INSTALLATION AND OPERATING

GROUNDTHERM

Ground Source Heat Pump

3.5 & 5

When replacing any part on this appliance, use only spare parts that you can be assured conform to the safety and performance specification that we require. Do not use reconditioned or copy parts that have not been clearly authorised by Ideal.

For the very latest copy of literature for specification and maintenance practices visit our website www.idealheating.com where you can download the relevant information in PDF format.

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Groundtherm
3.5 & 5
Ground Source Heat Pump

Destination Country: GB, IE

CONTENTS

INTRODUCTION

This installation manual is accompanied by a user guide (see reverse of this book), a commissioning record sheet and a warranty registration card, all of which should be left with the householder. The user guide explains how the system works, how it is controlled and what to do in the event of a problem. The commissioning record sheet must be completed as its production will be required in the event of a warranty claim.

HEATING WITH A HEAT PUMP

The Ideal heat pump is designed to operate up to 65°C water temperature for the domestic hot water delivery, and negates the need for direct electrical heating in the form of an electrical immersion heater. The unit also provides space heating temperatures variable from 35°C to 55°C.

Heat pumps for domestic heating are a fully proven technology which will give many years of trouble-free service. Ideal Heat Pumps have been specifically designed for optimum operation in the UK's climate.

However, unlike an oil or gas boiler which may be oversized for the heating demand of the property and therefore regularly cycles on and off, a heat pump is closely matched to the heat demand and is designed to run for long periods without switching on/off.

The following steps must therefore always be taken to ensure a successful installation. Major problems can occur if they are not taken and failure to comply will invalidate the warranty.

a. SAP or equivalent heat loss calculations must be established with the results recorded on the commissioning sheet.

b. The heat pump must be correctly sized in relation to the calculated heat losses.

c. The space heating system must be capable of satisfying the heat demand at the water flow temperature set for the heat pump. This is particularly important where retro-fitting a heat pump to a radiator system designed originally for a Delta T of 60°C, as the heat pump will run at a Delta T of 30°C. In this situation, you will normally need to fit larger radiators.

d. The electrical supply must be adequate to meet the start current demand.

e. The heat pump and the associated heating system must be commissioned in accordance with the procedures laid down in this manual.

A heat pump may be fitted on a stand-alone basis (monovalent system) to satisfy the full heating and hot water demand of the property or in parallel with an existing boiler (bivalent system).

In the case of a bivalent installation the heat pump is sized to provide a variable proportion of the annual heating requirement (say 85%) with the existing boiler integrated to deliver the balance on the coldest days. In bivalent systems, the heat pump is sometimes only linked to the space heating system which eliminates the requirement to fit a new DHW cylinder.

Standard designs for several different configurations, including plumbing and electrical circuits, are included in this manual.

REGULATIONS

The Ideal Groundtherm models conform to:

- *BS EN60335-1:2002 &2-40:2003, and therefore comply with the Low Voltage Electrical Equipment Directive 73/23/EEC;93/68/EC.*
- *BS EN ISO 12100-1:2003, BS EN ISO 12100-2:2003, BS EN ISO13857:2008: BS EN ISO 13850:2006, and therefore comply with the Supply of Machinery (Safety) Directive 98/37/EC.*
- *BS EN55014-1:2000+A1:2001+ A2:2002, 14-2:1997+A1:2001, EN61000-3-2:2000, -3-3:1995 + A1:2001, -4-2:1995, -4-3:1996, -4-4:1995, -4-5:1995, -4-6:1996, -4-11:1995. and therefore comply with the Electromagnetic Compatibility Directive 2004/108/EC.*
- *Comply with the Pressure Equipment Directive 97/23/EC, Fluid Group 2,Category 1.*
- *Compliant to RoHS Directive 2002/95/EC*

SAFETY PRECAUTIONS

a. The unit must be securely installed on a structure that can sustain its weight. If mounted on an unstable structure, it may fall causing injury or damage.

b. All electrical work must be performed by a qualified technician and comply with the latest I.E.E Regulations. The machine should be installed in accordance with EMC 2004/108/EC.

c. Electricity to the unit must be supplied through dedicated power lines and the correct voltage and circuit breakers must be used. Power lines with insufficient capacity or incorrect electrical work may result in electric shock or fire. The electrical ratings of Ideal heat pumps are included in the datasheet on page 38 of this manual.

UNPACKING

1. Position the heat pump close to point of installation on a sound flat surface and in an area large enough to unpack the unit.

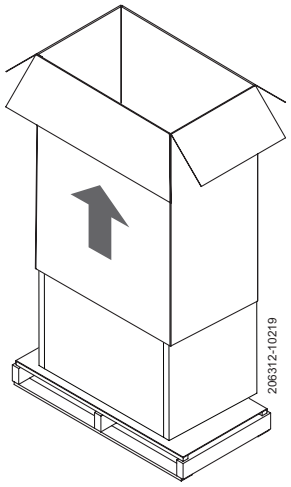
2. Carefully remove the plastic strapping securing the unit and carton sleeve to the pallet.

3. Fold back the top flaps to gain access to the literature pack.

4. Remove the instructions and read thoroughly before unpacking the product.

5. When ready for installation lift off the cardboard carton sleeve.

6. Carefully remove the unit from the pallet.



1.0 HOW THE HEAT PUMP WORKS

The Groundtherm units are ground source heat pumps especially designed to operate in association with closed ground loops. Such loops are inserted into the ground adjacent to the dwelling to be heated, and can take the form of vertical boreholes, horizontal trenched pipework, or slinkies.

A water/brine mix pumped through such boreholes or pipe work extracts heat (mainly solar) from the surrounding ground and provides a source of heat to the heat pump heat exchanger. The heat pump then converts this heat to useful energy used for space heating and domestic hot water. A small amount of electrical energy is required for this conversion.

The design and installation of the closed ground loop is critical to the performance of the heat pump and must only be carried out by experienced and competent persons.

The Groundtherm heat pump operates at a high level of efficiency and has two modes of operation, one for space heating through under floor heating or radiators, and a second for higher temperature domestic hot water (DHW). It is therefore known as a 'dual temperature' heat pump.

Typically the use of 1kW of electricity by the heat pump will collect 3kW of energy from the ground and release 4kW into the house.

Groundtherm heat pumps are designed to provide low cost space and DHW heating in well insulated properties. They also greatly reduce the emission of carbon dioxide (CO_2).

2.0 INSTALLATION

The heat pumps are compact in design and include easily accessible connection points for both electrical wiring and plumbing.

Due consideration should be given to frost protection when installing the heat pump.

If the heat pump is installed outside the property frost protection is required, either by a frost stat and pipe stat, or by adding antifreeze inhibitor to the heating system. See section 2.2.1.

An optional weather compensation unit is available if required. See section 5.4

2.1 ELECTRICAL

A separately fused single phase supply is required. See wiring installation diagrams and external wiring diagrams in section 5.2 & 5.3.

Note that the heat pump is not fitted with an on/off switch, any such switch required must be fitted as prior to the installation. Power to the unit is indicated by the red indicator light on the console (mains lamp).

Groundtherm 3.5 & Groundtherm 5 Units

With all power switched off, remove the front panels of the heat pump the electric box cover. The supply cable, entering the unit from the top rear, can then be fed through to connect into the marked live/neutral/earth terminals.

IMPORTANT

Groundtherm 3.5; the maximum permissible system impedance Z max at the interface point on the user's supply in accordance with section 6.2 EN61000-3-11 should be 0.35 + j0.22 (complex) 0.41 Ohms at 32.01 degrees (Real). Consult with the supply authority if necessary, that the equipment is connected only to a supply of that impedance or less.

Groundtherm 5; the maximum permissible system impedance Z max at the interface point on the user's supply in accordance with section 6.2 EN61000-3-11 should be 0.26 + j0.16 (complex) 0.3 Ohms at 32.01 degrees (Real). Consult with the supply authority if necessary, that the equipment is connected only to a supply of that impedance or less.

2.1.1 ELECTRICAL SAFETY

It is important to ensure that all aspects of the installation comply with the latest I.E.E Regulations.

The machine should be installed in accordance with EMC 2004/108/EC.

For multiple Heat Pump installations, to ensure sequential heat pump starting in event of mains supply interruption. Set timer (on electric box DIN rail) to incremental values. Example; Heat Pump No1 set to 4mins, Heat Pump No2 set to 4mins 30secs, Heat Pump No3 set to 5mins etc.

INCONSISTENT ELECTRICAL SUPPLY

The following limits of operation must not be exceeded.

Voltage	Minimum	Maximum
Single Phase machines	207V	253V
Frequency	47.5Hz	52.5Hz

N.B The voltage must be measured at the heat pump mains in terminals with compressor(s) running at the rated load condition.

2.2 PLUMBING

2.2.1 GROUND LOOP

The Groundtherm 3.5 & 5 units are available with an optional ground loop kit (Earthpack) consisting of a pump box (including circulation pump, overheat protection and run LED, charging and air bleed points). See Section 4.4.

Flexible connectors are provided between the pump box and the specially marked ground loop connection points on the back of the heat pump (marked 'to ground loop' and 'from ground loop').

Connections to the pump box from the ground loop should be carefully made either by the ground loop contractor or in accordance with their instructions. These connections should then be leak tested.

Connections to the heat pump from the pump box should also be carefully made, avoiding any twisting or distortion of the flexible hoses. The heat pump connections have variable geometry for easy installation.

All pipe work must then be flushed carefully to remove air, and then charged with an appropriate water/brine mixture. It should be remembered that the ground loop water temperature can occasionally drop below 0˚C, so an anti-freeze agent must be included. In the event of top-ups being required during the settling in period, avoid excessive dilution.

The ground loop pump system incorporates a pressure relief valve that, in the event of over pressure, may release a mixture of water/antifreeze. Due consideration needs to be given as to where this is vented.

The anti-freeze concentration should provide freeze protection to -10 or -15ºC maximum.

This level of protection will be achieved with approximately 25% concentration of an ethylene glycol based anti-freeze. The fluid manufacturer's guidelines should be followed for precise concentration required.

The anti-freeze fluid used should also contain corrosion, scale and biocidal inhibitors to ensure the long term performance of the ground loop, for example Hydratech Thermox DTX.

2.2.2 HEATING SYSTEM

Variable geometry connections are fitted to the rear of the unit to facilitate the connection of heating system pipe work (connectors marked 'heating flow, heating return'). These connectors include a fibre washer. It is important to replace the washer **every time** a hose is disconnected from the heat pump. Short sections of flexible hose (supplied) are recommended for final connection to the heat pump to reduce the potential for transfer of noise or vibration to the heating pipe work.

The domestic heating circuit designed to connect to the heat pump should be designed to allow the unit and its internal controls to service a space heating circuit and a domestic hot water heating circuit according to demand. Care should be taken to ensure that de-aeration is included in the heating circuit. General heating schematics are provided in this manual. The pumps used must be fixed speed pumps.

A proprietary anti corrosion inhibitor should be added to the system.

2.2.3 DOMESTIC HOT WATER

A special DHW cylinder (Ideal - Thermstore) should be purchased with each Ideal Ground Source Heat Pump. These cylinders are designed to have a different heating specification profile to standard cylinders and are supplied with a special tank thermostat and an immersion heater. The plumbing contractor should install these items as shown on the water circuit diagrams enclosed in section 5.6.

Where indirect pressurised cylinders are fitted in the heating circuit an energy (safety) cut out valve must be fitted in accordance with building regulations. The valve responds to a signal from the cylinder thermostat and prevents the water from over heating in the event of a heat pump malfunction.

3.0 COMMISSIONING

The heat pump must be correctly connected to:

1. A suitable electrical supply, see Section 5.3
2. Heating system/plumbing pumped circuit, see section 5.6.
3. Ground loop pumped circuit.
4. Programmable heating controller.

All connected water circuits must be clean, purged and fully de-aerated and correctly balanced with the flow/pressure capacity of the water circulation pump/s, valves, water quality to be within the limits of the table opposite.

The programmable heating controller can then be programmed for heating. Switch on the heating and controller and heating will commence (see section 4.1 Room Heating regarding compressor delay timer).

