Release R.2.0 Uk

SCE

80-115
80-140
80-180
95-199
95-260
70-360
65-400
65-500

Installation
User and
Service Manual

state
WATER HEATERS

CE

www.state-waterheaters.co.uk

your installer

state

The Expert's Choice™

Warning
Read this manual carefully before first using the water heater. Failure to read this manual and to follow the instructions in this manual may lead to accidents, personal injury, and damage to the appliance.

Copyright

State Water Heaters reserves the right to modify specifications stated in this manual.

Trademarks

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Liability

State Water Heaters accepts no liability for claims from third parties arising from improper use other than that stated in this manual and in accordance with the General Conditions registered at the Eindhoven Chamber of Commerce.

Refer further to the General Conditions. These are available on request, and without charge.

Although considerable care has been taken to ensure a correct and suitably comprehensive description of all relevant components, the manual may nonetheless contain errors and inaccuracies.

Should you detect any errors or inaccuracies in the manual, we would be grateful to receive notification. This helps us to further improve our documentation.

More information

If you have any comments or queries concerning any aspect related to the appliance, then please do not hesitate to contact State Water Heaters.

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In the event of problems with connecting to the gas, electricity or water supply, please contact your installation’s supplier/installer.

Table of contents

1 Introduction

1.1 About the appliance

This manual describes how to install, service and use the SCE appliance. The SCE appliance is a gas-fired open water heater without a fan. The SCE appliance is fitted with a flue gas backflow safeguard and falls into the appliance category B11BS. This information is located on the appliance's identification plate. The information in this manual is applicable to types SCE: 80-115, 80-140, 80-180, 95-199, 95-260, 70-360, 65-400, 65-500.

The manner of construction and features of the appliance are in conformance with the European standard for gas-fired storage water heaters for the production of domestic hot water (ES 89). The appliances are therefore compliant with the European Directive for Gas Appliances, and have the right to bear the CE mark.

CE
0063

Warning
Read this manual carefully before starting up the water heater. Failure to read the manual and to follow the printed instructions may lead to personal injury and damage to the appliance.

1.2 What to do if you smell gas

Warning
Whenever there is a **smell of gas**:

No naked flames! No smoking!

Avoid causing sparks! Do not use any electrical equipment or switch, i.e. no telephones, plugs or bells!

Shut off the mains gas supply!

Open windows and doors!

Warn occupants and leave the building!

After leaving the building, alert the gas distribution company or installer.

1.3 Regulations

As the (end) user, installer or service and maintenance engineer, you must ensure that the entire installation complies, as a minimum, with the official local:

- building regulations;
- energy supplier's directives for existing gas installations;
- directives and technical guidelines for natural gas installations;
- safety requirements for low-voltage installations;
- regulations governing the supply of drinking water;
- regulations governing ventilation in buildings;
- regulations governing the supply of air for combustion;
- regulations governing the discharge of products of combustion;
- requirements for installations that consume gas;
- regulations governing indoor waste water disposal;
- regulations imposed by fire service, power companies and municipality;

Furthermore, the installation must comply with the manufacturer's instructions.

Note
Later amendments and/or additions to all regulations, requirements and guidelines published on or prior to the moment of installing, will apply to the installation.

1.4 Target groups

The three target groups for this manual are:

- (end) users;
- installers;
- service and maintenance engineers.

Symbols on each page indicate the target groups for whom the information is intended. See Table 1.1.

Table 1.1 Target group symbols

Symbol	Target group
	(End) user
	installer
	Service and maintenance engineer

1.5 Maintenance

A service should be carried out at least once a year, both on the water side and on the gas side. Maintenance frequency depends, among other things, on the water quality, the average burning time per day and the set water temperature.

Note
To determine the correct maintenance frequency, it is recommended to arrange for the service and maintenance engineer to check the appliance on both the water and gas side, three months after installation. Based on this check, the best maintenance frequency can be determined.

Note
Regular maintenance extends the service life of the appliance.

Both the end user and the service and maintenance engineer are responsible for regular maintenance. They will need to establish clear agreements on this.

Note
If the appliance is not regularly maintained, the warranty will become void.

1.6 Forms of notation

The following notation is used in this manual:

Note
Important information

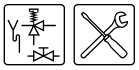
Caution
Ignoring this information can lead to the appliance being damaged.

Warning
Failure to carefully read this information may lead to danger of personal injury, and serious damage to the appliance.

1.7 Overview of this document

Table 1.2 provides an overview of the contents of this document.

Table 1.2 Contents of document

Chapter	Target groups	Description
2 Functioning of the appliance		This chapter describes how the appliance functions.
3 Installation		This chapter describes the installation activity to be completed before you actually start up the appliance. Instructions are also provided for the installation and/or service and maintenance engineer on converting the appliance to other types of gas.
4 Filling and draining		This chapter describes how to fill and drain the appliance.
5 Operating		This chapter describes the appliance's control panel, and how to use it.
6 Status of the appliance		This chapter describes the status (mode or condition) that the appliance may have, and possible actions to take.
7 Starting up and shutting down		This chapter describes how to start up the appliance, and how to shut it down for a brief or long period of time. The general heating cycle of the appliance is also described.
8 Troubleshooting		This chapter is mainly intended for the installer and the service and maintenance engineer. It describes appliance errors. These errors are indicated on the display. A troubleshooting table of possible causes and solutions is provided. End users may also refer to this chapter for additional information about the appliance.
9 Maintenance		This chapter sets out the maintenance tasks to be carried out during a service.
10 Warranty (Certificate)		This chapter states the warranty terms and conditions.

2 Functioning of the appliance

2.1 Introduction

Topics covered in this chapter:

- Functional description of the appliance;
- The appliance's heating cycle;
- Protection for the appliance;
- Safety of the installation.

2.2 Functional description of the appliance

Figure 2.1 shows a cut-away view of the appliance.

Legend

❶ flue gas discharge
❷ draught diverter
❸ anodes
❹ flue tubes
❺ flue baffles
❻ PU-isolation
❼ tank
❽ cleaning opening
❾ drain valve
❿ combustion chamber
⓫ radiation shield/condensation tray
⓬ gas control
⓭ flue gas thermostat sensor
⓮ flue gas thermostat
⓯ hot water outlet
⓰ safety thermostat sensor
⓱ high-limit thermostat sensor
⓲ control panel
⓳ control thermostat
⓴ burner control
㉑ high-limit thermostat
㉒ frost thermostat
㉓ safety thermostat
㉔ control thermostat sensor
㉕ frost thermostat sensor
㉖ cold water inlet
㉗ glow igniter
㉘ ionisation rod
㉙ bar burner/ burner tray

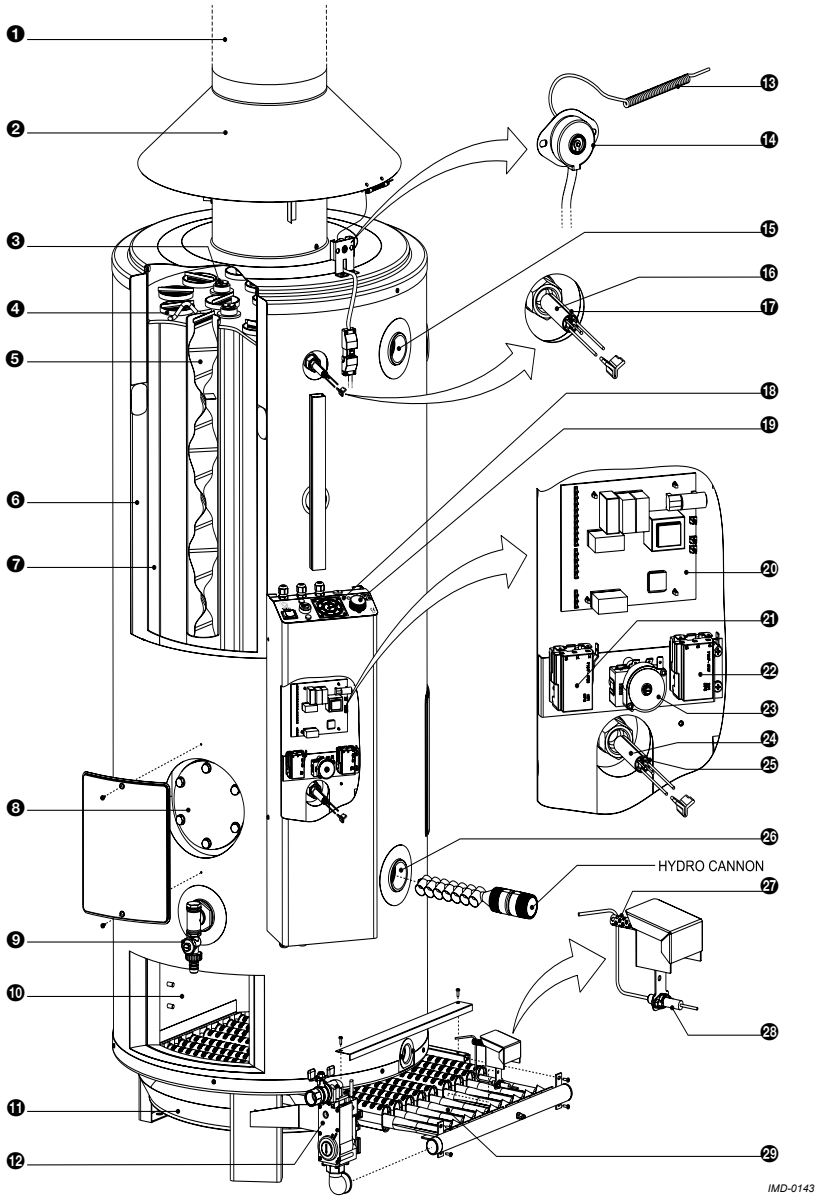


Figure 2.1 Cross-section of the appliance

In this appliance, the cold water enters the bottom of the tank via the cold water inlet ㉖. The heat of combustion is transferred to the water through the combustion chamber ❿ and flue tubes ❹. The heated tap water leaves the tank via the hot water outlet ⓯. Once the appliance is completely filled with water, it remains constantly under water supply pressure. As hot water from the appliance is consumed, it is continuously replenished with cold water.

The gas required for combustion flows into the manifold via the gas control ⓬. Orifices are located within the manifold. Via these orifices, the gas enters the bar burners ㉙. The bar burners together form the burner tray. As the gas is injected into the bar burners, the primary air required for combustion is also drawn in[1]. Additional air is drawn through the openings in the burner tray. The glow igniter ㉗ ensures the ignition of the gas/air mixture. The flue gases generated by this combustion are led through the flue tubes ❹. There are flue baffles ❺ fitted inside the flue tubes. These slow down the flue gas exhaust, improving the heat transfer efficiency. The flue gases leave the appliance via the draught diverter ❷. A radiation shield/condensation tray ⓫ is mounted below the burner tray. This prevents overheating of the floor surface under the appliance and serves as a collection tray for condensation water.

The PU-isolation ❻ prevents heat loss. The inside of the tank is enamelled to protect against corrosion. The anodes ❸ provide additional protection. The Hydro Cannon also protects the bottom of the tank from scale and lime buildup.

2.3 The appliance's heating cycle

The entire appliance is controlled by the burner control ⓴ and the control thermostat ⓳ or frost thermostat ㉒. The control thermostat and frost thermostat both independently measure the water temperature (T_{water}). The appliance's heating cycle is activated as soon as T_{water} falls below the specified threshold value (T_{set}). The value for T_{set} depends on the status chosen for the appliance, see paragraph '6.2 Operating modes'. If the appliance is in the 'OFF mode' (frost protection), then this value is determined by the frost thermostat (threshold value = 20°C). If the appliance is in the 'ON mode', then the threshold value is selectable via the control thermostat (±40°C - ±70°C).

As soon as T_{water} falls below T_{set}, the relevant thermostat (control or frost) will close, and the burner control will register a heat demand. The gas control ⓬ will open, and the gas will mix with the air it draws in. This mixture is ignited by the glow igniter ㉗ and the water becomes heated. A soon as T_{water} exceeds T_{set}, the thermostat will open once more. The heat demand will cease, and the burner control will stop the heating cycle.

The thermostats have a certain margin both when closing and opening. We refer to this margin as the hysteresis. The hysteresis cannot be adjusted.

2.4 Protection for the appliance

The burner control monitors the water temperature by means of thermostats, and ensures a safe combustion. This is achieved by:

- the Water temperature protection;
- the Flue gas backflow safeguard;
- the Ionisation rod.

1. *The narrow opening in the orifices accelerates the gas flow. This causes a partial vacuum. The effect of this partial vacuum is to draw the air into the flow (the Venturi effect).*

2.4.1 Water temperature protection

By means of the frost, high-limit and safety thermostats, the burner control monitors three temperatures related to safety. See Table 2.1.

Table 2.1 Temperature protection

Protection	Description
Frost thermostat	If the frost thermostat sensor ㉕ detects a temperature of 20°C or lower, the appliance's heating cycle will start. See paragraph '2.3 The appliance's heating cycle'.
High-limit thermostat	If the high-limit thermostat sensor ⑰ detects a temperature greater than 84°C, the high-limit thermostat will open. The heat demand will be stopped, and the burner control will stop the heating cycle until the high-limit thermostat closes again. At that moment, the burner control resets the appliance, and the heating cycle resumes. The high-limit safeguard serves to prevent overheating and/or excessive formation of scale in the appliance.
Safety thermostat	If the safety thermostat sensor ⑯ detects a temperature greater than 93°C, the safety thermostat will open. The heat demand will be ended, and the burner control immediately stops the heating cycle. A lockout error will occur in the burner control. This must be manually reset, before the appliance can be put back into operation.

2.4.2 Flue gas backflow safeguard

The flue gasses are directed to the outside via the draught diverter ❷ and the flue gas discharge ❶. To prevent the flue gases from flowing back into the boiler room, the discharge ducting is monitored by a feature called the Thermal Reflux Safeguard (T.R.S.). This uses a flue gas thermostat sensor ⑱ with flue gas thermostat ⑭ which are located in the draught diverter. Under normal circumstances this sensor will register the ambient temperature. However, if the chimney is not drawing sufficiently (for example, due to a blockage in the chimney), the flue gases will 'reflux' and flow back past the flue gas thermostat sensor. The sensor will then detect an excessive temperature and the flue gas thermostat will open. The heat demand will be ended, and the burner control immediately stops the heating cycle. The flue gas thermostat will also lock out. This must be manually reset, before the appliance can be put back into operation.

2.4.3 Ionisation rod

To prevent gas flowing when there is no combustion, an ionisation rod ㉙ is fitted. The burner control uses this rod for flame detection, by means of ionisation detection. The burner control acts immediately, as soon as it detects that gas is flowing, but there is no flame.

