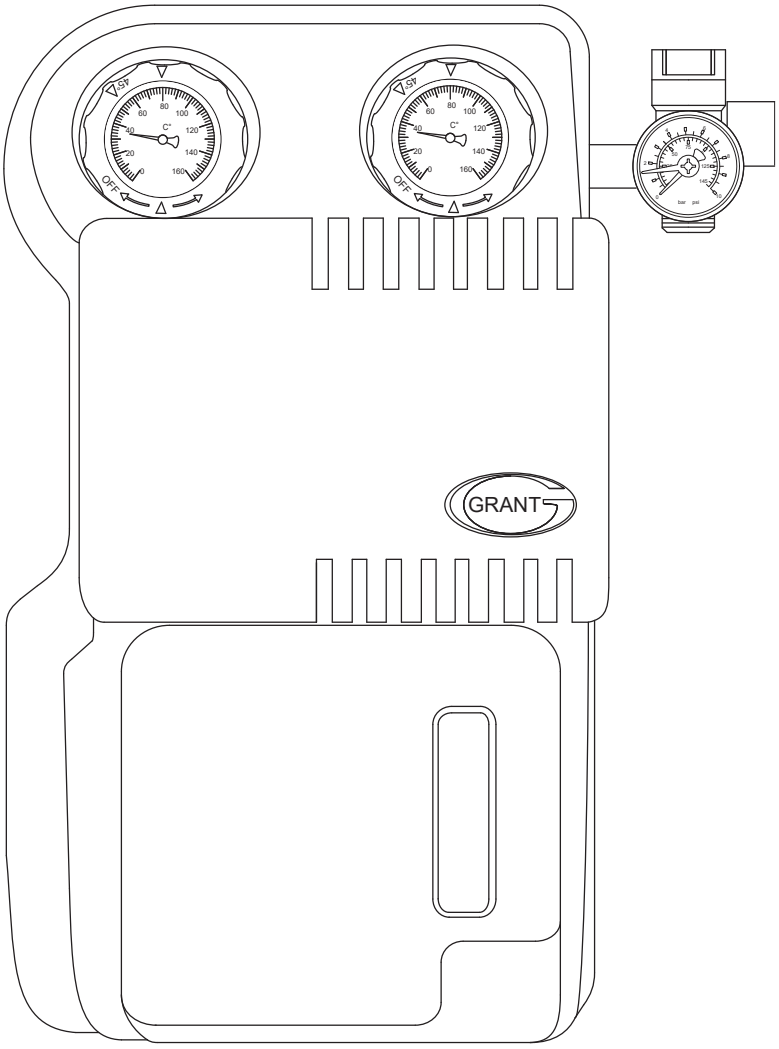
Grant

Solar Pump Station

Installation & Servicing Instructions



UK | DOC 0096 | Rev 1.1 | March 2024

IMPORTANT NOTE FOR INSTALLERS

Please read these instructions alongside the instructions supplied with the Grant Sahara Solar Thermal System (Grant UK DOC 0073).

After commissioning, please leave both the System Installation Instructions and these Pump Station Instructions with the user for future reference.

Important: All system pipe connections must use compression fittings with brass olives. Soft soldered joints must NOT be used on the solar primary circuit. Plastic pipe must not be used for any part of the solar primary circuit.

SPECIAL TEXT FORMATS

The following special text formats are used in these instructions for the purposes listed below:

! WARNING !

Warning of possible human injury as a consequence of not following the instructions in the warning.

! CAUTION !

Caution concerning likely damage to equipment or tools as a consequence of not following the instructions in the caution.

! NOTE !

Used for emphasis or information not directly concerned with the surrounding text but of importance to the reader.

SERVICING

The Grant Solar Pump Station Supplied with your Grant Solar Thermal system should be inspected at least every twelve months.

PRODUCT CODES COVERED

These instructions cover the following product codes:

	Product code
Grant Solar Pump Station	GS222154HX

CUSTOMER SUPPORT CENTRE

Grant UK provides an online support centre for Heating Professionals and Homeowners to access post-installation care, advice and maintenance support for Grant products. Follow the QR codes below to access your relevant Customer Support Centre.

SUPPORT HUB

Homeowner`

SUPPORT HUB

Professional

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Contents

1 Introduction

1.1 GENERAL

The Grant Solar Pump Station is a two-line Solar Pump Station for the circulation of glycol mix solar fluid through Grant solar thermal systems.

All components are housed within an insulated enclosure designed to be wall mounted.

The Grant Solar Pump Station provides the following functions:

- Filling and flushing connection points
- Fluid flow rate regulation
- System pressure and temperature readings
- Check valves (Gravity Brakes) for anti-gravitation circulation
- Safety pressure relief valve and discharge connection
- System expansion vessel connection point
- Isolation valves for upper and lower system levels and pump

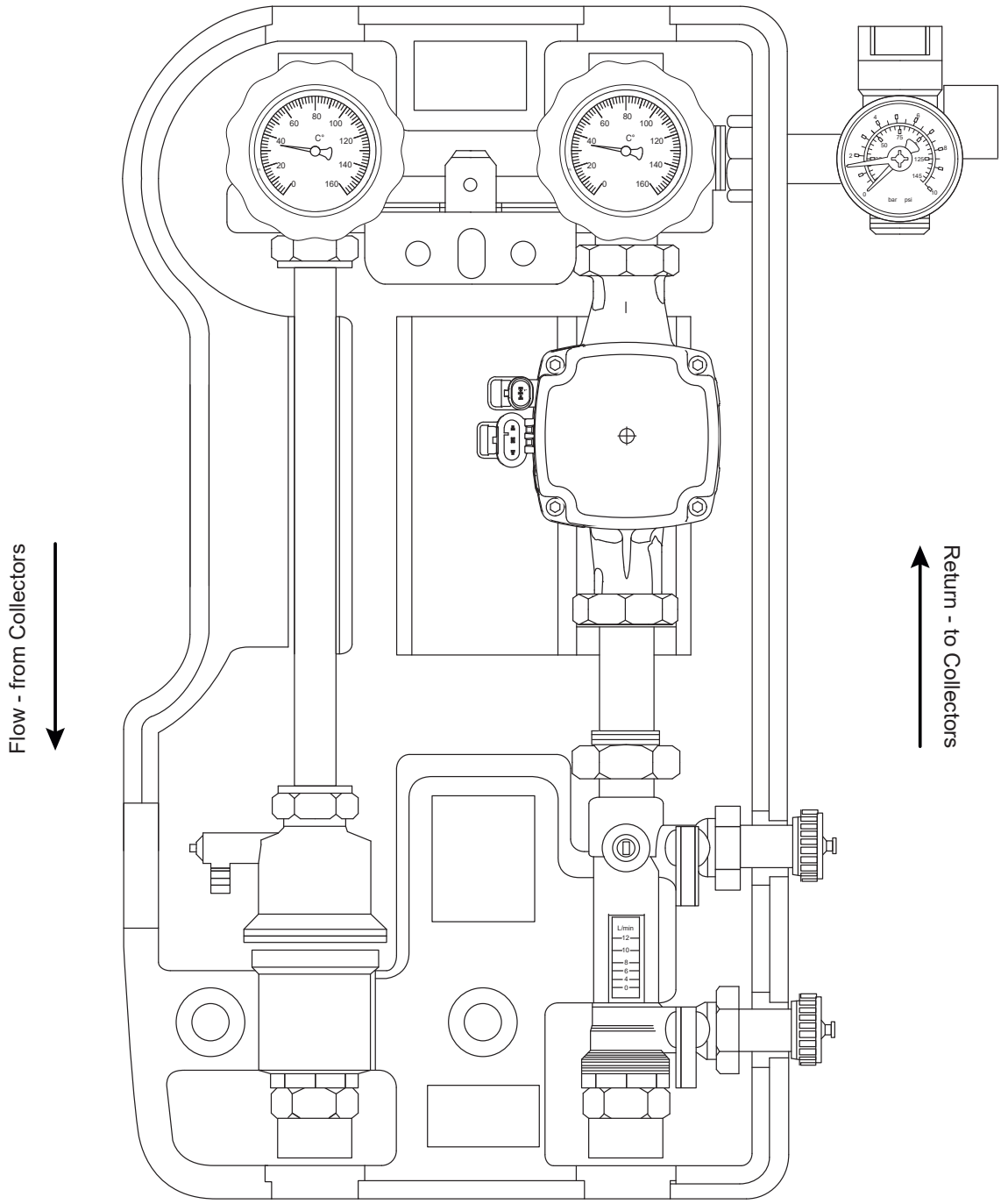

Figure 1-1: Grant Solar Pump Station with front cover removed

2 Technical Data

2.1 GRANT SOLAR PUMP STATION TECHNICAL DATA

Table 2-1: Technical data

Specifications for The Grant Solar Pump Station	
Dimensions	480 x 275* x 180 (mm)
Weight	6 kg
Pump mounting length	130mm
Spacing between flow and return connections	125mm
Body material	Brass
Flow meter range	0-12 l/min.
System pipe connections	¾" BSP Female.
Safety valve	With safety valve 6 bar certified TUV according to SV 100 7.7 - Directive 97/23/CE.
Safety valve discharge connection	¾" BSP Female.
Expansion vessel connection	¾" BSP Male.
Pressure gauge range	0-10 bar.
Thermometer gauge range	0-160°C.
Maximum glycol (%) in solar fluid	50 %
Circulating pump**	Grundfos UPM3 Solar 25-75 130 CZA.(Hybrid variant). 1½" BSP Male.
Temperature range of pump operation	Maximum fluid temp of 110°C at 70°C ambient temperature. Maximum fluid temp of 130°C at 60°C ambient temperature.
Pump connection	1 ½" BSP Male.
Electrical supply	230-240V 50 Hz.
Insulation material	Black PPE (Density = 40 kg/m³). Plain.
Flow and Return valves	DN20. ¾" BSP Female connection, integral check valve.
Min pressure to open check valve	2 kPa (200mm w.g./ 20mbar)
Check valve activation	Closure at 90° and opening at 45°.
Solar controller	Available separately. Contact Grant UK for details.

