

# System Manual

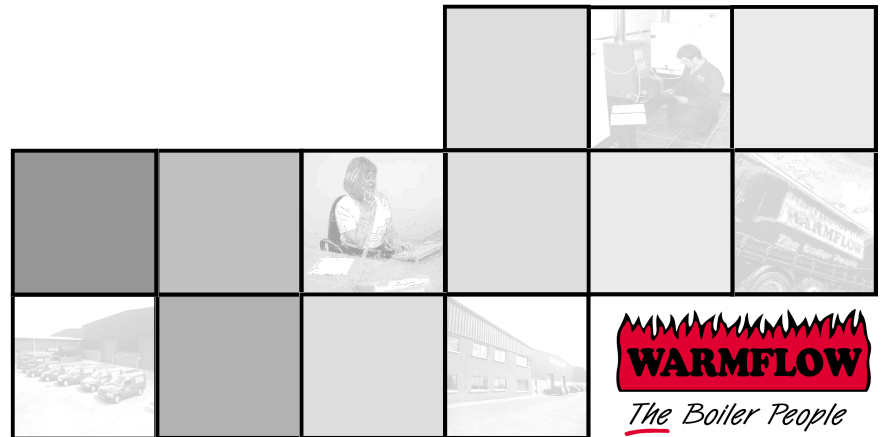
## High Efficiency Condensing Boiler Cascade System

A guide to Multiple Boiler Installations incorporating the following models:

Utility  
Kabin Pak

*U120HE, U150HE*  
*K120HE, K150HE*

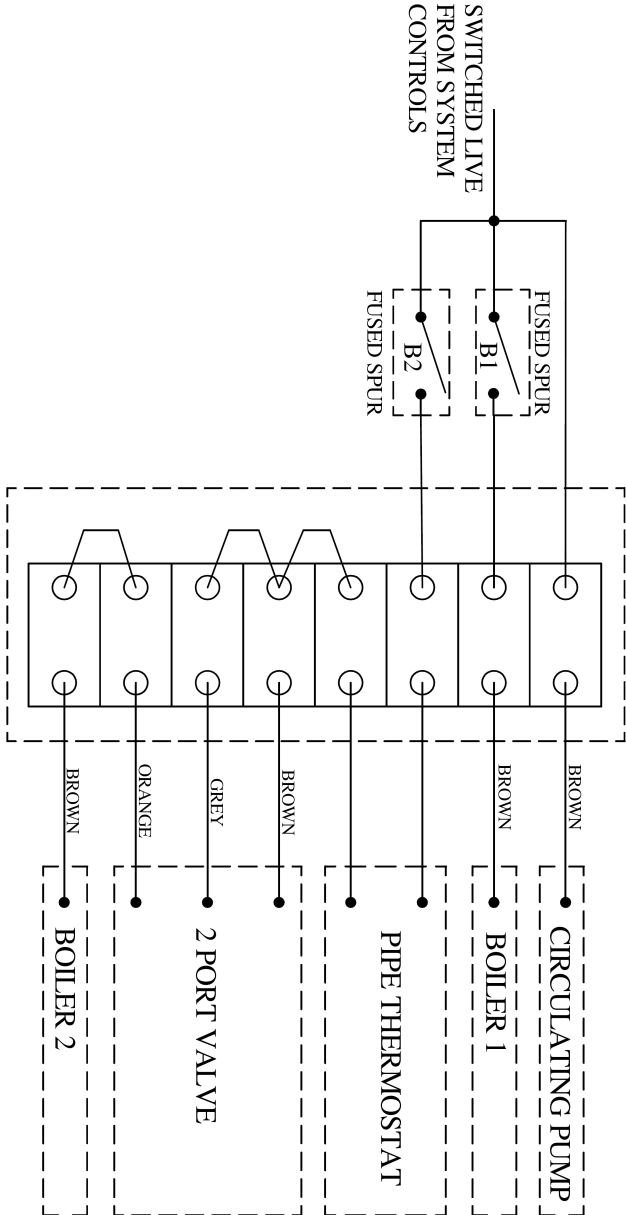
*For use with kerosene only. Leave this addendum with the end user.*



This manual is accurate at the date of printing (E&OE) but will be superseded and should be disregarded if specifications and/or appearances are changed in the interests of continued product improvement.

