Pressure		Fuel Input
			bar	psi	kg/h	bar	psi	kg/h
CPx30	RG1RKD	0.65 x 80S	13.44	195	2.70	8.96	130	1.89
CPx45	RG2D	1.00 x 60S	14.48	210	4.15	8.96	130	3.27
CPx60	RG2D	1.25 x 60S	14.13	205	5.36	8.96	130	4.07
CPx90	RG3D	2.00 x 60S	13.79	200	8.28	8.27	120	6.16
CPx120	RG3D	2.75 x 60S	12.07	175	10.91	8.96	130	8.50
CPx150	RG3D	3.00 x 60S	15.17	220	13.45	8.96	130	9.82
CPx175	RG4D	3.75 x 60B	15.17	220	16.45	8.27	120	11.59
CPx200	RG5D	2.5 + 2.0 x 60S	13.10	190	17.96	13.10	190	10.01
CPx250	RG5D	3.0 + 2.5 x 60S	11.70	170	23.69	11.70	170	13.07
CPx300	RL34 MZ TC	4.0 + 2.75 x 60S	11.03	160	25.30	11.03	160	15.00

MODEL	Head Setting no.	Combustion Air		Nominal CO ₂ (±0.5)		Nox		Smoke	Nett Flue Temp	
		High Fire	Low Fire	High Fire	Low Fire	High Fire	Low Fire		High Fire	Low Fire
		No.	No.	%	%	ppm	ppm		No.	°C
CPx30	1.3	1.5	0.25	11.8	12.5	67.5	65.5	0-1	133	96
CPx45	0	1.1	0.25	12.5	12.6	70.3	65.3	0-1	209	138
CPx60	2	1.9	0.45	12.7	12.6	74.5	65.0	0-1	158	110
CPx90	0.5	0.8	0.2	12.5	12.5	80.3	68.2	0-1	214	138
CPx120	3	1.6	0.4	12.7	12.5	57.6	49.1	0-1	213	169
CPx150	5	2.9	0.8	12.7	12.2	65.3	49.9	0-1	182	139
CPx175	3	4.2	0.5	13.0	11.8	68.5	51.8	0-1	213	146
CPx200	6	4.0	0.4	12.4	12.1	91.2	65.8	0-1	157	79
CPx250	8	6.0	0.6	12.7	12.4	83.6	62.4	0-1	219	117
CPx300	6	(70)	(30)	12.6	12.1	tbc	tbc	0-1	tbc	tba

Notes: CO₂ values and Nett flue gas temperatures are given for guidance and measured values will depend on site conditions.

* Air Pressure Switch settings are given for guidance and measured values will depend on site conditions.

1.2 Technical Data

Riello Burner Settings - 28sec Oil - Kerosene - Net CV (Hi = 47.00MJ/kg)

MODEL	Burner Type	Nozzle	High Fire			Low Fire		
			Burner Pressure		Fuel Input	Burner Pressure		Fuel Input
			bar	psi	kg/h	bar	psi	kg/h
CPx30	RG1RKD	0.75 x 60S	10.0	140	2.70	7.0	100	1.89
CPx45	RG2D	1.25 x 60S	10.0	140	4.15	7.0	100	3.27
CPx60	RG2D	1.50 x 60S	10.0	140	5.36	7.0	100	4.07
CPx90	RG3D	2.50 x 60S	10.0	140	8.28	7.0	100	6.16
CPx120	RG3D	3.00 x 60S	10.0	140	10.91	7.0	100	8.50
CPx150	RG3D	3.75 x 60B	10.0	140	13.45	7.0	100	9.82
CPx175	RG4D	4.50 x 60B	10.0	140	16.45	7.0	100	11.60
CPx200	RG5D	2.5 + 2.0 x 60S	10.0	140	17.96	10.0	140	10.00
CPx250	RG5D	3.5 + 3.0 x 60S	10.0	140	23.69	10.0	140	13.10
CPx300	RL34 MZ TC	4.5x60B + 3x60S	tbc	tbc	tbc	tbc	tbc	tbc

MODEL	Head Setting no.	Combustion Air		Nominal CO ₂ (±0.5)		Nox		Smoke	Nett Flue Temp	
		High Fire	Low Fire	High Fire	Low Fire	High Fire	Low Fire		High Fire	Low Fire
		No.	No.	%	%	ppm	ppm		°C	°C
CPx30	1.3	1.5	0.25	11.8	12.5	67.5	65.5	0-1	133	96
CPx45	0	1.1	0.25	12.5	12.6	70.3	65.3	0-1	209	138
CPx60	2	1.9	0.45	12.7	12.6	74.5	65.0	0-1	158	110
CPx90	0.5	0.8	0.2	12.5	12.5	80.3	68.2	0-1	214	138
CPx120	3	1.6	0.4	12.7	12.6	57.6	49.1	0-1	213	169
CPx150	5	2.9	0.8	12.7	12.2	65.3	49.9	0-1	182	139
CPx175	3	4.2	0.5	13.0	11.8	68.5	51.8	0-1	213	146
CPx200	6	4.0	0.4	12.4	12.1	91.2	65.8	0-1	157	79
CPx250	8	6.0	0.6	12.7	12.4	83.3	62.4	0-1	219	117
CPx300	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc	tbc

Notes: CO₂ values and Nett flue gas temperatures are given for guidance and measured values will depend on site conditions.

* Air Pressure Switch settings are given for guidance and measured values will depend on site conditions.

1.2 Technical Data

Electrical Loadings

MODEL	Standard Motor						Uprated Motor (fitted to EA models as standard)					
	Motor	Pha	Nominal Motor	Start Amps	Run Amps	Fuse Rating	Motor	Pha	Nominal Motor	Start Amps	Run Amps	Fuse Rating
	kW		r.p.m	A	A	A	kW		r.p.m	A	A	A
CPx30	0.55	1	1500	8.1	4.3	6	0.75	1	1500	15.9	5.3	6
CPx45	0.55	1	1500	17.1	5.7	10	0.75	1	1500	15.9	5.3	6
CPx60	1.1	1	1000	16.1	5.3	6	2.2	1	1500	37.8	12.6	16
CPx90G	1.5	1	1500	25.5	10.0	16	2.2	1	1500	37.8	12.6	16
CPx900	1.4	1	1000	28.1	9.6	16	1.5	1	1500	27.6	9.2	16
CPx120	1.7	3	1000	12.4	6.4	10	3.0	3	1500	22.05	6.3	10
CPx150	3.0	3	1500	23.5	6.7	10	4.0	3	1500	29.05	8.3	10
CPx175	4.0	3	1500	23.0	7.1	10	5.5	3	1500	38.5	11.0	16
CPx200	4.0	3	1500	19.7	8.6	10	5.5	3	1500	38.5	11.0	16
CPx250	4.0	3	1500	28.2	8.4	10	5.5	3	1500	38.5	11.0	16
CPx300	7.5	3	1500	50.1	14.5	16	11.0	3	1500	75.6	21.6	32

Heater Specifications

MODEL	Air Volume (UF/HF)		Heads		Throw (UF/HF)	Max Duct Resistance		Noise Level (std UF/HF)	Weight CPx	Weight CPx/ NCA	Weight CPx/ EA
	m ³ /s	m ³ /h	qty	mm		Std Motor	Uprated				
					m	Pa	Pa	dB(A)	kg	kg	kg
CPx30	0.97	3492	2	203	15	188	250	67.7	168	tbc	tbc
CPx45	0.86	3096	2	254	21	222	250	35.8	173	tbc	tbc
CPx60	1.01	3636	3	254	19	270	400	63.9	231	tbc	tbc
CPx90G	2.11	7596	3	305	24	250	500	70.5	241	tbc	tbc
CPx900	1.50	5400	3	305	24	200	450	69.2	241	tbc	tbc
CPx120	2.30	8280	4	305/358	24	180	350	71.5	341	tbc	tbc
CPx150	3.15	11340	4	305/358	29	185	400	70.0	386	tbc	tbc
CPx175	3.36	12096	4	256	29	290	500	71.0	530	tbc	tbc
CPx200	3.84	13824	4	406	29	250	500	72.0	530	tbc	tbc
CPx250	4.49	16164	4	457	41	140	450	72.7	556	tbc	tbc
CPx300	5.76	20736	4	457	48	150	500	77.0	556	tbc	tbc

Heat Exchanger Baffles

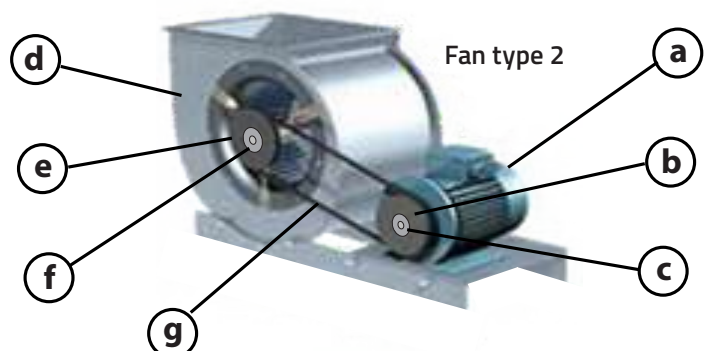
Model	30	45	60	90	120	150	175	200	250	300
Nat Gas G20	None	Top tubes	Top tubes	All tubes	Top tubes	All tubes	Top tubes	All tubes	All tubes	All tubes
Propane G31	None	Top tubes	Top tubes	All tubes	Top tubes	All tubes	Top tubes	All tubes	All tubes	All tubes
Oil - 35 sec	None	None	None	Top tubes	None	Top tubes	None	Top tubes	None	Top tubes
Oil - 28 sec	None	None	None	Top tubes	None	All tubes	None	Top tubes	None	Top tubes

1.2 Technical Data

Drive Data - Standard Motor

MODEL	Motor (a)				Motor Pulley (b)		Motor Pulley TaperLock (c)			Centrifugal Fan (d)	
	kW	Pha	RPM	Pt no.	Size	Pt no.	Size	Pt no.	type	Size	Pt no.
CPx30	0.55	1	1500	n/a	n/a	n/a	n/a	n/a	1	270 x 270	1402CFAN150/T/15
CPx45	0.55	1	1500	n/a	n/a	n/a	n/a	n/a	1	270 x 270	1402CFAN140/T/15
CPx60	1.1	1	1000	n/a	n/a	n/a	n/a	n/a	1	321 x 321	1402CFAN210/T/15
CPx90G	1.5	1	1500	140001908	170x1 SPA	142001689	1610-24	142003360	2	381 x 381	1402CFAN510/T
CPx900	1.4	1	1000	n/a	n/a	n/a	n/a	n/a	1	381 x 381	1402CFAN560/T/15
CPx120	1.7	3	1000	n/a	n/a	n/a	n/a	n/a	1	381 x 381	1402CFAN580/T/15/3P
CPx150	3.0	3	1500	140002055	95x1 SPA	142000602	1210-28	142003856	2	457 x 486	1402CFAN820/T
CPx175	4.0	3	1500	140002108	95x1 SPA	142000602	1210-28	142003856	2	457 x 486	1402CFAN820/T
CPx200	4.0	3	1500	140002108	95x1 SPA	142000602	1210-28	142003856	2	457 x 486	1402CFAN820/T
CPx250	4.0	3	1500	140002108	160x1 SPA	142001619	1610-28	142161028	3	381 x 381 x2	1402CFAN510/T/2DECK
CPx300	7.5	3	1500	140002251	160x1 SPA	142001619	1610-38	142003655	3	381 x 381 x2	1402CFAN510/T/2DECK

Fan Pulley (e)		Fan Pulley TaperLock (f)		Belt(s) (g)		Fuse		Contactor/Relay/ Soft Start		Overload	
Size	Pt no.	Size	Pt no.	Size	Pt no.	T (A)	Pt no.	Type	Pt no.	Type	Pt no.
n/a	n/a	n/a	n/a	n/a	n/a	6A	140700046	JOX	143000816	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	6A	140700046	JOX	143000816	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	10A	140700040	JOX	143000816	n/a	n/a
280X1 SPA	142002604	2012-25	142201225	A1690/65	142116903	12A	140700042	JOX	143000816	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	12A	140700042	JOX	143000816	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.5kW AC3	143000601	5-8A	143000802
200x1 SPA	142001825	2012-25	142201225	XPA1700	142119742	n/a	n/a	5.5kW AC3	143000601	5-8A	143000802
170x1 SPA	142001689	1610-25	142003370	XPA1632	142119730	n/a	n/a	5.5kW AC3	143000601	7-11A	143000801
160x1 SPA	142001619	1610-25	142003370	XPA1632	142119730	n/a	n/a	5.5kW AC3	143000601	7-11A	143000801
280x1 SPA	142002604	2012-25	142201225	XPA1700	142119742	n/a	n/a	5.5kW AC3	143000601	12-18A	143000801
250x1 SPA	142002494	2012-25	142201225	XPA1632	142119730	n/a	n/a	11.0kW MCI	143000621	12-18A	143000800

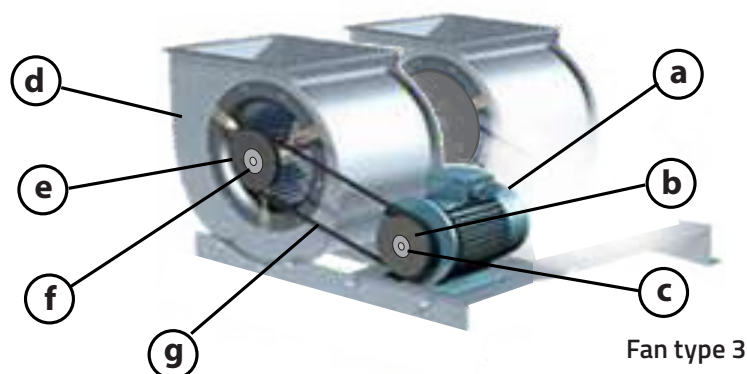


1.2 Technical Data

Drive Data - LHP (Larger Horsepower) Motor

MODEL	Motor (a)				Motor Pulley (b)		Motor Pulley TaperLock (c)			Centrifugal Fan (d)		
	kW	Pha	RPM	Pt no.	Size	Pt no.	Size	Pt no.	type	Size	Pt no.	
CPx30	0.75	1	1500	140001520	95x1 SPA	142000602	1210-24	142003350	2	321 x 321	1402CFAN240/T	
CPx45	0.75	1	1500	140001520	95x1 SPA	142000602	1210-24	142003350	2	321 x 321	1402CFAN240/T	
CPx60	2.2	1	1500	140001998	170x1 SPA	142001689	1610-24	142003360	2	381 x 381	1402CFAN510/T	
CPx90G	2.2	1	1500	140001998	180x1 SPA	142001675	1610-24	142003360	2	381 x 381	1402CFAN510/T	
CPx900	1.5	1	1500	140001908	170x1 SPA	142001689	1610-24	142003360	2	381 x 381	1402CFAN510/T	
CPx120	3.0	3	1500	140002055	95x1 SPA	142000602	1210-28	142003856	2	457 x 486	1402CFAN820/T	
CPx150	4.0	3	1500	140002108	100x1 SPA	142000601	1610-28	142161028	2	457 x 486	1402CFAN820/T	
CPx175	5.5	3	1450	140002206	95x1 SPA	142000602	1210-28	142003856	2	457 x 486	1402CFAN820/T	
CPx200	5.5	3	1450	140002206	100x1 SPA	142000601	1610-28	142003655	2	457 x 486	1402CFAN820/T	
CPx250	5.5	3	1450	140002206	170x1 SPA	142001689	1610-28	142003655	3	381 x 381 x2	1402CFAN510/T/2DECK	
CPx300	11.0	3	1500	140002610	140x2 SPA	142001013	2012-42	142201242	3	381 x 381 x2	1402CFAN510/T/2DECK	

Fan Pulley (e)		Fan Pulley TaperLock (f)		Belt(s) (g)		Fuse		Contactor/Relay/ Soft Start		Overload	
Size	Pt no.	Size	Pt no.	Size	Pt no.	T (A)	Pt no.	Type	Pt no.	Type	Pt no.
170x1 SPA	142001689	1610-25	142003370	A1020/44	142111504	6A	140700046	JOX	143000816	n/a	n/a
180x1 SPA	142001675	1610-25	142003370	A1020/44	142111504	6A	140700046	JOX	143000816	n/a	n/a
280x1 SPA	142002604	2012-25	142201225	A1690/65	142116903	12A	140700042	5.5kW AC3	143000601	12-18A	143000800
280x1 SPA	142002604	2012-25	142201225	A1690/65	142116903	n/a	n/a	5.5kW AC3	143000601	12-18A	143000800
280x1 SPA	142002604	2012-25	142201225	A1690/65	142116903	12A	140700042	JOX	143000816	n/a	n/a
200x1 SPA	142001825	2012-25	142201225	XPA1700	142119742	n/a	n/a	5.5kW AC3	143000601	5-8A	143000802
200x1 SPA	142001825	2012-25	142201225	XPA1700	142119742	n/a	n/a	5.5kW AC3	143000601	7-11A	143000801
160x1 SPA	142001619	1610-25	142003370	XPA1632	142119730	n/a	n/a	7.5kW MCI	143000620	9-13A	143000828
160x1 SPA	142001619	1610-25	142003370	XPA1632	142119730	n/a	n/a	7.5kW MCI	143000620	9-13A	143000828
280x1 SPA	142002604	2012-25	142201225	XPA1700	142119742	n/a	n/a	7.5kW MCI	143000620	9-13A	143000828
190x2 SPA	142001823	2012-25	142201225	XPA1550	142119725	n/a	n/a	11.0KW MCI	143000621	17-24A	143000807



1.3 General Requirements

1.3.1. General

Before installation, check that the local distribution conditions, fuel specification, and adjustment of the appliance (see data plate) are compatible.



IMPORTANT:

Copper Sulphide / 'Black Dust'

In some areas of the UK, particularly Northern Ireland, problems have been experienced with copper sulphide (more commonly referred to as 'Black Dust') forming on the inner surfaces of copper gas supply pipework. This dust can enter the gas stream and may lead to blockages of valves, filters and injectors.

