HeatKing

BWarm BCool2

Air Source Heat Pumps
BWarm & BCool2 units

Technical Manual

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DECLARATION OF CONFORMITY

CE Heatking **BWarm** heat pumps have been designed, tested and approved in accordance with BS EN 14511 2004.

All **BWarm** Heatking air source heatpumps are fully tested before leaving the factory and comply with all current EC directives.

Relevant EC Council Directives: Machinery Directive (98/37/EC)
EMC Directive (89/336/EEC in the versions 93/68/EEC)
Low Voltage Directive (73/23/EEC in the version 93/68/EEC)

Applied harmonised standards: EN 292-1:1991, EN 292-2:1991, EN 294:1992, EN 349:1993, EN 55014-1:2000,
EN 55014-2:1997, EN 60335-1:2002, EN 60335-2-40:2003, EN 61000-3:1995
BS EN 14511-Pts 1 to 4:2004, EN378:2000, BS848-5:1999

Basis of self attestation: BS EN ISO 9001:2000 BSI registered firm certificate no. FM671

GENERAL

UNIT		UNIT	
BWarm 6000 1ph	The Standard Bwarm series of units are designed to provide comfort heating by extracting heat from the outside air at temperatures as low as –20C and allowing water to be heated to 50°C	*Bcool2 6000* 1ph	BCool2 range of units are based upon the standard range but incorporate a reverse cycle to provide cooling as well as heating
BWarm 6000 3ph		*Bcool2 6000* 3ph	
BWarm 8000 1ph		*Bcool2 8000* 1ph	
BWarm 8000 3ph		*Bcool2 8000* 3ph	
BWarm 9000i 1ph		*Bcool2 9000i* 1ph	
BWarm 9000i 3ph		*Bcool2 9000i* 3ph	
BWarm 12000 1ph		*Bcool2 12000* 1ph	
BWarm 12000 3ph		*Bcool2 12000* 3ph	

BWarm 13000i 1ph	The BWarm (i) series are as standard but use advanced compressor technology, which allows water temperatures of 60°C to be achieved.	*Bcool2 13000i* 1ph	The BCool2 (i) series are as standard BCool2 units but use advanced compressor technology, which allows water temperatures of 60°C to be achieved.
BWarm 13000i 3ph		*Bcool2 13000i* 3ph	

PART NUMBERS

DESCRIPTION	PART NUMBERS	DESCRIPTION	PART NUMBERS
BWarm 6000 1ph	70400020	*Bcool2 6000* 1ph	70400038
BWarm 6000 3ph	70400021	*Bcool2 6000* 3ph	70400039
BWarm 8000 1ph	70400032	*Bcool2 8000* 1ph	70400042
BWarm 8000 3ph	70400033	*Bcool2 8000* 3ph	70400043
BWarm 9000i 1ph	70400078	*Bcool2 9000i* 1ph	70400080
BWarm 9000i 3ph	70400079	*Bcool2 9000i* 3ph	70400081
BWarm 12000 1ph	70400034	*Bcool2 12000* 1ph	70400044
BWarm 12000 3ph	70400035	*Bcool2 12000* 3ph	70400045
BWarm 13000i 1ph	70400036	*Bcool2 13000i* 1ph	70400046
BWarm 13000i 3ph	70400037	*Bcool2 13000i* 3ph	70400047

SPARES AND KITS

SPARES	PART NUMBER	KITS	PART NUMBER
5 µf Capacitor	04401025S*	Wall Brackets (6000)	70400416
40 µf Capacitor (6000 1ph)	04400755S	Wall Brackets (8000/9000i)	70400417
45 µf Capacitor (12000 1ph)	04400840S	Wall Brackets (12000 & 13000i)	70400420
50 µf Capacitor (8000 1ph)	04400841S	Condensate Drain Tray (6000)	70400425
60 µf Capacitor (9000i & 13000i 1ph)	04400842S	Condensate Drain Tray (8000/9000i)	70400419
Water Flow Switch	04401230S*	Condensate Drain Tray (12000 & 13000i)	70400421
2A MCB	04407037S*	2 kW Boost Heater	70400412
25A D Rated MCB (1PH 6000, 8000 & 9000i units)	04407061S	Digital Stat	70400423
10A D Rated MCB (1PH 6000, 8000 & 9000i units)	04407062S	Variable Setpoints	70400428
32A D Rated MCB (1PH 12000&13000i units)	04407067S	Enclosure (floor mounted) (6000)	70400407
16A D Rated MCB (3PH 12000&13000i units)	04407066S	Enclosure (wall mounted) (6000)	70400408
Water Pump	04500094S*	Enclosure (8000, 9000i, 12000, 13000i)	70400427
Tamperproof Screw Key	70401080S*	Fixed Setpoints 35°C & 50°C	70400434
1 Amp Fuse	04400028S	Anti-Vib Floor Mount (6000, 8000 & 9000i)	70400411
315mA Fuse	04400814S*	Anti-Vib Floor Mount (12000 & 13000i)	70400435
400mA Fuse	04400027S	Flexible Pipe	70400422
Return Water Sensor	70400151S*	Thermal store Cylinder 215lt	70400454
Fan/Motor Assembly (6000, 8000 & 9000i units)	55023950S	Thermal store Cylinder 255lt	70400455
Fan/Motor Assembly (12000 & 13000i)	70401263S	Thermal store Cylinder 305lt	70400456
Lid (6000)	70401013S	Buffer Tank 80lt	70400630
Lid (8000/9000i)	70401192S	Buffer Tank 200lt	70400457
Lid (12000 & 13000i)	70401260S	Buffer Tank 300lt	70400458
Access Panel (6000)	70401138S	Flow Switch	70400459
Access Panel (8000/9000i)	70401191S	**FFO**	
Access Panel (12000 & 13000i)	70401259S	Digital Stat	70400426
Defrost Sensor	70401307S*	Variable Setpoint	70400429
Switch LP (waterside)	04401230S*	Fixed Setpoints 35°C & 50°C	70400433
Fan Speed Controller	70401068S*	Sound Attenuation (6000)	70400430
Unit Controller	70401067S	Sound Attenuation (8000)	70400431
Unit Controller (9000i only)	70401309S	Sound Attenuation (12000 & 13000i)	70400432
24V Transformer	70401052S*	*** For use on all size units**	
Soft Start Device (1PH units) (6000, 8000 & 9000i)	70401120S		
Soft Start Device (1PH units) (12000 & 13000i)	70401127S		
Electronic Expansion Valve Driver	70401310S		

The following accessories are available to order:

- **Wall mounting brackets**: Brackets are supplied complete with anti-vibration mounts to allow the heat pump to be mounted on a wall at high or low level.
- **Condensate drain tray**: for fitting beneath a wall mounted unit to collect and drain away condensate, preventing water dripping from the unit.
- **Enclosure**: a full wrap around mesh enclosure is available for both wall and floor mounted heat pumps, to provide additional protection when required.
- **2kW Boost Heater**: The boost heater is used to supplement the Heatking in lower ambient conditions to meet the heating demands of the building. It is also used to assist in defrost on the Bwarm 6000.
- **Ambient Stat Kit**: The digital stat kit is used as a supplement to the Boost Heater to increase the efficiency of operation through user settable parameters.

WARRANTY

The air source heatpump is sold subject to the Company's terms and conditions in force at the time of sale. The heatpump has a 2 years parts and labour warranty*, providing that the installation and any warranty work is carried out by Installers and Service personnel accredited by the Company.

The second year of warranty is activated upon the return to TEV Ltd of the completed warranty card supplied with the heatpump.
The warranty will be invalid if the heatpump is found to have been tampered with.

The above warranty statement does not affect your statutory rights.
*Subject to manufacturer's recommended annual inspection

BWarm Heat Pumps
- Providing heat by extracting energy from the air.

Heatking **BWarm** air source heat pumps (ASHP) are designed to provide comfort heating by extracting heat from the outside air at temperatures as low as –20C, using the latest scroll compressor technology and sophisticated pre-programmed controls. This combination provides a very energy efficient alternative heating system with Coefficients of Performance up to 4.3. The **BWarm** will supply water at 50°C from ambient temperatures down to -15°C, and 45°C from ambient temperature between -16°C and -20°C (9000i & 13000i unit will generate 60°C from ambient temperatures down to -15°C, and 55°C from ambient temperature between -16°C and -20°C).
Heatking heat pumps are designed for ease of installation and operation. The heat pumps sits outside, either wall or floor mounted, thus causing minimal disruption to the householder, especially in retrofit situations. All heat pumps leave the factory fully programmed and tested, only requiring connection to a suitable wet heating system, an electric supply and a thermostat/timeclock.
The Heatking ASHP's are specifically designed to operate with low temperature heating systems, with radiator temperatures of 50°C and underfloor temperatures of 35°C and above. Heat pumps are particularly effective in well insulated buildings with minimal heat loss.
The heat pumps are designed primarily for space heating but can, with the addition of a valve pack, be used to provide pre-heating of up to 50°C (60°C 9000i & 13000i) for domestic hot water systems. An additional boost heater (such as an immersion heater) is required to raise the DHW temperature as required. Heat pumps are also well suited to operating in conjunction with other environmentally friendly systems such as solar energy for DHW.
Units are designed for long life and safe operation, and have various safety features fitted to the unit. The unit contains a CFC free, non-flammable, biodegradable refrigerant, fully contained within the unit. The pre-programmed controller monitors the operation of the heat pump and all alarm conditions, ensuring optimum operation at all times.
Designed to operate in outdoor temperatures of between -20°C and +30°C (6000 units), and +35°C (8000/9000i/12000/13000i units) the heat pumps are fitted with a weather compensation system and current limiter.
Heatking **BWarm** ASHP's are available for connection to 1 phase or 3 phase electric supplies. There are 5 sizes of unit, the **6000/8000/9000i/12000/13000i** providing nominal heating duties of 6kW, 8kW, 12kW & 13kW.
(See pages 5,6,7,8,9,10,11 & 12 for performance details at different conditions)

TECHNICAL DATA

Min water temperature can be reduced as long as the system is dosed with correct anti-freeze and the anti-freeze set point is lowered to suit. Please contact Technical services for details.

	6000 units	***8000 units***	***9000i units***	***12000 units***	***13000i units***
Unit Weight (unpacked)	87Kg	110Kg	115Kg	173Kg	178Kg
Refrigerant Type	R407C	R407C	R407C	R407C	R407C
Refrigerant Charge Weight	1700gms	3500gms	3500gms	6800gms	6800gms
Water Capacity	2 Litres	3 Litres	3 Litres	7 Litres	7 Litres
Pump Delivery	15 l/m	20 l/m	25 l/m	30 l/m	35 l/m
Pump	85watts	85watts	85watts	170watts	170watts
Min Return Water	6°C	6°C	6°C	6°C	6°C
Max Return Water	45°C	45°C	60°C	45°C	60°C
Minimum Operating Ambient Temperature	-20°C	-20°C	-20°C	-20°C	-20°C
Maximum Operating Ambient Temperature	+30°C	+35°C	+35°C	+35°C	+35°C
Heat Output/Input=cop 7db/6wb°C @ 30-35°C kW	6.00/1.63 = 3.7	8.10/2.03 = 4.0	9.1/2.35 = 3.9	12.1/2.85 = 4.0	12.8/3.39 = 3.8
Heat Output/Input=cop 2db/1wb°C @ 30-35°C* kW	5.30/1.63 = 3.3	7.20/2.03 = 3.5	8.35/2.55 = 3.6	10.7/2.79 = 3.8	11.8/3.32 = 3.5
Heat Output/Input=cop 7db/6wb°C @ 40-45°C kW	5.70/1.95 = 2.9	7.75/2.35 = 3.3	9.1/2.72 = 3.3	11.5/3.35 = 3.4	13.0/4.01 = 3.2
Heat Output/Input=cop 2db/1wb°C @ 40-45°C* kW	5.05/1.95 = 2.6	6.85/2.35 = 2.9	8.25/2.72 = 3.0	10.1/3.28 = 3.1	12.0/3.94 = 3.0
Cool Output/Input=eer 27°C @ 7-12°C kW	4.70/1.97 = 2.39	5.75/2.16 = 2.66	5.75/2.16 = 2.66	9.70/3.93 = 2.47	9.70/3.93 = 2.47
Cool Output/Input=eer 27°C @ 18-23°C kW	5.80/2.13 = 2.72	8.65/2.55 = 3.39	8.65/2.55 = 3.39	11.9/4.22 = 2.82	11.9/4.22 = 2.82
Cool Output/Input=eer 35°C @ 7-12°C kW	4.46/2.19 = 2.04	5.60/2.47 = 2.27	5.60/2.47 = 2.27	9.26/4.37 = 2.12	9.26/4.37 = 2.12
Cool Output/Input=eer 35°C @ 18-23°C kW	5.75/2.40 = 2.40	8.15/2.88 = 2.83	8.15/2.88 = 2.83	11.75/4.74 = 2.98	11.75/4.74 = 2.98
Air volume m^3/h	2900 (max)	2900 (max)	2900 (max)	3700 (max)	3700 (max)
Fan rating W	220	220	220	260	260

*Operating point to BS EN 14511-2:2004. Power input shown without water pump. Capacity should be adjusted by 10% for defrost when considering seasonal efficiencies. Performance characteristics apply to a new unit with clean heat exchanges.
For additional performance information see page 5.

ELECTRICAL

6000 units

	1ph	3ph
Supply Voltage	220 - 240v 50hz	380 - 420v 50hz
Starting Current	20 Amps	18 A/Ph
Normal Operating Current	10.7 Amps	3.4 A/Ph
Maximum Operating Current	14.5 Amps	5 A/Ph
Fitted Compressor Protection (D motor rated MCB)	25 Amps	10 A/Ph
Recommended Supply Protection (D motor rated MCB)	32 Amps	16 A/Ph
Locked Rotor Current	58 Amps	26 A/Ph

8000 units

	1ph	3ph
Supply Voltage	220 - 240v 50hz	380 - 420v 50hz
Starting Current	24 Amps	29 A/Ph
Normal Operating Current	13.5 Amps	4.3 A/Ph
Maximum Operating Current	18.5 Amps	7 A/Ph
Fitted Compressor Protection (D motor rated MCB)	25 Amps	10 A/Ph
Recommended Supply Protection (D motor rated MCB)	32 Amps	16 A/Ph
Locked Rotor Current	76 Amps	32 A/Ph

9000i units

	1ph	3ph
Supply Voltage	220 - 240v 50hz	380 - 420v 50hz
Starting Current	26 Amps	29 A/Ph
Normal Operating Current	13.5 Amps	4.3 A/Ph
Maximum Operating Current	20.9 Amps	6 A/Ph
Fitted Compressor Protection (D motor rated MCB)	25 Amps	10 A/Ph
Recommended Supply Protection (D motor rated MCB)	32 Amps	16 A/Ph
Locked Rotor Current	97 Amps	40 A/Ph

12000 units

	1ph	3ph
Supply Voltage	220 - 240v 50hz	380 - 420v 50hz
Starting Current	31 Amps	34 Amps
Normal Operating Current	19 Amps	6.5 A/Ph
Maximum Operating Current	25 Amps	11 A/Ph
Fitted Compressor Protection (D motor rated MCB)	32 Amps	16 A/Ph
Recommended Supply Protection (D motor rated MCB)	40 Amps	20 A/Ph
Locked Rotor Current	108 Amps	51.5 A/Ph

13000i units

	1ph	3ph
Supply Voltage	220 - 240v 50hz	380 - 420v 50hz
Starting Current	33 Amps	34 Amps
Normal Operating Current	19 Amps	6.5 A/Ph
Maximum Operating Current	30 Amps	10 A/Ph
Fitted Compressor Protection (D motor rated MCB)	32 Amps	16 A/Ph
Recommended Supply Protection (D motor rated MCB)	40 Amps	20 A/Ph
Locked Rotor Current	160 Amps	64 A/Ph

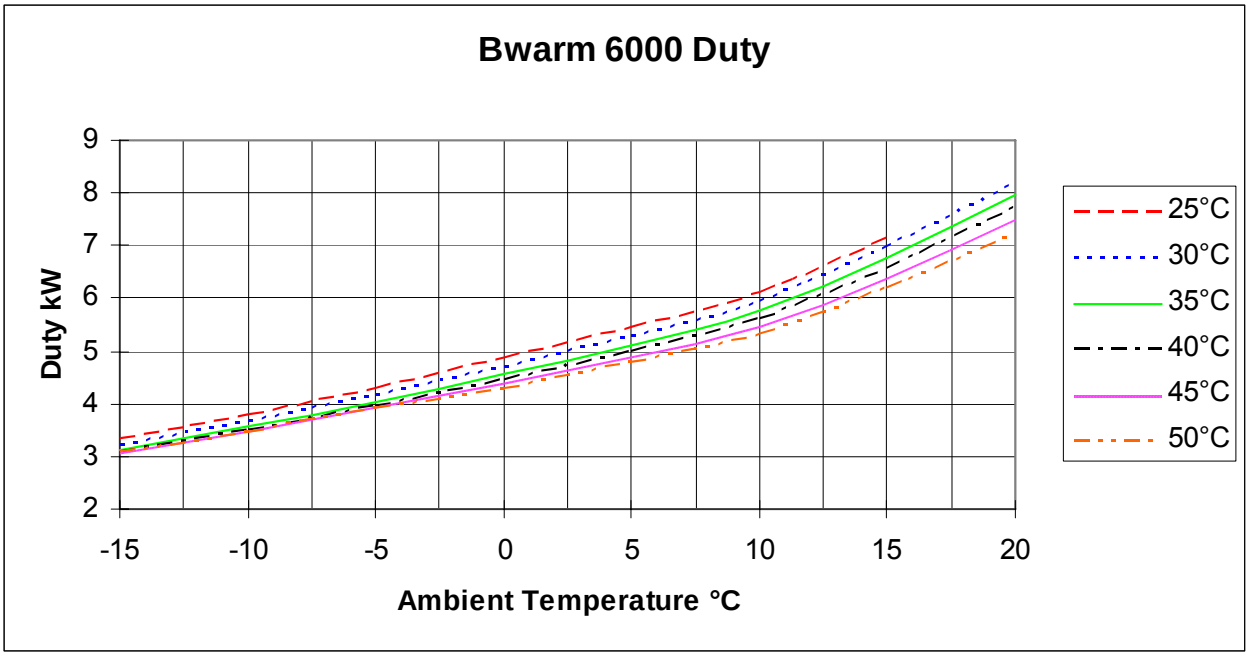
SOUND LEVELS

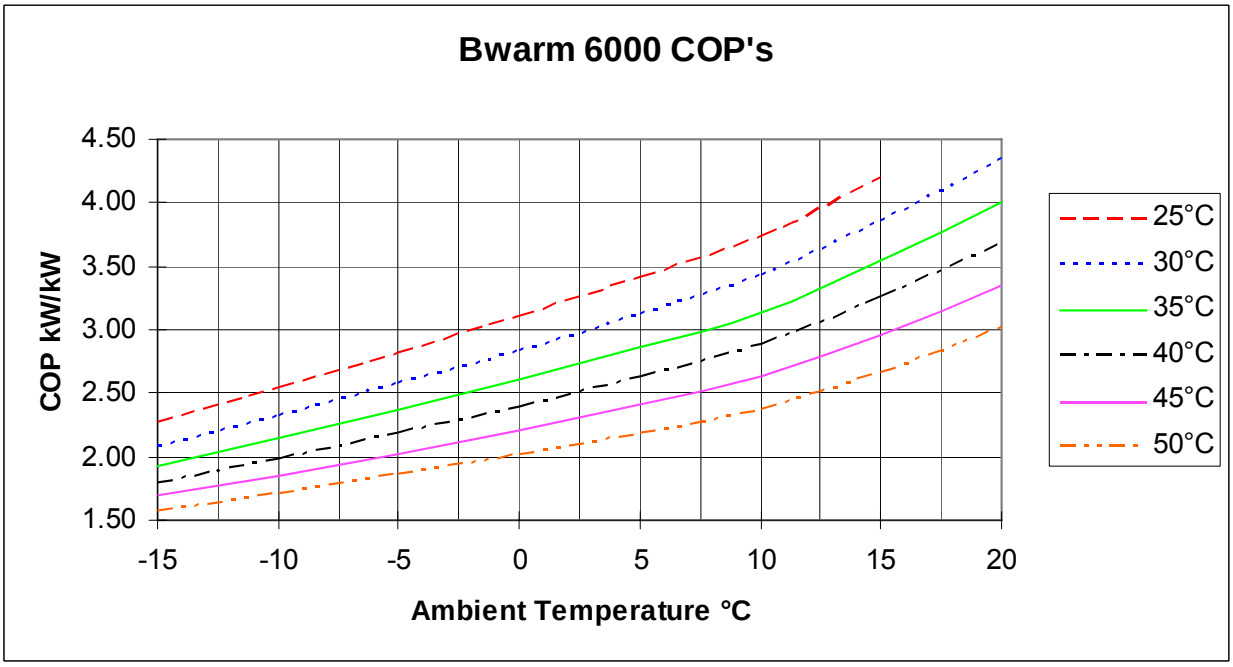
	Unit	125	250	500	1000	2000	4000	8000	dBA
Sound Power	**6000**	79.6	76.2	67.8	65.7	59.1	53.8	48.2	72.0
	8000	80.6	76.6	67.9	65.7	59.1	53.8	48.2	72.5
	9000i	81.6	77.1	68.0	65.7	59.1	53.8	48.2	72.7
	12000	84.6	80.8	73.9	70.0	65.3	59.1	51.2	76.5
	13000i	85.6	81.3	74.0	70.0	65.3	59.1	51.2	77.4
	6000 (with attenuation FFO)	74.8	67.4	64.0	62.6	54.3	48.0	45.0	67.0
	8000 (with attenuation FFO)	75.8	67.8	64.1	62.6	54.3	48.0	45.0	67.2
	9000i (with attenuation FFO)	76.8	68.3	64.2	62.6	54.3	48.0	45.0	67.5
	12000 (with attenuation FFO)	77.0	72.6	67.7	63.0	58.5	52.1	46.0	69.9
	13000i (with attenuation FFO)	78.0	73.1	67.8	63.0	58.5	52.1	46.0	70.2

