Installation & User Manual

DuoWave System

Part No. DOC 75 Rev. 01 May 2007

WRAS APPROVED PRODUCT

GRANT

EFFICIENT HEATING SOLUTIONS

Important Information

Thank you for purchasing a Grant unvented hot water storage cylinder from our Duowave range. This installation manual must be read carefully before you begin installing the cylinder.

This cylinder must be installed by a competent person in compliance with all current legislation, codes of practice and local by-laws covering the installation of an unvented hot water cylinder. Please also make sure that any installation complies with the instructions contained in this manual.

General Requirements

If the cylinder is not being installed immediately, it should remain sealed with all pipe-end protective caps in-situ to prevent damage. We recommend that the cylinder be transported and stored in an upright position.

The cylinder must be installed in an upright (vertical) position and may stand on any flat and level surface without special preparation, provided that it is sufficiently robust to support the fully flooded weight of the cylinder.

The cylinder should be positioned so that enough access is provided for servicing and maintaining the controls and replacing the immersion heater, should the need arise.

Key User Information

If water is seen to flow from the Temperature & Pressure Relief Valve on the cylinder (Item 15 - Page 6)

- Shut off the electrical supply to the immersion heater
- Shut down the boiler
- Switch off all other heat sources to cylinder (e.g. solar, heat pump, etc.)

Do **NOT** shut off the water supply to the cylinder.

Contact your installer to check the system.

WARNING

Do NOT tamper with any of the Safety controls fitted to the cylinder. If you suspect a fault always contact a COMPETENT installer – qualified to work on unvented water cylinders.

About your New Cylinder

Your DuoWave cylinder has two coils for connection to Primary heat sources. If a heat source such as Solar Thermal or a Ground Source heat pump is to be connected, the bottom coil must be used. Please refer to the manufacturers installation instructions for more information.

The central heating boiler connections should be made to the top coil.

In all cases, each coil must be connected using a 2 port motorised valve (for solar installations a high temperature valve must be used) to shut off the flow from the primary source and electrically interlocked with the heat source via the cylinder control and limit thermostat.

Failure to do so will invalidate all warranties and will be in breach of The Building Regulations (2000) Approved Document G3.

More information on electrical wiring is given on pages 12-15.

Health and Safety

The information supplied in Table 1 will help you assess the safest way to manoeuvre your cylinder into position. Please use the table to find the empty weight of your cylinder and then consider how you can safely move it into its final position.

Dimensions and Weights Table 1

Model	Capacity (litres)	Height (mm)	Diameter (mm)	Weight Empty (kg)	Weight Full (kg)
GDW200	200	1165	580	56	256
GDW250	250	1425	580	61	311
GDW300	300	1680	580	66	366
GDW400	400	2190	580	78	478

✧ **PLEASE LEAVE THIS MANUAL WITH THE HOUSEHOLDER AFTER INSTALLATION** ✧

Contents

Installation Guide

1 Technical Specification

1.1 Dimensions

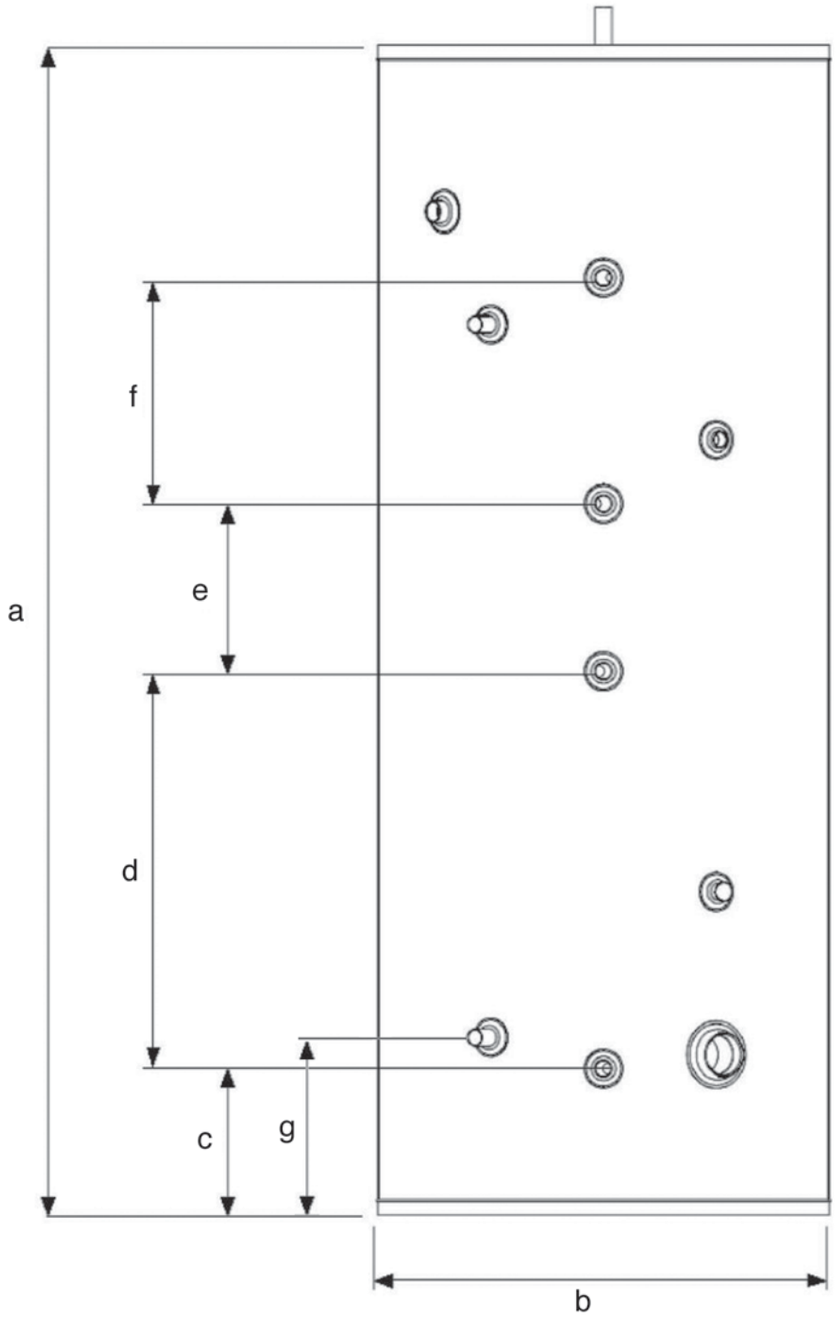
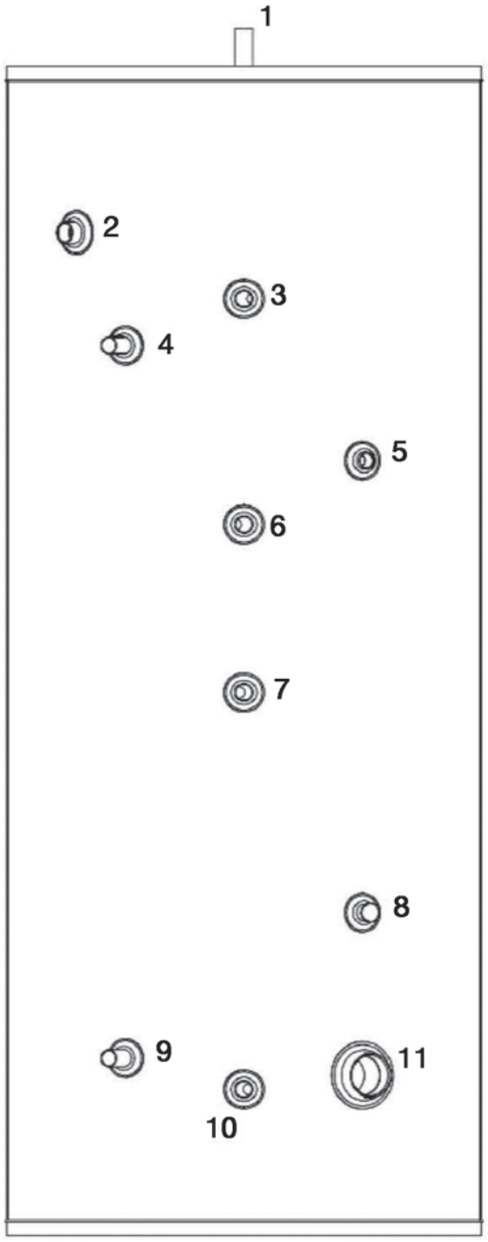


