



Steam Generator



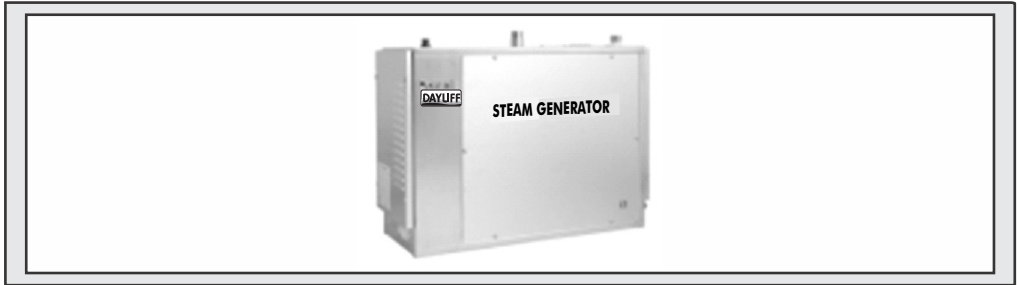
Installation & Operating Manual

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Congratulations on selecting Dayliff Steam Generator. They are manufactured to the highest standards and if installed and operated correctly will give many years of efficient and trouble free service. Careful reading of this Installation Manual is therefore important, though should there be any queries they should be referred to the equipment supplier.

1. SPECIFICATIONS



DAYLIFF steam generators are high specification units with a number of design features that provide exceptional performance. They are fitted with multiples of 3kW elements depending on size for improved reliability ensuring steam freshness and selectable manual/auto drain. A remote control panel is included that gives a digital display of temperature and timer settings with indicator lights showing various operating conditions. Remote switches are included in the controller for cabin lighting and ventilation. One controller may be used to control one or up to 3 units. A demand switch is included that is installed inside the steam room for extending steam release for 30min. Units are supplied complete with all installation accessories including a steam head and auto drain valve. Provision for auto-descaling is provided.

OPERATING CONDITIONS

Water Pressure: Min 0.25Bar, Max 8Bar

Water Quality: Hardness less than 50ppm CaCo₂ above which regular de-scaling is necessary. If hardness exceeds 100ppm a water softener and a cartridge prefilter is required to ensure efficient operation on the water inlet

Model	Size (kW)	Heating Elements (kW)	Phase/ Current (A)	Room Volume (m³)	Dimensions(mm)			Weight (Kg)
					L	W	H	
DSTEAM90	9	3x3	1-39/3-13	6-10	530	210	370	14
DSTEAM120	12	4x3	3-17	8-12				
DSTEAM150	15	5x3	3-22	12-17		240	460	18

2. SYMBOLS AND WARNINGS



This appliance must be connected to an all pole isolator.



Disconnect the power supply before making any electrical connections.



Ensure correct voltage for single and three phase steam generator.



This equipment must be installed by a qualified technician.



The steam inlet nozzle should be set at approximately 300mm from the floor and at least 200mm from wall.



The steam generator should be installed in an accessible place where both the electrical power and water supply can be isolated in an emergency.



The minimum water inlet pressure is 0.25 bar and a maximum of 8 bar, working pressure should not exceed 5 bar.



The steam pipe length from steam generator to steam room should be kept to a minimum, pipes longer than 5 meters should be insulated to prevent heat loss. Steam pipes are hot during use and must be protected against accidental contact.



Bends and elbows should be kept at a minimum. The pipe line should be kept simple and straight to prevent condensate from gathering and causing blockage.



There must be no valve or other blockage in the steam pipe.



The steam pipes should be metallic or of any other material which can withstand 150°C temperature, copper pipe is recommended.



Steam generator should be installed on level ground.



The Steam generator should not be in close proximity to hazardous substances.



The size of heater required to heat a particular size of steam room is dependent on type of material used for construction, the height of the steam room and the ambient temperature.