*Pressure gauge assembly not included in unit width.
**To see details refer to Appendix A.

2.2 PUMP PERFORMANCE

2.2.1 GRUNDFOS UPM3 SOLAR 25-75 130 CZA (HYBRID VARIANT)

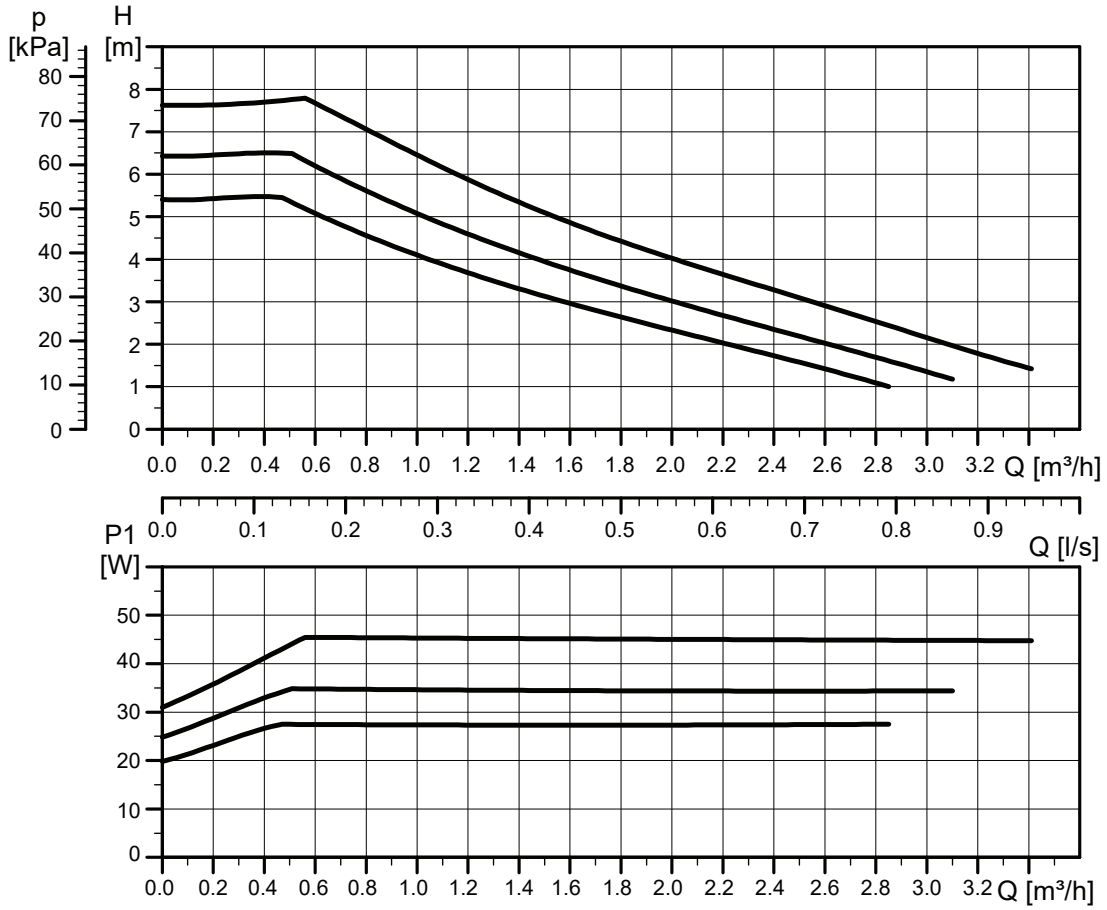

Figure 2-1: Grundfos UPM3 Solar Q(H) & energy consumption characteristics

2.3 DIMENSIONS

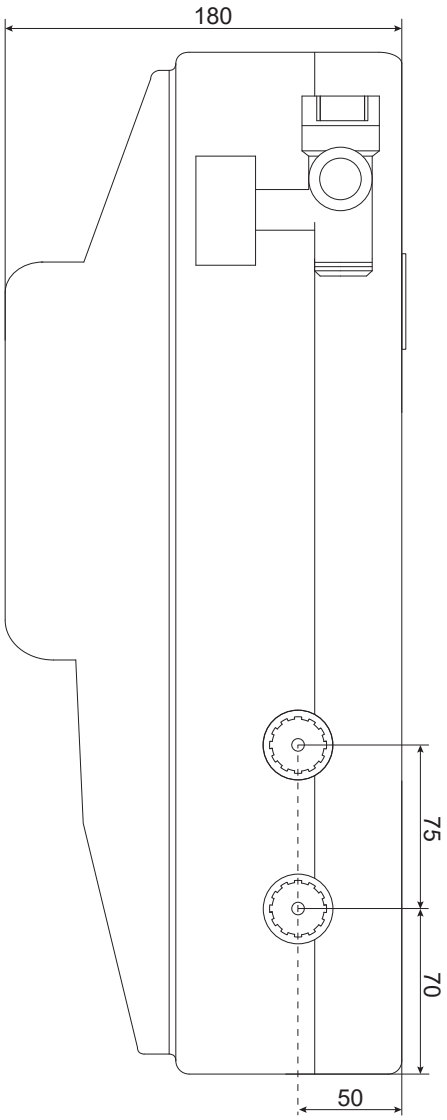

Figure 2-2: Side view

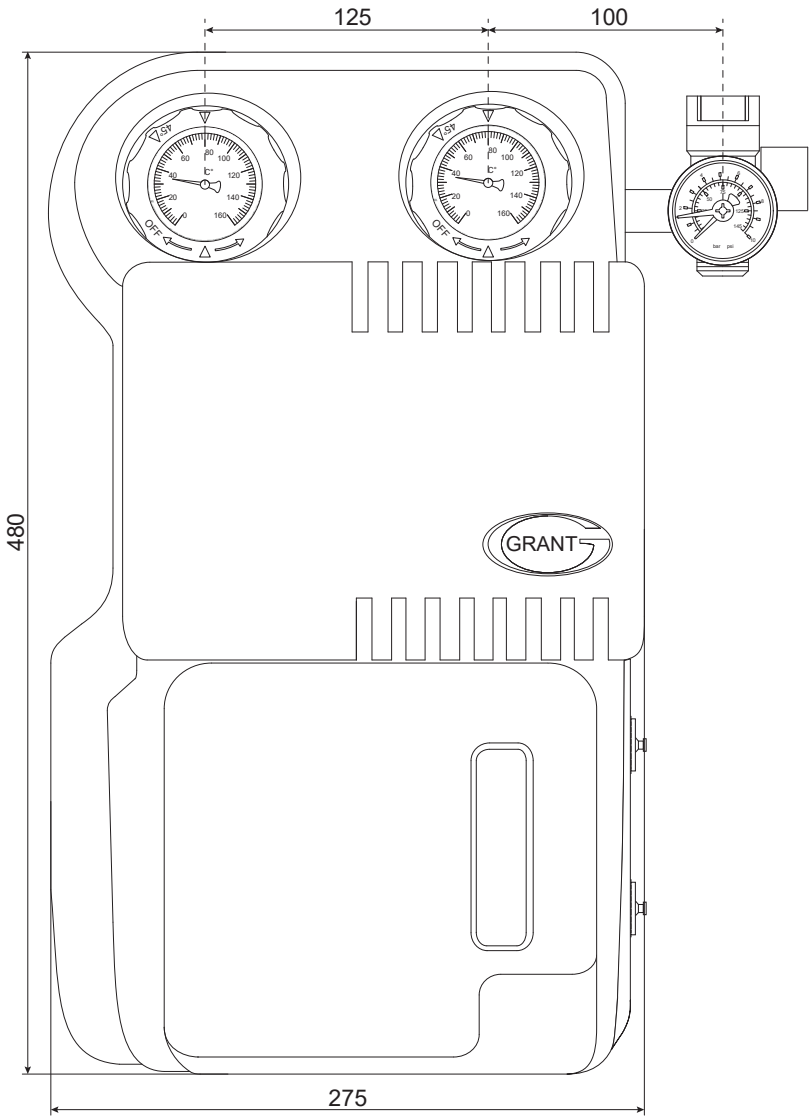

Figure 2-3: Front view

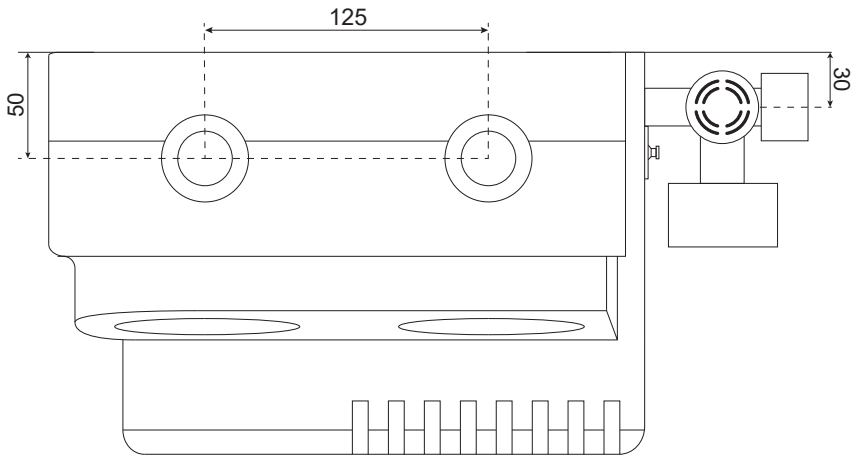

Figure 2-4: Plan view

2.4 COMPONENTS

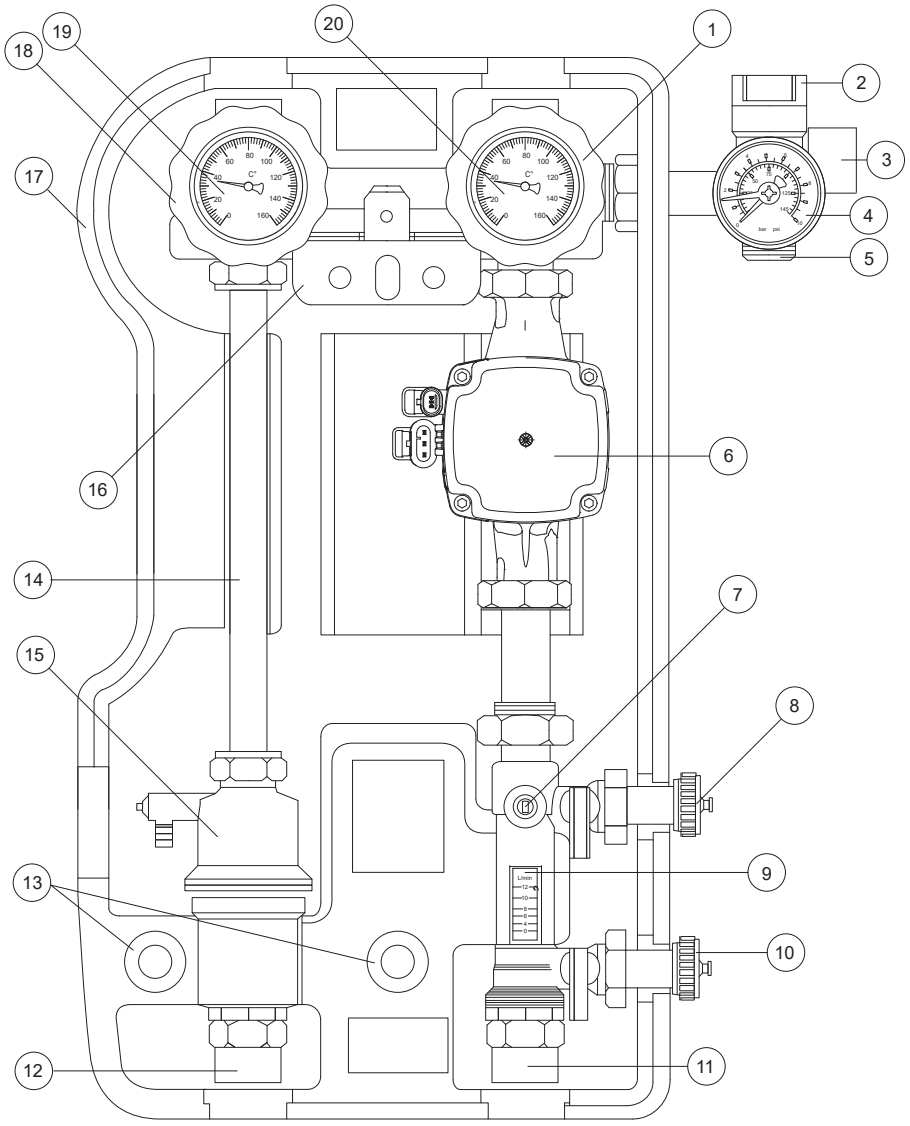

Figure 2-5: Components of the Grant Solar Pump Station

Table 2-2: Components of the Grant Solar Pump Station

Key No.	Description
1	Return valve (right knob) - ¾" BSP Female connection.
2	Safety valve (6bar).
3	Safety valve discharge connection.
4	Pressure gauge (0-10bar).
5	Expansion vessel connection ¾" BSP Male - with flat gasket connection.
6*	Circulator - Grundfos UPM3 Solar 25-75 130 CZA. (Hybrid variant). 1½" BSP Male
7	Filling/shut-off valve.
8	Filling flow valve connection - ¾" BSP Male - with safety cap and rubber strip.
9	Flow meter - range 0-12 l/min.
10	Filling return valve connection - ¾" BSP Male - with safety cap and rubber strip.
11	System connection - ¾" Female.
12	System connection - ¾" Female.
13	Filling hose connectors (x 2) – to fit filling/flushing valve - 15mm dia x ¾" swivel nut.
14	Connection pipe - copper d.18mm.
15	Air separator with integral manual vent .
16	Wall bracket.
17	Insulated housing.
18	Flow valve (left knob) - ¾" BSP Female connection.
19	Thermometer (0-160°C) - on flow valve (red).
20	Thermometer (0-160°C) - on return valve (blue).

*To see details refer to Appendix A.

3 Installation

3.1 GENERAL

Installation of this pump station must be carried out by a competent installer in compliance with all current local Building Regulations, Codes of practice, Health & Safety legislation and any relevant bylaws and regulations in force at the time.

All electrical installation work must be carried out by a qualified electrician. The electrical installation must comply with the requirements of the Electricity at Work Regulations 1989 and BS7671:2008 - IET Wiring Regulations 17th Edition British Standards Institutions (including all amendments).

3.2 REGULATIONS AND STANDARDS

The installation of the Grant Solar Pump Station must be in accordance with the following recommendations, as applicable:

- Building Regulations for England and Wales, and Building Standards for Scotland
- Local Bylaws (check with the Local Authority for the area)
- Water Supply (Water Fittings) Regulations 1999

The installation should also be in accordance with the latest edition of the following standards and Codes of Practice:

- BS7671 and amendments
- BS EN 12831

3.3 LOCATION

The Grant Solar Pump Station can be mounted on any suitable wall surface capable of carrying the weight of the Pump Station (refer to Table 2-1) where the required clearances can be achieved. Leave at least 200mm clearance around the Grant Solar Pump station's housing.

The Solar Pump Station is designed for wall mounting in an upright position.

The Grant Solar Pump Station MUST only be installed inside a property, and not located externally, as it not designed to be weatherproof.

3.4 SAFETY

The Grant Solar Pump Station is intended only for a sealed solar installation. The Grant Solar Pump Station complies with the current technical standards and technical safety regulations.

Each device is checked for proper operation and safety prior to shipping.

The Grant Solar Pump Station MUST only be installed and operated by trained personnel. Untrained personnel can work only under the supervision of an experienced person, who is familiar with the way the unit works. Before installation, the installer must carefully read and understand these instructions.

! WARNING !

The temperature inside the Grant Solar Pump Station can reach dangerous levels that can cause serious burns.

3.5 FITTING PROCEDURE

1. Refer to Figure 3-1. Take the two coach screws (3), the two plugs (1) and the two metallic washers (2) from the wall bracket kit (Supplied).
2. Remove the front section of the insulated pump station housing.
3. Undo screw and remove retaining clip from wall bracket.

! WARNING !

Ensure that the electrical supply has been isolated before making any wiring connections.

4. Lift out both the flow valve/air separator assembly and the return valve/pump assembly.
5. Position the back section of the insulated housing in the required location. If necessary check the cover is level using a spirit level on the side and mark the top hole of the wall bracket.
6. Separate the wall bracket from the back section of the housing. Drill the wall with an 8 mm drill and securely fix the wall bracket to the wall using the fixings supplied.
7. Fit the back section of the insulated housing onto the wall bracket, taking care to insert it completely. Refer to Figure 3-2.
8. Re-fit the flow and return assemblies, inserting the body of the flow and return valves into the corresponding fork in the wall bracket. Refer to Figure 3-3.
9. Fit the retaining clip and secure using the screw provided. Refer to Figure 3-4.
10. Connect the flow and return pipes. Refer to Section 3.6.

! NOTE !

The Grant Solar Pump Station MUST only be installed vertically, as shown in Figure 1-1.