Check system for correct operation of the heating services, noting that under floor heating circuits take some time to react, especially when new. Follow good plumbing practices to ensure that the heating and hot water installations are operating correctly.

Component	Units	Value
organic material (possibility of sedimentation)		none
pH		6.5 - 9.0
electrical conductivity	µS/cm	50 to 1000
chloride	mg/litre	< 300
Iron and manganese	mg/litre	< 1
sulfate	mg/litre	0 to 150
O_2 content	mg/litre	< 2
chlorine	mg/litre	0 to 5
nitrate	mg/litre	0 to 100

4.0 HOW TO USE THE GROUNDTHERM UNIT

Groundtherm units are designed to operate with standard heating controllers. The installation should include a programmable heating controller linked to the room thermostats, as appropriate.

These controls allow the user to set their own preferred temperatures and required periods of heating.

The programmable heating controller illustrated in the External Wiring Diagram (EWD) is a Danfoss FP715, but equivalent types may be fitted provided that Ideal basic requirements are observed. (see EWD).

The Groundtherm unit will operate on space heating or DHW according to demand. It is recommended that maximum use of night rate electricity is programmed into the controller as DHW heating is particularly well suited to this approach.

The programmable heating controller will be supplied with its own set of instructions - users should familiarise themselves with the best method of operation.

4.1 ROOM HEATING

When the room thermostat calls for heating, the controller activates both the heating circulation pump and the Groundtherm heat pump.

Note that the heat pumps are fitted with delay timers which prevent the compressor(s) from starting immediately. Heat pumps fitted with one compressor (units 3.5 & 5) have a 3 minute time delay.

Delayed compressor operation is normal and maximises the life of the unit.

Heated water is then circulated through the underfloor or radiator system. The return temperature of the water flowing through the system is controlled by the thermostat mounted on the Ideal unit machine console. The heat pump uses more energy heating water to a higher temperature, so each user should find the lowest temperature setting possible for the required level of comfort.

Underfloor Heating

Note that under floor heating systems have a different heating profile to traditional radiators. Initial heat up is slower but then longer lasting, so ensure that the unit controls are not set unnecessarily high. Also ensure that thick carpets and rugs are avoided since these will reduce the heating effect to the room.

It is better to run the heat pump for longer periods of time at moderate temperatures than for short periods at high temperatures. During colder months it may be necessary to increase the temperature setting on the thermostat on the Groundtherm unit, but remember to turn it down again when the weather warms up.

4.2 DOMESTIC HOT WATER

The programmable heating controller can be set for periods of domestic hot water heating according to need. Since the heat pump uses electricity it is sensible to reduce cost by selecting a heating period during off-peak hours – Economy 7 or 10 – for example from 02.00 to 06.00 hours.

The domestic hot water heating circulation pump takes hot water from the Groundtherm unit to the Thermstore water storage vessel which is a specially designed indirect cylinder (see section 6).

A range of compatible unvented cylinders are available from Ideal Heating.

The tank fitted thermostat controls the stored water temperature.

Maximum domestic hot water temperature is set in the factory at 65°C.

4.3 MACHINE CONTROLS

The Groundtherm unit has the minimum of controls for simple operation. The function of the heating control is explained in Section 4 Room Heating. Other controls are illustrated on the schematic in section 5.1 and can be described as follows:

Mains Lamp	Mains Power Connected
Space Heating Temperature Control	Adjust the maximum return temperature to which water is heated for the underfloor or radiator system by the heat pump. For maximum economy, adjust the control to the lowest acceptable setting. This control does not influence the domestic hot water temperature.
HP	This refers to a high pressure switch in the refrigeration circuit of the heat pump. This device protects the compressor and components from damage and its operation stops the unit. The problem may be due to lack of water flow or a fault external to the machine. The switch can be re-set by inserting a cross head screw-driver or similar narrow device. Operation of the HP switch (marked HP) makes the owner aware of an actual or growing problem in the system. Call for service if reset does not clear fault.

The console panel on the Groundtherm unit has a digital thermostat which controls the space heating return water temperature from the heat pump. This is adjustable, up to the factory set flow limit of 55ºC. Consult Ideal if higher temperatures are required.

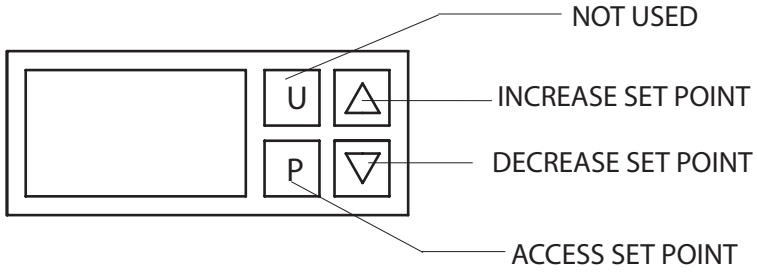
As an economy feature the thermostat can be set to its minimum setting of 10ºC.

THE THERMOSTAT WILL BE MARKED "TL"**

THERMOSTAT MARKED TLZ11/TLK38

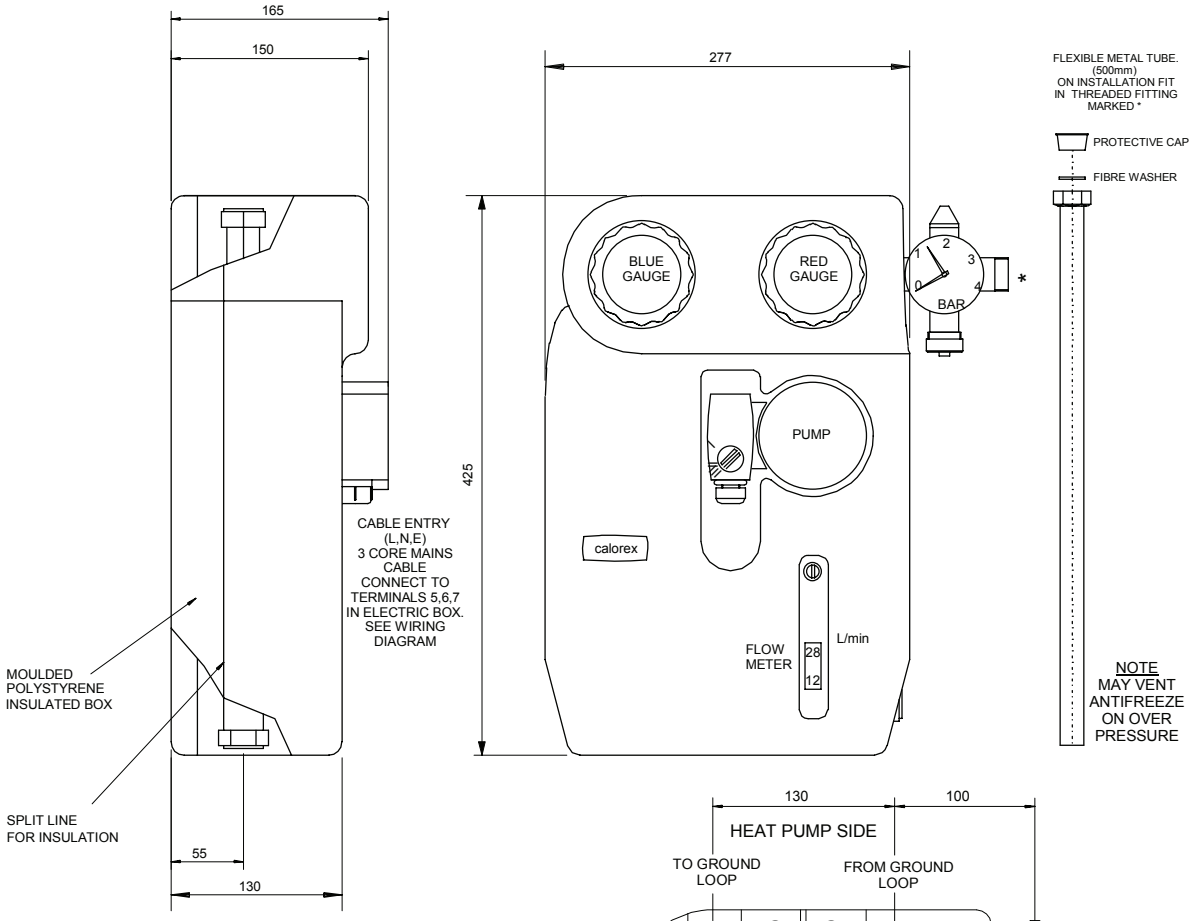
The digital thermostat may be adjusted in the following way:

1. Press and release the P key to display the target water temperature (Set Point) .
2. Press the up or down symbols to adjust the water temperature (Set Point) as required. After 5 seconds the display will revert to the actual water temperature.

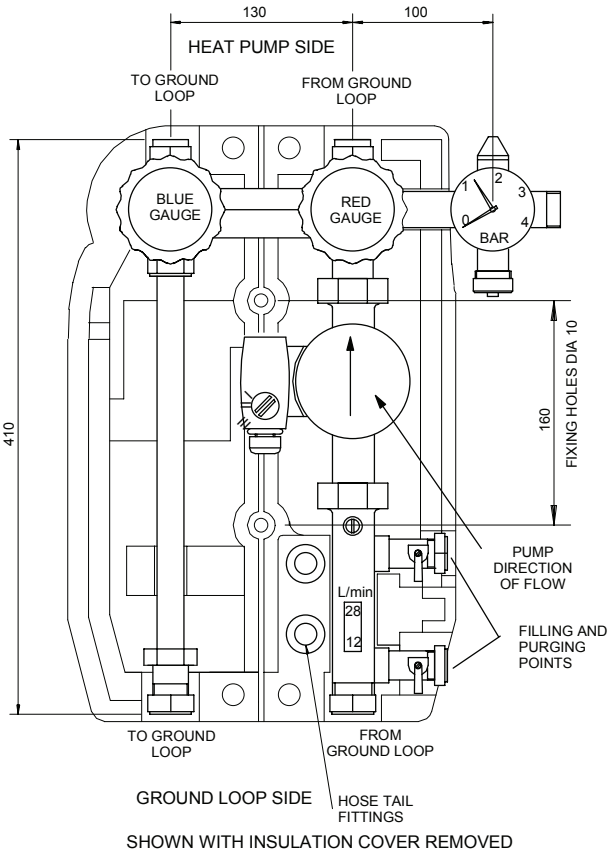


4.4 GROUND LOOP PUMP BOX - 3.5 & 5 UNITS

Suitable (max dia 10mm) screw may be used to fix the box in position.



PUMP BOX FOR 3500/5000 UNITS



SHOWN WITH INSULATION COVER REMOVED

TECHNICAL INFORMATION

POWER SUPPLY 230V 1 PHASE 50Hz.

CONNECTIONS
GROUND LOOP AND HEAT PUMP
22mm COMPRESSION.

FILLING AND PURGING POINTS 3/4 INCH BSP MALE.
ADDITIONAL HOSETAIL ADAPTORS SUPPLIED.

PUMP WILO RL ST 25/7.

MAX HEAD 7 m.

MAX FLOW VOLUME 66 l/min

POWER CONSUMPTION:
SPEED 3 110 WATTS
SPEED 2 81 WATTS
SPEED 1 59 WATTS

CURRENT
SPEED 3 0.47 AMPS
SPEED 2 0.35 AMPS
SPEED 1 0.25 AMPS

PRESSUE RELIEF SETTING 3.0 BAR

PRESSURE GAUGE RANGE 0 TO 4 BAR

FLOW METER RANGE 8 TO 28 l/min.