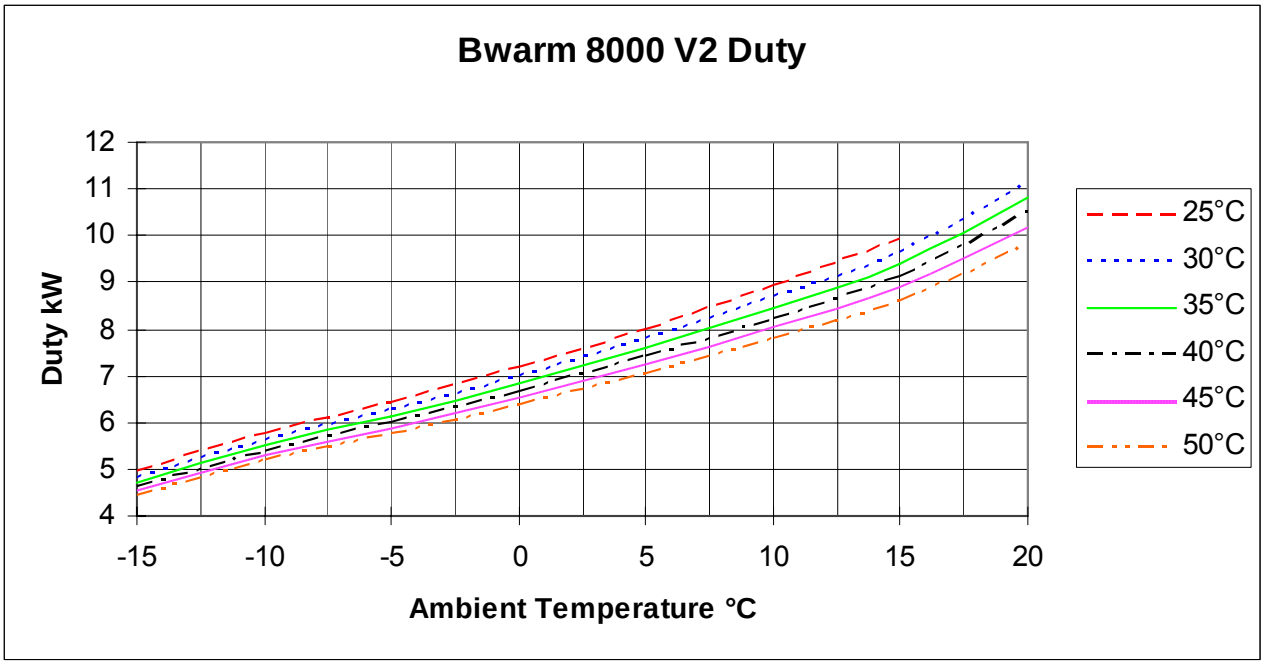
	Unit	125	250	500	1000	2000	4000	8000	dBA	NR
Sound Pressure (SPL)	**6000**	62.1	58.7	50.3	48.2	41.6	36.3	30.7	54.5	50
	8000	63.1	59.1	50.4	48.2	41.6	36.6	30.7	54.8	51
	9000i	64.1	59.6	50.5	48.2	41.6	36.3	30.7	55.2	51
	12000	67.1	63.3	56.4	52.5	47.8	41.6	33.7	59.6	55
	13000i	68.1	63.8	56.5	52.5	47.8	41.6	33.7	59.9	56
	6000 (with attenuation FFO)	57.3	49.9	46.5	45.1	36.8	30.5	27.5	49.4	45
	8000 (with attenuation FFO)	58.3	50.3	46.6	45.1	36.8	30.5	27.5	49.7	45
	9000i (with attenuation FFO)	59.3	50.8	46.7	45.1	36.8	30.5	27.5	50.0	45
	12000 (with attenuation FFO)	59.5	55.1	50.2	45.5	41.0	34.6	28.5	52.4	47
	13000i (with attenuation FFO)	60.5	55.6	50.3	45.5	41.0	34.6	28.5	52.7	47

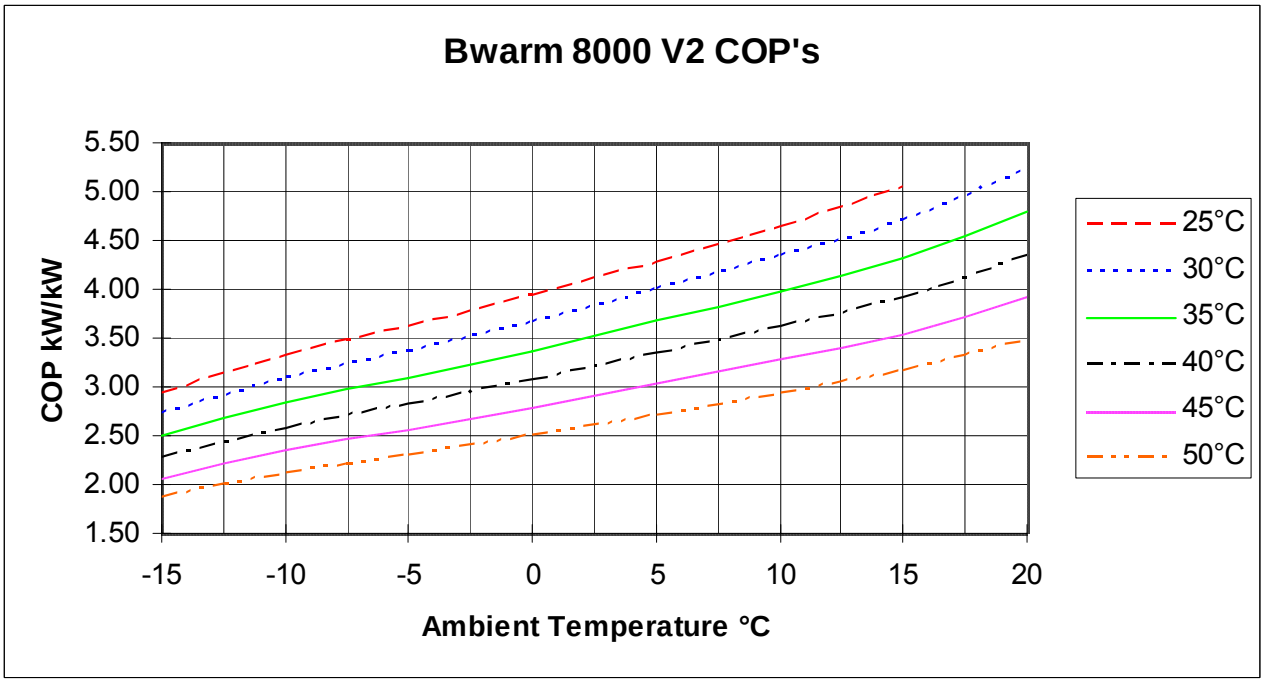
Sound Pressure figures taken at 3metres using a floor standing unit with no other reflective surfaces
Test Method – BS EN ISO 3744:1995 as required by BS EN 12102:2008 and BS EN 14511-4:2007 6.2.3.
The octave sound levels shown are flat without weighting.

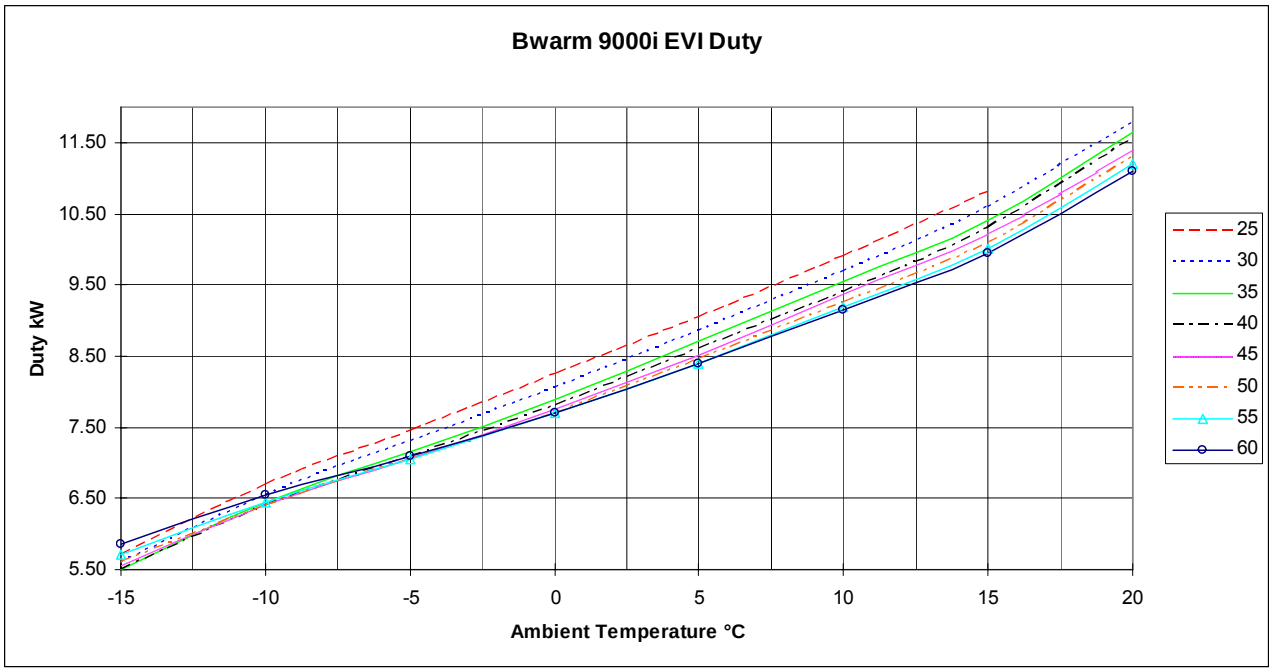
DUTY AND COP DATA FOR BWarm 6000, 8000, 9000i, 12000 & 13000i
(There will be varying effects due to defrost at different humidity please contact technical services for more information)

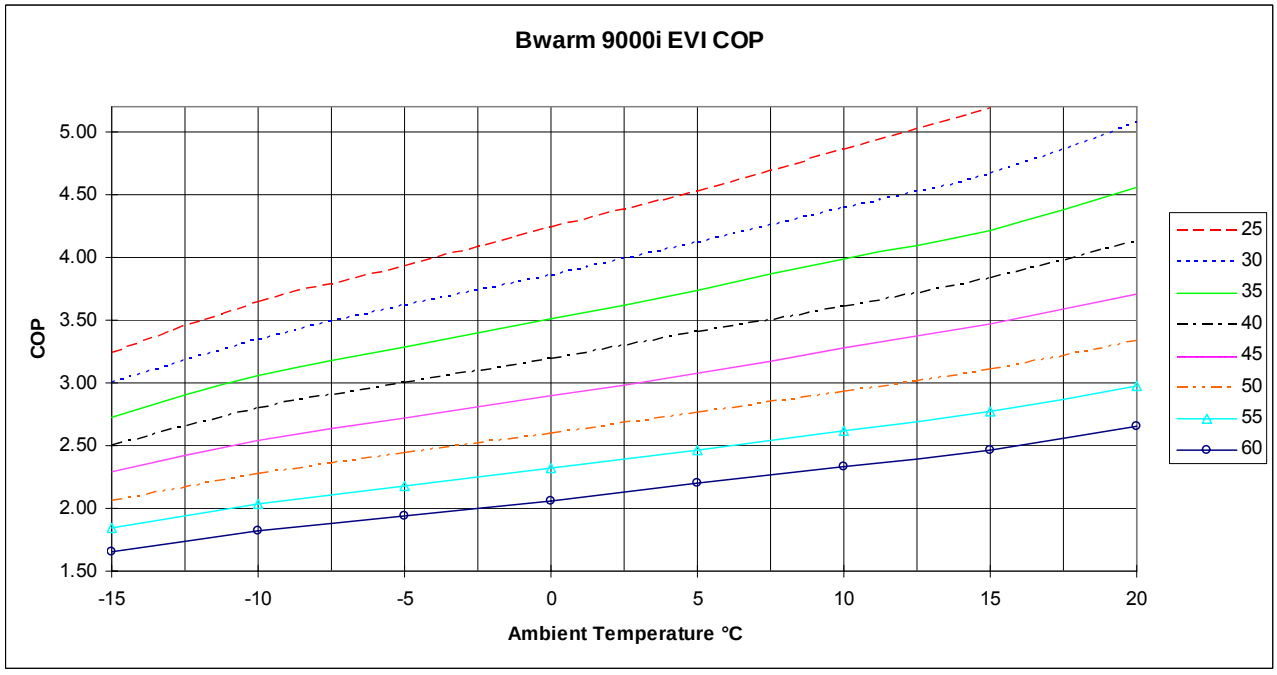


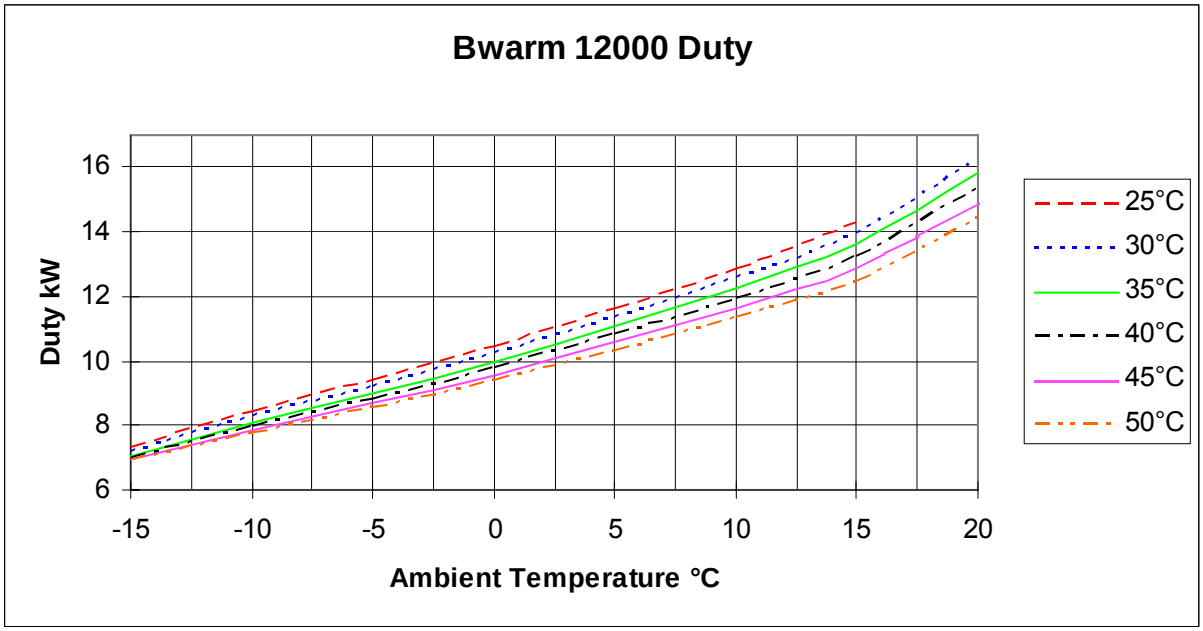


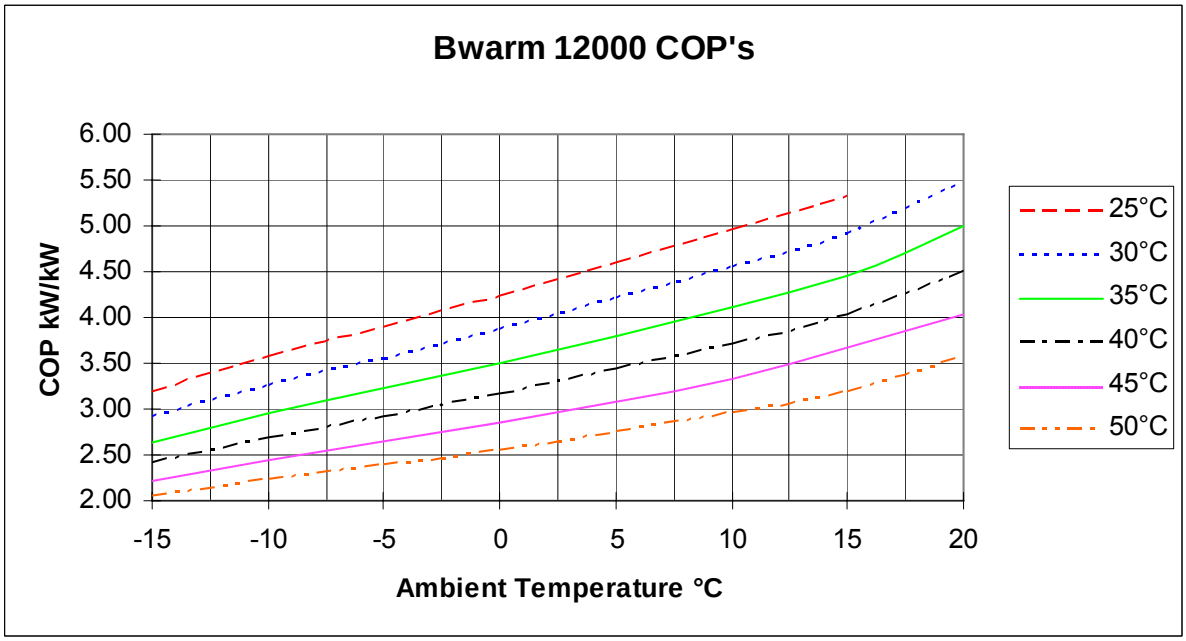

Bwarm 8000 V2 Duty
Duty kW
12
11
10
9
8
7
6
5
4
-15
-10
-5
0
5
10
15
20
Ambient Temperature °C
25°C
30°C
35°C
40°C
45°C
50°C

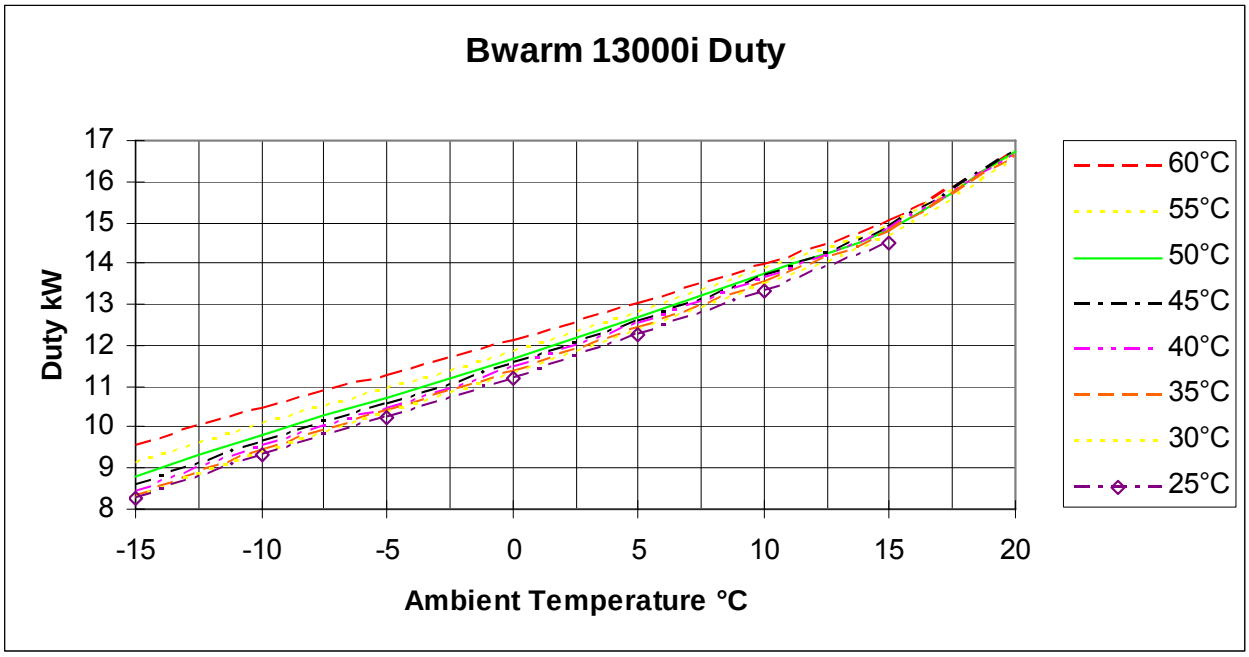

Bwarm 8000 V2 COP's
COP kW/kW
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
-15
-10
-5
0
5
10
15
20
Ambient Temperature °C
25°C
30°C
35°C
40°C
45°C
50°C

