



Instruction manual

Unit air heater

TYPE WWH-EC; WWH-LT



Version EN 402h



THIS DOCUMENTATION MUST ABSOLUTELY BE READ BEFORE STARTING THE INSTALLATION.
INSTRUCT USER AND LEAVE THIS DOCUMENT WITH HEATER FOR REFERENCE.

Content

1	GENERAL	3
1.1	DESCRIPTION	3
1.2	FUNCTION	3
1.3	MATCHING CAPACITY HOT WATER BOILER AND WWH	3
1.4	GUARANTEE	3
2	TECHNICAL FEATURE	4
2.1	TABLE WITH DATA	4
2.2	TABLE WITH DATA WWH-LT	5
2.3	USER'S RESTRICTIONS	6
2.4	PRE-CHECK	7
3	INSTALLATION	7
3.1	SUSPENSION	7
3.2	WATER CONNECTIONS	8
3.3	BLOW-OUT OPTIONS	9
4	ELECTRICAL CONNECTION	10
4.1	230VAC SUPPLY	10
4.2	GENERAL FUNCTIONING OF THE UNIT	10
4.3	CONNECTING OPTIONS	10
5	MAINTENANCE AND OPERATION	15
5.1	MAINTENANCE	15
5.2	SAFE OPERATION	15
5.3	FROST DAMAGE	15
6	WATER TEMPERATURES/ AIR VOLUMES	16
6.1	WWH-EC CAPACITIES AT SEVERAL WATER TEMPERATURES	16
6.2	WWH-LT CAPACITIES AT SEVERAL WATER TEMPERATURES	16
6.3	EXAMPLE	16
7	DISPOSAL & RECYCLING	17

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 WWH-EC and WWHLT. For a safe and effective function of this appliance it is strictly necessary that this manual is applied correctly.

1.1 Description

The WWH is an effective in-direct fired heater.

The heat exchanger consists of copper tubes and aluminium fins. This is an approved design for an optimal heat exchange.

The grill has been designed to accomplish an optimal air displacement at the lowest possible sound level. With a (stepless) regulator or external voltage source it is possible to reduce the air output and noise level.

1.2 Function

The WWH is in fact a radiator with a fan on the back. When hot water is pumped through the radiator, and the fan is on, the heater will blow hot air. The heater will give no heat when the fan is off, no matter there is hot water running through the radiator or not.

The heater requires a control (thermostat) to arrange the supply of hot water and to switch the fan on/off. There are several options for control, this will be described later in this manual.

For a better air distribution it's always better to choose 2 or more heaters instead of 1 heater. For example, it's better to select two 30kW heaters, instead of one 60kW heater.

1.3 Matching capacity hot water boiler and WWH

In case the capacity of the boiler is higher than that of the WWH, the boiler won't be able to release all the heat produced. This will cause the boiler to go on and off (commute). 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 WWH which has an higher output than the boiler itself.

