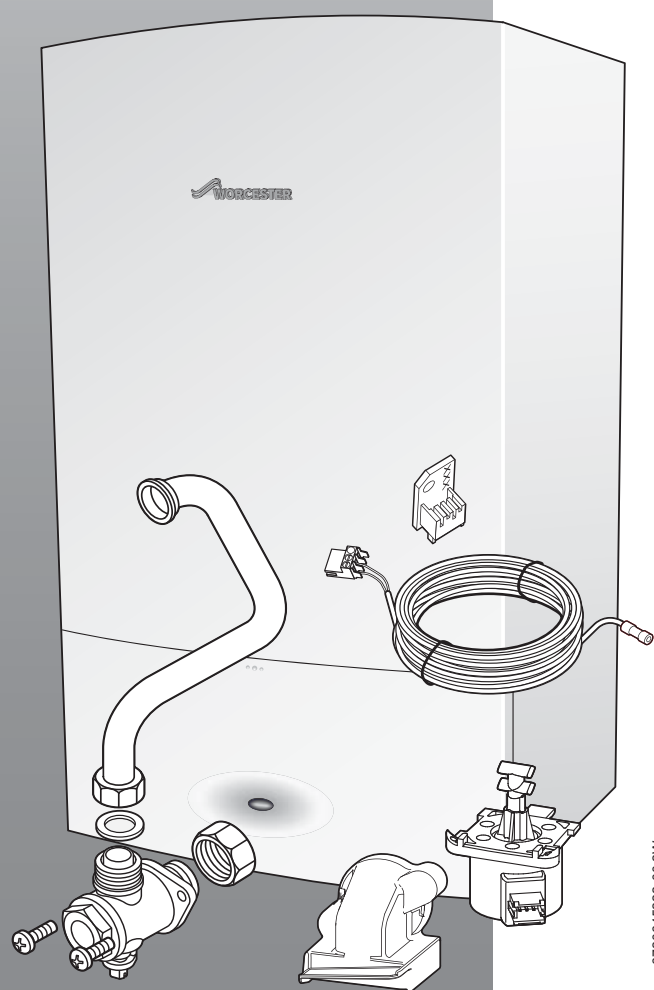


# INSTALLATION INSTRUCTIONS

## WALL HUNG RSF GAS FIRED CONDENSING BOILER

# GREENSTAR i SYSTEM OPTIONAL INTEGRAL DIVERTER VALVE

FOR SEALED CENTRAL HEATING SYSTEMS AND INDIRECTLY MAINS FED DOMESTIC HOT WATER



Read these instruction in conjunction with the i System Installation, Commissioning and Servicing instruction manual

### Diverter valve kit numbers

12kW	7 716 192 566
15kW	7 716 192 567
18kW	7 716 192 568
24kW	7 716 192 409

### Diverter valve kits contain:

1	Copper return pipe
1	Brass service valve
1	15mm Compression nut
1	15mm Olive
1	Diverter valve motor and cover
1	Cylinder temperature sensor and lead
2	Screws
2	Code plugs
1	Code plug tie

The appliance is for use with Natural Gas or L.P.G. (Cat II 2H3P type C13, C33 & C53)

	Model	GC Number
Natural Gas	12i System	41-311-67
	15i System	41-311-84
	18i System	41-311-86
	24i System	41-311-68
LPG (Liquid Petroleum Gas)	12i System	41-311-69
	15i System	41-311-85
	18i System	41-311-87
	24i System	41-311-70

UK/IE




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## 1 KEY TO SYMBOLS AND SAFETY INSTRUCTIONS

### 1.1 EXPLANATION OF SYMBOLS

#### WARNING SYMBOLS


	<b>NOTICE: Safety precautions and standards</b> ► Refer to the relevant Installation, Commissioning and Service instructions for Safety precautions and British standards
---	--

	Safety instructions in this document are framed and identified by a warning triangle which is printed on a grey background.
---	---

Signal words indicate the seriousness of the hazard in terms of the consequences of not following the safety instructions.

- **NOTICE** indicates possible damage to property or equipment, but where there is no risk of injury.
- **CAUTION** indicates possible injury.
- **WARNING** indicates possible severe injury.
- **DANGER** indicates possible risk to life.







#### IMPORTANT INFORMATION

	Important information in cases where there is no risk of personal injury or material losses is identified by the symbol shown on the left. It is bordered by horizontal lines above and below the text.
---	---

## ADDITIONAL SYMBOLS

Symbol	Meaning
►	a step in an action sequence
→	a reference to a related part in the document or to other related documents
•	a list entry
–	a list entry (second level)

## SYMBOLS USED IN THIS MANUAL

	Domestic Hot Water
	Central Heating
	Hot Water Storage Cylinder
	Domestic Cold Water Supply
	Electrical Supply
	Gas Supply

## PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE STARTING INSTALLATION.

These instructions are applicable to the Worcester appliance model(s) stated on the front cover of this manual only and must not be used with any other make or model of appliance.

These instructions apply in the UK and Ireland only and must be followed except for any statutory obligations.

This appliance must be installed by a **GAS SAFE** registered, competent person. Failure to install correctly could lead to prosecution.

If you are in any doubt, contact the Worcester Technical help-line (0844 892 3366).

Please leave these instructions with the completed BENCHMARK CHECKLIST, (or a certificate confirming compliance with IS 813, Eire only) and the user manual with the owner or at the gas meter after installation or servicing.

Distance learning and training courses are available from Worcester.

The BENCHMARK CHECKLIST can be found in the back of the Installation, Commissioning and Servicing instructions.

## ABBREVIATIONS USED IN THIS MANUAL:

Ø	Diameter
NG	Natural Gas
LPG	Liquid Petroleum Gas
CH	Central Heating
DHW	Domestic Hot Water
PRV	Pressure Relief Valve
PTC	Positive Temperature Coefficient (sensor)
NTC	Negative Temperature Coefficient (sensor)
IP	Ingress Protection
RCD	Residual Current Device
TRV	Thermostatic Radiator Valve
WRAS	Water Regulations Advisory Scheme
SEDBUK	Seasonal Efficiency of Domestic Boilers in the U.K.

## 2 PLUMBING MANIFOLD

### CONNECTIONS:

- Heating System: 22mm compression fittings
- Gas: 22mm compression fitting
- Cylinder Return 15mm compression fitting
- Use the fittings supplied in the Hardware literature pack and the Optional Diverter Valve Kit.



**NOTICE:** Fitting the service valve

- ▶ Refer to figure 2
- ▶ The service valve (7) from the Optional Diverter Valve Kit must be fitted and secured to the wall mounting frame with two screws (8) supplied, before the wall mounting frame is fitted to the wall.

If the boiler pipes are to be run behind the appliance ensure that the pipes pass through the slot in the guide (9). This is fitted to the boiler frame.



Further guidance on pipe routing can be found printed on the boiler template (supplied with the boiler).



