



INSTALLATION MANUAL

LPHW Warm Air Heater

Model SWH-EC (MK2)

CE

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The meaning of the symbol on the material, its accessory or packaging indicates that this product shall not be treated as regular waste. Please, dispose of this equipment at your applicable collection point for the recycling of electrical and electronic equipments waste. In the European Union and Other European countries which there are separate collection systems for used electrical and electronic product. By ensuring the correct disposal of this product, you will help prevent potentially hazardous to the environment and to human health, which could otherwise be caused by unsuitable waste handling of this product. The recycling of materials will help conserve natural resources. Please do not therefore dispose of your old electrical and electronic equipment with your regular waste.

1. General

This user's guide is meant for the installer and if necessary for the user. It's a reference to operation and installation of the SWH-EC heater.

1.1. Description

The SWH-EC is an effective in-direct fired heater. The heat exchanger consist of copper tubes and aluminium fins. This is an approved design for an optimal heat exchange.

The grille has been designed to accomplish an optimal air displacement at the lowest possible sound level.

With a 5-stage switch is it possible to reduce the air output and noise level.

1.2. Function

The SWH-EC is essentially a radiator with a fan on the back. When hot water is pumped through the radiator, and the supply air fan is on, the heater will blow hot air. The heater will give no heat when the supply air fan is off, irrespective if there is hot water running through the radiator.

The heater requires a control (thermostat) to operate the supply of hot water and to switch the supply air fan on/off.

There are several options for control, this will be described later in this manual.

For a good air distribution it's always better to choose 2 or more heaters instead of a single heater. For example, it's better to select two 30kW heaters, instead of one 60kW heater.

1.3. Matching capacity of hot water boiler and SWH-EC

In case the capacity of the boiler is higher than that of the SWH-EC, the boiler won't be able to release all the heat produced.

This will cause the boiler to go on and off. As a consequence of this the installation won't be able to reach the temperature demanded. For small installations it is advisable to select a SWH-EC which has an higher output than the boiler itself.

1.4 Guarantee

Operation and /or installation of appliances not in accordance with this manual will invalidate guarantee.

2 Technical

2.1 Technical data

The SWH-EC is available in 9 models with capacities from 11.7 to 76.8kW. The range of nine models is subdivided into 3 basic sizes.

See table2, for dimensions

SPECIFICATION GUIDE - SWH-EC Series									
Model		SWH115-EC	SWH120-EC	SWH235-EC	SWH245-EC	SWH350-EC	SWH365-EC	SWH380-EC	
Maximum heat output*		kW	14.7	19.5	27.8	38.7	46.4	54.4	76.8
Air volume	m³/h	2200	1950	3900	3500	6150	8500	7600	
Throw	Horizontal	m	16	14	22	19	21	25	21
	Vertical	m	5	5	7	6	7	8	7
Electrical supply		V	230V 1 Phase N & E - 50Hz						
Rated power		W	111	123	200	250	320	400	308
Electrical current		A	1.0	1.1	0.9	1.1	1.5	1.8	1.4
Sound level @ 5m		dB(A)	35-54	35-54	35-59	35-57	35-60	35-56	35-54
Weight (incl water)		kg	20	21	31	32	44	61	65
Water connection			¾"			1"			
Water coil pressure drop		kPa	3	3	4	6	4	7	9
Minimum suspension height		m	2.5						

* Based upon water flow and return temperature of 90/70°C and air temperature of 15°C