Figure 2.
GDW Cylinder Dimensions (mm)

	Model			
	200	**250**	**300**	**400**
a	1165	1425	1680	2190
b	580	580	580	580
c	187	187	187	187
d	400	510	580	800
e	60	100	100	100
f	290	290	290	400
g	228	228	228	228

1 Technical Specification

1.2 Connections

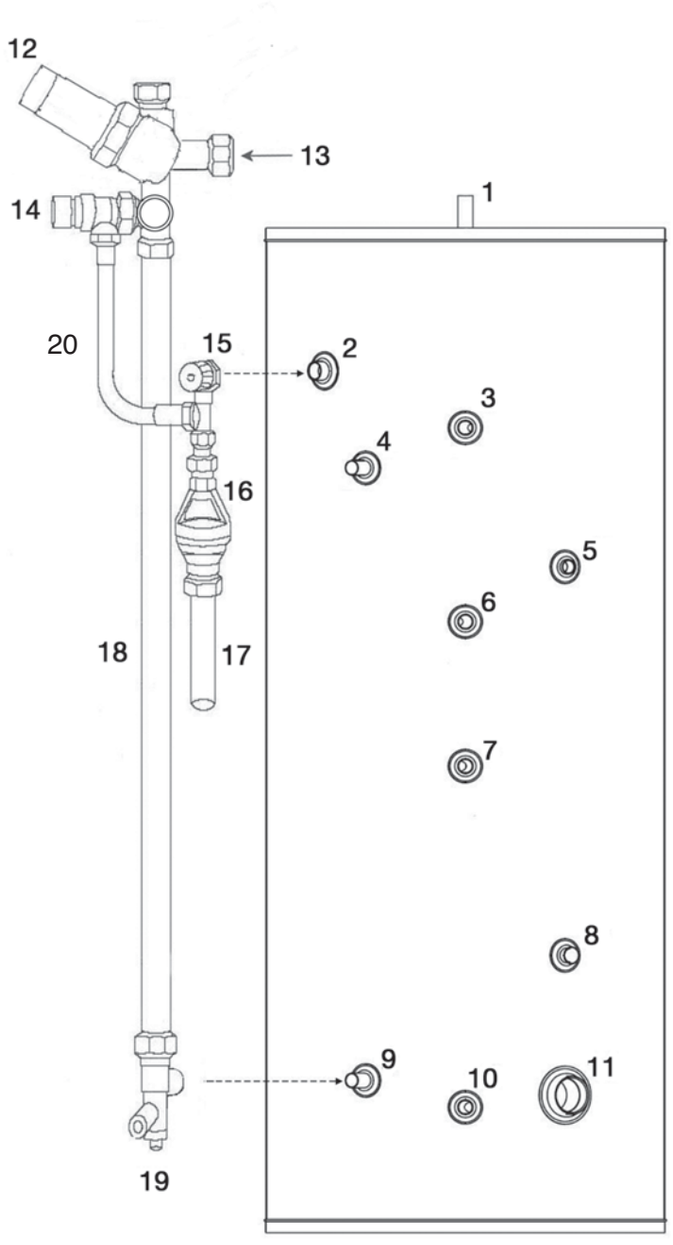


Connections		
1	DHW Out	22mm
2	T & P Valve 90°C/7 bar	3/4" BSPF
3	Boiler Return	22mm
4	Secondary Return	22mm
5	Boiler Thermostat pocket	1/2" BSPF
6	Boiler Flow	22mm
7	2nd Heat Source Return	22mm
8	2nd Heat Source Thermostat Pocket	1/2" BSPF
9	Cold In	22mm
10	2nd Heat Source Flow	22mm
11	Immersion Element	1 3/4" BSPF

Figure 3. Connections

1 Technical Specification

1.3 Controls



Item	Description	
1	DHW Out	3/4" BSPF
2	T & P Valve Pocket	22mm
3	Boiler Return Tapping	22mm
4	Secondary Return Tapping	1/2" BSPF
5	Boiler Control & Limit Thermostat Tapping	22mm
6	Boiler Flow Tapping	22mm
7	2nd Heat Source Return Tapping	1/2" BSPF
8	2nd Heat Source Control & Limit Thermostat Pocket (For Dual Stat only)	22mm
9	Cold Mains In	22mm
10	2nd Heat Source Flow Tapping	1 3/4" BSPF
11	Immersion Element c/w Control & Limit Thermostat Tapping	22mm
12	Pressure Reducing Valve 3 bar	22mm
13	Balanced Cold Supply	22mm
14	Pressure Relief Valve 6 bar	15mm
15	T & P Valve 90°C/7 bar	-
16	Tundish	-
17	Discharge Pipe (not supplied)	-
18	Mains Supply Pipe (not supplied)	-
19	Drain Cock	-
20	Press. Relief Valve Pipe (not supplied)	-

Note: Do not use Push-Fit fittings on stainless steel pipe.

Note: Connections 14 (Pressure Relief Valve) and 2 (T & P Valve) sockets must not be used for any other purpose.

The pipework between item 14 and 15 is not supplied.

Figure 4. Controls and Connections

1 Technical Specification

1.4 Coil Details

Figure 5. General Assembly Cut Through

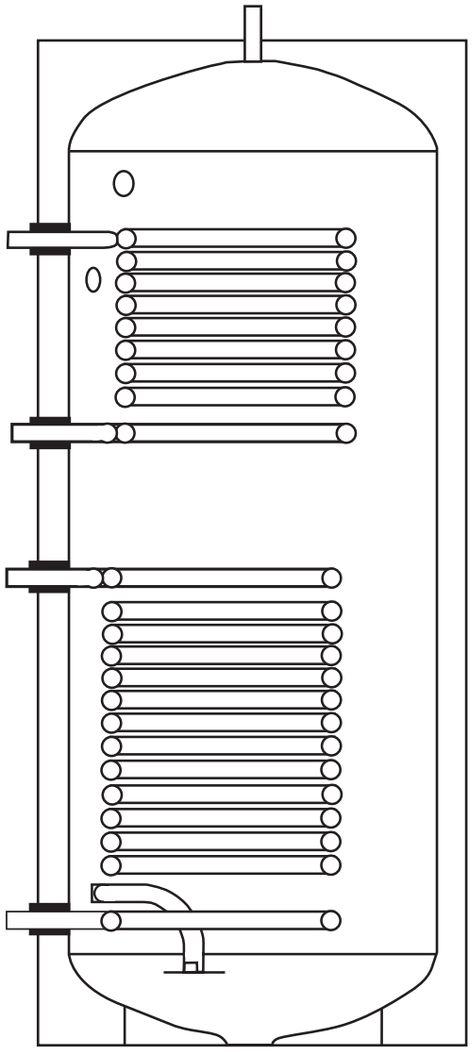


Figure 6. Cold Feed Tube & Hot Water

Model	Bottom Coil Pipe					Top Coil Pipe			
	Length	Pipe Diameter	Surface Area	Recovery Rate*	Coil rating	Length	Pipe Diameter	Recovery Rate*	Coil rating
GDW200	11m	22mm	0.76m^2	24mins	12.1kW	8m	22mm	10mins	8.8kW
GDW250	14m	22mm	0.97m^2	28mins	15.4kW	8m	22mm	14mins	8.8kW
GDW300	16m	22mm	1.11m^2	27mins	17.6kW	8m	22mm	18mins	8.8kW
GDW400	22m	22mm	1.52m^2	35mins	24.2kW	11m	22mm	18mins	12.1kW

*Recovery rate is based on 82^{o}C flow @ 0.2L/sec over a 50^{o}C temperature rise for 70% of contents.

2 Water Supply

2.1 Cold Water Supply

1. We recommend that your Grant Unvented Cylinder is installed with an uninterrupted water supply.
2. Position the cylinder in such a way that future engineers will have access to all components in and around the area.
3. If you are ready to use the bottom coil connect the flow from your secondary heat source (e.g solar) to the bottom connection and the return to the top. Fit the dual thermostat and locate solar sensor through capillary sleeve.
4. Assemble the pressure reducing valve to the pressure relief valve (PRV) (if not already assembled) and install as per Figure 1 using 22mm copper pipe. Make sure that the head of the pressure reducing valve is off set from the cylinder to ensure ease of access.
5. Connect the PRV to below the temperature and pressure relief valve (T & P) with a 15mm copper pipe using a T-piece. Fit the tundish to the tee piece using a short length of 15mm copper tube.
6. If the dwelling has a shower mixing valve (manual or thermostatic) or a bidet (over rim type) remove the blanking cap from the PRV and use this connection to provide the cold water supply for these appliances.