Fig. 1 Pipe dimensions

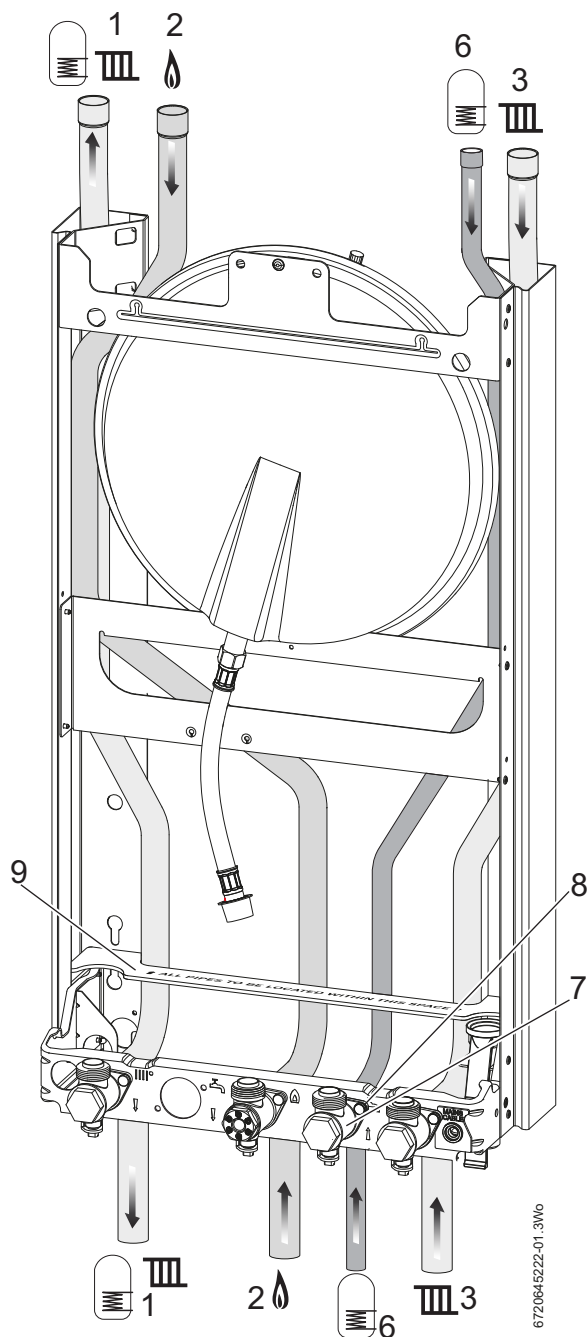


Fig. 2 Plumbing manifold with wall frame

#	Function	From left case edge	Diameter of pipe
1	CH and cylinder flow	70mm	22mm
2	Gas	200mm	22mm
3	CH Return	330mm	22mm
4	Condensate	35mm	22mm
5	Pressure Relief Valve	367mm	15mm
6	Cylinder return	267mm	15mm
7	Cylinder return isolation valve		
8	Isolation valve mounting screws		
9	Pipe guide		

Table 1 Key to figures 1 & 2

### 3 BOILER CONNECTIONS


**NOTICE: CYLINDER RETURN PIPE**

- The following must be completed before the boiler is mounted onto the wall mounting frame

#### 3.1 ASSEMBLY OF THE INTERNAL CYLINDER RETURN PIPE TO THE BOILER

Use the packaging as protection, turn the boiler on its left hand side to enable fitting of the hot water return pipe.

- Move the control panel into the service position by removing the screw from the retaining bracket.

1. Loosen the two retaining screws to free the back clamping plate on the hydraulic block as shown in figure 3.

2. Remove the brass bung assembly from the hydraulic block by removing the screw and sliding it free from the flange on the clamping plate. Make sure that the other brass bung assembly is retained in place.
3. Remove the copper pipe from the Optional Integral Diverter Valve Kit and feed the flat end of the pipe through the rear of the boiler as shown.
4. Before fitting the pipe, check that the seal is in position on the plastic moulding. Slide the flat end of the pipe under the flange on the hydraulic block clamping plate ensuring that pipe is located correctly.
5. Secure the clamping plate by re-tightening the two screws (1) loosened in step 1.



Re-secure the control panel before lifting the boiler.

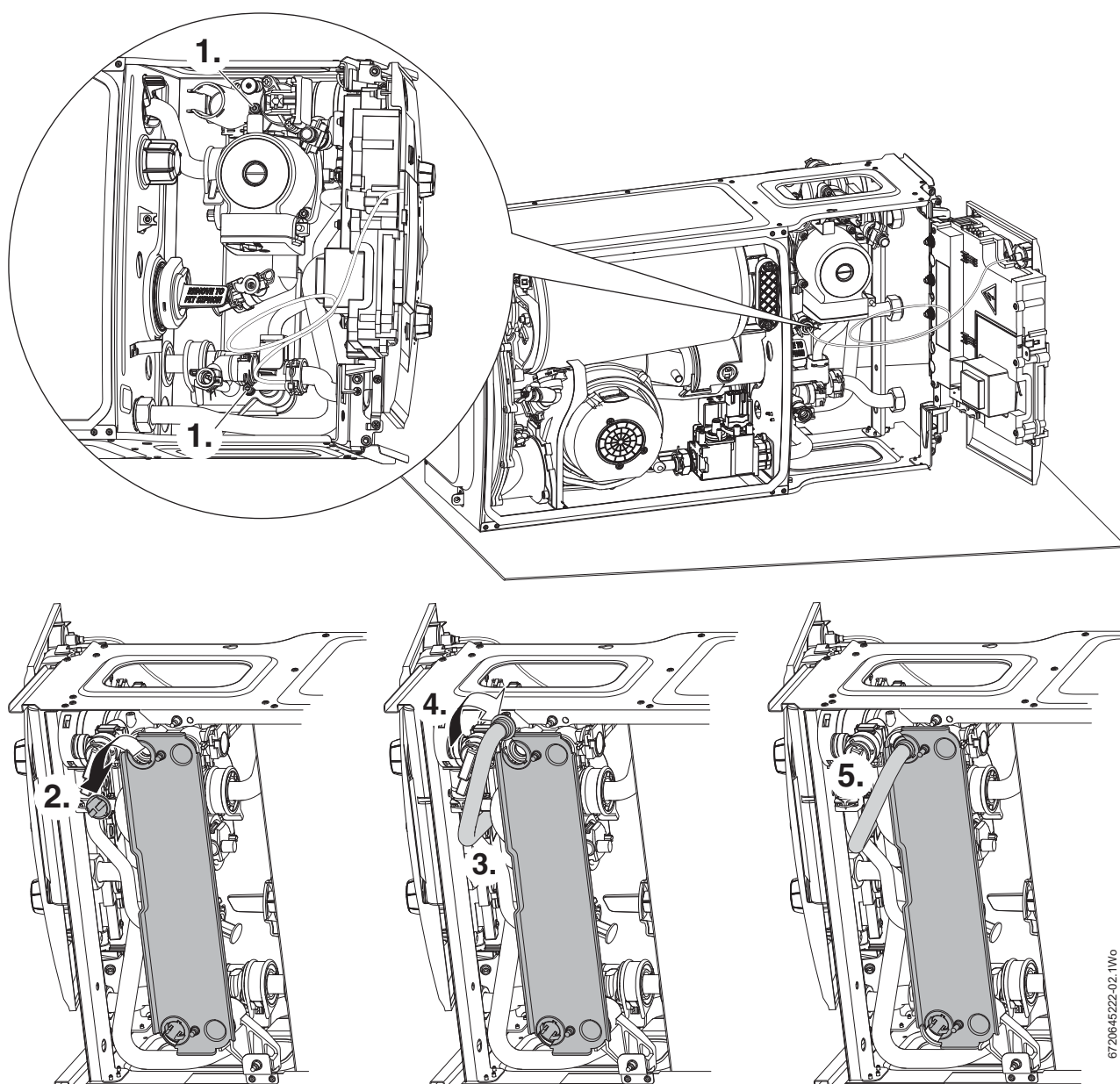


Fig. 3 Hot water return pipe fitting

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### 3.2 GAS AND WATER CONNECTIONS



**CAUTION: MAINS SUPPLIES:**

- ▶ ISOLATE THE MAINS GAS SUPPLY BEFORE STARTING ANY WORK AND OBSERVE ALL RELEVANT SAFETY PRECAUTIONS.