2.5 Safety of the installation

In addition to the standard safety monitoring of the appliance, the appliance must also be protected by an expansion vessel, pressure overflow valve, non-return valve and a T&P valve.

Use of an expansion vessel, a pressure relief valve and/or a pressure reducing valve depends on the type of installation: unvented or vented.

2.5.1 Unvented installation

With an unvented installation, a pressure relief valve and expansion vessel prevent excessive pressure in the tank. This prevents damage being caused to the enamelled coating (in the appliance) or to the tank. A non-return valve prevents excessive pressure in the water supply system. This valve also

prevents water from flowing backwards from the tank into the cold water supply system. The pressure reducing valve protects the installation against an excessively high water supply pressure (> 8 bar). These components are fitted to the cold water pipe. See paragraph '3.6.1 Cold water side'.

2.5.2 Vented installation

With a vented installation, excess pressure is taken up by the open water reservoir. The level of the water reservoir determines the maximum working pressure in the tank, which may not exceed 8 bar. The installation must also be fitted with an overflow from the hot water pipe, which discharges into the water reservoir. See paragraph '3.6.3 Hot water side'.

2.5.3 T&P valve

A T&P valve is only mandatory in an 'unvented' installation. However, State also recommends the use of a T&P valve in 'vented' installations.

A T&P valve monitors the pressure in the tank, and the water temperature at the top of the tank. If the pressure in the tank becomes excessive (>10 bar) or the water temperature is too high (>97°C), the valve will open. The hot water will immediately flow out of the tank. Because the appliance is under water supply pressure, cold water will automatically flow into the tank. The valve remains open until the unsafe situation has been averted. A connecting point for a T&P valve is standard on the appliance. See paragraph '3.6.3 Hot water side'.

3 Installation

Warning
The installation should be carried out by an approved installer in compliance with the general and local regulations imposed by the gas, water and power supply companies and the fire service.

The appliance may only be installed in a room which complies with the requirements stated in national and local ventilation regulations.

Refer also to paragraph '1.3 Regulations'.

3.1 Introduction

This chapter describes the installation activities to be carried out before the appliance may be started up, namely:

- Packaging;
- Environmental conditions;
- Technical specifications;
- Water connections, Unvented;
- Water connections, Vented;
- Gas connection;
- Flue gas discharge;
- Electrical connection;
- Checking the supply pressure and burner pressure;
- Conversion to a different gas category;

Note
Starting up the appliance is described in chapter '7 Starting up and shutting down'.

Figure 3.1 shows a front view of the appliance.

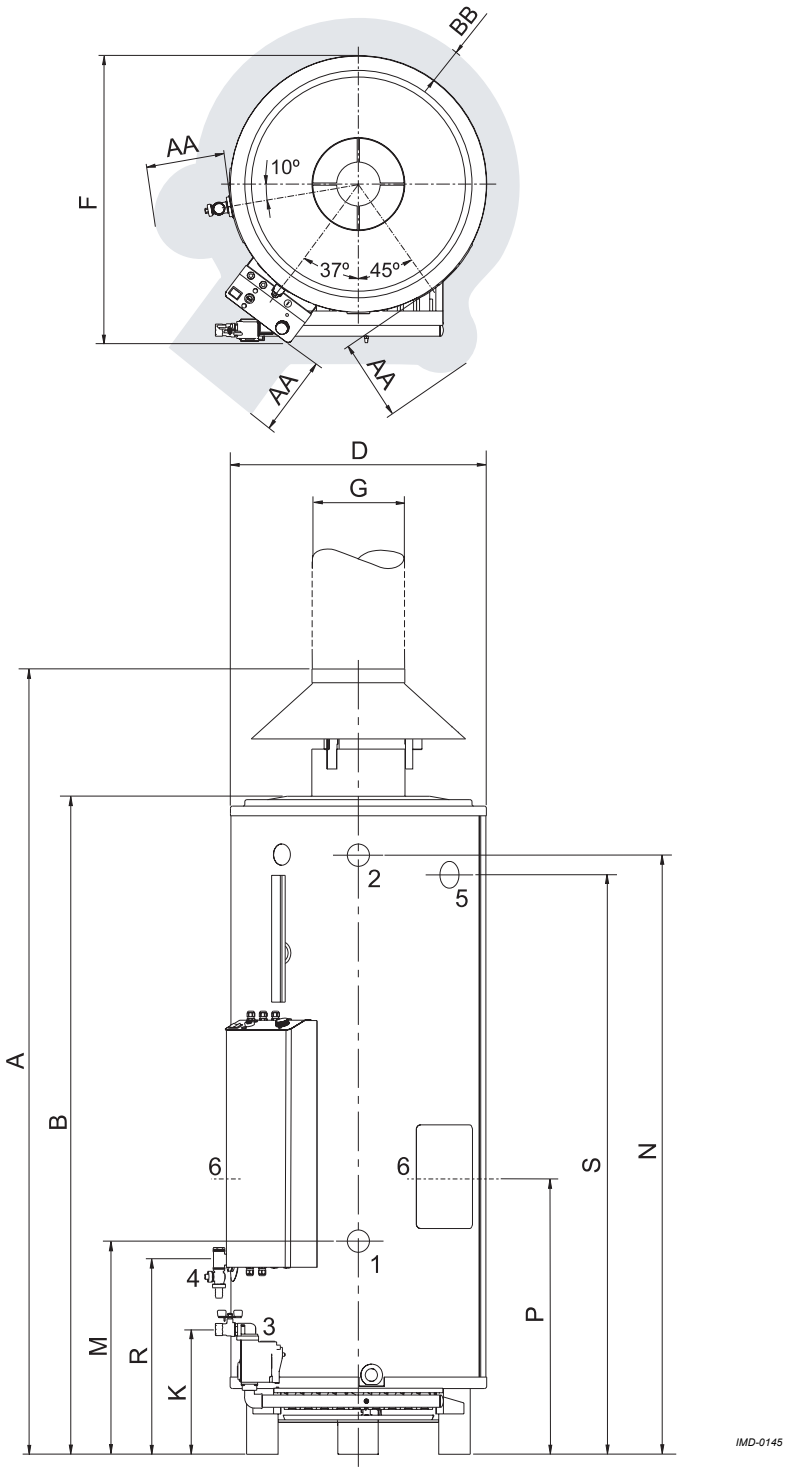


Figure 3.1 Plan and elevation of the appliance

3.2 Packaging

To avoid damaging the appliance, remove the packaging carefully.

We recommend unpacking the appliance at or near its intended location.

Caution

The appliance may only be manoeuvred in an upright position. Take care that the appliance is not damaged after unpacking.

3.3 Environmental conditions

Caution

The appliance may not be used in rooms where chemical substances are stored or used due to the risk of explosion, and corrosion to the appliance. Some propellants, bleaching agents, degreasing agents and so on, disperse vapours which are explosive and/or which cause accelerated corrosion. If the appliance is used in a room in which such substances are present, the warranty will be void.

SCE-appliances are open appliances, and may only be placed in an open boiler room. They fall under category B11BS.

3.3.1 Working clearances

For access to the appliance it is recommended that the following clearances are observed (see Figure 3.1):

- AA: around the appliance's control column and cleaning openings: 100 cm.
- BB: around the appliance itself: 50 cm.
- Above the appliance (room to replace the anodes):
  - 100 cm if using fixed anodes, or
  - 50 cm if using flexible anodes.

  If the available clearance is less than 100 cm, flexible magnesium anodes may be ordered from State Water Heaters.

Note

When installing the appliance, be aware that any leakage from the tank and/or connections can cause damage to the immediate environment or floors below the level of the boiler room. If this is the case, then the appliance should be installed above a wastewater drain or in a suitable metal leak tray. The leak tray must have an appropriate wastewater drain and must be at least 5 cm deep with a length and width at least 5 cm greater than the diameter of the appliance.

3.3.2 Humidity and ambient temperature

The boiler room must be frost-free, or be protected against frost. Table 3.1 shows the environmental conditions that must be adhered to, for correct functioning of the electronics present in the appliance to be guaranteed.

Table 3.1 Humidity and ambient temperature specifications

Humidity and ambient temperature	
Humidity	max. 93% RH at +25°C
Ambient temperature	Functional: $0 \leq t \leq 60$°C

3.3.3 Maximum floor loading

In connection with the appliance's weight, take account of the maximum floor loading, see Table 3.2.

Table 3.2 Weight specifications related to maximum floor loading

Weight of the appliance filled with water							
SCE 80-115	SCE 80-140	SCE 80-180	SCE 95-199	SCE 95-260	SCE 70-360	SCE 65-400	SCE 65-500
523 kg	523 kg	525 kg	594 kg	597 kg	540 kg	531 kg	582

3.3.4 Water composition

The appliance is intended for heating drinking water. The drinking water must comply with the regulations governing drinking water for human consumption. Table 3.3 shows these requirements.

Table 3.3 Water specifications

Water composition	
Hardness (alkaline earth ions)	> 1.00 mmol/l: • German hardness > 5.6° dH • French hardness > 10.0° fH • British hardness > 7.0° eH
Conductivity	> 125 µS/cm
Acidity (pH value)	7.0 < pH value < 9.5

Note
If the water specifications deviate from those stated in Table 3.3, then the tank protection cannot be guaranteed.
See also chapter '10 Warranty (Certificate)'.

3.4 Technical specifications

The appliance is supplied without accessories. Check the dimensions and other specifications for the accessories to be used, based on Figure 3.1 and tables Table 3.4 through Table 3.7.

Table 3.4 Dimensions SCE

Dimension Description	**SCE 80-115**	**SCE 80-140**	**SCE 80-180**	**SCE 95-199**	**SCE 95-260**	**SCE 70-360**	**SCE 65-400**	**SCE 65-500**
A. Height including draught diverter (mm)	1910	1910	1890	2155	2155	1950	2145	2145
B. Height excluding draught diverter (mm)	1690	1690	1690	1900	1900	1735	1810	1810
D. Diameter of the appliance (mm)	710	710	710	710	710	710	710	710
F. Width including control column (mm)	800	800	800	800	800	800	800	800
G. Flue gas outlet diameter (mm)?	130	130	150	180	180	200	250	250
K. Height of gas supply (mm)	145	145	145	145	145	145	145	145
M. Height of cold water supply (mm)	505	505	505	505	505	515	590	590
N. Height of hot water outlet (mm)	1545	1545	1545	1750	1750	1580	1655	1655

Table 3.4 Dimensions SCE

Dimension Description	SCE 80-115	SCE 80-140	SCE 80-180	SCE 95-199	SCE 95-260	SCE 70-360	SCE 65-400	SCE 65-500
P. Height of the cleaning opening centre (mm)	710	710	710	710	710	720	795	795
R. Height of the drain valve centre (mm)	440	440	440	440	440	480	535	535
S. Height of the T&P plug centre (mm)	1490	1490	1490	1695	1695	1525	1525	1525
1. Cold water supply (external)	R 1½							
2. Hot water outlet connection (internal)	Rp 1½							
3. Gas control connection (internal)	Rp ¾							Rp 1
4. Tank drain valve connection (internal)	Rp 1½							
5. T&P valve connection (internal)	1 -14 NPT							
6. Dimensions of the cleaning and inspection opening (mm)	Ø 100							

Table 3.5 Data on gas categories, appliance category II2H3+

Description	Unit	SCE 80-115	SCE 80-140	SCE 80-180	SCE 95-199	SCE 95-260	SCE 70-360	SCE 65-400	SCE 65-500
Data natural gas, gas category 2H									
Diameter of orifice	mm	2.90	3.20	3.20	3.30	2.95	3.20	3.30	3.90
Burner pressure control	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
G20									
Nominal load (Upper Value)	kW	33.9	42.1	53.4	59.9	83.2	102.6	128.8	142.4
Pre-pressure	mbar	20	20	20	20	20	20	20	20
Burner pressure(1)	mbar	8.5	8.6	7.8	8.5	8.5	9.2	7.8	11.5
Gas consumption (2)	m³/h	3.2	4.0	5.1	5.7	7.9	9.8	12.3	13.6
Warm-up time dT = 44 K	min.	38	30	23	25	17	11	8	7
Data on LP gas, gas category 3+									
Diameter of orifice	mm	1.60	1.70	1.60	1.75	1.50	1.70	1.75	2.25
Heating up time	min.	38	30	23	25	17	11	8	7
G30 (butane)									
Nominal load	kW	33.9	42.2	53.4	59.2	80.8	100.1	127.5	140.3
Supply pressure	mbar	30	30	30	30	30	30	30	30
Burner pressure(1)	mbar	-	-	-	-	-	-	-	-
Gas consumption(2)	kg/h	2.5	3.1	3.9	4.3	5.9	7.3	9.3	10.2

Table 3.5 Data on gas categories, appliance category II2H3+ (Continued)

Description	Unit	SCE 80-115	SCE 80-140	SCE 80-180	SCE 95-199	SCE 95-260	SCE 70-360	SCE 65-400	SCE 65-500
G31 (propane)									
Nominal load (Upper Value).	kW	33.1	41.4	52.8	58.2	78.4	98.3	125.5	136.2
Supply pressure	mbar	37	37	37	37	37	37	37	37
Burner pressure(1	mbar	-	-	-	-	-	-	-	-
Gas consumption(2)	kg/h	2.4	3.0	3.8	4.2	5.6	7.0	9.0	9.7

1. *If using a flat sealing plate or high-low control program, instead of a burner pressure control, it is assumed that the burner pressure is equal to the pre-pressure. In practice however the burner pressure will be lower,*
2. *Based on 1013.25 mbar and 15°C*

Table 3.6 Data general

Description	Unit	SCE 80-115	SCE 80-140	SCE 80-180	SCE 95-199	SCE 95-260	SCE 70-360	SCE 65-400	SCE 65-500
Capacity	litres	309	309	298	357	335	278	253	252
Number of bar burners/ orifices	-	3	3	4	4	7	7	9	6
Number of flue tubes/flue baffles	-	5	5	7	6	9	12	16	17
Empty weight	kg	214	214	227	237	262	262	278	330
Number of anodes	-	2	2	2	2	3	3	4	4
Maximum working pressure	bar	8	8	8	8	8	8	8	8

Table 3.7 Data electrical

DESCRIPTION	Unit	All models
Electrical power consumption	W	30
Supply voltage	VAC	230 (-15% +10%)
Mains frequency	Hz	50 (±1 Hz)

3.5 Installation diagram

Figure 3.2 shows the water and gas connection diagrams for unvented and vented installations. The following paragraphs, describing the connections in detail, make reference to these diagrams