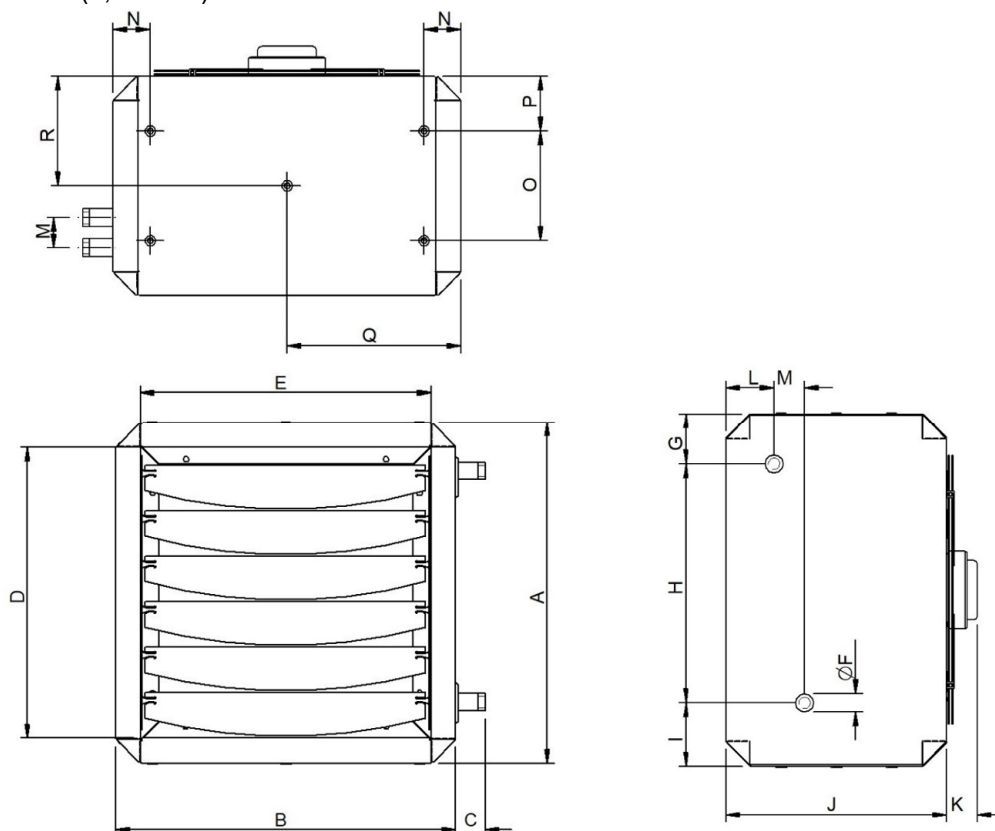
1.4 Guarantee

Operation and /or installation of appliances not according to this manual can imply invalidation of guarantee.

2 Technical feature

2.1 Table with data

The WWH-EC is available in 8 models with capacities that differ from 10 to 80 kW. The range of 10-80 kW heaters is subdivided in 3 basic sizes. The type number of the appliance starts with the housing model (1,2 and 3). See table below for exact dimensions.



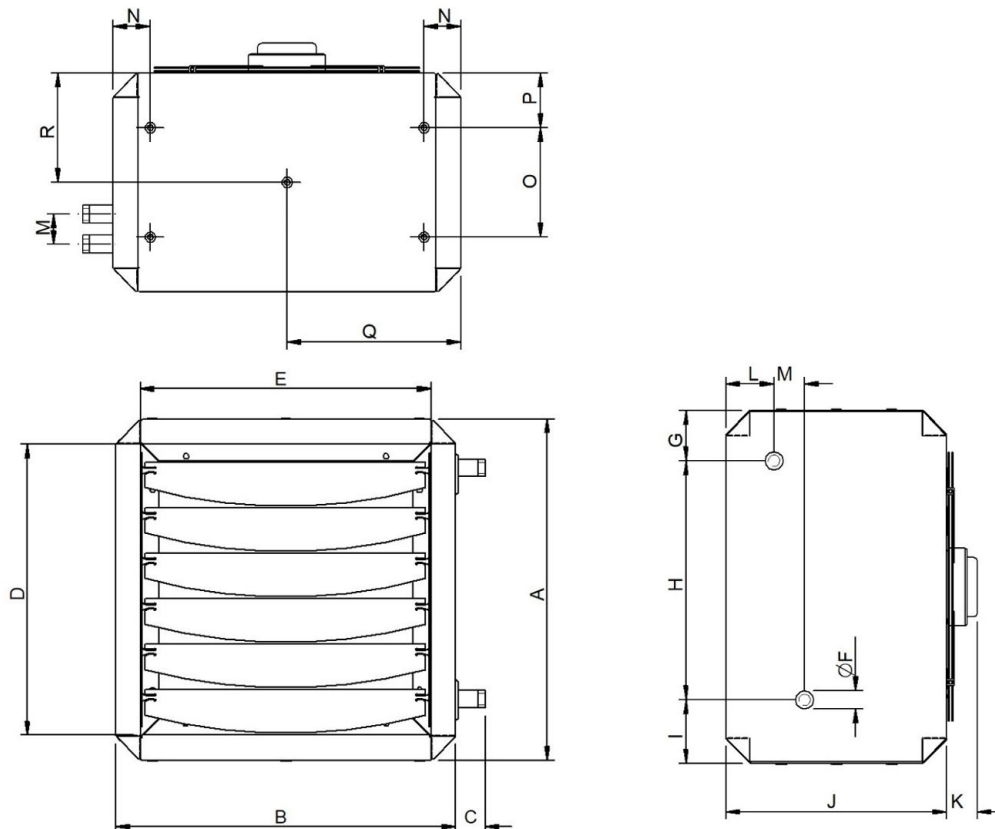
Type	115EC	120EC	235EC	245EC	350EC	365EC	380EC
Model size	1	1	2	2	3	3	3
A	510,5	510,5	692,5	692,5	863,5	863,5	863,5
B	509	509	693	693	864	864	864
C	46,5	44	34	42	33	33	34
D	435,5	435,5	585	585	756	756	756
E	435	435	585	585	756	756	756
F	3/4"	3/4"	3/4"	1"	1"	1"	1"
G	91,75	72,75	93,5	82,75	107,25	107,25	93,75
H	327	346	504,5	515,5	652	652	666,5
I	91,75	91,75	94,5	94,25	104,25	104,25	103,25
J	320	320	363	363	357,5	357,5	357,5
K	45	45	83	83	66,8	66,8	66,8
L	70	69	86	86	93	93	86,5
M	39	44	43,5	45	35	35	45,5
N	54,5	54,5	76,5	76,5	87	87	87
O	160	160	160	160	160	160	160
P	80	80	101	101	78	78	78
Q	254,5	254,5	346,5	346,5	432	432	432
R	160	160	181	181	158	158	158