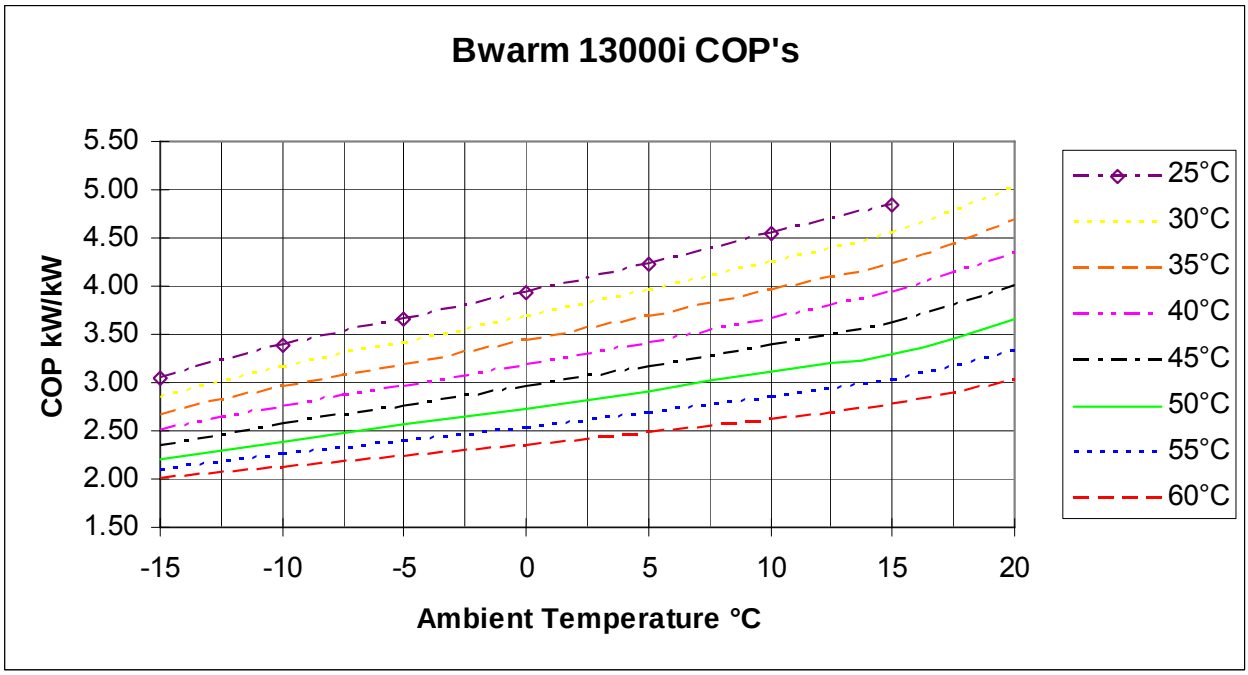

Bwarm 9000i EVI Duty
Duty kW
11.50
10.50
9.50
8.50
7.50
6.50
5.50
-15
-10
-5
0
5
10
15
20
Ambient Temperature °C
25
30
35
40
45
50
55
60


Bwarm 9000i EVI COP
COP
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
-15
-10
-5
0
5
10
15
20
Ambient Temperature °C
25
30
35
40
45
50
55
60

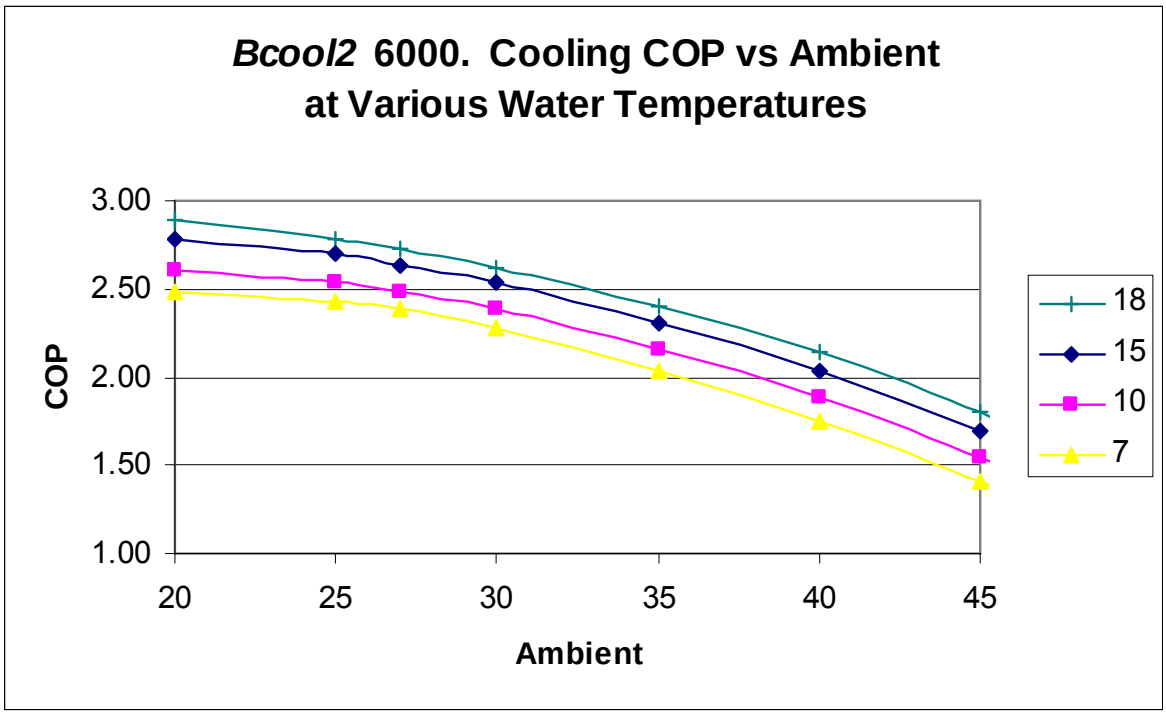

Bwarm 12000 Duty
Duty kW
16
14
12
10
8
6
-15
-10
-5
0
5
10
15
20
Ambient Temperature °C
25°C
30°C
35°C
40°C
45°C
50°C

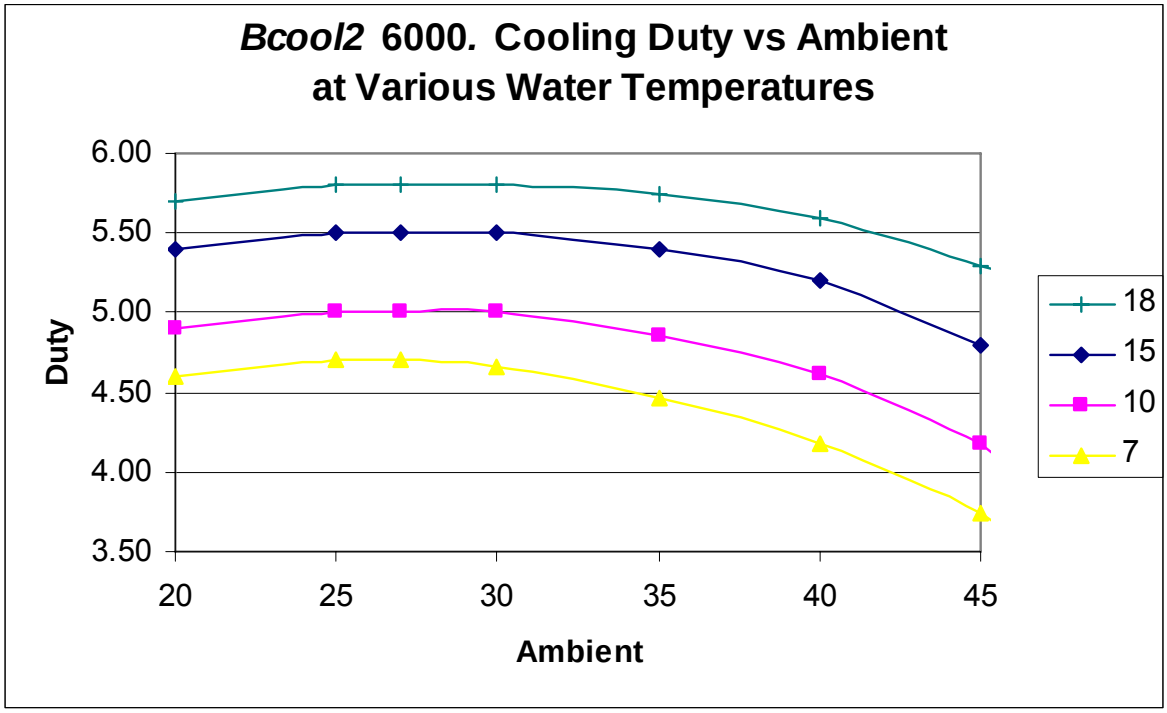

Bwarm 12000 COP's
COP kW/kW
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
-15
-10
-5
0
5
10
15
20
Ambient Temperature °C
25°C
30°C
35°C
40°C
45°C
50°C

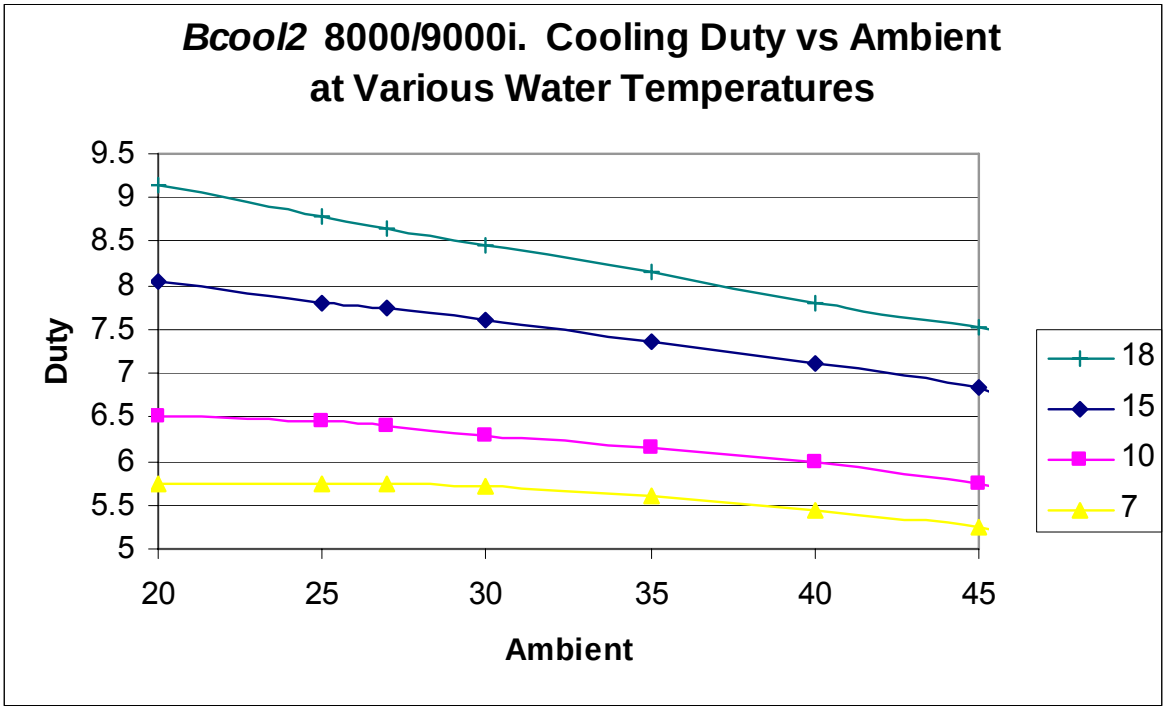

Bwarm 13000i Duty
Duty kW
17
16
15
14
13
12
11
10
9
8
-15
-10
-5
0
5
10
15
20
Ambient Temperature °C
60°C
55°C
50°C
45°C
40°C
35°C
30°C
25°C


Bwarm 13000i COP's
COP kW/kW
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
-15
-10
-5
0
5
10
15
20
Ambient Temperature °C
25°C
30°C
35°C
40°C
45°C
50°C
55°C
60°C

COOLING DUTY AND COP DATA FOR BCool2 6000, 8000, 9000i & 12000 units.






Bcool2 8000/9000i. Cooling Duty vs Ambient at Various Water Temperatures
Duty
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
20
25
30
35
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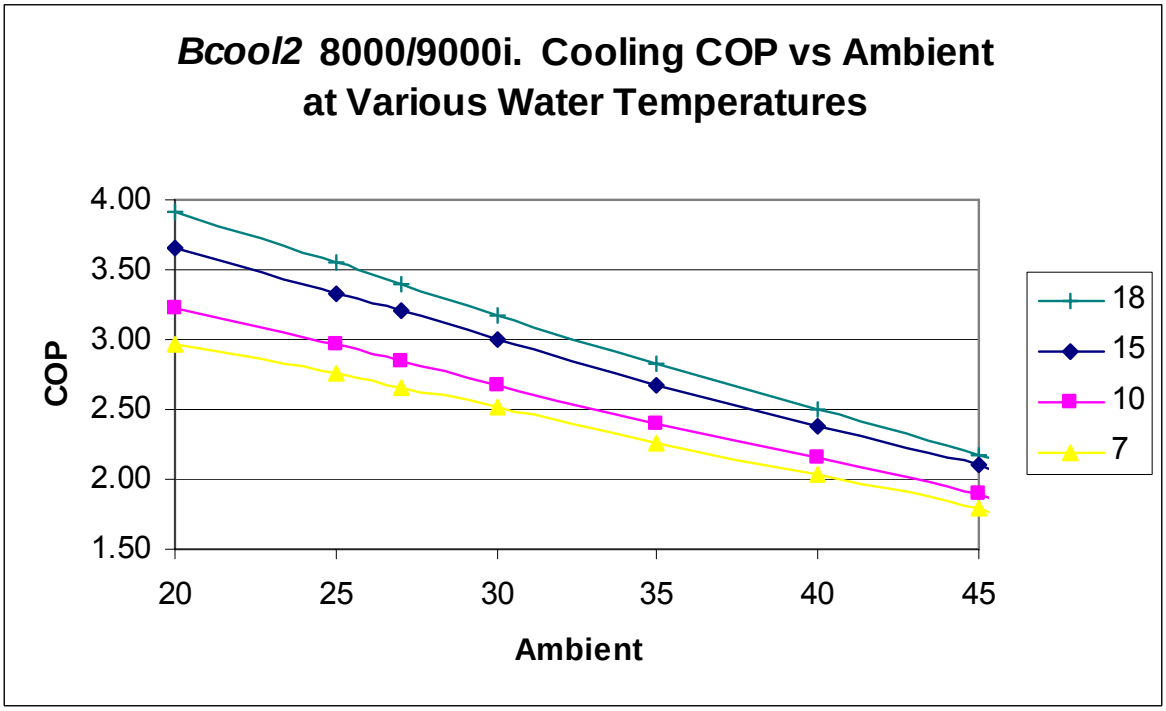
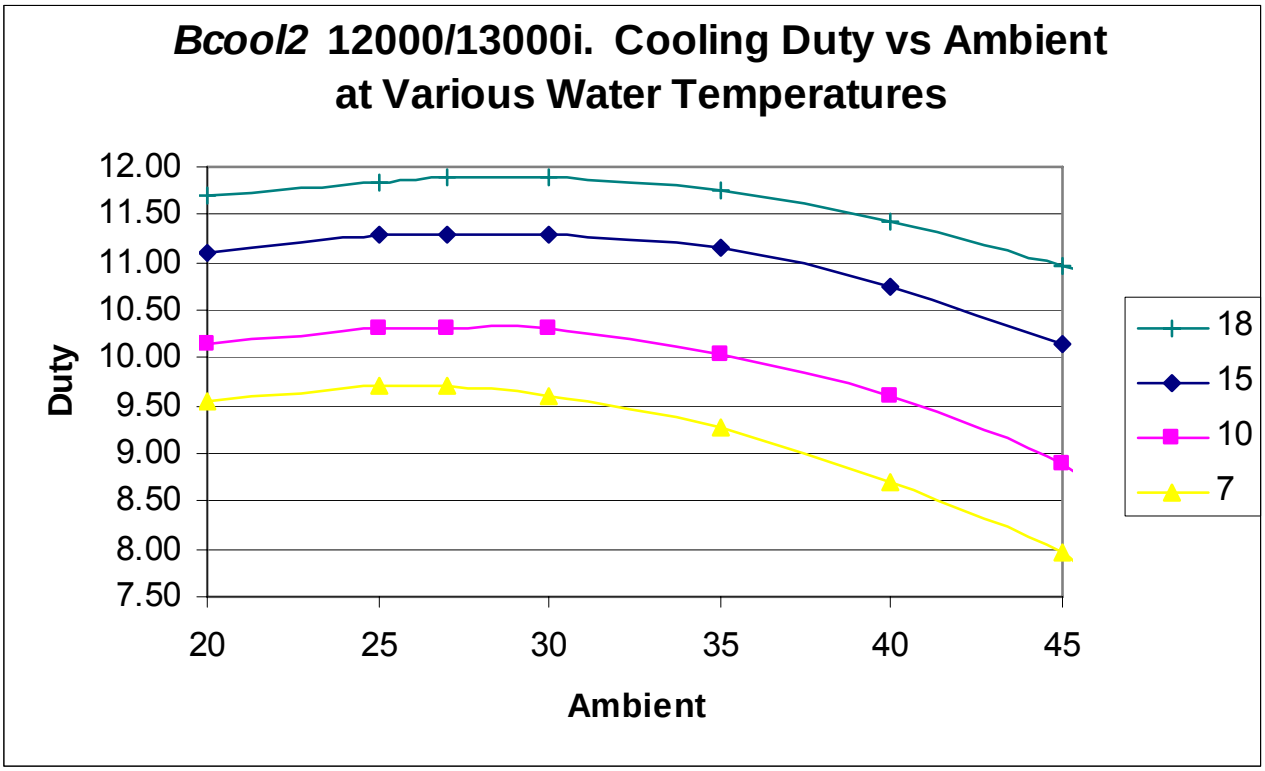
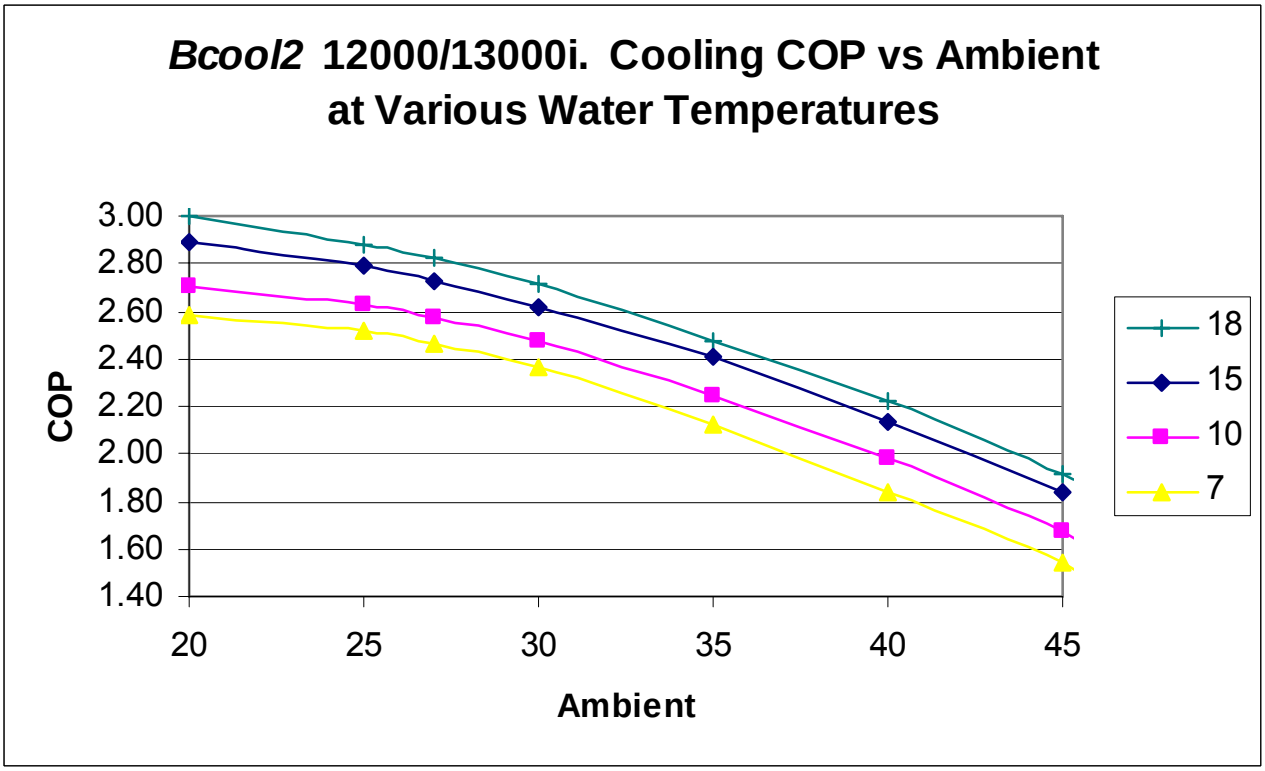
45
Ambient
18
15
10
7


Bcool2 8000/9000i. Cooling COP vs Ambient at Various Water Temperatures
COP
4.00
3.50
3.00
2.50
2.00
1.50
20
25
30
35
40
45
Ambient
18
15
10
7





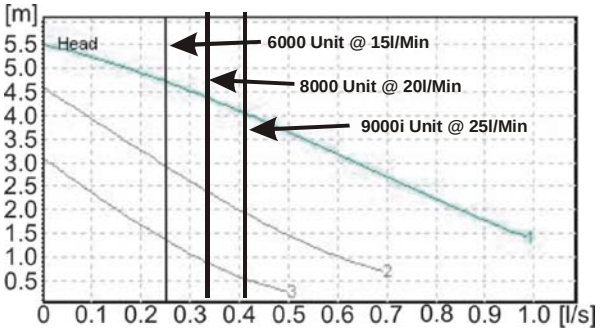
CONTROLS

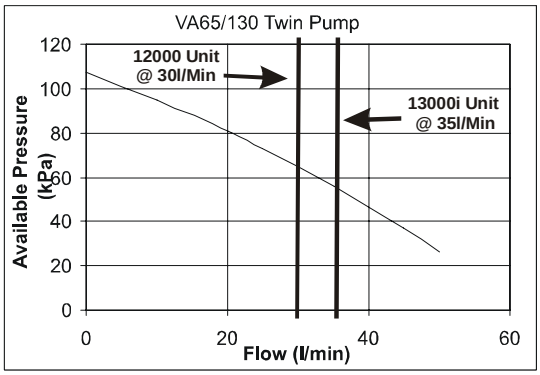
Each **BWarm** heat pump is fitted with a microprocessor controller, factory set, simplifying installation. The controller can be programmed for use with either radiator heating or underfloor heating. There is a requirement for additional external controls for the system to operate; (TEV Ltd recommends the use of a programmable time clock and thermostat designed to make best use of off peak supplies). Whatever controls are used the heat pump itself simply requires a 230V signal to switch on when there is a demand for heating. The microprocessor in the heat pump controls the following key functions:

- **Water temperature**: the heat pump is controlled on return water temperature. Once the water temperature reaches set point the unit will switch off until the water temperature falls to 3° below set point.