3. DESIGN DETAILS

Frame and functions of the Steam Generator

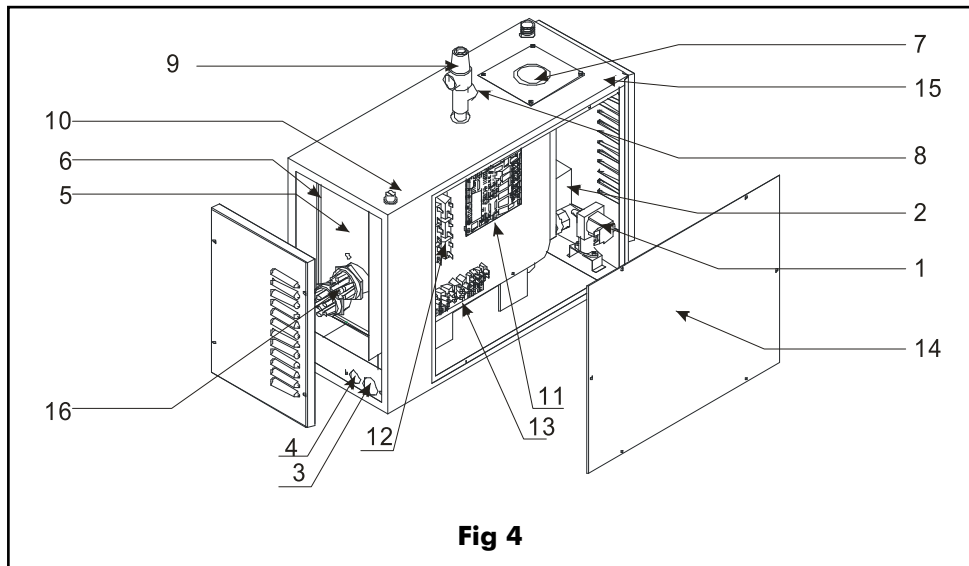
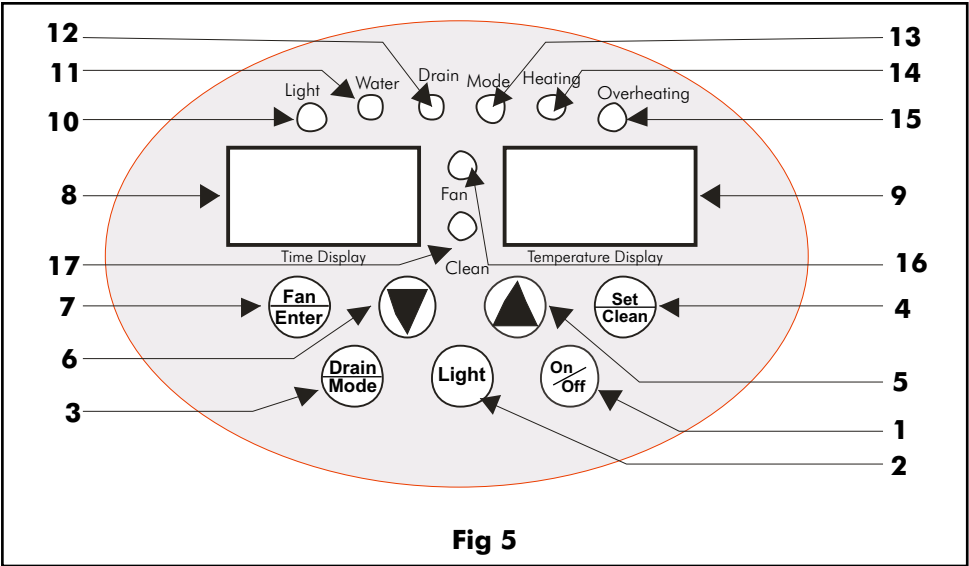


Fig 4

No.	Part	Description
1	Water Inlet Valve	Automatically controls the water flow (maximum pressure 2bar)
2	Drain Valve	Controlled by controller turn on or turn off to drain water
3	Power Entry	The entry route of power wire
4	Control Cable Entry	The entry route of control cable
5	Stainless Steel Tank	Boiler
6	Insulation Material	Reduce the loss of the boiler heat
7	Water Level Probe	Detect the water level
8	Steam Outlet	Steam Outlet
9	Pressure Relief Valve	Operates if the pressure in the boiler exceeds 10.2bar
10	Overheat Switch	To protect boiler when temperature exceeds 110°C
11	Main Circuit Board	Control Centre
12	Accessorial Circuit Board	Connect and control the heat element
13	Terminal	Connection for power supply
No.	Part	Description
14	Earth Wire Plug	Connection for earth wire
15	Descaling Liquid Inlet	Descaling liquid inlet (1/2 inch)
16	Heat Element	Electrical Element

OC-B Controller Display



No.	Part	Description
1		Switch ON & OFF
2		Push to operate lights
3		Dual function button push to select steam on demand mode or to drain the generator manually when not steaming
4		Dual function button used when steaming to set the time/temperature
5		Increase button
6		Decrease button

No.	Part	Description
7		Dual function button switches the fan on and off also used to confirm
8	Time Display Window	Display the resting and operating time of the steam generator
9	Temp Display Window	Display the detected temperature of steam room
10	Light LED	Indicator LED for the lamp of steam room
11	Water LED	Indicator LED for water level .Red means water is filling, green means ideal water level is reached. If the LED is always in red (exceed 5 minutes). Check water supply and if water level valve is blocked. Otherwise the water level inlet valve may be damaged .
12	Drain LED	Indicator LED for draining – shows red for manual draining and green for automatic draining at the end of the cycle.
13	Mode LED	Operation mode indicator red is for steam on demand mode and green for conventional timing.
14	Heating LED	Green indicates heating is on, red indicates the required temperature
15	Overheat LED	Indicator LED for over heat, red means the steam generator has been cut off due to heat element being too hot
16	Fan LED	Indicator LED for fan in operation
17	Clean LED	Indicator LED shows descaling in operation.