- ▶ Remove template and secure the wall mounting frame to the wall with the fittings supplied.

- ▶ System pipes may be run vertically upwards behind the boiler or below it.

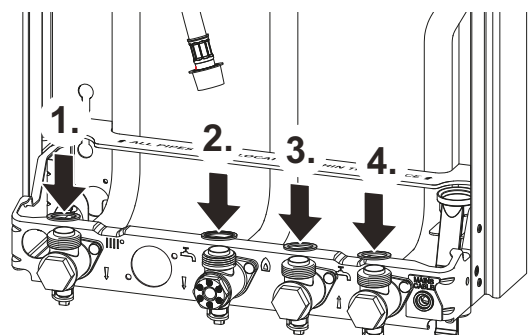
See Plumbing Manifold Section on page 3.

1. CH and cylinder flow (22mm),
2. Gas inlet (22mm),
3. Cylinder return (15mm),
4. CH return (22mm)



The bonded washer supplied is for the gas connection only.

- ▶ Fit sealing washers to service valves before hanging boiler.



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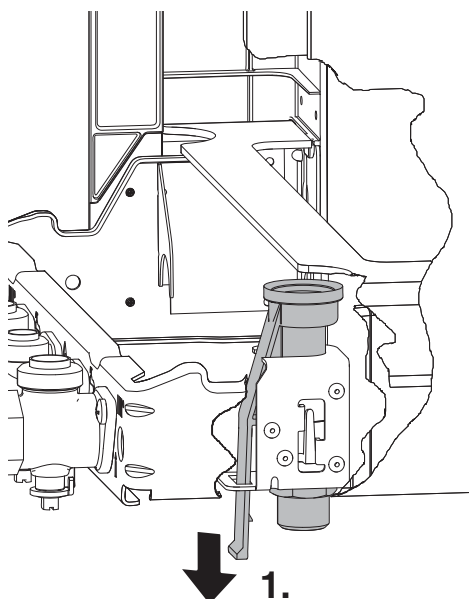
Fig. 4 Sealing washers



**NOTICE: PRV connector**

- ▶ Before hanging the boiler onto the wall mounting frame ensure that the pressure relief valve connection is in the DOWN position. This is located on the right hand side of the wall frame at the rear.

1. Pull the extended tab/lever forward and down until there is no further travel.



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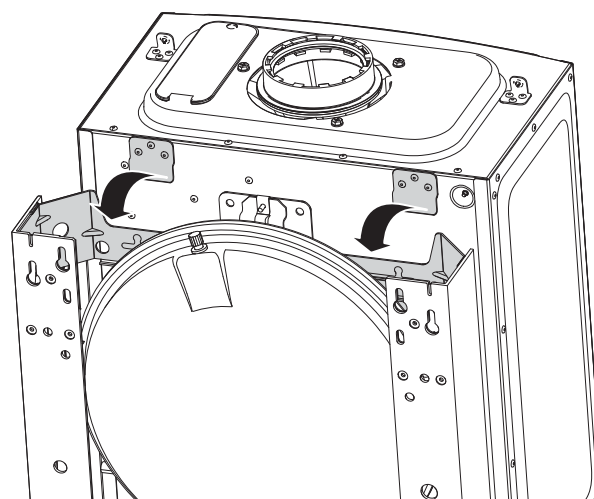
Fig. 5 PRV connection in the down position



**NOTICE: Protective caps/strips**

- ▶ Caps or plastic strip fitted to pipes must be removed before hanging the boiler.

- ▶ Hang the boiler on to the wall mounting frame by the two brackets positioned left and right at the top rear of the appliance. Do not lift the appliance by the air gas manifold. There are two handling holes incorporated into the inner casing left and right in the lower section of the appliance.



6720643895-22.1Wo

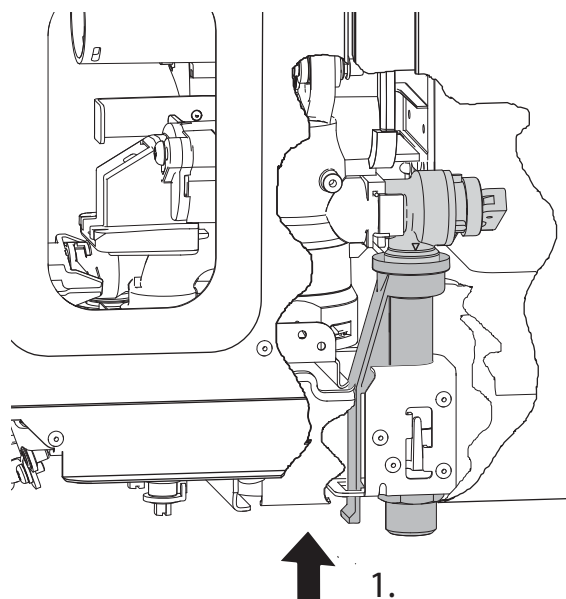
Fig. 6 Hanging the boiler



**NOTICE: PRV connector**

- ▶ The pressure relief connector must be repositioned after the boiler has been correctly mounted to the wall mounting frame.

1. Push the lever on the pressure relief connector UP until the stop on the inside of the handle is over the shoulder of the metal bracket to secure in place.



6720644743-17.2Wo

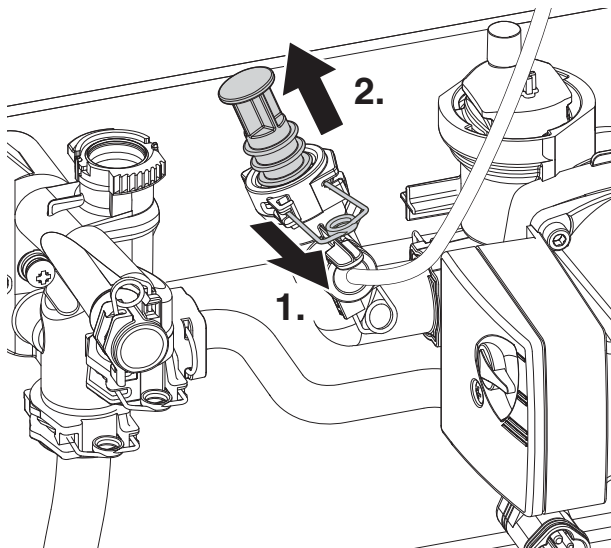
Fig. 7 PRV in the up position

- ▶ Remove the screw from the control panel retaining bracket and lower the control panel into the service position.
- ▶ Make connections to the heating system and cylinder. Connect the gas supply to the boiler gas cock 22mm compression.



To connect the expansion vessel flexible pipe to the hydraulic manifold situated to the left of the pump:

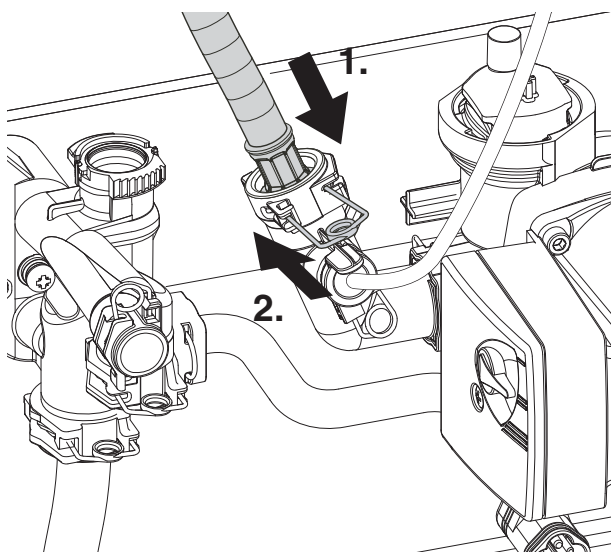
- Remove and discard the plastic cap from the expansion vessel flexible pipe.
- 1. Refer to figure 8, release the retaining clip.
- 2. Remove and discard the orange plastic blanking plug (2) from the pressure vessel connection at the hydraulic manifold.