If this heater is being installed in an area where 'Black Dust' is known to be a problem, and copper gas supply pipework is used, it is recommended that a filter having a stainless steel 50 micron mesh and suitable for Natural Gas is fitted at the inlet to the appliance immediately downstream of the main appliance isolation valve. The end user should be advised that the filter will require periodic cleaning or replacement at least once per year, during the annual service, or more often if the problem is severe.

1.3.2 Location

The location chosen for the air heater must permit:

- the provision of a satisfactory flue system and an adequate air supply.
- adequate space for servicing and air circulation around the air heater.

The heater(s) must not be installed in conditions for which it is not specifically designed e.g. where the atmosphere is corrosive or salty, and they are not suitable for outdoor use unless the CPx/EA style is specified. CPx/EA heaters must be installed on a plinth such that there is a minimum distance of 0.5m between ground level and the lowest point of any air inlet grilles.

Where the location of the air heater is such that it might suffer external mechanical damage e.g. from overhead cranes, fork lift trucks, it must be suitably protected. CPx heaters are for normal operation within an ambient temperature range of -10 to 25°C.

The air heater must be installed in accordance with the rules in force and the relevant requirements of any fire regulations or insurance company's requirements appertaining to the area in which the heater is located, particularly where special risks are involved such as areas where petrol vehicles are housed, where cellulose spraying is carried out, in wood working departments etc.



IMPORTANT:

Heaters shall not be installed in:-

- a) Those parts of spaces within buildings that have been classified as hazardous areas as defined in BS EN 60079-14.
- b) Where there is a foreseeable risk of flammable particles or gases or corrosion inducing gases or vapours being drawn into either the heated air stream or the air for combustion. In such cases installation may only proceed if both air sources are from an uncontaminated source, preferably from outside the building. It may also be necessary to purge the air heater before the burner is allowed to fire. In certain situations where only airborne particles are present it may suffice to fit filters on the main air inlet duct of the heater. Advice in these instances must be obtained from Powrmatic Ltd.
- c) In areas subjected to significant negative pressures due to extract systems.

1.3.3 Sizing of the heater

The heater should be correctly sized for the area that it is heating. Full calculations need to be performed to ensure the correct KW output heater is fitted (CIBSE elemental methodology can be used, or the Powrmatic Technical Department can provide guidelines).

1.3.4. Electrical Supply

Wiring external to the air heater must be installed in accordance with the I.E.E. Regulations for Electrical Installations and any local regulations which apply.

All heaters are supplied by either 230V - 1ph, 50Hz or 415V - 3ph, 50Hz (see technical data or data plate on heater for exact). The method of connection to the main electricity supply must:-

- facilitate the complete electrical isolation of the unit(s)
 - be in a readily accessible position adjacent to the unit(s)
 - serve only the unit(s)
 - have a contact separation of at least 3mm in all poles.
- See the accompanying wiring diagram for the heater electrical connections.

1.3.5 Flue System

Only flue systems supplied through Powrmatic Ltd may be used with CPx units. Several configurations of flue and combustion air ducts are available.

The flue must terminate in a freely exposed position and be sited to prevent the products of combustion entering any opening in a building in such concentration as to be prejudicial to health or a nuisance.

1.3 General Requirements

1.3.6. Gas Fired Heaters

1.3.6.1. Related Documents

All Gas Fired CPx heaters comply with the following European Directives:

Energy Related Product Directive:	2009/125/EC*
Gas Appliance Directive:	2009/142/EC
Electromagnetic Compatibility Directive:	2004/108/EC
Low Voltage Directive:	2006/95/EC
Machinery Directive:	2006/42/EC

Air heater(s) must be installed in accordance with **BS6230** and **BS5440** plus any relevant requirements of local and national building codes. * *where appropriate*.

1.3.6.2 Gas Supply

A servicing valve and union to facilitate servicing must be fitted to the gas inlet pipe work of the heater. The gas supply must be completed in solid pipe work and be adequately supported. Heaters suspended by drop rods, straps or chains must have a flexible connection as the final link between the gas supply pipe work and the heater. Sufficient slack must be left in the connection to take account of normal movement of the heater.

1.3.6.2 Service Pipes

The local gas undertaking should be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas. An existing service pipe must not be used without prior consultation with the local gas undertaking.

1.3.6.3 Meters

A gas meter is connected to the service pipe by the local gas undertaking or a local gas undertaking contractor. An existing meter should be checked, preferably by the gas undertaking, to ensure that the meter is adequate to deal with the total rate of gas supply required.

1.3.6.4. Installation Pipes

Installation pipes should be fitted in accordance with IGE/UP/2. Pipework from the meter to the air heater must be of adequate size. Do not use pipes of a smaller size than the inlet gas connection of the heater. The complete installation must be tested for soundness as described in the above Code.

1.3.7. Oil Fired Heaters

1.3.7.1. Related Documents

All Oil Fired CPx heaters comply with the following European Directives:

Energy Related Product Directive:	2009/125/EC*
Electromagnetic Compatibility Directive:	2004/108/EC
Low Voltage Directive:	2006/95/EC
Machinery Directive:	2006/42/EC

Air heater(s) must be installed in accordance with **BS6230** and **BS5440** plus any relevant requirements of local and national building codes. * *where appropriate*

It should also be in accordance with any relevant requirements of the local authority and fire authority and the relevant recommendations of the following documents: OFTEC Technical Book 3: Domestic & Commercial requirements for oil storage and supply equipment, Technical Book 4: Oil fired appliances & system installation requirements plus Easy Guides to non domestic oil feed pipes and oil storage.

1.3.7.2 Oil Supply



Powrmatic oil fired heaters are **ONLY** designed for operation with either **certified Gas Oil to BS2869 Class A2 or D**, (also referred to as 35 sec Oil' or 'Red Diesel') **and Kerosene to BS2869 Class C2**, (also referred to as '28 sec Oil').

Powrmatic are not able to confirm the suitability of any alternative blended Industrial Heating Oil (IHO) used to fuel their appliances and as such will affect the warranty on the appliance.

Construction and installation of service tanks and fittings should be in accordance with: (a) BS 5410 Part 2 Section 6, (b) BS 799 Part 5 & (c) BS 1563. In addition the service tank installation must comply with local regulations and by-laws and with the requirements of insurance companies

Refer to the detail provided in the burner handbook regarding oil pipe sizing. These must be generally in accordance with BS799 Part 3 and BS5410 Part 2. Particular attention is drawn to the following:

- a) Pipe jointing compounds must be capable of withstanding the solvent action of the fuel oil under all operating temperatures and pressures. Jointing compounds containing oil shall not be used. Hemp and other fibrous materials shall not be used as packing for screwed joints.
- b) Soft solder copper tube fittings and galvanised pipes and fittings must not be used.
- c) Oil lines must be completely air-tight.
- d) The pump suction must not exceed a maximum of 0.4 bar (30cm Hg). Beyond this limit gas may be released from the oil.



WARNING: The burners are supplied adjusted for a single pipe system. If the burner is to be used on a twin pipe system the Internal bypass plug of the burner oil pump must be fitted. Refer to the burner instruction booklet.

1.3 General Requirements

Ideally the return pipe should terminate within the oil tank at the same level as the suction line, both being below the minimum oil level.

1.3.7.3. Fire Valve

It is recommended that the fire valves should be installed as follows:

1. Main storage to service tank supply (if applicable)
2. Main storage to burner supply
3. Service tank to burner supply (if applicable)

Fire valves should be installed generally in accordance with the requirements of BS799: Part 5. The fire valve should be situated in an easily accessible position as near the tank as possible and where practicable within the boundary of the tank chamber or catchpit retaining wall.

1.3.8. Combustion & Ventilation Air Supply

Type B flued installations.

Where CPx heaters are **installed within the heated space (ie not in a plant room or an enclosure)** and having a building design air change rate of greater than 0.5/h, additional provision for ventilation is **not required**.

If the building design air change rate is **less than 0.5/h**, additional provision for natural or mechanical ventilation **is required**. These being:

Natural Ventilation:

Grilles having a free area of at least 2cm² per kW of rated heat input shall be provided at low level i.e. below the level of the heater flue connection.

Mechanical Ventilation:

Must ensure that the space air change rate is at least 0.5/h, must be of the 'input' type and interlocked to ensure the heaters cannot work if the input system is not working.

Type B flued installations.

Where CPx heaters are **installed in a plant room or an enclosure (ie not within the heated space)** having combustion air drawn directly from the room and connected to a flue that evacuates the products of combustion directly from the room additional provision for natural or mechanical ventilation **is required**.

These being:

Natural Ventilation:

There must be permanent air vents communicating directly with the outside air, at high level and at low level.

Plant Rooms

Low level (inlet) 4cm²/kw of total rated net heat input

High level (outlet) 2cm²/kw of total rated net heat input

Enclosures

Low level (inlet) 10cm²/kw of total rated net heat input

High level (outlet) 5cm²/kw of total rated net heat input

Mechanical Ventilation:

The minimum flow rate of ventilation shall be 4.14m³/h per kilowatt of total rated heat input.

Type B₂₃ Installation (these refer to section 1.4.3 of these instructions)

Air vents shall be permanently open.

Figures in column 1 are for heaters installed in the space they are heating.

Figures in column 2 are for heaters installed in a plant room, ventilation to outside air.

Figures in column 3 are for heaters installed in a enclosure, ventilation to outside air.

In all cases figures are per heater installed.

For multi heaters installations the appropriate values for each heater must be added together.

CPx	Input kW	In the heated space	In a plant room, ventilation to outside		In an enclosure, ventilation to outside	
		Low level grille. Free area cm ²	Low level grille. Free area cm ²	High level grille. Free area cm ²	Low level grille. Free area cm ²	High level grille. Free area cm ²
30	32.29	64.6	129.2	64.6	322.9	161.5
45	48.97	97.9	195.9	97.9	489.7	244.8
60	64.62	129.2	258.5	129.2	646.2	323.1
90	98.31	196.6	393.2	196.6	983.1	491.5
120	127.43	254.9	509.7	254.9	1274.3	637.1
150	162.90	325.8	651.6	325.8	1629.0	814.5
175	190.07	380.1	760.3	380.1	1900.7	950.4
200	215.87	431.7	863.5	431.7	2158.7	1079.3
250	269.86	539.7	1079.4	539.7	2698.6	1349.3
300	316.25	632.5	1265.0	632.5	3162.5	1581.2

1.3 General Requirements

1.3.9. Air Distribution System

1.3.9.1. Freeblowing UF/HF/CF/RF

These are equipped with rotatable air delivery heads fixed to the top panel of the unit providing rotational and lateral direction. The quantity of heads depend on the heater size (see Head Plans in section 1.2) and consist of a number of standard and extended heads. Extended heads are placed on the rear of the heater when located adjacent to a wall to allow complete freeblowing access without any restrictions.



NOTE: We do not recommend removing and blanking off any of these heads or removing singular heads and replacing with similar sized spiral ductwork. Ducted units are available for these applications.

For free-blowing units installed in buildings having a low heat loss i.e. where single units are required to cover a large floor area, and in buildings with high roof or ceiling heights Calecon thermal economiser units should be fitted to ensure even heat distribution and minimise stratification.

Care should be taken to avoid impeding the heater air throw with racking, partitions, plant or machinery etc. Various outlet configurations are available as optional extras to modify the air throw pattern to suit particular site conditions.

1.3.9.2. Ducted UD/HD/CD/RD units

These are designed for use with duct work to more precisely define the point of air delivery, and /or provide ducted return air or ducted fresh air inlet.



IMPORTANT. Ductwork must comply with current regulations and be correctly calculated to comply with the maximum static resistance available for the specific model installed (refer to the duct resistance/ air volume tables shown opposite).



WARNING Ensure that the total aggregate resistance¹ of the duct system, including any dampers, grilles or filters etc, is equivalent to the static pressure capability of the selected heater.

If the total static resistance of the duct system is greater than the stated for that heater, airflow will be restricted and the heater may trip to overheat. Resistance must be reduced to avoid nuisance temperature overheat conditions.

Conversely if the duct system resistance is insufficient, then the main fan motor may draw excess current and trip

to overload. Additional resistance must be introduced to stop the fan motor from 'free-wheeling' and eventually causing an electrical thermal trip condition. (e.g. by adjustment of duct outlet nozzles and balancing of the duct system).

Using a clamp meter around the fan power cable and with all side panels closed, check the running current of the centrifugal fan once the heater is running and compared with the table shown in section 2.6.7.

Adjust the balancing dampers within the airflow ductwork system to achieve the current suitable for that specific model.



WARNING: DO NOT EXCEED THE STATED MAXIMUM. Exceeding the MAX running current will cause the fan's thermal overload to trip!



IMPORTANT. Furthermore, a 1000mm (1M) straight plenum box with the same cross sectional area as the heater outlet duct spigot, must be fitted to outlet spigot prior to any restriction² in ductwork.



WARNING: Failure to install this plenum box could cause excess temperatures issues with the heater and nuisance overheats.

All ducting must be independently supported of the air heater. Joints and seams of supply ducts and fittings must be securely fastened and made airtight.

It is recommended that ducting should be connected to the heater spigots via an airtight flexible coupling of noncombustible material. Before fitting coupling it must be ensured that an adequate clearance will be maintained between the ends of the ducting and the heater spigots.

All delivery and return air ducts, including air filters, jointing and any insulation or lining must be constructed entirely of materials which will not contribute to a fire, are of adequate strength and dimensionally stable for the maximum internal and external temperatures to which they are to be exposed during commissioning and normal operation.

Where inter-joint spaces are used as duct routes they should be suitably lined with a fire-resisting material.

A full and unobstructed return air path to the air heater(s) must be provided. If the air heater(s) is installed in a plant room the return air intake(s) and the warm air outlet(s) from the heater(s) must be fully ducted, into and out of the plant room to avoid interference with the operation of the heater from other equipment.

1.3 General Requirements

The openings in the structure of the plant room through which the ducting passes must be fire stopped. Care must be taken to ensure that return-air intakes are kept clear of sources of smells and fumes, and where there is any possibility of pollution of the air by dust, shavings etc., precautions must be taken to prevent contamination.

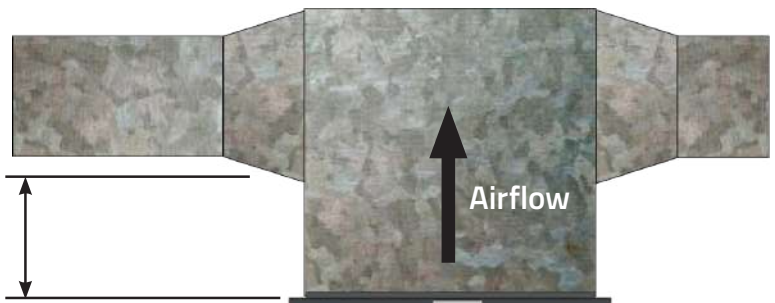
If necessary suitable barrier rails should be provided to prevent any combustible material being placed within 900mm of the outlets.

If required sound attenuators may be fitted in inlet and outlet ducts to reduce airborne fan noise. Materials used in outlet sound attenuators must be capable of withstanding 100°C air temperature without any deterioration.

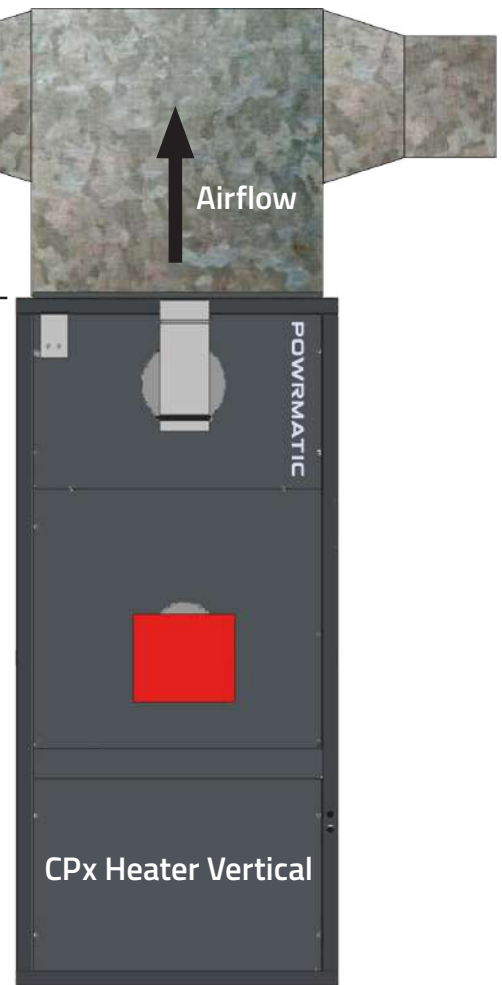
¹ inlet ducting and outlet ducting. ² in respect to reducer, bend or bi-directional section.