In order for the generator to operate in steam on demand mode the steam on demand button must be connected.

OC-S Steam on Demand Switch

When the switch is operated the LED indicator inside the switch turns red and steam is generated for 30 minutes. At the end of 30 minutes or if the switch is operated again, the light will go off and the steam will stop. (Notice: Long Press the “Drain/Model” button for 5 seconds, the time display will show “Long”, then enter “OC-S” mode).

Commercial Mode Instruction (OC-B+OC-S)

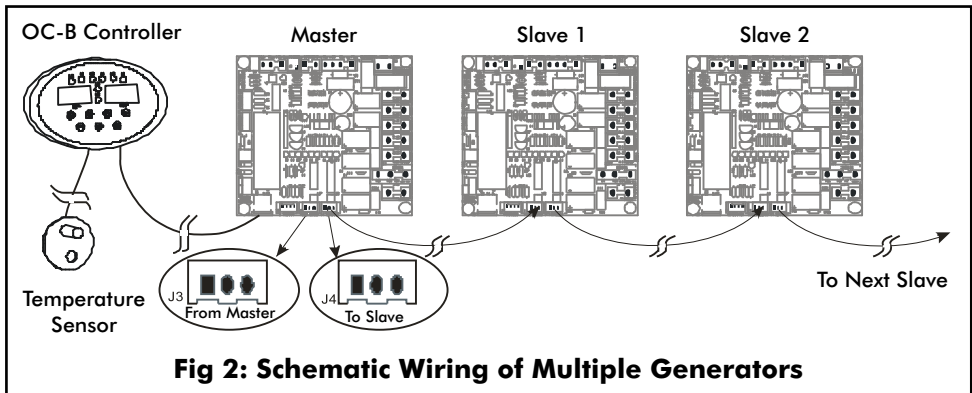
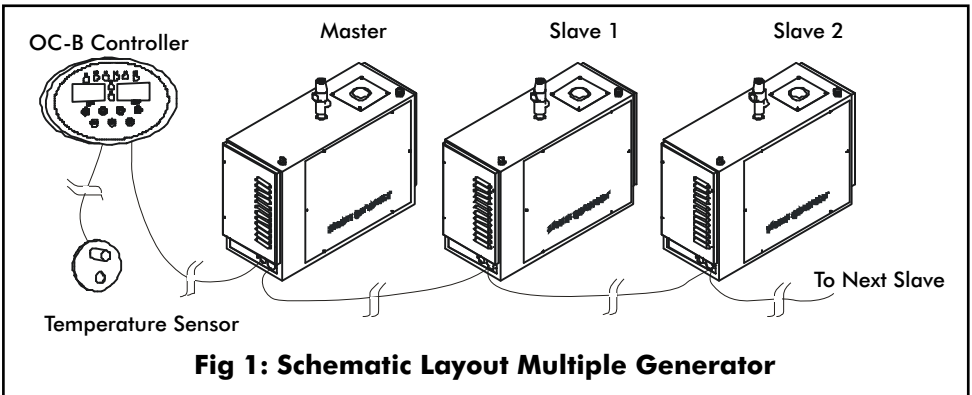
If OC-B is under domestic model, only the OC-B controls the steam generator .OC-S will not work. When OC-B is used on commercial model, the steam generator will be under waiting status (the time window shows “Long” and on circuit board the LED will be flashing) , press OC-S to operate steam generator , every press will make the steam generator keep working for intervals of 30 minutes , the temperature control will depend on the OC-B controller’s setting.

4. INSTALLATION

4.1 Steam Room Design

As a guide; For lightweight materials such as plastics and laminates, 1 kW will heat up to 1m³ of air. For dense materials such as stones and ceramics which conduct heat more rapidly allow for up to 2kW per m³ of air. Hot air rises so restricting the height to around 2 meters will ensure the user is sitting in the steam. For higher ceilings, ensure to increase the power requirement.

If greater power is required one OC-B controller may be used to control two or more steam generators, e.g. if a 30kW steam generator is needed, one OC-B controller can control two 15kW steam generator or three 10 kW steam generators .