### Suggested Wiring Centre Layout

Live only shown for clarity



## Cascade System Manual

This System Manual is to be read in conjunction with the Boiler Manual supplied with each appliance.

The additional information contained within this Manual is intended as a guide for the physical installation of two appliances in a multiple boiler installation (Cascade System).

The Boiler Manual, which contains important installation and commissioning information, remains the reference document for each appliance and must be read and adhered to in full.

## System Efficiency and Reliability

The Warmflow Cascade System is inherently more efficient than a traditional single boiler installation however is still capable of achieving an equivalent output.

At times of low heating demand, only one boiler usually fires to keep the system hot once up to temperature. At times of high heating demand, both boilers fire together to provide their full combined output.

The Cascade System is also more reliable than a traditional single boiler installation.

If a fault occurs on one boiler the other boiler is still able to provide hot water and some heating. Should a fault occur on one boiler it can be individually isolated from the electrical supply allowing the 2nd boiler to continue operating.

## System Output

### Up to 225,000 Btu/h

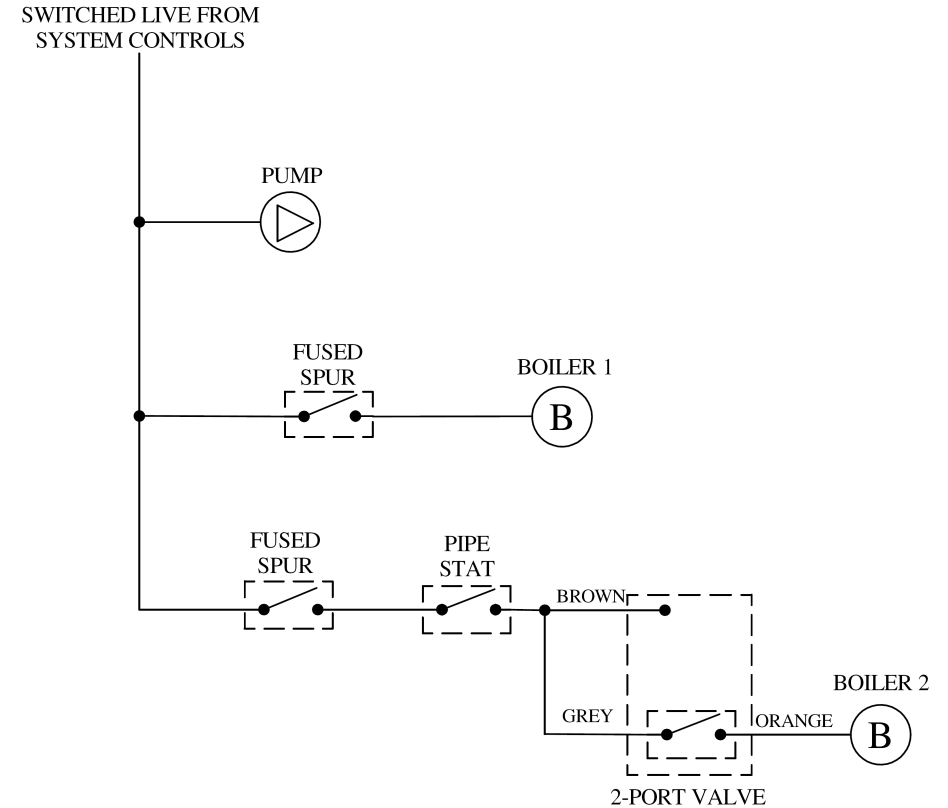
A Cascade System consisting of 2 no. U120HE or K120HE boilers is capable of achieving a range of outputs between 52kW (177,000 Btu/h) and 66kW (225,000 Btu/h).