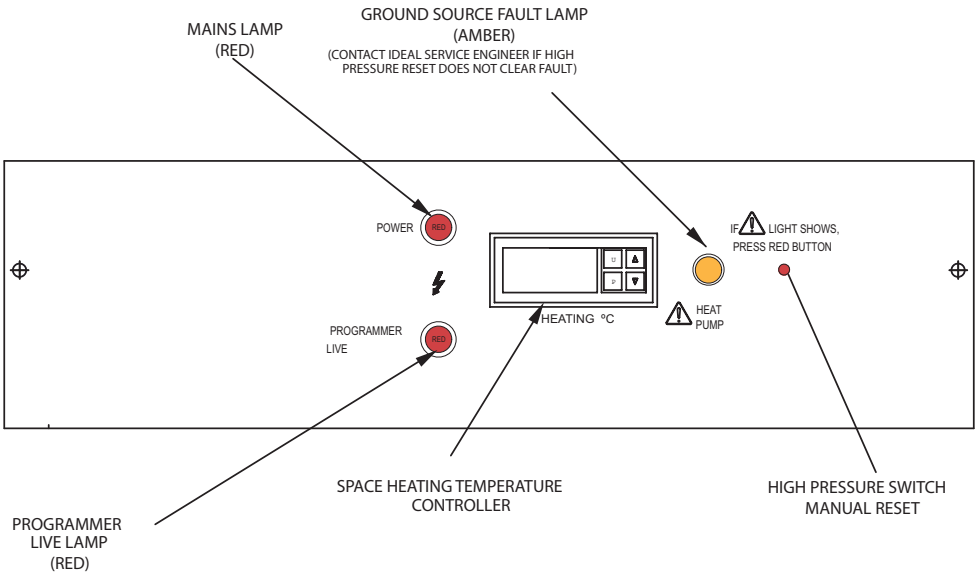
SEE DATA SHEET SECTION 5.8

Connect the pump box to the heat pump and ground loop in a suitable manner.

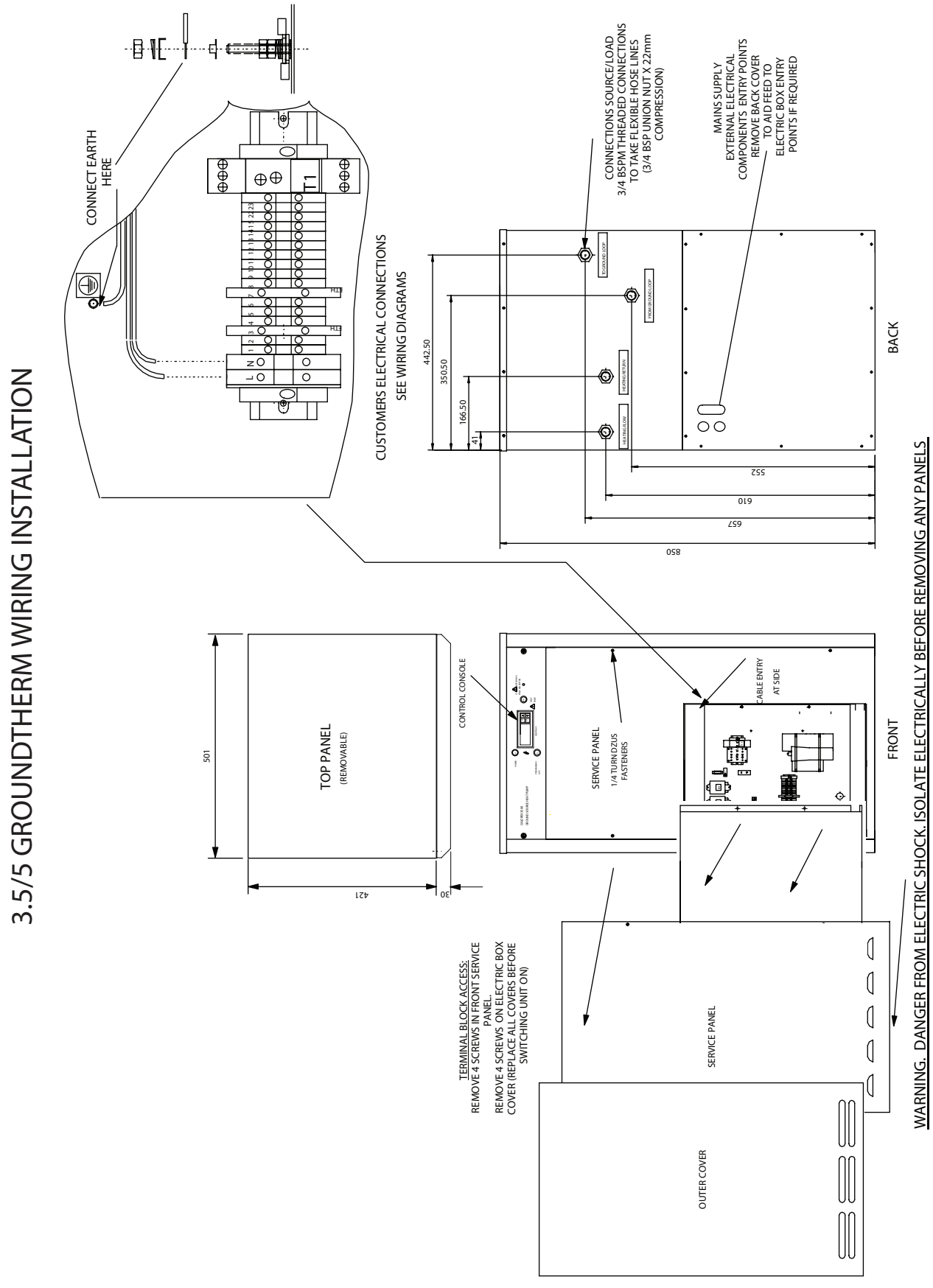
5.0 TECHNICAL

5.1 CONSOLE LAYOUT

3.5/5 CONSOLE LAYOUT

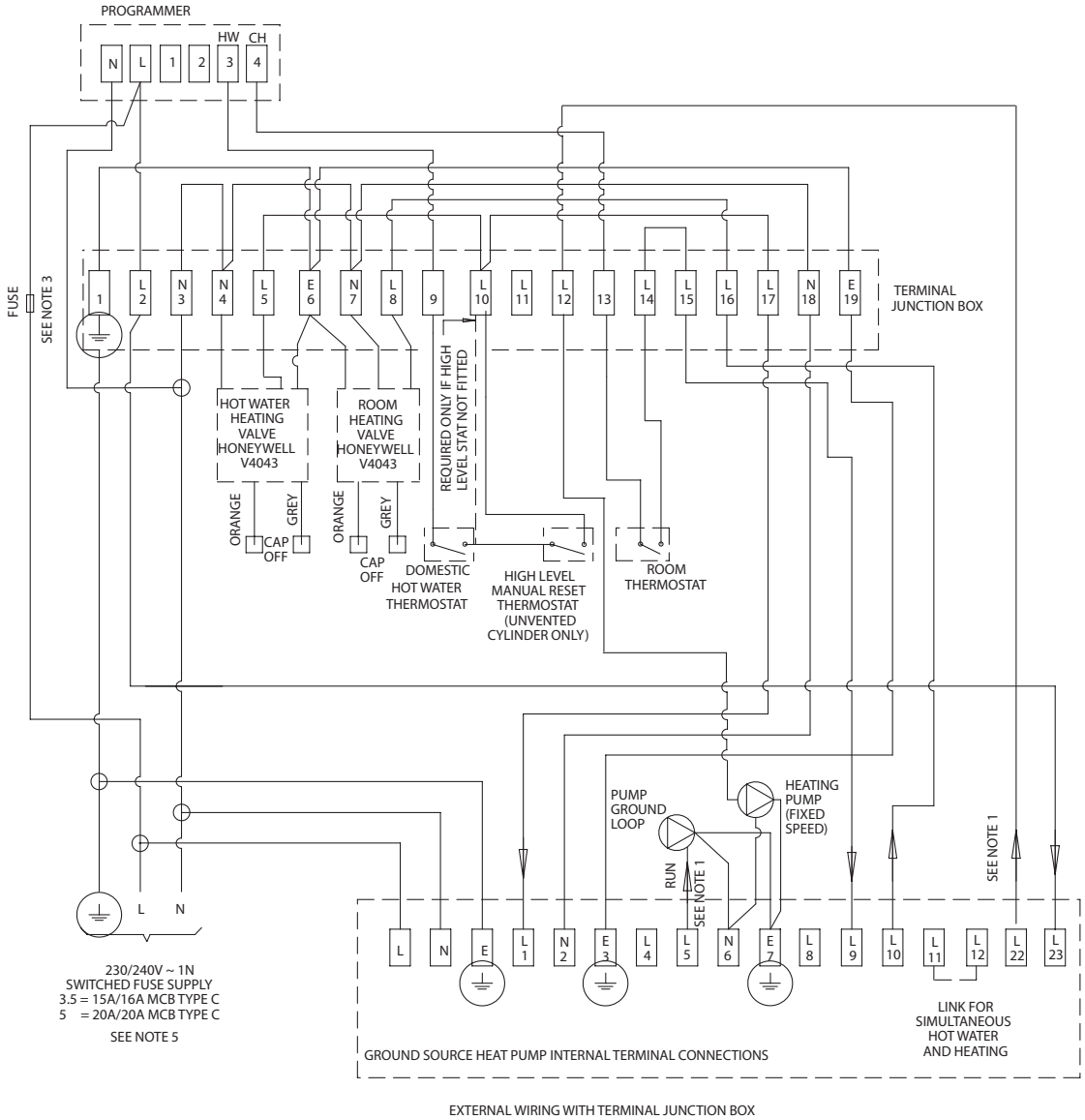


5.2 WIRING INSTALLATION



5.3 WIRING DIAGRAMS

EXTERNAL WIRING DIAGRAM IDEAL S PLAN



EXTERNAL WIRING WITH TERMINAL JUNCTION BOX

NOTES

1. MAXIMUM RATING OF CONTACTS FOR PUMP 1A.

IF OVER 1A RELAY WILL NEED TO BE FITTED

2. ALL VALVES TO BE SPRING RETURN TYPE.

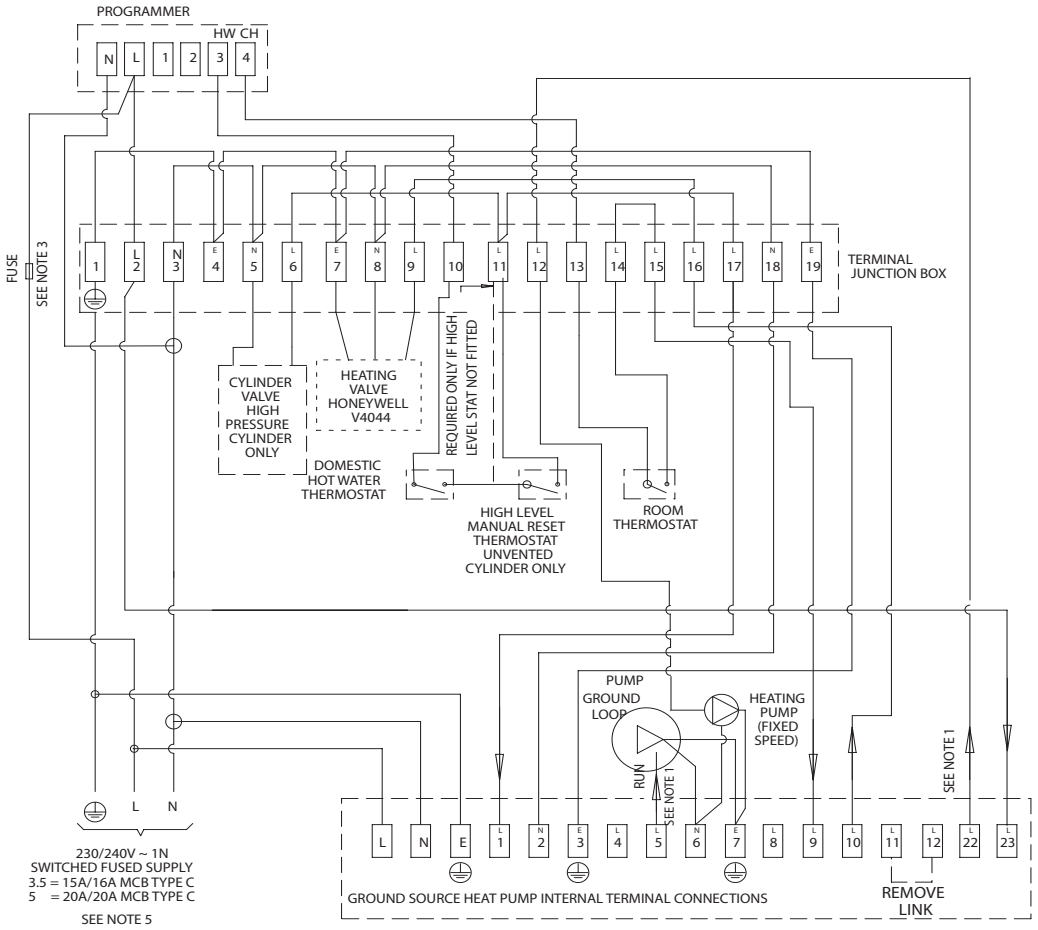
3. ALL EXTERNAL EQUIPMENT TO BE FUSED TO MANUFACTURERS RECOMMENDED FUSE SIZES.