Table 1 - Technical data

2.2 Dimensions

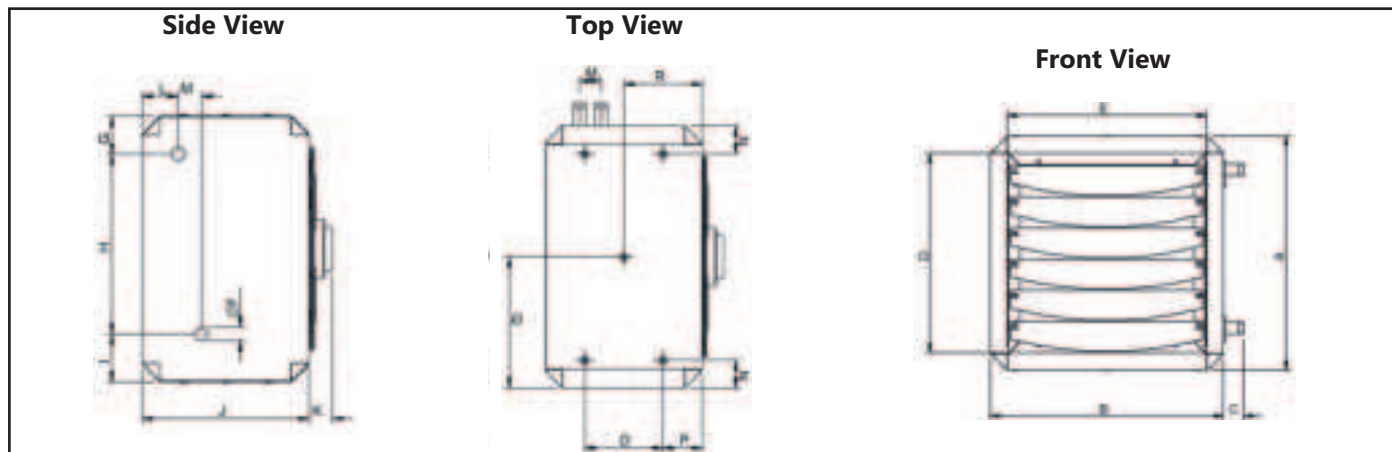


Table 2

DIMENSIONAL DATA - SWH Series

Model	SWH115-EC	SWH120-EC	SWH235-EC	SWH245-EC	SWH350-EC	SWH365-EC	SWH380-EC
A	510.5		692.5		863.5		
B	509		693		864		
C	46.5	44	34	42	33		34
D	435.5		585		756		
E	435		585		756		
F	¾"				1"		
G	91.75	72.75	93.5	82.75	107.25		93.75
H	327	346	504.5	515.5	652		666.5
I	91.75		94.5	94.25	104.25		103.25
J	320		363		357.5		
K	45		83		66.8		
L	70	69	86		93		86.5
M	39	44	43.5	45	35		45.5
N	54.5		76.5		87		
O	160						
P	80		101		78		
Q	254.5		346.5		432		
R	160		181		158		

2.3. Operating Parameters

Working pressure: Max. 5 bar

Water temp: Max. 100°C; Min. 4°C (risk of freezing)

Ambient temp: Max. 40°C; Min. 4°C (risk of freezing)

Protection grade: IP00B

NOTE Frost can cause the internal copper tubes in the coil to burst and subsequently to leak.. This is not covered by warranty.

2.4. Pre-check

Before installing the heater, please check the heater supplied is the same as ordered, and ensure it suits the application, supplies available (electrical, water etc.) along with any local or national regulations.

After installation ensure that the appliance is safe and is not a hazard for personnel and cannot cause, or be, damage(d) by the contents within the space i.e moisture, dust, inflammable or corrosive gases, smoke and/or combustible materials.

The competent installer must make sure that the heater functions correctly and must instruct the user about safe operation of the heater.

3. Installation

3.1 Suspension

The SWH-EC is provided with 10 No M10 suspension points on the side panels.

It is recommended that the specially designed cantilever brackets or the ceiling mounting-set are used when mounting the heater.

Ensure that the heater is placed in a stable position, and that there is no tension on the water side connections.

Wall installation: The pipe connections for water should always be horizontal, to enable a drain/venting point to be fitted. The heater can be tilted forward slightly, but the heater may **NOT** hang askew.

Place the heater in such a manner that the return

connection (cold water) is at the lowest point. It is important to place the drain/venting point in the pipework near the heater.

Ceiling installation: Again the pipe connections to the heater should be horizontal, to enable drain/venting of the internal tubes.

To avoid draughts place the heater high enough (minimum 2.5m). If necessary use our 4-way downflow plenum, use of a plenum will reduce the throw by a factor of 4. See Fig. 1.