   Do not use the balanced cold connection to supply bath taps as this can reduce the flow of water available to the cylinder (see page 21, fig.15).
7. Flush all new pipework thoroughly before connecting to the cold water supply.
8. Once the pipework is flushed connect the cold supply to the pressure reducing valve.

2.2 Hot Water Supply

9. Connect the hot water supply pipe to the top outlet (1) of the cylinder.

2.3 Secondary Return

10. Guidance on fitting a secondary return is given on page 21.

2.4 Discharge Pipe

11. The discharge pipe from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge. The discharge pipe should be of metal, e.g. copper and:

    a. be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long. Discharge pipes between 9m and 18m equivalent resistance length should be at least two pipe sizes larger than the nominal outlet size of the safety device and for pipes of between 18 and 27m at least three sizes larger, and so on. Bends must be taken in to account in calculating the equivalent resistance. Each bend/elbow is apporximately equivalent to 0.8m of straight pipe.

    b. have a vertical section of pipe at least 300mm long, below the tundish (must be installed vertically) before any elbows or bends in the pipework.

    c. be installed with a continuous fall.

    d. have discharges visible at both the tundish and the final point of discharge but where this is not possible or practically difficult there should be clear visibility at one or other of these locations.
12. Examples of acceptable discharge arrangements (see section 8.1) are:

    a. ideally below a fixed grating and above the water seal in a trapped gully.

    b. downward discharges at a low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc. are acceptable providing that where children may play or otherwise come in to contact with discharges, a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility.

    c. discharges at high level; e.g. in to metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastics guttering systems that would collect such discharges (tundish visible).
13. Where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any installation can be traced reasonably easily. The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe to be connected. If unvented hot water storage systems are installed where discharges from safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warm when discharge takes place.

Note: The discharge will consist of scalding water and steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.

2.5 Boiler Primary Connections

Central Heating

14. The boiler primary flow and return connections should be made to the upper coil connections of the unit (refer to page 5). The motorised valve (supplied) must be fitted into the primary flow. The primary flow and return fittings are 3/4" BSP female. The valve has 22mm x copper connections.
15. Fit the three port pocket to the 1/2" BSPF socket (item 5 page 6) and locate dual thermostat pocket bush.

2.6 Auxiliary Primary Connections

Solar Heating

16. The Solar flow and return connections should be made to the lower coil connections. If the lower coil is not thermostatically controlled a suitable **high temperature rated** two port valve (**not supplied**) must be fitted in the flow and be controlled from the thermostat mounted at low level in the cylinder, in the three port pocket (item 8 page 6).

    If you are connecting another primary heat source please refer to the installation manual of that appliance. Do not connect an uncontrollable appliance to this cylinder (e.g wood burning stove, multi fuel stove, etc.).

3 Installation & Servicing

3.1 Cold Water Manifold

This manifold contains a pressure reducing valve (with integral strainer), double check valve, expansion valve with a stainless steel seat. The pressure reducing valve is factory set. The set pressure is shown on top of the valve. Maximum inlet pressure to valve is 12 bar.

3.2 Installation

1. Cold water supply to be 22mm nominal size.
2. **Flush supply pipework before connection to remove all flux and debris prior to fitting the inlet controls. Failure to do this may result in irreparable damage to the controls and will invalidate the warranty.**
3. The manifold can be installed in any position as long as it is installed in the correct flow direction. Refer to the arrows on the side of the body.
4. The expansion valve should be either horizontal or upright - if fitted inverted, debris may be deposited on the seat and cause fouling of the seat when the valve operates. Check direction of flow arrows.
5. The black plastic plug in the body is a pressure gauge connection to enable pressure monitoring to be carried out, should the system develop a fault. It is recommended that this be accessible.
6. Expansion relief drain pipework must be connected to a safe visible discharge point via a tundish and the pipework must have a continuous fall.
7. The pressure reducing valve has two outlets, the second one is for a balanced cold water supply, to a shower or a bidet **(over rim type only, ascending spray type requires type AA, AB or AD air gap). Major shower manufacturers advise fitting a mini expansion vessel in the balanced cold supply to accommodate thermal expansion and prevent tightening of shower controls. Do not use the balanced cold connection to supply bath taps as this can reduce the flow of water available to the cylinder.** If the balanced cold water outlet is not required, blank off the port using the blanking disc supplied (see page 21, fig. 15).

   Both the Installation/Guarantee Card and the Benchmark book enclosed with the cylinder should be completed after commissioning of the system.
8. The expansion vessel must be fitted to the cold feed pipe between the pressure reducing valve and the cylinder. No valve should be fitted between the expansion vessel and cylinder.

4 Commissioning, Draining Down & Safety

4.1 Filling Cylinder

1. Open all hot water taps.
2. Turn on the stop cock.
3. When water flows from all taps close the taps.
4. Allow system to stabilise for five minutes.
5. Open each hot water tap in turn to expel air from the system pipe work.
6. Check for leaks.
7. Manually operate Temperature and Pressure Relief Valve (item 15, page 6) to ensure free water flow through discharge pipe. (Turn knob to left).

4.2 Draining Down

Switch the electrical power off (important to avoid damage to element). Isolate boiler from DuoWave unit.

Turn off the cold water supply valve (stop cock). Open hot water taps. Open drain (item 19, page 6). The unit will drain.

4.3 Safety Cut-Out

1. The safety cut-out operates if:
   a. Wiring is incorrect.
   b. The immersion heater thermostat or cylinder thermostat fails.
   c. Thermostat is set too high.
2. Remember before resetting the safety cut-out or altering the thermostat setting, isolate electrical supply to the unit prior to removal of the electrical box lid.
3. Reduce thermostat setting and press the reset button. After adjustments are completed, ensure the lid to the electrical box is replaced correctly and the retaining screw is fitted.

4.4 Cold Water Discharge from Tundish

There are two reasons why cold water will discharge from the tundish:

1. The pressure reducing valve has malfunctioned (This will cause a large volume of water to flow through the tundish).
2. The PRV is letting by (This will cause a very low volume of water to flow through the tundish).

In both cases, identify the defective component and replace. All repairs must be carried out by a competent person.

4.5 Hot Water Discharge from Tundish

There are four reasons why hot water will discharge from the tundish:

1. Thermal cut-out has malfunctioned.
2. The control thermostat has malfunctioned.
3. The T & P valve is letting by.
4. The expansion vessel has failed or lost its charge.

In all cases, should a repair be necessary, the work must be carried out by a competent person.

Isolate the cylinder from all electrical supplies before comencing maintenance work.

4.6 Expansion Vessel

1. Connect the expansion vessel to the cylinder by using the flexible hose to the tee piece as shown on Figure 2 on page 4. Note: No valve should be fitted between the expansion vessel and the supply pipe.
2. Ensure that the air charge in the vessel matches the pressure setting shown on the pressure reducing valve (normally 3 bar).
3. The expansion vessel must be installed even if an accumulator is fitted.
4. The charge of the vessel must be checked at every annual service.

5 Maintenance

5.1 Pressure Reducing Valve

1. Isolate the cold water supply.
2. Unscrew the retaining nut of the valve. The complete operating mechanism, including the strainer can be removed.
3. Clean the filter mesh and the cartridge under running water.
4. Replace cartridge ensuring that strainer is correctly located and reassemble the unit. Pressure Reducing Valve cartridge and strainer Part No.GCS07C - 3.0 bar.

5.2 Expansion Relief Valve

1. Isolate the cold water supply.
2. Remove grub screw (Allen Key type) from body of valve and withdraw valve ensuring not to damage O-ring.
3. Clean valve seat face and seating - do not scratch or damage either seat face or seating.
4. Refit in reverse order. Do not overtighten. Expansion relief valve Part No. GCS08.

5.3 Expansion Vessel

1. Isolate the cold water supply.
2. Open hot water taps.
3. Drain cylinder to below tee piece take off for expansion vessel flexible hose.
4. Replace expansion vessel after first checking the air charge (and hose if required).
5. Close drain off cock and turn on cold water supply.
6. When water is flowing freely from taps close taps.

5.4 Manifold

The manifold assembly should not, under normal circumstances, require any maintenance. During annual servicing it may be necessary to inspect and/or clean the line strainer, the pressure reducing valve cartridge and expansion relief valve cartridge. The frequency of cleaning will depend on the local water conditions.