Type	Unit	115EC	120EC	235EC	245EC	350EC	365EC	380EC
Heating capacity (*)	kW	14.7	19.7	27.8	42.4	46.4	54.4	76.7
Air output	m ³ /h	2200	1950	3900	3500	6150	8500	7600
Throw horizontally	m	16	14	22	19	21	25	21
Throw vertical	m	5	5	7	6	7	8	7
Electrical supply	V	230	230	230	230	230	230	230
Consumed current	A	1.0	1.1	0.9	1.1	1.5	1.8	1.4
Power consumption	W	111	123	200	250	320	400	308
Weight (incl. water)	kg	20	21	31	32	44	61	65
Water connection (ext.)	G	¾	¾	¾	1	1	1	1
Water sided pressure loss	kPa	3	3	4	5	4	7	9
Recommended susp. height	m	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Noise level (5m)	dB(A)	35-54	35-54	35-59	35-57	35-60	35-56	35-54

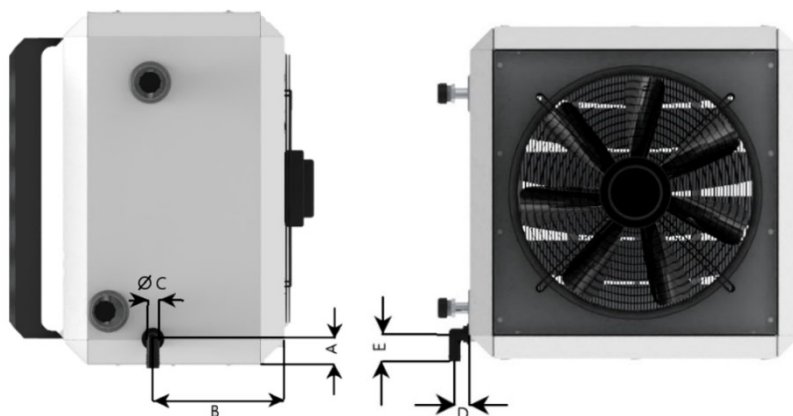
(*) at water temperature of 90°/70° and environmental temperature of 15°C.

2.2 Table with data WWH-LT

The WWH-LT is available in 4 models. Besides heating through a boiler, the WWH-LT has specially been developed for use in a low-temperature installation. In addition the WWH-LT model can be used for cooling through a heat pump or a cooling pump.