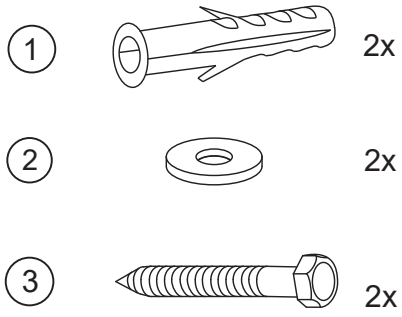

Figure 3-1: Wall bracket kit items

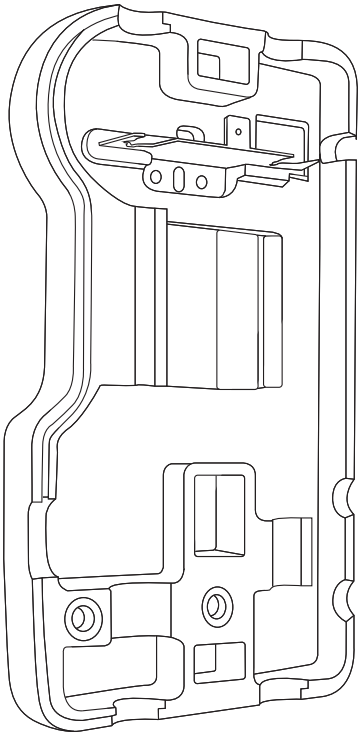

Figure 3-2: Fit back section of housing onto wall bracket

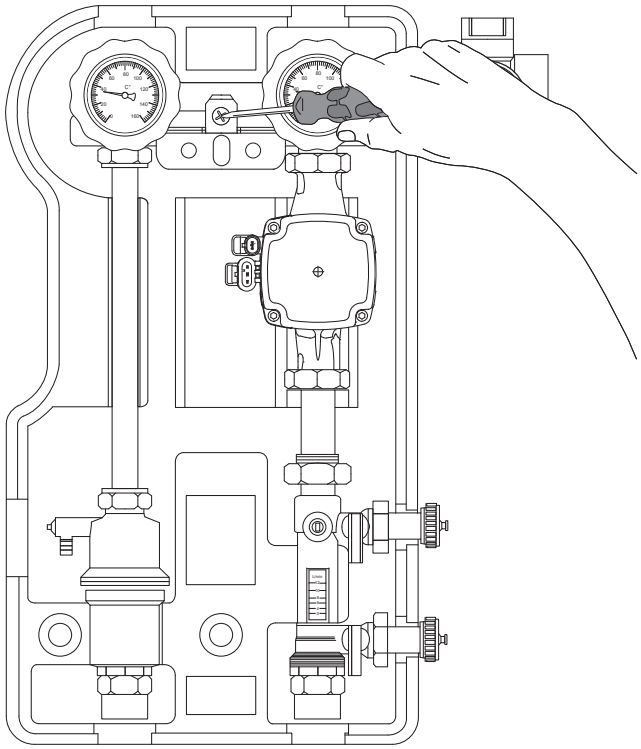

Figure 3-4: Fit retaining clip

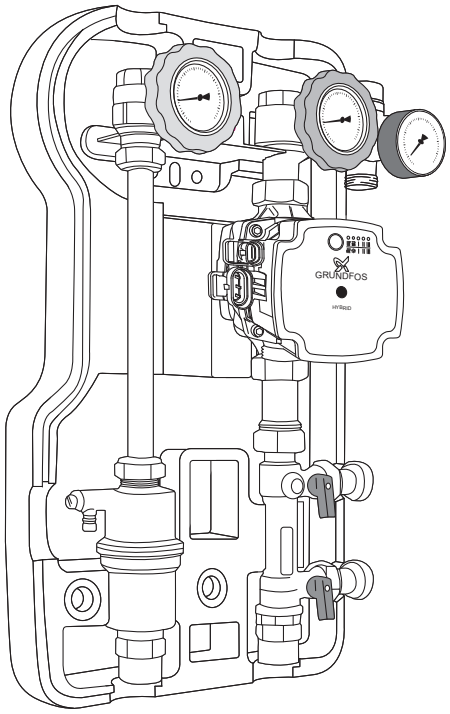

Figure 3-3: Re-fitting flow and return assemblies to wall bracket

! CAUTION !

The Grant Solar Pump Station should be installed with a minimum of 200mm clearance around the housing.

3.6 FLOW AND RETURN CONNECTIONS

The solar thermal system flow and return connections should be made to the four ¾" BSPF connections built into the pump station. Refer to items 1, 11, 12 and 18 in Figure 2-5.

These connections should be made using 3/4" BSPM x 15mm compression connections with brass olives. (Not supplied).

The flow from the solar collectors to the DHW cylinder should be made on the left handside of the pump station, and the return from the DHW cylinder back to the collectors should be made on the right handside of the pump station (view from front). Refer to Figure 3-5.

The system flow and return connections should be made to the pump station as follows:

1. Insert ¾" BSPM end of the compression adaptor into the chosen ¾" BSPF connector in the pump station and tighten to form a waterproof seal.
2. Make the hydraulic pipe connection from the solar system to the chosen compression adapter using the 15mm compression end of the adapter.

If more than one solar collector is being connected to the Grant Solar Pump Station, pipework connections between the collectors should be made prior to making the final connections to the pump station. Refer to Installation Instructions for the Solar Thermal Collectors (DOC 0073) for further information.

! NOTE !

If a thread sealant is to be used on any hydraulic connection in the solar thermal system, PTFE tape should be used in all cases due to its high temperature properties.

! CAUTION !

During assembly, do not overtighten the threads as some leakage could result over time.

! NOTE !

This is a diagrammatic view showing the connections to the Grant Solar Pump Station. As such it does NOT include all valves and controls and is NOT intended as a complete system diagram.

! CAUTION !

All system pipe connections must use compression fittings with brass olives. Soft soldered joints must NOT be used on the solar primary circuit.

Plastic pipe must NOT be used for any part of the solar primary circuit.

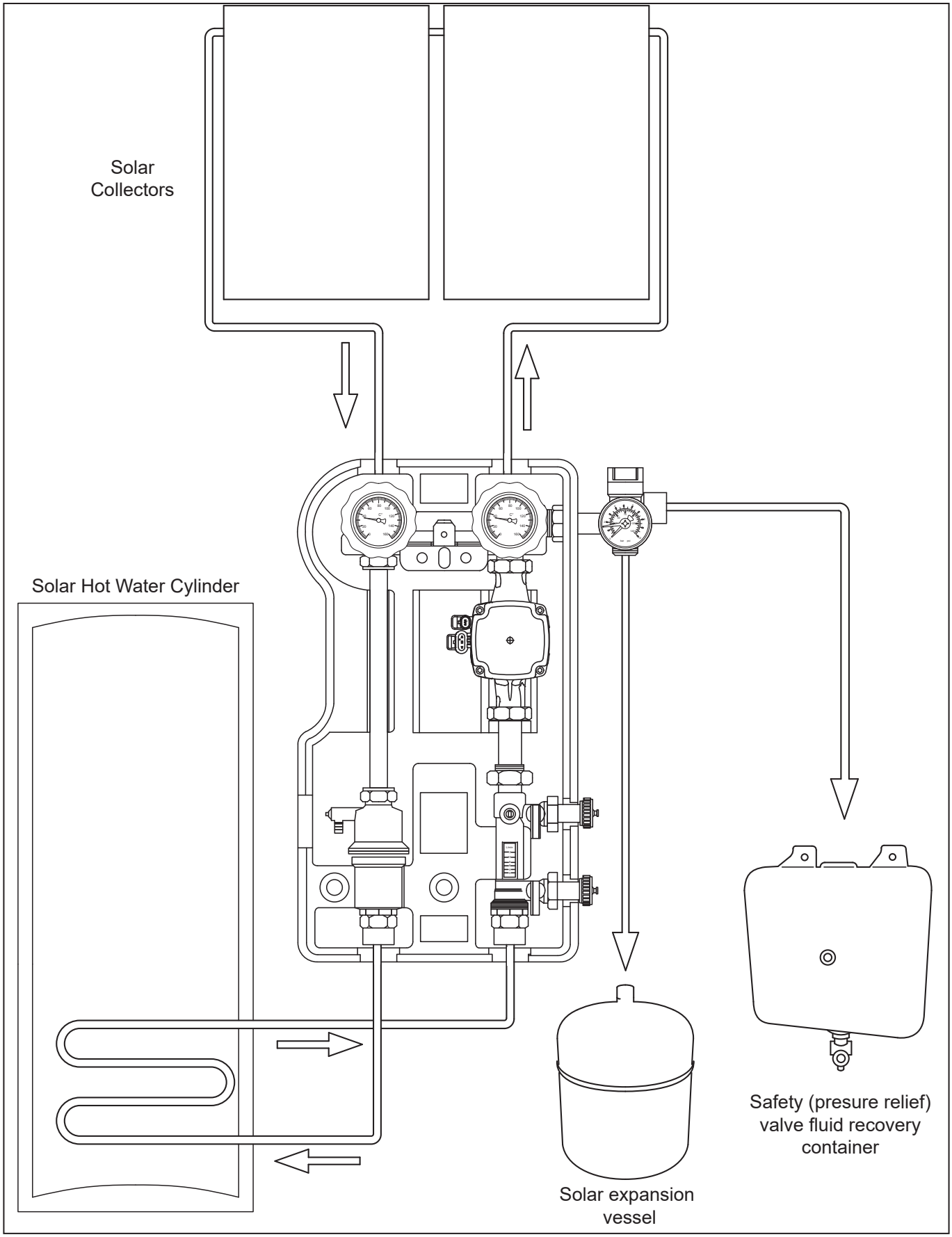

Figure 3-5: System connections to solar pump station

3.7 2-PORT VALVE

For Grant Sahara solar thermal installations using a Grant QR Twin Coil cylinder, a high temperature rated motorised valve (contact Grant UK for details) may need to be fitted to the solar thermal system flow pipe to the cylinder.

! NOTE !

A high temperature rated motorised valve is only required on installations where the solar thermal collectors are installed below the level of the indirect solar coil contained in the DHW cylinder.

If the Grant Sahara solar collector is installed above the indirect solar coil, a high temperature motorised valve DOES NOT need to be fitted.

Refer to Grant UK DOC 0179 (Grant QR Cylinder installation instructions) for system diagrams and wiring schematics.

3.8 EXPANSION VESSEL

The correct size of expansion vessel should be used based on the volume of the system - i.e. the number of collectors, the length and diameter of the system pipework, etc.