Legend

- ❶ pressure-reducing valve (obligatory)
- ❷ expansion vessel (obligatory)
- ❸ T&P valve (obligatory)
- ❹ stop valve (recommended)
- ❺ non-return valve (obligatory)
- ❻ circulation pump (optional)
- ❼ drain valve
- ❽ gas valve (obligatory)
- ❾ stop valve (obligatory)
- ❿ temperature gauge (recommended)
- ⓫ shunt pump (optional)
- ⓬ draught diverter
- ⓭ hot water draw-off points
- ⓮ pressure relief valve (obligatory)
- ⓯ water cistern
- ⓰ float valve
- ⓱ 3-way aeration valve (recommended)
- ⓲ overflow pipe
- Ⓐ cold water supply
- Ⓑ hot water outlet
- Ⓒ circulation pipe
- Ⓓ gas supply
- Ⓔ flue gas outlet

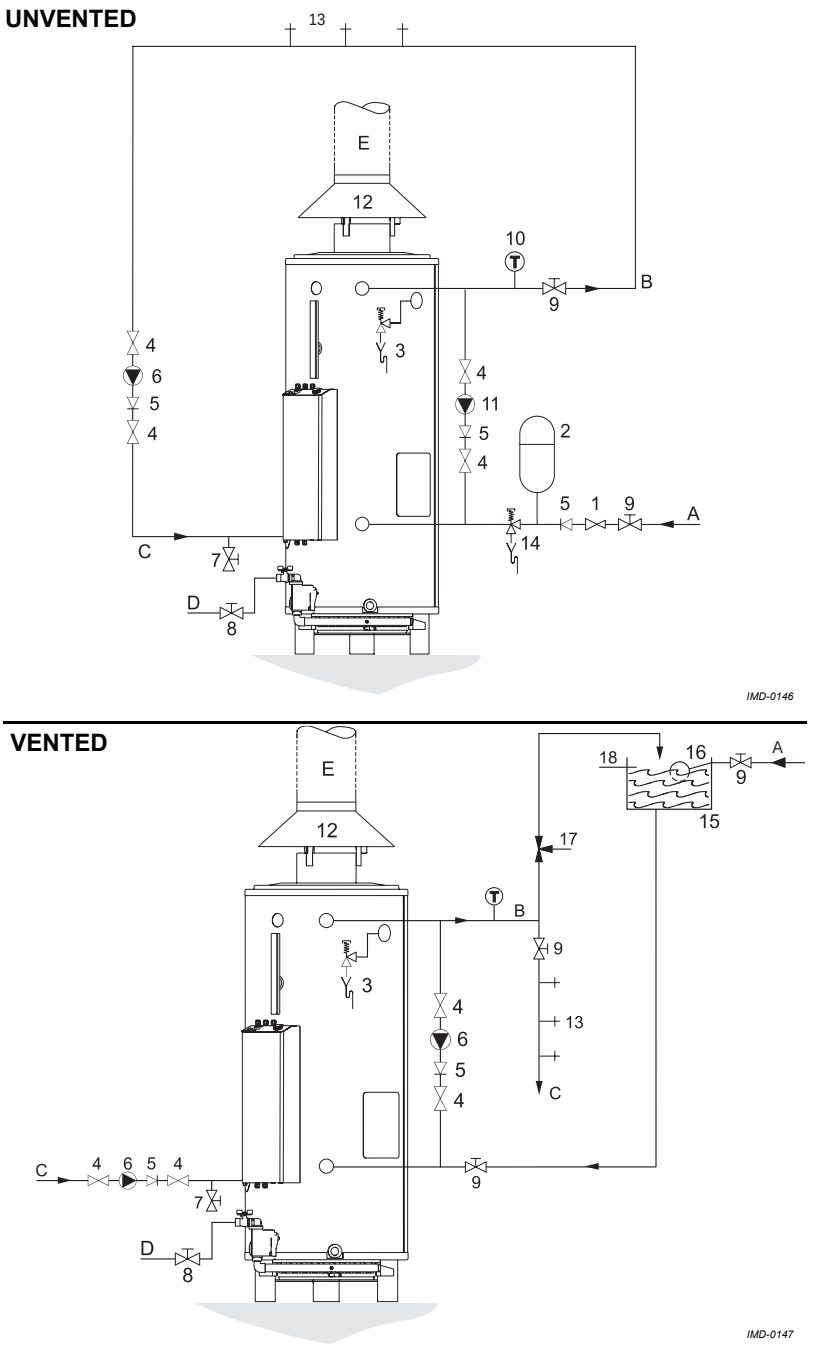


Figure 3.2 Installation diagrams

3.6 Water connections, Unvented

3.6.1 Cold water side

See ❹ in Figure 3.2.

1. Fit an approved stop valve ❾ on the cold water side as required by regulations.
   Refer also to paragraph '1.3 Regulations'.
2. The maximum working pressure of the appliance is 8 bar. Because the pressure in the water pipe at times can exceed 8 bar, you must fit an approved pressure-reducing valve ❶.
3. Fit a non-return valve ❺ and an expansion vessel ❷.
4. Fit a pressure relief valve ⓮ and connect the overflow side to an open wastewater pipe.

3.6.2 Shunt pipe

You can connect a shunt pump to prevent stacking of the water in the water heater.

1. Optional: Depending on the consumption pattern, fit a shunt pipe (Ø 22 mm), stop valve ❾ and a shunt pump ⓫.
2. Fit a non-return valve ❺.
3. Fit a stop valve ❾.

3.6.3 Hot water side

See ❸ in Figure 3.2.

Note
Insulating long hot water pipes prevents unnecessary energy loss.

1. Fit the T&P valve ❸.
2. Optional: fit a temperature gauge ❿ to be able to check the temperature of the tap water.
3. Fit a stop valve ❾ in the hot water outlet pipe, for use when servicing.

3.6.4 Drain valve

1. Fit the standard supplied drain valve ❼.
2. If a circulation pipe is to be fitted, then refer to paragraph 3.6.5. Otherwise, fit the sealing nut and gasket supplied with the drain valve. See Figure 3.3.

3.6.5 Circulation pipe

See ❻ in Figure 3.2 and Figure 3.3.

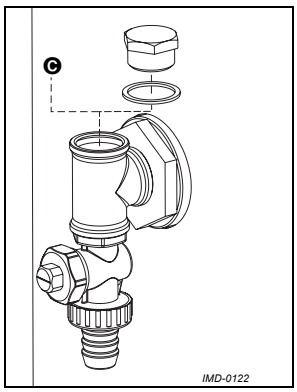


Figure 3.3 Drain valve

If an immediate flow of hot water is required at draw-off points, a circulation pump can be installed. This improves comfort and reduces water wastage.

1. Fit a circulation pump ❻ of the correct capacity for the length and resistance of the circulation system.
2. Fit a non-return valve ❺ behind the circulation pump to guarantee the direction of circulation.
3. Fit two stop valves ❹ for service purposes.
4. Connect the circulation pipe to the T-piece on the drain valve ❼. See Figure 3.3.

3.7 Water connections, Vented

3.7.1 Cold water side

See Ⓐ in Figure 3.2.

- Fit an approved stop valve ❾ on the cold water side between the water cistern ⓯ and the appliance, as required by regulations. Refer also to paragraph ’1.3 Regulations’.

3.7.2 Shunt pipe

You can connect a shunt pump to prevent stacking of the water in the water heater.

1. Optional: Depending on the consumption pattern, fit a shunt pipe (Ø 22 mm), stop valve ❾ and a shunt pump ⓫.
2. Fit a non-return valve ❺.
3. Fit a stop valve ❾.

3.7.3 Hot water side

See Ⓑ in Figure 3.2.

Note
Insulating long hot water pipes prevents unnecessary energy loss.

1. Fit the T&P valve ❸.
2. Optional: fit a temperature gauge ⓾ to be able to check the temperature of the tap water.
3. Fit a stop valve ❾ in the hot water outlet for servicing.
4. If a circulation pipe is to be fitted, then refer to paragraph 3.7.4.

3.7.4 Circulation pipe

See ❻ in Figure 3.2.

If an immediate flow of hot water is required at draw-off points, a circulation pump can be installed. This improves comfort and reduces water wastage.

1. Fit a circulation pump ❻ of the correct capacity for the length and resistance of the circulation system.
2. Fit a non-return valve ❺ behind the circulation pump to guarantee the direction of circulation.

3. Fit two stop valves ❹ for service purposes.
4. Connect the circulation pipe to the cold water supply pipe.

3.8 Gas connection

Warning
Gas installation may only be carried out by an authorised installer in compliance with the general regulations imposed by the gas company. Refer also to paragraph '1.3 Regulations'.

Caution
Make sure that the diameter and length of the gas supply pipe are large enough to supply sufficient capacity to the appliance.

See ❶ in Figure 3.2.

1. Fit a gas valve ❽ in the gas supply pipe.
2. Blow the gas pipe through before use, to be sure it is clean.
3. Close the gas valve.
4. Fit the gas supply pipe to the gas control.

Warning
Check for leaks after fitting.

3.9 Flue gas discharge

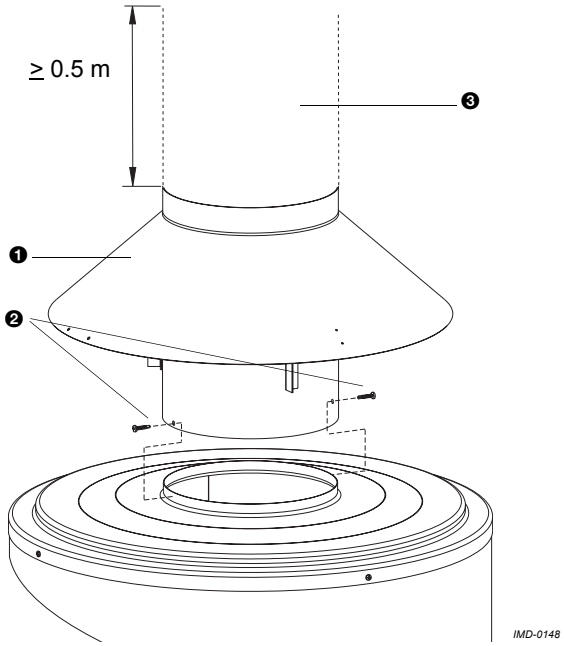
Warning
The installation should be carried out by an authorised installer, in compliance with the general and local regulations imposed by gas, water supply and power supply companies and the fire service.
Refer also to paragraph '1.3 Regulations'.

3.9.1 Introduction

When connecting the appliance to the chimney, the draught diverter ❶ supplied with the appliance must be used. The standard flue gas thermostat and sensor that are supplied must be fitted in the draught diverter.

Legend

❶ draught diverter
❷ fastening screws
❸ chimney pipe



3.9.2 Fitting the draught diverter

De draught diverter ❶ is fitted with two fastening screws ❷. The assembly procedure is as follows:

1. Place the draught diverter on the appliance and mark the drill holes. Again remove the draught diverter from the appliance.

Note
The position of the holes already made for the flue gas backflow safeguard sensor must be taken into account. The holes should be roughly in line with the flue gas thermostat bracket.

2. Now drill two holes into the top of the appliance (3.2 mm drill bit).
3. Using the fastening screws, fix the draft diverter to the appliance.
4. Fit a chimney pipe ❸ of at least 0.5 metres length to the opening of the draft diverter, before fitting the rest of the chimney materials according to current regulations. See paragraph '1.3 Regulations'.

Note
Use flue gas discharge materials that comply with the regulations. See paragraph '1.3 Regulations'.

Note
Make sure that the chimney discharges into an area where this is permitted for this category of appliance.

3.9.3 Flue gas thermostat assembly

The flue gas thermostat sensor is already mounted in the draught diverter. The bracket with thermostat needs to be mounted on the top of the unit and the cable from the thermostat needs to be connected with the connector on the unit.

Warning

If the flue gas thermostat is not (or is incorrectly) fitted/connected, the flue gas discharge will not be protected. An incorrectly fitted chimney can cause flue gases to backflow into the boiler room.

Note

Figure 3.4 shows an example. For each type of unit the position of the sensor can slightly differ.

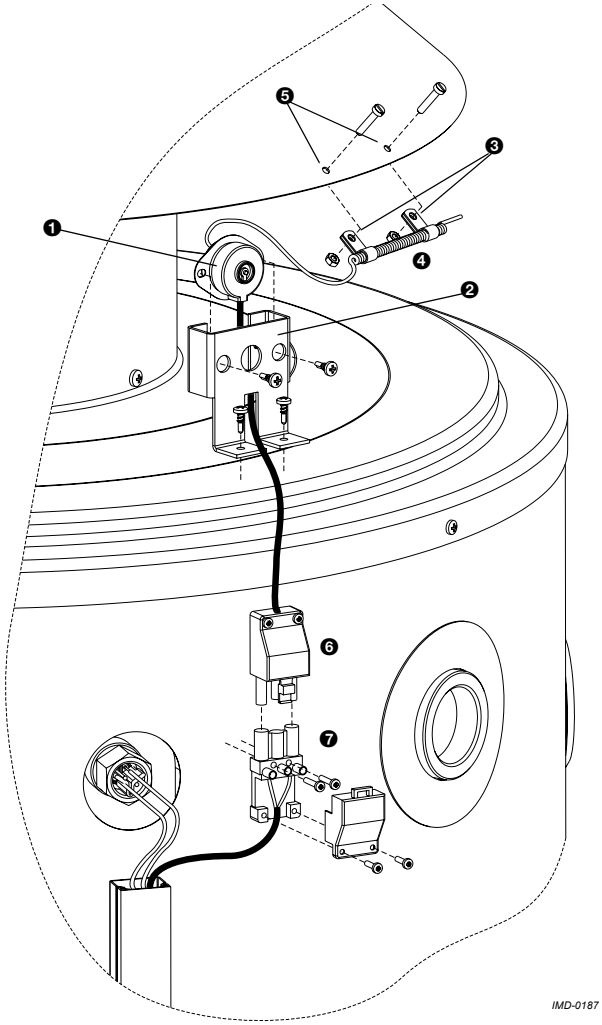


Figure 3.4 Flue gas backflow detection

Fit the flue gas thermostat as follows:

1. Remove the flue gas thermostat assembly ❶ a from the packet.
2. Mount the bracket ❷ with the thermostat on the top of the unit.

3. Connect the connector from the flue gas thermostat ❻ to the connector on the appliance ❼.

3.10 Electrical connection

Warning
The installation should be carried out by an approved installer in compliance with the general and local regulations imposed by the gas, water and power supply companies and the fire service.
Refer also to paragraph '1.3 Regulations'.