- **De-frost**: in periods of cold weather with high relative humidity, frost will form on the finned heat exchanger on the back of the unit. This is normal and not a cause for concern. A sensor is fitted inside the heat pump that, combined with a pre-programmed set point and time differential, instigates a de-frost. To do this the controller reverses the flow of refrigerant, passing hot gas through the heat exchanger and melting the frost. At this time there may be water vapour rising from the heat pump as the frost melts, this is a normal part of the operation and should not cause any concern to the user.

- **Water pump**: a 3 speed pump is fitted to all units, capable of providing the minimum required flow rate to a system with a total pressure drop not exceeding 37kPa. A supplementary pump, in series with the unit pump, may be required if the system pressure drop exceeds the maximum specified for the unit.





- **Fan**: a single axial fan with external rotor motor is used to provide the necessary airflow across the unit. The fan is connected to a fan speed controller to modulate the fan speed according to the outside temperature, as the temperature falls the fan speeds up to maintain the unit performance.

- **Protection**: a number of protective devices are fitted to the unit and monitored by the microprocessor. These include;

  - **Pressure switches**: high pressure and low-pressure switches are fitted to the refrigeration circuit to switch off the system if the minimum and maximum parameters are exceeded. The switches re-set automatically when conditions have stabilised.

  - **Water system pressure switch**: reduced coolant flow can cause a breakdown of the system. The unit will switch off if the system water pressure falls below preset levels.

  - **Temperature sensors**: fitted to the flow and return of the wet system, to switch the unit on and off within the preset parameters.

  - **Current surge protection**: both mains and control circuits are protected by individual MCB's that will trip should there be an electrical problem. This will not normally happen during a power cut or when starting in normal operating conditions.

  - **Start current limiter**: a soft start device is incorporated, reducing the peak starting current to between 30 and 50 Amps.

- **Alarms**: the microprocessor controller is programmed with a number of alarms. A list of the main alarms can be seen on page 15. There are two types of alarm;

  - **Critical alarm**: an alarm that shuts down the unit if there is a critical fault such as the tripping of one of the protective devices listed above.

  - **Indication**: non-critical alarms will be displayed on the controller but will not switch off the unit.

- **Weather compensation**: for units preset to operate with a radiator based wet system, weather compensation is programmed into the controller. As the outside temperature rises the controller automatically adjusts the set point to maintain a balance between the outdoor temperature and the heating water temperature required, to provide the correct level of heating. This facility is not available with underfloor systems as the minimum coolant operating temperature is 35°C, preset as standard for underfloor systems. Weather compensation should not be activated when the heat pump is used for Domestic Hot Water unless a Variable (or fixed) set point kit is fitted

APPLICATION GUIDELINES

Heatking **BWarm** heat pumps are designed to provide low temperature heating to well insulated buildings.

Heating requirements

Discuss the heating requirements with the client and determine the best solution for the building, either radiators or underfloor system. Take into account any special needs of the frail or elderly. Ideally the heat pump should be installed as part of a full replacement system. If it is being connected to an existing radiator system determine if the radiators are of an acceptable size for use with low temperature 50°C (60°C 9000i/13000i) heating. This assessment should take into account any alterations to the building and additional insulation added since the original system was installed.

Note: BWarm heat pumps should not be connected to an existing system that uses microbore piping (**unless an additional pump is added**) as the pressure drop of the pipe work will cause a significant reduction in heating water flow, reducing the effectiveness of the heat pump and possibly causing it to fail.

Heat Loss calculations

BS 5449 lists different design temperatures for different types of room. In reality the temperatures depend upon the preferences of the individual and actual temperatures achieved depend upon the suitability of the controls. As a guideline a design temperature of 21°C throughout and 22°C in the bathroom should give a good result. Where higher temperatures may be required for the elderly or infirm, use 23°C throughout. An external design temperature suitable for the area should be used to calculate heat loss.

RADIATOR SYSTEMS

Radiator sizing

Always look to use high efficiency radiators. Convector radiators are also a good option. Radiators should be sized to heat the room with an entering water temperature of 50°C. This should be checked with the radiator manufacturer or distributor, as differently manufactured radiators will require varying output factors to be applied.

The most efficient method of connecting the radiators to the main pipe work is to the top and bottom tapping's; used by radiator manufacturers for providing selection data. Bottom opposite end (BOE) connections are the most frequently used in domestic installations and should have a connection factor of 0.96 applied.

System design

BWarm heat pumps are designed to be part of a fully pumped pressurised system; the heat pump is fitted with a 3 speed pump and requires a suitably sized diaphragm expansion vessel (to BS4814) automatic air bleed, pressure gauge and a filling loop incorporating a stop valve (BS1010) double check valve with test point and removable flexible hose. A safety (pressure relief) valve should also be fitted, set to lift at a maximum pressure of 3 bar.

HEATING AND DOMESTIC HOT WATER

When installing a heat pump to provide central heating and hot water it is important that the system gives priority to supplying the heating demand before switching over to supply the domestic hot water.

Priority heating system

The system wiring and controls should be installed to provide independent control of both heating and domestic hot water giving priority to the heating circuit before the domestic hot water

Note: In periods of very cold weather where there is a high demand for heating and hot water it may be necessary to use an additional heat source to provide sufficient domestic hot water.

Priority Heating Wiring Plan

(see fact sheet 1 available from technical services)

Important When using a heat pump to provide domestic hot water it is important to take into account the lower flow temperatures produced by the ASHP. It will be necessary to use the immersion heater in the domestic hot water cylinder to raise the stored water temperature from the maximum the heat pump can achieve to 65 deg c. This will eliminate the risk of legionella forming in the domestic hot water cylinder.

The BWarm 6000, 8000 and 12000 units are factory set for 50 deg flow temperature

The BWarm 9000i and 13000i units are factory set for 60 deg flow temperature

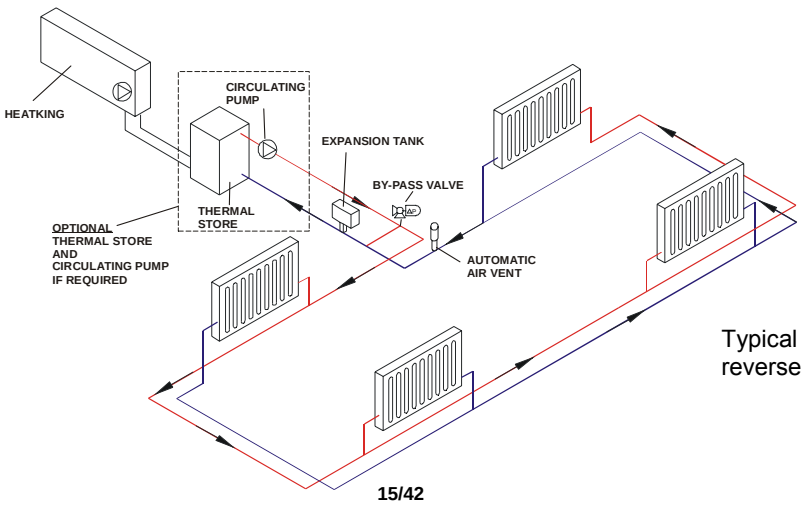
Thermostatic radiator valves

TRV's should be fitted in accordance with part 'L' of the building regulations.

To ensure adequate water flow to the heat pump the radiators in the room with the thermostat should be left open without TRV's. In addition a by pass should be fitted in the system to prevent loss of flow which could result in the heat pump cycling on and off more regularly than it should due to the reduced temperature drop caused by too little heat transfer.

Pipe work

In order for the heat pump to work efficiently it is important to size the system pipe work to minimise the pressure drop and ensure adequate flow at all times. Severe pressure drops and low flow will result in reduced performance and possible nuisance tripping of the heat pump. Pipe work must be sized to ensure that each part of the circuit has sufficient circulation to deliver the rated heat output. A minimum pipe diameter of 15mm should be used on any single part of the system with the flow and return headers sized according to the system requirements.



Typical radiator system with reverse return

DRYING OUT A BUILDING

Heat pumps are not designed to cope with the higher heat demands required to dry out a building. Should there be a higher heat demand additional temporary heating equipment should be used and removed once the building has dried out.

ZONES

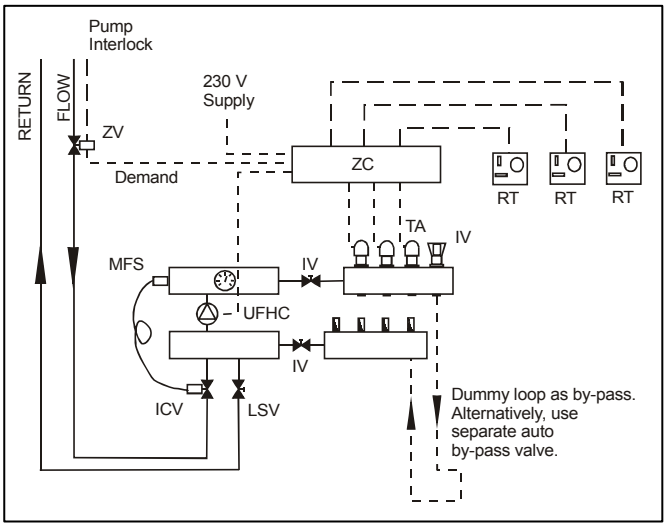
Separate the building into zones such that each zone covers a complete area to be heated that can be controlled by a single zone thermostat, valve and header arrangement.

CONTROLS

Individual zones should be controlled with a thermostat and thermal actuator to open/close the zone.

Zone controller: Used to simplify wiring installation, it allows for connection of multiple room thermostats and thermal actuators. It also incorporates relay contacts to control the circulating pump and the heat pump connected directly to the heating system.

Set back: the response time of underfloor heating systems is dependent on the amount of heat energy stored in the floor, which is a function of the density and thickness of the screed in solid floor systems. To improve response time it is advisable to set back the zone temperature by approximately 3°C during periods when zones are unoccupied. This can be achieved by using set back thermostats with an additional wire for the time-switch connection. This method of control has the added benefit of improving the energy efficiency of the heating system.



PIPE WORK

Pipe materials should be restricted to those specified in BS EN1264(2001) and BS 7291 (2002). Pipe fittings should not be used below ground.

Pipe sizing needs to take into account the heating medium flow required and the system pressure drop.

All manifolds should be fitted with primary isolating valves for ease of maintenance and isolation from the heating system during any chemical treatment processes or for draining the floor heating circuits.

Flow meters or calibrated valves should be used on each manifold to aid initial system balancing or re-balancing in the event of floor coverings being changed.

Manifold positions should located to minimise uncontrolled energy losses from pipes passing through heated areas en route to other zones.

Allow for the insulation of pipe work until it enters the area it is intended to heat, thus minimising local overheating.

Thermal store (Buffer tank)

For the most energy efficient system performance a thermal store (buffer tank) should be fitted in between the heat pump and the underfloor system (see Fig. 1). The heat pump is used to maintain the supply temperature in the tank that in turn serves the underfloor system via a second pump.

Floor coverings

It is essential that floor coverings do not provides too much insulation to the heating system and particular attention should be paid to the type of underlay fitted beneath a carpet.

Flow Switch

The system should be protected by a flow switch (Available as a Kit or supplied by the installer). The purpose of the flow switch is to protect the system from damage in the event of a pump failure

UNDERFLOOR SYSTEMS

Underfloor heating systems are well suited for heat pump applications because of the lower operating temperature of the heating medium. Unlike conventional boilers, a heat pump can supply the heating medium at the correct temperature to the heat emitters, without the need for mixing headers. The system efficiency is improved as power is only being used to raise the heating medium to the correct working temperature.

System configuration

The floor is the heat emitter and is of considerably greater mass than other heat emitters such as radiators. Because of this it takes much longer to raise the floor temperature on initial start up, although once operating it will stay at the correct temperature for longer due to the thermal mass. Because heat pumps generate a lower temperature heating medium there is a problem if the whole floor area is opened up to the heat pump on initial start-up of the system. The high heat losses into a cold floor will prevent the heating medium reaching the correct operating temperature and ultimately could cause the heat pump to frost up severely. To overcome this problem the best solution is to fit a thermal store between the heat pump and the heating system so that the heat pump is raising the temperature within the store and not directly within the floor. In addition the heating system should be split into a number of zones to allow for variations in heat load and to improve start up at the commissioning stage.

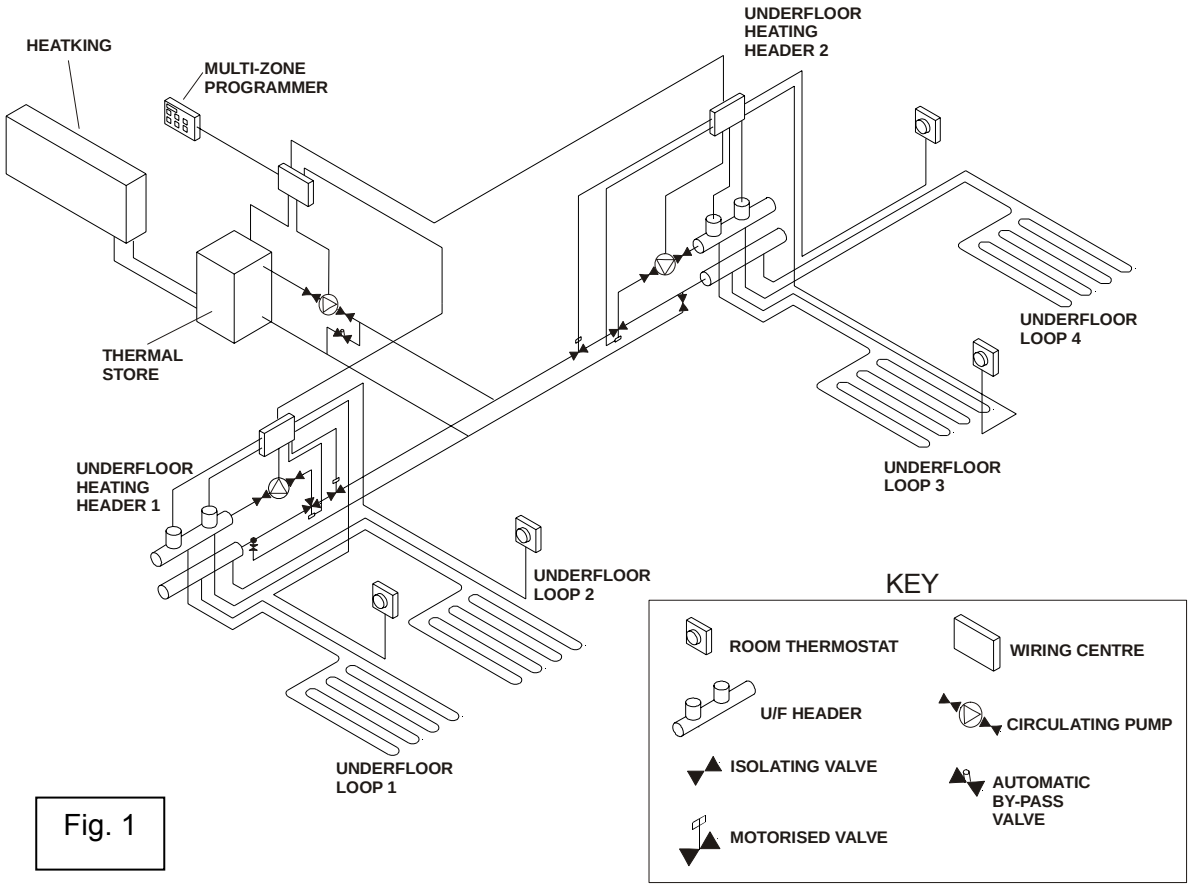


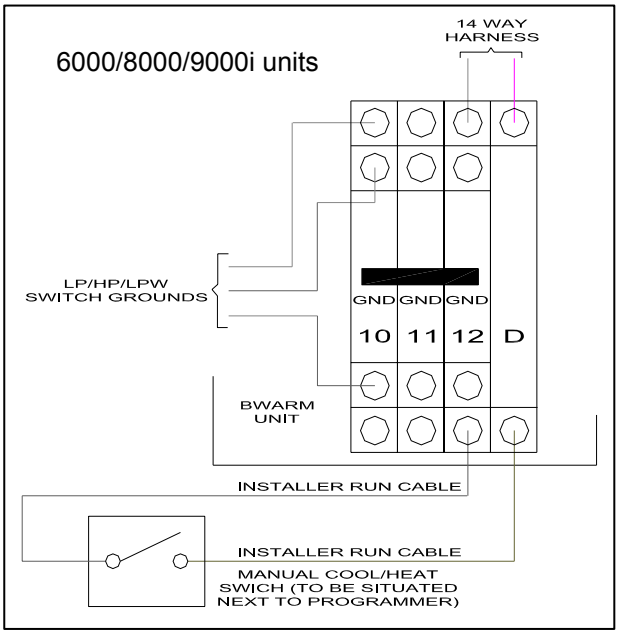
Fig. 1

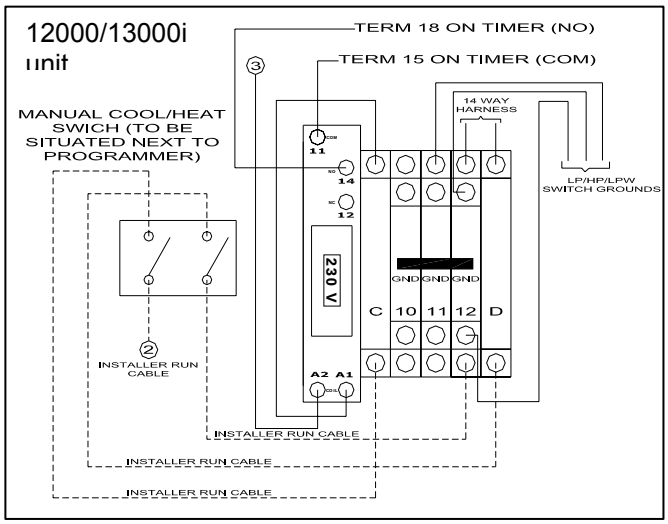
COOL \ HEAT SYSTEMS

IT IS RECOMMENDED THAT THE COOL FUNCTION IS ONLY USED IN HOUSEHOLDS WHERE A FULL UNDERFLOOR SYSTEM OR FAN COILS ARE INSTALLED.

Although heat pumps are primarily designed for heating, by reversing the flow of refrigerant through the system a cooling system is created.
The Cool \ Heat unit has its own specified part numbers (page 4). It should be noted that a HEAT ONLY unit CAN NOT be converted into a Cool \ Heat unit. The changeover between heating & Cooling is provided by means of a remote switch (provided by the installer). For the 6000 and 8000/9000i units this only needs to be a Single Pole switch. The signal is volts free. On the 12000 unit the switch needs to be Double Pole. One pole will be volt free the other pole will be 230v AC. This 230v signal is required for a control circuit to by-pass the defrost timer.

Interconnecting Wiring Diagram





NOTE: Both poles carry a current of < 1 Amp

IMPORTANT
If Full Weather Compensation is enabled and the unit is operating in cooling mode it is possible for the water temperature to fall below 0°C. It is therefore important that the system is correctly dosed with a suitable inhibitor / antifreeze such as FERNOX ALPHI-11. It is recommended to protect to -20°C in this situation.

If a 2kW Boost Heater Kit (70400412) is used on a Cool\Heat unit then a -5 Digital Stat Kit (70400423) must be purchased. This is because the heater will see temperatures below 35°C and run unnecessarily. Using the kit links the heater demand to the outside ambient temperature.

WIRING DIAGRAMS
See pages 28 & 33

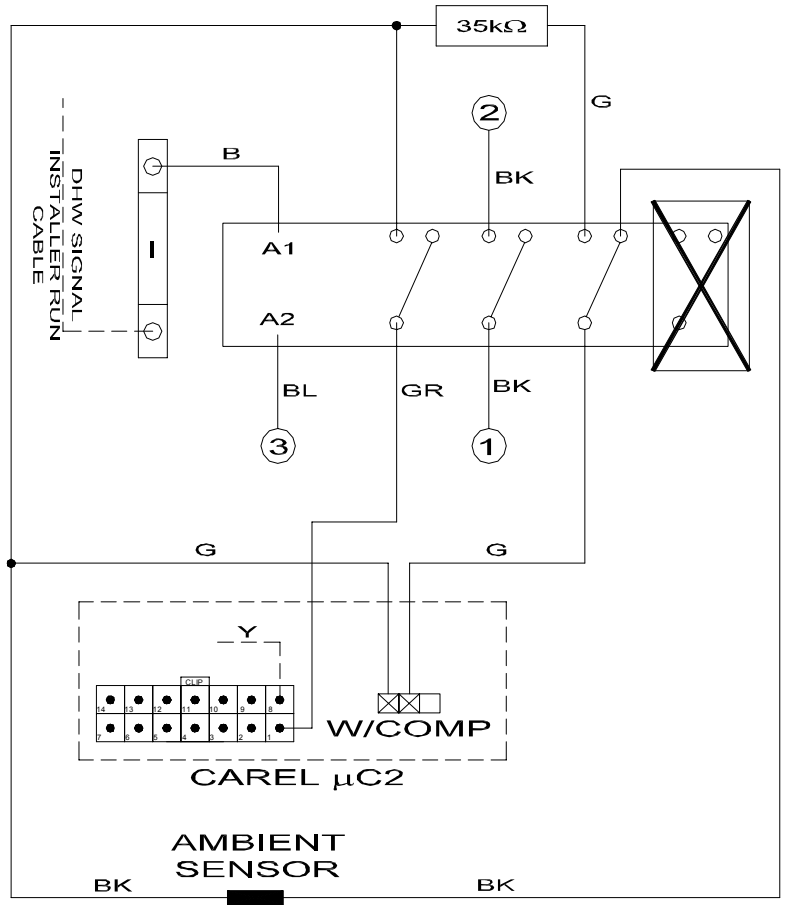
VARIABLE SET POINT

The Variable set point KIT allows a variable second temperature set point to be programmed and used for a night time setback function (Space Heating) or for DHW, e.g. under floor Heating at 35°C, DHW set point at 50°C. Both set points can be altered by the installer to suit their particular installation

This additional function can be achieved by using an expansion card for the controller which allows an extra digital input to control this set point.