For systems using up to 4 Grant Solar Collectors, with no more than 50 metres of 15mm pipework (total length of flow and return combined), an 18 litre expansion vessel is supplied as standard. For 5 collectors a 24 litre expansion vessel is used. For larger system configurations, contact the Grant Technical department for guidance on the expansion vessel required.

The expansion vessel is connected to the Grant Solar Pump Station via the ¾" BSP Male connection on the safety valve manifold, using the 1250mm long flexible corrugated stainless steel pipe. This pipe is supplied with flanged ends, each fitted with a ¾" union nut, and two sealing washers (Grant Part No. GS222074).

! NOTE !

This flexible pipe cannot be cut and must be used as supplied.

The expansion vessel is fixed to the wall using the Vessel Mounting kit (Grant Part No. GS222073). This kit includes an isolation valve union and the vessel mounting bracket.

Fix the mounting bracket to the wall, using the screws and wall plugs provided, to position the vessel in the required location.

! NOTE !

The expansion vessel must be located BELOW the connection on the Grant Solar Pump Station with the vessel connection pointing upwards. Refer to Figure 3-5.

Assemble and fit the expansion vessel isolation valve union as follows, referring to Figure 3-6:

- Fit the small black sealing washer onto the threaded connection of the bleed valve.
- Screw the bleed valve into the threaded port in the side of the valve union body and tighten.
- Remove the thin nut from the thread on the valve union.
- Fit the threaded connection on the expansion vessel up through the hole in the mounting bracket and secure using the thin nut.
- Using the sealing washer supplied, fit the valve union to the expansion vessel connection.
- Tighten the union nut to ensure the valve union in the required position.

Connect the flexible stainless steel pipe to the safety valve manifold and expansion vessel union valve, using the fibre sealing washers provided with the pipe.

Ensure that the expansion vessel isolation valve is OPEN - this is indicated when the two indicators (on the square end of the valve) are in line with the valve. Refer to figure 3-6.

Ensure that the bleed valve is fully CLOSED before filling the system.

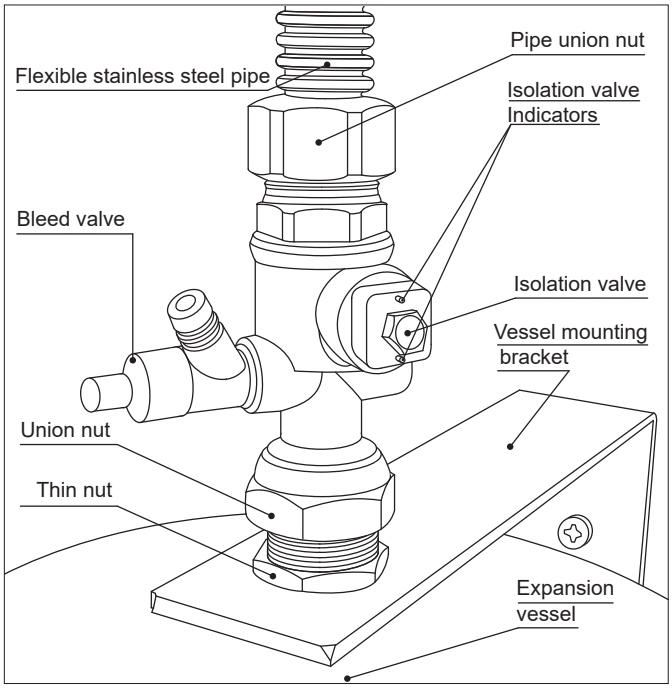

Figure 3-6: Expansion vessel connection

3.9 SAFETY VALVE DISCHARGE

A discharge pipe must be fitted to the outlet of the safety valve.

It is recommended that the safety valve discharge should be connected to a suitable discharge recovery tank, such as the Grant safety valve liquid recovery container with drain valve (Grant Part No. GS550001).

This discharge pipe should be 15mm copper.

! NOTE !

Plastic pipe must NOT be used for the discharge pipe

3.10 CIRCULATING PUMP

The Grant solar pump station will be supplied with the Grundfos UPM3 SOLAR 25-75 130 CZA (Hybrid) circulating pump.

The “SOLAR” variation of the Grundfos UPM3 only features operating modes suitable for use with solar thermal systems.

Refer to Appendix A at the back of these instructions for information on the operating modes available with the Grundfos UPM3 Solar pump.

! WARNING !

The electrical supply must be isolated before making the connections to the solar pump. After making the connections ensure cover is fitted to enclosure before reconnecting the electrical supply.

3.10.1 CONNECTING THE PUMP

The UPM3 Solar circulating pump requires a 230V 50Hz power supply from the Grant GSX1 Solar Controller to operate. This connection is made via a 3-pin plug supplied with the pump. Refer to the installation instructions provided with the Solar Controller for further information on the electrical control system wiring.

The pump can also be controlled using a PWM signal if a different Solar Controller that offers this feature is being used.

! NOTE !

If the Grant GSX1 Solar Controller is used to operate the circulating pump, It is not necessary to connect the PWM lead supplied. The circulating pump will run at a constant speed on the 230V supply from the GSX1 solar controller.

Before start-up

Before you start-up the circulating pump:

1. Check the pump station is installed in the correct position.
2. Check that the unions are tightened.
3. Fill and vent the system (refer to Sections 4.6 and 4.7). The solar thermal collectors must be cold when filling with solar fluid.
4. Check that the system is filled to the correct operating pressure.
5. When using the pump for the first time, check that the system has been vented.
6. Switch on the power supply to the solar pump (GSX1 Solar controller set to 'manual').
7. Refer to Appendix A for solar pump operating details.

! CAUTION !

Do not start the pump until the system has been filled and vented to avoid the possibility of damage.

! NOTE !

UPM3 pumps are self-venting and do not have to be vented before start-up. Air inside the pump is transported by the liquid into the system shortly after start-up.

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4 Commissioning

4.1 EXPANSION VESSEL

Ensure that the expansion vessel charge pressure is correct for the system pressure (when cold) and that this in turn corresponds to the height of the system. Refer to Table 4-1.

The height of the system should be measured from the expansion vessel to the top of the highest collector.

! NOTE !

If the collectors are positioned below the level of the expansion vessel (e.g. if the collectors are mounted at ground level), then measure from the bottom of the collectors to the expansion vessel. This will be a 'negative' height value, e.g. -5 metres. The vessel charge pressure must be checked BEFORE filling the system.

Table 4-1: Expansion vessel pressures

Height difference (height of the collector field minus height of expansion vessel	Initial expansion vessel charge pressure (air charge setting on valve)	System charge pressure at 20°C (0.2 - 0.5 bar greater than vessel charge pressure)
- 5m	~ 1.0 bar	~ 1.3 bar
< 0m	~ 1.0 bar	~ 1.3 bar
< 5m	~ 1.5 bar	~ 1.8 bar
< 10m	~ 2.0 bar	~ 2.3 bar
< 15m	~ 2.5 bar	~ 2.8 bar
> 15m	Contact Grant Technical Department for guidance	

4.2 FILLING VALVES

The filling flow and return valves, and the Filling/Shut off valve, are used for filling and flushing the solar thermal installation. Refer to Figure 4-1.

To enable filling/flushing of the system, the Filling/Shut-off valve must be rotated fully 90°C clock-wise. Refer to Figure 4-2. This will divert the flow from the filling station, entering the system via the Filling flow valve, through the pump, up to the collectors, through the coil of the cylinder and back to the filling station via the Filling return valve.

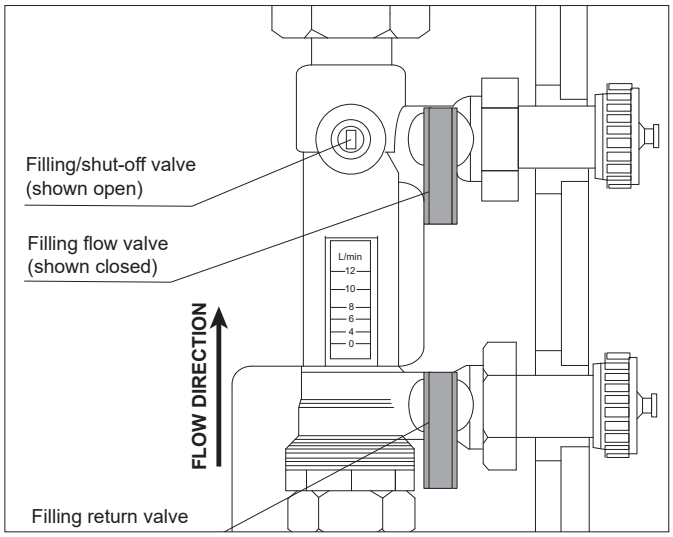

Figure 4-1: Filling and flushing valves

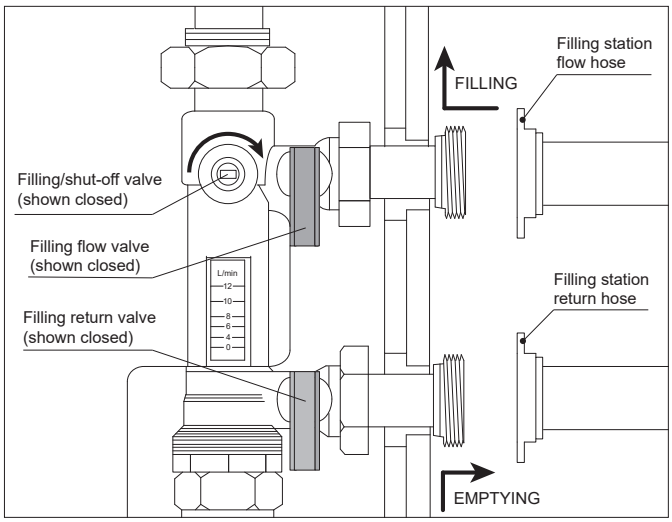

Figure 4-2: Detail A - Closing filling/Shut off valve to prepare to fill the system

4.3 GRAVITY BRAKES

The gravity brakes (check valves) are incorporated into both the flow and return valve assemblies. These gravity brakes are activated at 20 mbar and are operated by turning the valve handle on the valves as follows:

4.3.1 FLOW AND RETURN VALVES OPEN - '▽' MARKERS ON VALVE HANDLES IN VERTICAL POSITION

To prevent 'gravity' circulation of solar fluid, gravity brakes must be in the operation position (open), i.e. with '▽' markers in vertical position. Refer to Figure 4-3.