4. MINIMUM CABLE REQUIREMENTS 3 CORE MAINS CABLE, 8 CORE CONTROL CABLE.

5. PROGRAMMER AND MACHINE TO BE WIRED FROM SAME CONSUMER UNIT AND TAKEN FROM SAME PHASE AND NEUTRAL SUPPLY.

GUIDE ONLY

EXTERNAL WIRING DIAGRAM IDEAL W PLAN



EXTERNAL WIRING WITH TERMINAL JUNCTION BOX

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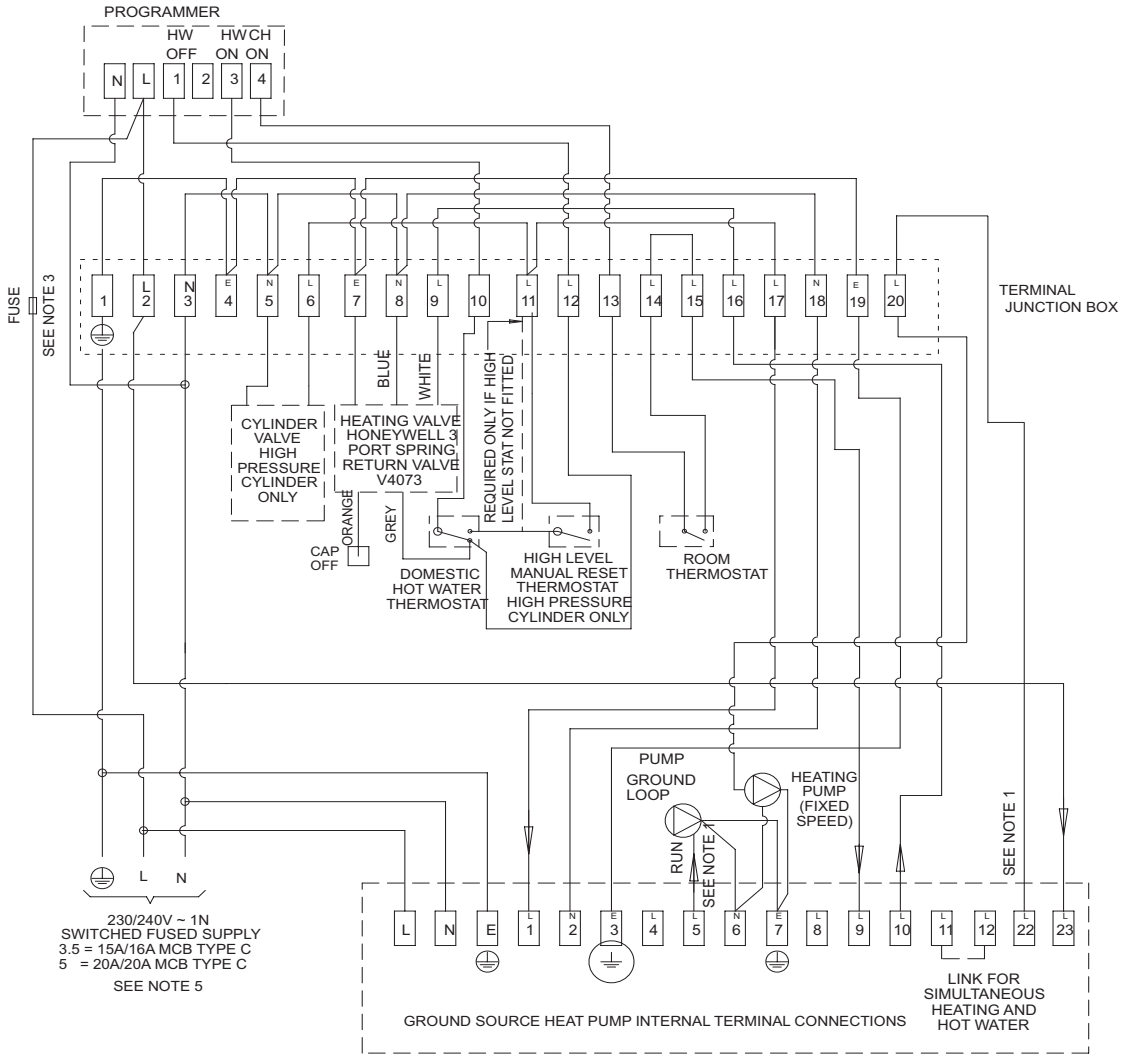
GUIDE ONLY

EXTERNAL WIRING DIAGRAM IDEAL Y PLAN



EXTERNAL WIRING WITH TERMINAL JUNCTION BOX

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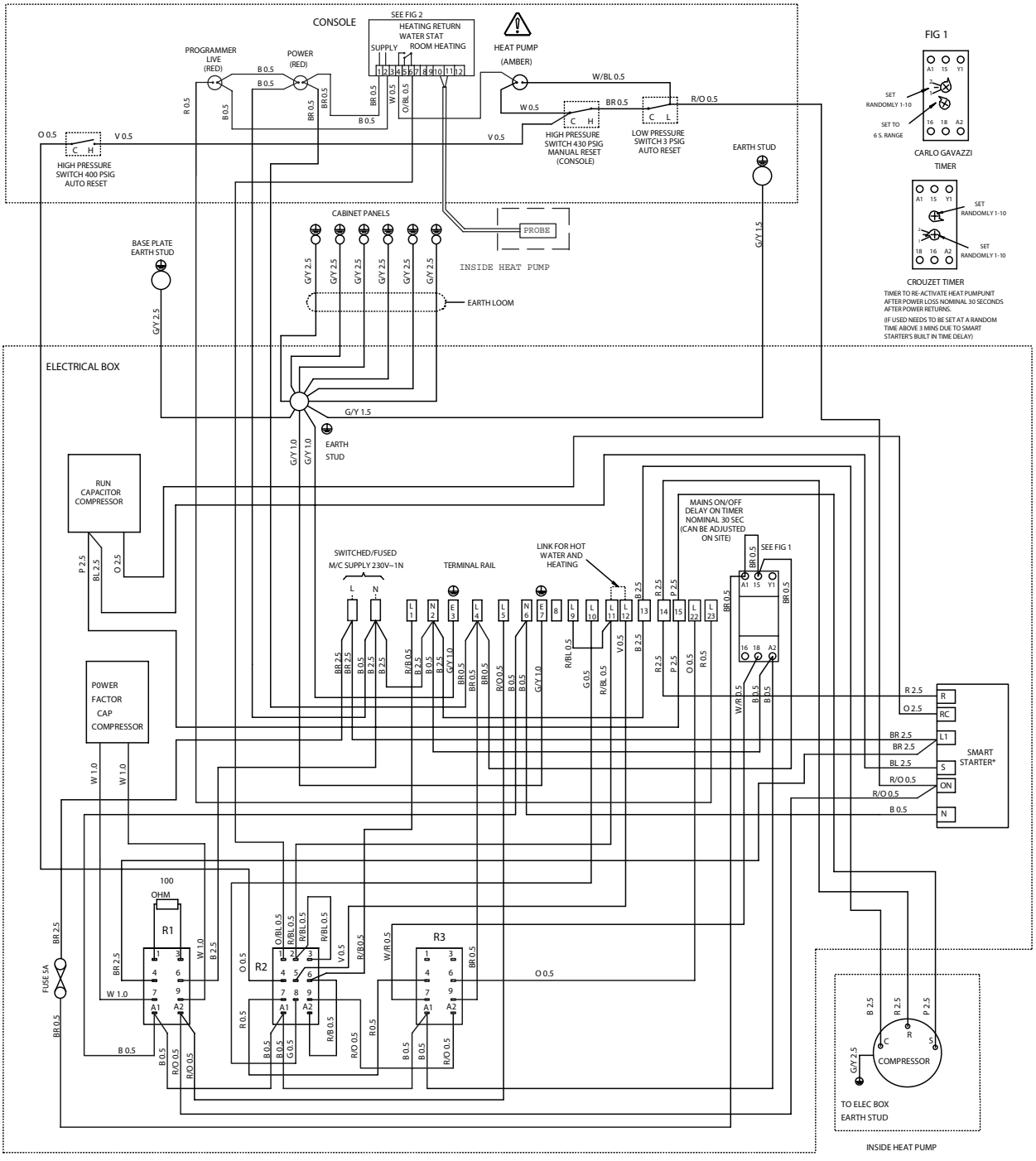
AND TAKEN FROM SAME PHASE AND NEUTRAL SUPPLY.

GUIDE ONLY

INTERNAL GROUNDTHERM WIRING DIAGRAM
3.5 AND 5 UNITS

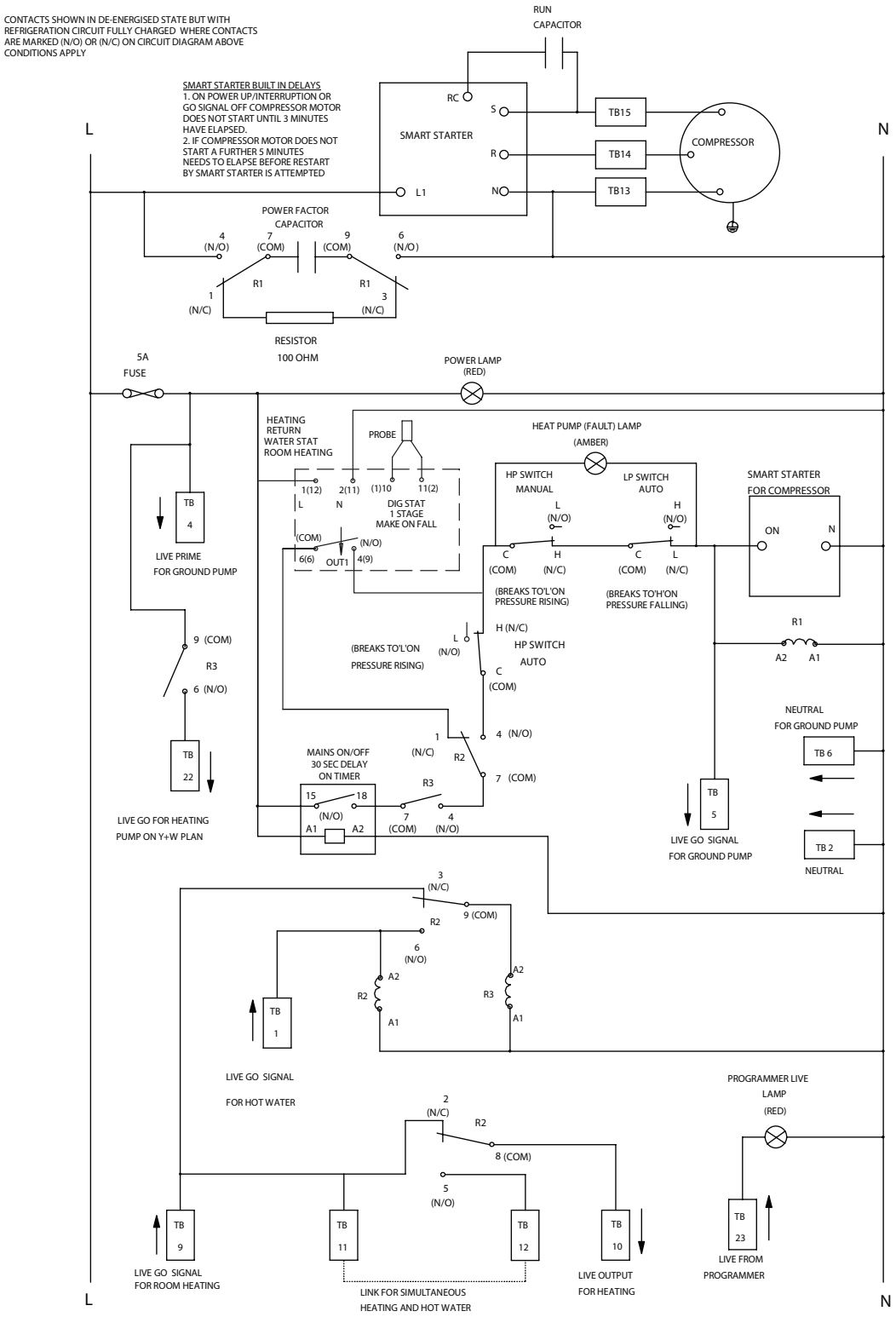


WIRE COLOUR CODE

R	RED	R/W	RED/WHITE
B	BLUE	R/O	RED/ORANGE
BL	BLACK	GR/B	GREY/BLUE
BR	BROWN	W/BL	WHITE/BLACK
P	PINK	O/BL	ORANGE/BLACK
W	WHITE	G/Y	GREEN/YELLOW
V	VIOLET		
G	GREY		
R/BL	RED/BLACK		

1.0 = 1.0mm² CONDUCTOR SIZE
2.5 = 2.5mm² CONDUCTOR SIZE
ETC.