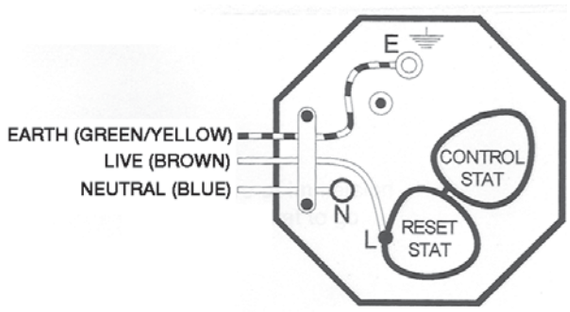
6 Electrical Installation

6.1 Immersion Heaters

All units are fitted with one immersion heater.

Wiring instructions for the immersion heater are located on the reverse side of the lower lid. Follow the wiring instructions connecting the live, neutral and earth as indicated. The electrical connection to the immersion heater must conform to current IEE wiring regulations. The unit must be permanently connected to the electrical supply through a double-pole linked switch with a minimum break capacity of 13 amp. All internal wiring is factory fitted. Each immersion heater has a working thermostat adjustable between 45°C - 75°C. A safety cut-out is also incorporated within the thermostat and will operate at 85°C ± 3°C. Should this happen, press the reset button.

Important:
Before resetting the safety cut-out or altering the thermostat setting, isolate electrical supply to the unit prior to removal of the lid. Ensure the cover to the immersion element is replaced correctly and the retaining nut is fitted.



WARNING: THIS APPLIANCE MUST BE EARTHED

Figure 7. Immersion Heater Thermostat
(Located in Electrical Box)

Electrical spare parts:	
Immersion Heater c/w Thermostat	GCS13
Thermostat for Immersion Heater	GCS15

6.2a Indirect Units Upper Coil

Motorised Valve

To comply with regulations governing the installation of indirect unvented cylinders, a motorised valve must be fitted in the primary flow. Your Grant DuoWave unit has been supplied with a two port motorised valve, which will act as a positive energy cut-out should the safety cut-out operate. The motorised valve will also control the temperature of the domestic stored water via the cylinder thermostat, which is located in the upper electrical box. The unit should be installed on an “S” or “Y” plan system, see pages 13 or 14. Cylinder temperature control can also be achieved via the solar thermostat when the boiler is not operational. **Please follow the instructions carefully**. All electrical connections must conform to current IEE wiring regulations. The working thermostat which controls the temperature of the domestic hot water (see fig. 9) is adjustable between 45°C - 75°C. A safety cut-out is also incorporated within the thermostat and will operate at 85°C ± 3°C. Should the safety cut-out be brought into operation, the motorised valve will operate and close down the primary flow to the cylinder. To reset the safety cut-out and the motorised valve the reset button must be pressed in.

Grant Engineering Limited cannot be responsible if alternative wiring plans are used.

Important:
Before resetting the safety cut-out or altering the thermostat setting isolate electrical supply to the unit before removal of the lid.

6.2b Position of Electrical Components

All electrical components must be fitted away from the location of the Tundish and from any area that is susceptible to splashing.