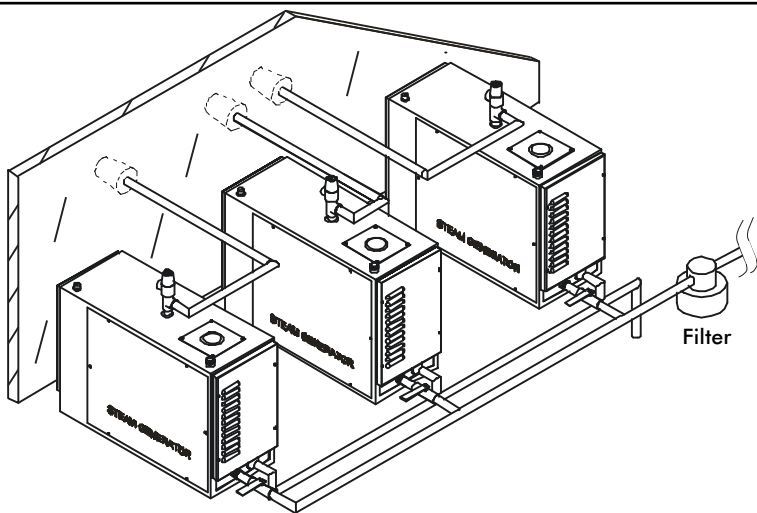


Fig 3: Typical Layout of Multiple Generators

The OC-B controller has a working window of 10-240 minutes and 30-60°C. When the time is not set, the generator operates continuously until switched off.

An OC-S demand switch may be included in the controller to set working times in regular intervals of 30 minutes.

4.2 Equipment Installation

The steam generator should be installed in a dry well ventilated place in close proximity to the steam room. It can be placed on the floor or hung from a wall.

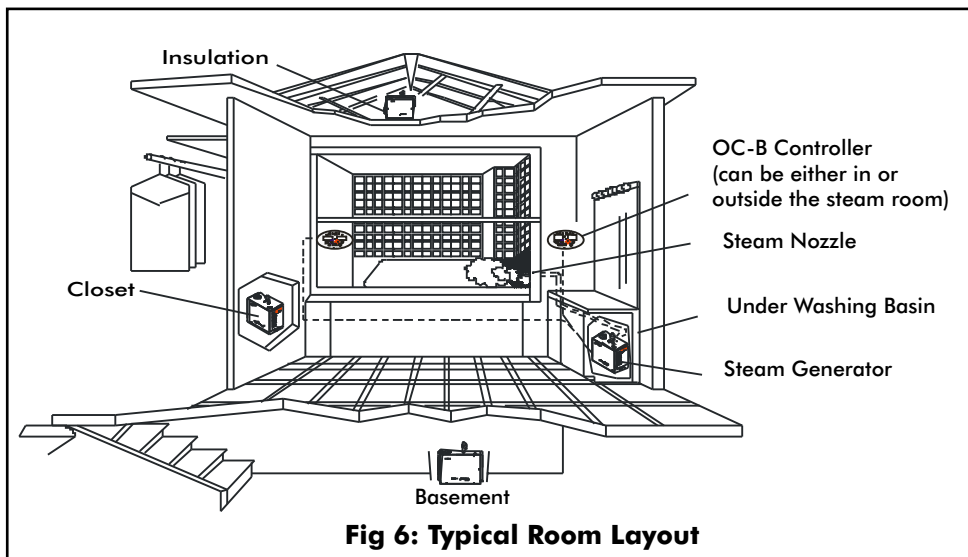
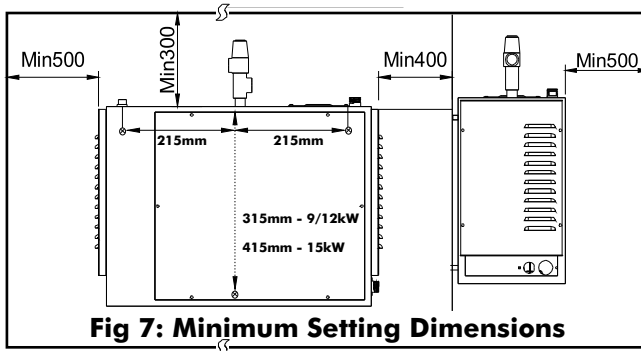


Fig 6: Typical Room Layout

- To hang the generator on a wall drill 3 holes 8mm in diameter as below image and use the wall plugs and screws provided.
- Fix the top 2 screws in place first then hang the generator by the 2 keyhole shaped holes in the back plate.
- Then with the front cover removed fix the third screw to secure the unit in place.