The design of this function is such that the primary set point can be used with weather compensation enabled (Programmed by user), but the second set point has the weather compensation disabled. This is useful for DHW when the set point should not be affected by ambient conditions.

WIRING DIAGRAM – Variable Setpoint



Wiring diagram shown for heating units only. (For cooling units please contact technical services)

FIXED SET POINT

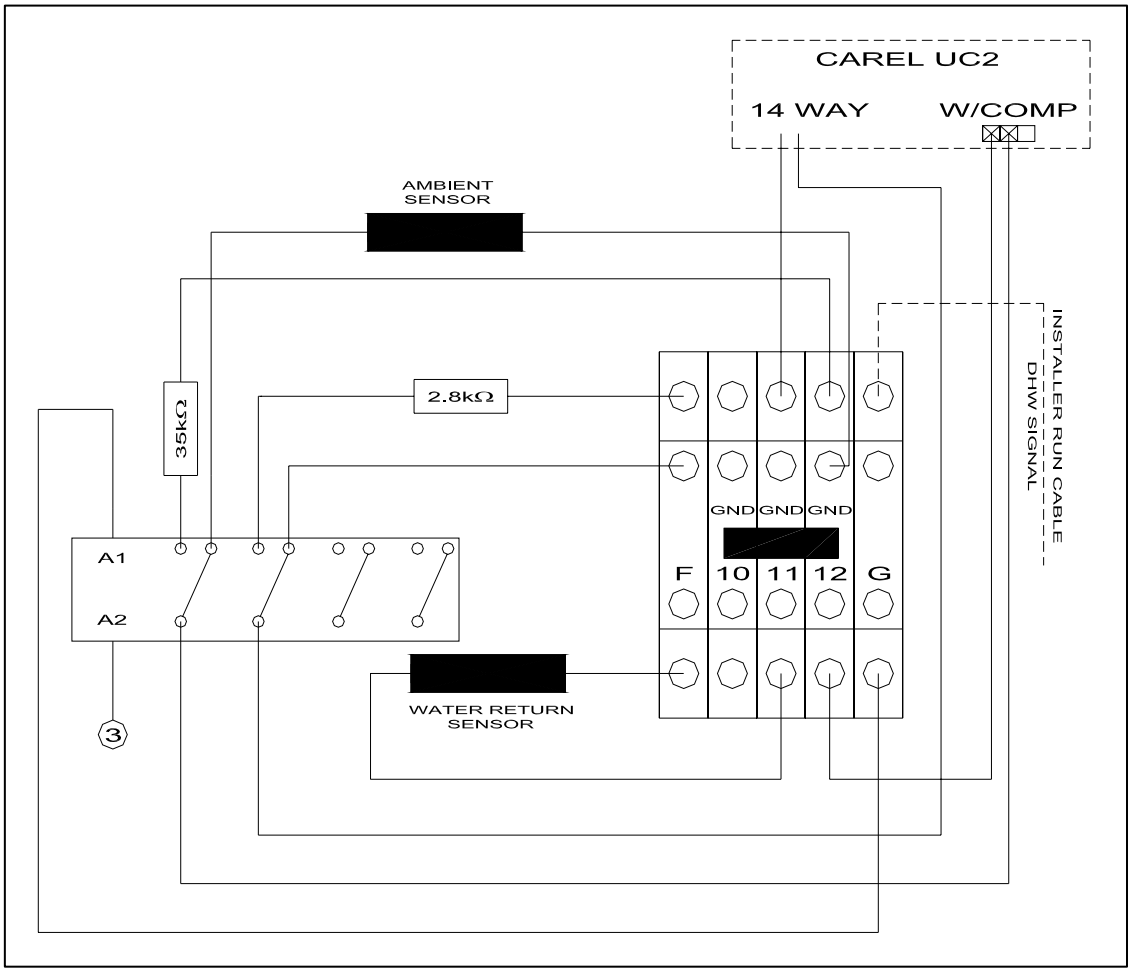
The Fixed set point FFO and Kit has been factory set to give 2 non adjustable set points. This function is primarily for the inclusion of a DHW circuit.

The primary, factory set temperature (r3) will be 35°C; therefore this option is aimed towards under floor installations.

When a DHW signal is received the set point is changed to a temperature of 50°C. This second set point has weather compensation disabled. This is useful for DHW when the set point should not be affected by ambient conditions.

Note: - The Factory set 35°C set point should not be altered

WIRING DIAGRAM – Fixed Setpoint



Wiring diagram shown for heating units only. (For cooling units please contact technical services)

The 4 pole relay is activated by a 230V (Mains voltage) signal (Installer Wiring) via terminal 'D' The 1st pole controls the weather compensation disable function. The 2nd pole enables the fixed second set point. The 3rd pole is spare (utilised on a BCool2 unit). The 4th pole is spare. (Utilised on BCool2 Unit)

PARALLEL HEATKING INSTALLATION & WIRING DIAGRAM

In order to ensure the second heat pump does not start simultaneously with the first heat pump, 2 parameters require changing on the µC²controller.

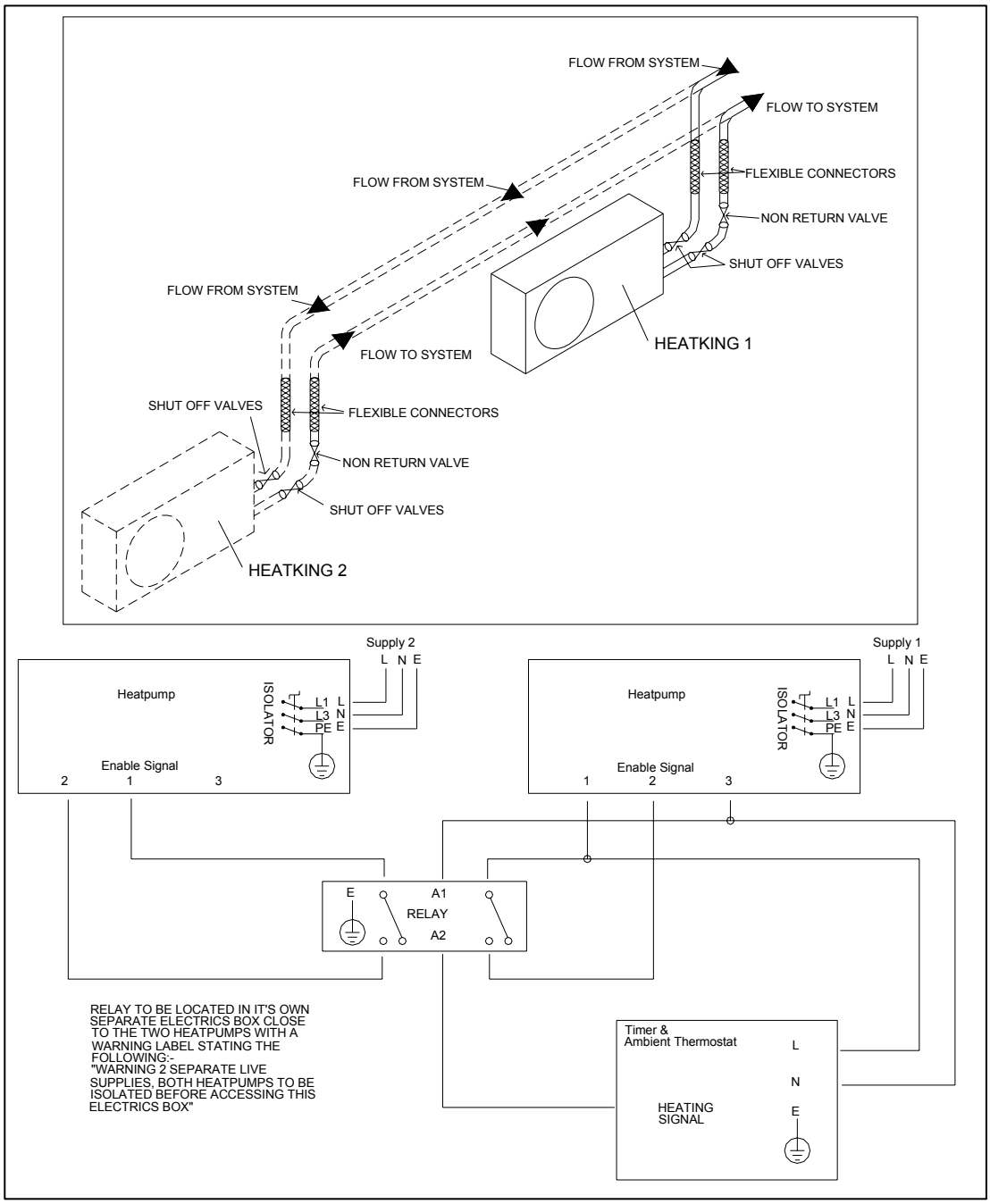
To gain access the controller should be powered.

Press and hold "Prg" and "Sel" — Screen will go to "00"
Press " ⬆ arrow to "66"….. Press "Sel"….. — Screen will go to "S - p"
Press "Sel"….. — Screen will go to "- / -"
Press " ⬆ arrow until "- c -" Press "Sel"….. — Screen will go to “c01”
Press " ⬆ arrow to ”c06” Press "Sel"….. Screen will go to “00”
Press " ⬆ arrow to "05” Press "Sel" Screen will go to “c06”

The second heat pump now has a 5 second delay on compressor start up.

Press "Prg" — Screen will go to "- c -"
Press " ⬆ arrow until "- r -" Press "Sel" — Screen will go to “r01”
Press " ⬆ arrow to "r04" Press "Sel" Screen will go to “3.0”
Press " ⬆ arrow to "4.0” Press "Sel" Screen will go to “r04”

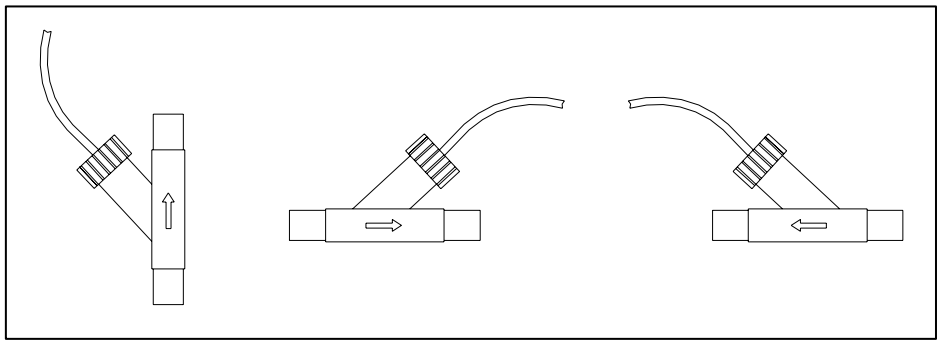
The second heat pump now has a heating differential of 4°C,
I.E, If your heating set point is set to 45°C the unit will heat until the return water reaches 45°C, The compressor will then stop running as the water cools, the unit will then cut back in at 41°C instead of 42°C.
Press "Prg" 3 times to exit. The procedure is now complete.



Flow Switch

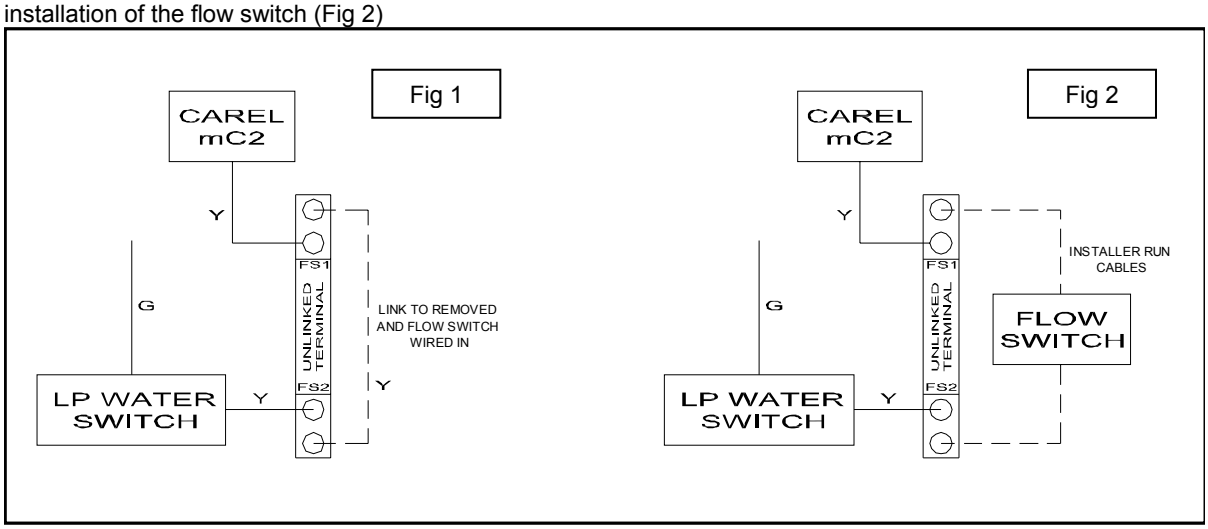
The flow switch is an option, but mandatory on micro generation units. The flow switch is wired in series with the Low Pressure water switch as a Volt Free signal. If either or both of these safety functions are not satisfied then the unit will alarm (FL) and will be prevented from operating. The Flow switch is available as a kit (70400459) or can be provided by the installer.

The flow switch contacts are made as long as the flow is above 3.75l/m (kit supplied switch). The flow switch can be installed in either the vertical (Upflow only) or horizontal positions (See Below).



<u>It should be noted that suggested operating flow rates should be followed.</u>

The wiring diagrams below show the unit as it will be wired from the factory (Fig 1) and how it should be wired after the installation of the flow switch (Fig 2)



INSTALLATION

Heatking heat pumps must be installed by accredited installers only. A list of accredited installers is available from TEV Ltd. on request.

WARNING!

The Heatking Heat Pump contains moving parts, hot pipes, electrical components and refrigerant under pressure. Under no circumstances should the outer panels be removed other than by qualified personnel. Care must be taken to prevent access to any of the components by unsuspecting or un-authorised persons.

All work carried out on the Heatking heat pump should be done by qualified heating, electrical or refrigeration engineers, as required, conforming to appropriate national or local regulations.

Adequate protection should be placed around the unit if there is a risk of wilful tampering or vandalism.

The information provided in this manual is to help ensure a good installation and should not be used to supersede any national or local regulations.

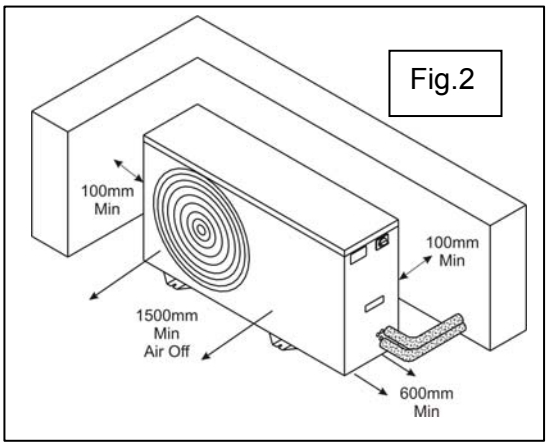
CAUTION: Heat pumps weigh 88-178kg and are an uneven load with the compressor at one end. Care must be taken when moving or lifting the heat pump into position.

Always keep the heat Pump in the upright position during transportation and installation

POSITIONING THE HEAT PUMP

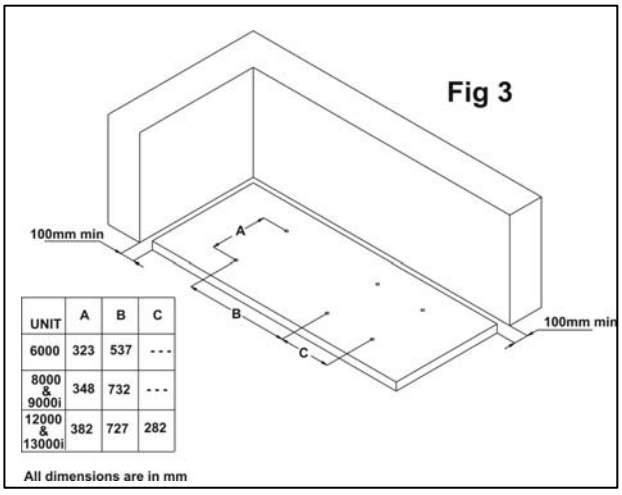
The heat pump can be floor mounted or wall mounted using the optional wall mount bracket kit.
Select a suitable location for the unit, paying particular attention to the following points;

1. Allow for the minimum necessary clearance around the unit. (see Fig.2)
2. Do not position the unit where it may obstruct a path or access way.
3. When floor mounting, ensure that the unit is fixed to a solid flat surface.
4. Avoid siting where water dripping from the unit could freeze and cause a hazard in cold weather.
5. Consideration should be given to the unit sound levels and be positioned to have minimum impact.
6. Cold air is discharged from the front of the unit; it should not be positioned to cause a nuisance.
7. When wall mounting ensure that the wall construction is suitable to support the weight of the unit.
8. Use the wall mounting kit available from TEV as this has been designed to accept the weight of the unit and is supplied with anti-vibration mounts fitted to prevent sound transmission.
9. Do not position over a doorway, as water will drip from the unit under certain conditions.
10. When wall mounting it is advisable to fit the condensate tray available from TEV, and to drain the condensate away to prevent dripping from the unit.



FLOOR MOUNTING

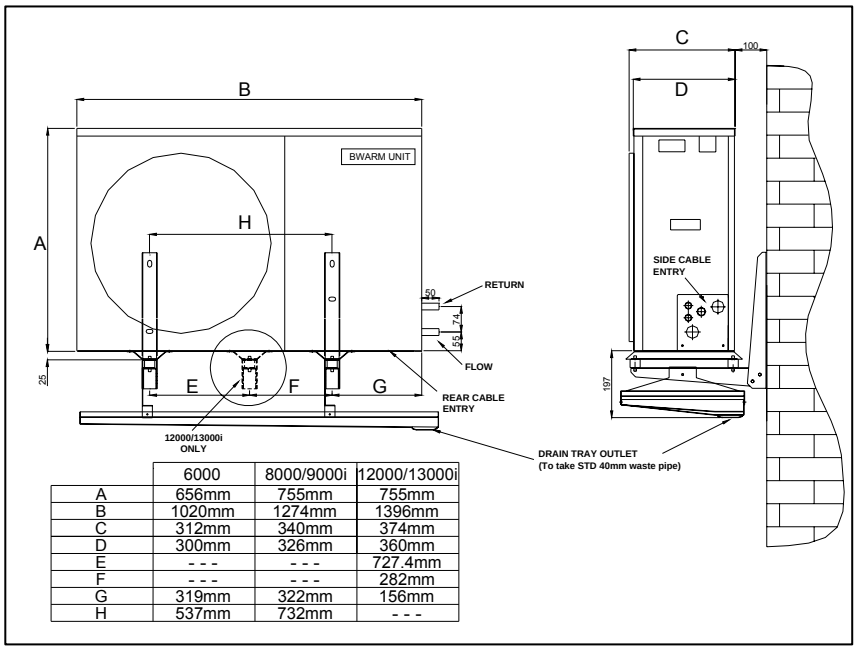
1. A concrete plinth should be sited away from the building (fig3)
2. The base should be mounted on a soakaway style drain which extends beyond all sides of the base by a minimum of 100mm.
3. The soakaway should be made so sufficient water will be drained without re-surfacing. (water logging)



UNIT	A	B	C
6000	323	537	---
8000 & 9000i	348	732	---
12000 & 13000i	382	727	282

All dimensions are in mm

DIMENSIONS AND POSITIONING



	6000	8000/9000i	12000/13000i
A	656mm	755mm	755mm
B	1020mm	1274mm	1396mm
C	312mm	340mm	374mm
D	300mm	326mm	360mm
E	- - -	- - -	727.4mm
F	- - -	- - -	282mm
G	319mm	322mm	156mm
H	537mm	732mm	- - -

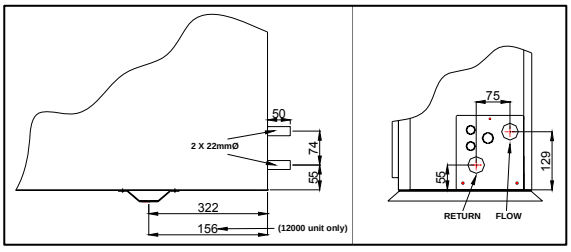
INSULATION

All pipe work should be insulated to meet current Building Regulations.