6 Electrical Installation

6.3 S Plan Wiring Layout

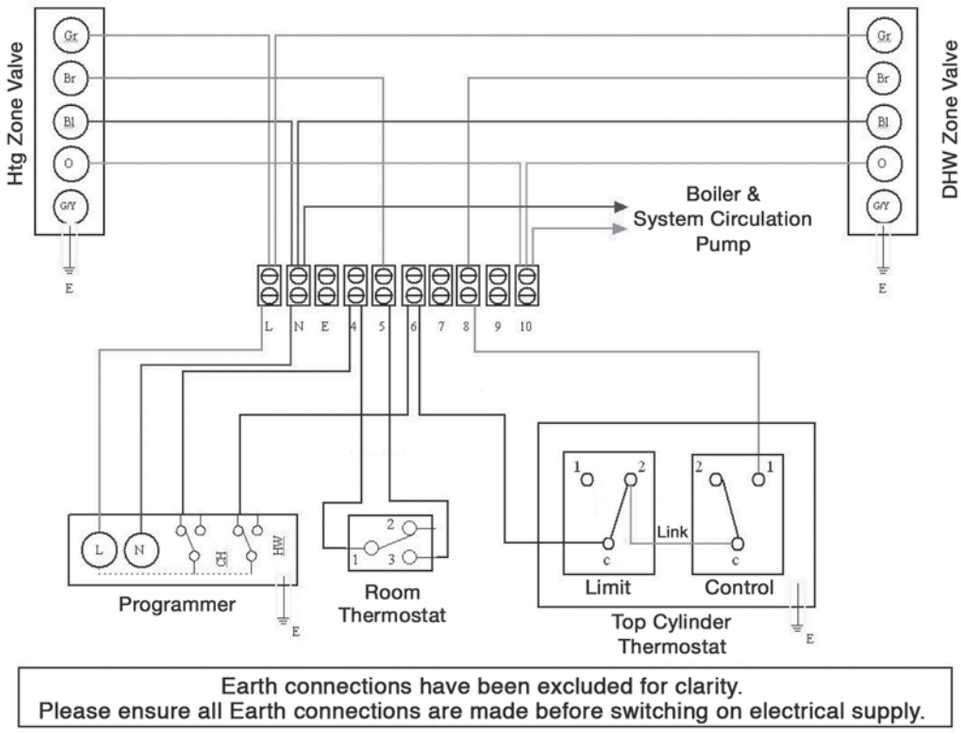


Figure 8. Plan Wiring

6.4 S Plan System Schematic

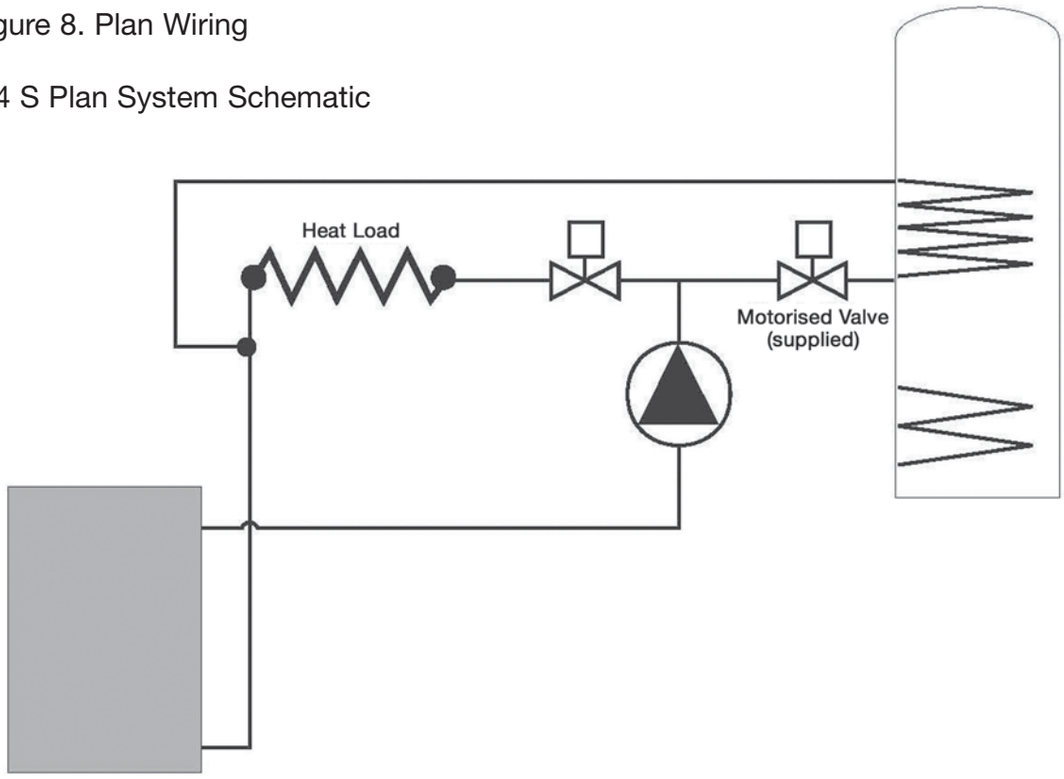


Figure 9. S Plan Schematic

6 Electrical Installation

6.5 Y Plan Wiring Layout

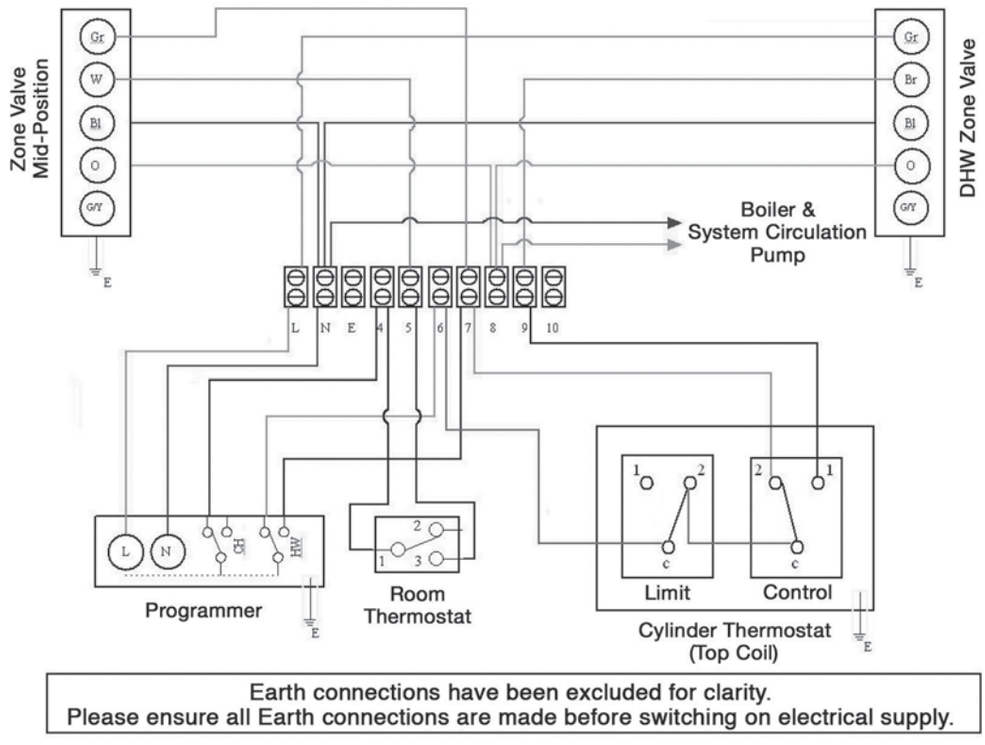


Figure 10. Y Plan Wiring