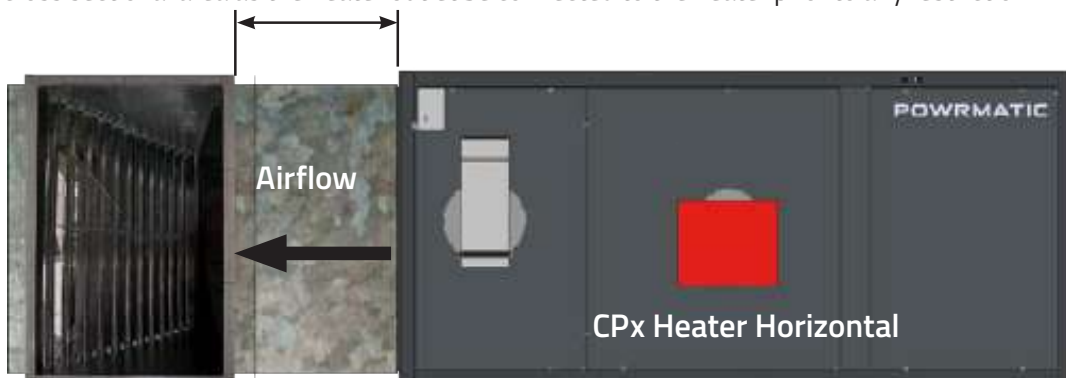
IMPORTANT. It is essential that a minimum 1000mm of straight ductwork, with the same cross sectional area as the heater outlet be connected to the heater prior to any restriction



Model	Standard Motor		LHP Motor
	Air Volume (m ³ /s)	Max Duct Resistance (Pa)	Max Duct Resistance (Pa)
CPx30	0.97	188	250
CPx45	0.86	222	250
CPx60	1.01	270	400
CPx90G	2.11	250	500
CPx900	1.50	200	450
CPx120	2.30	180	350
CPx150	3.15	185	400
CPx175	3.36	290	500
CPx200	3.84	250	500
CPx250	4.49	140	450
CPx300	5.76	150	500

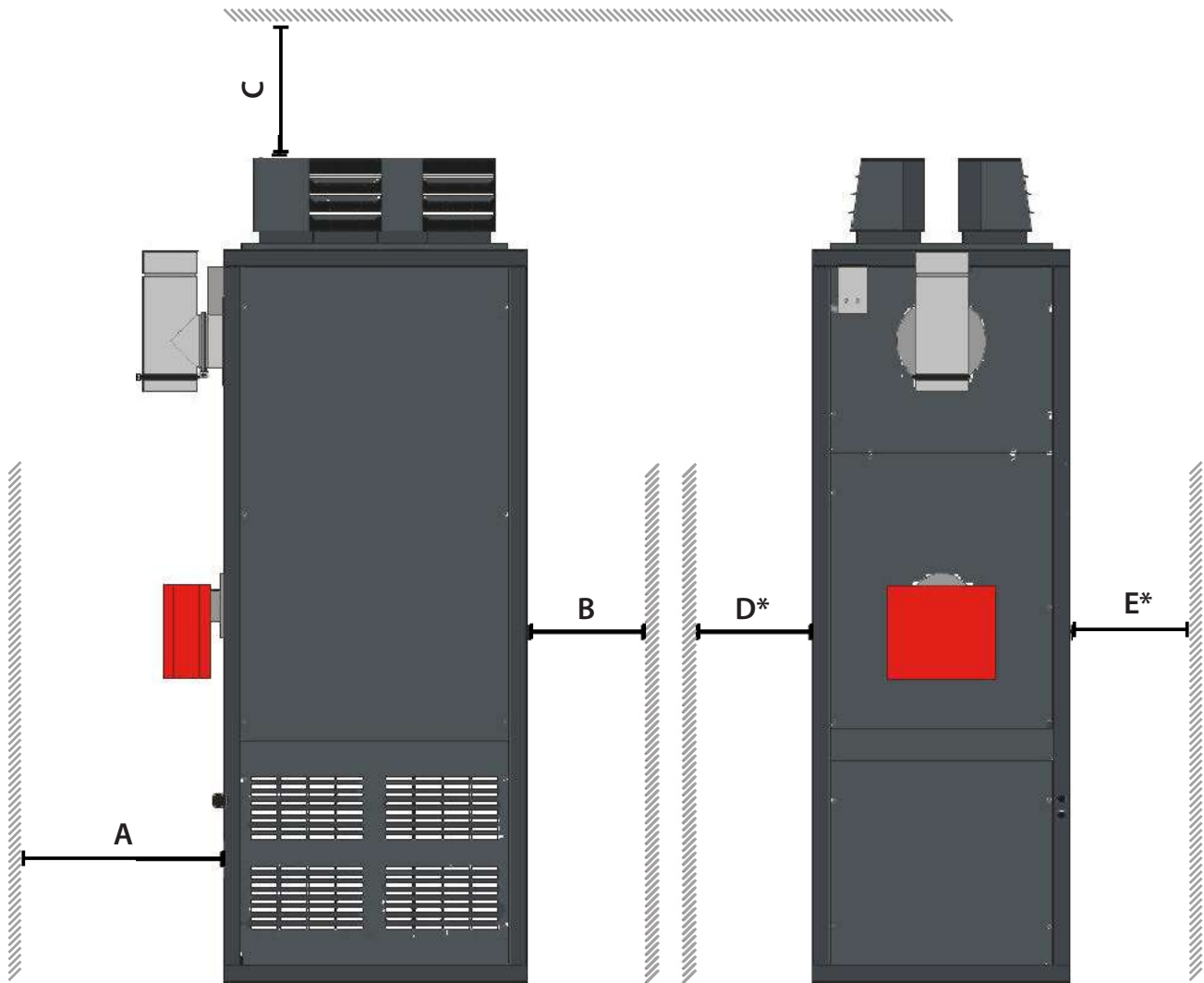


IMPORTANT. It is essential that a minimum 1000mm of straight ductwork, with the same cross sectional area as the heater outlet be connected to the heater prior to any restriction



2.1 Fitting the Unit

2.1.1 Fitting space requirement



	Model		30	45	60	90	120	150	175	200	250	300
A	Front	mm	750	750	950	950	1250	1250	1450	1450	1650	1650
B	Rear	mm	1000									
C	Above	mm	1000									
D	Side (Blank panel)*	mm	150									
E	Side (Louvred)*	mm	1000									

To the front	The depth of the heater
To the rear	1.0m
To the side having louvred lower panels	1.0m
To the side having blank lower panels (see below)*	0.15m
Above the heater	1.0m



* Blank side panels are only available on models 30 to 150 inc. Side panels are interchangeable to ease with installation against walls etc. Therefore D can = 1.0m if E = 0.15m **OR** E can = 0.15m if D = 1.0m

2.1 Fitting the Unit

2.1.2. General

Before installation, check that the local distribution conditions, fuel specification, and adjustment of the appliance (see data plate) are compatible.



IMPORTANT:

Copper Sulphide / 'Black Dust'
In some areas of the UK, particularly Northern Ireland, problems have been experienced with copper sulphide (more commonly referred to as 'Black Dust') forming on the inner surfaces of copper gas supply pipework. This dust can enter the gas stream and may lead to blockages of valves, filters and injectors.

If this heater is being installed in an area where 'Black Dust' is known to be a problem, and copper gas supply pipework is used, it is recommended that a filter having a stainless steel 50 micron mesh and suitable for Natural Gas is fitted at the inlet to the appliance immediately downstream of the main appliance isolation valve. The end user should be advised that the filter will require periodic cleaning or replacement at least once per year, during the annual service, or more often if the problem is severe.

2.1.3. Installing the Heater

If necessary consideration should be given to mounting the heater on resilient pads, or equivalent, to minimize transfer of noise and vibration to the structure of the building.

Floor mounted heaters must be installed on a level noncombustible surface.

Heaters mounted at high level must be supported on a purpose designed platform or framework that is suspended from vertical drop rods, chains or straps or mounted on specifically designed cantilever brackets from a non-combustible wall. The method of installation support must be capable of adequately supporting the weight of the unit and any ancillary equipment. Before installing the heater the existing structure must be inspected to ensure it is suitable. All supports should be protected against the effects of rust or corrosion.

Whichever method of mounting the air heater is used the following minimum clearances for installation and servicing must be observed.



NOTE: Models CPx 175 heaters and above have louvred lower panels on both sides. **Minimum clearance to any side is 0.5m.**



NOTE: Smaller heaters are supplied with one blank side panel and one louvred side panel. If the heater is installed against a wall ensure that the blank panel is facing the wall,

interchanging the two side panels if necessary. **Minimum clearance to any side is 0.15m.**

Any combustible material adjacent to the air heater and the flue system must be so placed or shielded as to ensure that its temperature does not exceed 65 °C.

If the method of mounting allows for any movement of the heater it is essential that all gas, duct, and electrical connections to the heater are made with flexible connections to maintain continuity of connection.

2.1.4. Gas Connection (where necessary)

- A servicing valve and union must be fitted at the gas inlet to the heater to facilitate servicing.
- The gas supply to the air heater must be completed in solid pipe work and be adequately supported.
- Heaters suspended by drop rods, straps or chains must have a flexible connection as the final link between the gas supply pipe work and the heater. Sufficient slack must be left in the connection to take account of normal movement of the heater.



Warning:

When completing the final gas connection to the heater do not place undue strain on the gas pipe work of the heater.

2.1.5. Oil Connection (where necessary)

Refer to the supplied burner installation instructions for details regarding oil supply options.

2.1.6 Room Thermostat Siting

If a remote room thermostat, or controller with an integral sensor, is used it should be fitted at a point which will be generally representative of the heated area as far as temperature is concerned. Draughty areas, areas subjected to direct heat e.g. from the sun, and areas where the air movement is relatively stagnant e.g. in recesses, are all positions to be avoided for siting the thermostat.

The thermostat should be mounted about 1.5m (5ft) from floor level.

Any room thermostat, frost thermostat, time clock etc. must be suitable for switching 230V, 5A and must be of the 'snap action' type to minimise contact bounce.



For electrical connections of external controls see section 2.5 or the accompanying wiring diagram.

2.2 Fitting the Flue

A single wall tee piece is supplied with each heater and must be fitted to the flue outlet socket on the heater. A closed chimney system that conforms to the requirements of EN1856-1 and has a designation appropriate to the application must be connected to the outlet of this tee. The cross sectional area of the chimney serving the appliance must be not less than the area of the flue outlet of the air heater. The chimney must have a minimum height, from the heater to the flue terminal, of 2m (1m for external EA units). Horizontal runs of flue must be minimised but where they are unavoidable the ratio of vertical to horizontal flue should be not less than 3:1.

If necessary a single offset using two 45° bends can be included to avoid obstructions. The minimum equivalent resistance of the flue system should not be less than 0.0mb, the maximum not greater than 0.5mb. Details of how to calculate the resistance of the flue to be installed are given in Appendix A.

In order to minimise condensation the use of twin wall chimney is recommended. With high efficiency heaters some condensation in the chimney, particularly at the terminal, is unavoidable and in addition there can also be rain water ingress. Use of a chimney system having joint seals will minimise any leakage from the flue system. The

heater tee is provided with a collection tray and the outlet from this should be run to a drainage point e.g. a gully. The condensation pipe from the collection tray to the disposal point should be of non-corrodible material of not less than 22mm (3/4") size.

Facilities should be made for disconnecting the chimney pipe(s) from the air heater(s) for inspection and servicing purposes.

The chimney outlet must be fitted with a terminal and where the heater chimney is less than 200mm (8") in diameter an approved terminal must be used.

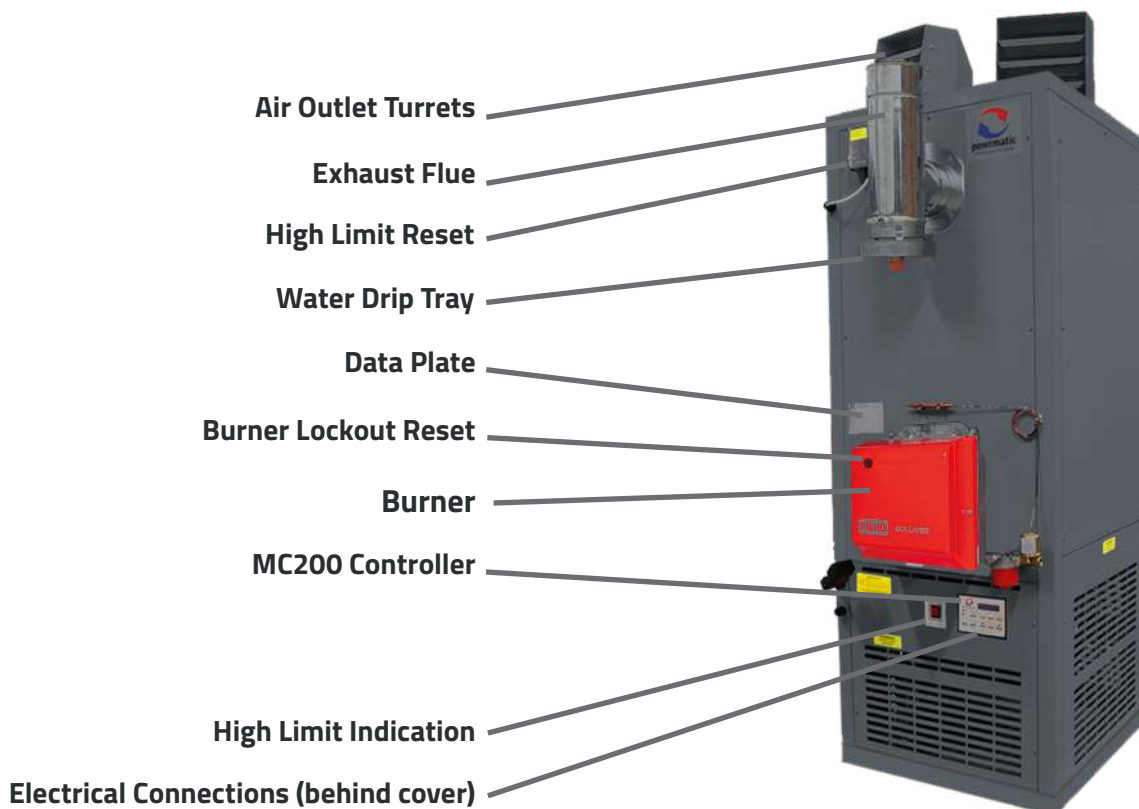
The chimney must be supported independently of the air heater.

The chimney must terminate in a freely exposed position and must be situated so as to prevent the products of combustion entering any opening in a building in such concentration as to be prejudicial to health or a nuisance.



Note: For flue positioning and minimum clearances of flue, please refer to current IGE/UP/10, BS5440-1 and BS5440-2 standards.

2.3 General Identification of Items



2.4 Electrical Cable Installation

2.4.1. Electrical Connections



Warning: THIS APPLIANCE MUST BE EARTHED.



Warning: Wiring external to the unit must be carried out by an appropriately qualified person to current IEE regulations for

Electrical Installations and any local regulations which apply.

The local electrical supply must be run to a point adjacent to the heater and be suitably terminated to provide an isolation point that will prevent remote activation of the unit during servicing. Wiring should be completed in flexible conduit.

The local electrical supply conditions must be compatible with the electrical data given on the appliance data plate.

Heaters are for use with 230V, 1N, 50Hz or 400V, 3N, 50Hz supplies (see heater data plate).

The method of connection to the main electricity supply must:-

- facilitate the complete electrical isolation of the heater(s) that will prevent remote activation of the heater during servicing.
- be in a readily accessible position adjacent to the heater(s).
- serve only the heater(s).
- have a contact separation of at least 3mm in all poles. See the wiring diagram for the heater electrical connections.

All units are fully prewired and only require final connections for the incoming mains supply. Heaters not supplied with inbuilt time and temperature controls will also require completion of the external control circuit (230V) via a room thermostat, time clock etc. and, if applicable, the remote low level lockout reset.

Reference must be made to Section 1.2 to ascertain the electrical loading of the unit(s) being installed so that cables of adequate cross-sectional area are used for the electrical installation. The length of the conductors between the cord anchorage and the terminals must be such that the current carrying conductors become taut before the earth conductor if the cable or cord slips out of the cord anchorage. All external controls must be of an approved type.

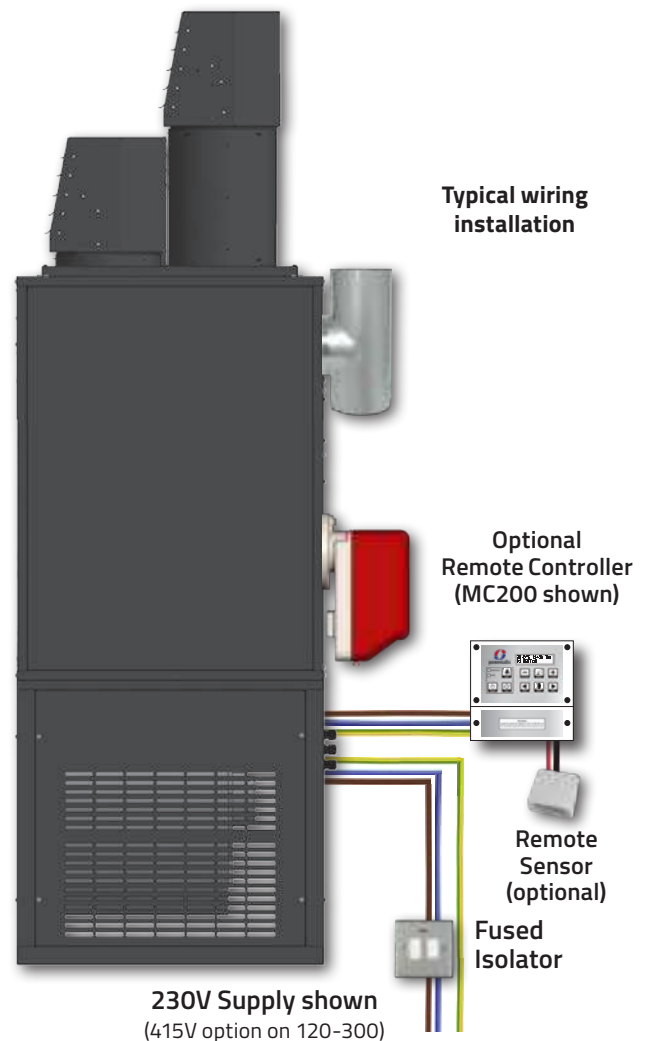
Heaters supplied less main fan must be electrically interlocked to the air movement system so that this is started in the same manner as the air heater fan would be viz. A connection from the appropriate heater terminal (see wiring diagram with the heater) must be made to one side of the fan motor contactor coil, the other side of the coil being connected to Neutral. Under no circumstances must the fan motor electrical supply be taken direct from the internal wiring of the heater.