INTERNAL GROUNDTHERM CIRCUIT DIAGRAM
3.5 AND 5 UNITS



NOTE: ALL EXTERNAL EQUIPMENT TO BE FUSED TO MANUFACTURERS RECOMMENDED FUSE SIZES

5.4 OPTIONAL WEATHER COMPENSATION

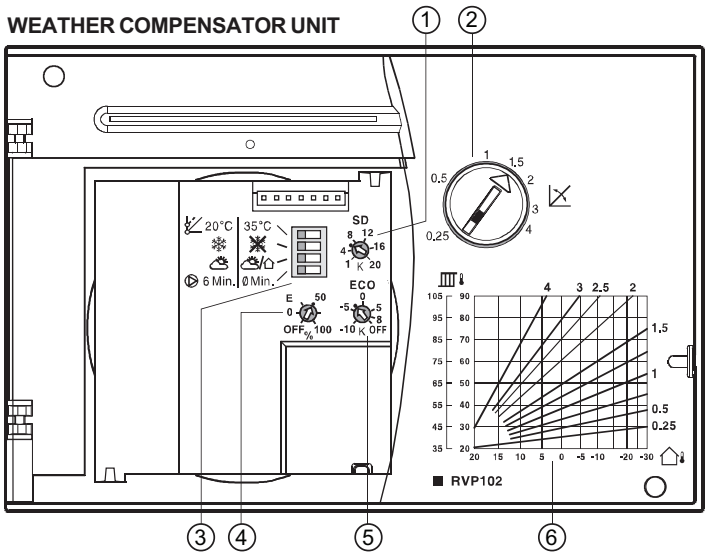
The use of a weather compensator with Ideal Groundtherm heat pumps achieves greater efficiency benefits.

An example of using the Siemens model RVP102 follows.

LEGEND

1. Setting potentiometer for switching differential.
2. Setting knob for heating curve slope.
3. Coding switches
4. Setting potentiometer for authority of room temperature for quick setback active/inactive.
5. Setting potentiometer for ECO heating limit.
6. Heating curve chart.

WEATHER COMPENSATOR UNIT



Coding switches (item 3)

Function	*Switch position on the left*	*Symbol*	*Symbol*	*Switch position on the right*	*Suggested Setting*
Base point of heating curve	Base point at 20 °C flow temperature	20°C	35°C	Base point at 35 °C flow temperature	Set to left
Frost protection, yes / no	Yes, frost protection			No, no frost protection	Set to right
Changeover of compensating variable, yes / no	No changeover; always weather-compensated control and room temperature authority according to setting of potentiometer E			Changeover to room temperature-compensated control at a reduced level	Set to left
Pump overrun, yes / no	Six-minute pump overrun	6 Min.	0 Min.	0 minutes, no pump overrun	Set to right

Setting Potentiometers (items 1, 4, 5)

Item	*Potentiometer*	*Function*	*Setting range*	*Guide value*	*Suggested Setting*
1	SD 8 12 4 16 1 K 20	Switching differential of heat pump temperature control	1…20 K	6 K	Set to 5 K
4	E 50 0 OFF% 100	Authority of room temperature on heat pump temperature control	0…100 % authority OFF = quick setback is inactive	50 % (quick setback is active)	Set to OFF
5	ECO 0 -5 5 8 -10 K OFF	Heating limit for ECO automatic energy saver	–10…+8 °C (referred to the room temperature setpoint)	–3 K (gives a heating limit of 16 °C at a room temperature setpoint of 20 °C)	Function disabled: OFF

MOUNTING THE SENSOR

Mounting Location

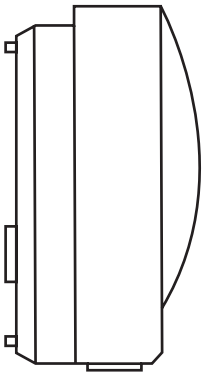
For optimisation the sensor must be positioned on the coldest wall of the house (normally wall facing north). The sensor must never be exposed to the morning sun.

Mounting Height

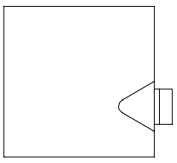
Preferably in middle of dwelling to be heated, but at least 2.5m above the ground.

Must not be fitted above windows, doors, air extracts or other heat sources, below balconies or in the eaves of the roof.

The sensor must not be painted over.

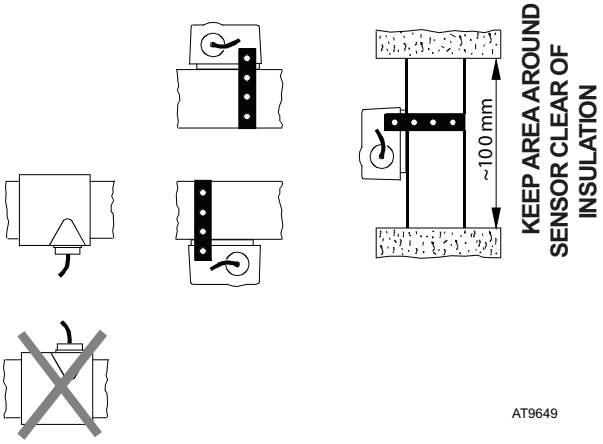


Outdoor Temperature Sensor



STRAP ON TEMPERATURE SENSOR

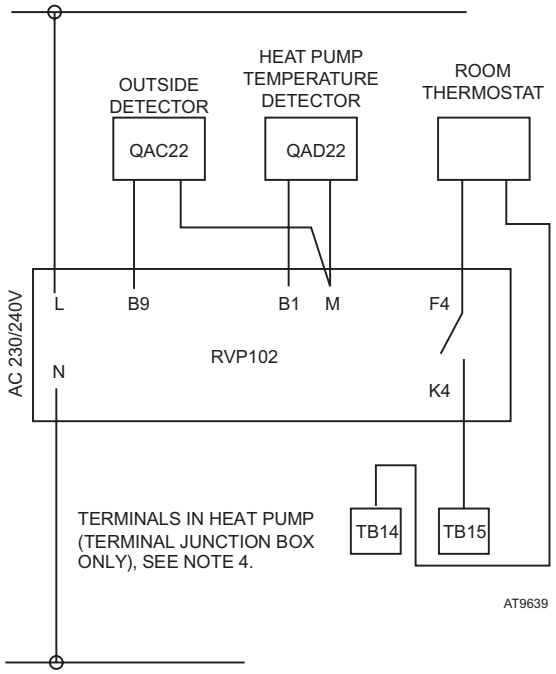
MOUNTING POSITIONS



WIRING THE OPTIONAL WEATHER COMPENSATOR (see external wiring diagram)

Notes.

1. Room thermostat enables heating pump
2. Assumed that domestic hot water will have priority and override heating circuit.
3. If using Grundfos control box, terminal numbers are different, see external wiring diagram.
4. Remove existing link between terminals 14 & 15 in terminal junction box.

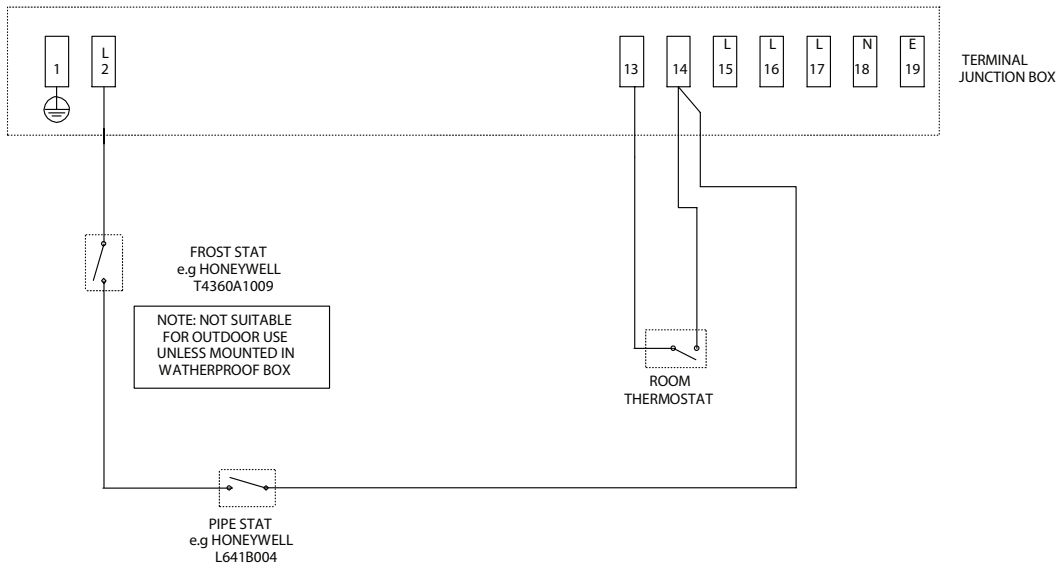


Cable lengths

PERMISSIBLE CABLE LENGTHS TO DETECTORS AND ROOM UNIT	
CABLE SIZE	CABLE LENGTH
COPPER CABLE Ø0.6mm	30m
COPPER CABLE 0.5mm²	50m
COPPER CABLE 1.0mm²	80m
COPPER CABLE 1.5mm²	120m

5.5 FROST PROTECTION USING THERMOSTATS (see external wiring diagram)

When a frost stat and pipe stat are fitted to a ground source heat pump they should be wired to the terminal junction box as shown below.



HANDING OVER

a. Hand the user instructions to the householder and explain his/her responsibilities under the relevant regulations.

b. Explain the start and shut down procedures.

c. The operation of the heat pump and the use and adjustment of all system controls should be fully explained to the householder, to ensure the greatest economy consistent with heating and hot water household requirements.