- Pipes should be insulated unless they contribute to the useful heat requirement of a heated room or space.
- **All** outdoor pipe work and pipe work under the ground floor **must** be adequately insulated, including bends.
- A good quality closed cell insulation should be used with a protective coating on external insulation to prevent degradation.

PIPE CONNECTIONS

Pipes are terminated in 22mm copper tails at the bottom right hand end of the unit. Speedfit or other similar push-on connectors are recommended for ease of installation. Shut off valves and drain cocks should be sited near the unit to isolate the system in the unlikely event that the unit needs to be disconnected or the system needs to be drained down for any reason. Fixed connection between the heat pump and pipe work should be made using flexible connectors.



CIRCULATING PUMP

Each unit is fitted with an integral pump. The system is designed to operate at a flow rate of (see table below).

Unit Size	Recommended	Minimum
6000	15 l/m	10 l/m
8000	20 l/m	15 l/m
9000i	25 l/m	25 l/m **
12000	30 l/m	20 l/m
13000i	35 l/m	35 l/m **

** i units must be no lower than recommended when set at maximum set point

ADDITIVES

To protect the heat pump and external pipe work from fouling and freezing it is necessary to add a suitable inhibitor and anti-freeze mix to the system, such as **Fernox Alphi-11** or equivalent Central Heating Protector and Anti-freeze. The quantity of additive necessary should be such that adequate protection is provided to a temperature 2°C below the expected minimum temperature for the particular location.

Fernox Alphi-11. Minimum recommended "in-use" concentration is 25%.

Concentration	25%	30%	35%	40%
Protection	-11°C	-15°C	-18°C	-22°C

ELECTRIC CONNECTION

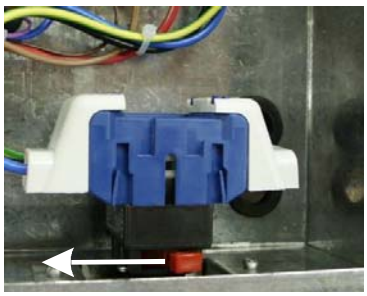
The heat pump requires a 230V / 50Hz 1phase or 440V / 50Hz 3phase supply depending upon the type of unit fitted. In domestic applications the general requirement will be for 1phase units with 3phase units being used in some commercial applications.

The mains supply to the unit should have adequate protection (see page 5) at the distribution board

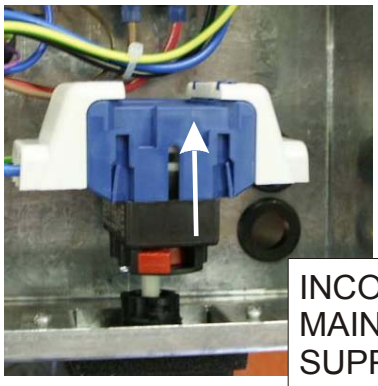
The heat pump requires mains connections and a 230V signal from a thermostat. (see Fig.4&5 page 15)

Any cable fitted between the heat pump and the building must conform to the relevant Local and National Regulations. If the unit is wall mounted on the rubber vibration isolators provided then it must be correctly grounded to Earth.

All BWarm units come fitted with an isolator switch as standard. See pictures below for connections.

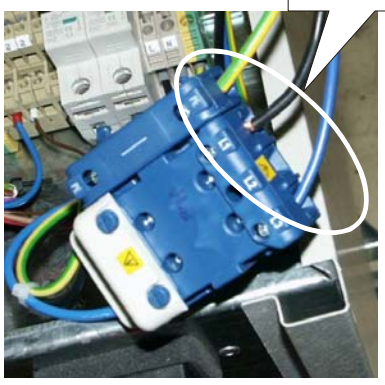


MOVE RED LEVER



PULL ISOLATOR BODY

INCOMING MAINS SUPPLY



1 Phase Supply
PE = Earth
L1 = Live
L3 = Neutral
3 Phase Supply
PE = Earth
L1 = Phase 1
L2 = Phase 2
L3 = Phase 3
N = Neutral

COMMISSIONING

1. Leak test all pipe work before adding the anti-freeze/inhibitor.
2. Add the anti-freeze/inhibitor and pressurise the system to 2bar.
   - (On initial power up the water pressure must be above 2 bar. Once the heat pump is operating the pressure can fall to 0.3bar before the alarm will switch off the unit).
3. Turn off half of the radiators in the building or all but one zone of the underfloor system.
4. Check that all wire connections are tight.
5. Switch on power at the distribution board and check that there is mains power to the unit.
6. Switch on the 2 MCB's in the unit control panel.
7. Turn the room thermostat up to 30°C.
   - The water pump should start followed by the compressor and fan.
8. The return water temperature is displayed on the controller. Wait for the temperature to read 43°C (radiators) or 33°C (underfloor) and then open each radiator or zone one at a time, waiting for the return water temperature to rise each time. Once the whole system is open allow the water temperature to rise to the normal operating temperature.
   - It may help to put supplementary heating into the building whilst commissioning on a cold day to speed up the process.
   - The unit may go into defrost during the commissioning period due to the low temperatures. This is normal and there will be a small drop in the water temperature at this time.
9. Radiators should be balanced throughout with a temperature difference of 5-6°C to prevent preferential feeding and cold spots.
10. Once the system is running correctly, turn any thermostatic radiator valves to the required setting and set the room thermostat to 21/22°C.
11. Check the time clock is set to suit the occupant.
12. Ensure all panels are securely fitted to the unit with the tamper proof screws.
13. Ensure coil is clean and clear of debris.

NOTE: On 3Ph units it is possible for the scroll compressor to run backwards. This becomes obvious on start up; there will be no significant rise in water temperature from the unit. (Normal rise approximately 1°C per minute) The top of the compressor will not become warm and it may be excessively noisy. If this happens, switch off the mains power and exchange two of the supply phases this will correct the rotation.

ALARMS & FAULT FINDING

There are 2 levels of alarm that may be displayed on the controller;

1. Signal only – indicating a non-critical condition.
2. Critical alarm that will switch off the unit.

When an alarm is active the display will sequence between the return water temperature and the relevant alarm code.

Each alarm has a fault code relating to the water controls or the refrigeration parts of the system. The system should only be worked on by a suitably qualified engineer.

Alarm	Fault
HP1	**Refrigerant high pressure.** Check there is adequate water flow (min 15l/s)
LP1	**Refrigerant low pressure.** Check if the outside heat exchanger is blocked. Check the fan operates
FL	**Low water pressure.** Raise the pressure above 2bar or fit link provided if mains pressure is too low.
E1	**Water return temperature probe failure** Replace probe.
E2	**Water flow temperature probe failure** Replace probe.
E3	**Defrost sensor probe failure** Replace probe.
E4	**Ambient/Weather Compensation probe failure** Check plug into back of controller Replace probe.
EHS	**High supply voltage**
ELS	**Low supply voltage**

	Indication only
d1	Defrost in progress
DF1	Defrost terminated on time not temperature
EU	Low supply voltage

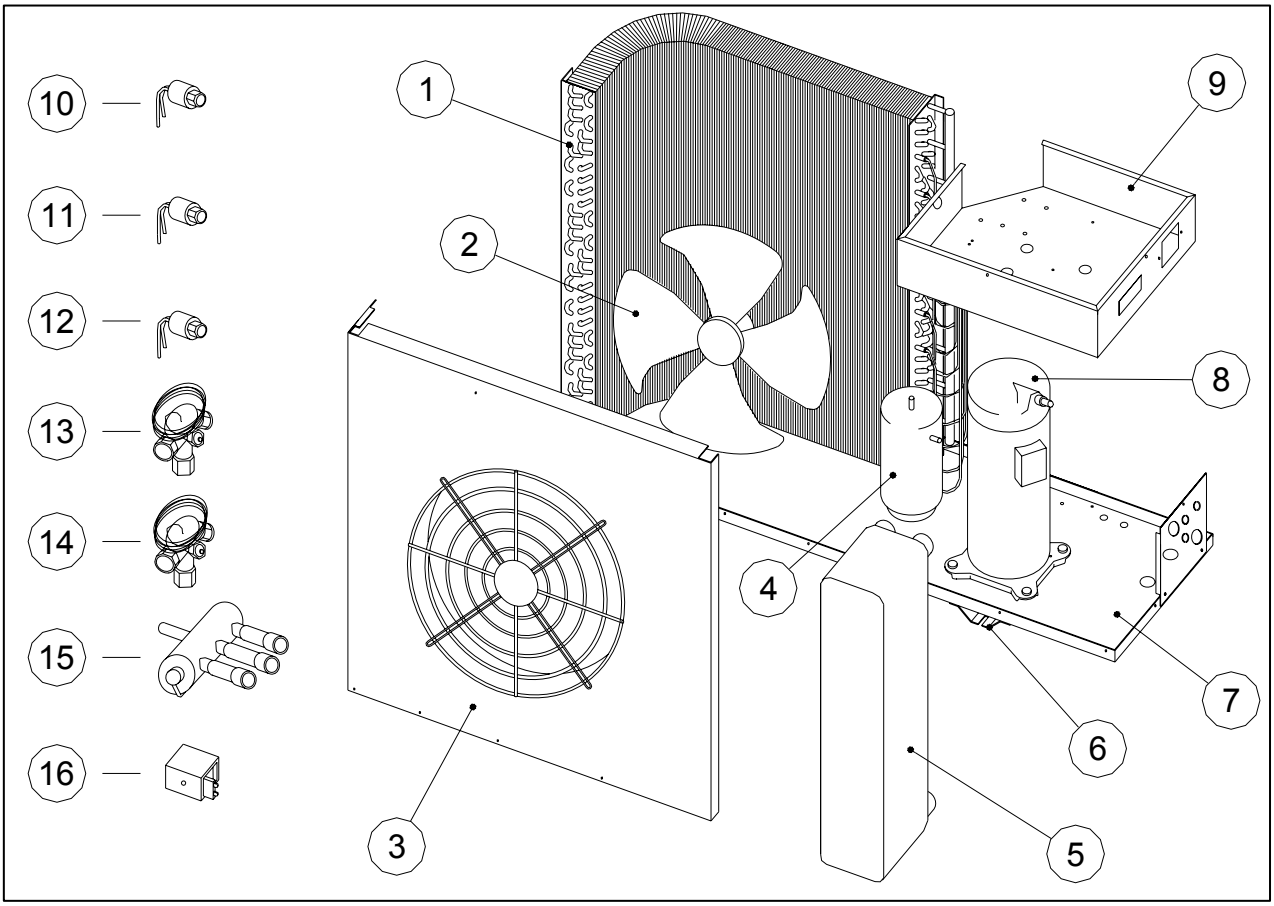
Note: All alarms will reset automatically once the fault has been cleared.

Soft start device - The LED indicates as shown in the table below:

Unit in standby	Double blink every 5 seconds
3 minute start delay period	1 flash per second
Fault mode	Slow flash; 5 secs 0n, 5 secs off.
Low voltage indication	Rapid flash; 10 per second

Fault	Possible cause	Solution
No power at the unit	MCB at distribution box not on. *Unit Isolator not on.*	Check and turn on. *Check and turn on.*
No power at terminal 1.	2A MCB not on. *Wires not secure.*	Turn on MCB. *Check and tighten.*
No power at terminal 2.	Room thermostat set too low. *Time clock in "off" mode.* No supply to thermostat from terminal 1.	Adjust thermostat. *Reset time clock.* Check wiring connections from unit to time clock.
Power at terminal 2 but controller is not lit.	*No 230V supply onto transformer primary.* No 24V supply from transformer secondary. *Poor connection from transformer to controller.*	*Check for loose connections.* Switch off power and measure resistance of transformer. 15.5Ω Primary 0.4Ω Secondary *Check pins are secure in 12 & 14 way connectors in the controller.*
Compressor does not run at start up but fan and pump run, compressor symbol is lit on controller.	No supply to terminal L1 on soft starter. *No signal to terminal ON at soft starter.* Loose wire at Compressor Faulty compressor.	Check connections. *Check connections* Switch off power and check resistance of compressor windings. BWarm 6000 8000 9000i 12000 13000i C – R 1.2 Ω 0.9 Ω 0.7 Ω 0.6 Ω 0.4 Ω C – S 3.3 Ω 2.0 Ω 1.6 Ω 1.9 Ω 1.2 Ω R – S 4.5 Ω 2.9 Ω 2.3 Ω 2.5 Ω 1.6 Ω
Fault	**Possible cause**	**Solution**
Compressor and fan start but unit trips on alarm	Water pump has not started. *Air in unit water pipe work.*	Check feed to terminal 4. Remove pump terminal box cover and check connections. *Bleed water pipe at outlet of plate heat exchanger.* *Spin the pump round to access bleed screw at back, slacken and bleed pump.* *Remove screw fully and check impellor is rotating. If yes problem is air lock. If no problem is seized pump.*
Unit does not start and **FL** alarm is displayed	Insufficient pressure in the water system.	Check pressure and increase to 2 bar. Check for leaks in the water system. Bleed as necessary.
LP1 alarm is displayed.	Loss of refrigerant. *Fan failure.*	Check unit standing pressures (5.5 – 7.0bar). *Check for 230V at fan speed controller.* *Check for signal from controller to fan speed controller (white and grey wires).*
E1, **E2**, **E3** or **E4** alarm displayed.	Faulty probe.	Check probe connections in 14 way connector on the controller. Check connections of return water probe. Remove 14 way connector and check resistance across each probe. If any probe is open circuit, replace.
During defrost **LP1** alarms and defrost TEV frosts significantly	Faulty refrigerant flow. Faulty expansion valve	Check reversing valve, check valve and expansion valve operation. Replace unit and return for repair.
Fault	**Possible cause**	**Solution**
d1 is displayed but unit does not go into defrost	Reversing valve stuck. *Faulty solenoid.*	Tap the reversing valve gently to free the slide. *Check the solenoid is switching.* Replace and return unit for repair.
DF1 is displayed at the end of defrost	**Defrost has terminated on time not on temperature.**	**Inadequate defrost.** **Check refrigerant charge.** **Check for ice build up in the base of the unit.**
LP1, **HP1** or **FL** are displayed despite water and refrigerant pressures being correct.	Loose or broken wire	Check connections for LP, HP and water pressure switches. Check pin connections on 12 & 14 way connectors at the controller. Are they making good contact?
Alarm **FL** is displayed despite pressure being correct.	Wiring fault Flow Switch not satisfied (if fitted)	Check that the correct grey (ground) wire is connected to the water pressure switch on the supply water pipe. Check Pump is Running.
Unit is working correctly but continually trips on **HP1**	Water circulation problem.	Check that the wet system has at least one radiator without a TRV or that an adequate by-pass is fitted in the circuit to maintain the minimum flow rate.
Unit icing up.	Low refrigerant Unit undersized.	Check pressures, check for leaks and add refrigerant as required. Collect information on the building and the wet system to allow a heat load to be calculated and radiator sizes to be checked. Replace and return unit for investigation.

EXPLODED VIEW



Item	Description	Item	Description
1	Evaporator/outdoor coil	9	Electrics and controls panel
2	Fan/motor assembly	10	Refrigerant low pressure switch
3	Front panel/fan guard assembly	11	Refrigerant high pressure switch
4	Liquid receiver	12	Water low pressure switch
5	Condenser/Plate heat exchanger	13	Heating thermal expansion valve
6	Foot	14	Defrost thermal expansion valve
7	Base plate	15	4 way reversing valve
8	Compressor	16	Reversing valve solenoid

WIRING DIAGRAMS

Interconnecting 1 PH Wiring Diagram

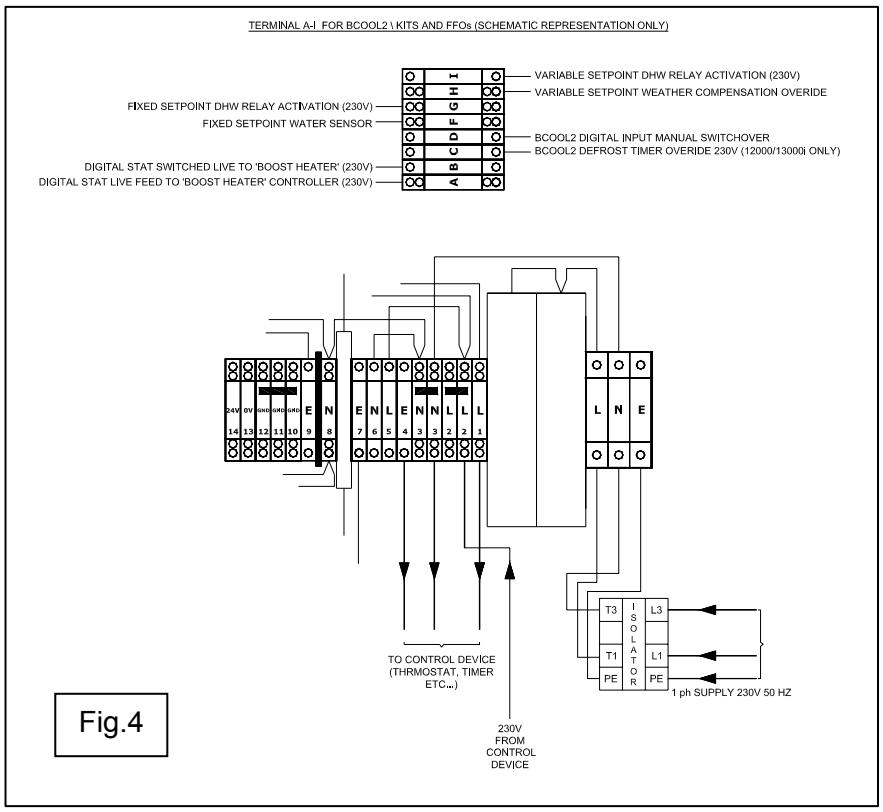
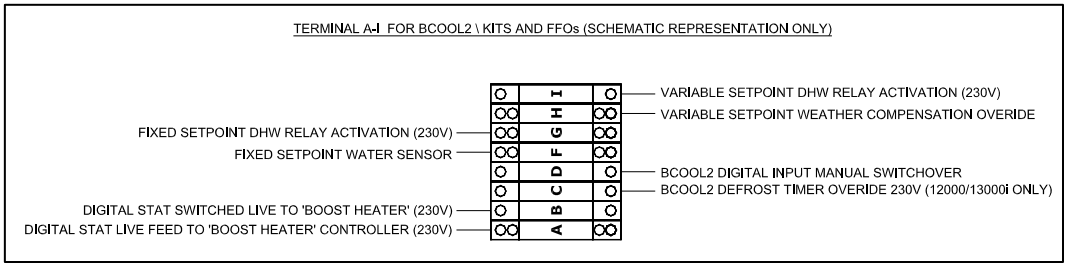
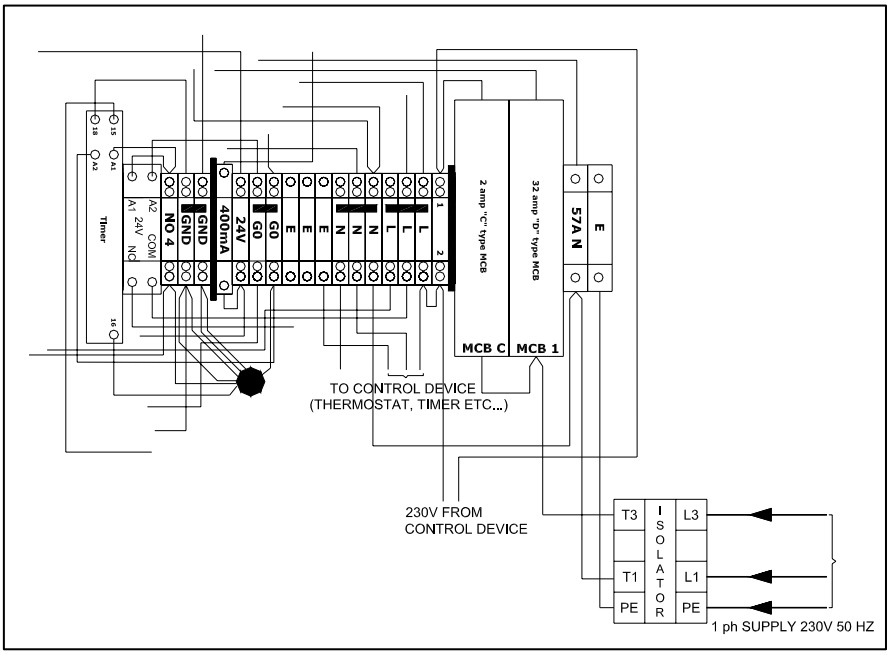