2.4.2. Typical Wiring Installation showing remote controller

Key:

A =	2 core and earth (single phase)
	4 core and earth (three phase)
B* = MC200 On/Off	= 5 core and earth
MC200 High/Low	= 7 core and earth
MC200 Mod	= 7 core and earth
C=	Screened 2 core (MC200 models only)**

** (screen must be grounded only at the MC200, See instructions supplied with controller for wiring sizing, Max. 100m)



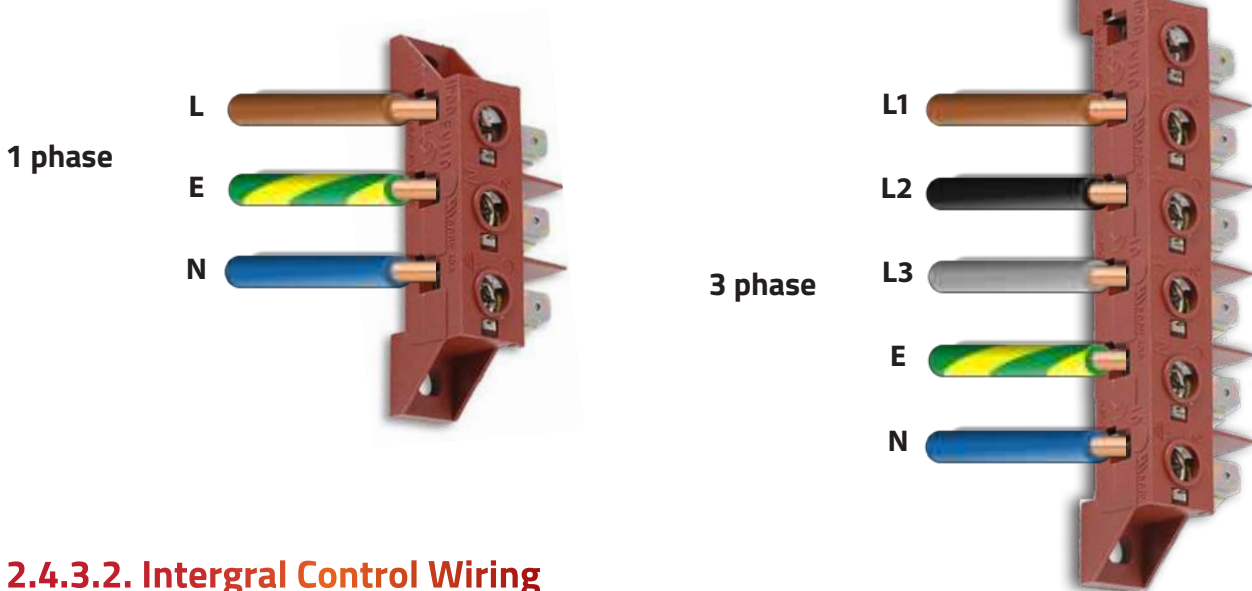
2.4 Electrical Cable Installation

2.4.3. Wiring

The wiring terminals, both mains input and controller, are located on the electrical chassis panel behind the bottom front panel of the heater which firstly has to be removed.

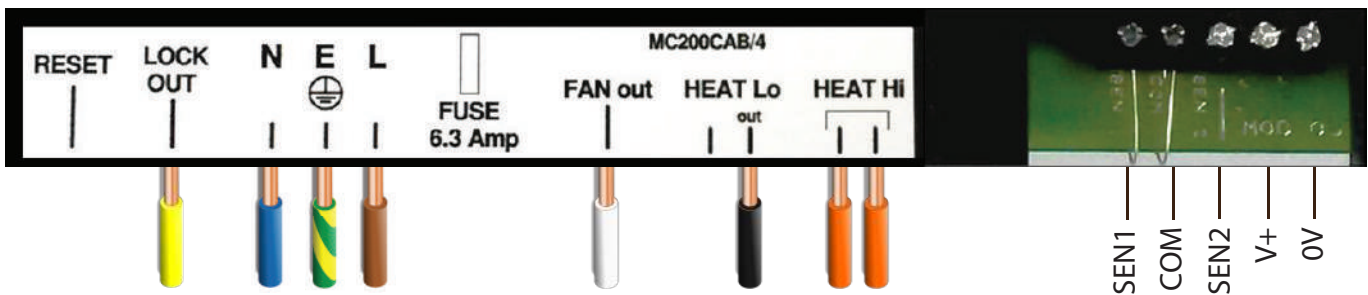
Mains input of either 230V 50Hz 1Ph or 415V 50Hz 3Ph supply connections are via a separate terminal block. For input power refer to table below.

2.4.3.1. Mains Supply



2.4.3.2. Intergral Control Wiring

The heater is fitted with an integral MC200/CAB controller which is pre-wired to the terminal strip



2.4.4. External Fuses

Model	Pha	Standard Motor Fuse Rating (A)	Large Horsepower (LHP) Fuse Rating (A)
CPx30	1	6	6
CPx45	1	10	6
CPx60	1	6	16
CPx90G, CPx900	1	16	16
CPx120, CPx150	3	10	10
CPx175, CPx200, CPx250	3	10	16
CPx300	3	16	32

2.4 Electrical Cable Installation

2.4.5. Optional Remote Controller

The wiring terminals, both mains input and controller, are located on the electrical chassis panel behind the bottom front panel of the heater which firstly has to be removed.

Mains input of either 230V 50Hz 1Ph or 415V 50Hz 3Ph supply connections are via a separate terminal block. For input power refer to table below.

The mains supply (single or three phase) connections are via a Hylec terminal block.

Control Circuitry connections are via a 30A numbered terminal strip. They are as follows:

terminal 7	230V Heat LOW Demand
terminal 8	230V Main Fan Only
terminal 9	Lockout indication (230V)
terminals 13 & 14	230V Heat HIGH Circuit
terminal 15	Lockout Reset*

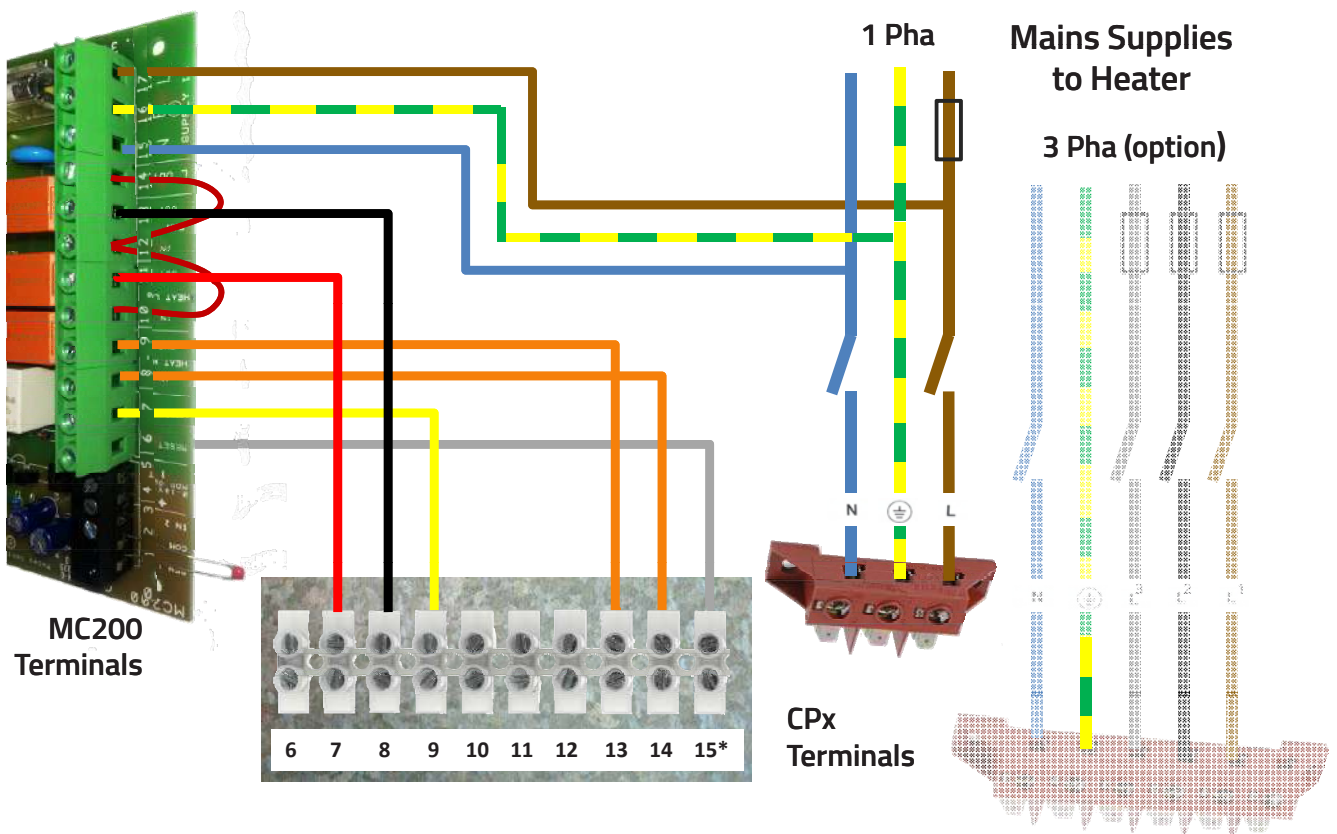
** only available on gas cabinets with 'remote controls'*



NOTE:

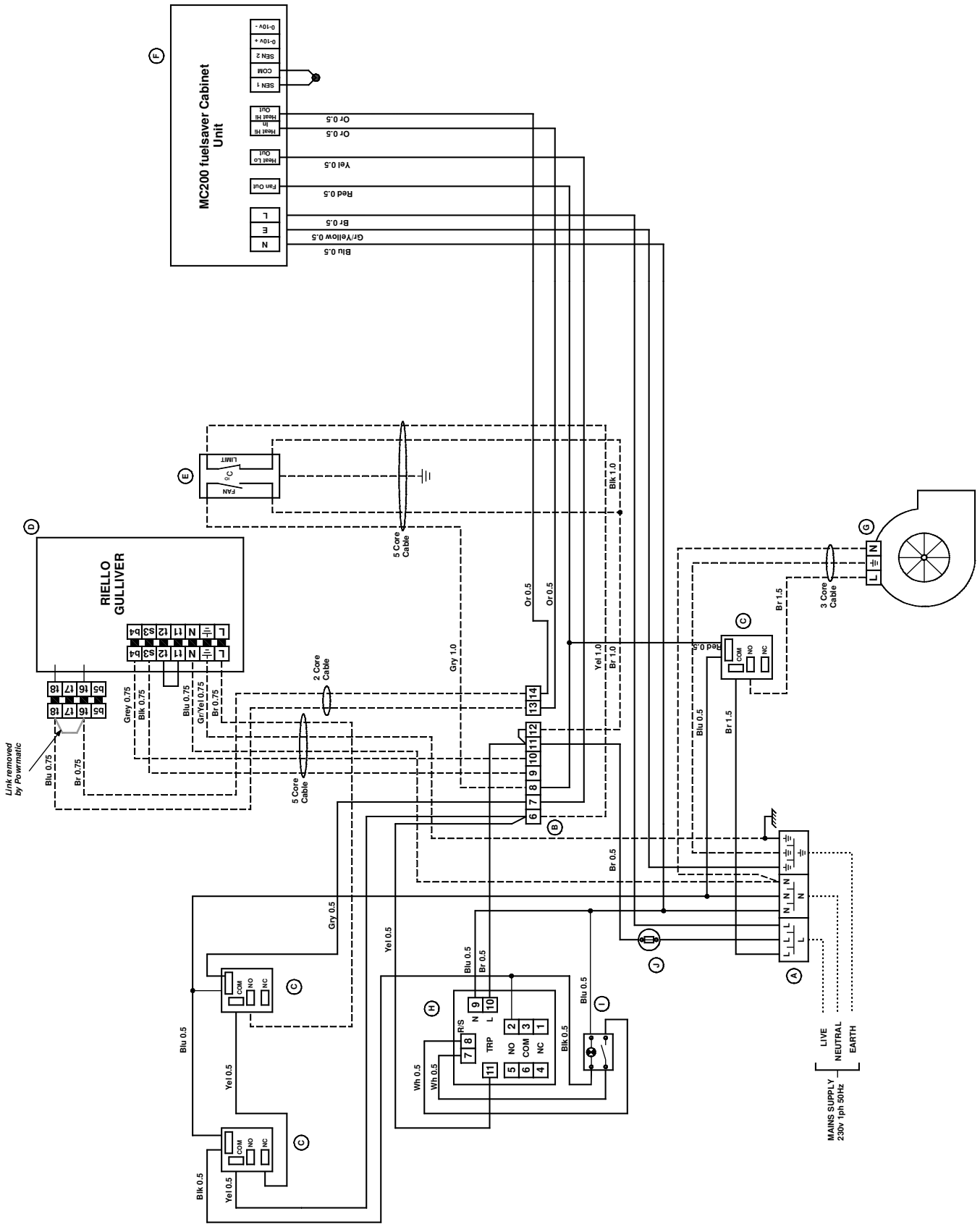
To achieve maximum system efficiency it is recommended that CPx units are controlled by an MC200 Fuel Saver unit. Simple room thermostat and thermostat/time clock control systems will not provide optimum system efficiency and fuel savings.

Wiring drawings and instructions are supplied with the respective controller.