4.3.2 GRAVITY BRAKES OPEN - '▽' MARKERS OF THE VALVE HANDLES AT 45° ANGLE CLOCKWISE

To fill or completely empty the solar thermal installation, the gravity brakes must be opened, i.e. by turning the valve handles clockwise to an angle of 45°. Refer to Figure 4-4.

4.3.3 FLOW AND RETURN VALVES CLOSED - '▽' MARKERS ON VALVE HANDLES IN HORIZONTAL POSITION

The flow and return valves are closed by turning the valve handles clockwise to an angle of 90°, i.e. until the '▽' markers are horizontal. Refer to Figure 4-5.

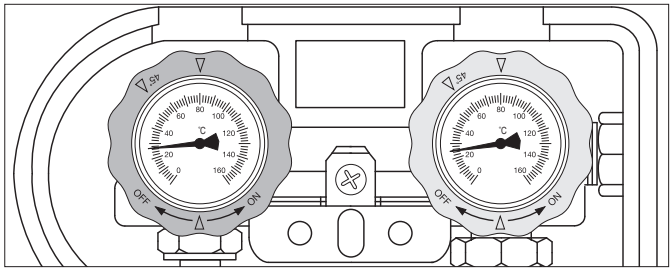

Figure 4-3: Flow and return valves open

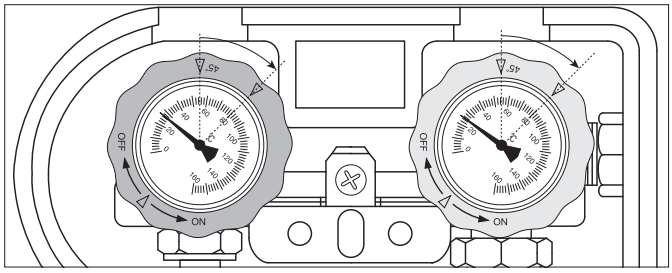

Figure 4-4: Gravity breaks open

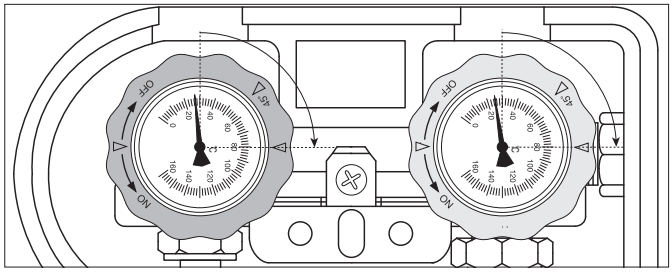

Figure 4-5: Flow and return valves closed

4.4 SOLAR FLUID

In order to prevent frost and corrosion damage to the Grant Solar Collectors and pipework, the system must only be filled with a high quality solar fluid. The Grant solar fluid is a ready mixed 40% solution of 1.2 propylene glycol/water providing frost protection down to approx. -21.5°C.

To prevent damage to the system, the same specification solar fluid should be used when replacing or topping up the solar fluid in the system.

If required, a copy of the Material Safety Data Sheet for the Grant solar fluid is available on request from Grant UK.

4.5 FILLING THE SYSTEM

Grant Solar Thermal systems should be flushed and filled using a purpose designed closed circuit solar thermal filling station, incorporating a high pressure pump, such as the Grant Solar Filling Station. Refer to Figure 4-6.

The capacity of the filling station is 30 litres.

! WARNING !

If the Grant Solar Pump Station is located in the roof space, there must be a suitable flat surface on which to stand the filling station, e.g. floor, loft boarding or similar, capable of carrying the weight of the filling station with a full tank of solar fluid.

Figure 4-6: Grant Solar Filling Station

4.6 FILLING PROCEDURE

Important: The collectors must be cool before filling the system. They must be covered to stop solar radiation reaching them, until the filling and commissioning procedure is completed.

Before filling the system: Check all system connections and the expansion vessel charge pressure. Refer to Table 4-1. At the time of filling and venting of the solar installation, the expansion vessel should not be connected.

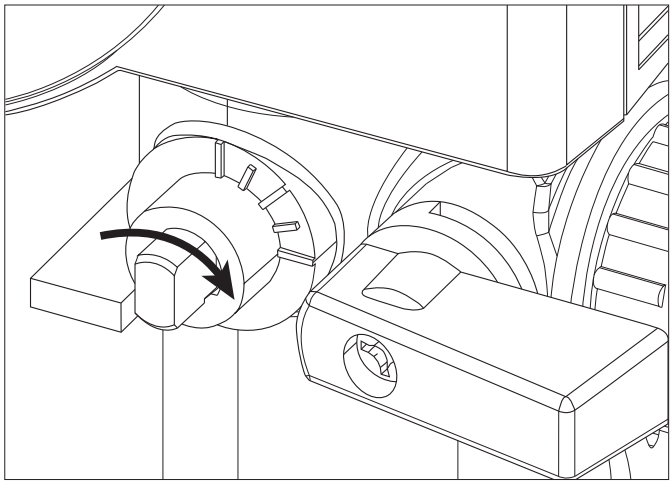

Figure 4-7: Rotating the filling/shut-off valve 90° clock-wise

4.6.1 PHASE 1

1. Connect the pressure hose from the Filling Station to the Filling Flow valve connection and open the valve. Refer to Figure 4-2.
2. Connect the return hose from the filling station to the Filling Return valve connection and open the valve. Refer to Figure 4-2.
3. Using a small spanner to rotate the Filling/Shut-off valve 90° clock-wise to open it. Refer to Figure 4-7. This will divert the flow from the filling station through the pump, up to the collectors, through the coil of the cylinder and back to the filling station via the filling return valve.
4. Fill the filling station tank with sufficient solar fluid for the system.
5. Check that Flow and Return valves are set to 'half open' position (to open the gravity brakes) as shown in Figure 4-4.
6. Switch on the filling station to fill and flush the solar circuit for approx. 15 minutes.

4.6.2 PHASE 2

1. Whilst the filling pump is running, close the Filling Return valve and allow the system pressure to reach around 4 - 5 bar. If the pressure increases slowly, this indicates air is trapped in the solar thermal system. Rapidly open the filling return valve to lower the pressure. Repeat until the pressure increases to the maximum pressure (4 -5 bar) after closing the return valve.
2. When the pressure reaches 5 bar, close the Filling Flow valve and immediately switch off the filling pump.
3. Check that the system pipework and pump station are leak-free. After leaving the system at about 5 bar for a minimum of 15 minutes, check if the pressure gauge shows any significant drop in pressure. If it does, this points to a leak in the system that must be traced and rectified.
4. Check the operation of the pressure relief valve by slowly rotating the valve knob, lifting the valve, until fluid is discharged. This should be collected in a suitable container, e.g. a pressure relief valve fluid recovery container (Refer to Figure 3-5 in section 3.6).

4.6.3 PHASE 3

1. Re-open the Filling/Shut-off valve by turning 90° anti-clockwise.
2. Switch on the circulating pump (by setting the solar controller to "manual") to the highest pumping speed and allow the solar fluid to circulate for at least 15 minutes.
3. Set the solar controller to "stand by" (pump = OFF).
4. Bleed the air separator using the manual air vent until the solar fluid begins to escape. Refer to section 4.7
5. Set the operating pressure (as in Table 4-1) by carefully opening the Filling Return valve and releasing the fluid back into the filling station tank.

4.6.4 PHASE 4

1. Reset Flow and Return valves to fully open position. Refer to Figure 4-3.
2. Switch on the circulating pump (solar controller set to "manual").
3. Set the flow rate on the flow rate indicator (refer to section 4.8) by selecting the appropriate pump speed and by using the Filling/Shut-off valve.
4. Remove the filling station hoses from the filling connections and screw the caps on both valves. Release the Filling Return valve first and then the Filling Flow valve.
5. Switch the solar controller to automatic operation and remove covers from the collectors.

! CAUTION !

Venting air from the system should only be carried out by a competent installer. Frequent venting leads to system pressure loss and disruption to the system operation.