3.10.1 Introduction

Topics covered in this paragraph:

- 3.10.2 Preparation;
- 3.10.3 Mains voltage;
- 3.10.4 Week timer circuit
- 3.10.5 Connecting extra error signal ('Alarm OUT')

3.10.2 Preparation

Caution
The appliance is phase-sensitive. It is **absolutely essential** to connect the phase (L) from the mains to the phase of the appliance, and the neutral (N) of the mains to the neutral of the appliance.
There should also be **no potential difference** present between neutral (N) and earth (⏚). If this is the case, then an isolating transformer must be applied in the supply circuit. For more information, or to order this isolating transformer, please contact State.

Figure 3.5 shows a front view of the electrical connection block. Table 3.8 shows the associated connections.

Table 3.8 Electrical connection block SCE

Mains voltage			Flue gas protection		Week timer circuit						Un-used	Potential free contact		
⏚	L_1	N	L_2	L_3	N	N	L	L	L	L	-	NO	P	NC
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

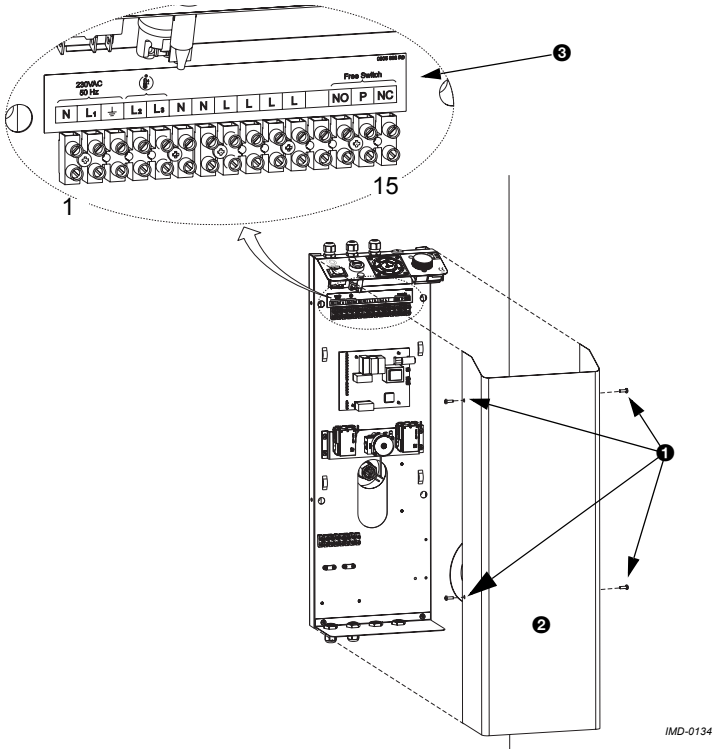


Figure 3.5 Connection block (connections 1 through 15 explained in Table 3.8)

In preparation, first remove the protective cover from the control column:

- Undo the 4 screws ❶ and remove the protective cover ❷ from the electrical section. The connection block ❸ is now visible.

Note
Refer to 'A.2 Electrical diagram SCE' for the connection of electrical components.

3.10.3 Mains voltage

The appliance is supplied without a power cord and main switch.

Note
In order to receive electrical power, the appliance has to be connected to the mains voltage by means of a permanent electrical connection. A two-terminal main switch with a contact gap of at least 3 mm must be fitted between this fixed connection and the appliance. The power cord must have cores of at least 3 x 1.0 mm^2.

1. Lead the power cord through the metric pull relief on the top of the control column.
2. Connect earth (⏚), phase (L_1) and neutral (N) of the power cord to terminals 1 through 3 of the connection block as indicated in Table 3.8.
3. Tighten the pull relief so that the cable is clamped.
4. If you do not need to make any more connections, then fit the protective cover back on the control column.

5. Connect the power cord to the main switch.

Warning
Leave the appliance disconnected until you are ready to start it up.

3.10.4 Week timer circuit

1. Cut out the week timer image from the control panel.
2. Fit the week timer in the hole.
3. Connect the week timer by connecting the wires with core bush to 7 (N), 9(L) and 11 (L).
4. Connect the cable with sliding bush to position B4 of the **I/0/II** switch.
5. If you do not need to make any more connections, then fit the protective cover back on the control column

3.10.5 Connecting extra error signal (’Alarm OUT’)

Alarm OUT is a potential free terminal that is switched when an error is detected. You can connect various objects to it. For example, a signalling lamp (max. 250V, 10A) to indicate malfunctioning of the appliance .

The objects can be connected to normally open contacts (lamp ON on error) or to normally closed contacts (lamp OFF on error).

1. Feed the power cord through the metric pull relief on the top of the control column.
2. Connect the extra indicator at points 13 (NO) and 14 (P), and/or 14 (P) and 15 (NC) according to Table 3.8.
3. Tighten the pull relief so that the cable is clamped.
4. If you do not need to make any more connections, then fit the protective cover back on the control column.

3.11 Checking the supply pressure and burner pressure

Note
Before you start up the appliance and/or begin to check the supply pressure and burner pressure, you must first fill the appliance. Please refer to paragraph ’4.2 Filling the appliance’ for filling instructions.

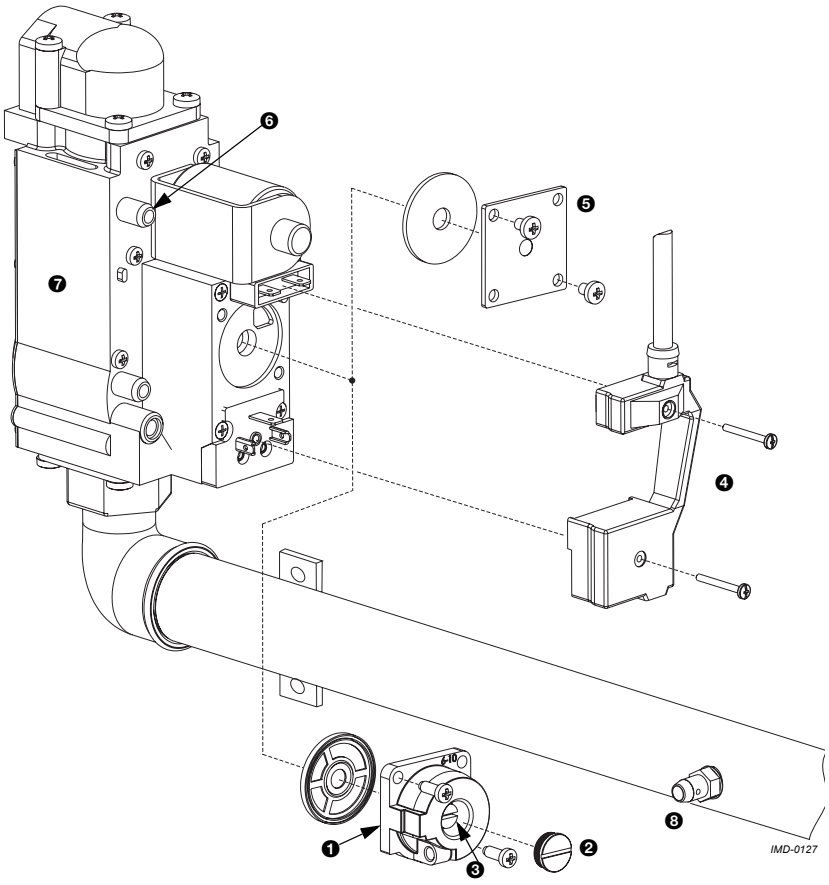
Caution
Before starting-up for the first time, and following conversion, you must always check the supply pressure and burner pressure. If necessary, adjust these to be certain of optimum performance of the appliance.

Note
The easiest way to check the gas pressures is by using two pressure gauges. This procedure assumes that these two gauges are available.

Legend

- ❶ burner pressure regulator
- ❷ burner pressure regulator cap
- ❸ burner pressure regulator adjusting screw
- ❹ gas control connector
- ❺ flat sealing plate
- ❻ supply pressure nipple
- ❼ gas control
- ❽ manifold nipple
- ❾ high-low control

Block for SCE 80-115, 80-140, 80-180, 95-199, 95-260, 70-360, 65-400



Block for SCE 65-500

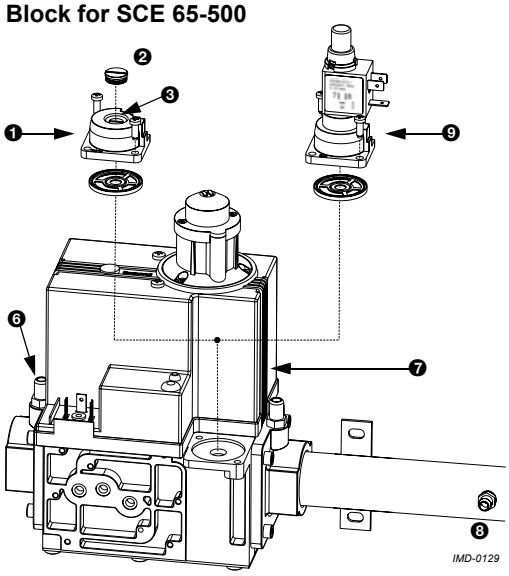


Figure 3.6 Gas blocks for the two designs

To check the supply pressure and burner pressure, proceed as follows:

1. Disconnect the appliance from the mains. See paragraph '7.3.2 Disconnect the appliance from the mains'.
2. On the gas control (Figure 3.6) there are two nipples. To check the supply pressure, nipple ❻ is used. The other nipple on the gas control is not used. The manifold nipple ❽ is used for measuring the burner pressure. Sealing screws are located inside the nipples. Loosen both sealing screws by a few turns. Do not loosen them completely; this makes them difficult to tighten again.
3. Connect a pressure gauge to the manifold nipple ❽.
4. Open the gas supply and vent the gas supply line via nipple ❻.
5. Connect a pressure gauge to nipple ❻ as soon as gas starts to flow from this nipple.
6. Switch on the power to the appliance using the mains switch.
7. Set the control thermostat to the highest position and start the appliance running by putting the **I/0/II** switch to **I position**.
8. The heating cycle will start and the burner tray will ignite after a short time.
9. After the burner tray has ignited, wait for approximately 1 minute before you start reading the dynamic pressures.
10. Use the pressure gauge to read the supply pressure at nipple ❻. See Table 3.9.

Note
Consult the mains gas supply company if the supply pressure is not correct.

11. Use the pressure gauge to read the burner pressure at the burner pressure nipple ❽. Refer to Table 3.9.

Table 3.9 Conversion data for appliance category II_{2H3+}

DESCRIPTION	Unit	SCE 80-115	SCE 80-140	SCE 80-180	SCE 95-199	SCE 95-260	SCE 70-360	SCE 65-400	SCE 65-500
Data for natural gas, gas category 2H									
Diameter of orifices	mm	2.90	3.20	3.20	3.30	2.95	3.20	3.30	3.90
G20									
Supply pressure	mbar	20	20	20	20	20	20	20	20
Burner pressure	mbar	8.5	8.6	7.8	8.5	8.5	9.2	7.8	11.5
Data for LP gas, gas category 3+									
Diameter of orifices	mm	1.60	1.70	1.60	1.75	1.50	1.70	1.75	2.25
G30 (butane)									
Supply pressure	mbar	30	30	30	30	30	30	30	30
Burner pressure(1)	mbar	-	-	-	-	-	-	-	-
G31 (propane)									
Supply pressure	mbar	37	37	37	37	37	37	37	37
Burner pressure(1)	mbar	-	-	-	-	-	-	-	-

1. *If using a flat sealing plate or high-low control program, instead of a burner pressure regulator, it is assumed that the burner pressure is equal to the supply pressure. In practice however, the burner pressure will be lower.*

Note
If the burner pressure is not correct and the appliance is fitted with a flat sealing plate or high-low control, you will not be able to adjust the pressure. In this case, consult your installer or supplier.
If the appliance is fitted with a burner pressure regulator, then the pressure can be adjusted by following steps 12 through 17.

12. Remove the cap ❷ from the burner pressure regulator ❶.
13. Adjust the burner pressure by turning the adjusting screw ❸, depending on the correction required:
    - Adjusting screw anticlockwise: burner pressure decreases.
    - Adjusting screw clockwise: burner pressure increases.
14. Cover the opening of the adjusting screw and check the burner pressure against the target value from Table 3.9.
15. If the pressure reading is not correct, repeat steps 13 and 14 until the correct pressure is attained.
16. Fit the cap ❷ on the burner pressure regulator.
17. Shut down the appliance by putting the **I/0/II** switch to **0 position**.
18. Shut off the gas supply.
19. Disconnect the two pressure gauges and re-tighten the sealing screws in the nipples.

3.12 Conversion to a different gas category

Caution
The conversion may only by carried out by an authorised installer.

3.12.1 Introduction

If the appliance must operate on a family of gas (LP gas or natural gas) other than the category of gas for which the appliance has been set up at the factory, the appliance will have be adapted using a special conversion kit.

Caution
Check the supply pressure and burner pressure after conversion.

Legend
❶ cover plate
❷ locking strip
❸ orifice with stamped figure

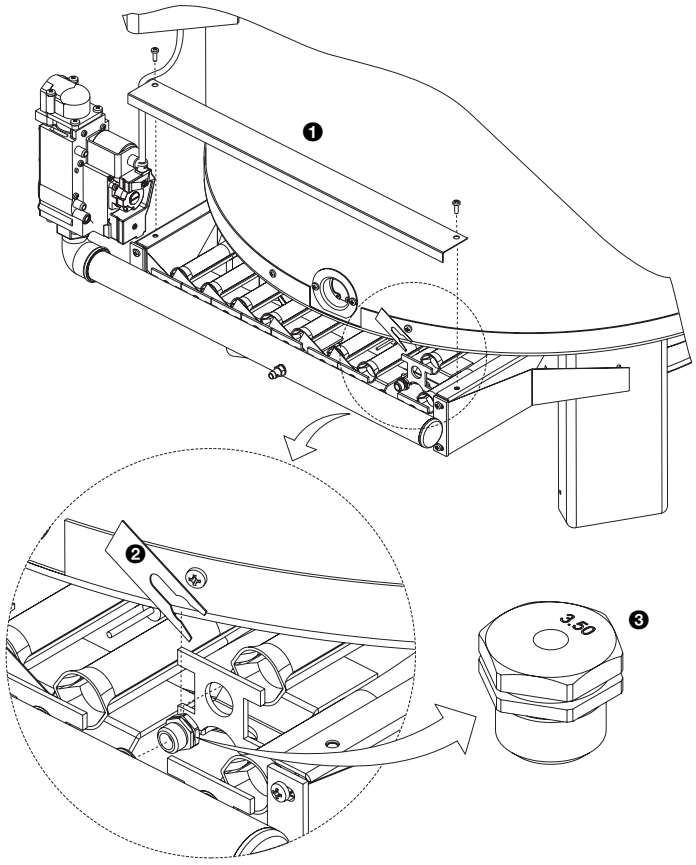


Figure 3.7 Exchanging orifices

The conversion of the SCE 65-500 differs from the other SCE-appliances. The conversion procedures are described in paragraphs:

- '3.12.2 Conversion to a different gas SCE 80-115 through 65-400'
- '3.12.3 Conversion to a different gas category SCE 65-500'.