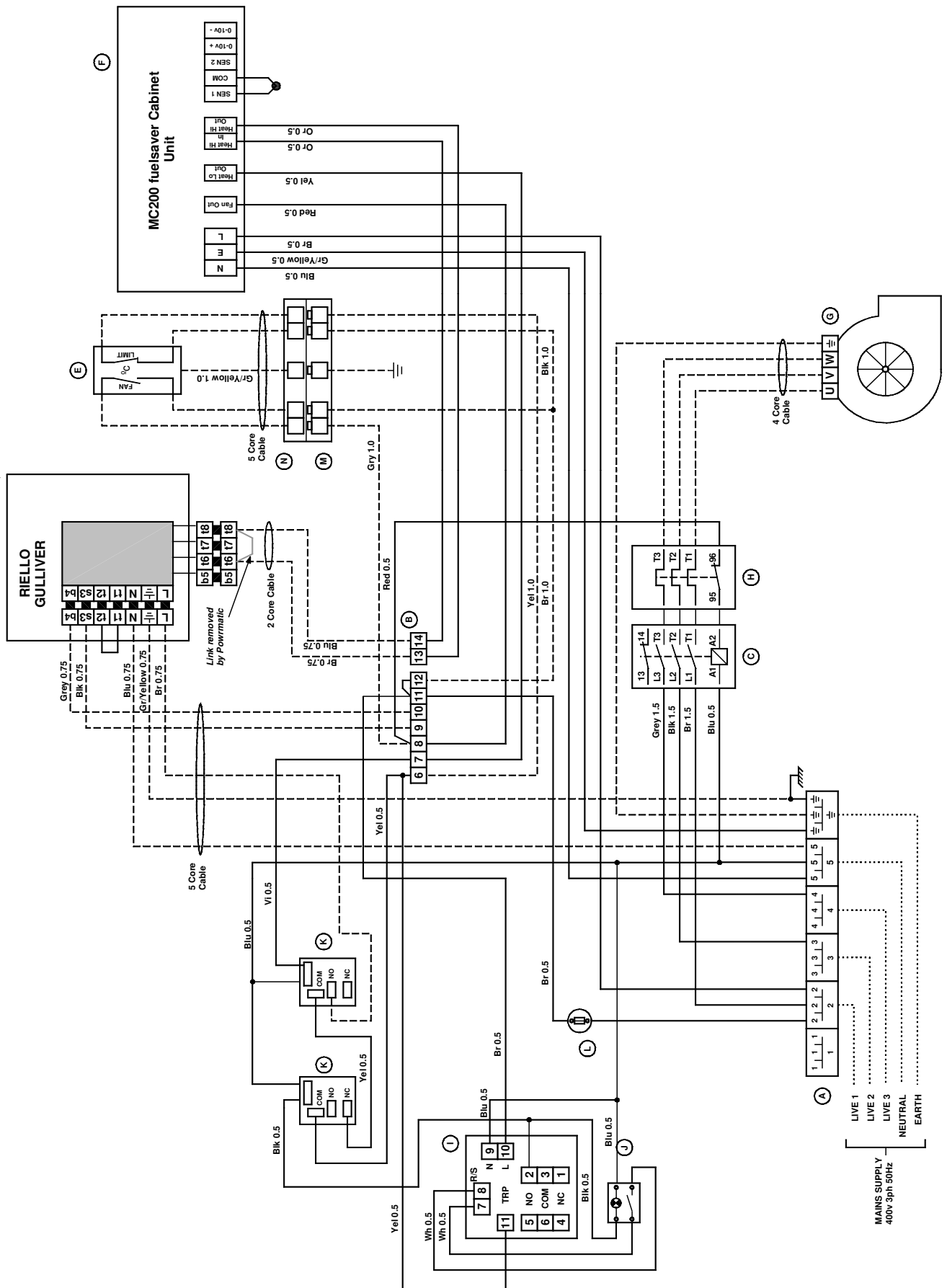
2.5 Wiring Diagrams

2.5.1 CPx30-90 1Pha Gas/Oil Heater Main Internal Wiring Diagram



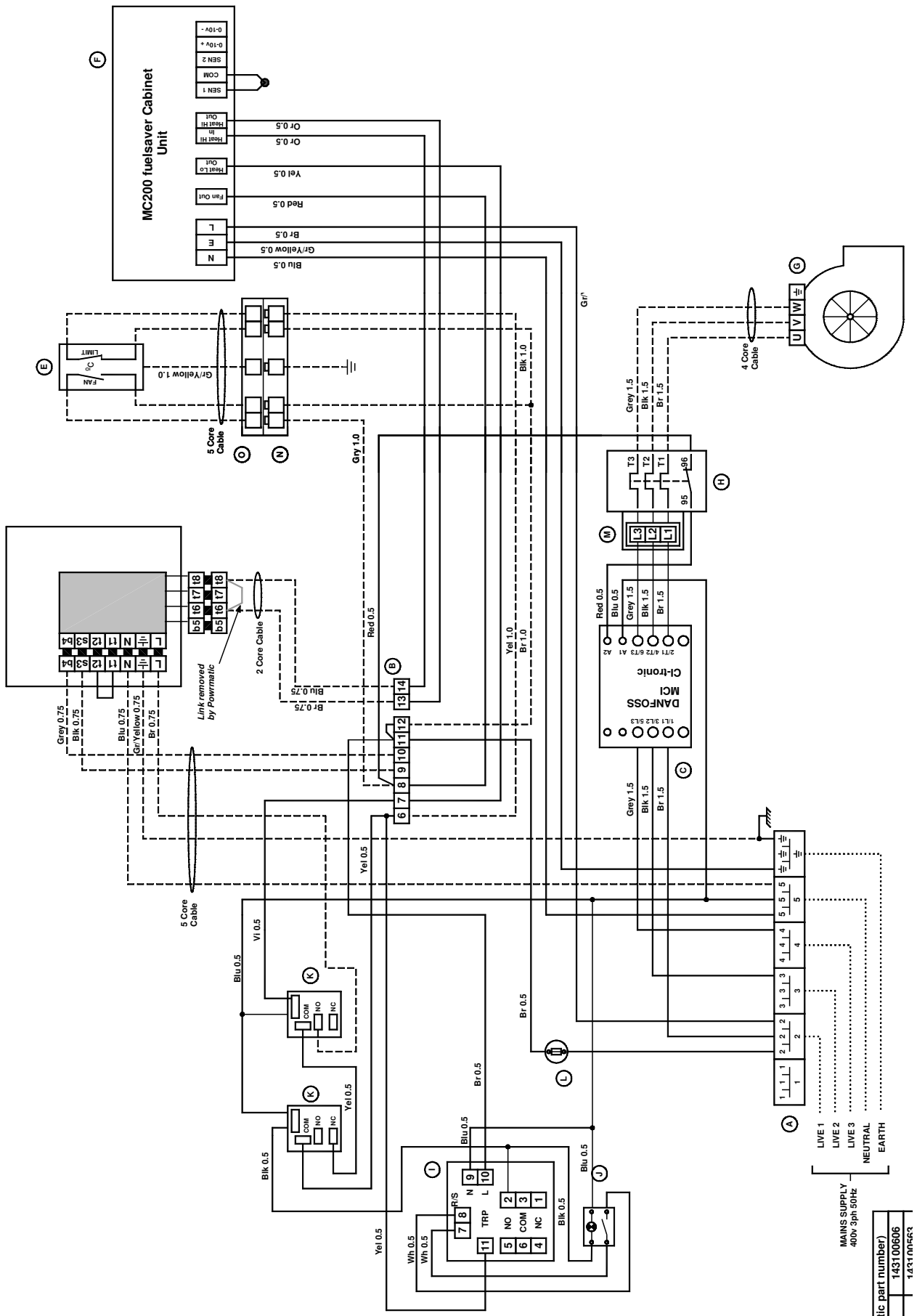
2.5 Wiring Diagrams

2.5.2 CPx120-200 3Pha Gas/Oil Heater Main Internal Wiring Diagram



2.5 Wiring Diagrams

2.5.3 CPx250-300 3Pha Gas/Oil Heater Main Internal Wiring Diagram



2.6 Commissioning and Testing

Gas Safety (Installation & Use) (Amendment) Regulations



It is law that all gas appliances are adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations. Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer

The CPx cabinet heater will be despatched preset and fully tested to our most up to date test procedures.

2.6.1. Electrical Installation

Checks to ensure electrical safety must be carried out by a qualified person.

2.6.2. Gas Installation *(where applicable)*

For new installations, the whole of the gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the recommendations of IGE/UP/1 (Edition 2) or IGE/UP/2A as appropriate.

2.6.3. Oil Installation *(where applicable)*

The whole of the oil installation, including the tank, should be inspected and tested in accordance with the recommendations of OFTEC.

2.6.4. Air Distribution System

The system should be checked to ensure that the installation work has been carried out in accordance with the design requirements.

Particular attention should be given to the correct arrangement of delivery ducts and registers, return air ducts and grills and general adequacy of return air paths.

For CPx*/D heaters ensure that the total duct system resistance does not exceed the available air pressure of the equipment supplied – refer to section 1.2. If the duct system resistance is less than the available air pressure of the equipment supplied additional resistance must be introduced e.g. by adjustment of duct outlet nozzles and balancing of the duct system. Conversely if the duct system resistance is greater than the available air pressure of the heater supplied the system resistance must be reduced.

2.6.5. Lighting The Heater



NOTE: The limit thermostat interlock relay may require resetting after loss of the electrical supply to the heater regardless of whether the limit thermostat has operated.

2.6.5.1. Gas Fired Heaters



NOTE: Refer also to the burner instruction booklet supplied with the heater. This provides information on how to adjust the burner, setting up the air pressure switches, system checks and fault finding detail.



IMPORTANT:

DO NOT use burner settings from the burner instruction booklet. The burners are specifically adjusted for Powrmatic heaters, only use the settings in these instructions.

2.6.5.1.1. Gas Controls Assembly - Soundness Check

1. Ensure the gas service valve at the inlet to the gas controls assembly is shut.
2. To prove soundness of the first main safety shut-off valve:-
 - a) Connect pressure gauge to the inlet pressure test point on the main valve block or inlet pipework.
 - b) Open gas service valve and allow pressure to stabilize before shutting it again. The valves are sound if no pressure drop is observed. If a pressure drop is observed do not proceed until the fault has been rectified. Remove pressure gauge and refit sealing screw in pressure test point. If any adjustments have been made, re-check both high and low fire once more.

2.6.5.1.2. Sequence Check

1. Ensure that the gas service valve is closed and that the main electrical supply to the heater is switched off.
2. Start the burner by setting the time clock and thermostat to call for heat or complete the external control circuit.
3. Turn ON the main electrical supply and check that the following sequence of events occurs.
 - i) Burner fan runs.
 - ii) Ignition spark is heard.
 - iii) Main gas valves open and main gas flame is established.

2.6 Commissioning and Testing

iv) Burner goes to lockout as there is no gas supply.

4. Switch OFF main electricity supply.

2.6.5.1.3. Final Adjustments

1. Remove the burner cover by undoing the two screws either side of the housing. (Gulliver burner shown)



3. Turn ON the main electricity supply and check that the following sequence of events occur. i) Burner fan runs. ii) Ignition spark is heard. iii) Main gas valves open and main gas flame is established.

4. Check that the High Fire burner gas pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the high fire burner gas pressure by rotating the adjustment screw under the cover flap - clockwise (+ positive), anticlockwise (- negative).



2.6.5.1.3.1. Hi/Low Burners

1. Remove the sealing screw from the pressure test point located on the bottom of the gas inlet to the burner head and attach a pressure gauge. Remove the sample point cover plug from the outlet flue length and insert a CO2 measuring instrument.



2. Check that the gas pressure switch on the side of the gas valve is set to cut out below the minimum inlet gas pressure (app. 15mbar)



If the range of adjustment does not allow for setting of the correct burner pressure the main volume regulator may also be used. It is recommended that the main governor adjustment is within 50% to 75% of its range. Clockwise (- negative) anti-clockwise (- positive)



5. Check that the Low Fire burner gas pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the low fire burner gas pressure by rotating the adjustment wheel clockwise (- negative) anti-clockwise (- positive)



2.6 Commissioning and Testing

If any adjustments have been made, re-check both high and low fire once more.

6. Gulliver burners are manufactured to EN 676 standard and fitted with a singular air pressure switch.

Turn the switch at the lowest setting. With the burner working at the required output, adjust the dial clockwise, increasing its value until the burner shuts down. Reduce the value by one set point, turning the dial anti-clockwise. Check for reliable burner operation, if the burner shuts down, reduce the value by a half set point.



7. Measure the CO₂ content of the flue gases. If necessary adjust the combustion air damper of the burner (Refer to the Burner Instructions) to obtain a CO₂ reading as indicated in section 1.2 (± 0.5)

8. Turn OFF the burner, remove pressure gauge and refit sealing screw in pressure test point and flue sample point cover plug.

2.6.5.1.3.2. Modulation Burners

Refer to the burner instructions supplied with the heater.

2.6.5.1.4 Final Soundness Test

After making final gas rate checks all joints on the gas controls assembly must be tested for soundness using leak detection fluid/electronic leak detector.

2.6.5.1.5 Flame Safeguard

Whilst the burner is in operation close the gas service valve. The burner should go to lockout within 1 second.

2.6.5.2. Oil Fired Heaters



NOTE: Refer also to the burner instruction booklet supplied with the heater. This provides information on how to adjust the burner, system checks and fault finding detail.



IMPORTANT:

DO NOT use burner settings from the burner instruction booklet. The burners are specifically adjusted for Powrmatic heaters, only use the settings in these instructions.

2.6.5.2.1. Initial Burner Startup

1. Check that fuel is present in the tank and at the oil filter fitted on the front of the heater.

2. Check that fitted fire valves are open.

3. Remove the gauge connection plug located on the bottom right of the oil pump and attach an oil gauge. (and vent valve if the burner is on a single pipe oil feed) to the oil pump.

4. Set the time clock and thermostat to call for heat or complete the external control circuit.

5. Turn ON the main electrical supply and check that the burner fan starts.

6. *Note: This step is only for when a vent valve is being used.*

Open the vent valve. When air free oil issues from the vent valve close the valve and the burner will fire when the ignition spark is present. (Note: This procedure may need to be repeated several times if the oil line cannot be purged of air within one ignition cycle. At the end of the unsuccessful ignition cycle the burner will go to lockout. Wait 2/3 minutes and then depress the red reset button on the burner control box to restart the ignition cycle.)

7. After completion of the pre-purge period the ignition spark will be energised and the burner oil solenoid valve will open and the burner will light.



WARNING:

If burner ignition cannot be achieved after 2-3 attempts do not continue to recycle through the ignition sequence but ascertain the cause and rectify.

2.6 Commissioning and Testing



WARNING:

If continued unsuccessful ignition attempts are made it is possible to accumulate a significant quantity of oil and oil mist in the combustion chamber which, if the burner then fires, can result in a dangerous situation. Any such accumulation of oil must be removed by safe means before any further attempt to light the burner.

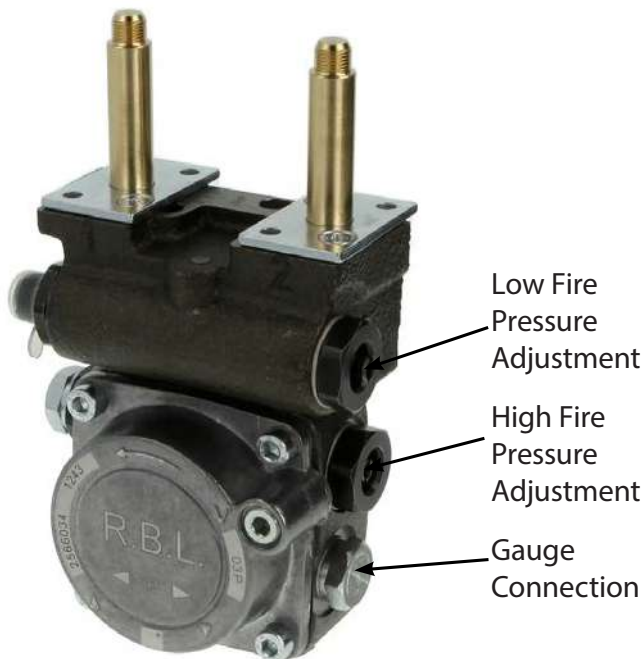
2.6.5.2.2. Final Adjustment

2.6.5.2.2.1. Hi/Low Burners

1. Ensure the oil gauge is connected. Remove the sample point cover plug from the outlet flue length and insert a CO2 measuring instrument.

2. Turn ON the main electricity supply and check that the following sequence of events occur. i) Burner fan runs. ii) Ignition spark is heard. iii) Main flame is established.

2.6.5.2.2.1.1 CPx030 to CPx175 inc

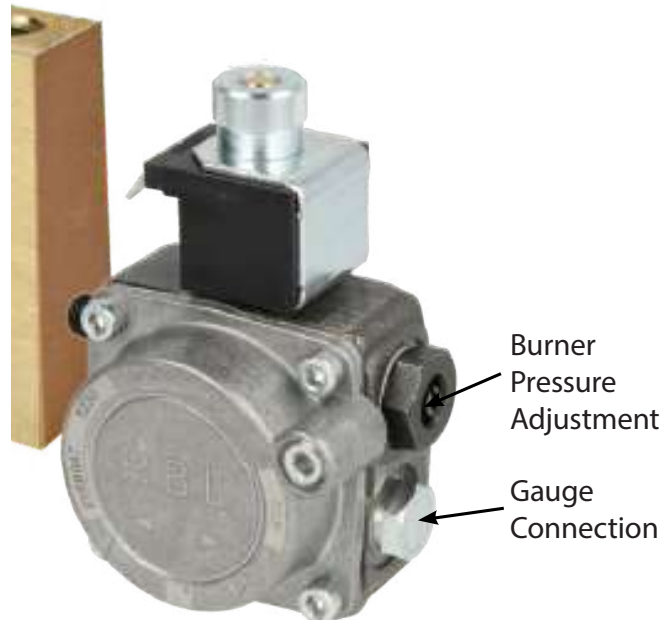


Check that the High Fire burner pump pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the pump pressure by rotating the high fire adjustment screw clockwise (+ positive), anticlockwise (- negative)

Check that the Low Fire pump pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the pump pressure by rotating the low fire adjustment screw clockwise (+ positive), anticlockwise (- negative)

If any adjustments have been made, re-check both high and low fire once more.

2.6.5.2.2.1.2 CPx200 & CPx250 inc



Hi/Low operation works on the basis that either a single or both nozzles are open. Check that the burner pump pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the pump pressure by rotating the burner adjustment screw clockwise (+ positive), anticlockwise (- negative)

If any adjustments have been made, re-check both high and low fire once more.

2.6.5.2.2.1.3 CPx300



Hi/Low operation works on the basis that either a single or both nozzles are open. Check that the burner pump pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the pump pressure by rotating the burner adjustment screw clockwise (+ positive), anticlockwise (- negative)

2.6 Commissioning and Testing

2.6.5.2.2.1. Hi/Low Burners cont.

3. Measure the CO₂ content of the flue gases. If necessary adjust the combustion air damper of the burner (Refer to the Burner Instructions) to obtain a CO₂ reading as indicated in section 1.2 (± 0.5)

4. Turn OFF the burner. Remove oil gauge and refit gauge connection plug, refit flue sample point cover plug.

2.6.5.2.2.2. Modulation Burners

Refer to the burner instructions supplied with the heater.

2.6.5.2.3. Final Checks

After making final adjustments check that there are no leaks on the oil pipework.

2.6.5.2.4 Flame Safeguard

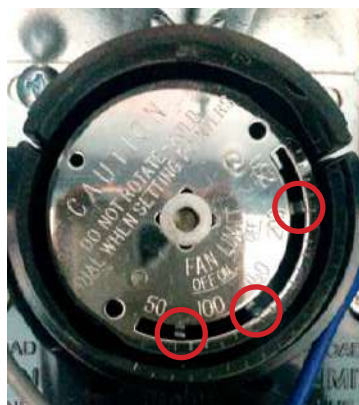
Whilst the burner is in operation close the oil service valve. The burner should go to lockout within 1 second.

2.6.6. Fan/Limit Stat

Ensure that the limit settings are as follows:-

Thermostat settings:-

Fan Off: 86°F/30°C	Fan On: 122°F/50°C
Limit: CPx 30 - 90, 150 - 175	212°F/100°C
CPx 120	230°F/110°C
CPx 200 - 300	248°F/120°C



On ducted units ensure that the main air fan comes on no later than 150 to 180 seconds after the main burners light.

2.6.7. Fan Adjustments

Using a clamp meter around the fan power cable and with all side panels closed, check the running current of the centrifugal fan once the heater is running and compared with the following table.

CPx - Maximum Run Current				
Model	Pha	Motor kW	Typical Running Current	Max Running Current
CPx30	1	1.1	3.8	5.4A
CPx30 - LHP	1	0.75	4.0	4.8A
CPx45	1	1.1	3.5	5.4A
CPx45 - LHP	1	0.75	4.0	4.8A
CPx60	1	1.6	4.5	8.0A
CPx60 - LHP	1	2.2	6.0	12.8A
CPx60	3	2.2	3.5	4.6A
CPxG90	1	1.5	6.0	8.0A
CPxG90 - LHP	1	2.2	8.0	12.8A
CPxG90	3	2.2	4.0	4.6A
CPxO90	1	2.0	8.0	9.8A
CPxO90 - LHP	1	1.5	6.0	9.3A
CPxO90	3	1.5	3.0	3.7A
CPx120	3	2.6	5.0	5.4A
CPx120 - LHP	3	3.0	5.4	6.3A
CPx120	1	1.4	14.0	16.4A
CPx150	3	3.0	5.4	6.3A
CPx150 - LHP	3	4.0	8.0	8.3A
CPx175	3	4.0	8.0	8.3A
CPx175 - LHP	3	5.5	9.5	10.6A
CPx200	3	4.0	8.0	8.3A
CPx200 - LHP	3	5.5	9.5	10.6A
CPx250	3	4.0	8.0	8.3A
CPx250 - LHP	3	5.5	9.5	10.6A
CPx300	3	7.5	9.6	14.3A
CPx300 - LHP	3	11.0	12.0	21.6A

2.6 Commissioning and Testing

2.6.8. Soft Start (CPx250 & 300 only).

Ensure that the soft start settings are nominally:-

Ramp Up - 8.2

Ramp Down - 0

Initial Torque - 2



NOTE: Adjustments are then made if necessary. Usually reducing the ramp up time is all that is required. Avoid coming below 5 to ensure a low starting current.

2.6.9. Handing Over The Air Heater

Hand these instructions to the user or purchaser for retention and instruct the User in the efficient and safe operation of the air heater.

In the event that the premises are not yet occupied turn off the gas (or oil) connections and electricity supplies and leave instructional literature with the heater.

2.7 Servicing

Gas Safety (Installation & Use) (Amendment) Regulations



It is law that all gas appliances are adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations. Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* An approved class of person listed on the gas safe register.



WARNING: Always switch off and disconnect electricity supply and close the gas / oil service valve before carrying out any servicing work or replacement of failed components.