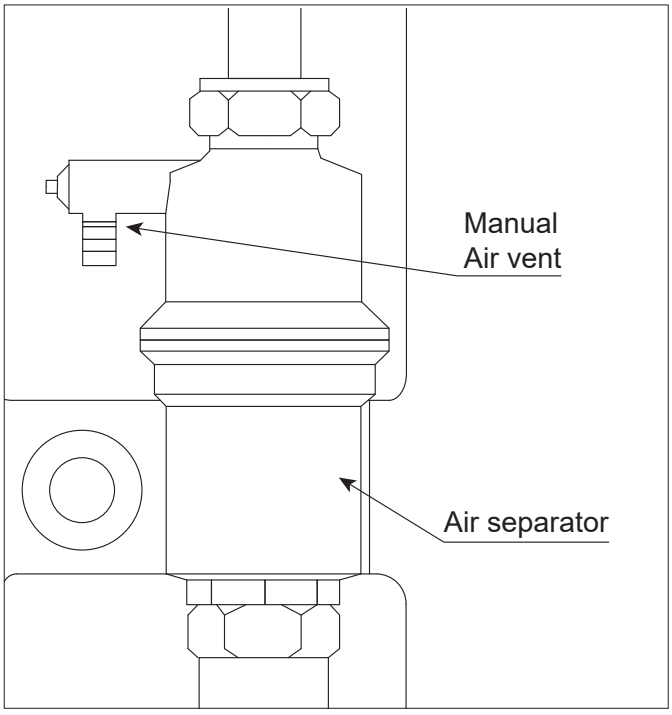

Figure 4-8: Air separator and air vent

4.7 RELEASING TRAPPED AIR

The residual air from the heat transfer fluid is collected in the air separator and manually released via the air vent. There is no need to use an automatic air vent elsewhere on the solar primary circuit, e.g. at high level.

To release any air collected in the air separator, push a plastic tube on the manual air vent outlet (Refer to Figure 4-8) and catch the fluid that is released in a suitable container. Open the manual air vent with a flat bladed screw driver turning the screw head anticlockwise until all air has been vented, i.e. a steady stream of solar fluid is flowing from air vent.

! WARNING !

Danger of scalding!

The temperature of both the escaping air and the solar fluid can exceed 100°C.

4.8 SETTING THE FLOW RATE

The setting of the solar fluid flow rate is made via the speed setting of the circulating pump and the Filling/Shut-off valve. For required system flow rates refer to Table 4-2 in this section.

To set the flow rate:

- Using a wrench, fully open the Filling/Shut-off valve by turning it anti-clockwise. Use the push button on the circulating pump operating panel (refer to Figure A-3) to set the pump to the lowest speed setting, CC1, (refer to Table A-3).
- At the solar controller, ensure that pump operation is set to “manual”; refer to the instructions supplied with the controller.
- Using a wrench, slowly turn the filling/shut-off valve until the required flow rate is achieved. A small adjustment of this screw can make a large difference to the flow rate set.
- If the required flow rate cannot be achieved, fully open the Filling/Shut-off valve, increase the pump speed and try again until the required flow rate is achieved.

The flow indicator displays the fluid flow rate. The display range is between 0 and 12 litres per minute. The lower edge of the float indicates the flow. Refer to Figure 4-9 and 4-10 in this section for details.

! NOTE !

For larger installations, please contact Grant Technical Department for assistance.

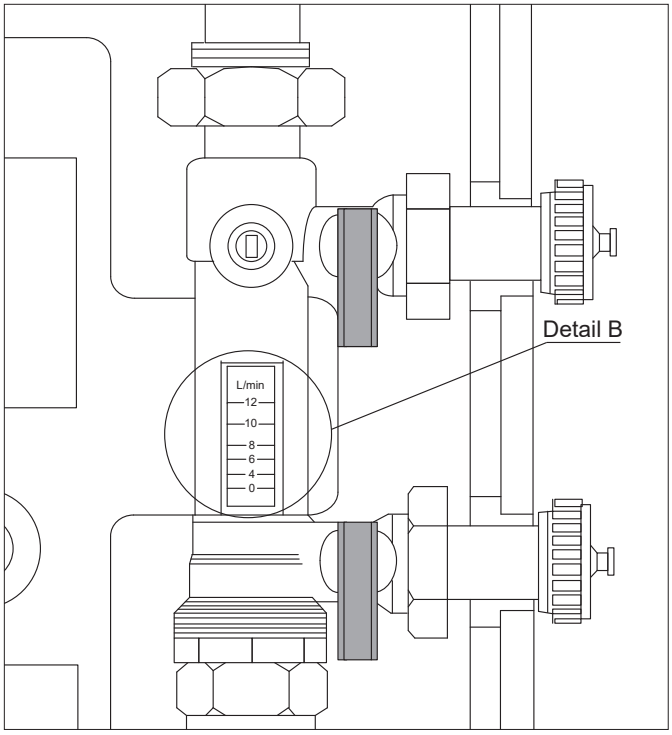

Figure 4-9: Flow rate indicator

Table 4-2: System volume flow rates

Number of solar panels	Type of connection	Flow and return pipe diameter	Minimum volume flow rate
1 to 5	Up to 5 in series	15mm	2-3 l/min
6	2 x 3 in parallel	22mm	4-5 l/min
8	2 x 4 in parallel	22mm	4-5 l/min
9	3 x 3 in parallel	22mm	6-8 l/min
12	4 x 3 in parallel	22mm	6-8 l/min

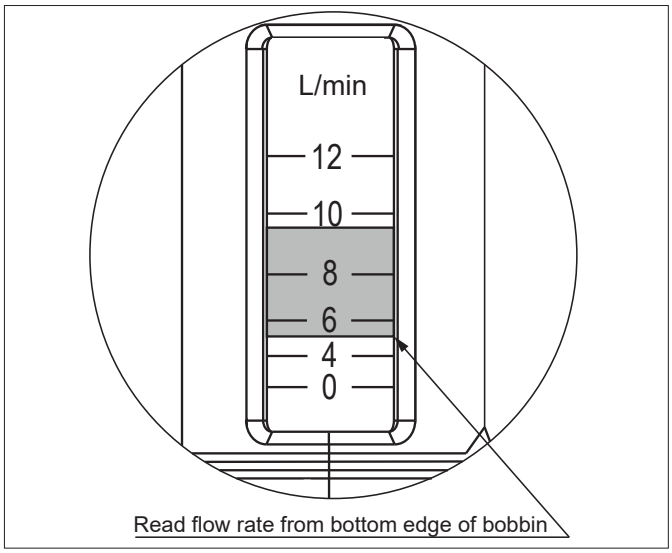

Figure 4-10: Detail B - Flow rate indicator

5 Fault Finding

In the event of a problem occurring with your Grant Solar Thermal System, follow the information given below in order to identify and rectify the matter:

5.1 NO SYSTEM CIRCULATION

Check for the following:

- Pump is not operating (Refer to section 5.2).
- If pump is noisy, there may be air in the system.
- Pump may be air locked and needs venting. Let the pump run, the pump vents itself over time.
- Valves are closed - ensure that Flow and Return valves are fully open (see Figure 4-3). If filling or flushing the system (see section 4.6) ensure the Filling/Shut off valves are fully open.

5.2 PUMP NOT OPERATING

Check for the following:

- No electrical supply to pump.
    - Controller is not calling for pump to operate.
    - Check power supply to controls (at fused spur).
    - Check wiring to controller and pump is correct.
    - Check for any loose connections.
- Controller is not calling for pump to operate.
    - Check controller settings and correct as necessary (Refer to Instructions supplied with the Solar Controller)
    - Collectors may be in stagnation mode - wait for system to cool down.
    - Collector temperature may be too low (insufficient solar radiation).
    - Cylinder temperature setting may be satisfied.
- Pump is stuck - Turn off power, locate de-blocking screw on pump motor (see Figure A-x) and rotate motor using a screwdriver.
- Motor capacitor failed - replace capacitor or pump motor.

5.3 LOSS OF SYSTEM PRESSURE (ON PRESSURE GAUGE)

Check for the following:

- Leaks on system - find and rectify as necessary.
- Expansion vessel pre-charge lost - check and re-charge vessel as necessary.
- Pressure relief valve discharging fluid - check and rectify/ replace valve.