6720645222-05.1Wo

**Fig. 8** Blanking plug removal

- 1. Refer to figure 9 and insert the expansion vessel flexible pipe it to the fitting on the pump.
- 2. Secure in place with the wire retaining clip.



6720645222-06.1Wo

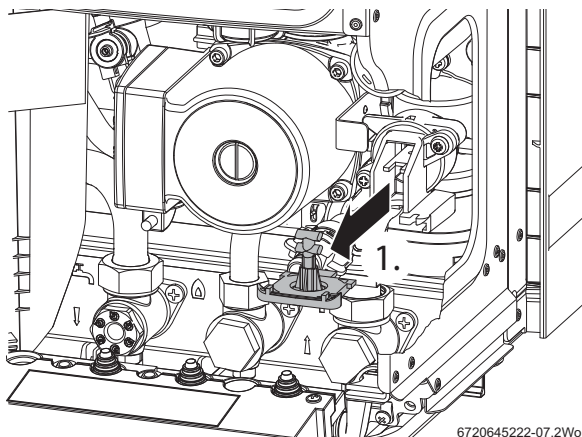
**Fig. 9** Expansion vessel connection

- Connect the pressure relief drain pipe to 15mm compression joint using the compression nut and olive supplied in the literature/hardware pack.

## 4 FITTING THE DIVERTER VALVE MOTOR AND CODE PLUG

### 4.1 FITTING THE DIVERTER VALVE MOTOR:

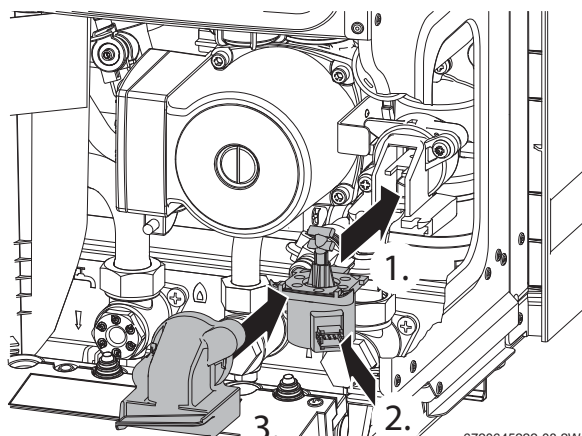
- 1. Remove the diverter valve blanking plate by pulling it forwards to free it from its location.



6720645222-07.2Wo

**Fig. 10** Removing Diverter valve blanking plate

- 1. To fit the diverter valve motor, push the motor into the housing until the motor "clicks" securely into place, ensuring that the actuator arm locates into the middle of the "H" receptor on the motor.
- 2. Connect the plug of the diverter valve motor harness into the socket on the diverter valve motor.
- 3. Slide the protective cover over the diverter valve motor.

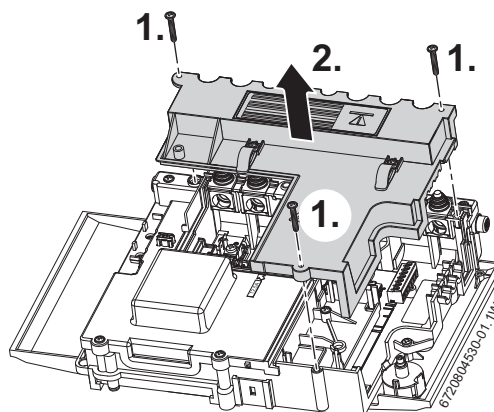


6720645222-08.2Wo

**Fig. 11** Fitting Diverter motor and cover

### 4.2 ACCESS TO THE CODE PLUG

- 1. Referring to figure 12, unscrew the three screws in the control panel.
- 2. Pull off the connections cover.



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**Fig. 12** Removing the connection cover

- Identify ST18, the code plug and connector.

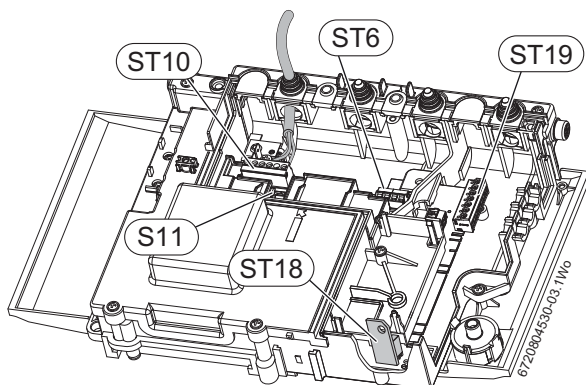


Fig. 13 Connector locations

**NOTICE: RESET THE CONTROL BOARD**

Following changes to the wiring of ST15 and ST8 the control board will need to be reset to recognise the new connection.

The power must be on to reset, all lights will flash to confirm the reset.

To reset the control board:

- Hold the Service mode “Spanner” and the Eco buttons down for at least five seconds.

#### 4.3 FITTING THE CODE PLUG

Boiler size	Gas	Code plug no.
12kW i System kit	NG	1118
	LPG	1119
15kW i System kit	NG	1122
	LPG	1123
18kW i System kit	NG	1126
	LPG	1127
24kW i System kit	NG	1114
	LPG	1115

1. Refer to figure 14 and remove the code plug from the controller, cut the tie securing the plug to the boiler chassis and discard the plug and tie.
  2. Fit the code plug from the kit making sure that code plug is secured to the boiler chassis with the new tie.
- Confirm that the number on the code plug corresponds to the boiler type in the table above.

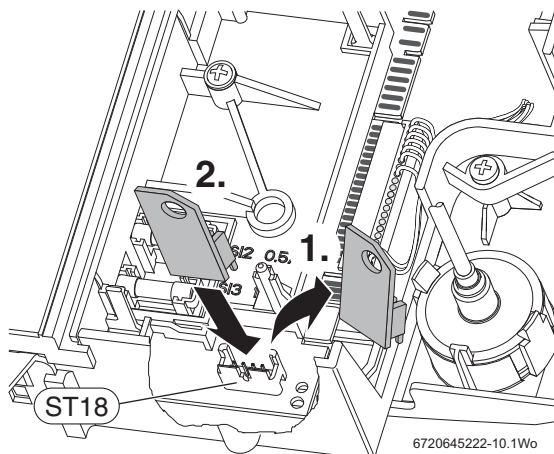


Fig. 14 Fitting new code plug

## 5 DHW MONITORING AND CONTROL



Cylinder sensors can only be utilised on boilers with DHW temperature control.

The diverter valve kit is supplied with a cylinder temperature sensor, which is the better option when using Worcester's FX range of controls with the boiler, refer to sections 5.1 and 5.2.

However a volt-free cylinder thermostat can be used instead and should be wired to ST8, refer to section 5.3.

Do not use both methods of hot water control, choose one or the other

### 5.1 CYLINDER TEMPERATURE SENSOR/THERMOSTAT

#### 5.1.1 FITTING THE CYLINDER TEMPERATURE SENSOR

Refer to the cylinder installation instructions for the position of the sensor, there may already be a “sensor pocket” available. If no “pocket” is available, for foam insulated cylinders only with no metal jacket, follow the steps below.