### Up to 300,000 Btu/h

A Cascade System consisting of 2 no. U150HE or K150HE boilers is capable of achieving a range of outputs between 66kW (225,000 Btu/h) and 88kW (300,000 Btu/h).

## Wiring Schematic

Live only shown for clarity



## Maximum Balanced Flue Length

The maximum permissible flue length of each appliance is dependant on the output at which it is fired. Refer to the table below. The Boiler Manual also gives guidance on calculating equivalent flue lengths.

Both appliances need not be fired at the same output, so therefore may have different maximum permissible flue lengths.

In all cases, both appliance need not have the same length of flue.

BOILER OUTPUT (kW)	TOTAL EQUIVALENT FLUE LENGTH (m)	
	Vertical Balanced Flue	High/Low Level Balanced Flue
27.1	8.0	5.0
29.0	6.0	3.5
33.0	4.0	2.5
38.5	4.0	2.5
44.0	4.0	2.5

## Burner Output Settings

MODEL	120HE (All Models)			150HE (All Models)		
	Nominal Heat Output	kW 27.1	<b>29</b> 92,380	32.7 111,600	33 112,629	<b>38.5</b> 131,362
Nominal Heat Input	kW 28	<b>30</b> 102,400	34 116,000	33 112,629	<b>40</b> 136,139	46.8 159,681
Burner	RDB 2.2 26-33			RDB 3.2 33-44		
Head	T5 Short			Adjustable @ Setting 5		
Conventional Flue Diameter	mm 100 or 125 in 4 or 5			100 or 125 4 or 5		
Flue Gas Temperature	°C 95	<b>98</b>	110	75	<b>90</b>	105
Smoke	Bacarach 0			0		
<b>Kerosene Settings</b>						
Nozzle	make size	Danfoss 60°ES			Danfoss 80°H	
Oil Pump Pressure	bar psi	7.0 100	<b>8.0</b> <b>116</b>	10.0 145	10.0 145	<b>9.5</b> <b>138</b>
Max CO <sub>2</sub>	%	11.5	<b>11.5</b>	11.5	<b>11.5</b>	11.5
Approx Fuel Flow Rate	litres/h Gals/h	2.98 0.65	<b>3.40</b> <b>0.75</b>	3.81 0.84	3.81 0.84	<b>4.48</b> <b>0.99</b>
SEDBUK Efficiency		92.4%			91.9%	
Factory Settings		Highlighted in bold			Highlighted in bold	

## Inventory

Key components only listed for clarity

### Required Electrical Components (in addition to system controls)

- 2 no. Fused Spur Isolating Switches (fitted with 5 Amp fuses)
- 1 no. Pipe Thermostat
- 1 no. Wiring Centre / Junction Box
- Assorted Cable (suitably rated for current, temperature, etc)

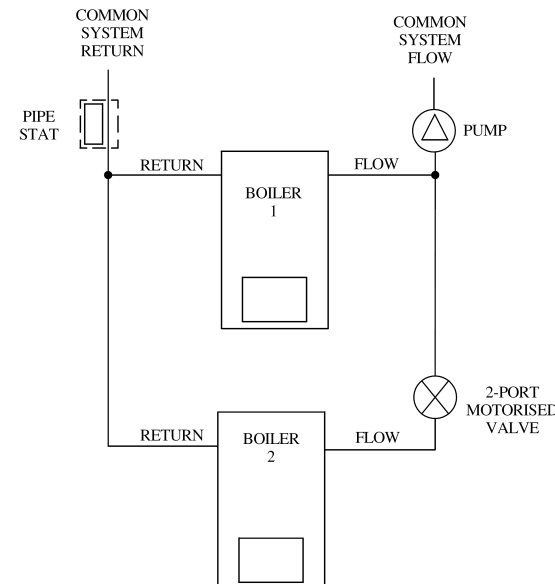
### Required Plumbing Components (in addition to heating system)