Type	110LT	220LT	330LT	340LT
Model size	1	2	3	3
A	510,5	692,5	863,5	863,5
B	508	693	864	864
C	46,5	35	28,5	28,5
D	435,5	585	756	756
E	435	585	756	756
F	¾"	1"	1"	1"
G	102,75	111,25	121,5	121,5
H	330	495	647	647
I	77,75	86,25	95	95
J	320	363	357	357
K	45	83	65,5	65,5
L	124	142	144	144
M	60,5	60	65,5	65,5
N	54,5	76,5	87	87
O	160	160	160	160
P	80	95,5	78	78
Q	254,5	364,5	432	432
R	160	175,5	158	158



Type	110 LT	220 LT	330 LT	340 LT
A	37,75	40,75	51,75	51,75
B	190	214	208,75	208,75
C	19	19	19	19
D	23,75	20,25	24,25	24,25
E	42,5	42,5	42,5	42,5

Type	Unit	110LT	220LT	330LT	340LT
Capacity * 45°/35°C	kW	8.3	19.4	28.6	37.9
Cool capacity ** at 7°/12°C	kW	6.6	16.5	19.2	32.1
Cool capacity ** at 15°/18°C	kW	3.8	8.8	12.8	17.8
Cool capacity ** at 16°/19°C	kW	3.4	7.9	11.7	16.1
Air output	m³/hr	1850	4150	5450	8850
Throw horizontally	m	14	21	20	25
Throw vertical	m	5	7	7	8
Electrical supply	V	230	230	230	230
Consumed current	A	1.1	2.3	1.5	3.2
Power consumption	W	118	515	320	718
Weight (incl. water)	kg	22	34	66	68
Water connection (ext.)	G	¾	1	1	1
Water sided pressure loss	kPa	4	11	30	30
Recommended susp. height	m	2.5	2.5	2.5	2.5
Noise level (5m)	dB(A)	35-54	35-64	35-60	35-62

(*) at water temperature 90°C/70°C and ambient temperature of 15°C

(**) at ambient temperature 28°C

2.3 User's restrictions

Work pressure:	max. 5 bar.
Water temperature:	max. 100°C; min 4°C. (freezing danger!)
Environment temp.:	max. 40°C; min 4°C. (freezing danger!)
Protection grade :	IP00B

Note: frost can cause the internal copper tubes in the exchanger to burst, the exchanger will leak. No warranty on this!

2.4 Pre-check

Before installing the heater, please check if the heater is in accordance with the order, and whether it suites the local and present provisions (electrical supply etc.). The heater also has to meet local and national legislations.

After installation ensure that the appliance is no hazard for persons or can cause damage in terms of 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

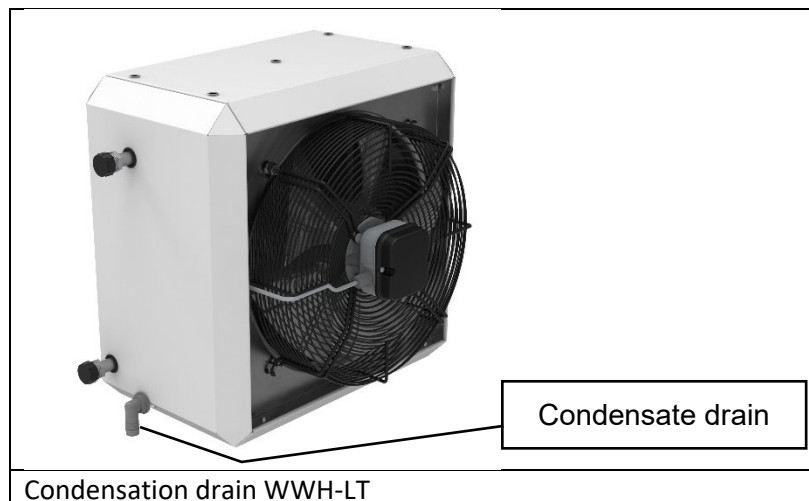
3.1 Suspension

The WWH is provided with eight M10 suspension points on the side panels.

Use preferably the specially designed cantilever brackets or the ceiling mounting-set.