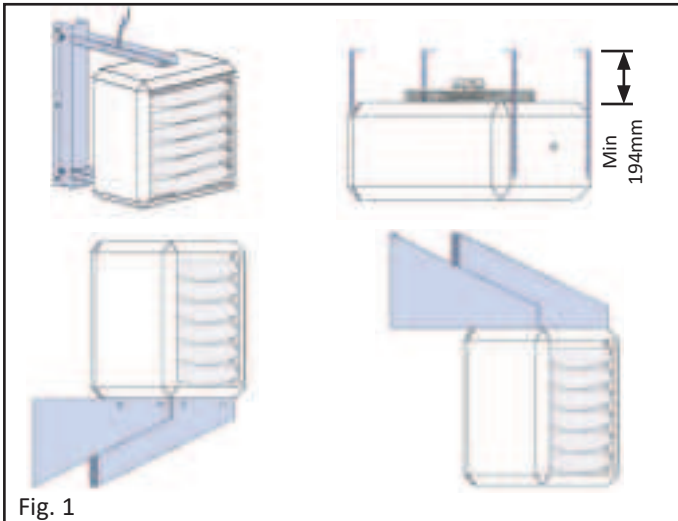


Fig. 1

The discharge grille, 4-sided discharge plenum and the vertical louvres are easy to adjust to the desired airflow direction.

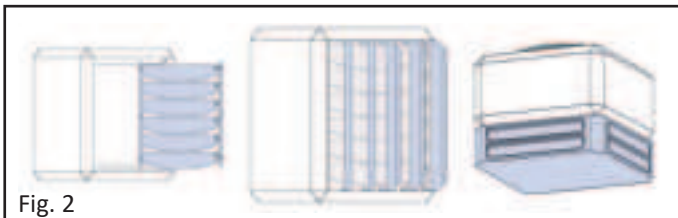


Fig. 2

Make sure that the exchanger is not damaged and that the heater discharge is not blocked, and the supply air fan has no restrictions. Make sure that there's sufficient circulation of air within the space without the airstream being considered a draught.

Heaters fixed to the wall should always blow in the direction of the cooler areas.

3.2 Water connections

Connections for hot water supply and return (2 x ¾" or 2 x 1") are marked with a red and a blue sticker. Red is water supply and blue is water return.

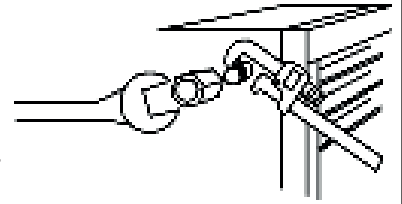
Do not swap these connections, as this will affect the heat output.

The SWH-EC is not provided with a vent/drain. This should be fitted as part of the pipework installation and should be as close to the heater connections as possible.

Do not over tighten the pipework on the heater connections, this will result in leaks!

WARNING! To prevent damage to the heater, hold the water connections with a wrench to avoid twisting the welded parts of the connections.

Do not apply excessive force!
Internal welds may break and cause leaks.



4. Electrical connection

4.1 230Vac supply

The installation must comply with all applicable local and/or national standards.

There should be a suitable mains electrical isolator with a main fuse.

There is an electrical diagram further on in this guide. The supply is 230Vac (50 Hz) with earth.

Isolation switch or power plug

The heater must be equipped with a 230V isolation switch or power plug. This switch should disconnect live and neutral (not earth) and have a minimum 3mm contact opening. Switches or power plugs must be accessible at all times.

4.2 General functioning of the unit

The SWH-EC is simply described as a radiator with a fan at the rear. If there is hot water flowing through the radiator, and the heater is on, the heater will blow warm air. But when hot water is flowing through the radiator and the heater is off, the heater will not discharge warm air.

If the fan is turned on, but the water supply is cold, then ambient air will leave the heater, possibly causing draughts. This should be prevented.

The installation should have some form of control to make turning on/off the hot water boiler and the fan of the SWH-EC separately, possible. The SWH-EC and the boiler are 2 separate systems. Both systems need to be controlled.