3.12.2 Conversion to a different gas SCE 80-115 through 65-400

(80-115, 80-140, 80-180, 95-199, 95-260, 70-360, 65-400)

1. Disconnect the appliance from the mains. See paragraph '7.3.2 Disconnect the appliance from the mains'.
2. Shut off the gas supply.

Take care
The burner may be hot.

3. Unscrew the cover plate ❶ from the burner support.
4. Use a suitable tool to remove the locking strips ❷. Note: the locking strips have very sharp edges.
   Withdraw the locking strips straight upwards.

Note
The radiation shield / condensation tray can be temporarily loosened to simplify assembly of the burner.

5. Remove the burners one by one from their brackets at the front. To do this, you first move them away from you and then downwards. The orifices will now be accessible.

6. Remove the orifices.
7. Select and fit the correct orifices from the conversion kit, based on Table 3.9. The orifice diameter is stamped into each orifice ❸.

Legend
See Figure 3.7 for ❶ through ❸.
❹ burner pressure regulator
❺ gas control connector
❻ flat sealing plate
❼ supply pressure nipple
❽ gas control

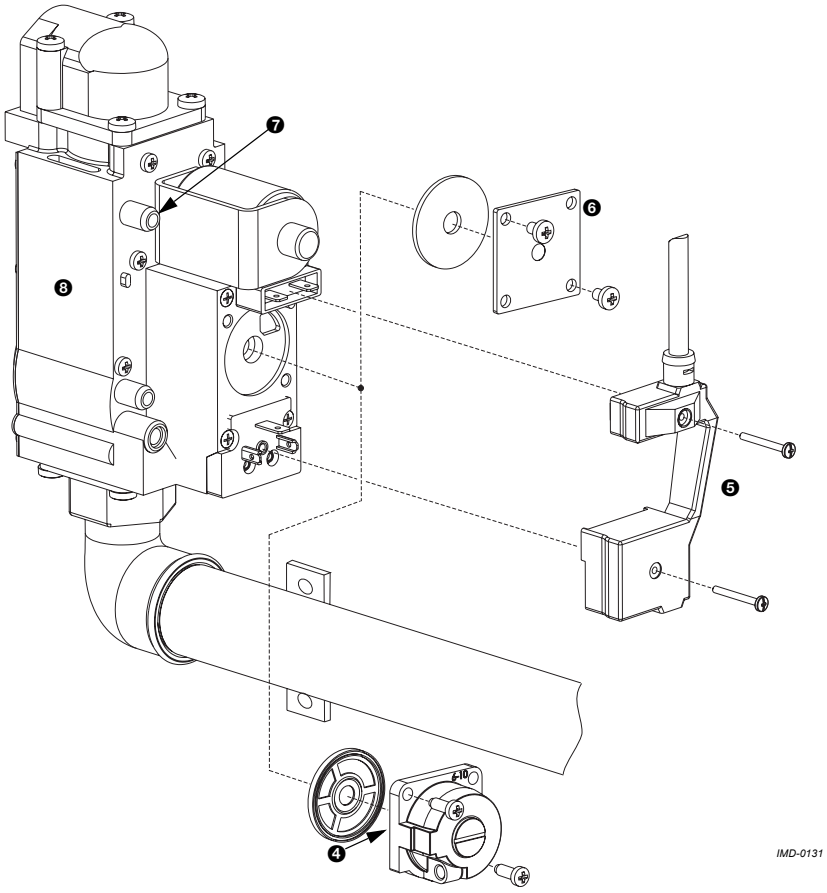


Figure 3.8 Conversion of gas control

8. Refit the burners back in their original position.
9. Re-fit the locking strips.

Note
If the radiation shield /condensation tray was loosened, re-tighten it.

10. Check whether the block is equipped with a burner pressure regulator ❹ or a flat sealing plate ❻.
11. Check with Table 3.5 whether a burner pressure regulator is required for the new gas category.
12. If the flat sealing plate or burner pressure regulator need to be replaced:
    - Undo the gas control connector ❺.
    - Disassemble the flat sealing plate ❻ or burner pressure regulator ❹.
    - Fit the flat sealing plate or burner pressure regulator supplied with the conversion kit.
    - Fit the gas control connector ❺.

Caution
13. Check the burner and supply pressure (see paragraph 3.11).

14. Remove the sticker showing the new gas category from the conversion kit, and attach it below the appliance's rating plate. This clearly indicates that the appliance may no longer be run on the gas for which it was originally supplied.
15. Start the appliance (see paragraph 7.2).

3.12.3 Conversion to a different gas category SCE 65-500

Introduction

This paragraph describes the:

- Conversion from LP gas to natural gas.
- Conversion from natural gas to LP gas.

Legend

❶ burner pressure regulator
❷ high-low control
❸ gas control

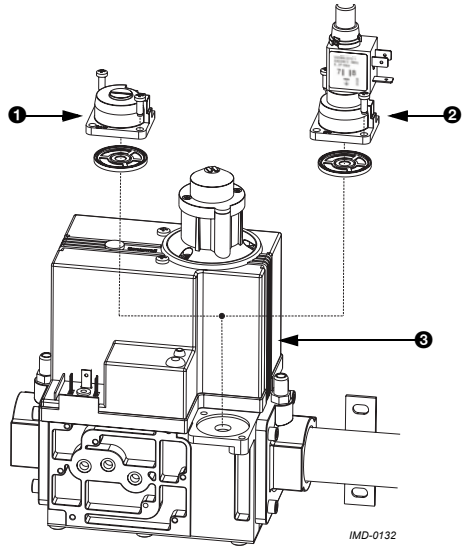


Figure 3.9 Conversion of gas control SCE 65-500

Conversion from LP gas to natural gas

1. Perform steps 1 through 9 of paragraph '3.12.2 Conversion to a different gas SCE 80-115 through 65-400'.
2. Detach the high-low control ❷.
3. Fit the burner pressure regulator ❶ including the sealing gasket from the conversion kit. Attach the burner pressure regulator to the gas control ❸ using the two small screws supplied.

Legend

See Figure 3.9 for the numbers ❶ to ❸.

❹ timers
❺ bracket
❻ 6-terminal connector strip
❼ pull relief
❽ 9-terminal connector strip
❾ metrical pull relief
❿ high-low control cable

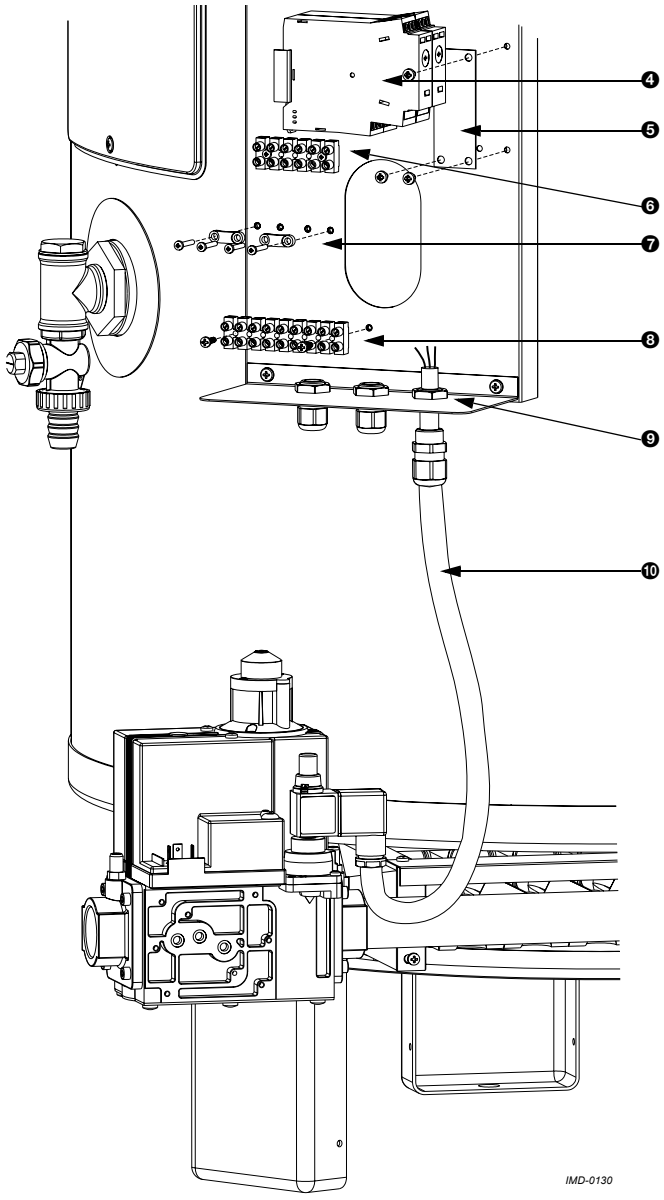


Figure 3.10 Fitting and removal of conversion components

4. Detach the cables between the 6-terminal connector strip ❻ and 9-terminal connector strip ❽. These are the cables for the timers, high-low control, gas control, glow igniter and ionisation rod.
5. Undo timers ❹, bracket ❺, cable-harness (not shown) and the 9-terminal connector strip ❽.
6. Undo the metrical pull relief ❾ with high-low control cable ❿. Remove this cable.
7. Fit the stop plug from the conversion set in the place of the metric pull relief.
8. Connect the cables of the gas control, the glow igniter, and ionisation rod to the 6-terminal connector strip as shown in the electrical diagram. See appendices 'A.2.1 Electrical diagram SCE 65-500 LP' and 'A.2.2 Electrical diagram SCE'.
9. Clamp the gas control cable in one of the pull reliefs supplied ❼. Do the same for the cables from the glow igniter and ionisation rod.

Caution

10. Check the burner and supply pressure (see paragraph 3.11).

11. Remove the sticker showing the new gas category from the conversion kit, and attach it below the appliance's rating plate. This clearly indicates that the appliance may no longer be run on the gas for which it was originally supplied.
12. Start the appliance (see paragraph 7.2).

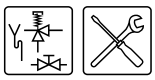
Conversion from natural gas to LP gas

1. Perform steps 1 through 9 of paragraph '3.12.2 Conversion to a different gas SCE 80-115 through 65-400'.
2. Detach the burner pressure regulator ❶.
3. Fit the high-low control ❷ including the sealing gasket from the conversion kit. Attach the high-low control to the gas control using two small screws.
4. Detach the cables from the gas control, the glow igniter, and the ionisation rod from the 6-terminal connector strip ❻ and pull relief ❼.
5. Fit the timers ❹ including cable harness plus 9-terminal connector strip ❽ from the conversion kit, to the control column.
6. Remove the stop plug (not shown) from the underside of the control column and replace this with metrical pull relief ❾ from the conversion kit.
7. Lead the high-low control cable ❿ through the pull relief and tighten the pull relief by turning it until the cable is clamped.
8. Connect the high-low control cable ❿ with connector to the high-low control ❷.
9. Connect the cables from the timers, high-low control, gas control and the glow igniter as shown in the electrical diagram. See appendix 'A.2 Electrical diagram SCE'.

Caution

10. Check the burner and supply pressure (see paragraph 3.11).

11. Remove the sticker showing the new gas category from the conversion kit, and attach it below the appliance's rating plate. This clearly indicates that the appliance may no longer be run on the gas for which it was originally supplied.
12. Start the appliance (see paragraph 7.2).



4 Filling and draining

4.1 Introduction

Topics covered in this chapter:

- Filling the appliance.
- Draining the appliance.

The components referred to in these paragraphs are illustrated in Figure 4.1.

Legend

❶ pressure-reducing valve (obligatory)
❷ expansion vessel (obligatory)
❸ T&P valve (obligatory)
❹ stop valve (recommended)
❺ non-return valve (obligatory)
❻ circulation pump (optional)
❼ drain valve
❽ gas valve (obligatory)
❾ stop valve (obligatory)
❿ temperature gauge (recommended)
⓫ shunt pump (optional)
⓬ draught diverter
⓭ hot water draw-off points
⓮ pressure relief valve (obligatory)
⓯ water cistern
⓰ float valve
⓱ 3-way aeration valve (recommended)
⓲ overflow pipe
Ⓐ cold water supply
Ⓑ hot water outlet
Ⓒ circulation pipe
Ⓓ gas supply
Ⓔ flue gas discharge

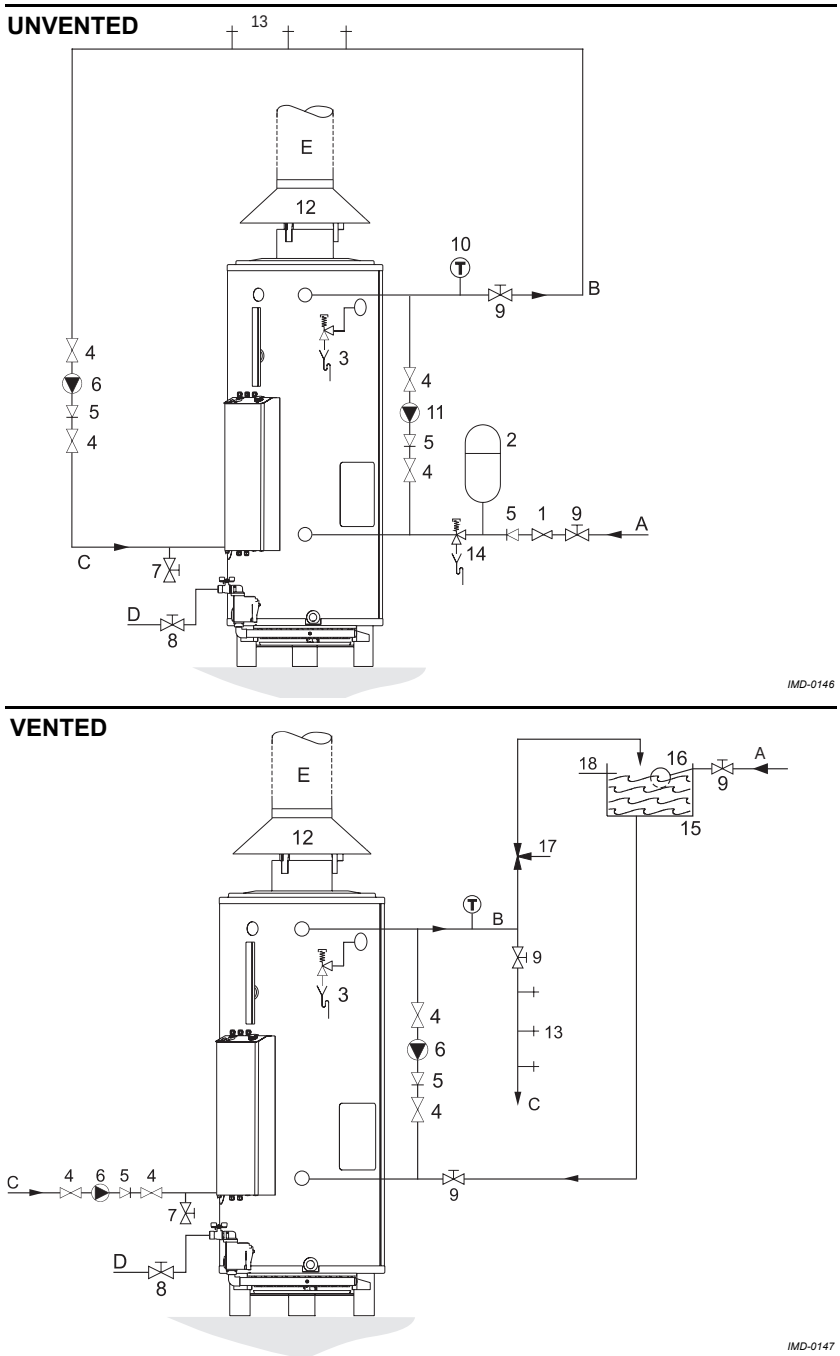


Figure 4.1 Installation diagrams

4.2 Filling the appliance

4.2.1 Filling unvented installations

To fill the appliance, proceed as follows.