1. Mark a rectangular hole of approximately 50 by 100mm about one third of the cylinder length from the bottom of the cylinder.



**CAUTION:** Cut carefully!

- Do not pierce the wall of cylinder.
- Do not cut any metal insulation jacket.

1. Using a sharp knife, cut through the insulation, remove and retain the piece of insulation.
2. Apply heat conductive paste to the sensor and place the sensor on the cylinder body in the middle of the cut-out.
3. Hold the sensor in position with a piece of aluminium tape.
4. Replace the insulation material.
5. Secure the insulation in place with suitable cloth tape.



**NOTICE:** Foam covered hot water cylinders

- Figure 15 applies only to foam covered open vented cylinders.

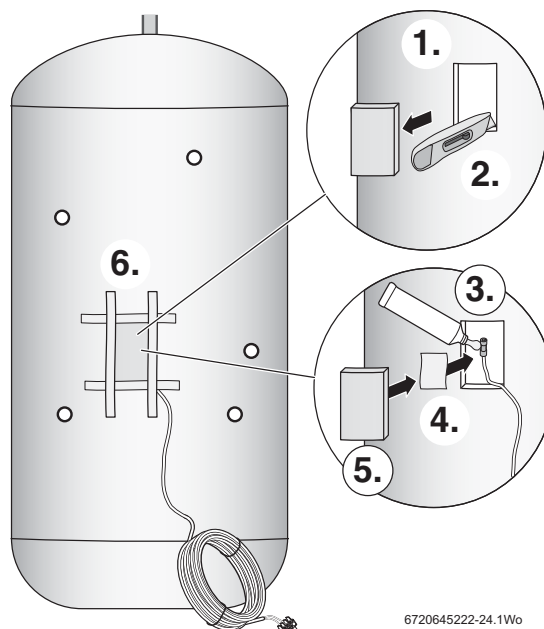


Fig. 15 Sensor connection to cylinder

#### 5.1.2 FITTING THE CYLINDER THERMOSTAT

Refer to the cylinder installation instructions for the position of the thermostat, there may already be a “pocket” available.

On foam insulated cylinders with no metal jacket and no “pocket” use a strap thermostat. Cut out a suitable piece of insulation to accommodate the thermostat and secure the thermostat with the strap.

## 5.2 DIVERTER VALVE AND SENSOR CONNECTIONS


**NOTICE:** Cable routing:

- ▶ Do not route low voltage cables alongside mains voltage cables.  
This can cause interference on the low voltage cables.

1. Connect the cylinder temperature sensor (1) to the edge connector ST15.

- ▶ Connect the Diverter valve motor harness to the Diverter valve motor connection, refer to the circuit diagram in section 6.4.



If the ST15 connector and sensor is being used do not connect ST8 as well.  
The link is not required.

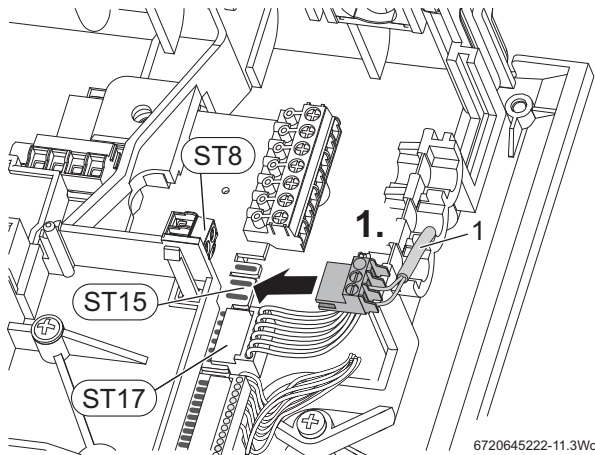


Fig. 16 Diverter motor and sensor connections

- ▶ Replace the control panel cover.
- ▶ Move the control panel to the up position and secure.

## 5.3 DIVERTER VALVE AND CYLINDER THERMOSTAT CONNECTIONS

1. Connect the cylinder thermostat (1) to the connector ST8.

- ▶ Connect the Diverter valve motor harness to the Diverter valve motor connection, refer to the circuit diagram in section 6.4.



If the ST8 and thermostat are being used do not use ST15 as well.  
The link is not required.

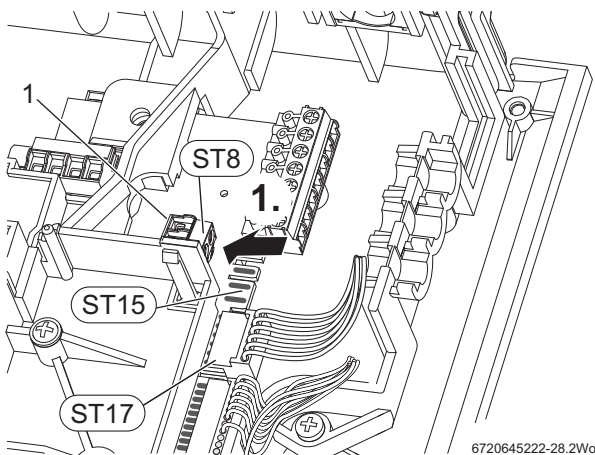


Fig. 17 Diverter motor and thermostat connections

- ▶ Replace the control panel cover.
- ▶ Move the control panel to the up position and secure.

## 6 ELECTRICAL


**NOTICE:** General information

- ▶ Mains supply to the boiler must be through a fused double pole isolator situated adjacent to the appliance. The isolator must have a contact separation of 3mm minimum in both poles. External fuse rating 3A.
- ▶ When stripping wires always ensure copper strands do not fall into the control box.
- ▶ There should be no external wiring centre.
- ▶ A fascia mounted twin channel programmer must be used. Timers available:  
DT20 Twin Channel Programmer (7 716 192 038),  
DT10RF Digistat (7 716 192 052),  
DT10RF Optimiser (7 716 192 053)  
DT20RF Digistat (7 716 192 054),  
FR10 Intelligent room thermostat (7 716 192 065),  
FR110 Programmable thermostat (7 716 192 066),  
FW100 Weather compensation (7 716 192 067).
- ▶ If any of the programmers/timers listed above are used, the room thermostat is incorporated in the transmitter. Therefore keep link fitted across L<sub>S</sub>/L<sub>R</sub>.

### 6.1 INTERNAL DIVERTER VALVE WITH A VENTED CYLINDER AND DHW CYLINDER SENSOR

#### ACCESS TO ELECTRICAL CONNECTIONS:

Remove boiler casing to access control panel.

1. Unscrew the single screw and lower the control box into the horizontal position.
2. Unscrew the three screws in the control panel and pull off the connections cover.
3. 230V room thermostat with timer 7 716 192 038 (ST10):
  - ▶ Remove link - L<sub>S</sub>/L<sub>R</sub>
  - ▶ Connect room stat LIVE supply to terminal (L<sub>S</sub>)
  - ▶ Connect room stat LIVE return to terminal (L<sub>R</sub>)
  - ▶ Connect room stat NEUTRAL to terminal (N<sub>S</sub>)
4. Hot water channel
  - Cylinder sensor connects to ST15
5. Optional external frost stat connection (ST6):
  - ▶ Connect frost stat wires to terminal (F<sub>S</sub>) and (F<sub>R</sub>)
6. Diverter valve motor:
  - ▶ Connect the Diverter valve motor harness to the Diverter valve motor connection, refer to the circuit diagram in section 6.4.