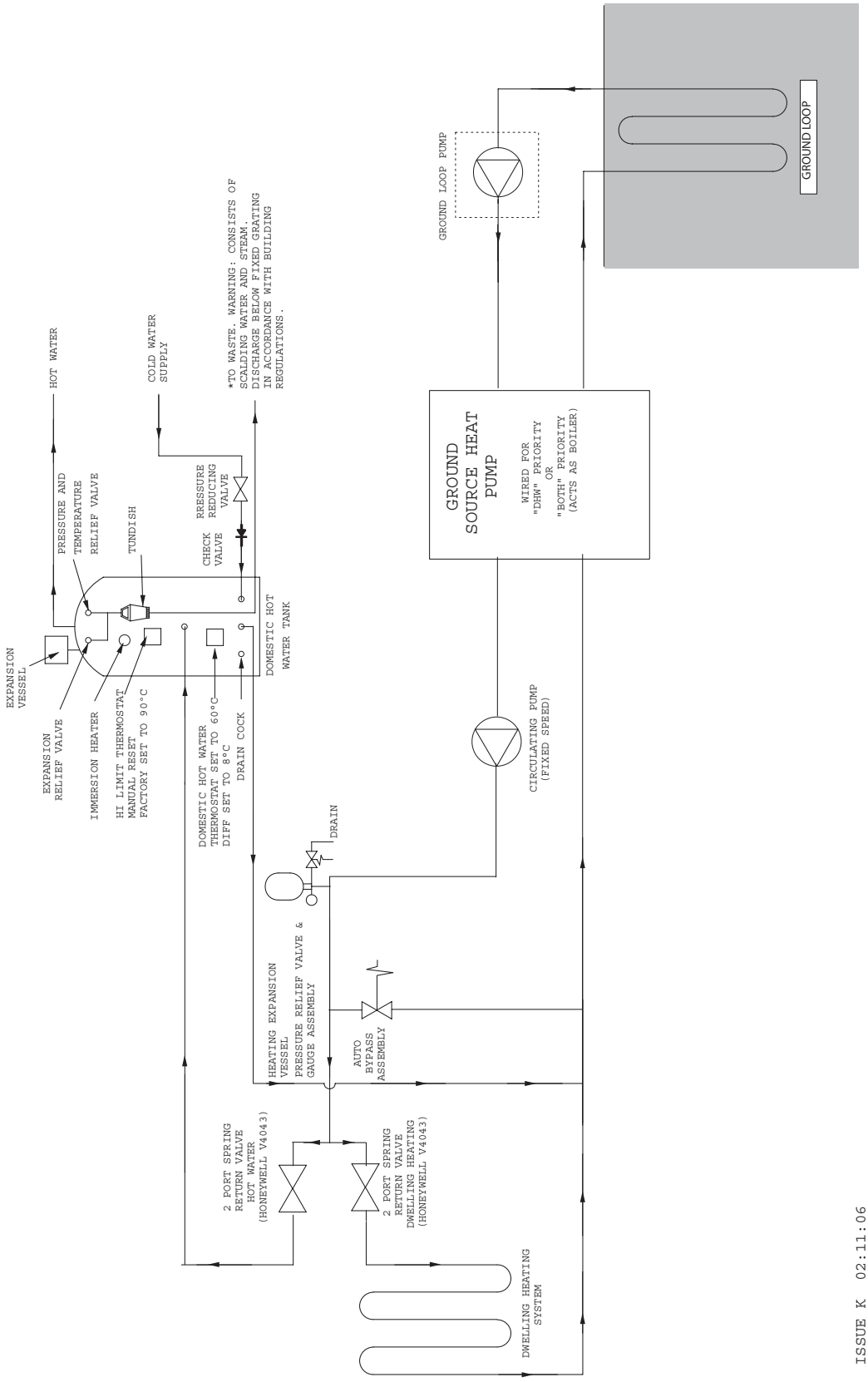
d. Advise the user of the precautions necessary to prevent damage to the system and heat pump.

e. Explain the function of pump fault light.

f. Loss of system water pressure - Explain that the system pressure gauge indicates the central heating system pressure and that if the normal COLD pressure of the system is seen to decrease over a period of time then a water leak is indicated. Explain the re-pressurising procedure and if unable to re-pressurise or if the pressure continues to drop a registered local heating installer should be consulted.

5.6 SYSTEM DIAGRAM

GROUND SOURCE HEAT PUMP PLUMBING CIRCUIT IDEAL S PLAN (EXAMPLE)
UNVENTED SYSTEM



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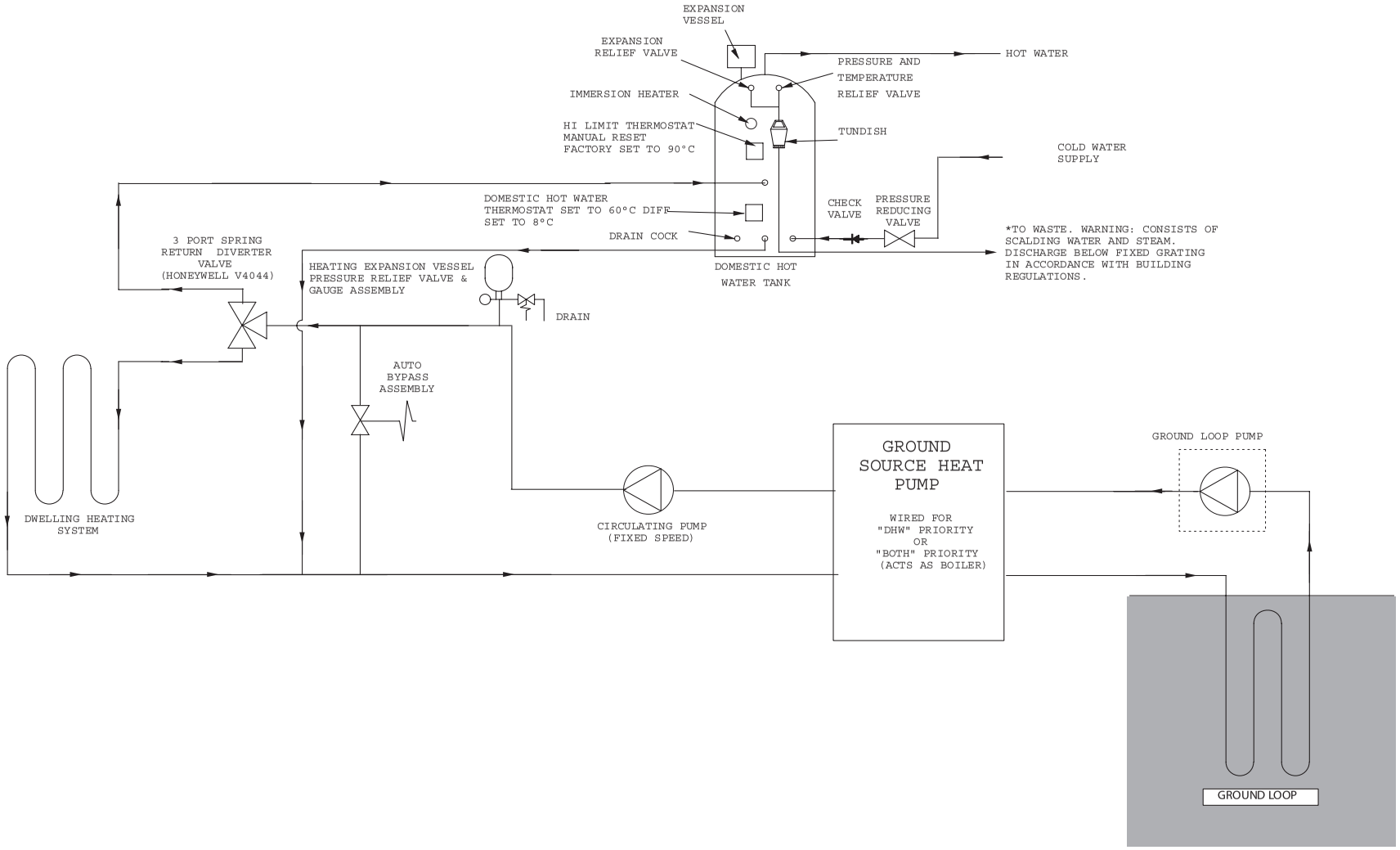
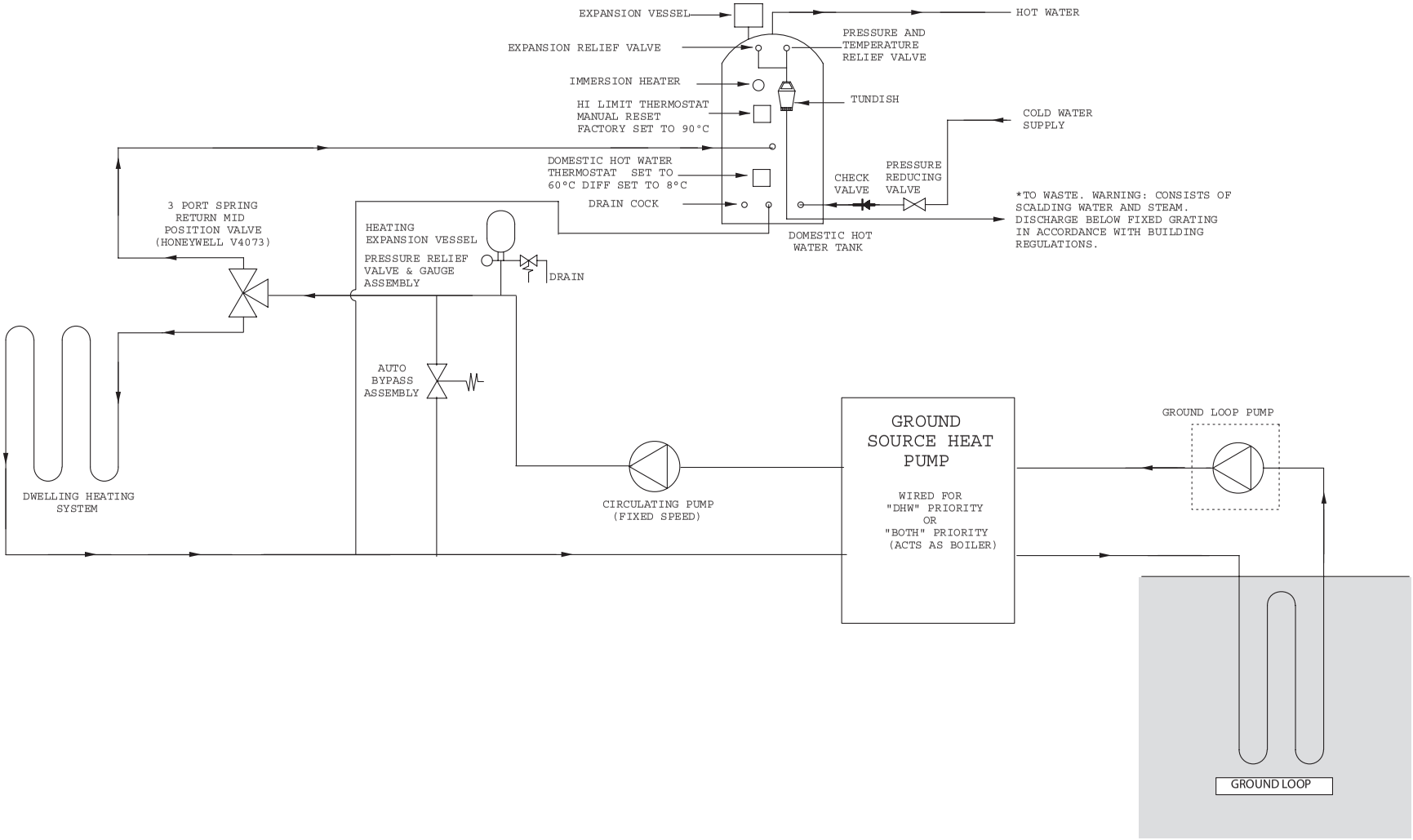
GROUND SOURCE HEAT PUMP PLUMBING CIRCUIT IDEAL W PLAN (EXAMPLE)
UNVENTED SYSTEM