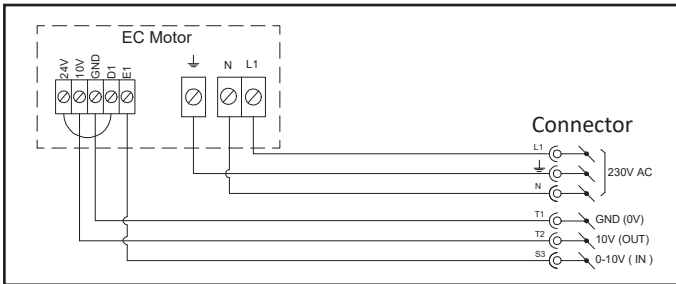
There are several ways to do this. This is dependant upon the application and needs of the user.

4.3 Connecting options

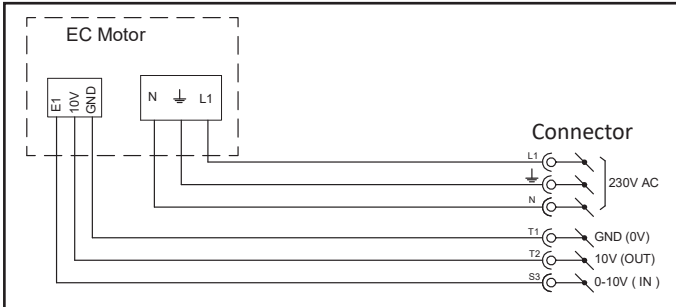
4.3.1 Variants

The SWH-EC has two motor connection versions.

Version 1, motor with internal connection terminals



Version 2, without terminals



4.3.2 Combinations with a stepless controller.

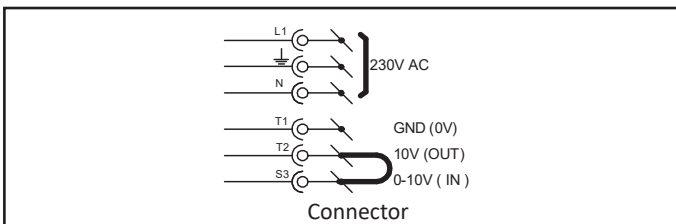
An optional stepless controller can be used to reduce the noise level of the appliance. This controls the fan speed of the SWH-EC, remember, lower fan speed equals lower heat output of the unit.

There are three options for the speed setting:

1. Only maximum speed (factory setting)
2. With a speed controller
3. External via 0-10V

1. Maximum speed only (factory setting):

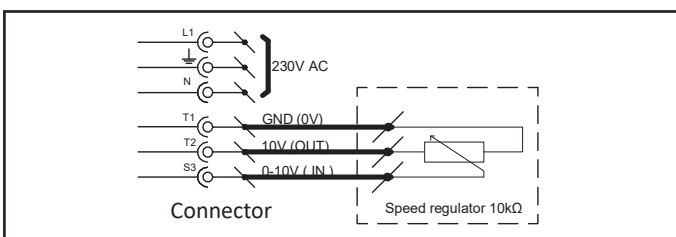
This can be done with a wire link on the motor between [10V] and [E1] or between [T2] and [S3] on the 6-pole connector. As a result, the fan will always run at maximum speed. This is already fitted as standard.



2. With a speed controller (potentiometer)

Connect terminals [10V] [GND] and [E1] in the motor or to GND[T1], 10V[T2] and 0-10V IN[S3] on the 6-pole connector a 3-wire speed controller GA3955, or another potentiometer can be connected.

NOTE The potentiometer has a resistance value of 10kΩ.

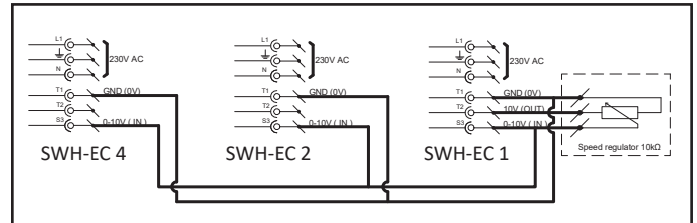


3. Externally controlled with 0-10V

Between terminals [GND] and [E1] in the motor, or GND[T1] and 0-10V IN[S3] on the 6-pin connector, an external voltage can be set between 0 and 10V to control fan speed.

Multiple SWH-EC's on one controller (max of 8 units)

The supply voltage of 10V[T2] may only be used from one SWH-EC, no other's should not be connected.