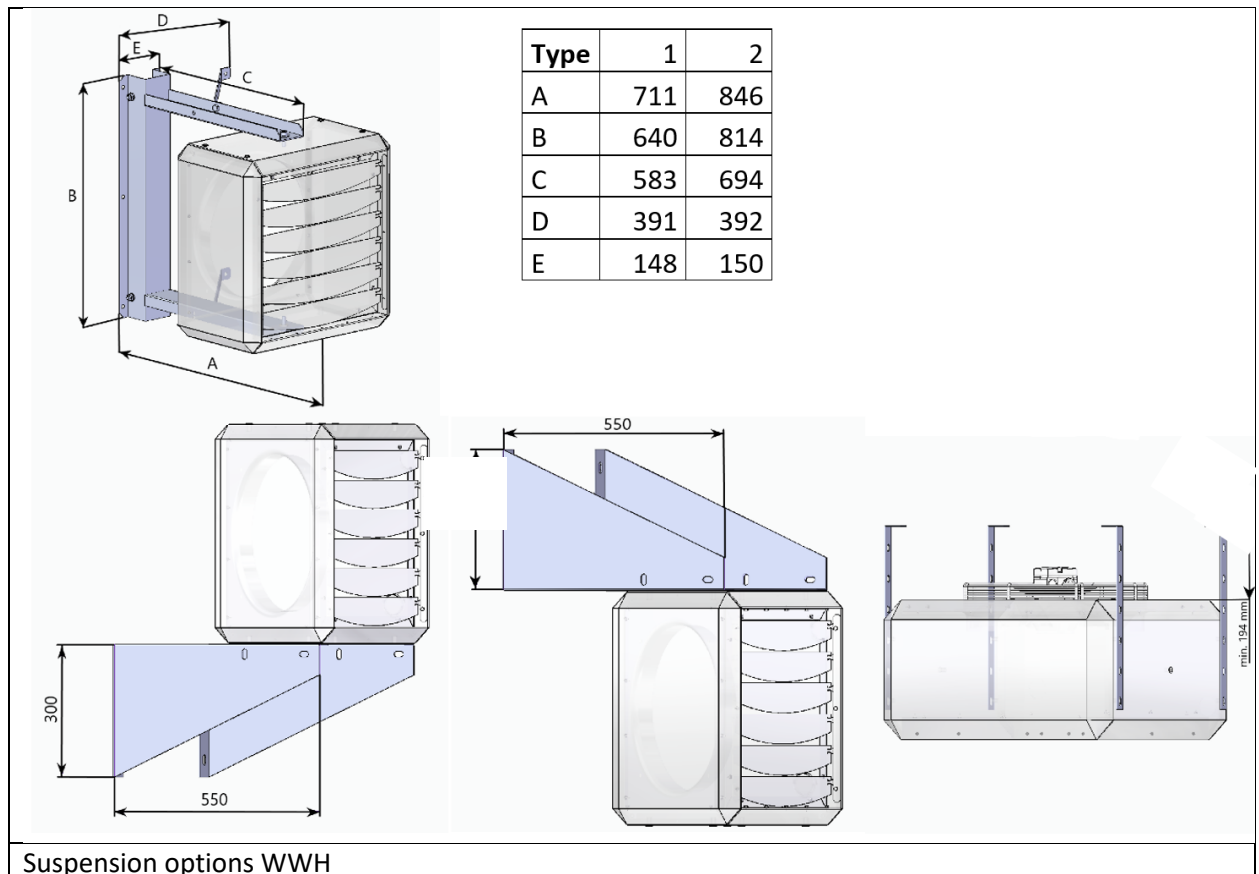
Take care that the heater is placed stable and that there is no tension on the water sided connections.

In case de WWH-LT is used for cooling, make sure that the condensate discharge pipe is on the bottom and that the air heater has been placed upright, enabling condensate to run out of the discharge system.



Wall setup: The pipe connections for water should always be **horizontal**, with a view to venting of the internal pipes. The heater can be turned over slightly, but the heater may absolutely not hang askew. Place the heater in such manner that, the return connection (cold water) is at the lowest point. It's important to place the venting in the duct near the heater.

Ceiling set up: Again the pipe connections to the heater should be **horizontal**, to enable venting of the internal tubes.. Place the heater high enough (minimally 2,5m) to avoid draught. If necessary use our outlet cone or the 4-way down flow plenum. Application of a plenum will decrease the throw with factor 4. **The WWH-LT can't be installed in a ceiling setup in case it is also used for cooling. This will cause condensate dripping down from the air heater.**



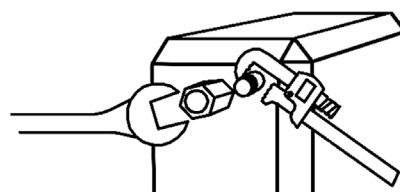
3.2 Water connections

Connections for hot water supply and return (two times $\frac{3}{4}$ inch or two times 1 inch) are marked with a red and a blue sticker. Red is water supply and blue is water return. Do not twist these connections, the heater will not give the desired output.