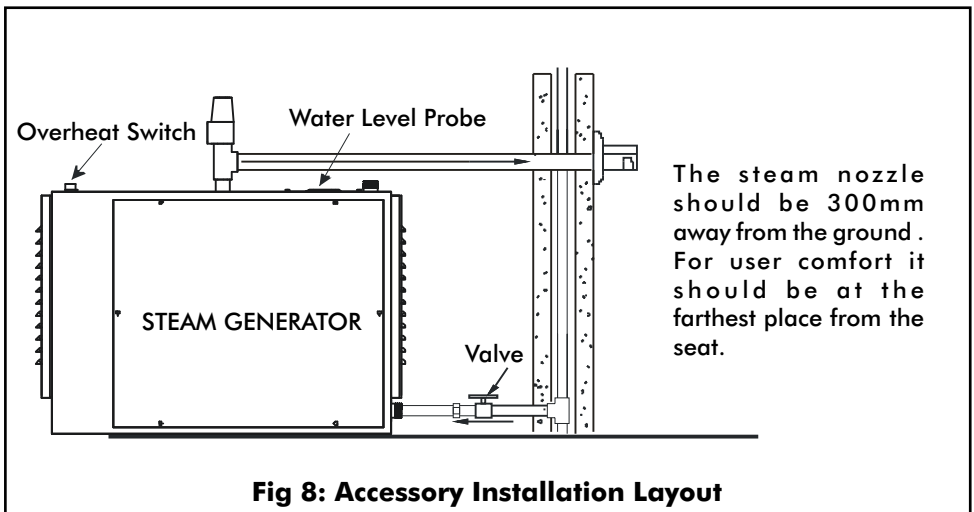


4.3 Water & Steam Connection

1. The water supply pipe and steam pipe should comply with local standards.
2. Connect the water inlet valve of the generator to the 15mm mains water supply using a flexible hose with 1/2 inch fittings.
3. Steam outlet (1/2 inch or 3/4 inch) should use the same dimension copper pipe for ease of connection



According to the location it may be necessary to attach an additional length of pipe to the pressure relief valve in order to divert the steam flow to a safe direction should the valve operate.



4. Connect the drain outlet to a suitable drain via a copper pipe with the appropriate fittings.
5. Make a secure connection between steam nozzle & steam pipe.
6. Use non corrosive hose with ½ inch unions to connect between the descaling liquid container and the inlet valve; note the descaling liquid container must be mounted at least 500 mm above the steam generator.

4.4 Installation of Controller and Temperature Probe

Steam generator controller is water proof and can be installed inside or outside the steam room according to customer preference.

1. The control panel should be installed at a height of approximately 1200mm for ease of use.
2. To Install: drill a $\Phi 40$ mm hole on wall. Open the front cover of steam generator. Fix the control cable (6 core) and temperature sensor cable (2 cores) to the relevant ports. Put the protruding back of controller in the hole at the bottom of controller press close to the wall and place back the cover.

Control panel installation: Screw one end to circuit board ports in steam generator and connect the other to the controller's cable.