NOTE: If a suspended cabinet heater is to be serviced do not lean ladders against the heater. Ensure that an access tower or equivalent is used.

2.7.1. General

Full maintenance should be undertaken not less than once per year by a qualified person.

No 'specialised' tools will be required to carry out this service.

A fault finding guide is given in section 3.1 to aid servicing

After any servicing work has been complete, or any

component replaced, the air heater(s) must be fully commissioned and tested for soundness as described in Section 2.6.

2.7.2. Main Burner Assembly Removal

Refer to the burner instructions supplied with the heater and complete the servicing/maintenance instructions therein. Note: In the case of gas burners ignore any references in the burner supplement to the gas controls assembly. **Tip! Loosen top right nut before removing burner.**

2.7.3. Heat Exchanger Cleaning

1. Removing the upper rear panel of the heater exposes the heat exchanger rear clean out panel.
2. Removing the fan/limit thermostat(s) as described in section 2.6.6.4 disconnecting the flue and then removing the upper front panel of the heater exposes the heat exchanger front clean out panels. If the flue cannot be disconnected removal of the side panels exposes the upper front header side clean out plates.
3. Remove the nuts securing the clean out panel(s) as appropriate and remove panel(s).
4. If heat exchanger baffles are fitted, withdraw them.
5. Brush through heat exchanger tubes and remove loose material using a vacuum cleaner.

2.7 Servicing

6. If it is necessary to also gain access to the combustion chamber disconnect the fuel and electrical connections from the burner. Remove the nuts securing the burner to the heater and withdraw the burner from the burner tube.

7. Reassemble all components in reverse order.



NOTE Replace any gaskets with new ones.

2.7.4. Main Fan Assembly

1. Remove the lower panels of the heater to gain access to the fan section.

2. Inspect the fan blades to see that they are not damaged and that there is no excessive build up of deposits that could give rise to an imbalance. If necessary clean the fan blades using a stiff brush and vacuum cleaner.

3. Replace panels accordingly

2.7.5. Oil Filter (if applicable)

1. Release the securing bolt, or unscrew the filter bowl, to access the filter.

2. Clean the filter or replace as deemed necessary.

3. Refit bowl ensuring that seals are correctly in place.

4. Reconnect the new valve in the reverse order to that above ensuring that the valve is correctly orientated. Renew the sealing 'O' rings if necessary.

2.7.6. Replacement of Faulty Components

2.7.6.1 Burner Components

Refer to the burner instructions supplied with the heater for information regarding replacement of individual components within the burner

2.7.6.2 Complete Burner Set-up

If a burner has been replaced or substituted complete, the burner must be set up correctly.

2.7.6.2.1 BSD (Gas) for CPxG030 to CPxG175 inc

1. Remove the burner cover by undoing the two screws either side of the housing.



Adjustment of the first stage air damper position is carried out by setting the air damper motor.

2. Loosen locknut (clockwise) and adjust by turning screw to the required setting as indicated on the adjacent scale. Once the setting is achieved, tighten locknut (anticlockwise). (When the burner stops, the air damper closes automatically under its own weight)



Adjustment of the second stage air damper position is carried out by setting the air damper indicator.

3. Slightly loosen locknut (clockwise) and adjust by turning screw till the required setting is shown level with the locknut. Once the setting is achieved, tighten locknut (anticlockwise) (may require re-adjust when the nut is locked down).



Head pressure is achieved by adjusting a screw which moves a regulating rod. A test point on the burner casting

2.7 Servicing

allows reading the air pressure in the combustion head.

4. Rotate the setting screw in a clockwise or anticlockwise direction until set point marked on the regulating rod is level with the outside plane of the head assembly.



Gulliver burners are manufactured to EN 676 standard and fitted with a singular air pressure switch.

5. Turn the switch at the lowest setting. With the burner working at the required output, adjust the dial clockwise, increasing its value until the burner shuts down. Reduce the value by one set point, turning the dial anti-clockwise.

6. Check for reliable burner operation, if the burner shuts down, reduce the value by a half set point.



For adjustment and setting of gas valve, refer to section 2.6.5.1.3

Correct operational start-up

0s	Start of heat demand.
0s-4s	Burner begins the ignition cycle.
4s-44s	The burner is in stand-by.
44s	Pre-purge with opened air damper
44s	Ignition 1st stage.
49s-69s	Ignition 2nd stage.

2.7.6.2.2 RSD (Gas) for CPxG200 to CPxG250 inc

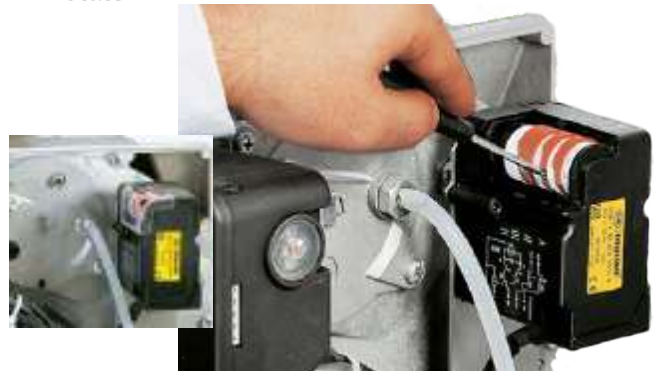
1. Remove the burner cover by undoing the two screws either side of the housing.



Adjustment of the first and second stage air damper position is carried out by setting the cam on the servomotor.

2. Remove the plastic cover.

3. Use a flat-headed screwdriver to adjust the air damper cam settings. This allows you to make small adjustments to the air damper. As you turn the screw, the numbers will rotate.



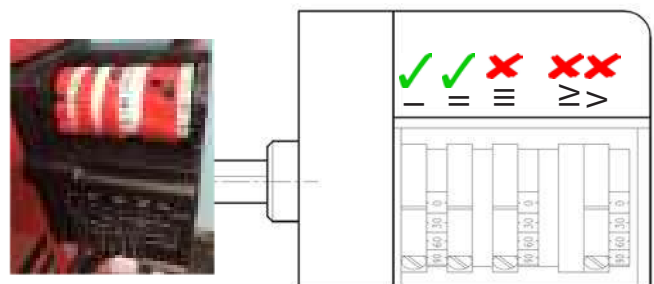
4. Read off numbers against the red line marker point (indicated opposite)

FIRST STAGE ADJUSTMENT

By adjusting the micrometric screw, cam I regulates the position of the 1st stage air damper (default value 25°).

SECOND STAGE ADJUSTMENT

Cam II regulates the position of the 2nd stage air damper (factory setting reference value 50°, do not exceed 65°)



Head pressure is achieved by adjusting a screw which moves a regulating rod. A test point on the burner casting allows reading the air pressure in the combustion head.

2.7 Servicing

5. Rotate the setting screw in a clockwise or anticlockwise direction until set point marked on the regulating rod is level with the outside plane of the head assembly.



Gulliver burners are manufactured to EN 676 standard and fitted with a singular air pressure switch.

6. Turn the switch at the lowest setting. With the burner working at the required output, adjust the dial clockwise, increasing its value until the burner shuts down. Reduce the value by one set point, turning the dial anti-clockwise.

7. Check for reliable burner operation, if the burner shuts down, reduce the value by a half set point.



For adjustment and setting of gas valve, refer to section 2.6.5.1.3

Correct operational start-up

0s	Start of heat demand. Burner begins the ignition cycle.
0s-4s	The burner is in stand-by.
4s-44s	Pre-purge with opened air damper
44s	Ignition 1st stage.
47s-52s	Ignition 2nd stage.

2.7.6.2.2 RGD (Oil) for CPxG30 to CPxG250 inc

1. Remove the burner cover by undoing the two screws either side of the housing.



Adjustment of the first stage air damper position is carried out by setting the air damper.

2. Loosen locknut (clockwise) and adjust by turning screw to the required setting as indicated on the adjacent scale. Once the setting is achieved, tighten locknut (anticlockwise).



Adjustment of the second stage air damper position is carried out by setting the air damper indicator.

3. Slightly loosen locknut (clockwise) and adjust by turning screw till the required setting is shown level with the locknut. Once the setting is achieved, tighten locknut (anticlockwise) (may require re-adjust when the nut is locked down).



Head pressure is achieved by adjusting a screw which moves a regulating rod. A test point on the burner casting allows reading the air pressure in the combustion head.

4. Rotate the setting screw in a clockwise or anticlockwise direction until set point marked on the regulating rod is level with the outside plane of the head assembly.

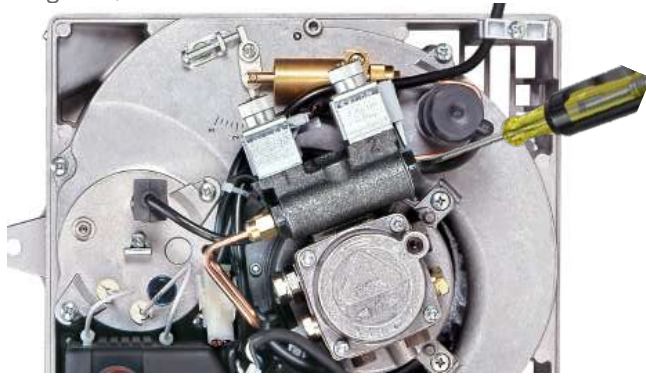
2.7 Servicing



5a. CPx 30 - CPx 175 ONLY

High Fire pump pressure is adjusted by rotating the high fire adjustment screw clockwise (+ positive), anticlockwise (- negative).

Low Fire pump pressure is adjusted by rotating the low fire adjustment screw clockwise (+ positive), anticlockwise (- negative).



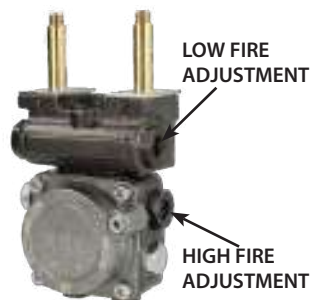
Correct operational start-up

0s	Start of heat demand.
	Burner begins the ignition cycle.
0s-12s	Pre-purge with opened air damper
12s	Ignition 1st stage.
15s-40s	Ignition 2nd stage.

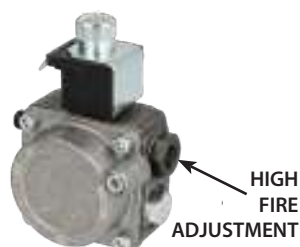
5b. CPx 200 - CPx 250 ONLY

Hi/Low operation works on the basis that either a single or both nozzles are open. Adjust the pump pressure by rotating the burner adjustment screw clockwise (+ positive), anticlockwise (- negative)

RG1RKD-RG4D Pumps



RG5D Pump only



6. Re-check If any adjustments have been made.

2.7.6.3. Gas Controls Assembly (if applicable)

1. Remove the electrical connections from the gas control block.
2. Release the nuts securing the inlet and outlet flanges to the gas control block and lift out the gas control block. Fit the replacement assembly in reverse order ensuring the valve is correctly orientated for the direction of gas flow.

2.7.6.4. Main Fan and Motor



IMPORTANT:

On 3ph heaters fitted with 3ph main fan motors ensure that the fan direction of rotation corresponds with the direction of rotation arrow on the fan guard or case. If necessary reverse the direction of rotation by interchanging any two of the motor live leads at the terminal strip in the electrical panel. Should it be necessary to remove one or more of the fans for cleaning proceed as follows

2.7.6.4.1. CPx 30 - CPx 120



NOTE: These heaters are fitted with direct drive fan units.

1. Remove the lower panels of the heater to gain access to the fan section.
2. Disconnect the fan motor electrical leads from the terminal strip - see section 2.5 or the accompanying wiring diagram.
3. Remove the two screws, one on each side of the fan mounting flange, that secure the fan to the fan shroud.
4. Remove the screws securing the heat exchanger mounting frame to the fan shroud on the side that the fan is going to be withdrawn.
5. Withdraw the fan from the slide rails.
6. Reassemble in reverse order.

2.7.6.4.1. CPx 150 - CPx 300



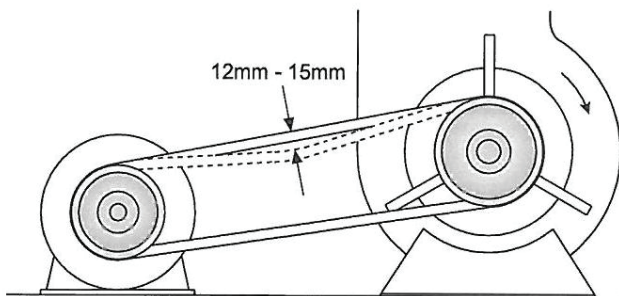
NOTE: These units are fitted with belt driven main air fans.

1. Remove the lower panels of the heater to gain access to the fan section.
2. Release the motor mounting plate securing screws and then remove the belt tension by turning the tension adjustment screw anticlockwise. Remove the fan belts.
3. Remove the screws securing the fan mounting feet to the heater framework and remove the fan. It may

2.7 Servicing

be necessary to re-orientate the fan within the fan compartment and also to release the fan shroud fixings in order to pass the fan through the heater frame. On units with twin or triple fan sets on a common fan shaft it will be necessary to first remove the fan shaft.

4. Inspect the fan belts and if necessary replace with new.
5. Replace components in reverse order.
6. Do not over tension the fan belts. There should be approximately 15mm of deflection when downward pressure is applied to the belt(s) halfway between the motor and fan pulleys.

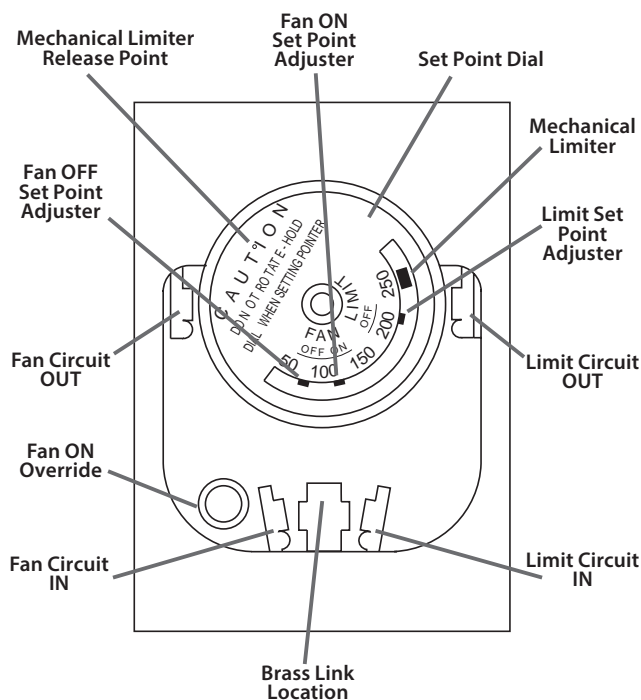


2.7.6.5. Fan/Limit Thermostat



NOTE: CD/CF Counterflow heaters have two fan and limit thermostats fitted. Either one will start the main fan and either one will shut the burner down in the event of an overheat situation.

situation.



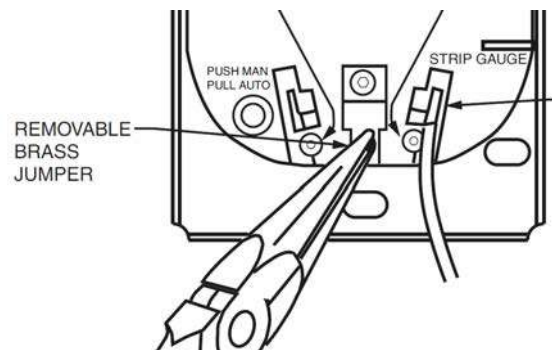
1. Undo cover retaining screw
2. Squeeze the sides of the cover and remove cover by pulling forward.
3. Release wiring from clamp terminals by pushing a small

screwdriver into the clamp release holes adjacent to the clamps.

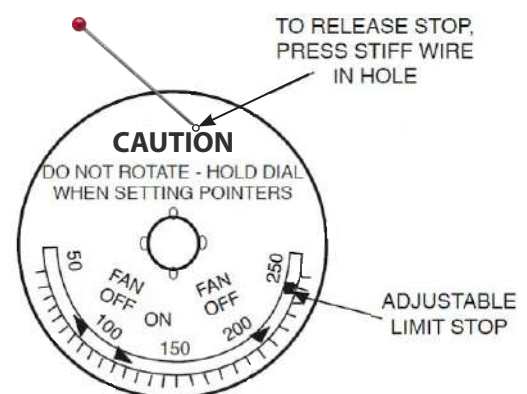
4. Remove the 2 screws securing the thermostat to the heater panel and withdraw thermostat.
5. Reassemble new unit in reverse order referring to the heater wiring diagram to ensure correct wiring as detailed in section 2.5.



IMPORTANT: A replacement fan/limit thermostat may have a brass link between the terminals. This MUST be removed, before the replacement thermostat is installed.



NOTE: The new L4064B may be supplied with the limit temperature mechanically limited to less than the setting required. To release the mechanical limit push a stiff wire into the small hole at the top of the dial located by the word "CAUTION". At the same time prevent the dial from rotating and push the limit temperature adjuster around to the required setting.



Thermostat settings:-

Fan Off:	86°F/30°C	Fan On:	122°F/50°C
Limit:	CPx 30 - 90, 150 - 175		212°F/100°C
	CPx 120		230°F/110°C
	CPx 200 - 300		248°F/120°C



NOTE: Temperature points on the dial are in Fahrenheit

3.1 Fault Finding

3.1.1. Heater General

Fault	Action
Heater does not turn on	<ol style="list-style-type: none"> 1. Check electrical supply is ON. 2. Check controls are ON or calling for heat. 3. Faulty burner control unit. 4. Limit thermostat open circuit/faulty, interlock relay not set/faulty. 5. Check fuel supply is present.
Heater goes into high limit trip	<ol style="list-style-type: none"> 1. Faulty or incorrect setting fan thermostat - See Section 2.6.6 2. Faulty or incorrect setting limit thermostat - See Section 2.6.6 3. Faulty fan assembly - change. 4. Fan motor out on thermal overload/inbuilt motor thermal trip. <ul style="list-style-type: none"> - check running amps. See section 1.2 - check duct resistance. See duties, page 7 - check that airflow through the heater is not restricted.
Main fan runs continuously	<ol style="list-style-type: none"> 1. White button on fan/limit thermostat pushed in - pull out. 2. Summer/Winter switch set to Summer - set to Winter. 3. Faulty or incorrect setting fan thermostat - See Section 2.6.6
Main fan fails to run	<ol style="list-style-type: none"> 1. Fan motor or capacitor failed - replace. 2. Fan thermostat faulty - replace. 3. Fan contactor failed - replace (3ph units) 4. Reset Motor Overload

3.1.1.1 BSD/RSD (Gas) for CPxG030 to CPxG250 inc

Indication of operation

In normal operation, the various statues are indicated in the form of colour codes according to the table below.