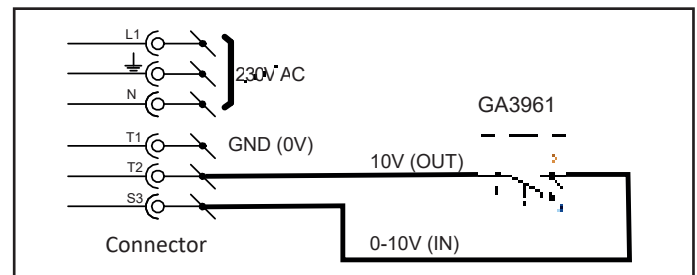
4.3.3 Connection with room thermostat only

This option is only possible when there is a continuous hot water supply. The hot water boiler should have its own control.

Operation:

The on/off room thermostat will operate the fan of the SWH-EC when there is a demand for heat. The fan will blow air over the heat exchanger, if the water is hot the heater will discharge warm air. If the water is cold the heater will blow ambient air, this can be experienced as a draught.

The boiler must be switched on/off separately. Therefore a second room thermostat is required.



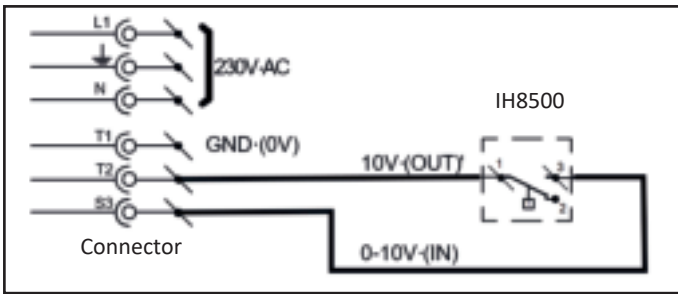
4.3.4 Connecting with contact thermostat.

This control can be used if the thermostat of the boiler is in the same room as the SWH-EC.

Operation:

The contact thermostat will close if the water has reached the pre-set temperature. In this scenario the SWH-EC will only discharge warm air. The boiler thermostat will switch on the boiler. The boiler will pump hot water around the system with the contact thermostat of the SWH-EC closing if the water is hot enough. The fan will blow warm air into the space.

If the boiler is shut off by the boiler thermostat, the water will cool down and the contact thermostat will open (disconnect) causing the SWH-EC fan to stop.



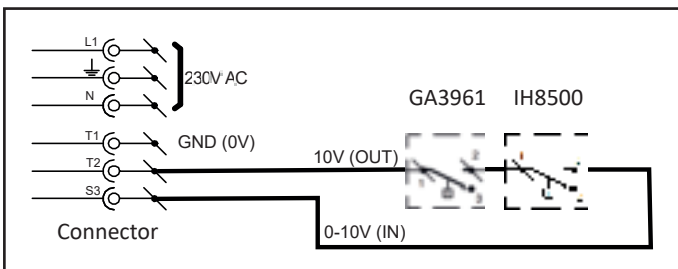
4.3.5 Connection with room thermostat combined with contact thermostat

This option is applicable when the boiler is controlled by its own thermostat and there is a continuous hot water supply.

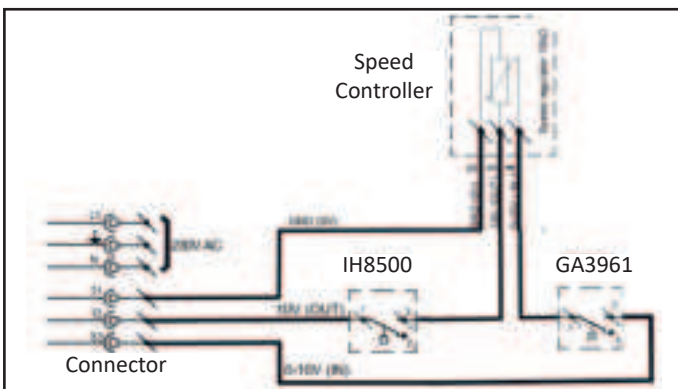
Operation:

The on/off thermostat will operate when there is a demand for heat. The contact thermostat will not close until the water has reached a pre-set temperature. In this scenario, the fan of the SWH-EC will blow warm air and will prevent draughts.