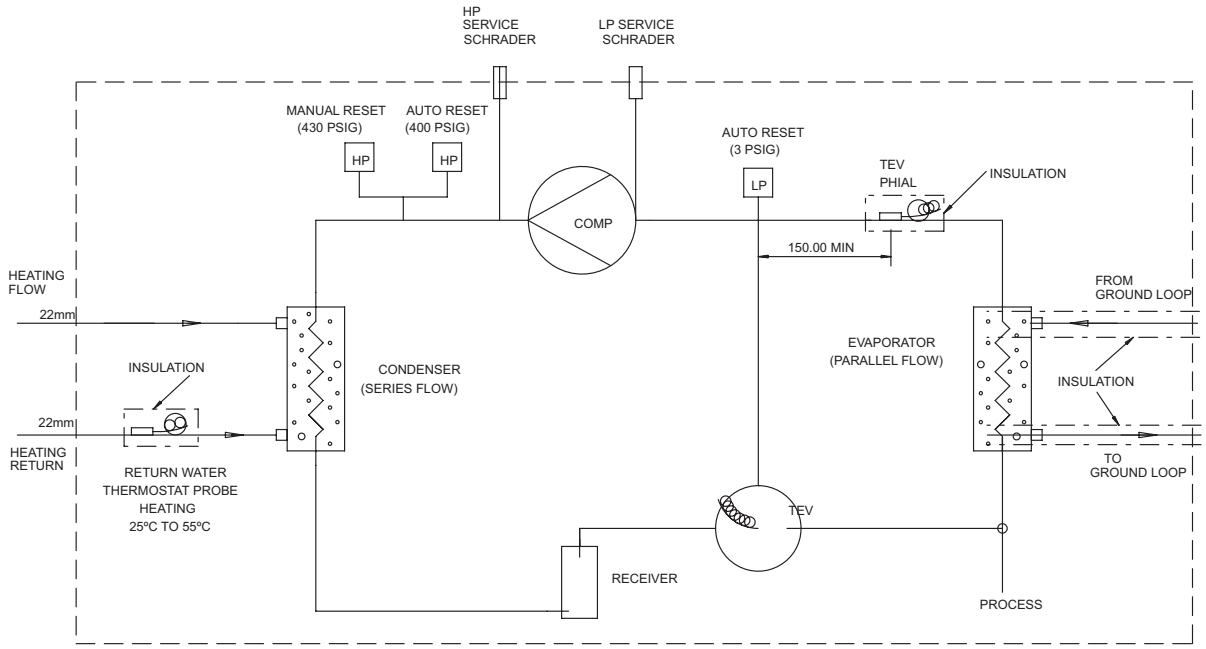


GROUND SOURCE HEAT PUMP PLUMBING CIRCUIT IDEAL Y PLAN (EXAMPLE) UNVENTED SYSTEM

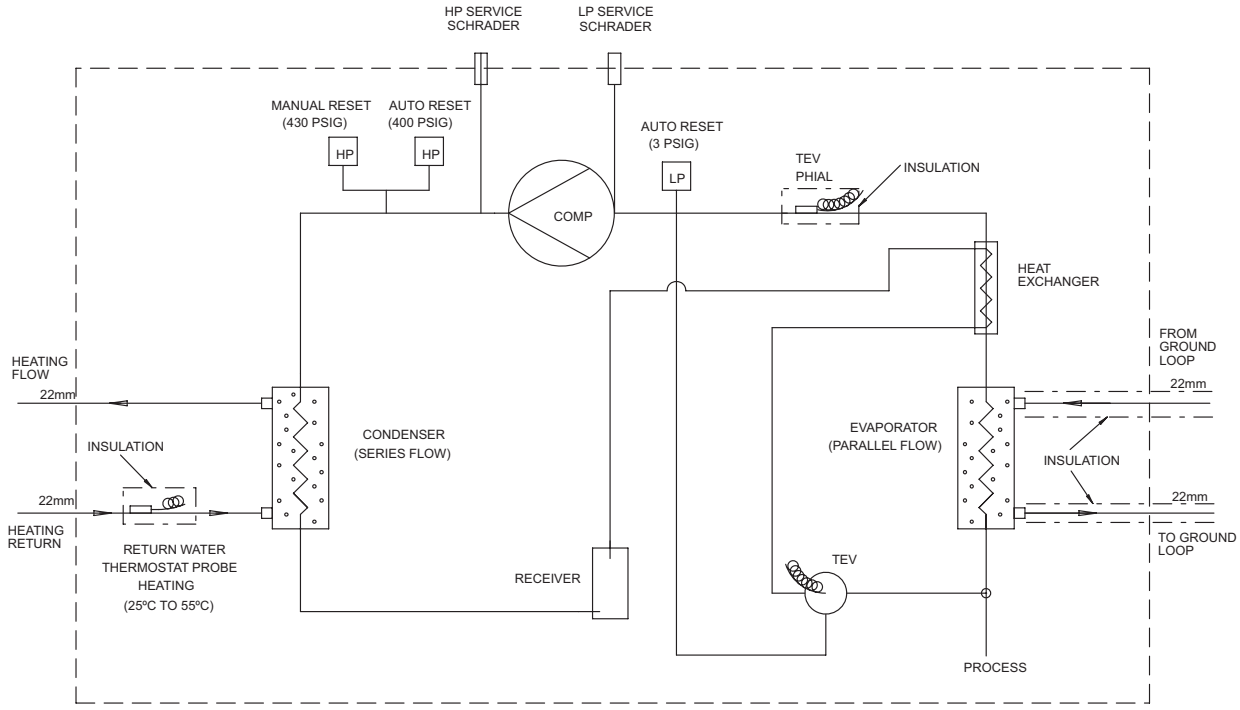


5.7 REFRIGERATION DIAGRAMS

3.5 REFRIGERATION



5 REFRIGERATION



5.8 DATA SHEET

GROUND SOURCE HEAT PUMP

MODEL	Units	3.5	5
DUTY			
SOURCE WATER/BRINE ON 0ºC*			
OUTPUT TO WATER AT 55ºC#	kW	2.61	3.41
ELECTRICAL INPUT	kW	0.87	1.19
OUTPUT TO WATER AT 35ºC#	kW	3.17	4.54
ELECTRICAL INPUT	kW	0.86	1.14
C.O.P (SEE NOTE 7)		3.69	3.97
SOURCE WATER/BRINE ON 15ºC*			
OUTPUT TO WATER AT 55ºC#	kW	4.65	6.15
ELECTRICAL INPUT	kW	1.2	1.64
OUTPUT TO WATER AT 35ºC#	kW	5.49	7.76
SOURCE 0ºC (TO EN 14511-2-2007)			
OUTPUT TO WATER (@35ºC) #	kW	3.17	4.54
ELECTRICAL INPUT	kW	0.86	1.14
C.O.P (SEE NOTE 7)	kW	3.69	3.97
COMPRESSOR 1			
NOMINAL POWER CONSUMED :-	kW	0.81	1.2
LRA- 1 ph N :-	amps	55	65
RLA- 1 ph N :-	amps	8.4	10.7
SOFT START AMPS 1 ph N :-	amps	19	22
COMPRESSOR 2			
NOMINAL POWER CONSUMED :-	kW	N/A	N/A
LRA- 1 ph N :-	amps	N/A	N/A
RLA- 1 ph N :-	amps	N/A	N/A
SOFT START AMPS 1 ph N :-	amps	N/A	N/A
WATER FLOWS ETC			
GROUND LOOP FLOW RATE ± 10%	litres/min	12	17
HEATING FLOW RATE ± 10%	litres/min	7·5	10
GROUND/HEATING			
WATER PRESSURE DROP (@ Rated Flow) :-	metres hd	0·84/0.08	1.2/3·5
MAX WORKING PRESSURE :-	bar	10	10
SOURCE & LOAD IN /OUT CONNECTIONS :-	mm	3/4" BSPM	3/4" BSPM
HEATING CIRCUIT WATER VOLUME (Heat Pump only)	litres	1.40	3.00
GROUND LOOP CIRCUIT WATER VOLUME (Heat Pump only)	litres	1.40	3.20
ELECTRICAL			
ELECTRICAL SUPPLY 1 PHASE	V/ph/Hz	230/240V~1N/50Hz	
MIN SUPPLY CAPACITY (Max F L A) 1 ph N :-	amps	11	15
MAX SUPPLY FUSE 1 ph N/TYPE C MCB:-	amps	15	20
GENERAL			
HERMETIC SYSTEM			
GAS CHARGE R134a	kg	2.5	2.5
OIL TYPE (COMPRESSOR)		POLYOLESTER OIL	
PHYSICAL DIMENSIONS			
WIDTH (Un-packed) :-	mm	500	500
DEPTH (Un-packed) :-	mm	467	467
HEIGHT (Un packed) :-	mm	850	850
WEIGHT (Un-packed) :-	kg	103	109
SOUND POWER TO ENV 12102	dB(A)	50.4	50.6
SOUND PRESSURE LEVELS @ 1 METRE	dB(A)	39	40

* OUTDOOR HEAT EXCHANGER, INLET TEMPERATURE
# INDOOR HEAT EXCHANGER, OUTLET TEMPERATURE

NOTES:-1) Weight and dimensions nett

1m hd = 1.4 psi
1L/min = 0.22 gall/min

2) Performance design limitations -
Water heating mode -max 65ºC Diff 5ºC±1·5ºC
Room heating mode -min 10ºC (economy) max 55ºC (high) Diff -5ºC.

3) Application limits: Lower limit of use to EN14511-4-2007, Outside Heat Exchanger = -5ºC
Lowest entering temperature to EN14511-4-2007, Inside Heat Exchanger (water on) = 10ºC

Higher limit of use to EN14511-4-2007, Outside Heat Exchanger = 20ºC,
Higher limit of use to EN14511-4-2007, Inside Heat Exchanger (water off) = 65ºC

4) Allow 500mm clearance to service panels.
5) Ideal reserve the right to change or modify models without prior notice.
6) R134a Global Warming Potential (GWP) 1300.
7) The C.O.P applies to NEW units with CLEAN heat exchangers.
8) Use a tolerance of ± 5% when sizing systems.

5.9 GROUND COLLECTOR INFORMATION

TYPICAL GSHP GROUND COLLECTOR SPECIFICATIONS FOR UK DOMESTIC INSTALLATIONS

Ground source heat pump systems require that geological ground conditions and preferred heat extraction methods are considered strictly in association with the thermal load requirements of the load dwelling and the heat pump coefficient of performance.

Geological conditions vary significantly around the UK and the following tables are presented solely as a guide to assist in pre qualification formatting.

Borehole Collector Heat Extraction Guide

Underground Geology	Specific Heat Extraction	
General guideline values	1800 hours	2400 hours Poor
underground (dry sediment)	25 W/m	20 W/m
Normal rocky underground with water saturated sediment	60W/m	50W/m
Consolidated solid rock with high thermal conductivity	84 W/m	70 W/m
Individual rocks		
Gravel, sand, dry	<25 W/m	< 20W/m
Gravel, sand, saturated water	65-80W/m	55-65W/m
Strong groundwater flow in gravel and sand, for individual systems	80-100 W/m	80 -100 W/m
Clay, loam, damp	35 - 50 W/m	30-40W/m
Limestone (solid)	55 -70 W/m	45-60W/m
Sandstone	65 - 80 W/m	55-65W/m
Acidic magmatite (e.g. granite)	65 -85 W/m	55 -70 W/m
Basic magmatite (e.g. basalt)	40-65W/m	35-55W/m
Gneiss	70 - 85 W/m	60-70W/m
Illustrated extraction values are approximate guides only. Actual values can vary significantly due to rock fabric such as crevices, foliation, weathering etc.		

Horizontal (flat) Collector Heat Extraction Guide

Ground Conditions	Specific Extraction Output	
Underground Geology	For 1800 hours	For 2400 hours
Dry, non- cohesive soils	10 W/m^2	8 W/m^2
Wet, non - cohesive soils	15 - 20 W/m^2	12 -16 W/m^2
Cohesive (loamy) soils, wet	20 -30 W/m^2	16 - 24 W/m^2
Water saturated sand/gravel	40 W/m^2	32 W/m^2

Slinky Collector Heat Extraction Guide

House floor Area m^2	Heat pump nominal output	Number of trenches required	Length of slinkies
Up to 90	3.5kW	2	30 metres
80-130	5.0kW	2	40 metres

Comparative Examples

240V single phase - for 1800 hours		
Heat pump capacity	3.5kW	5.0kW
Borehole depth m	60 - 80	70 - 90
Groundhose length m	150 200	200 300
Ideal slinky collectors m	2 x 30	2 x 40

The above information is offered as guidance only and Ideal recommend that professional technical advice is sought prior to design and selection of system components.

5.10 GROUNDTHERM FAULT FINDING

Problem, No Heating

1. Check programmer calling for heating and giving output to correct pump or zone valve.
2. Check room thermostat calling for heat and giving signal to terminal 9 in Ideal unit.
3. Check correct heating pump running and not airlocked and/or zone valve opening.
4. Check ground loop pressure above zero.
5. Check ground loop pump running when on demand.
6. Check for air locks in heating system or loss of pressure.

If fault light is illuminated (amber lamp located on heat pump control panel) press the reset button to clear. (Note - This will not reset immediately if just activated. Wait 10 minutes and try again.)
If fault light requires continuous resetting contact your installer.