Diagnosis of fault causes

After lock-out has occurred, the red signal lamp is steady on.

The control box has a diagnostic function that can identify the likely causes of any malfunctions (indicator: RED LED).

In order to be able to use this function, press and hold the reset button for at least 3 seconds from when the appliance is made safe (lock-out).

The control box sends a sequence of pulses that are repeated at 2-second intervals.

Color code table

Operation statuses	Color code
Stand-by	○ Led off
Pre-purging	● Green
Ignition phase	● Green
Flame OK	● Green
Post purge	● Green
Undervoltage, built-in fuse	○ Led off
Fault, alarm	● Red

Blink code

2 blinks



Possible cause of fault

No flame at the end of safety time:
faulty or soiled gas valves.

faulty ionisation probe.

poor adjustment of burner, no gas.

faulty ignition transformer.

neutral / phase exchange.

3 blinks



Air pressure switch does not close or is already closed before heat demand:
faulty air pressure switch.
air pressure switch incorrectly regulated.

4 blinks



Presence of flame (light) in chamber:
in stand-by position.
with thermostat of heat demand in idle or working position.
during pre-purge.
during post-purge.

6 blinks



Loss of air pressure:
during pre-purge.
during or after safety time.

7 blinks



Loss of flame during operations after 3 attempts of re-cycle:
faulty or soiled gas valves.
faulty ionisation probe.
short circuit between ionisation probe and earth of the burner.
poor adjustment of burner, no fuel

To reset the control box after the diagnostics display, press the lockout-reset button.

3.1 Fault Finding

FAULTS	POSSIBLE CAUSES	SOLUTION
The burner doesn't start when the limit thermostat closes.	Lack of electrical supply.	Check presence of voltage in the L1-N clamps of the 7 pin plug.
		Check the condition of the fuses.
		Check that safety thermostat is not lock out.
	Lack of gas	Check the manual cock opening
		Check that the valves change over to the opening position and there are not short circuits.
	The gas pressure switch does not close its contact.	Adjust them.
The connections in the control box are wrongly inserted.	Check and connect all the plugs	
The air pressure switch is changed over to the operational position.	Replace the pressure switch	
Burner tends to pull the flame when switching from 1st to 2nd stage.	Output ratio between 1st and 2nd stage greater than 1:2.	Restore correct maximum ratio of 1:2, making sure 1st stage output is no less than the operating range's minimum.
	High air excess in 1st stage	Restore the correct air excess value (λ min. = 1.3) see manual
The burner runs normally in the prepurge and ignition cycle and locks out after about 3 seconds.	Phase and neutral connection is inverted.	Invert them.
	The earth connection lacks or is inefficient.	Make the earth connection efficient.
	The ionization probe is earthed or not in contact with the flame, or its wiring to the control box is broken, or there is a fault on its insulation to the earth.	Check the right position and if necessary set it according to the instructions.
		Reset the electrical connection.
Replace the faulty connection.		
The burner starts with an ignition delay.	The ignition electrodes is wrongly positioned.	Adjust it according to the instructions.
	Air output is too high.	Set the air output according to the instructions.
	Valve brake is too close with insufficient gas output.	Adjust it.
The burner doesn't change over the 2nd stage.	The air damper is locked.	Check the right working.
		Check the right electrical connection
	The 2nd stage gas valve doesn't pull in.	Failed valve: replace it. The air damper doesn't close completely and therefore it doesn't pull in the 2nd stage valve micro: check the micro working.
The burner locks out after the prepurge phase due to flame failure.	The solenoid valves is passing too little gas.	Check the pressure in the network and/or adjust the solenoid valve according to the instructions of this manual.
	The solenoid valves are defective.	Change them
	The ignition arc is irregular or has failed.	Check the right insertion of the connectors.
		Check the right position of the electrode according to the instructions of this manual.
The pipe has not been purged from the air.	Carry out a complete breathing of the line of gas-supply.	
The burner locks out during the prepurge phase.	The air pressure switch does not change over to the operational position.	The pressure switch is faulty, change it.
		The air pressure is too low, (the head is bad adjusted).
	The flame exists.	Faulty valves: replace them.
The pressure test point is badly positioned.	Place it in the right position according to the instructions.	
The burner continues to repeat the starting cycle without going on lock-out.	The gas pressure in the gas main lies very close to the value to which the gas pressure switch has been set. The sudden falling off pressure at the opening of the valve causes the opening of the pressure switch. However this only temporarily, because the valve immediately closes again, so then does the pressure switch, because the pressure builds up again, causing the cycle to be repeated over and over.	Lower and set the pressure switch.

3.1 Fault Finding

3.1.1.2 RGD (Oil) for CPx0030 to CPx0250 inc

Lock-out due to ignition failure

If the flame does not light within the safety limit (~ 5s) the burner locks-out.

Lock-out is shown by a led on the appliance.

MAXIMUM Total number of recycle trials is 3.


To carry out the control box reset, proceed as follows:

Press the reset button for at least 1 second.

In the event of the burner not restarting it is necessary to check if the limit thermostat (TL) is closed.

FAULTS	POSSIBLE CAUSES	SOLUTION
The burner will not start when the adjustment thermostat closes.	Lack of electrical supply.	Check presence of voltage in the L1 - N clamps of the 7 pin plug.
		Check the conditions of the fuses.
		Check that thermostat limit is not lock out.
	The photoresistance sees false light.	Eliminate the light.
	Heater and start thermostats are faulty.	Replace them.
Burner runs normally in the prepurge and ignition cycle and locks out after 5 seconds ca.	The connections in the control box are wrongly inserted.	Check and connect completely all the plugs.
	The photoresistance is dirty.	Clear it.
	The photoresistance is defective.	Change it.
	Flame moves away or fails.	Check pressure and output of the fuel.
		Check air output.
		Change nozzle.
Burner starts with an ignition delay.	The ignition electrodes are wrongly positioned.	Check the coil of solenoid valve 1st stage.
		Adjust them according to the instructions of this manual.
		Air output is too high.
Nozzle dirty or worn.	Nozzle dirty or worn.	Set the air output according to the instructions of this manual.
		Replace it.

3.2 List of Parts

Item	Description	CPx30	CPx45	CPx60	CPx90	CPx120	
	Riello Gas Burner NatGas c/w Valve & Lead	BNR030CPxG /MK3/ERP	BNR045CPxG /MK3/ERP	BNR060CPxG /MK3/ERP	BNR090CPxG /MK3/ERP	BNR120CPxG /MK3/ERP	
	Gas Valve	14292110		14292111	14292112		
	Burner Gasket Gas Oil	141937081 141937080	141937081 141930806	141930806 141930806	141937150 141937150		
	Riello 35s Oil Burner c/w Nozzle & Lead	BNR030CPxO /MK3/ERP	BNR045CPxO /MK3/ERP	BNR060CPxO /MK3/ERP	BNR090CPxO /MK3/ERP	BNR120CPxO /MK3/ERP	
	Nozzle 35 sec 28 sec	141521059 141522381	141522600 141522610	141522610 141522620	141522629 141522663	141522661 141522670	
	Oil Filter	141474534					
	Fire Valve	141474530					
	Fan & Limit Thermostat L4064	143000306					
	Limit Interlock P.C.B. MkIII	142403600/3					
	Fuse Standard LPH	140700046 140700046	140700046 140700046	140700040 n/a	140700042 140700042*	n/a n/a	
	LPG Conversion Kit	CPX30HL/LPG	CPX45HL/LPG	CPX60HL/LPG	CPX90HL/LPG	CPX120HL/LPG	

* n/a on LHP CPx90 Gas

3.2 List of Parts

Item	Description	CPx150	CPx175	CPx200	CPx250	CPx300
	Riello Gas Burner NatGas c/w Valve & Lead	BNR150CPxG /MK3/ERP	BNR175CPxG /MK3/ERP	BNR200CPxG /MK3/ERP	BNR250CPxG /MK3/ERP	BNR300CPxG /HILO/MK3
	Gas Valve		14292113		14292114	14292105
	Burner Gasket Gas Oil	141937150 141937150		141937082 141937150		142992790 142992790
	Riello 35s Oil Burner c/w Nozzle & Lead	BNR150CPxO /MK3/ERP	BNR175CPxO /MK3/ERP	BNR200CPxO /MK3/ERP	BNR250CPxO /MK3/ERP	BNR300CPxO /HILO/MK3
	Nozzle 35 sec	141522670	141522704	141522659+ 141522629	141522659+ 141522670	141522661+ 141522706
	28 sec	141522704	141522820	141522659+ 141522670	141522703+ 141522670	141523500
	Oil Filter			141474534		
	Fire Valve			141474530		
	Fan & Limit Thermostat L4064			143000306		
	Limit Interlock P.C.B. MkIII			142403603		
	Fuse Standard LPH			n/a n/a		
	LPG Conversion Kit	CPX150HL/LPG	CPX175HL/LPG	CPX200HL/LPG	CPX250HL/LPG	CPX300HL/LPG

3.2 List of Parts

Item	Description	CPx30	CPx45	CPx60	CPx90	CPx120
	HTX Gas Oil	CPx0450201 CPx0450201	CPx0450202 CPx0450201	CPx0600201 CPx0600202	CPx0900201 CPx0900202	CPx1200201 CPx1200202
	Swirlers Gas Oil	n/a n/a	28 x CPx0900223 n/a	34 x CPx0900223 n/a	34 x CPx1500223 17 x CPx0900223	23 x CPx1500223 n/a
	MC200 Controller	MC200CAB				
	Control Panel Std On/Off	CPX3-90/CP/ MK3	CPX3-90/CP/ MK3	CPX3-90/CP/ MK3	CPX3-90/CP/ MK3	CPX12-175/CP/ MK3
	20mm x 3mm Plain Tape Gasket	6m x 170272210				
	10mm x 3mm Sponge Strip Gasket	1.25 x 142206504	1.4 x 142206504	1.6 x 142206504		2 x 142206504
	Burner Mtg Gasket	142203802				142203704
	HTX Cleanout Gasket	CPxSTD00301		CPxSTD00302		
	Flex Oil Line	141956087				
	Control Box Gas Oil	141979503 141979501	141979503 141979502			
	Motor	141979571			141979572	
	Fan Impellor	141979581			141979582	

3.2 List of Parts

Item	Description	CPx150	CPx175	CPx200	CPx250	CPx300
	HTX Gas Oil	CPx1500201 CPx1500202	CPx1750201 CPx1750202	CPx2000201 CPx2000202	CPx3000201 CPx3000202	CPx3000201 CPx3000202
	Swirlers Gas Oil	46 x CPx1500223 23 x CPx1500223	29x CPx1750223 n/a	59 x 1750223 29 x 1750223	59 x 3000223 29 x 1750223	59 x 3000223 29 x 1750223
	MC200 Controller	MC200CAB				
	Control Panel Std On/Off	CPX3-90/CP/ MK3	CPX3-90/CP/ MK3	CPX3-90/CP/ MK3	CPX3-90/CP/ MK3	CPX12-175/CP/ MK3
	20mm x 3mm Plain Tape Gasket	6m x 170272210			7m x 170272210	
	10mm x 3mm Sponge Strip Gasket	2.0 x 142206504	3.0 x 142206504			
	Burner Mtg Gasket	142203804			142203320	
	HTX Cleanout Gasket	CPxSTD00302				
	Flex Oil Line	141956087			141956012	
	Control Box Gas Oil	141979503 141979502			141979503 141979505	142992997 142992650
	Motor Gas Oil	141979572 141979572	141979573 141979572	141979573 141979573		142917808 142917808
	Fan Impellor Gas Oil	141979582 141979582	141979583 141979582	141979583 141979583		142917821 141979584

3.2 List of Parts

Item	Description	CPx30	CPx45	CPx60	CPx90	CPx120
	Electrode Gas	142992991			142992990	
	Sensor Probe Gas	142992989			142992987	
	Photocell Oil			141979531		
	Electrode Oil	142924310		142924311		
	HT Lead Gas Oil			142992998 142992999		
	Probe Lead			142992986		
	Speed Gear Pump			141979551		
	Coil 1 Coil 2			141979561 141979562		
	Pressure Switch	145604651		142961108		
	Capacitor		141979575		141979575 141979576	
	Hydraulic Ram			141979591		
	Damper Motor			141979592		

3.2 List of Parts

Item	Description	CPx150	CPx175	CPx200	CPx250	CPx300
	Electrode Gas	142992990		142992988		141979104
	Sensor Probe Gas	142992987				142992894
	Photocell Oil	141979531		141979533		141979532
	Electrode Oil	142924311				142992793
	HT Lead Gas Oil	142992998 142992999		142992998 142993000		142993001 142993002
	Probe Lead	142992986				145604654
	Speed Gear Pump	141979551		141979552		142992633
	Coil 1 Coil 2	141979561 141979562		141979563 n/a		142992666 n/a
	Pressure Switch	142961108				142961106
	Capacitor Gas Oil	141979575 141979576	141979577 141979576	141979577 141979577		141979578 141979578
	Hydraulic Ram	141979591				142992813
	Damper Motor	141979592		141979593		142992780

3.2 List of Parts

Item	Description	CPx30	CPx45	CPx60	CPx90 GAS
	DD Fan Standard LHP	1402CFAN150/T/15 n/a	1402CFAN140/T/15 n/a	1402CFAN210/T/15 n/a	n/a n/a
	Main Fan Standard LHP	n/a 1402CFAN240/T	n/a 1402CFAN240/T	n/a 1402CFAN510/T	1402CFAN510/T 1402CFAN510/T
	Motor Standard LHP	n/a 140001520	n/a 140001520	n/a 140001998	140001908 140001998
	Motor Pulley Standard LHP	n/a 142000602	n/a 142000602	n/a 142001689	142001689 142001675
	Motor T/lock Standard LHP	n/a 142003350	n/a 142003350	n/a 142003360	142003360 142003360
	Fan Pulley Standard LHP	n/a 142001689	n/a 142001675	n/a 142002604	142002604 142002604
	Fan T/lock Standard LHP	n/a 142003370	n/a 142003370	n/a 142201225	142201225 142201225
	Belts Standard LHP	n/a 142111504	n/a 142111504	n/a 142116903	142116903 142116903
	JOX Relay	143000816	143000816	143000816	143000816
	Contactor Standard LHP	n/a n/a	n/a n/a	n/a 143000601	n/a 143000601
	Overload Standard LHP	n/a n/a	n/a n/a	n/a 143000800	n/a 143000800
	Soft Start Standard LHP	n/a n/a	n/a n/a	n/a n/a	n/a n/a

3.2 List of Parts

Item	Description	CPx90 OIL	CPx120	CPx150	CPx175
	DD Fan Standard LHP	1402CFAN560/ T/15 n/a	1402CFAN580/ T/15/3P n/a	n/a tba	n/a tba
	Main Fan Standard LHP	n/a 1402CFAN510/T	n/a 1402CFAN820/T	1402CFAN820/T 1402CFAN820/T	1402CFAN820/T 1402CFAN820/T
	Motor Standard LHP	n/a 140001908	n/a 140002055	140002055 140002108	140002108 140002206
	Motor Pulley Standard LHP	n/a 142001689	n/a 142000602	142000602 142000601	142000602 142000602
	Motor T/lock Standard LHP	n/a 142003360	n/a 142003856	142003856 142161028	142003856 142003856
	Fan Pulley Standard LHP	n/a 142002604	n/a 142001825	142001825 142001825	142001689 142001619
	Fan T/lock Standard LHP	n/a 142201225	n/a 142201225	142201225 142003370	142003370 142003370
	Belts Standard LHP	n/a 142116903	n/a 142119742	142119742 142119742	142119730 142119730
	JOX Relay	143000816	143000816	143000816	143000816
	Contactor Standard LHP	n/a n/a	143000601 143000601	143000601 143000601	143000601 143000601
	Overload Standard LHP	n/a n/a	143000802 143000802	143000802 143000801	143000801 143000828
	Soft Start Standard LHP	n/a n/a	n/a n/a	n/a n/a	n/a 143000620

3.2 List of Parts

Item	Description	CPx200	CPx250	CPx300
	DD Fan Standard LHP	n/a n/a	n/a n/a	n/a n/a
	Main Fan Standard LHP	1402CFAN820/T 1402CFAN820/T	1402CFAN510/ T/2DECK	1402CFAN510/ T/2DECK
	Motor Standard LHP	140002108 140002206	140002108 140002206	140002251 140002610
	Motor Pulley Standard LHP	142000602 142000601	142001619 142001689	142001619 142001013
	Motor T/lock Standard LHP	142003856 142003655	142161028 142003655	142003655 142201242
	Fan Pulley Standard LHP	142001619 142001619	142002604 142002604	142002494 142001823
	Fan T/lock Standard LHP	142003370 142003370	142201225 142201225	142201225 142201225
	Belts Standard LHP	142119730 142119730	142119742 142119742	142119730 142119725
	JOX Relay	143000816	143000816	143000816
	Contactor Standard LHP	143000601 143000601	n/a n/a	n/a n/a
	Overload Standard LHP	143000801 143000828	143000801 143000828	143000800 143000807
	Soft Start Standard LHP	n/a 143000620	n/a 143000620	143000621 143000621

3.3 Fuel Conversion

3.3.1. Oil Conversion



WARNING: Always switch off and disconnect electricity supply and close the oil service valve before carrying out any servicing work or replacement of failed components.