6.6 Y Plan System Schematic

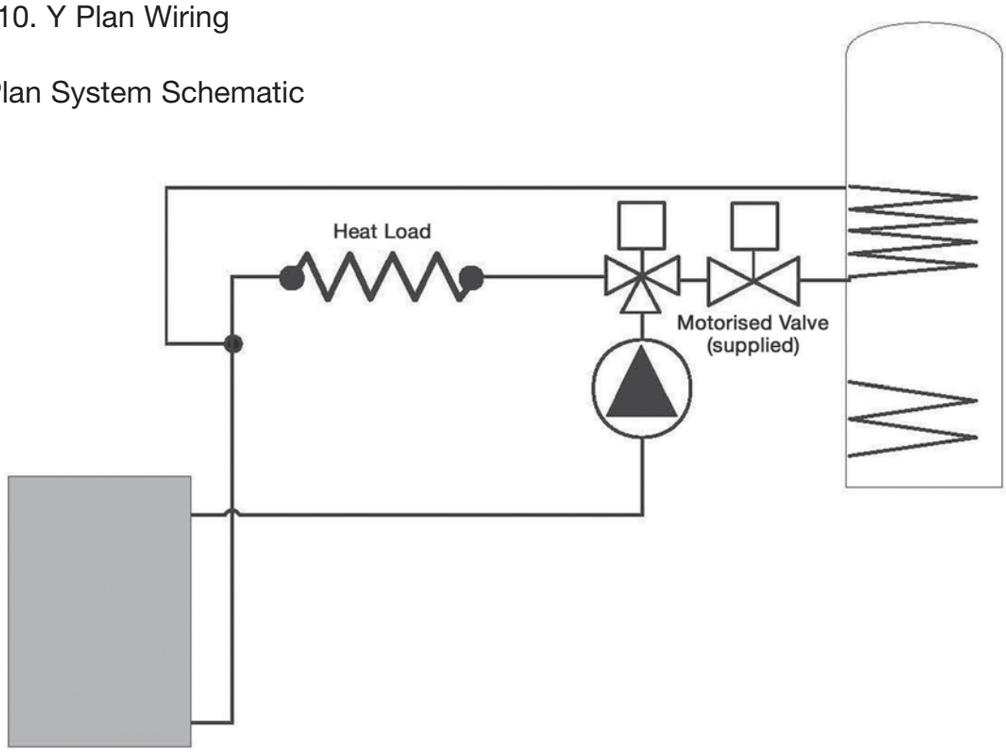


Figure 11. Y Plan System Schematic

6 Electrical Installation

6.7 Solar Thermal Wiring Layout

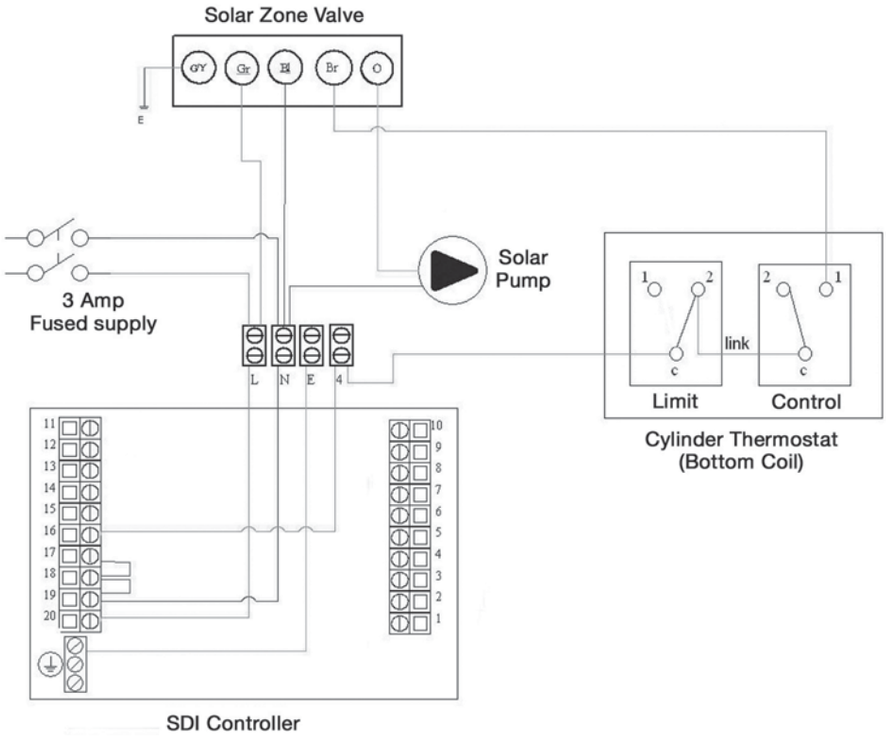


Figure 12. Solar Wiring

6.8 Solar Thermal Schematic

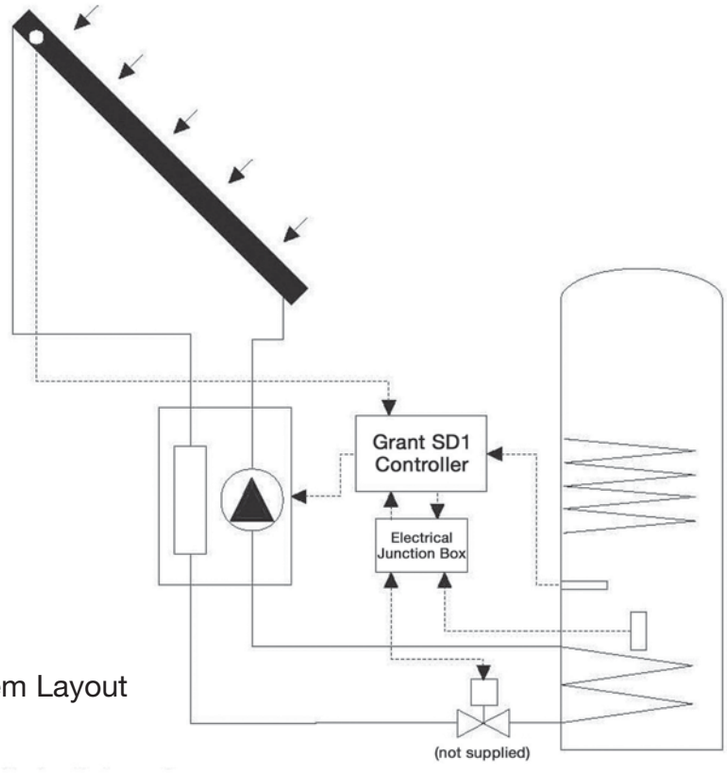
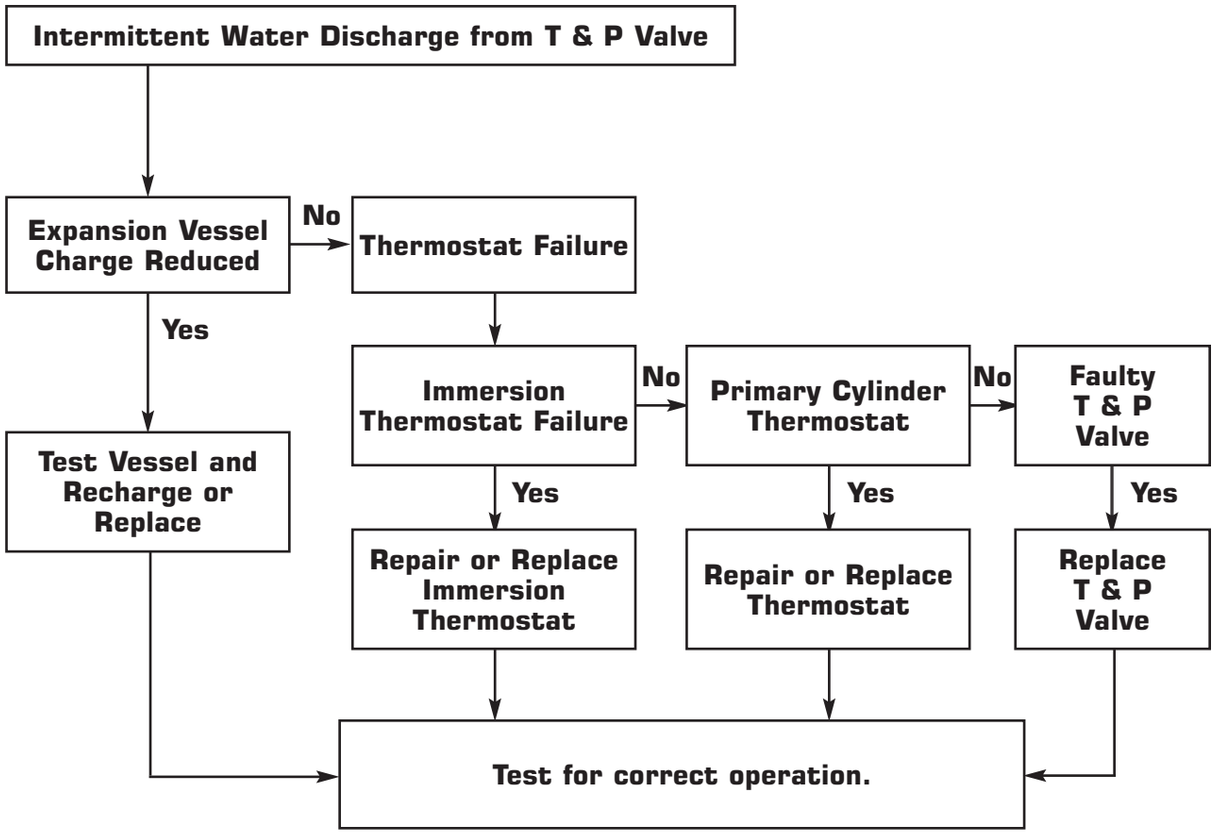