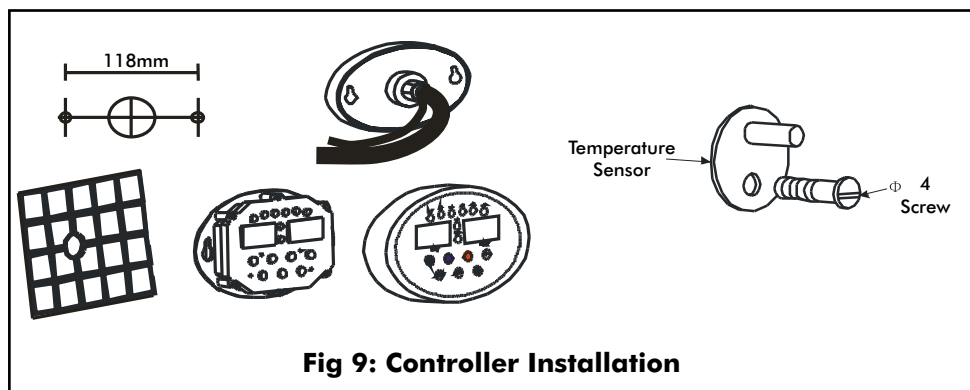
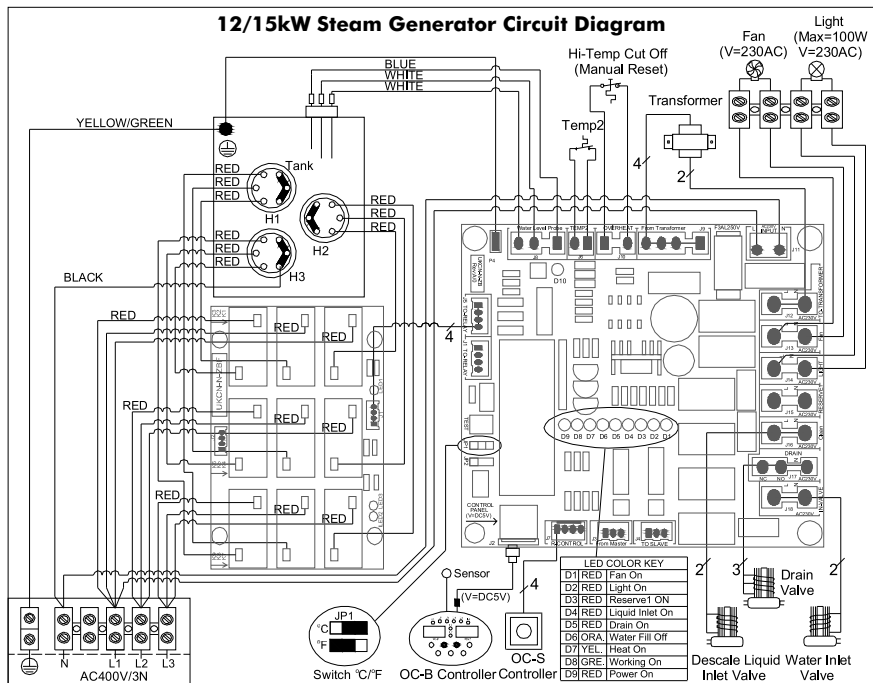
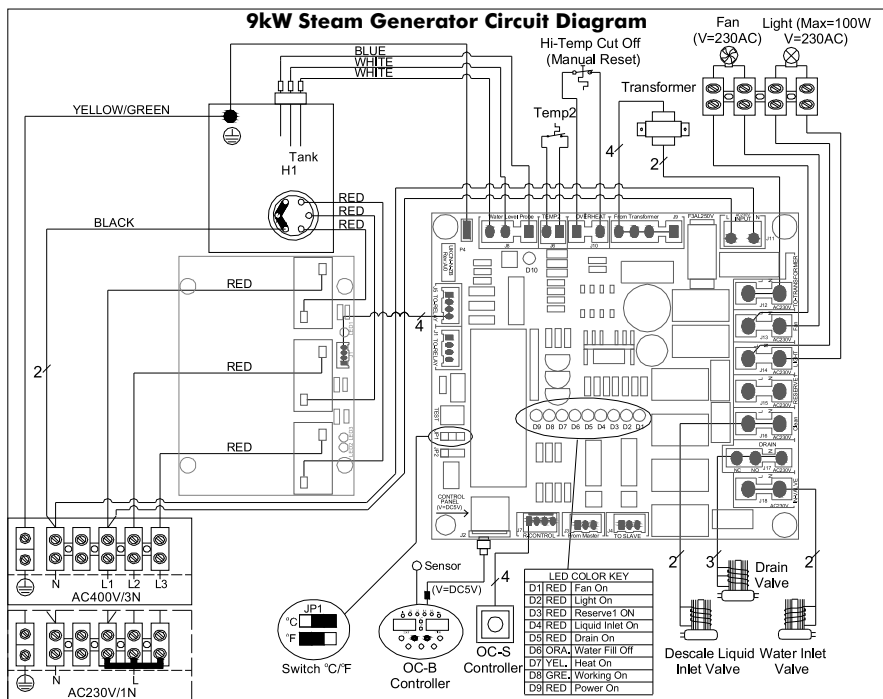


Fig 9: Controller Installation

Temperature probe installation: The temperature probe is installed inside the steam room at approximately 1.2 to 1.5 meters high and away from the door respective. Use a $\Phi 4$ mm screw to fix it in place and connect to the wire from the controller.

Installation for Power Supply and Control Cable

1. Confirm the correct voltage of power supply and the wires.
2. Remove the knock out for the power cable entry and use a rubber grommet to protect the cable, connect the conductors to the correct terminals. For single phase power use the copper bridge connectors.
3. Ensure the power supply wire and control cable remains separated to prevent magnetic field of power supply wire from interfering with control cable signal.



Steam on Demand Function

Commercial operators may wish to take advantage of the steam on demand function which allows bathers to press the steam on demand button located inside the steam room after which the generator will operate for 30 minutes then stop until activated again.

To operate the steam on demand function install the controller inside the plant room alongside the generator then fit the push button supplied in a convenient location inside the steam room and connect to the controller with the cable provided.