6 Spare Parts

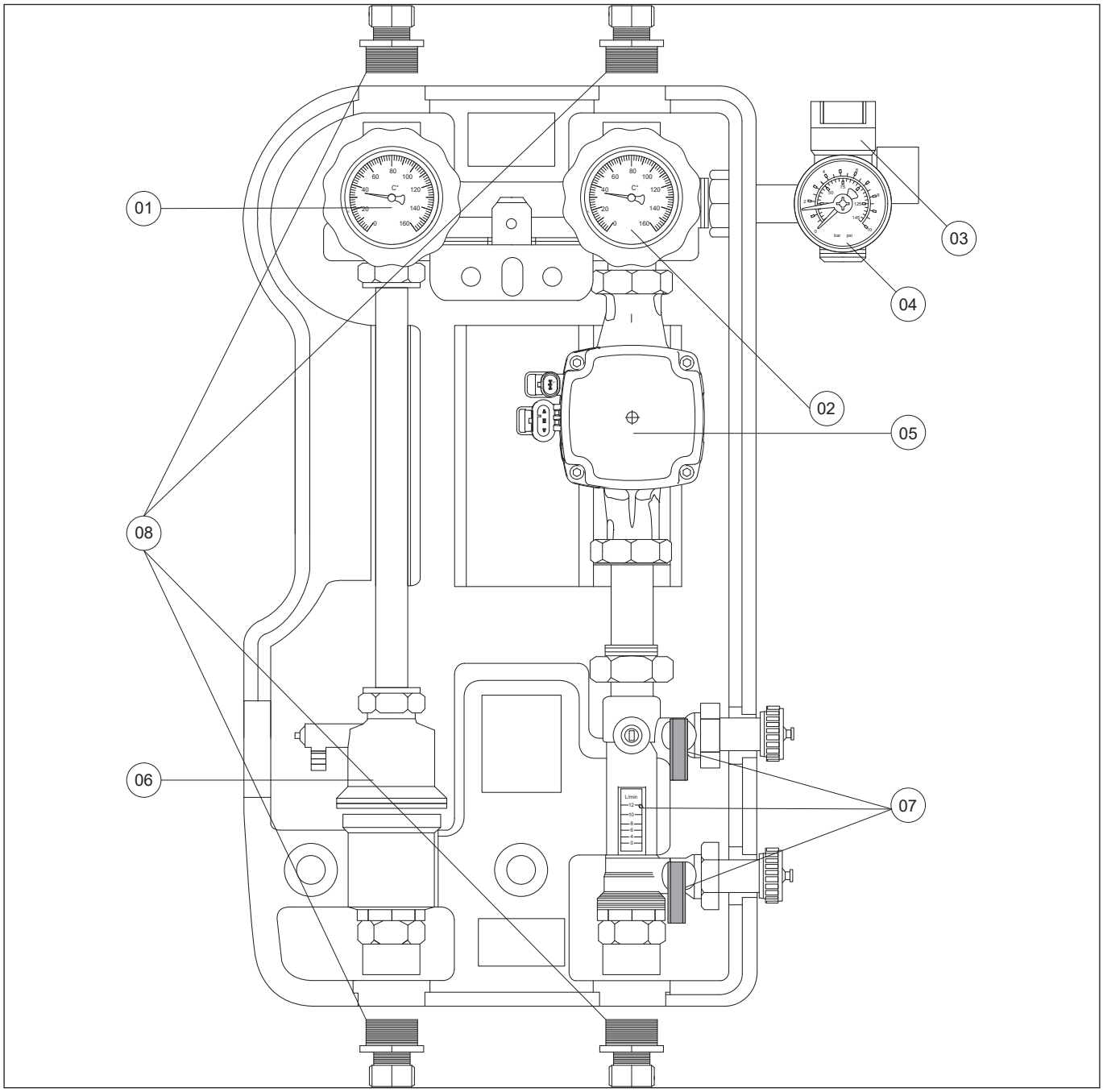

Figure 6-1: Spare Parts

Table 6-1: Key to Figure 6-1

Key No.	Description	Part No.
01	Flow valve assembly (Red)	GSE01AX
02	Return valve assembly (Blue)	GSE02X
03	Safety valve assembly (6 bar)	GSE03X
04	Pressure gauge	GSE04X
05*	Grundfos UPM3 Solar 25-75 130 CZA. (Hybrid variant). 1½" BSP Male	GS200032X
06	Air separator assembly	GSE07AX
07**	Fill/flush valve and flow regulator assembly	GSE08BX
08	¾" BSPM to 15mm compression connections	Not supplied

*To see details refer to Appendix A.
**1½" fittings

Appendix A GRUNDFOS UPM3 SOLAR 25-75 130 CZA PUMP (HYBRID VARIANT)

A.1 GRUNDFOS UPM3 SOLAR PUMP

Table A-1: Grundfos UPM3 Solar pump specifications

Feature	Specification
Nominal supply voltage	EU: 1 x 230V +10% / -15%, 50/60 Hz
Minimum supply voltage	160V AC (runs with reduced performance)
Motor protection	The motor is protected by the electronics in the control box and requires no external motor protection
Enclosure class	IPX4D (standard without drain holes)
Equipment class	I (EN 60335-1)
Insulation class	F (EN 60335-1)
Temperature class	TF110 - 110°C at 70°C ambient temperature
High voltage protection	EN 60335-1 1000 VAC
Maximum ambient temperature	70°C at 110°C or 60°C at 130°C
Maximum media temperature	130°C for cast iron housings
Minimum media temperature	2°C (IPX4D: above dew point of ambient air).
Storage temperature	-40°C to +75°C
Maximum system pressure	1 MPa (10 bar)
Minimum inlet pressure	0.05 MPa (0.50 bar) at 95°C liquid temperature.
Drinking water approvals	ACS, WRAS, UBA, KTW, DVGW W270
De-blocking device	Manual de-blocking device. Access from front side.
De-blocking software	Continuously restarting with relay after 1.33 seconds, with NTC every 0.3 - 0.4 seconds with max. torque
Dry run ability - first start	3 x 20 seconds (5 minutes interval), all pumps are lubricated with glycerine
Dry run ability - during operation	Rotor must be filled with water: fulfils EN 60335-2-51
Expected lifetime	> 100,000 h (with specified load profile). > 500,000 on/off cycles
Minimum switching time power on/off	With NTC: 1 minute. With relay: No specific requirements
Reaction time - power on	With relay: < 2 seconds. With NTC: < 1 second
Reaction time - standby	With relay: < 2 seconds. With NTC: < 1 second
Reaction time - speed change	< 1 second
Inrush current	With NTC: < 10 A. With relay: < 4 A
Maximum leakage current	≤ 3.5 mA (EN 60335-1)
Speed range	563 to 5991rpm (depending on the variant)
Relative humidity	Maximum 95%, non-condensing environment
Standby power consumption	With relay < 1 W. With NTC < 1 W
Sleep mode power consumption	0.4 W
Surge robustness	With relay/NTC > 3 kV (DM/CM)
RF emissions	-6 dB CE / EN 55014-1,-2
Acoustic sound pressure level (LP)	≤ 32 dB(A) on cast iron housings
Maximum altitude of installation	2000 m above sea level

A.1.1 CONTROL MODES AND CURVES

Two different control modes are available for Grundfos UPM3 Solar pumps. Constant Curve (3 different curves available) and PWM C profile (for use with solar controllers offering a PWM control feature).

Overview of operating panel control modes

Grundfos UPM3 Solar pumps can be controlled with the button on the operating panel.

The LEDs on the operating panel show the control mode selected.

Table A-2: Setting Operating Status of the UPM3 pump

Control mode	LED1 Green	LED2 Green	LED3 Yellow	LED4 Yellow	LED5 Yellow
CC1			●		
CC2			●	●	
CC3			●	●	●
PWM C signal off		●[1]	●	●	●
PWM C signal on		●[2]	●	●	●

[1] 1 Flash per second (No PWM signal connection)

[2] 12 Flashes per second (Correct PWM signal connection)

A.1.2 CONTROL MODE EXPLANATION

Constant curve

The pump runs on a constant curve, which means that it runs at a constant speed or power.

The duty point of the pump moves up or down on the selected constant curve, depending on the heat demand in the system.

Figure A-1: Constant curve

Table A-3: Control mode Constant Curve

Control mode	Head (m)
CC1	5
CC2	6
CC3 (max.)	7.5

PWM C profile (SOLAR)

The pump runs on constant speed curves depending on the current PWM value.

Speed increases when the PWM value increases. If PWM equals 0, the pump stops.

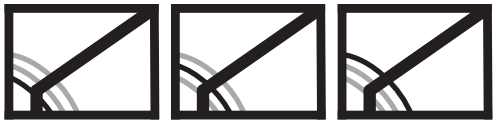

Figure A-2: PWM C profile (solar)

Table A-4: Control mode PWM C profile (solar) values

Control mode	Head (m)
C1	5
C2	6
C3 (max.)	7.5

Hint for installers

- Heating systems must be flushed according to local standards, such as BS EN 14336, before start-up. After filling the system for the first time, the pump must run for approx. 1 hour before a long-term stop.
- If filters are installed, they must be monitored and maintained thoroughly.

Operating panel

The operating panel is designed with a single button, one red/ green LED and four yellow LEDs.

The operating panel shows:

- Control mode
- Alarm status

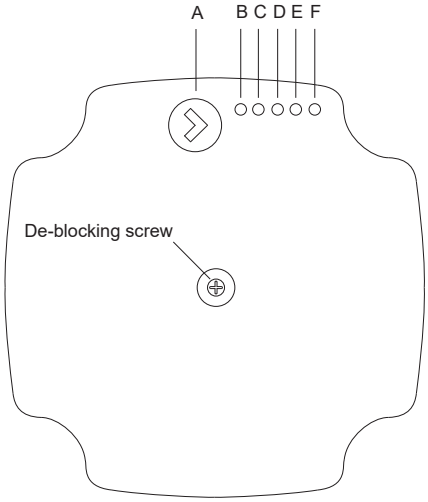

Figure A-3: Operating panel

Table A-5: Key to Figure A-3

Item	Description
A	Push button
B	LED 1 (Red/Green)
C	LED 2 (Yellow)
D	LED 3 (Yellow)
E	LED 4 (Yellow)
F	LED 5 (Yellow)

Fault indication and alarm status on the operating panel

If the pump has detected one or more alarms, LED 1 switches from green to red and one of the other LED lights yellow to indicate the alarm type. Refer to Table A-6.

If multiple alarms are active at the same time, the LEDs only show the error with the highest priority. The priority is defined by the sequence of the table as shown in the fault finding information given in Table A-6. When there is no active alarm anymore, the operating panel switches back to the operation mode.

A.2 FAULT INDICATION

When an alarm is active, the LEDs indicate the alarm type as defined in the Table A1-4.

Table A-6: Fault indication on the operating panel

Operation panel							
LED1	LED2	LED3	LED4	LED5	Indication	Pump operation	Counter action
●				●	Rotor is blocked	Trying to start again every 1.33 seconds	Wait or deblock the shaft
●			●		Supply voltage too low	Only warning, pump runs	Control the supply voltage
●		●			Electrical error	Pump is stopped because of low supply voltage or serious failure	Control the supply voltage. Replace the pump

Notes

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