- 1 no. Circulating Pump (appropriately sized for the system)
- 1 no. 2-Port Motorised Valve
- 2 no. Remote Acting Fire Valves
- Assorted Solder and/or Compression Fittings as required

### Required Warmflow Products

- 2 no. Warmflow High Efficiency Condensing Boilers
- 2 no. Warmflow Condensing Boiler Flue Systems (refer to page 4)  
(Low-level flue supplied as standard with all Kabin Pak models)

## Boiler Plumbing Configuration



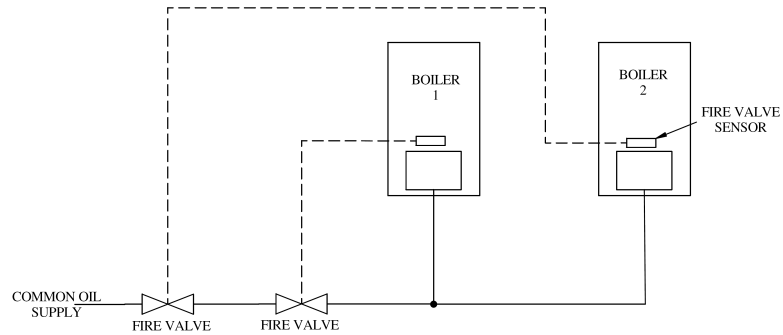
A pipe thermostat must be fitted to the common system return, before it splits to feed each boiler, so as to sense the return temperature at all times whether only 1 or both boilers are running.

A 2-port motorised valve must be fitted to the flow pipework of boiler no. 2 in order to prevent water flowing through this boiler when it is not called for.

All pipework depicted here, and all pipework within 1 metre of either boiler, must be run in copper.

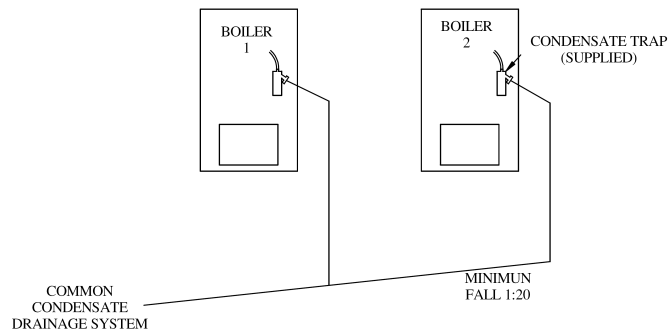
## Fuel Lines and Fire Valves

A pair of remote acting fire valves must be fitted in order to meet Building Regulations, OFTEC standards and BS 5410. The valve sensors must be fitted to both boilers, above the burner. The valve bodies must be installed in series on the incoming fuel line, before entering the building and before the fuel line splits to supply each boiler, so as to ensure that fuel is cut off from both boilers in the event of a fire on either.



## Condensate Drainage System

The condensate discharge from each boiler can be run to its own drainage system, or the two discharges can be brought together into one drainage system as shown. In either case, the full drainage system for both boilers must be installed in accordance with the instructions contained in the Boiler Manual. There must be a continuous fall of at least 1:20 on every section of the drainage system and the pipework must be run in such a way as to prevent back flow of condensate into either appliance.



## Flue Positioning

The locations of the flue terminals of both boilers must in all instances comply with Building Regulations. The installer must also verify that the flue type and location chosen are appropriate. Refer to the Boiler Manual for further guidance.

If installing Kabin Pak boilers, care must also be taken to ensure that the flue gas from one boiler is not drawn in by the other.

## Balanced Flue Terminal Locations

In order to comply with Building Regulations, terminals on the same wall must be at least 750mm apart horizontally or 1500mm apart vertically.

When installing two boilers side by side, the boilers must either:

- 1) Be spaced apart to provide the necessary terminal separation, or
- 2) Have one flue terminal at least 1500mm higher than the other