1. Open the valve ❾ in the hot water pipe and, if present, the valve ❹ for the circulation pump.
2. Close drain valve ❼
3. Open the nearest hot water draw-off points ⓲.
4. Open the valve ❾ on the cold water side Ⓐ so that cold water flows into the appliance.
5. Completely fill the appliance (when cold water flows at normal pressure from the nearest hot water draw-off point, the appliance is full).
6. Bleed the entire installation of air, for example by opening all hot water draw-off points.
7. The appliance is now under water supply pressure. There should be no water coming out of the T&P valve. If this does happen, the cause might be:
   - The water supply pressure is greater than the specified 8 bar. Do place a pressure-reducing valve ❶ after all.
   - The overflow valve in the protected cold supply setup is defective or incorrectly fitted.

4.2.2 Filling vented installations

To fill the appliance, proceed as follows.

1. Open the valve ❾ in the hot water pipe and, if present, the stop valves ❹ for the circulation pump.
2. Close the drain valve ❼.
3. Open the nearest hot water draw-off point ⓲.
4. Open the valve ❾ on the cold water side Ⓐ so that cold water flows into the appliance.
5. Completely fill the appliance (when cold water flows at normal pressure from the nearest hot water draw-off point, the appliance is full).
6. Bleed the entire installation of air, for example by opening all hot water draw-off points.
7. The appliance is now under water supply pressure. There should be no water coming out of the T&P valve ❸. If this does happen, the T&P valve might be defective or incorrectly fitted.

4.3 Draining the appliance

4.3.1 Draining unvented installations

Some service activities require the appliance to be drained. Proceed as follows:

1. Shut the appliance down by putting the **I/0/II** switch to **0 position**.
2. Disconnect the appliance by putting the mains switch between the appliance and the mains power supply to **0 position**.
3. Shut off the gas supply ❽.
4. Close the valve ❾ in the hot water pipe Ⓑ.
5. Close the valve ❾ in the cold water supply Ⓐ.
6. Open the drain valve ❼.
7. Bleed the appliance (or installation) so that it drains completely empty.

4.3.2 Draining vented installations

Some service activities require the appliance to be drained. Proceed as follows:

1. Shut the appliance down by putting the **I/0/II** switch to **0 position**.
2. Disconnect the appliance by putting the mains switch between the appliance and the mains power supply to **0 position**.
3. Shut off the gas supply ❽.
4. Close the stop valve valve ❾ in the hot water pipe ❽.
5. Close the supply valve in the cold water supply.
6. Open the drain valve ❼.
7. Bleed the appliance (or installation) so that it drains completely empty.

5 Operating

5.1 Introduction

Topics covered in this chapter:

- 5.2 Control panel;
- 5.3 Explanation of the icons;
- 5.4 I/0/II switch;
- 5.5 Control thermostat;
- 5.6 Burner control reset button;
- 5.7 Week timer circuit;
- 5.8 Flue gas backflow safeguard reset button.

5.2 Control panel

Figure 5.1 shows the control panel The panel consists of:

- a **I/0/II** switch;
- a reset button;
- a control thermostat with rotary knob;
- two status LEDs;
- a week timer (optional);
- a Power Anode indicator light (optional).

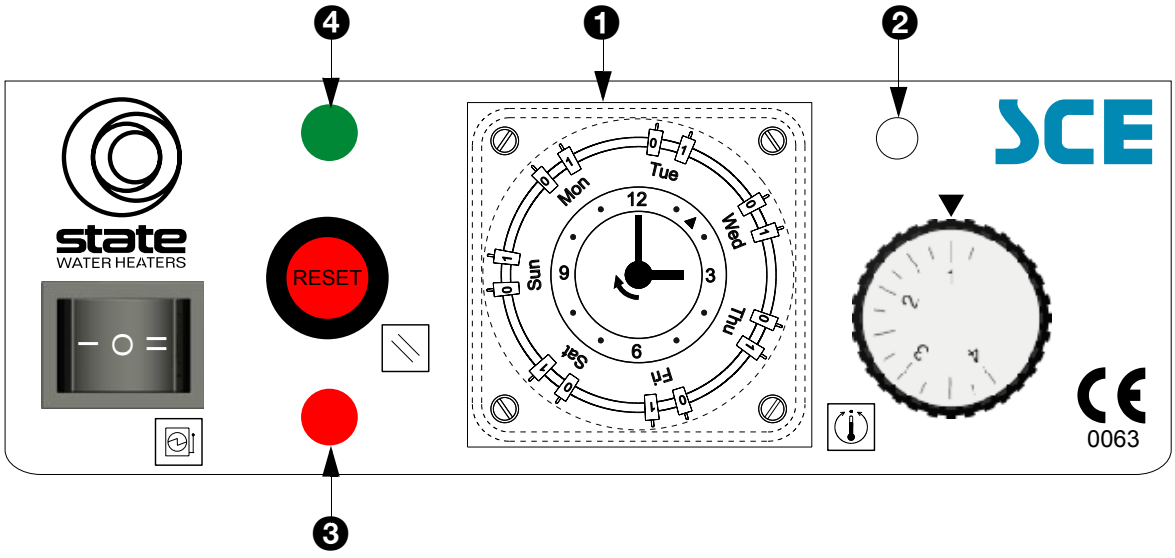


Figure 5.1 The control panel

5.3 Explanation of the icons

Table 5.1 shows the meanings of the icons on the control panel.

Table 5.1 Icons and their meaning

Icon	Name	Explanation
	**I/0/II** switch	'ON mode' / 'OFF mode'
	Reset button	Reset burner control
	Temperature control	To set water temperature (T_{set})
❶	Week timer	Sets the weekly water heating program
❷	Power Anode indicator lamp	Shows Power Anode status
❸	Error light	Burner control lockout
❹	Power light	Burner control on power

5.4 I/0/II switch

With the **I/0/II** switch, the appliance is set in ON mode (**I position**), OFF mode (**0 position**), or the week timer mode (**II position**). See paragraph '6.2 Operating modes'.

The appliance remains live, even when in the OFF mode. This ensures the frost protection remains activated.

Note
To electrically disconnect the appliance, you must use the main switch between the appliance and the mains power supply.

5.5 Control thermostat

Use the rotary knob on the control thermostat to set the desired water temperature to between ± 40°C and ± 70°C. The rotary knob is continuous, over a scale of 1 to 4. Table 5.2 shows the temperatures corresponding to each position.

Table 5.2 Temperature setting

Position	Temperature
1	± 40°C
2	± 50°C
3	± 60°C
4	± 70°C

5.6 Burner control reset button

An error can cause the burner control to lock out. When this happens, the red light on the control panel will illuminate. After eliminating the cause of the error, you can reset the appliance using the reset button.

Note
Before resetting, always eliminate the cause of the error.

To identify the various errors, refer to chapter '6 Status of the appliance'. Chapter '8 Troubleshooting' describes how to troubleshoot errors and problems.

5.7 Week timer circuit

Optionally, you can use the week timer to program when the appliance must supply the heat demand. Set the **I/0/II** switch to the **II position** to activate the week timer circuit.

On the week disc ❷ of the timer switch ❶ seven day segments are indicated 'Monday' through 'Sunday'. Each day is divided by 12 tabs ❻ (2 hours per tab).

To set a two-hour period during which the appliance must respond to a heat demand, press the tab for that period outwards.

The current time can be read from the hands ❹ (12 hour clock).

Set the day and time as follows: to set the time roughly, rotate the week disc ❷ in the direction of the arrow, until the correct weekday lies beside the arrow marker ❸. To finely set the time, rotate the minute hand clockwise until the correct time is set. The manual switch ❺ must always be in the central position (this activates the timer program).

Legend:

❶ timer switch
❷ week disc
❸ arrow marker
❹ hands
❺ manual switch
❻ tabs

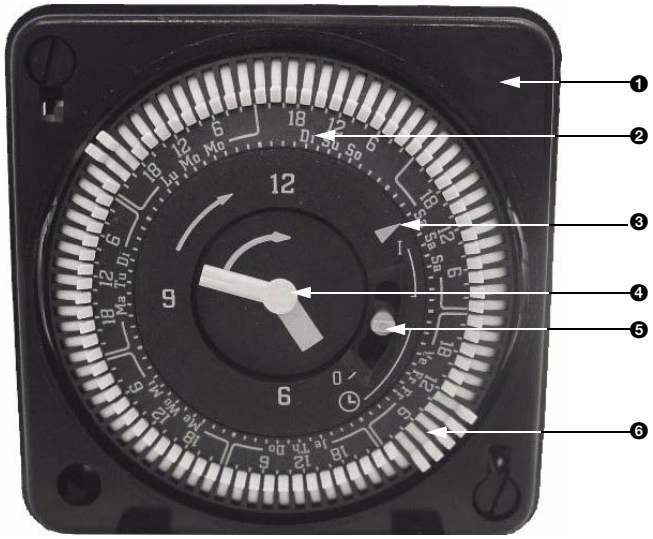


Figure 5.2 Week timer

5.8 Flue gas backflow safeguard reset button

A malfunction in the flue gas discharge, like a blockage in the chimney, can lead to the flue gas thermostat locking out. This state is evident when the push button on the flue gas thermostat is activated, see Figure 5.3. Once the cause has been removed, and the sensor has cooled down sufficiently, press this push button to reset (if the sensor is not sufficiently cooled down, the flue gas thermostat will immediately lock out again). The appliance will then automatically start up again, if there is a current heat demand. If this does not happen, refer to chapter '8 Troubleshooting' for a complete troubleshooting guide.

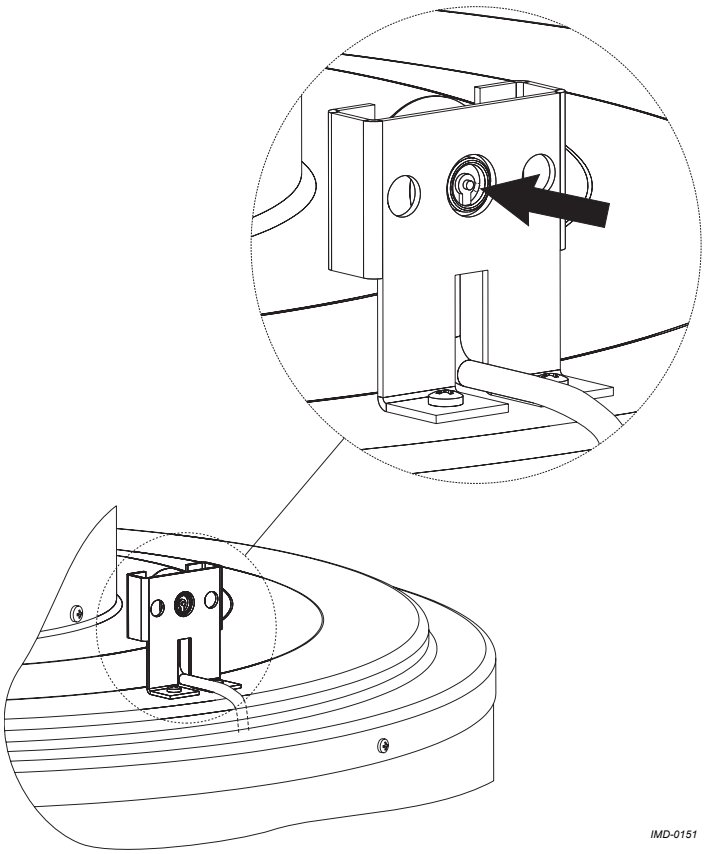


Figure 5.3 Flue gas backflow safeguard reset button

6 Status of the appliance

6.1 Introduction

Topics covered in this chapter:

- 6.2 Operating modes;
- 6.3 Power Anode Status;
- 6.4 Error conditions.

6.2 Operating modes

When running, the appliance has three basic operating modes, namely:

- **DISCONNECTED**

  In this mode the appliance is off and all components are electrically dead. The main switch (switch between the appliance and the power supply) is turned off. On the control panel:

  - the **I/0/II** switch is set tot the **0 position**;
  - the green light is off.

- **WEEK PROGRAM** (optional)

  In this position the appliance only meets the heat demand during the periods set by the timer. Outside these periods, only frost protection is active.

  On the control panel:

  - The **I/0/II** switch is set to the **II position**.
  - The water temperature can be set by turning the rotary knob on the control thermostat, see paragraph 5.5 Control thermostat.
  - The period during which the heat demand must be fulfilled can be programmed using the week timer, see paragraph 5.7 Week timer circuit.
  - the green light is illuminated.

Note
If no week timer is installed, the 'II' mode is the same as the '0' mode.

- **OFF**

  In this mode, the frost protection is activated. The main switch is set to **I position**. On the control panel:

  - The **I/0/II** switch is set to the **0 position**;
  - the green light is illuminated.

- **ON**

  In this mode the appliance continuously fulfils the demand for heat. On the control panel:

  - The **I/0/II** switch is set to the **I position**;
  - The water temperature can be set by turning the rotary knob on the control thermostat, see paragraph '5.5 Control thermostat';
  - the green light is illuminated.