Problem, No hot water DHW

1. Check programmer calling for hot water and giving output to correct pump or zone valve.
2. Check tank thermostat calling for heat and giving signal to terminal 1 in Ideal unit.
3. Check correct DHW pump running and not airlocked and/or zone valve opening.
4. Check ground loop pressure above zero.
5. Check ground loop pump running when on demand.

If fault light is illuminated (amber lamp located on heat pump control panel) press the reset button to clear. (Note - This will not reset immediately if just activated. Wait 10 minutes and try again.)
If fault light requires continuous resetting contact your installer.

Problem, Loss of performance

1. Carry out the above checks for the relevant service.
2. Where twin pump heads are used check for bypassing between pump heads/systems.
3. Where diverting valve used check for bypassing between systems.
4. Check correct flow rates for heating and hot water circuits.
5. Consider insulation issues of property.
6. Consider how system is used by tenant.
7. Consider how property is used i.e. windows and doors being left open etc.

General points

1. There can be a delay of between 3 to 10 minutes before the compressors in the units start after a demand is made.
2. The compressors in the ground source heat pumps will cycle on and off according to the return water temperature back to the heat pump. Return temperature achieved will depend on energy dissipated in the system. The more energy dissipated the lower the return temperature.
3. If return temperature set point is achieved the compressors and ground loop pump will stop but the heating circulating pumps will continue while there is a demand from either the central heating or tank thermostats and there is a call for the service from the programmer.
4. The return temperature range available in heating mode is variable from 25°C to 55°C.
5. The return temperature in hot water mode is factory set at 65°C.
6. The Ideal machine is fitted with a “Smart Starter” (situated on electrics panel) which prevents damage to the compressor within the heatpump. This smart starter has an LED which indicates fault conditions as follows:

Ready to accept a start command:	a double blink every 5 seconds.
3 minute cycle delay:	1 flash per second
Fault mode:	slow flash, 5 sec on, 5 sec off.
Low voltage:	fast flash, 10 per second.

6.0 WATER STORAGE REQUIREMENT

The heating circulation pump takes hot water from the Groundtherm unit to the thermstore water storage vessel which is a specially designed indirect cylinder.

The following range of cylinders are available from Ideal heating. These are fitted with thermostatic controls which control the storage water temperature. The maximum DHW temperature is set in the factory at 65ºC.

Sealed Systems - Installation must comply with the requirements of BS6798 and BS5449.

Installations must be designed in excess of the maximum system operating temperature and pressures.

Safety valves must comply with BS6759.

All system components must comply with the required local water regulations.

6.1 IN-DIRECT WATER STORAGE CYLINDER

Thermostore Cylinders Pressure Data

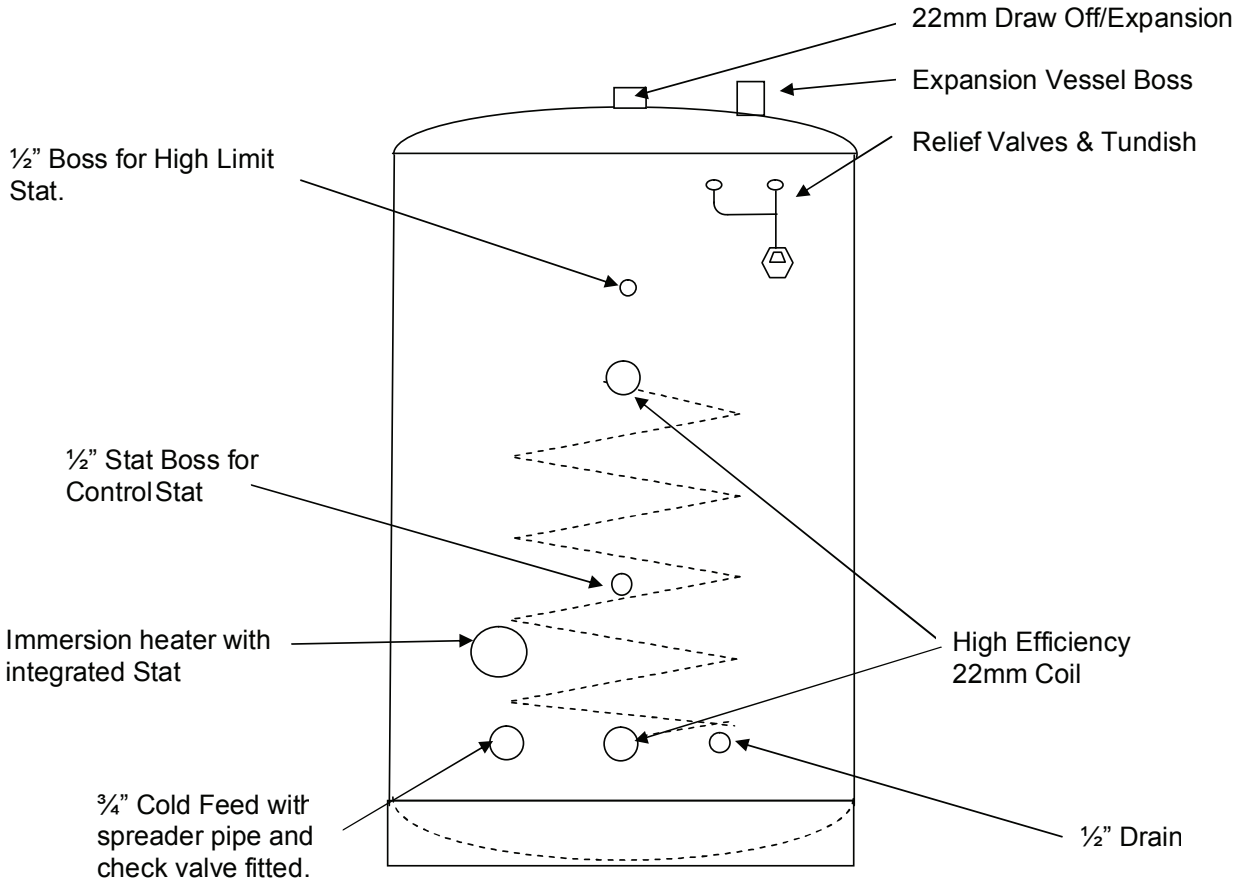
1. Inlet control to 2.1 bars (by the valve provided)
2. The venting pressure 3.5 bars (by the valve provided)
3. The maximum operating pressure is 3 bars

Thermstore Coil Pressure Data

1. Coil is rated to 3.5 bars
2. Maximum operating pressure 3 bars

Indirect POWER Flow 2000 Standard

Cylinder Type	Shell size (mm)	Overall dimensions(mm)	Ideal No
150 Litre	1100 x 450	1125 x 550	204829
180 Litre	1300 x 450	1325 x 550	204830
210 Litre	1500 x 450	1525 x 550	204831



GROUND SOURCE HEAT PUMP COMMISSIONING CHECKLIST

This Commissioning Checklist is to be completed in full by the competent person who commissioned the heat pump and associated equipment as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.
Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights

Customer Name

Address

Telephone Number

Heat Pump Make and Model

Heat Pump Serial Number

Commissioned by *(print name)* | Certified Operative Reg. No. [1]

Company Name & Address | Commissioning Date

Telephone No.

Building Regulations Notification Number *(if applicable)* [2]

CONTROLS - SYSTEM AND HEAT PUMP *Tick the appropriate boxes if applicable*

1. Time & Temperature Control to Heating	Room Thermostat & Programmer/Timer	☐	Programmable Roomstat	☐	Load/Weather Compensation	☐	Optimum Start Control ☐
2. Time & Temperature Control to Hot Water					Cylinder Thermostat & Programmer/Timer	☐	Combined with Heat pump main controls ☐
3. Heating Zone Valves (including underfloor loops)					Fitted	☐	Not Required ☐
4. Hot Water Zone Valves					Fitted	☐	Not Required ☐
5. Thermostatic Radiator Valves					Fitted	☐	Not Required ☐
6. Heat Pump Safety Interlock [3]					Built In	☐	Provided ☐
7. Outdoor Sensor					Fitted	☐	Not Required ☐
8. Automatic Bypass System					Fitted	☐	Not Required ☐
9. Buffer Vessel Fitted					Yes ☐	No ☐	If YES, Volume ☐ Litres

ALL SYSTEMS

The heating system has been filled and pressure tested	Yes ☐
Expansion vessel for heating is sized, fitted & charged in accordance with manufacturer's instructions	Yes ☐
The heat pump is fitted on a solid/stable surface capable of taking its weight	Yes ☐
The system has been flushed and cleaned in accordance with BS7593 and heat pump manufacturer's instructions	Yes ☐
What system cleaner was used?	
What inhibitor was used?	Qty ☐ litres
Are all exposed external pipeworks insulated?	Yes ☐

BORE HOLE/GROUND LOOPS

☐ Bore Hole ☐ Ground Loop — Length/Depth ☐ m

The ground loops/bore hole pipes have been filled and pressure tested in accordance with relevant British Standards	Yes ☐
If more than one 1 collector has been used has the system been hydraulically balanced (Flow balancing/regulating valves fitted & adjusted)?	Yes ☐
Has the system been vented/de-aired?	Yes ☐
Are system filters fitted & clean?	Yes ☐
Is the system topped up to the correct level?	Yes ☐
Was the system cleaned & flushed prior to use?	Yes ☐
Are isolating valves in their correct position	Yes ☐
What system cleaner was used?	Qty ☐ litres
What antifreeze was used?	Qty ☐ litres
What temperature will the antifreeze protect to?	☐ °C
What inhibitor was used (if not included in Antifreeze)?	Qty ☐ litres
Record incoming collector fluid temperature	☐ °C
Record outgoing collector fluid temperature	☐ °C

CENTRAL HEATING MODE *Measure and Record*

Heating Flow Temperature ☐ °C Heating Return Temperature ☐ °C

DOMESTIC HOT WATER MODE *Measure and Record*

Is the heat pump connected to a hot water cylinder? ☐ Unvented ☐ Vented ☐ Thermal Store ☐ Not Connected

Hot water has been checked at all outlets ☐ Yes Have Thermostatic Blending Valves been fitted? ☐ Yes ☐ Not required

ADDITIONAL SYSTEM INFORMATON

Additional heat sources connected: ☐ Gas Boiler ☐ Oil Boiler ☐ Electric Heater ☐ Solar Thermal Other _____

ALL INSTALLATIONS

The heating, hot water and ventilation systems complies with the appropriate Building Regulations	Yes ☐
All electrical work complies with the appropriate Regulations	Yes ☐
The heat pump and associated products have been installed and commissioned in accordance with the manufacturer's instructions	Yes ☐
The operation of the heat pump and system controls have been demonstrated to the customer	Yes ☐
The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer	Yes ☐

Commissioning Engineer's Signature

Customer's Signature

(To confirm demonstration of equipment and receipt of appliance instructions)

benchmark COLLECTIVE MARK
THE MARK OF QUALITY FOR THE INSTALLATION, COMMISSIONING AND SERVICING OF DOMESTIC HEATING AND HOT WATER SYSTEMS

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Notes: [1] Installers should be members of an appropriate Competent Persons Scheme. [2] All installations in England and Wales must be notified to Local Area Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer. [3] May be required for systems covered by G3 Regulations

Service Record

It is recommended that your heating system is serviced regularly and that the appropriate Service Interval Record is completed.

Service Provider

Before completing the appropriate Service Interval Record below, please ensure you have carried out the service as described in the manufacturer's instructions.

Always use the manufacturer's specified spare part when replacing controls.

Service 1 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 2 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 3 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 4 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 5 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 6 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 7 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 8 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 9 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 10 Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Technical Training

The Ideal Technical Training Centre offers a series of first class training courses for domestic, commercial and industrial heating installers, engineers and system specifiers. For details of courses please ring:..... 01482 498 432

FM 59915

Manufactured under an ISO 9001 registered quality management system

Ideal Boilers Ltd., P.O. Box 103, National Ave, Kingston upon Hull, HU5 4JN. Telephone: 01482 492 251 Fax: 01482 448 858. Registration No. London 322 137.

Ideal Stelrad Group pursues a policy of continuing improvement in the design and performance of its products. The right is therefore reserved to vary specification without notice.

Ideal Stelrad Group

Ideal Installer/Technical Helpline: 01621 878549

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