5. OPERATION

5.1 Steaming Control

Once the installation has been completed and checked, turn on the power and water supply and carry out the following procedure

1. On the control panel press the "  " key, the key has a time-lapse function, long press for 1 second, the time and temp windows will display the data.
2. Open the water inlet valve and water will enter the boiler, the indicator LED turns red. When the water level rises to the low water sensor level the elements will switch on and the heating indicator LED will turn on. When the high water sensor is reached the water inlet indicator LED changes to green and the water inlet valve will turn off.
3. After a few minutes of operation the generator will begin steaming, for small steam generator 2-3 minutes and about 3-5 minutes for larger generators.
4. Press the "  ", key again and the controller turns off. The display turns off and steam stops being generated there will also be no data on display.
5. Press the "  " key once more (temp and time display again) after a few seconds the generator will begin producing steam again. Let the generator operate for a short while until the water level falls to the low water level, check that the water inlet valve opens automatically and the water inlet indicator LED turns red. Cold water then enters the boiler and the steam generator starts to produce steam once the high water level is reached. The water inlet valve will close and the LED will turn green.
6. The timer will then count down to show the remaining time and when it reaches 0 the steam generator will stop.
7. Once the steam generator has operated for 10 minutes or more and turns off (manually or automatically) it prepares for automatic drain down cycle. Once the temperature of the water falls below 80°C, drain and flush are carried out and steaming can begin.



The water will only start draining once the temperature has fallen below 80 °C.

8. "  " This button has 2 functions; if the generator is off this button can be used to drain the generator manually. If the generator is switched on it can be used to select the steam on demand operating mode.
9. When the preset temperature for the steam room is reached 2 of the 3 elements will switch off allowing just 1 to continue heating to maintain the temperature. Elements will cycle on and off to maintain the temperature to within approximately 2.5 degrees above or below the preset requirement.
10. Boil dry protection – If the water supply is discontinued the water level indicator LED turns red and the steam generator stops immediately.
11. The "  " button can output AC230V to power the transformer for a 12V steam room lamp.
12. "  " button has 2 functions; it can be used to power a fan if fitted and can also be used during the temperature or time setting procedure to confirm the settings (see further details below).
13. "  " button has 2 functions; it is used to set the time and temperature settings and to start the descaling operation (see further details below).
14. The display temperature can be changed from Celsius (default) to Fahrenheit by altering the settings of the JP1 pins on the circuit board.

5.2 Setting Time and Temperature

The steam generator default settings are 40°C temp and 1 hour of operation which can be adjusted as follows;

1. To set time: press "  " key and the time display window will flash - press "▲" or "▼" to adjust the time, every press increases or reduces by 5 minutes, once the desired setting is achieved press "  " the window will stop flashing. Time may be adjusted from 10 to 240 minutes. Exceeding 240 minutes the display will show "NO" meaning no time limit.
2. To set temperature press "  " twice. The temperature window will flash, enter the required temperature by pressing "▲" or "▼" to adjust - every press will increase or reduce by 1 °C . Temperature is adjustable from 30°C-60°C , press "  " key and the window will stop flashing.



The memory is lost and reverted back to the factory default settings when the power is cut off.

3. Auto-descaling can only operate when the steam generator is in OFF mode i.e. the boiler has finished steaming; the water has drained and flushed, the drain LED will be off. Before auto-descaling can commence, a supply of dilute citric acid liquid must be connected from a storage vessel positioned at least 500mm above the steam generator. For the dilution ratio refer to the information supplied with the citric acid.

5.3 Descaling Process



Do not use strong acids or high concentrations as these may attack and destroy the element or other metal parts of the boiler.

1. To start the process press the “” key for 5 seconds, “Clean” LED light will come on and time window display last setting time (default setting is 8 hours).
2. Press “▲” or “▼” for 5 seconds, to change display into hours, increase or decrease to set the required time, each button press will increase or decrease 1 hour, maximum is 24 hours, minimum is 1 hour.
3. Once the setting is done the flashing will stop and the process will begin automatically by opening, the inlet valve for the boiler to fill with the descaling solution. The inlet valve will then close and the solution will remain inside the boiler for the preset time.

5.4 Flushing and Draining

1. At the end of the sequence, the drain valve will open and the boiler will drain and then flush with clean water; when the cycle is complete the drain LED will go off.
2. Ensure there is sufficient descaling solution in the container to completely fill the boiler - when liquid level reaches set point, the LED on circuit board will light up.



If during descaling the power supply is interrupted do not operate the steam generator until either the descaling process has been reset or the acid solution has been drained and the boiler flushed with clean water – minimum 3 flushes.

6. TROUBLE SHOOTING

Fault	Cause	Solution
There is no display on the control panel when the on/off switch is pressed	1. No Power Supply 2. Transformer faulty 3. Main Circuit Board faulty 4. Control Cable or Port faulty	1. Check power supply voltage. 2. If Indicator LED of power supply on circuit board is not in red then check transformer. 3. If the LED is red, remove controller, use circuit board and turn the steam generator. If steam generator doesn't work, then circuit board is faulty, change circuit board. 4. If the circuit board is ok and the steam generator works normally, Check the control cable port and controller.