We recommend that any adjustment or conversion should be conducted by a competent person. It is in your own interests and that of safety to ensure that this is adhered to.

* A competent person such as an Oftec approved

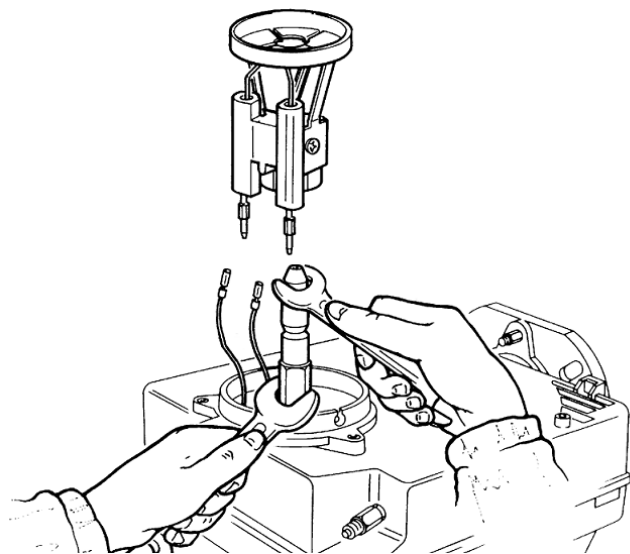
Heater conversion between oil fuels will require a change of burner nozzle, adjustment of burner pressure and re-commissioning of the heater. (Refer to section 2.6 for commissioning details.)



Ensure that the oil inlet pressure to the heater does not exceed the maximum pressure stated in the burner manual, and that the oil line has been purged of the old oil.

3.3.1.1. Burner Nozzle Conversion

1. Remove the burner from the heater and hook the burner to the flange.
2. Undo the fixing screws retaining the blast tube and remove.
3. Remove the cables from the electrode assembly.
4. Undo the fixing screws retaining the diffuser disc holder assembly from the nozzle holder assembly and remove.
5. Using appropriate spanners, hold the base of the nozzle holder whilst un-doing and removing the original nozzle.



6. Fit replacement nozzle, again by holding the base of the nozzle holder with a spanner whilst tightening nozzle.

7. Refit all other components in reverse order.
8. Check that fitted fire valves are open.
9. Refer to the burner instruction book and fit a pressure gauge (and vent valve if the burner is on a single pipe oil feed) to the oil pump.
10. Set the time clock and thermostat to call for heat or complete the external control circuit.
11. Turn ON the main electrical supply, press the limit reset switch if required and check that the burner fan starts.

3.3.1.2. Oil Pressure Settings

All burners used on the OUH range have oil pumps that may be set to operate on 35sec (diesel) and 28sec (kerosene).

Burner setting pressures are carried out by adjusting the high and low burner pressures to the value in the tables opposite.



Note*: Ensure the original data badge is removed and replaced with new data badge

3.3.1.3. High/Low Pump Adjustment

1. Ensure the oil gauge is connected. Remove the sample point cover plug from the outlet flue length and insert a CO2 measuring instrument.
2. Turn ON the main electricity supply and check that the following sequence of events occur. i) Burner fan runs. ii) Ignition spark is heard. iii) Main flame is established.

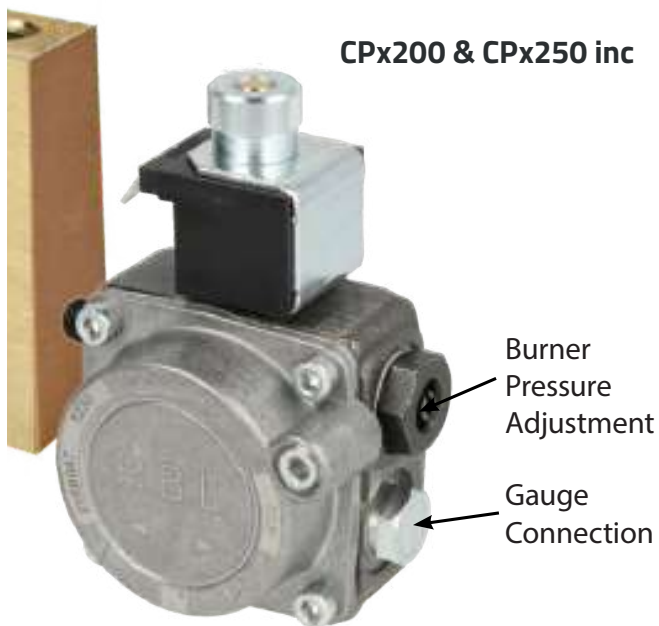


3.3 Fuel Conversion

Check that the High Fire burner pump pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the pump pressure by rotating the high fire adjustment screw clockwise (+ positive), anticlockwise (- negative)

Check that the Low Fire pump pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the pump pressure by rotating the low fire adjustment screw clockwise (+ positive), anticlockwise (- negative)

If any adjustments have been made, re-check both high and low fire once more.



Hi/Low operation works on the basis that either a single or both nozzles are open. Check that the burner pump pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the pump pressure by rotating the burner adjustment screw clockwise (+ positive), anticlockwise (- negative)

If any adjustments have been made, re-check both high and low fire once more.



Hi/Low operation works on the basis that either a single or both nozzles are open. Check that the burner pump pressure agrees with that stated on the heater data plate and in section 1.2. If necessary adjust the pump pressure by rotating the burner adjustment screw clockwise (+ positive), anticlockwise (- negative).

2.6.5.2.2.1. Hi/Low Burners cont.

3. Measure the CO₂ content of the flue gases. If necessary adjust the combustion air damper of the burner (Refer to the Burner Instructions) to obtain a CO₂ reading as indicated in section 1.2 (± 0.5)

4. Turn OFF the burner. Remove oil gauge and refit gauge connection plug, refit flue sample point cover plug.

3.3 Fuel Conversion

Riello Burner Settings - 28sec Oil - Kerosene - Net CV (Hi = 47.00MJ/kg)

Maximum Pump Suction = 0.4bar			Burner Pressure			
			High Fire		Low Fire	
MODEL	Nozzle Type	Kit part number	bar	p.s.i.	bar	p.s.i.
CPx30	0.75 x 60S	CPX30HL/28	10.0	145	7.0	101.5
CPx45	1.25 x 60S	CPX45HL/28	10.0	145	7.0	101.5
CPx60	1.50 x 60S	CPX60HL/28	10.0	145	7.0	101.5
CPx90	2.50 x 60S	CPX90HL/28	10.0	145	7.0	101.5
CPx120	3.00 x 60S	CPX120HL/28	10.0	145	7.0	101.5
CPx150	3.75 x 60B	CPX150HL/28	10.0	145	7.0	101.5
CPx175	4.50 x 60B	CPX175HL/28	10.0	145	7.0	101.5
CPx200	2.5 + 2.0 x 60S	CPX200HL/28	10.0	145	10.0	101.5
CPx250	3.5 + 3.0 x 60S	CPX250HL/28	10.0	145	10.0	101.5
CPx300	tbc	CPX300HL/28	tbc	tbc	tbc	tbc

Riello Burner Settings - 35sec Oil - Diesel - Net CV (Hi = 42.69MJ/kg)

Maximum Pump Suction = 0.4bar			Burner Pressure			
			High Fire		Low Fire	
MODEL	Nozzle Type	Kit part number	bar	p.s.i.	bar	p.s.i.
CPx30	0.75 x 60S	CPX30HL/35	13.44	195	8.96	130
CPx45	1.25 x 60S	CPX45HL/35	14.48	210	8.96	130
CPx60	1.50 x 60S	CPX60HL/35	14.13	205	8.96	130
CPx90	2.50 x 60S	CPX90HL/35	13.79	200	8.27	120
CPx120	3.00 x 60S	CPX120HL/35	12.07	175	8.96	130
CPx150	3.75 x 60B	CPX150HL/35	15.17	220	8.96	130
CPx175	4.50 x 60B	CPX175HL/35	15.17	220	8.27	120
CPx200	2.5 + 2.0 x 60S	CPX200HL/35	13.10	190	13.10	190
CPx250	3.5 + 3.0 x 60S	CPX250HL/35	11.70	170	11.70	170
CPx300	tbc	CPX300HL/35	tbc	tbc	tbc	tbc

3.3 Fuel Conversion

3.3.2. Gas Conversion

Gas Safety (Installation & Use) (Amendment) Regulations



It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations.

Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer.

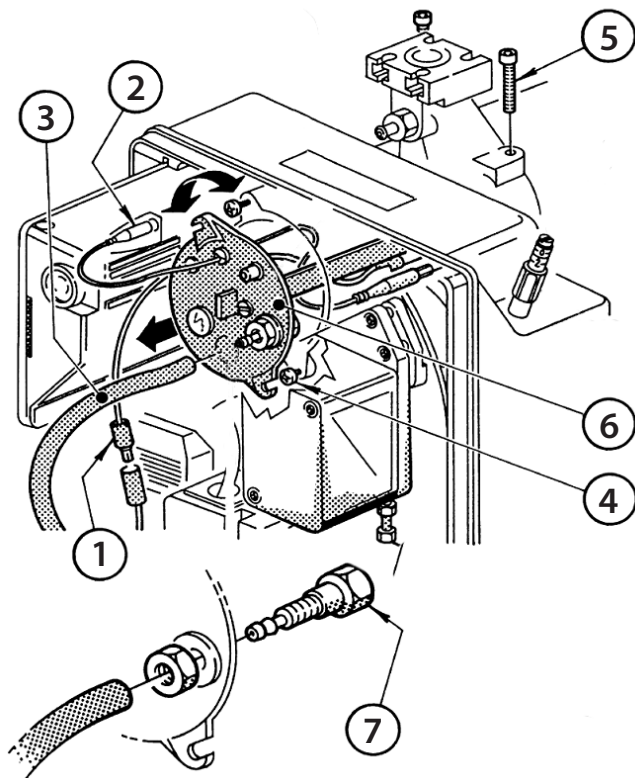
3.3.2.1. General

Heater conversion between gases will require a change of burner injectors, alteration of burner pressure and re-commissioning of the heater. (Refer to section 2.6 for commissioning details.)



Ensure that the gas inlet pressure to the heater is correct for the new gas, and that the gas supply has been purged of the old gas. (Refer to tables opposite for new gas inlet pressures.)

3.3.2.2. Burner Conversion



1. Disconnect the probe connections (1 and 2).
2. Remove the small tube (3) and loosen the screws (4).

3. Unscrew and remove the screws (5), pull out the head assembly support (6) turning it slightly to the right, taking care not to change the setting position on the elbow-bracket during dismantling.
4. Remove the Natural Gas Injector Head by removing two screws.
5. To reassemble the new Injector head follow the above instructions in reverse, returning the head assembly (1) to its original position.



WARNINGS

- Tighten the screws (5) completely (without locking them); then lock them with a torque wrench setting of 3-4 Nm.
- Check there are no gas leaks from the screws during these operations.
- If the pressure test point (7) should work loose, it must be correctly fixed ensuring that the hole inside the head assembly (1) is facing downwards.

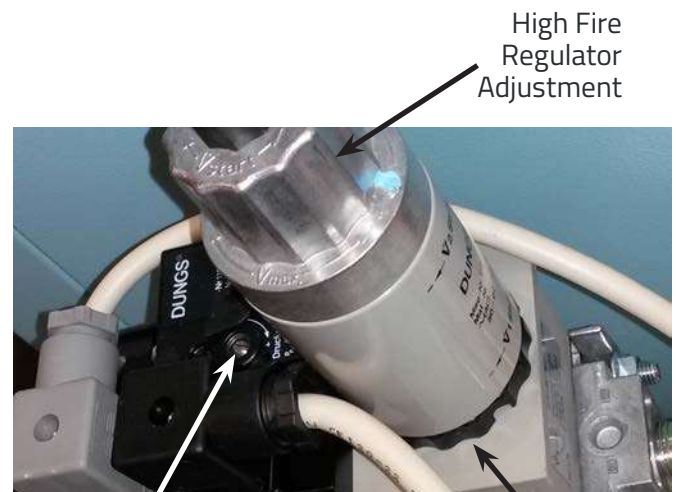
3.3.2.3. Gas Valve Settings

All gas valves used on the CPXx range have pressure regulators that may be set to operate on natural gas or propane (LPG).

Conversion is carried out by adjusting the high and low burner pressures to the value in the tables opposite. (Refer to full regulator adjustment in section 2.6.6.1)



Note*: Ensure the original data badge is removed and replaced with new data badge and "change of gas" stickers.



High Fire
Fine Pressure
Adjustment

Low Fire
Pressure
Adjustment

3.3 Fuel Conversion

Natural Gas to Propane (LPG) Conversion Data

Nominal Inlet Pressure = 37mbar, Minimum Inlet Pressure = 37mbar		Burner Pressure	
		High Fire	Low Fire
MODEL	Conversion Kit part number	mbar	mbar
CPx30	CPX30HL/LPG	5.0	2.7
CPx45	CPX45HL/LPG	10.2	3.9
CPx60	CPX60HL/LPG	8.2	3.5
CPx90	CPX90HL/LPG	5.5	2.6
CPx120	CPX120HL/LPG	7.6	3.5
CPx150	CPX150HL/LPG	10.6	4.4
CPx175	CPX175HL/LPG	tbc	tbc
CPx200	CPX200HL/LPG	6.9	3.9
CPx250	CPX250HL/LPG	10.0	4.7
CPx300	CPX300HL/LPG	tbc	tbc

Propane (LPG) to Natural Gas Conversion Data

Nominal Inlet Pressure = 20mbar, Minimum Inlet Pressure = 17.5mbar		Burner Pressure	
		High Fire	Low Fire
MODEL	Conversion Kit part number	mbar	mbar
CPx30	CPX30HL/NG	3.4	1.5
CPx45	CPX45HL/NG	5.7	2.3
CPx60	CPX60HL/NG	5.8	2.5
CPx90	CPX90HL/NG	4.2	1.9
CPx120	CPX120HL/NG	6.0	2.6
CPx150	CPX150HL/NG	9.1	3.3
CPx175	CPX175HL/NG	8.3	3.5
CPx200	CPX200HL/NG	6.9	4.1
CPx250	CPX250HL/NG	9.3	5.8
CPx300	CPX300HL/NG	tbc	tbc

Calculation of flue system equivalent resistance

Model			30	45	60	90	120
Rated Heat Capacity		kW	30.0	43.2	60.0	90.0	120.0
Low Heat Input	Nett CV	kW	20.0	27.0	40.9	64.5	81.4
Minimum Heat Capacity		kW	19.3	26.1	39.4	61.9	77.3
Useful Efficiency ¹	High Fire	%	92%	91%	92%	92%	94%
	Low Fire	%	96%	97%	96%	96%	95%
Electrical Power Consumption ²	High Fire	kW	0.99	1.31	1.17	2.30	4.43
	Low Fire	kW	0.99	1.31	1.17	2.30	4.43
	Standby	kW	<0.01	<0.01	<0.01	<0.01	<0.01
	Ignition	kW	0.00	2.00	4.00	6.00	8.00
NOx Seasonal (Gross)		mg/kWh	56.0	58.5	59.0	65.5	67.5
Envelope Loss Factor		%	n/a	n/a	n/a	n/a	n/a
Emission Efficiency		% η_s , flow	90%	91%	89%	92%	90%
Seasonal Space Heating Energy Efficiency		% η_s ,h	73.6%	74.7%	72.5%	74.2%	72.8%

Model cont.			150	175	200	250	300
Rated Heat Capacity		kW	150.0	175.0	200.0	250.0	tbc
Low Heat Input	Nett CV	kW	94.8	122.0	152.8	183.3	tbc
Minimum Heat Capacity		kW	91.1	116.5	145.5	175.9	tbc
Useful Efficiency ¹	High Fire	%	92%	92%	92%	93%	tbc
	Low Fire	%	96%	95%	95%	96%	tbc
Electrical Power Consumption ²	High Fire	kW	3.74	4.57	5.47	5.47	tbc
	Low Fire	kW	3.74	4.57	5.47	5.47	tbc
	Standby	kW	<0.01	<0.01	<0.01	<0.01	tbc
	Ignition	kW	10.0	12.0	14.0	16.0	tbc
NOx Seasonal (Gross)		mg/kWh	69.2	65.5	84.9	97.3	tbc
Envelope Loss Factor		%	n/a	n/a	n/a	n/a	tbc
Emission Efficiency		% η_s , flow	91%	90%	89%	89%	tbc
Seasonal Space Heating Energy Efficiency		% η_s ,h	75.2%	72.9%	72.1%	72.5%	tbc
¹ Seasonal Efficiency figure based on table 16 of the 'Non-Domestic Building Services Compliance Guide'. Extra efficiency credits are available for High/Low burners and controlling via the Powmatic MC200. ² Excluding Distribution Fan							

Appendices

Information required for ecodesign (ErP) Directive 2009/125

The pressure resistance of the flue system (P_r) = $1.5 * [(PFF * H / D + SRF) Q_m / W_m^2]$ (pa)

Where H = Effective flue height in m

D = Internal Diameter of flue in m

PRF (Pipe Friction Factor) = $0.118 * (0.21147 / D^{0.4})$

Where D = Internal Diameter of flue in m

SRF (Sum of individual resistance factors)

Typical resistance factors for individual components are as follows:

Segmented 90° bend 0.5

45° Elbow 0.4

Cowl 1.0

Q_m (Mean Density of the column of exhaust gas in kg/m³) = $97000 / (300 * T_m)$

Where the mean temperature of the column of exhaust gas (T_m) = $288 + ((T_e - T_L) / 0.2) * (0.18)$

Where T_e is the exhaust gas temperature in °C

T_L is the external air temperature in °C

W_m (Mean exhaust gas velocity in m/s = $M / (A * Q_m)$)

Where A is the cross sectional area of the flue in m²

M is the exhaust gas mass flow in kg/s which is as follows for the various units

CPx 30 0.018

CPx 45 0.027

CPx 60 0.035

CPx 90 0.050

CPx 120 0.080

CPx 150 0.125

CPx 175 0.140

CPx 200 0.145

CPx 250 0.160

CPx 300 0.200

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