Fig.4

9000i only





Interconnecting 3 PH Wiring Diagram

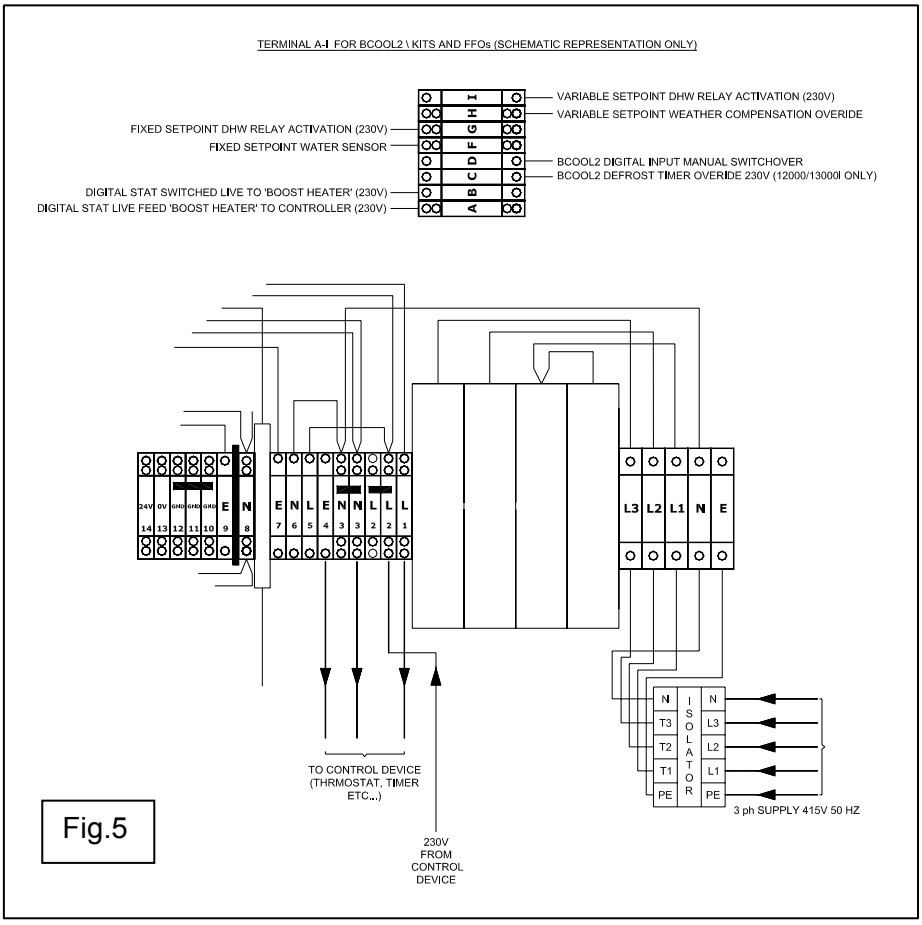
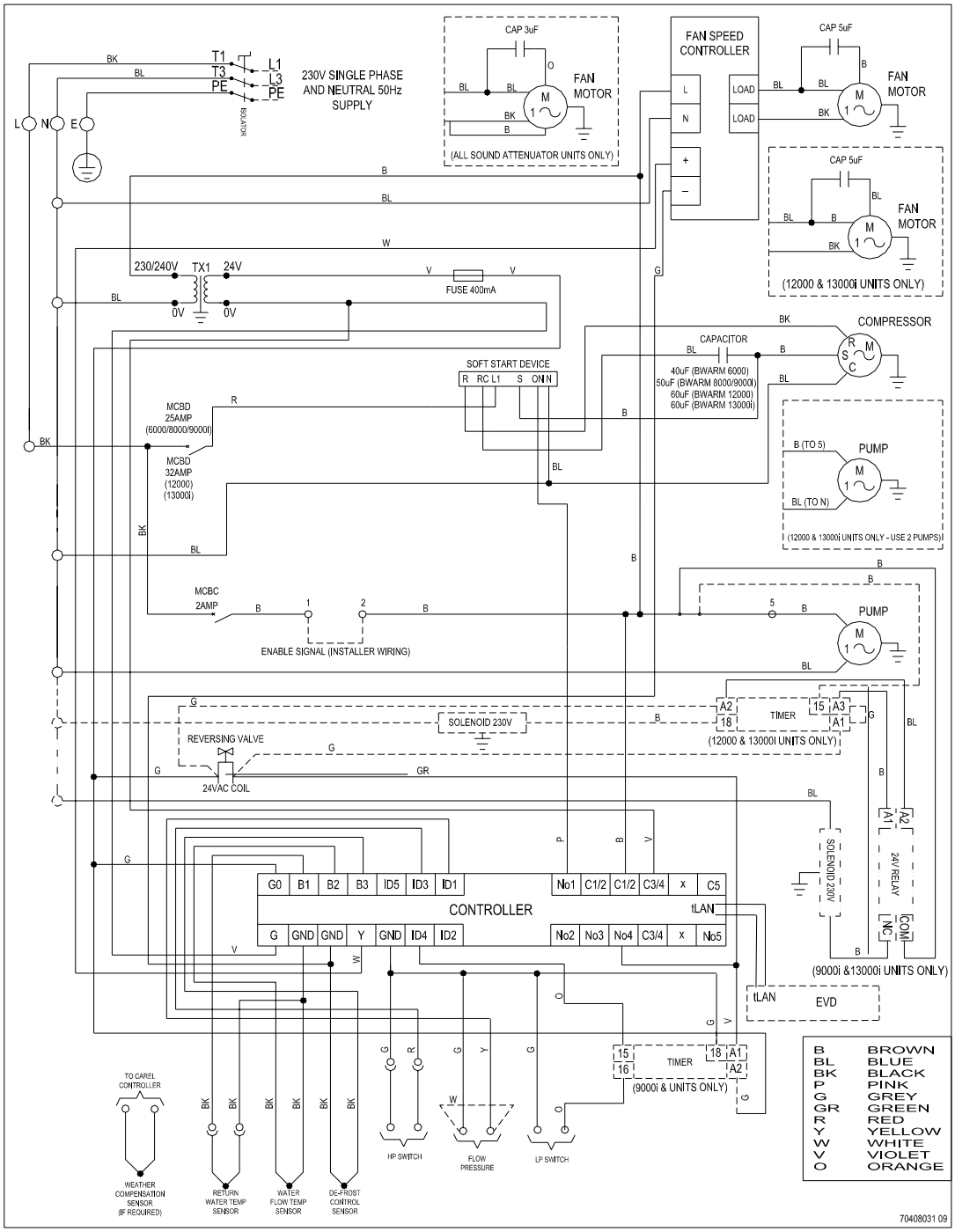
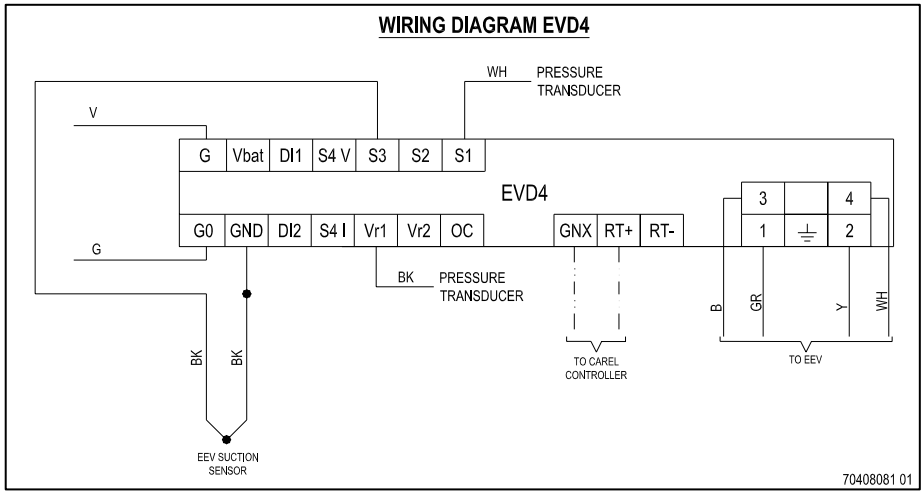


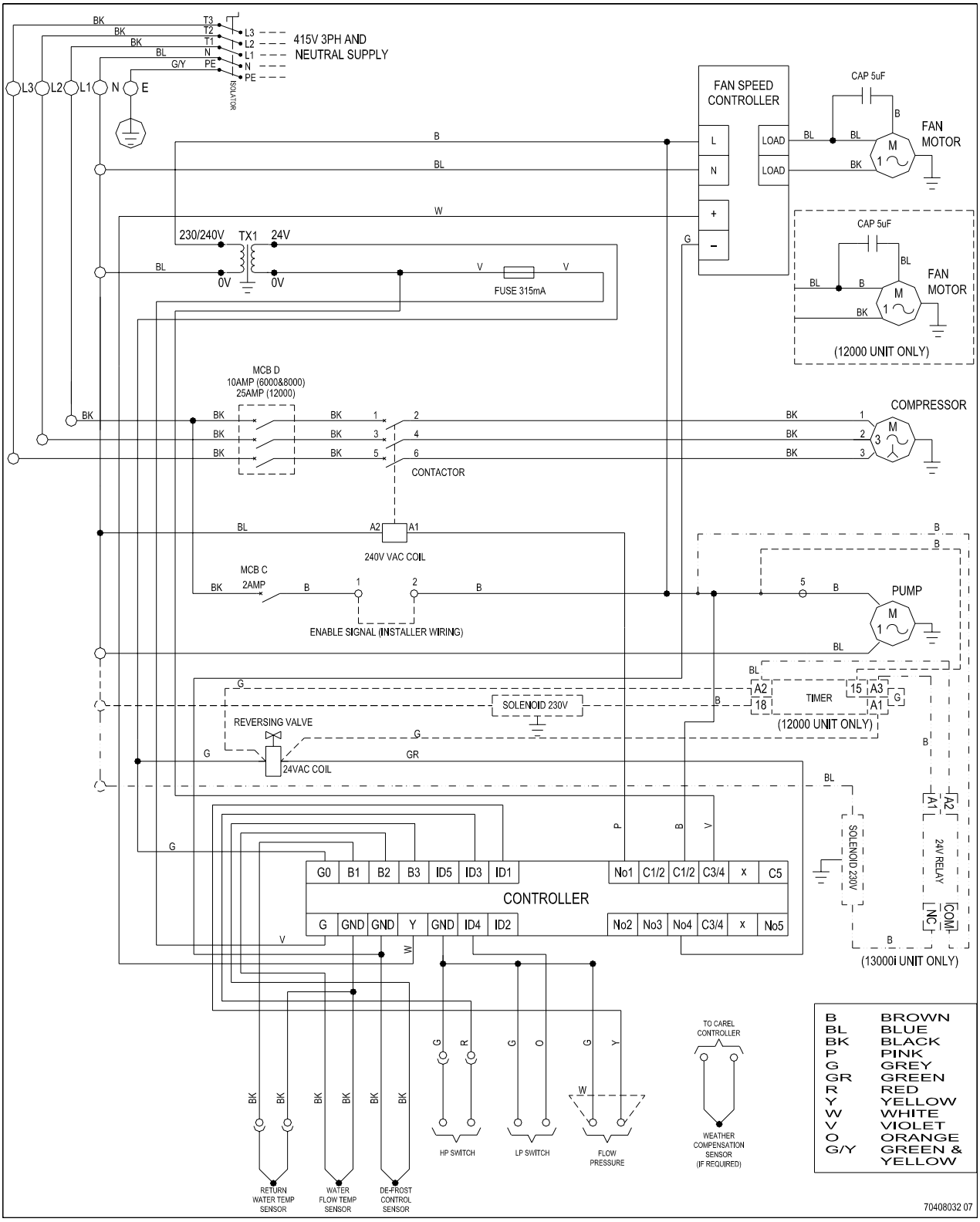
Fig.5

BWarm Space Heating 1 Phase soft start

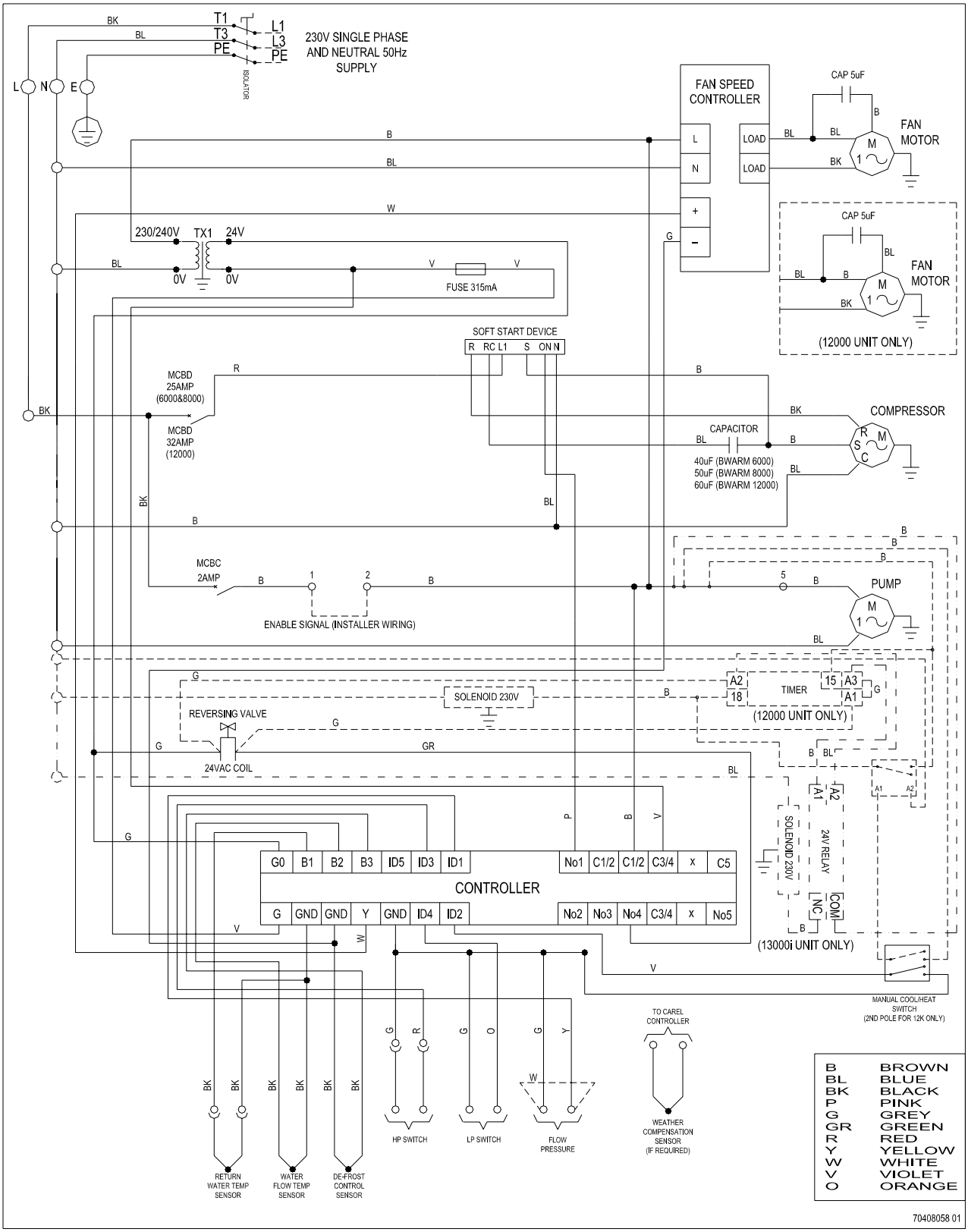




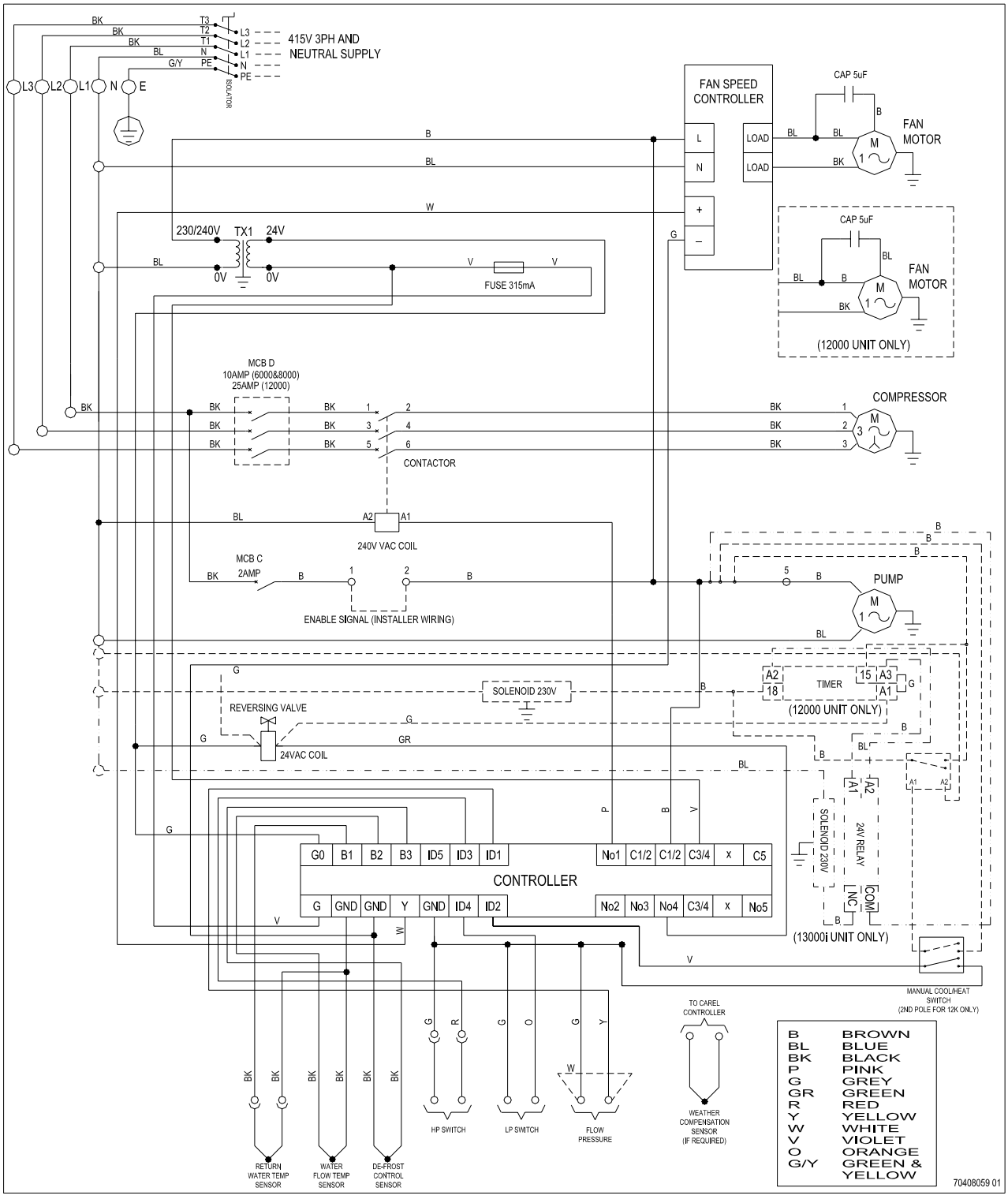
BWarm Space Heating 3 Phase



Bcool2 6000, 8000, 9000i, 12000 & 13000i 1 Phase



Bcool2 6000, 8000, 9000i, 12000 & 13000i 3 Phase



USER GUIDE

General

Heatking **BWarm** heat pumps are designed to provide space heating to buildings insulated to the latest specifications. They do not operate at high enough water temperatures to provide full domestic hot water heating. The heat pump uses a refrigerant to remove heat from the outside air at temperatures as low as –20°C and produces up to 4 times as much heat energy as the electrical energy put in to drive it. This results in an efficient low cost heating system.

Running the unit

When setting time clocks and controls allow extra time for the heat pump to raise the water temperature when first switching on, as it does take longer than a traditional boiler to reach the full operating temperature. Heat pumps are most efficient when allowed to run for long periods. The unit will automatically switch on and off as required to control the water temperature.

Radiator temperatures

Heat pumps are designed to operate with water temperatures of about 50°C. The radiators will feel cooler than those associated with a gas or oil boiler traditionally supplying water at 80°C. Radiators on a heat pump system will be larger than a traditional system to compensate for the lower temperature.

Sound

The heat pump is fitted with a fan to draw air across the heat exchanger. When the unit is operating there will be some sound from the fan but this is not dissimilar to the sound produced by the flue of a gas condensing boiler.

Frosting

When the heat pump is drawing cold air across the heat exchanger some of the moisture is removed from the air and this can freeze onto the heat exchanger. This is a normal part of the heat pump operation. The heat pump controls sense the build up of frost and periodically switch the heat pump into defrost mode. When in defrost the fan will stop and water vapour may be seen rising from the heat exchanger, this is normal and is not a cause for concern.
Some ice may be seen forming on the case of the heat pump, particularly at the bottom. This is not a problem and will not affect the performance of the unit.

Safety

DO NOT STAND ON THE HEAT PUMP FOR ANY REASON

1. **Fan:** the fan is protected by a metal guard to prevent accidental contact. Do not allow children to poke sticks or other objects into the fan as this could damage the fan and cause accidental harm to the child.
2. **Case:** the heat pump has a number of sharp corners and care should be taken when walking past the unit.
3. **Heat exchanger:** the heat exchanger at the side and back of the heat pump is covered with thin aluminium fins. These fins can cause cuts and grazes and where children may be playing near the heat pump it is advisable to have coil guards fitted to prevent accidental contact.

Outer panels should never be removed from the unit unless by a qualified Service Engineer about to work on the unit.

Service & Maintenance

In order to continue to get optimum performance from the heat pump a service should be carried out annually by a qualified technician. Regular inspection of the unit is recommended to ensure that the air path onto and off the unit is clear and that the finned heat exchanger at the back of the unit is not blocked by leaves or debris. Switch the heat pump on prior to the start of the heating season to ensure that it starts correctly. If the unit does not start;

1. Check the time clock is on and the thermostat is turned up high to call for heating.
2. Check the main MCB (in the distribution board) and the isolator are switched on.
3. If the unit still does not operate check the water pressure at the gauge in the house (normally attached to the expansion tank). If the unit has been turned off at the mains during the summer it will be necessary to raise the water pressure above 2bar before the unit will start.
4. Finally, call the installer if the unit does not operate.

KEEP THE AREA AROUND THE HEAT PUMP CLEAR. Do not stack objects next to or on top of the unit that may obstruct the air passage through the unit.

Disposal

The BWarm heat pumps contain a number of components that, by law, must be disposed of under controlled conditions. Under no circumstances should this appliance be disposed of at a Local Authority refuse site without first identifying the special components to the site Management/Operatives.

Special components:

1. **R407C refrigerant:** this must be correctly recovered and disposed of before disposing of the heat pump.
2. **Polyolester oil:** This will be contained in all of the internal refrigerant components and should not be burnt.
3. **Electronic components:** To be disposed of in accordance with WEEE directives.
4. **PVC sheathed cable:** not to be burnt except under controlled conditions.