Faulty	Cause	Solution
The controller is on, Indicator LED of heating is not on and there is no steam being produced	1. Water Supply valve is not turned on. 2. Water inlet valve faulty 3. Water Level Probe Faulty 4. Earth Wire of Boiler and Circuit Board Faulty. 5. Circuit Board Faulty. 6. Heat Element Faulty.	1. If indicator LED for water level is red. check water supply and turn on water inlet valve. 2. Check the connection of water level probe. 3. Check grounding connection of circuit board and boiler. 4. If indicator LED for water level is green check circuit board. 5. Check if overheat switch is disconnected 6. Check heating elements.
Steam generator is turned on but there is no steam output	1. Main Circuit Board Faulty 2. Relay Circuit Board Faulty 3. Heating Elements Faulty	1. Replace main circuit board 2. Replace relay circuit board 3. Replace heating elements
Temp. window display "LC"	Water level probe connection faulty	Check connection or change water level probe.
Temp. window display "HC"	Water level probe is short circuited	1. Check water level probe connection 2. Check controller if it is has shorted circuited
Water flows from steam nozzle when steam generator is off	Water inlet valve faulty	Clean and change water inlet valve
When power is cut off water continues to flow	1. Water Inlet Valve Faulty 2. Circuit Board Faulty	Change circuit board or water inlet valve

Faulty	Cause	Solution
Steam generator is turned off but continues working	1. Circuit Board Faulty 2. Controller Faulty 3. Faulty Relays on accessory circuit board 4. Water Level Probe	Disconnect power supply and contact nearest Dayliff retailer
When steam generator is turned on, water comes off the valve	Last cycle of draining curtailed due to power loss	Turn off the steam generator manually and press the drain button ,when the steam generator finishes draining, the drain valve will close , and then turn on the steam generator.

7. MAINTENANCE

The single biggest problem with steam generation is the build up of scale resulting from dissolved solids within the water. Scaling can cause the elements to fail, the water level sensors not to function and premature failure of the O-rings resulting in leaks from around the elements. The extent of the problem will vary according to the degree of hardness in the local water supply.



It is recommended to use water softener.

All commercial and domestic uses must ensure a regular maintenance routine for descaling the generator. The frequency of this will vary according to the degree of hardness in the local water supply and the amount of time the generator is used. Check the water for hardness and arrange the descaling routine accordingly.



Faults arising from a failure to descale the generator are not covered by warranty.

Because heating and cooling cause expansion and contraction it is important to inspect all the water and steam inlets and outlets as well as their pipes and connectors on a regular basis to ensure there are no leaks.

Clean the filter net in the magnetic valve according to the water quality in the location.

Wiring and electrical integrity of the generator should be checked regularly at least once a year.

8. TERMS OF WARRANTY

I) General Liability

- In lieu of any warranty, condition or liability implied by law, the liability of Davis & Shirtliff (hereafter called the Company) in respect of any defect or failure of equipment supplied **is limited to making good by replacement or repair** (at the Company's discretion) defects which under proper use appear therein and arise solely from faulty design, materials or workmanship within a specified period. This period commences **immediately after the equipment has been delivered to the customer** and at its termination all liability ceases. Also the warranty period will be assessed **on the basis of the date that the Company is informed of the failure.**
- This warranty applies solely to equipment supplied and **no claim for consequential damages**, however arising, will be entertained. Also the warranty specifically excludes defects caused by fair wear and tear, the effects of careless handling, lack of maintenance, faulty installation, incompetence on the part of the equipment user, Acts of God or any other cause beyond the Company's reasonable control. Also, any repair or attempt at repair carried out by any other party **invalidates all warranties.**

ii) Standard Warranty

General Terms

If equipment failure occurs in the normal course of service having been competently installed and when operating within its specified duty limits warranty will be provided as follows:-

- **Up to 1 year - The item will be replaced or repaired at no charge.**
- **Over 1 year, less than 2 years - The item will be replaced or repaired at a cost to the customer of 50% of the Davis & Shirtliff market price.**

The warranty on equipment supplied or installed by others is conditional upon the defective unit **being promptly returned free to a Davis & Shirtliff office** and collected thereafter when repaired. No element of site repair is included in the warranty and any site attendance costs will be payable in full at standard chargeout rates. Also proof of purchase including the purchase invoice must be provided for a warranty claim to be considered.

DAYLIFF is a brand of **Davis & Shirtliff**
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