6.3 Power Anode Status

If the appliance is fitted with a Power Anode, there is an extra indicator lamp on the operating panel. Depending on the status of the appliance, this lamp will be lit either Green or Red, or it will be Off:

- **Green**
  This state indicates that the Power Anode is working correctly.
- **Red**
  This state indicated that the Power Anode is not working properly due to an error.
- **Off**
  This state indicates that the Power Anode is not working.

Note
If there is an error with the Power Anode (Red), or if the Power Anode is not working (Off), this will have no effect on the hot water supply.

6.4 Error conditions

If the appliance has an error, heat demand will be (temporarily) ignored. The frost protection will also be out of operation. There are various types of errors:

- **Lockout error due to the flue gas backflow safeguard**
  The lockout (push button) of the flue gas thermostat in de draught diverter has been activated. After removing the cause, the push button must be pressed to re-start the appliance (see '5.8 Flue gas backflow safeguard reset button').
- **Lockout errors of the burner control**
  In this event, the red error light on the control panel will be illuminated. The burner control is locked out.
  After eliminating the cause, the appliance must be returned to service by pressing the reset button (see '5.6 Burner control reset button').
- **Blocking errors**
  You can recognise this status by the fact that the appliance will not start operation, despite the water temperature being lower than you have set with the control thermostat (see '5.5 Control thermostat').
  These errors disappear automatically once the cause of the error has been removed, after which the appliance resumes by itself.

The cause of the error cannot be seen on the control panel. For a detailed overview of error conditions, please refer to chapter '8 Troubleshooting'.

If, as end-user, you find the appliance in an error condition, you may attempt to re-start the appliance by pressing the reset button once. However, should the error return or become persistent, you should contact your service and maintenance engineer.

7 Starting up and shutting down

7.1 Introduction

Topics covered in this chapter:

- Starting up;
- Shutting down;
- The appliance's heating cycle.

7.2 Starting up

Start-up the appliance as follows:

1. Fill the appliance. See chapter '4 Filling and draining'.
2. Open the gas valve (see 'Figure 4.1 Installation diagrams').
3. Switch on the power to the appliance using the mains switch between the appliance and the power supply.
4. Set the appliance, using the **I/0/II** switch on the control panel, to the ON mode (**I position**) or in the weekly program mode (**II position**). See '6.2 operating states'.
5. Set the desired water temperature using the control thermostat. See paragraph '5.5 Control thermostat'

If there is a heat demand, the appliance will run through a heating cycle. See paragraph '7.4 The appliance's heating cycle'.

7.3 Shutting down

You can:

- Shut the appliance down for a brief period ('OFF mode').
- Disconnect the appliance from the mains.
- Shut the appliance down for a longer period.

7.3.1 Shut the appliance down for a brief period ('OFF mode')

To shut the appliance down for a brief period, you must activate the frost protection. Refer also to paragraph '2.3 The appliance's heating cycle'

With the frost protection you can prevent water freezing in the appliance. Activate frost protection by switching the **I/0/II** switch on the control panel to the **0 position**.

7.3.2 Disconnect the appliance from the mains

The appliance should only be disconnected from mains power in the correct way. The correct procedure is as follows:

1. Shut the appliance down by putting the **I/0/II** switch to **0 position**.
2. Disconnect the appliance by putting the mains switch between the appliance and the mains power supply to **0 position**.

7.3.3 Shut the appliance down for a longer period

Drain the appliance, if you are shutting it down for a longer period of time. Proceed as described in paragraph '4.3 Draining the appliance'.

7.4 The appliance's heating cycle

The appliance's heating cycle is activated as soon as the measured water temperature (T_{water}) falls below the threshold value (T_{set}). This threshold value depends on the currently selected appliance operating mode. For example, if the appliance is in the 'OFF mode' (frost protection), then this value is 20°C. If the appliance is in the 'ON mode', then this threshold value is selectable, for example, position 3 (±60°C).

The heating cycle runs in turn through the following states:

1. HEAT DEMAND;
2. WAITING TIME;
3. PRE-GLOW;
4. IGNITION;
5. RUNNING;
6. WAITING TIME.

The complete cycle is explained in the example set out below.

Note
The appliance runs through an identical cycle when frost protection is activated.

1. The control thermostat sensor measures the water temperature. The water temperature falls below the set temperature, e.g. 60°C, causing the control thermostat to close. The burner control now detects a heat demand and starts the heating cycle.
2. Following the heat demand, the waiting time begins. This waiting time ensures the ignition takes place safely. The waiting time lasts about 15 seconds.
3. Once the waiting time is over (audible 'clicking' of the relay in the burner control) the pre-glowing of the glow igniter is started.
4. After about 12 seconds (pre-)glowing, the gas control is opened and ignition can take place.
5. After ignition, the flame is detected and the appliance will be running. This means that actual heating has started.
6. When the water is up to temperature, the heat demand cuts out. The gas control closes, and the burner tray is extinguished. A new waiting time begins, of about 10 seconds.
7. After this waiting time, the appliance enters an idle state, and waits until the water temperature again falls below the set temperature.

With any subsequent heat demand, the heating cycle will resume from step 1.

8 Troubleshooting

8.1 Introduction

This chapter covers the following errors:

- General errors:
  - Gas smell;
  - Water leakage;
  - Explosive ignition;
  - Poor flame profile;
  - Power Anode (optional).
- No hot water;
- Insufficient hot water.

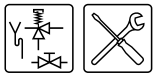
General errors cannot be displayed on the control panel, but these errors usually do not cause the hot water supply to fail, neither fully nor partially.

If the hot water supply should fail, this is termed an error condition. See paragraph '6.4 Error conditions''.

If the hot water supplied is insufficient, this is usually caused by an incorrect setting, or some temporary problem.

The following pages provide troubleshooting tables for each type of error.

Warning
Onderhoud mag alleen worden uitgevoerd door een service- en onderhoudsmonteur.



8.2 Troubleshooting table for general errors

Table 8.1 General errors (page 1 of 2)

Symptom	Cause	Solution	Remark
Gas smell	Gas leak	**Warning** Immediately close the main gas valve. **Warning** Do not operate any switches. **Warning** No naked flames. **Warning** Ventilate the boiler room.	**Note** Immediately contact your installer or local gas company.
Water leakage	Leakage from one of the water connections (threaded).	Tighten the threaded connection.	If the leak persists, consult your installer.
	Leakage from another nearby water appliance or pipe segment.	Trace the leak.	
	Leakage from the appliance's tank.	Consult the supplier and/or manufacturer.	
	Condensation	Before drawing off (too much) hot tap water, wait until the water in the heater has reached the set temperature.	

Warning
Onderhoud mag alleen worden uitgevoerd door een service- en onderhoudsmonteur.

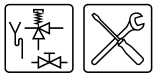


Table 8.1 General errors (page 2 of 2)

Symptom	Cause	Solution	Remark
Explosive ignition **Poor flame profile**	Incorrect supply pressure and/or burner pressure.	Set the correct supply pressure and/or burner pressure, see ’3.11 Checking the supply pressure and burner pressure’.	If ignition is not improved, consult your installer.
	Contaminated burner	Clean the burner. See ’9.4.2 Cleaning the burners’	
	Contaminated orifice.	Clean the orifice. See ’9.4.3 Cleaning the orifices’	
	Inadequate air supply	Improve the air supply by better ventilating the boiler room.	
Power Anode (optional) • **Indicator lamp is red**	• Anodes not making contact with the water; • Break in one of the cables; • Anode poorly earthed;	1. Check that the water heater is full of water; 2. Check that the Power Anode is properly connected, see appendix ’A Electrical scheme SCE'; 3. Check to see that all connections are properly made; 4. Check all cables for breaks and replace if any are found.	If the malfunction cannot be solved, consult your installer.
• **Indicator lamp is off**	No power supply to the potentiostat;	Check the power supply	

8.3 Troubleshooting table ’no hot water’

If the appliance fails to supply any hot water, there are several possible causes.
Refer to table ’Table 8.2 No hot water’.

Warning
Onderhoud mag alleen worden uitgevoerd door een service- en onderhoudsmonteur.

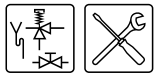


Table 8.2 No hot water (page 1 of 2)

Symptom	Cause	Solution	Remark
Green light OFF and Red light OFF	No mains power present	1. Check that the mains switch is ON. 2. Check the voltage across the main switch. 3. Check the voltage on the electrical connector block. 4. Check the voltage on the burner control. 5. Check the fuse in the burner control. The measured voltage must be 230V AC +15% -10%.	See appendix 'A.2 Electrical diagram SCE'. If you cannot resolve the error, contact your installer.
Green light ON and Red light OFF.	Blockage in the flue gas discharge (the flue gas backflow safeguard has cut out)	1. Trace the blockage. 2. Remove the blockage. 3. Reset flue gas backflow safeguard. See paragraph '5.8 Flue gas backflow safeguard reset button'.	When heat demand is detected, the appliance will re-start.

Warning
Onderhoud mag alleen worden uitgevoerd door een service- en onderhoudsmonteur.

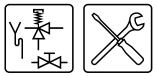
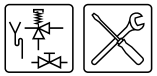


Table 8.2 No hot water (page 2 of 2)

Symptom	Cause	Solution	Remark
Green light ON and Red light ON.	There are three possible causes for this error. To determine the cause, the error must be made to recur: 1. Reset the appliance by pressing the reset button 1x. 2. Should nothing happen, then the reset button has already been pressed too often (maximum 5x in a single heating cycle) and you will have to first electrically disconnect the appliance, then start it again. See paragraph '7.3.2 Disconnect the appliance from the mains' and steps 3 through 5 of paragraph '7.2 Starting up'. 3. Decide which type of cause (a) or (b) describes the situation.		
	(a) three unsuccessful start attempts in a row	1. No gas: • Check that the gas valve is open. • Check that gas control opens (clicking of the gas control). • Check the gas control wiring. 2. No ignition: • Check whether the glow igniter lights up. • Check the power supply to the glow igniter. • Check the wiring of the glow igniter. 3. No flame detection: • Check that the Phase (L) and Neutral (N) are correctly connected (from the mains) to the appliance • Check that the ionisation rod is not defective. • Check that the wiring to the ionisation rod is correctly connected.	If the error cannot be resolved or is persistent, contact your installer.
	(b) The safety thermostat has cut out	1. The safety thermostat has cut out correctly: • Reset the appliance. • Check whether the control thermostat is working. • Check whether the high-limit thermostat is working. • Check that the circulation pump (if present) is working. 2. The safety thermostat has cut out without apparent reason: • Check whether the thermostat may be broken. • Check whether the thermostat sensor may be broken.	If the error cannot be resolved or is persistent, contact your installer.

Warning
Onderhoud mag alleen worden uitgevoerd door een service- en onderhoudsmonteur.



8.4 Troubleshooting table ’insufficient hot water’

If the appliance fails to supply any hot water, there are several possible causes.
Refer to ’Table 8.3 Insufficient hot water’

Table 8.3 Insufficient hot water

Symptom	Cause	Solution	Remark
Insufficient hot water	The water temperature setting (T_{set}) is too low	Set the control thermostat to a higher setting. See paragraph ’5.5 Control thermostat’.	
	Hot water supply used up.	1. Reduce the rate of hot water consumption. Allow the appliance enough time to heat up the water. 2. If this error occurs regularly, check whether the high-limit thermostat is cutting in/out. If so, check that the circulation- and/or shunt pump are working properly.	If the error has not been rectified, and no other cause can be found, disconnect the appliance from the mains, shut off the gas valve and alert your installer.

9 Maintenance

9.1 Introduction

Caution
Maintenance may only by carried out by an approved service and maintenance engineer.

At each service, the appliance undergoes maintenance both on the water side and on the gas side. The maintenance should be carried out in the following order.

1. Preparation for maintenance;
2. Water-side maintenance;
3. Gas-side maintenance;
4. Finalising maintenance.

Note
Before ordering spare parts, take a moment to write down the appliance type and model, and the full serial number of the appliance. Only by ordering with this information can you be sure to receive the correct spare parts. These details can be found on the rating plate.

9.2 Preparation for maintenance

To test whether all components are still working properly, you should complete the following steps:

1. Put the **I/0/II** switch on the control panel to **0 position**.
2. Set the control thermostat to the highest position (take note of the original setting) and put the **I/0/II** switch back to **I position**.
3. If there is no heat demand, draw some hot water off to initiate a heat demand.
4. Check whether the heating cycle runs correctly. See paragraph ’7.4 The appliance’s heating cycle’.
5. Set the control thermostat back to the original setting, and put the **I/0/II** switch back to **I position**.
6. Check the supply and burner pressures and adjust these, where necessary. See paragraph ’3.11 Checking the supply pressure and burner pressure’.
7. Check that all components of the flue gas system are properly attached.
8. Test the operation of the overflow valve of the cold supply setup. The water should spurt out.
9. Test the overflow operation of the T&P valve. The water should spurt out.
10. Check the wastewater pipes of the overflow valves and remove any lime buildup that may be present.
11. Drain the appliance. See paragraph ’4.3 Draining the appliance’.

9.3 Water-side maintenance

9.3.1 Introduction

The following steps should be carried out on the water side:

1. Checking the anodes.
2. Descaling and cleaning the tank.

9.3.2 Checking the anodes

Timely replacement of the anodes extends the service life of the appliance. The appliance's anodes must be replaced as soon as they are 60% or more used up (take this into consideration when determining the maintenance frequency).

Take care
The draught diverter and the cover may be hot.

1. Disassemble the protective cap on the control column by loosening the 4 screws on the cap.
2. Disconnect the draught diverter from the flue gas discharge.
3. Undo the screws on the draught diverter.
4. Remove the draught diverter from the appliance.
5. Undo the screws on the draught diverter.
6. Remove the cover from the appliance.
7. Remove the sealing ring from the tank.
8. Loosen the anodes using suitable tools.
9. Check the anodes, and if necessary, replace them.
10. Now also check the flue baffles. Replace them, if necessary. See paragraph '9.4.4 Checking the flue baffles'.
11. Fit a new sealing ring around the edge of the tank and replace the cover.
12. Reconnect the wiring for the flue gas thermostat to the connector of the appliance.

Note
For this appliance Power Anodes might be used as well. These anodes require less to no maintenance. The anodes are deliverable as an option and can be ordered separately. See the instructions coming with these anodes or contact your installer.

9.3.3 Descaling and cleaning the tank

Scale and lime buildup prevent effective conduction of the heat to the water. Periodic descaling prevents buildup of these deposits. This increases the service life of the appliance, and also improves the heating process. Take the rate of scale formation into account when deciding on maintenance frequency.

1. Remove the cover plate ❶ on the outer jacket. See Figure 9.1.
2. Undo the bolts.
3. Remove the cover and the rubber O-ring.
4. Inspect the tank and remove any contamination.
5. Remove the scale using Borcoil[1].
6. Close the cleaning opening.
   Use a new rubber O-ring for this.