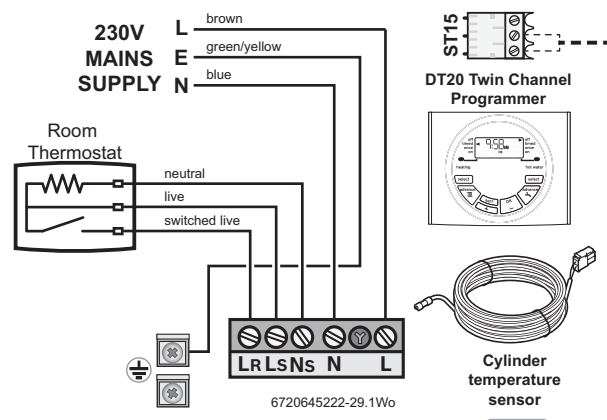


Fig. 18



## 6.2 INTERNAL DIVERTER VALVE WITH A VENTED CYLINDER AND DHW CYLINDER THERMOSTAT

### ACCESS TO ELECTRICAL CONNECTIONS:

Remove boiler casing to access control panel.

1. Unscrew the single screw and lower the control box into the horizontal position.
2. Unscrew the three screws in the control panel and pull off the connections cover.
3. 230V room thermostat with timer 7 716 192 038 (ST10):
  - ▶ Remove link - L<sub>S</sub>/L<sub>R</sub>
  - ▶ Connect room stat LIVE supply to terminal (L<sub>S</sub>)
  - ▶ Connect room stat LIVE return to terminal (L<sub>R</sub>)
  - ▶ Connect room stat NEUTRAL to terminal (N<sub>S</sub>)



#### NOTICE: Programmers/Timers:

- ▶ If any of the programmers/timers listed in the notice at beginning of chapter 6 are used, the room thermostat is incorporated in the transmitter. Therefore keep link fitted across L<sub>S</sub>/L<sub>R</sub>.

### 4. Hot water channel

- Volt free cylinder thermostat (ST8)
- Cylinder thermostat connects to ST8 terminals 7 and 9



#### NOTICE: ST8 Cylinder thermostat

- ▶ The cylinder thermostat must be volt free, i.e. not connected to any voltage source.

### 5. Optional external frost stat connection (ST6):

- ▶ Connect frost stat wires to terminal (F<sub>S</sub>) and (F<sub>R</sub>)

### 6. Diverter valve motor:

- ▶ Connect the Diverter valve motor harness to the Diverter valve motor connection, refer to the circuit diagram in section 6.4.

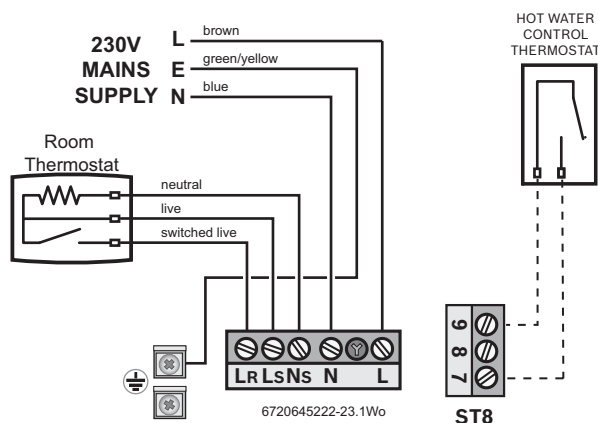


Fig. 19 Vented cylinder with DHW thermostat

## 6.3 INTERNAL DIVERTER VALVE WITH AN UNVENTED CYLINDER AND DHW CYLINDER THERMOSTAT ONLY

### HOT WATER CHANNEL

- ▶ The wiring of the unvented cylinder dual thermostat must be electrically separate.
- ▶ The cylinder dual thermostat must be connected to terminals 7 and 9.



#### NOTICE: ST8 Cylinder thermostat

- ▶ The cylinder dual thermostat must be volt free, i.e. not connected to any voltage source.

- ▶ Any factory fitted links within the dual thermostat must be removed.
- ▶ The safety limit thermostat must be wired to interrupt the mains 230 Volt supply to the boiler terminal S10.

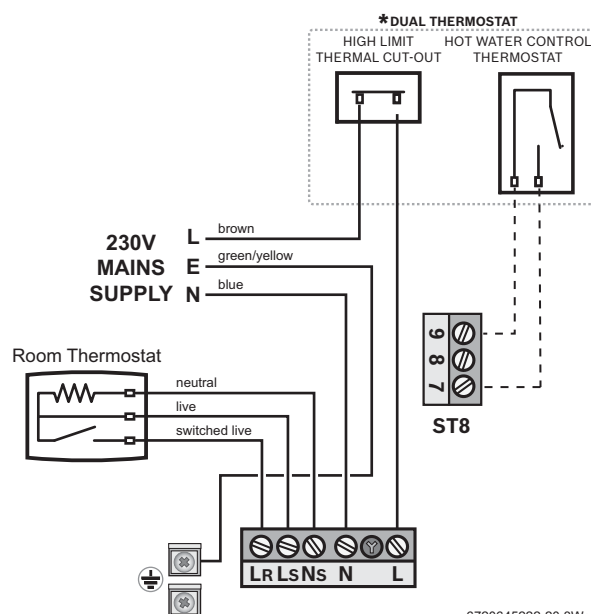


Fig. 20 Unvented cylinder with DHW thermostat



#### NOTICE: RESET THE CONTROL BOARD

Following changes to the wiring of ST15 and ST8 the control board will need to be reset to recognise the new connection.

The power must be on to reset, all lights will flash to confirm reset.

To reset the control board:

- ▶ Hold the Service mode "Spanner" and the Eco buttons down for at least five seconds.

## OPTIONAL EXTERNAL FROST STAT CONNECTION ST6

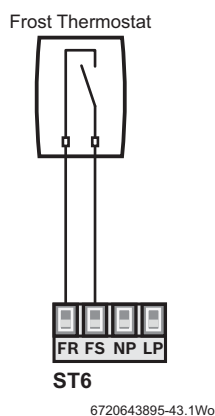


Fig. 21 Frost Thermostat

- Connect frost thermostat cables to terminals  $F_S$  &  $F_R$ .
- These are not polarity sensitive.

## CONNECTOR LOCATIONS

S11	Fuse F1 2.5A
ST6	Frost thermostat connection
ST8	Optional cylinder stat
ST10	Mains in & external controls connections
ST18	Code plug
ST19	EMS BUS connection