The boiler must be turned on and off separately.



If speed controller is also used, follow below wiring.



5. Maintenance and operation

Caution! Make sure that you have turned off the power supply to the heater you are working on. The heater must be earthed.

5.1 Maintenance

Especially in dusty spaces, it is important to clean the heater regularly. If the heat exchanger is heavily covered by dust, it will not displace the heat sufficiently. Use a vacuum cleaner or compressed air taking care to avoid-damaging the heat exchanger fins. Clean also the fan, guard and air outlet grille.

5.2 Safe operation

The heater is controlled by the room thermostat and/or the 5 speed switch if there is one present. There are no controls on the heater itself.

Depending on the installation, the user can make following settings:

- Control main or isolation switch
- Turn up and down room thermostat
- Turn up and down contact thermostat
- Change fan speed with 5-stage switch

Adjusting direction of the air outlets is not normally a user action, this is done by the installer.

5.3 Frost damage

ATTENTION! Frost damage!

Do not set the room thermostat lower than 5°C. Freezing of the exchanger or the tubes, will cause irreparable damage to the heater. A constant supply of hot water from the boiler must be ensured. Frost damage will void warranty claims!

6. Water temperatures/ air volumes

The technical data table (table 1) shows heater capacities (KW) with supplied hot water temperature of 90/70°C.

6.1 Other water temperatures

In applications where the water flow and return temperatures are not 90/70°C, the heat output from the SWH-EC will be reduced.

To calculate the heat output at different water temperatures, please refer to table 3. Select the water temperature along with the air temperature at the fan inlet.

Where these intersect on the table, this figure is multiplied by the given heat output in table 2, the resultant figure is the new heat output of the appliance at the new flow and return water temperatures.

The SWH-EC is not suitable for steam applications.

Water Temperature	Air Temperature					
	0°C	5°C	10°C	15°C	18°C	20°C
90/70°C	1.30	1.19	1.10	1.00	0.94	0.91
80/60°C	1.11	1.01	0.91	0.82	0.76	0.73
70/50°C	0.92	0.82	0.73	0.64	0.56	0.55
60/40°C	0.73	0.64	0.54	0.45	0.40	0.37
50/30°C	0.54	0.45	0.37	0.27	0.22	0.18

Table 3

6.2 Example

What is the capacity of a SWH235 at a water temperature of 80/60°C degrees in a room with an ambient temperature of 10°C?

Table 1 in section 2, shows the capacity of the SWH235 at 90/70°C and 15°C ambient room temperature. This is 27.7 kW.

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Model		SWH115-EC	SWH120-EC	SWH235-EC	SWH245-EC	SWH350-EC	SWH365-EC	SWH380-EC	
Maximum heat output*		kW	14.7	19.5	27.8	38.7	46.4	54.4	76.8
Air volume	m³/h	2200	1950	3900	3500	6150	8500	7600	
Throw	Horizontal	m	16	14	22	19	21	25	21
	Vertical	m	5	5	7	6	7	8	7
Electrical supply		V	230V 1 Phase N & E - 50Hz						
Rated power		W	111	123	200	250	320	400	308
Electrical current		A	1.0	1.1	0.9	1.1	1.5	1.8	1.4
Sound level @ 5m		dB(A)	35-54	35-54	35-59	35-57	35-60	35-56	35-54
Weight (incl water)		kg	20	21	31	32	44	61	65
Water connection			¾"			1"			
Water coil pressure drop		kPa	3	3	4	6	4	7	9
Minimum suspension height		m	2.5						

With a water temperature of 80/60°C and 10°C ambient room temperature, the conversion factor is, according to table 3 above.

Water Temperature	Air Temperature					
	0°C	5°C	10°C	15°C	18°C	20°C
90/70°C	1.30	1.19	1.10	1.00	0.94	0.91
80/60°C	1.11	1.01	0.91	0.82	0.76	0.73
70/50°C	0.92	0.82	0.73	0.64	0.56	0.55
60/40°C	0.73	0.64	0.54	0.45	0.40	0.37
50/30°C	0.54	0.45	0.37	0.27	0.22	0.18

So the heat output output will be $0.91 \times 27.8\text{kW} = 25.3\text{kW}$



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