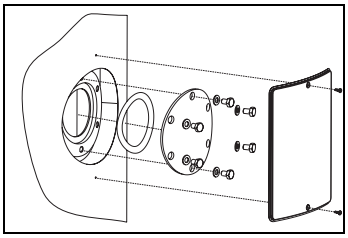


Figure 9.1 Cleaning opening

1. *State recommends the use of Borcoil, as the composition of this material is known to us. Borcoil can be ordered from State.*

9.4 Gas-side maintenance

9.4.1 Introduction

The following steps should be carried out on the gas side:

Take care
The burners may be hot.

1. Cleaning the burners.
2. Cleaning the orifices.
3. Checking the flue baffles.

9.4.2 Cleaning the burners

1. Detach the burners.
2. Carefully remove any contamination present on the burners.
3. Re-attach the burners.

9.4.3 Cleaning the orifices

1. Remove the orifices.
2. Remove any contamination present in the orifices.
3. Re-attach the orifices.

9.4.4 Checking the flue baffles

Take care
The flue baffles may be hot.

1. Complete steps 1 through 9 of paragraph ’9.3.2 Checking the anodes’.
2. Remove the flue baffles from the appliance.
3. Check the flue baffles for rust, and remove any which is present.
4. Check the flue baffles for wear, and replace any worn flue baffles.
5. Complete steps 11 and 12 of paragraph ’9.3.2 Checking the anodes’

9.5 Finalising maintenance

To finalise the maintenance carry out the following steps:

1. Fill the appliance. See paragraph ’4.2 Filling the appliance’.
2. Start-up the appliance. See ’7.2 Starting up’.

10 Warranty (Certificate)

10.1 General warranty

If within one year of the original installation date of a water heater supplied by State, following verification, and at the sole option of State, a part or component, (with exclusion of the tank) proves to be defective or does not function correctly due to manufacturing and/or material defects, State shall replace or repair this part or component.

10.2 Tank warranty

If within 3 years of the original installation date of a water heater supplied by State, following inspection, and at the sole option of State, the glass-lined steel tank proves to be leaking due to rust or corrosion occurring on the water side, State shall provide an entirely new water heater of equivalent size and quality. The warranty period given on the replacement water heater shall be equal to the remaining warranty period of the original water heater that was supplied. Notwithstanding that stated earlier in this article, in the event that unfiltered or softened water is used, or allowed to stand in the water heater, the warranty shall be reduced to one year from the original installation date.

10.3 Installation and conditions of use

The warranty set out in article 1 and 2 will apply solely under the following conditions:

a. The water heater is installed under strict adherence to the installation instructions of State applying to the specific model, and the relevant local authority installation and building codes, rules and regulations in force.

b. The water heater remains installed at the original site of installation.

c. The appliance is exclusively used with drinking water, which at all times can freely circulate (a separately installed heat exchanger is mandatory for heating salt water or corrosive water).

d. The tank is safeguarded against harmful scaling and lime buildup by means of periodic maintenance.

e. The water temperatures in the heater do not exceed the maximum setting of the thermostats, which form a part of the water heater.

f. The water pressure and/or heat load do not exceed the maximum values stated on the water heater rating plate.

g. The water heater is installed in a non-corrosive atmosphere or environment.

h. The water heater is connected to a cold water supply arrangement, which is: approved by the relevant authority; with sufficient capacity for this purpose; supplying a pressure no greater than the working pressure stated on the water heater; and where applicable, fitted with a temperature and pressure relief valve compliant with the installation instructions of State pertaining to the specific model of water heater, and under adherence to the relevant local authority installation and building codes, rules and regulations in force.

i. At all times the appliance must be equipped with a protection in the form of anodes. If sacrificial anodes are used they must be replaced when and if they are used for 60% or more. If electrical anodes are used they should be operational at all times.

10.4 Exclusions

The warranty set out in article 1 and 2 will not apply, in the event of:

a. damage to the water heater caused by an external factor;

b. misuse, neglect (including frost damage), modification, incorrect and/or unauthorised use of the water heater and any attempt to repair leaks;

c. contaminants or other substances having been allowed to enter the tank;

d. the conductivity of the water being less than 125 μS/cm and/or the hardness (alkaline-earth ions) of the water being less than 1.00 mmol/lit (see Table 3.3);

e. unfiltered, recirculated water flowing through or being stored in the water heater;

f. any attempts at repair to a defective water heater other than by an approved service engineer.

10.5 Scope of the warranty

The obligations of State pursuant to the specified warranty do not extend beyond free delivery from the Veldhoven warehouse of the replacement parts or components or water heater. Shipping, labour, installation and any other costs associated with the replacement will not be accepted by State.

10.6 Claims

A claim on grounds of the specified warranty must be submitted to the dealer from whom the water heater was purchased, or to another authorised dealer for the products of State Water Heaters. Inspection of the water heater as referred to in articles 1 and 2 shall take place in one of the laboratories of State.

10.7 Limitation of liability State

State grants no other warranty or guarantee over its water heaters nor the (parts or components of) water heaters supplied for replacement, other than the warranty expressly set out in this Certificate.

State is not liable for damage to persons or property caused by (parts or components, or the glass-lined steel tank of) a (replacement) water heater that it has supplied under the terms of this warranty, nor on any other grounds.

A Appendices

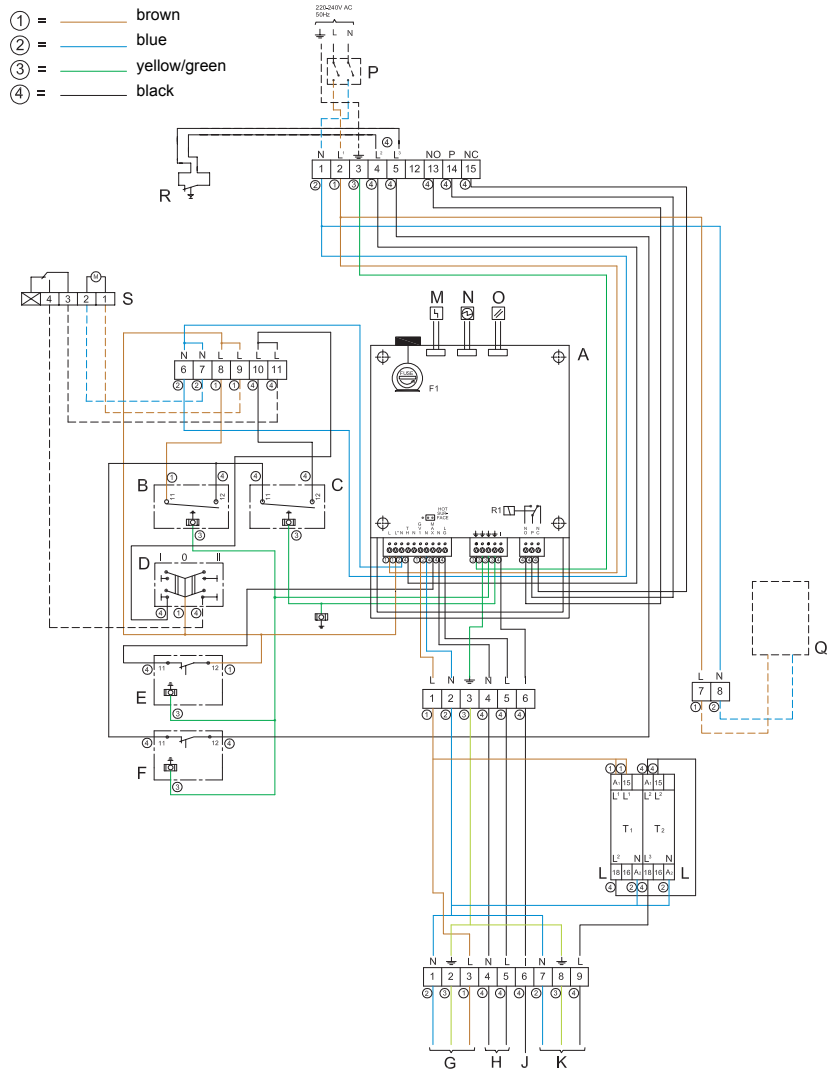
A.1 Introduction

This appendix contains:

- The Electrical diagram SCE.

A.2 Electrical diagram SCE

A.2.1 Electrical diagram SCE 65-500 LP



TERMINAL STRIP CONNECTIONS:

⏚ Earth
N Neutral
L Phase
L^1 Phase input to controller
L^2 Phase input to flue gas backflow safeguard
L^3 Phase input safety circuit for enabling temperate control
NO Normally open
P PVC supply
NC Normally closed

COMPONENTS:

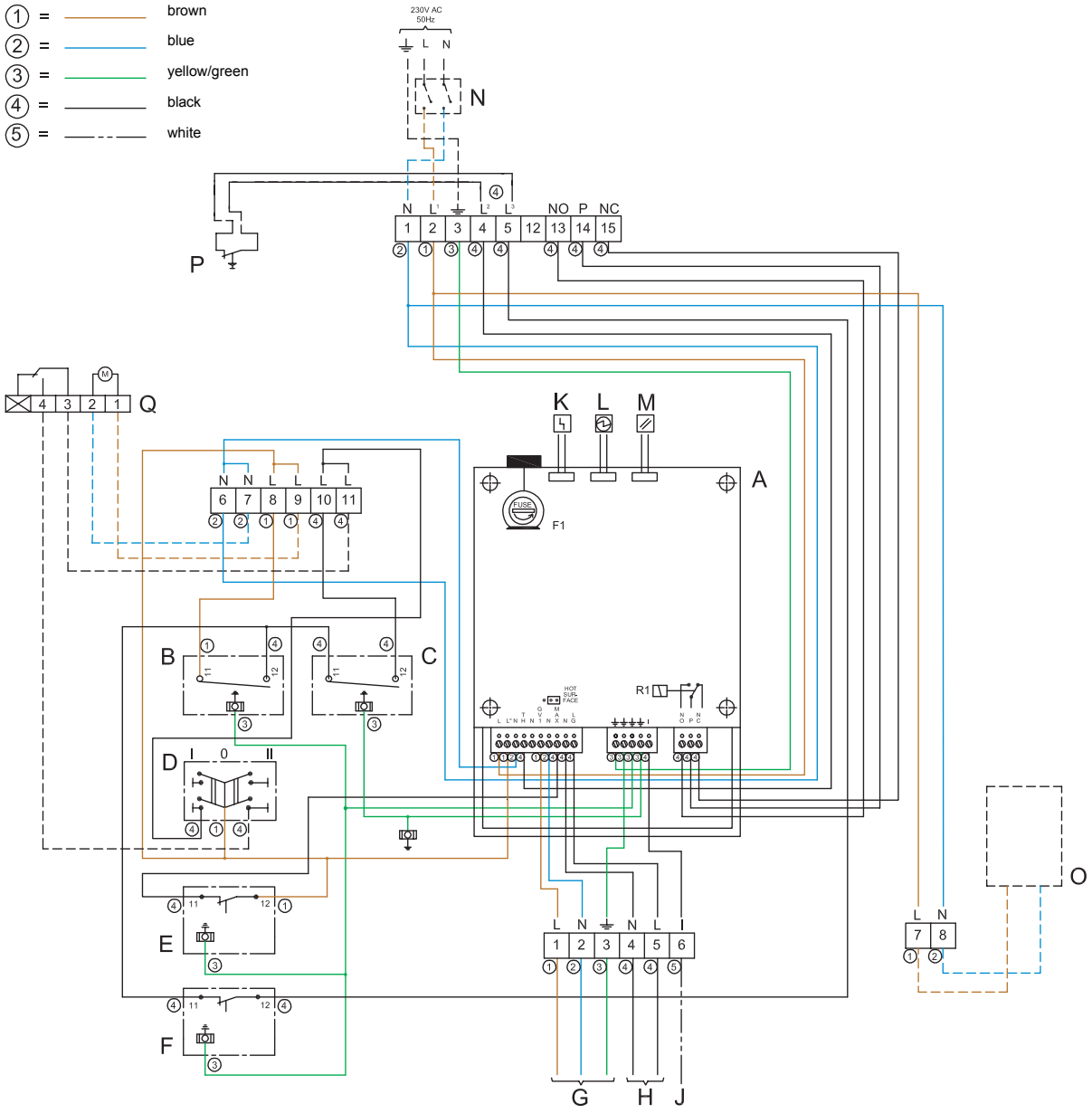
A burner control Double-pole main switch
- N Neutral
- ⏚ Earth
- L^I Phase input to controller
- L^{II} Phase output
- TH Phase input of thermostat circuit
- GV1 Phase output to gas control
- MAX Phase input of safety thermostat
- LG Phase output to glow igniter
- I Ionisation detection = output
- NO Normally open
- P Phase input alarm
- NC Normally closed
- F1 Fuse (T5A)
- R1 Relay max 250V-10A

B Frost thermostat
C Control thermostat
D **I/0/II**-switch
E Safety thermostat
F Max. thermostat
G Gas block
H Glow igniter
J Ionisation pin
K High-low control
L Timer
M Error signalling
N Signalling In operation
O Reset button

OPTIONAL COMPONENTS:
P Main switch
Q Potentiostat (for power anodes)
R Thermal Reflux Safeguard (TRS)
S Week timer control

Figure A.1 Electrical scheme SCE 65-500 LP

A.2.2 Electrical diagram SCE



TERMINAL STRIP CONNECTIONS:

⏚ Earth
N Neutral
L Phase
L^1 Phase input to controller
L^2 Phase input to flue gas backflow safeguard
L^3 Phase input safety circuit for enabling temperate control
NO Normally open
P PVC Supply
NC Normally closed

COMPONENTS:

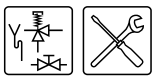
A Double-pole main switch
- N Neutral
- ⏚ Earth
- L^I Phase input to controller
- L^{II} Phase out
- TH Phase input of thermostat circuit
- GV1 Phase output to gas control
- MAX Phase input of safety thermostat
- LG Phase output to glow igniter
- I Ionisation-detection = output
- NO Normally open
- P Phase in: alarm
- NC Normally closed
- F1 Fuse (T5A)
- R1 Relay max 250V-10A

B Frost protection thermostat
C Control thermostat
D **I/0/II**-switch
E Safety thermostat
F High-limit thermostat
G Gas valve
H Glow plug
J Ionisation rod
M Error signalling
L Signalling In operation
M Reset button

OPTIONAL COMPONENTS:

N Mains switch control
O Potentiostat (for power anodes)
P Thermal Reflux Safeguard (TRS)
Q Week timer control

Figure A.2 Electrical diagram SCE



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