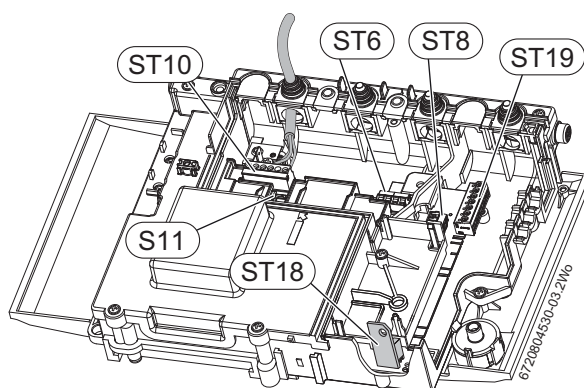


Fig. 22 Connector locations



### NOTICE: RESET THE CONTROL BOARD

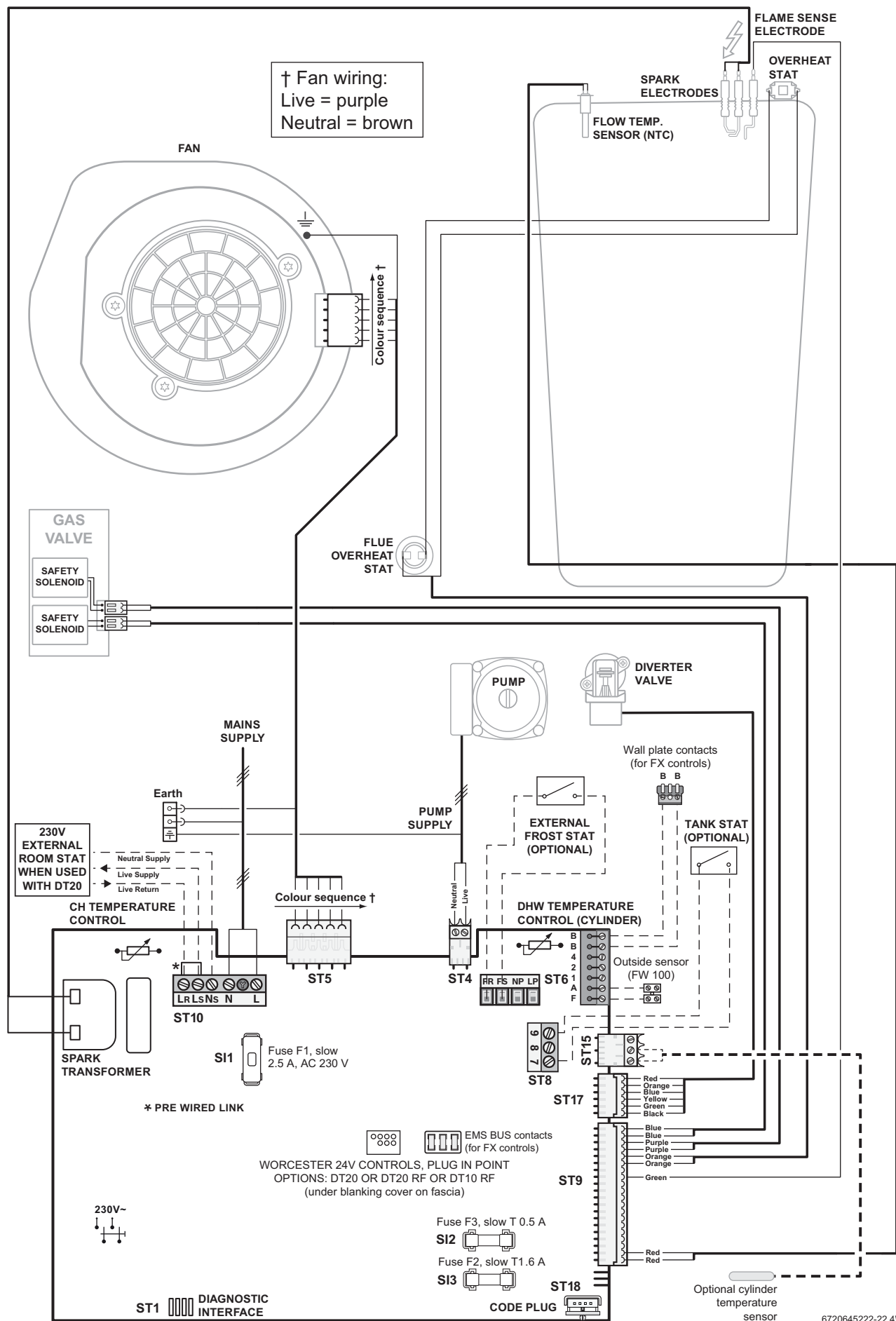
Following changes to the wiring of ST15 and ST8 the control board will need to be reset to recognise the new connection.

The power must be on to reset, all lights will flash to confirm reset.

To reset the control board:

- Hold the Service mode "Spanner" and the Eco buttons down for at least five seconds.

## 6.4 POSITION OF WIRED COMPONENTS



## 7 PRE-COMMISSIONING CHECKS

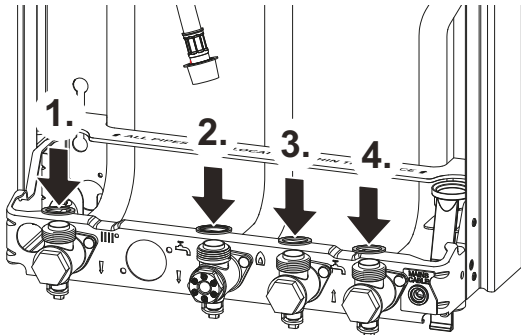


**NOTICE:** If the boiler is not to be commissioned immediately then:

- after successfully completing all of the checks and any rectification work, close the gas and water valves, shut off the gas supply, electrically isolate the boiler and label appropriately.

1. Check that the service and water pipes are connected to the correct position on the manifold.

- 1 - CH and cylinder flow (22mm)
- 2 - Gas inlet (22mm)
- 3 - Cylinder Return (15mm)
- 4 - CH Return (22mm)



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Fig. 23 Pipe connections

2. Check the gas type specified on the identification plate matches that of the gas supply. Turn on the main gas supply, check the gas pipework, connections and rectify any leaks.
3. Check that the condensate pipe has been connected to the syphon.
4. Check pressure relief drain pipe is correctly fitted and securely tightened.



**NOTICE:**

- NOW RETURN TO THE I SYSTEM INSTRUCTION MANUAL (FILLING THE SYSTEM) TO CONTINUE INSTALLATION.

## 8 BOILER FUNCTION

### 8.1 FAULT FINDING

If in the unlikely event the boiler does not give complete satisfaction, before calling for a service engineer, the installer should check the following:

#### FOR BOILERS WITH INTEGRAL DIVERTER VALVE AND CONTROLS

##### NO CENTRAL HEATING, BUT HOT WATER OK

Remove the room stat wiring from L<sub>S</sub>, L<sub>R</sub> and N from terminal block ST10. Fit a link between L<sub>S</sub> and L<sub>R</sub>, if the CH now works there is likely to be a problem with the room stat or wiring to it.

##### NO HOT WATER, BUT CENTRAL HEATING OK



Do NOT link out the cylinder sensor, it is a PTC device. Only link out the cylinder thermostat to check the operation of the boiler.

If a cylinder thermostat is used, remove the cylinder stat wiring from 7 and 9 on the terminal block ST8. Fit link across 7 and 9.

If the HW now functions, the problem may be with the cylinder thermostat or wiring to the thermostat.

#### FOR ALL BOILERS WITH INTERNAL OR EXTERNAL CONTROLS

##### Burner lights then goes out in DHW or CH mode

Does the boiler run normally with the front cover off and then fail when the cover is put back on?

If yes there is likely to be a flue problem - either the air inlet is blocked or the inner flue is leaking flue gases into the air inlet.