Figure 13. Typical Solar Thermal System Layout

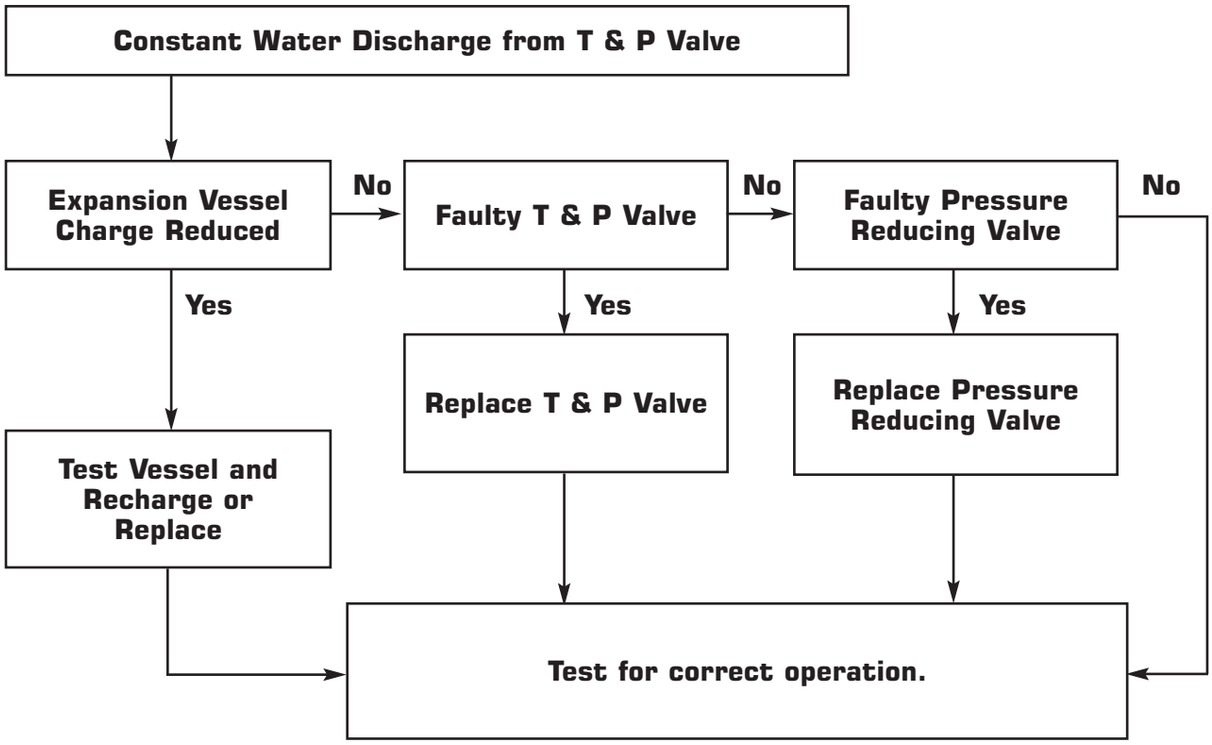
7 Fault Finding Guide

7.1 Intermittent Water Discharge



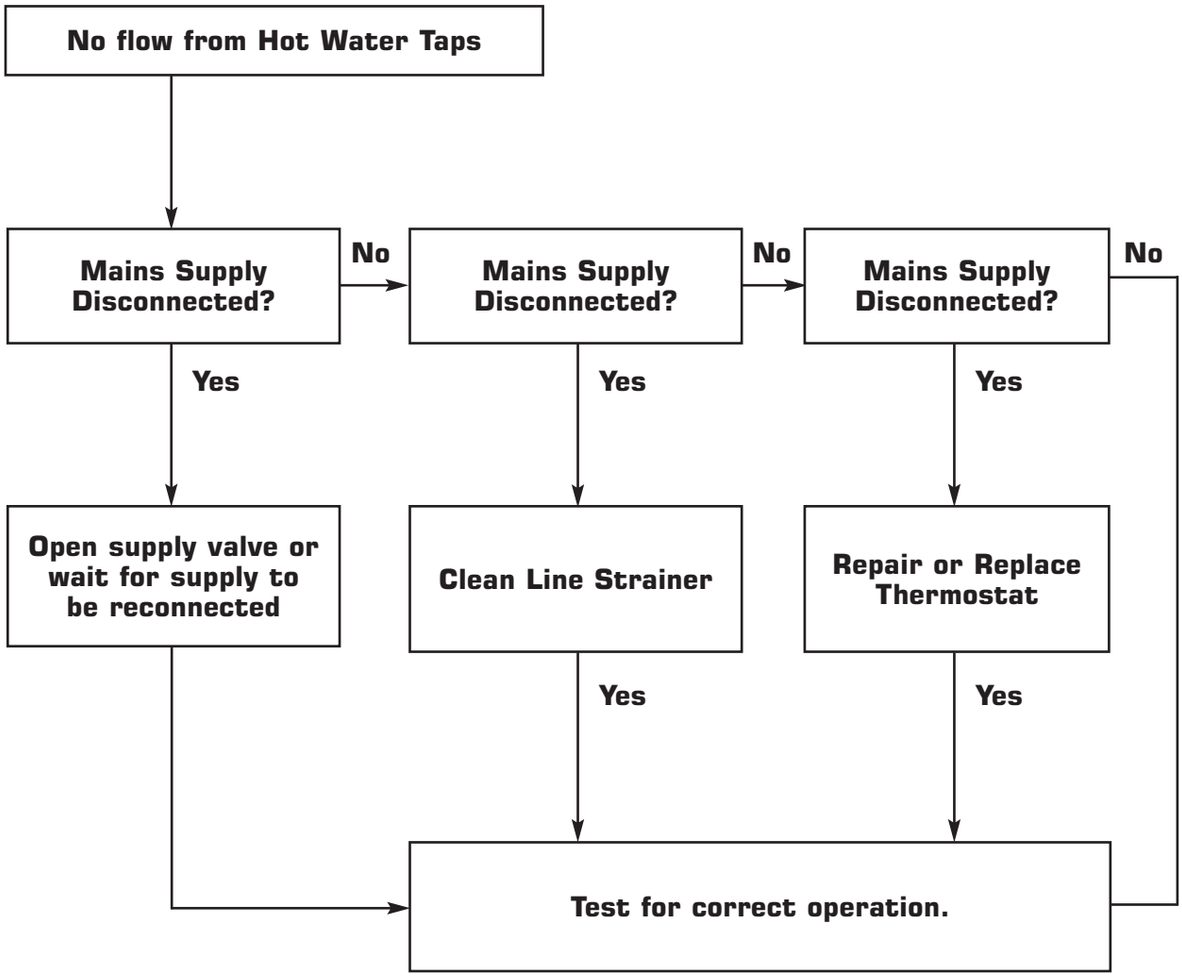
7 Fault Finding Guide

7.2 Constant Water Discharge



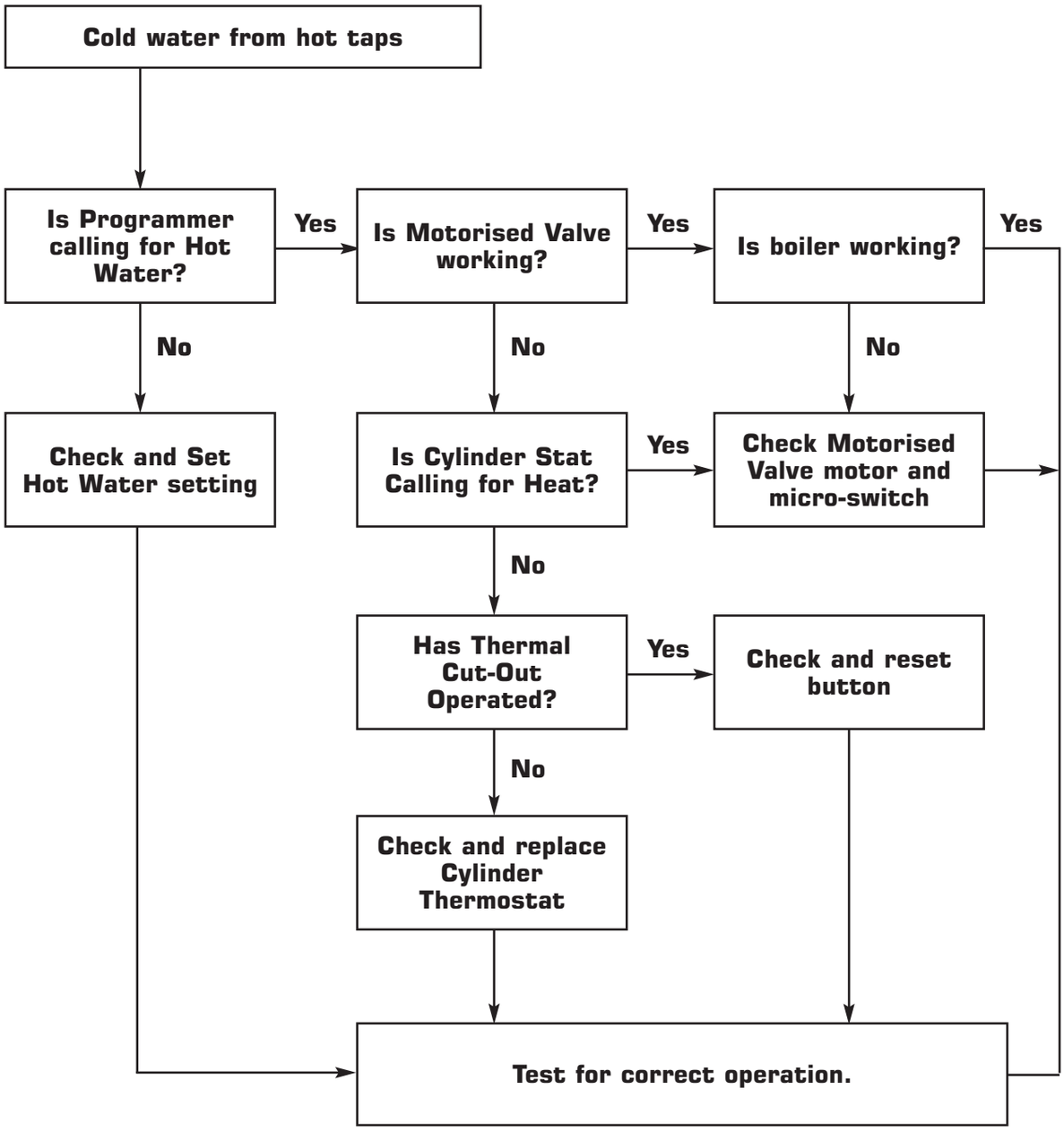
7 Fault Finding Guide

7.3 No Flow from Hot Water Taps



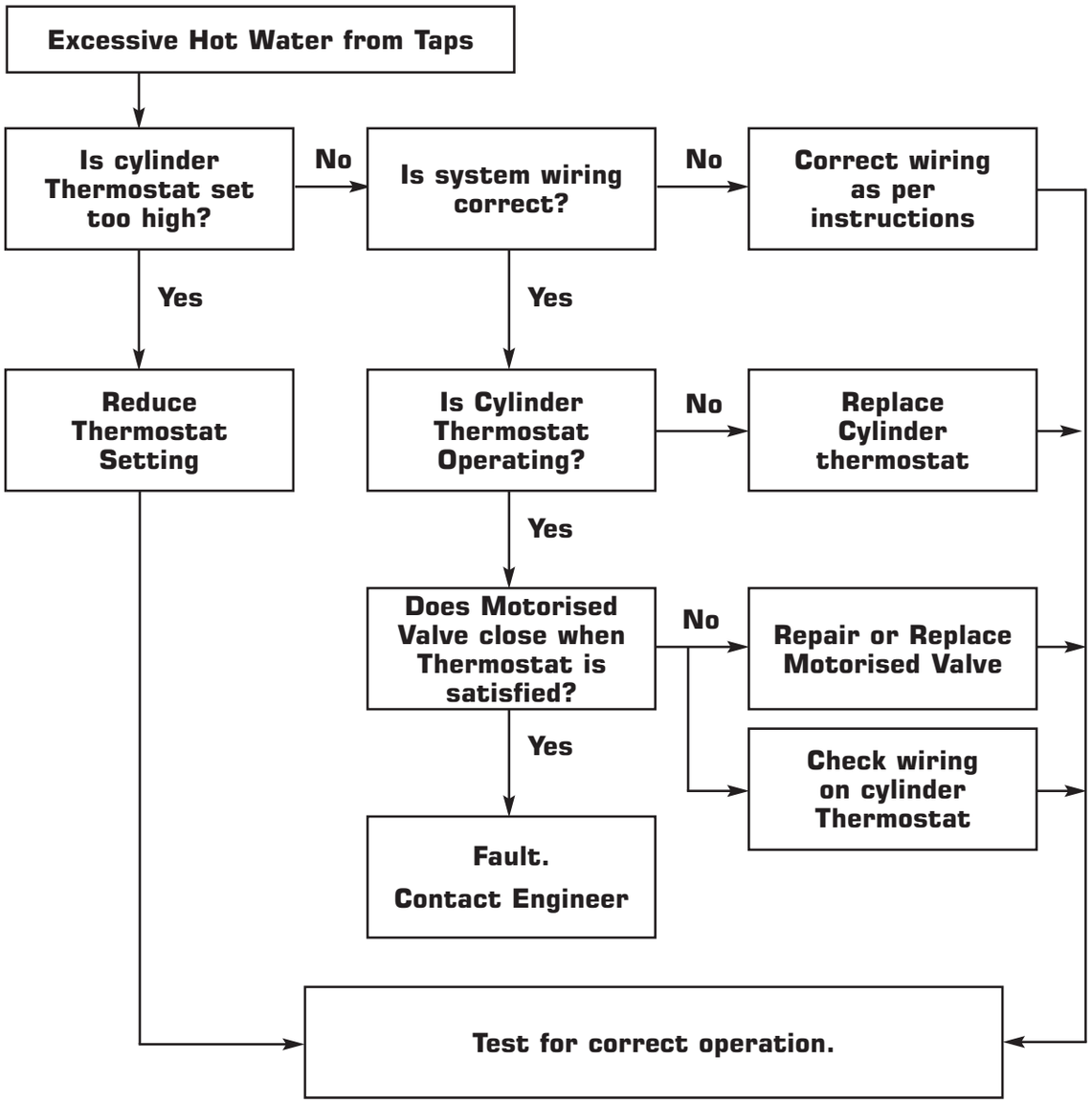
7 Fault Finding Guide

7.4 Cold Water from Hot Water Taps



7 Fault Finding Guide

7.5 Excessive Hot Water from Taps



8 Alternative Discharge

8.1 Alternative Discharge

Downward discharges at low level, i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc, are acceptable providing that where children may play or otherwise come into contact with discharges, a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility.

Discharge at high level, i.e. into a metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastics guttering system that would collect such discharges (tundish visible).

Where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any installation discharging can be traced reasonably easily. The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe to be connected. For further information contact your Building Control Office.

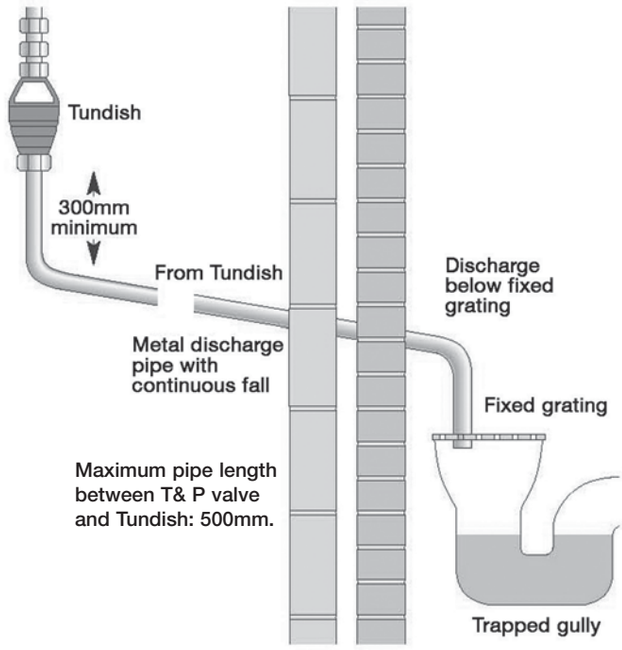


Figure 14. Suggested Discharge Route

8.2 Secondary Return

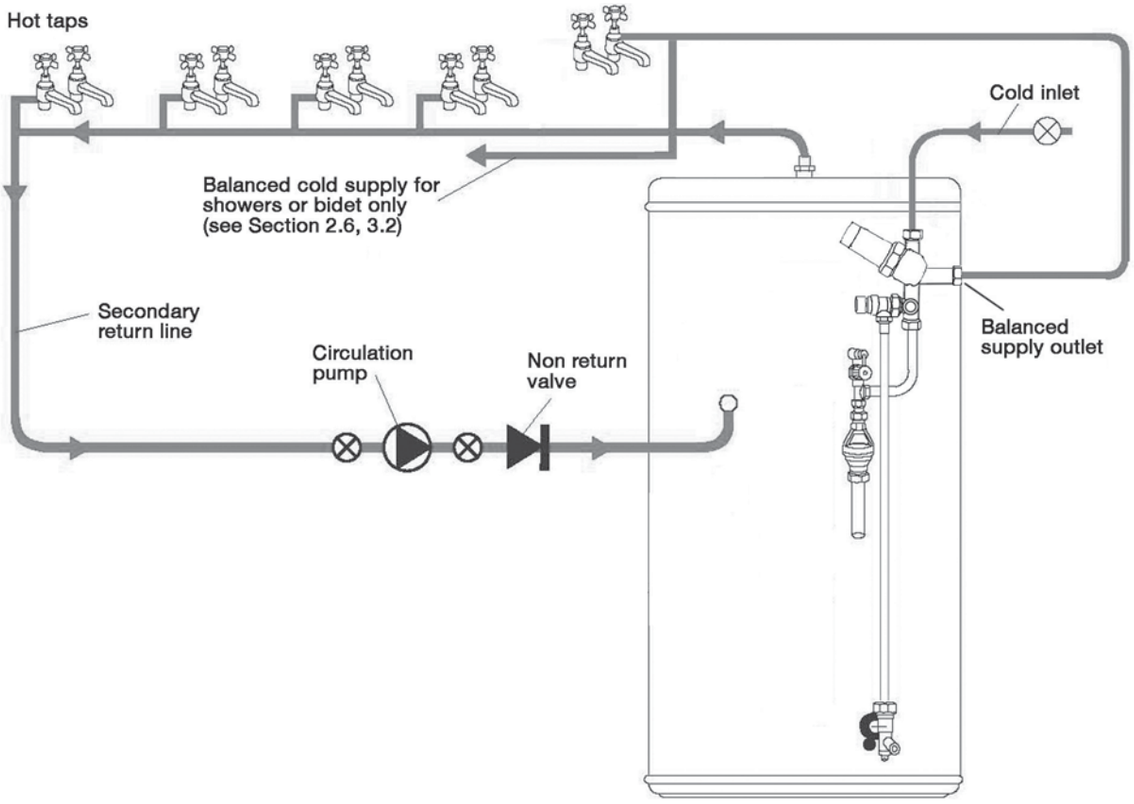


Figure 15. Secondary Return

9 Spare Parts

9.1 Spare Parts