DO NOT ATTEMPT TO CRUSH OR BURN THIS APPLIANCE

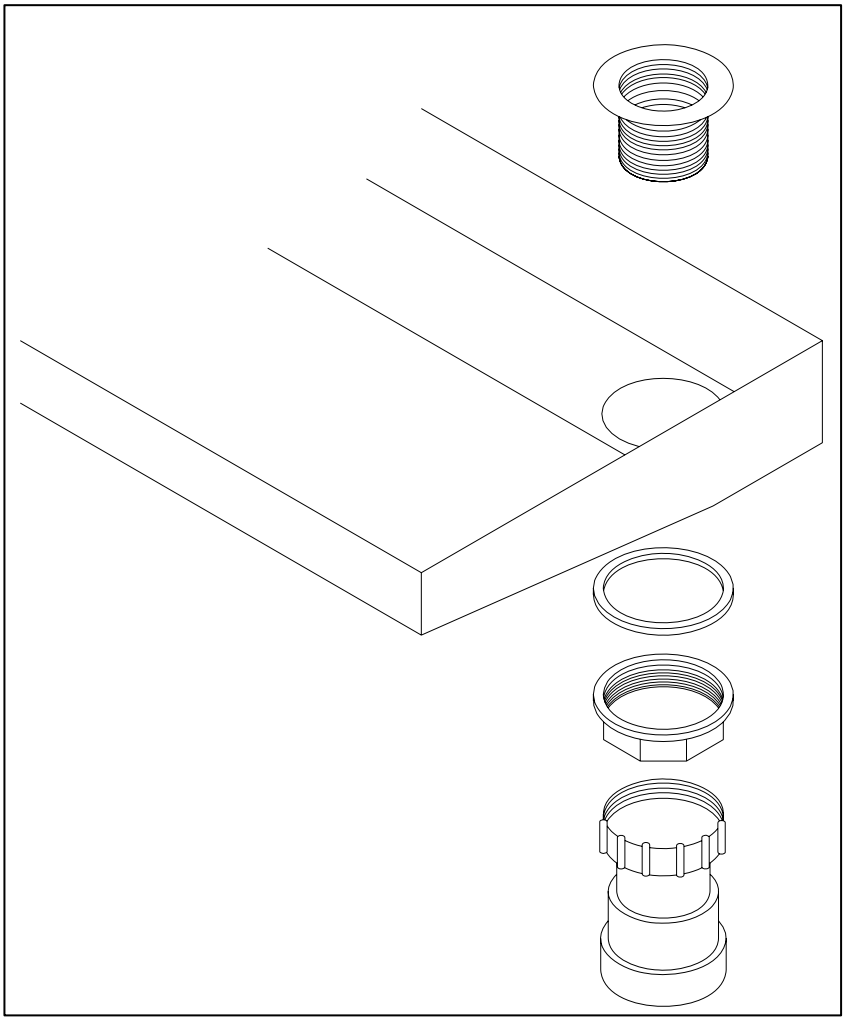
If in doubt contact the installer, Local Authority or the Manufacturer before attempting to dispose of the heat pump.

BWARM CONDENSATE DRAIN KIT – 70400425 (BWarm6000 units)
BWARM CONDENSATE DRAIN KIT – 70400419 (BWarm8000/9000i units)
BWARM CONDENSATE DRAIN KIT – 70400421 (BWarm12000/13000i units)

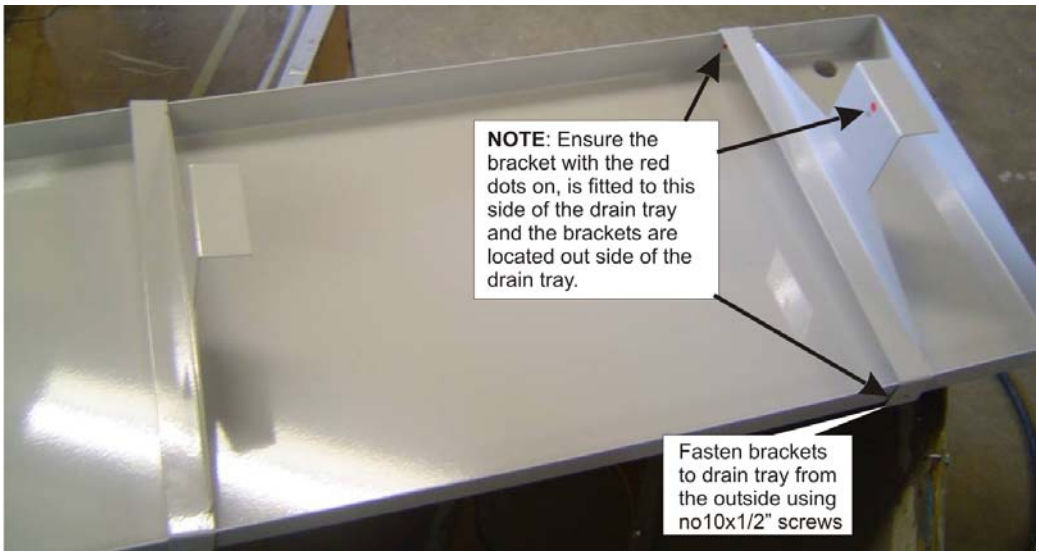
CONTENTS

DESCRIPTION	QUANTITY
DRAIN TRAY	1
BRACKET DRAINTRAY CONPRESSOR END (red dotted)	1
BRACKET DRAINTRAY COIL END	1
TAMPER PROOF SCREW no10 x 1/2”	4
SCREW M5 X ½”	2
CHROME WASTE DRAIN ADAPTER	1
40mm WASTE CONNECTOR	1

1. Fit the chrome waste adapter and the 40mm waste connector to the drain tray as shown in the diagram below.



2. Position the drain tray with the drain outlet to your right hand side then fasten draintray bracket with red dots to the right hand side nearest the drain outlet and the other bracket to the left hand side. When fastening the brackets make sure the brackets are to the outside of the drain tray and secure using screw no10x1/2 (see picture below) use the key provided with the unit.



3. Fasten the assembled draintray to the BWarm unit making sure the drain outlet is fitted to the right hand side. Secure to the BWarm hanger brackets using M5 x ½" screws. (see picture below)

Supplementary Boost Heater
Installation Instructions

- 10L Capacity
- 2.0kW element for rapid heat up
- Neon element-on indicator
- Glass lined vessel with magnesium anode
- Wall mounting or floor standing
- Manually re-settable thermal cut-out

Qty	Description	Qty	Description
1	Boost Heater	2	22mm Push fit connectors
2	Fibre Washers	1	Wall brackets
1	Bypass Header		

When fitting the water heater to an existing installation, drain down the system and Isolate the mains electric to the Bwarm unit prior to starting the work.

AT NO POINT SHOULD THE BYPASS HEADER BE USED FOR CARRYING THE HEATER

Mounting

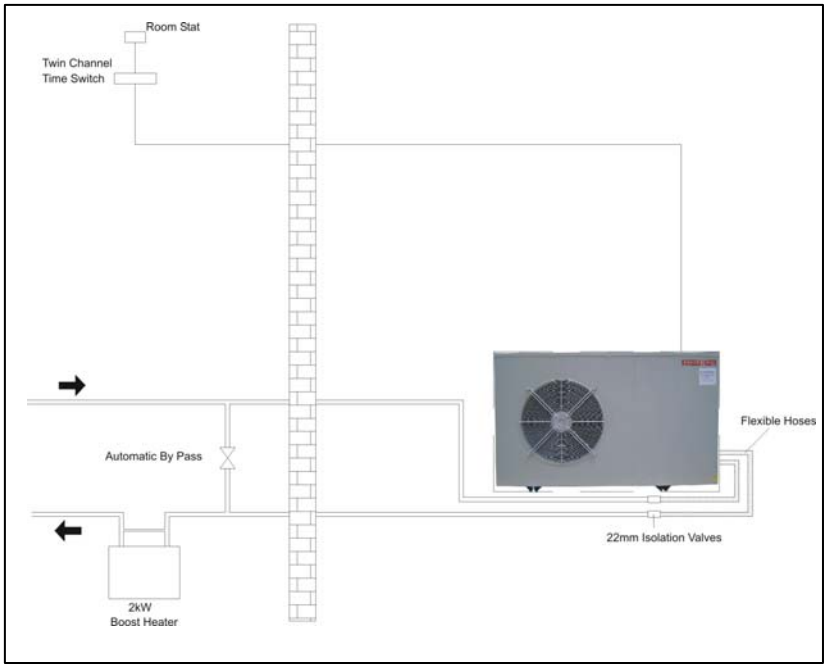
The boiler must be mounted in the correct orientation, I.E. vertically with the flow and return connections at the top. It can be free standing on the floor or fixed to a wall using the bracket supplied. Either way, it ***must*** remain upright, with the pipe connections at the top

Pipework

1. The boost heater unit is to be fitted on the flow pipe from the Bwarm unit.
2. Ensure the water flow through the heater is in the correct direction. The connections on the boost heater are colour coded (blue = cold "from the Bwarm unit", red = hot "to the Heating circuit"). See the diagram below.
3. The boost heater must be connected using the bypass header, which is supplied loose with the boost heater.
4. **The fibre washers must be fitted to the header before connecting to the boost heater.** (see photo)
5. Wherever possible the pipe work running to and from the boost heater must be least Ø22mm to reduce the increase in resistance incurred by fitting the boiler.

Note

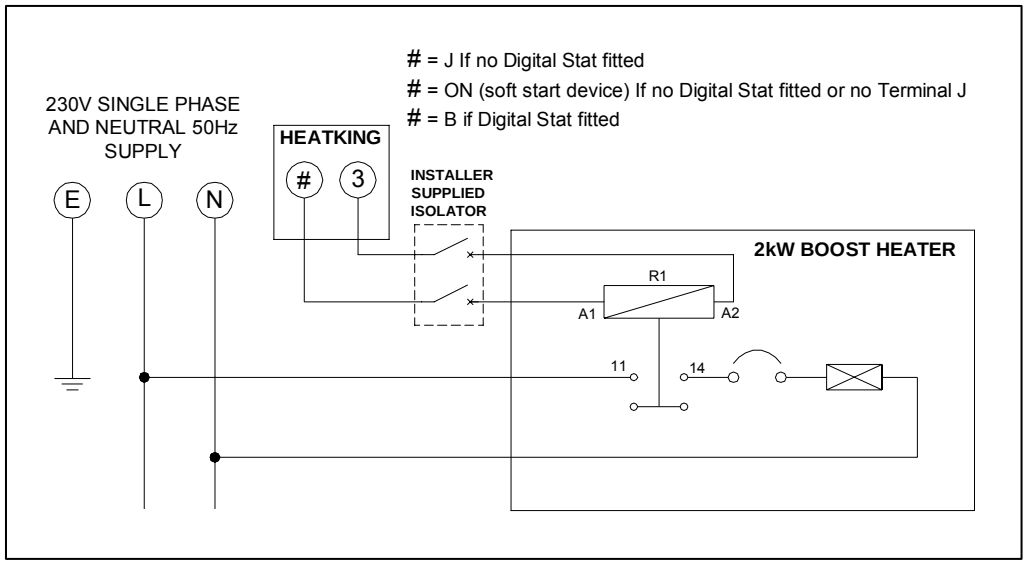
A 3bar pressure relief valve must be fitted in the heating system.



Electric connections

1. Installation should comply with current IEE and local regulations.
2. Remove HeatKing top cover by removing the screws to gain access to the electrics.
3. Connect a wire from terminal J (B if digital stat kit is fitted) (240v) on the Bwarm unit to the isolator (installer supplied). On older units terminal J has not been supplied, so the wire that would be connected to terminal J should be connected to terminal "ON" on the soft start device.
4. Connect a wire from terminal 3 (Neutral) on the Bwarm unit to the isolator (installer supplied). **(A 2 core double insulated cable should be used for the above connections)**
5. Connect the 2 core cable supplied with the boost heater to the isolator (Brown live) and (Blue Neutral).
6. Mains connection should be to a 13A spur (3 core 1mm cable).
   If either of the cable lengths are insufficient, it is recommended that the entire cable is replaced and that no joints are made to the original.
7. Ensure the boiler unit is earthed.

Important: Do not switch on the heater unless you are certain that it is completely full of water. Failure to do so will void the warranty.



Operation

The two reasons why the boost heater may be specified are as follows:-

1. To add thermal mass to the system to aid the Bwarm unit with defrosting. If there is only a small quantity of water in the system, the Bwarm unit may take longer to defrost just after a cold start. The addition of the boost heater will alleviate this issue.

2. To act as a boost heater to the Bwarm unit, giving an extra 2kW duty to the system when the Bwarm unit is operating below it's design condition. ***The boost heater also gives higher flow temperatures to assist the heat transfer effectiveness of the radiators. (Additional benefit due to the enhancements)***.

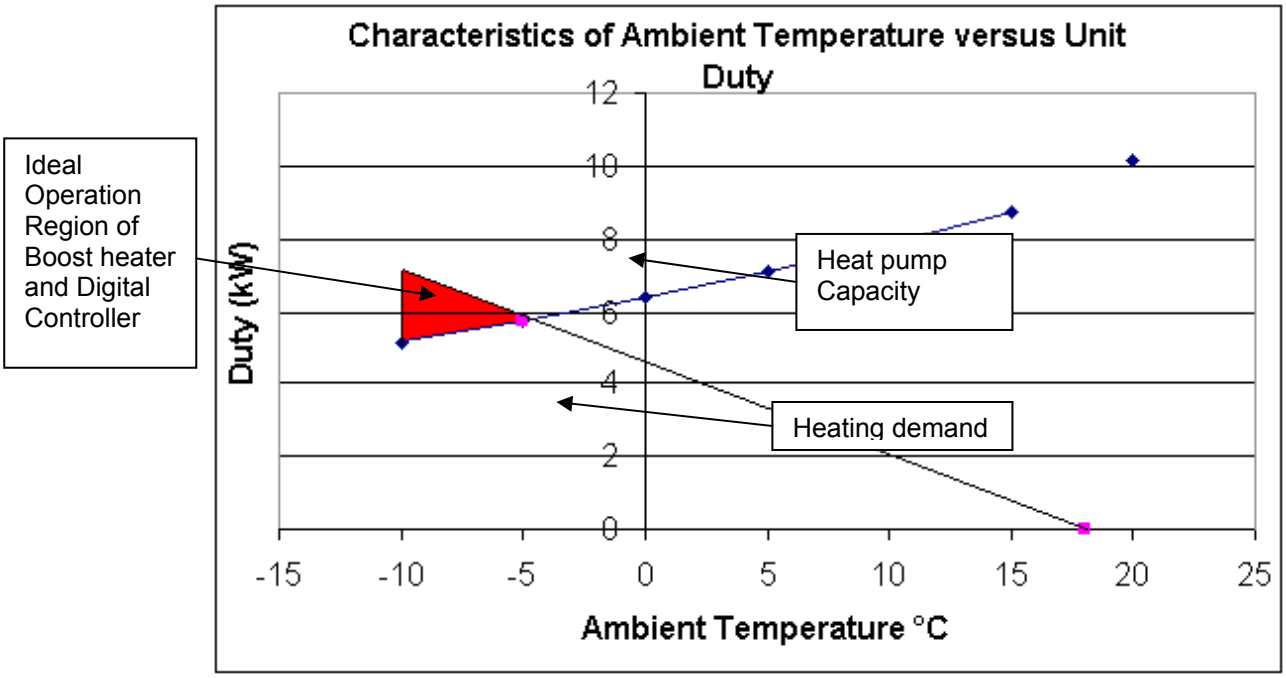
In both instances it is recommended that this heater be used in conjunction with the kit 70400423 "Heater digital stat kit" This only allows the boost heater to operate below an external ambient set point. This ensures the heater only runs when necessary, saving energy and improving the systems overall seasonal COP.

Settings for the thermostats are to be as follows:-

Specification	Boost heater thermostat	Digital thermostat
Defrost aid	Factory set 35°C	2°C
Boost Heater	Change to maximum	System design temperature. See graphical example below

If the unit is being used as a defrost aid, it is recommended that the stat on the heater be left at it's factory setting, 35°C. This will boost the system heating capacity on start up, ensuring that there is always sufficient thermal mass in the system for the heat pump to complete a good defrost. If a "Heater digital stat kit" is fitted, it is recommended that this be set at 2°C. It is at this temperature, which the most severe defrost conditions can occur.

If the unit is being supplied as a boost heater, it is recommended that the stat on the heater be turned up to maximum. If a "Heater digital stat kit" is fitted, it is recommended that this be set at the temperature the heat pump system was designed at. See the graphical example below for details.



Switch on the mains supply. The external neon lamp indicates when the heater element is on.

A manual re-settable safety cutout switches off the heater if the element over heats. To access the cutout, remove the electrical access panel. The cutout is identified by a small red button and is located inside the centre of a white disc. To re-set the cutout, press the red button.

Maintenance
The heater element should be checked annually for signs of corrosion and replaced when necessary.

WALL MOUNTING BRACKET KIT: 70400416 & 70400417 (6000, 8000 & 9000i units)
INSTALLATION INSTRUCTION

ITEM	QUANTITY	DESCRIPTION
1	4	M10 RAWLBOLT
2	4	PIN (wall mtg bkt) BWARM
3	4	PIN 2.0mm RETAINER
4	4	M8 NUT
5	4	M8 SPRING WASHER
6	4	M8x21 WASHER
7	10	M8x32 WASHER

Ensure that the wall to accept brackets is flat, perpendicular and will accept the weight of the unit (85Kg)

- ❑ **BRACKETS** – Assemble as diagram. Fit retaining clips after inserting pins through holes in horizontal and vertical brackets. Brackets with **RED DOT** markers **MUST** be fixed at the right hand (compressor) end of unit.

- ❑ **RAWLBOLTS** – Hole 12mm diameter x 60mm deep. M10 nut (15mm A/F)

- ❑ **UNIT MOUNTING –** Locate unit feet holes on anti-vibration mounts and secure with plain washer, spring washer and M8 nut (13mm A/F)

- ❑ **LEVELING –** It is essential, to minimize the effects of vibration and maximize drainage, if a drain tray is fitted, that the unit is level when fixed to the bracket. Use the large washers, provided loose, to level each corner of the unit if necessary**. DO NOT EXCEED 4 WASHERS PER CORNER. (see fig 1)**

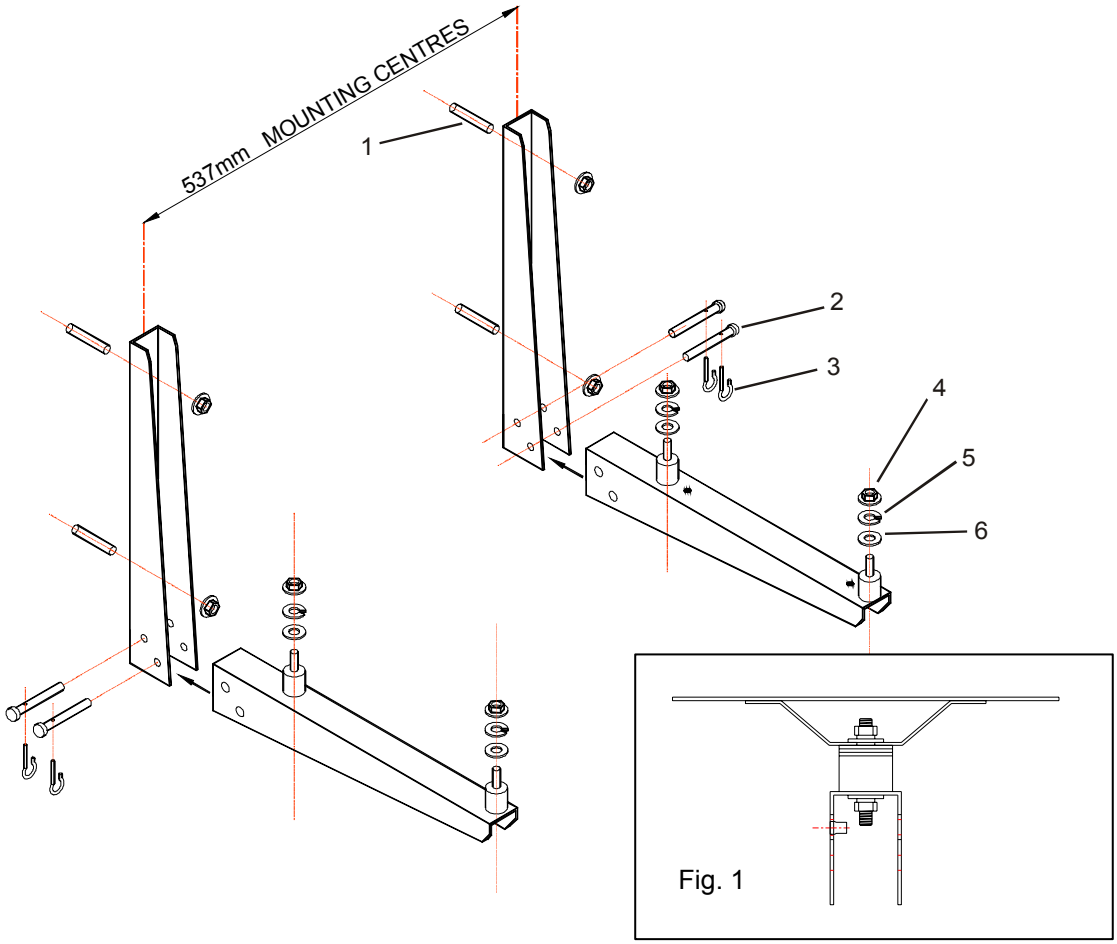


Fig. 1