##### BOILER NOISY OR GOING TO OVERHEAT

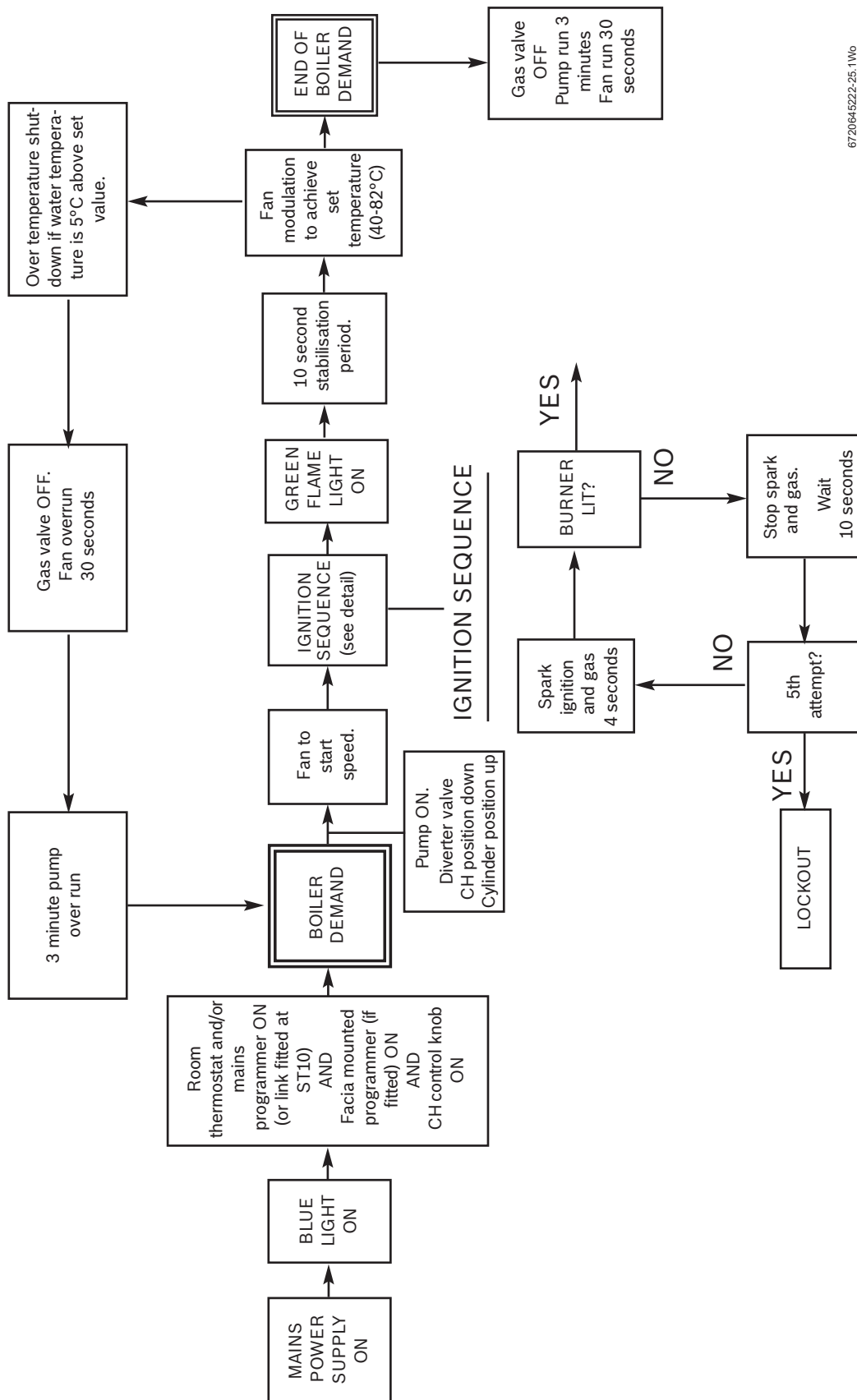
1. Was the system flushed?
2. Has the pump been bled and the dust cap released?

##### GENERAL CHECKS

1. Is all the air bled from the gas supply?
2. Is all the air bled from the primary water system?
3. Is there 230v a.c. across the boiler live and neutral terminals? (L & N on ST10)
4. Is the polarity correct?
5. Is the incoming gas pressure at least 16.5mbar at the gas valve with the boiler at maximum output?



## 8.2 BOILER FUNCTION

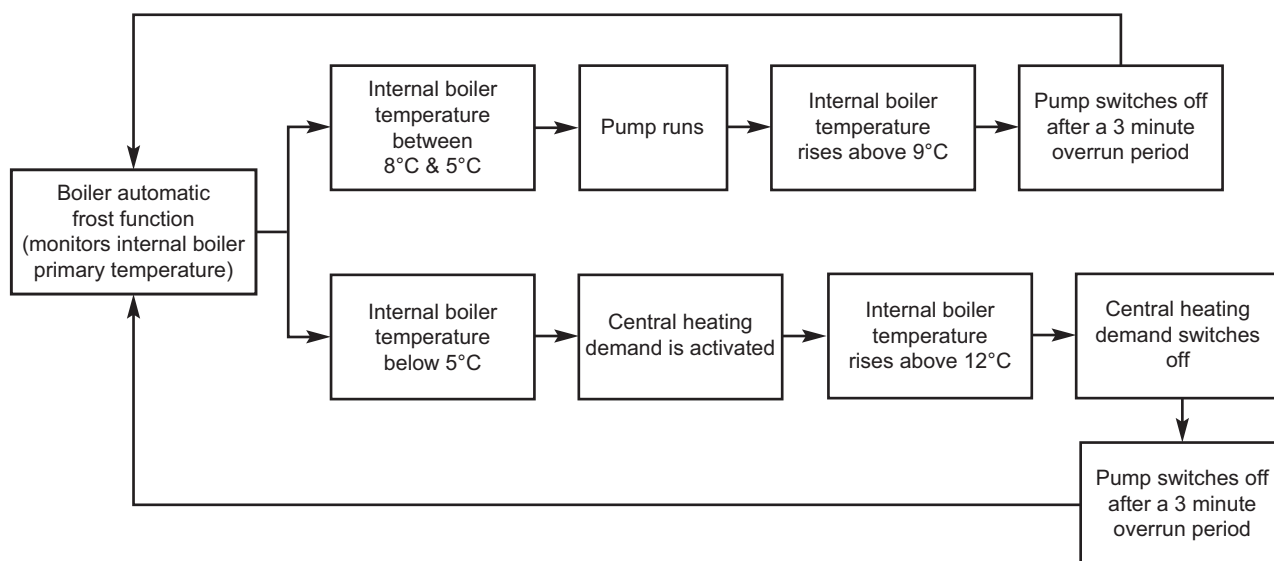


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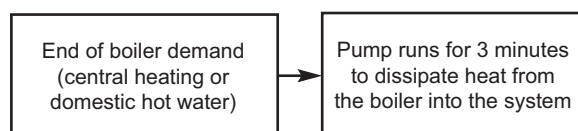
Fig. 24 Boiler function

### 8.3 PROTECTION FUNCTION

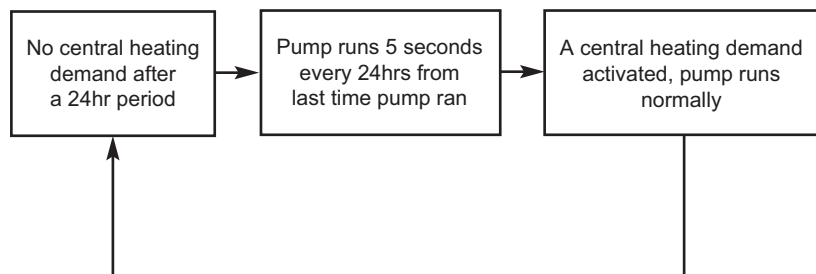
#### AUTOMATIC INTERNAL FROST FUNCTION



#### PUMP OVERRUN FUNCTION



#### PUMP ANTISEIZE FUNCTION



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Fig. 25 Protection function

## NOTES

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Worcester, Bosch Group is a brand name of Bosch Thermotechnology Ltd.  
[worcester-bosch.co.uk](http://worcester-bosch.co.uk)

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