Figure 16. Pressure Reducing Valve (Cartridge and Strainer) - Part No. GCS07C - 3 bar.

Figure 18. Tundish - Part No. GCS10.

Figure 17. Pressure Reducing Valve complete assembly with Pressure Release Valve. Part No. GCS17.

Figure 19. Pressure Relief Valve (Complete) - Part No. GCS08 - 6 bar.

9 Spare Parts

Figure 20. Flexible Hose - Part No. 200, 250 & 300 litre: GCS02 and 400 litre: GCS06

Part Name	Part No.
Pressure Reducing Valve Manifold	GCS07
Pressure Relief Valve	GCS08
Flexible Hose 200, 250 & 300	GCS02
Flexible Hose 400	GCS06
Temperatue & Pressure Relief Valve 90°C/7 bar 1/2"	GCS09
Tundish 15mm - 22mm	GCS10
Control/Limit Thermostat	GCS11
Tundish 22mm - 1"	GCS22
Immersion Heater Element	GCS13
Elbow/Drain Cock	GCS14
Immersion Heater Thermostat	GCS15
Motorised Valve (not factory fitted)	GCS20
Expansion Vessel 19 litre (200 & 250)*	GCS01
Expansion Vessel 25 litre (300)*	GCS04
Expansion Vessel 35 litre (400)*	GCS05
Temperatue & Pressure Relief Valve 90°C/7 bar 3/4"	GCS17
Three port pocket 1/2" BSPF	GCS18

*All pre-set to 3 bar

Figure 21. Expansion Vessel - Part No. 19 litre: GCS01, 25 litre: GCS04 and 35 litre: GCS05

EFFICIENT HEATING SOLUTIONS

WRAS APPROVED PRODUCT

GRANT ENGINEERING LIMITED

UK: Hopton House, Hopton Industrial Estate, Devizes, Wiltshire SN10 2EU Tel: 0870 7775553 Fax: 0870 7775559
Email: sales@grantuk.com www.grantuk.com

Ireland: Crinkle Birr, Co. Offaly, Ireland Tel: 05791 20089 Fax: 05791 21060
Email: info@grantengineering.ie www.grantengineering.ie

Part No. DOC 75 Rev. 01 May 2007