The WWH is not provided with a standard venting. There is the possibility to place one when it is desired.

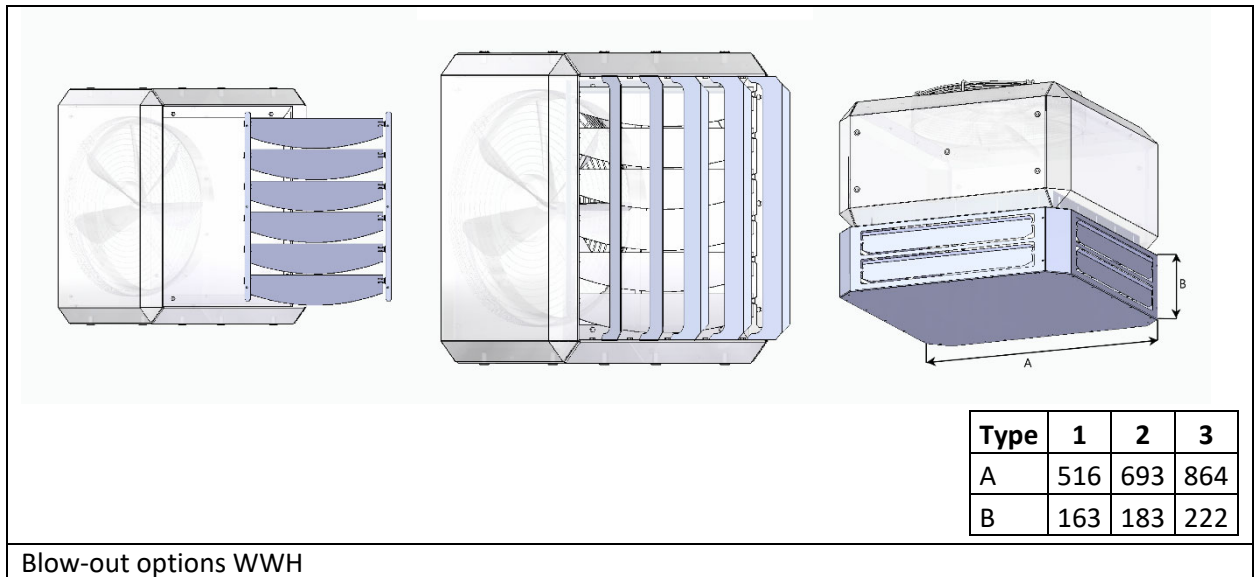
Prevent mechanical tension on the connections, this will cause leakage.

Warning: Prevent damage to the heater, hold the connections with pliers to avoid twisting of welded parts of the connections. Do not put excessive force! Internal welds may break and cause leakage.



Water pipe installation

3.3 Blow-out options



The discharge grille, 4-sided discharge plenum and the vertical blades can be easily removed and directed to the desired discharge direction. When using a plenum, the throw decreases by a factor of 4! Make sure that the exchanger is not damaged at all times.

Ensure free intake and discharge options.

Make sure that there is a good air exchange in the room (enough fans), but that people present are not bothered by annoying air currents. Always have the heaters in a wall arrangement blow on the cold surfaces.

4 Electrical connection

4.1 230Vac supply

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

There should be a suitable electrical group 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 has to be equipped with a 230 Volt isolation switch or power plug. This switch should disconnect phase and neutral (not earth) and have a 3mm contact opening at least. Switches or power plugs must be accessible at all times.

4.2 General functioning of the unit

The WWH is simply described as a radiator with a ventilator at the back. If there is hot water flowing through the radiator, and the heater is on, the heater will blow hot air. But when hot water is flowing through the radiator and the heater is off, the heater will not discharge hot air. If the fan is turned on, but the boiler water is cold, there could be draught. This must be prevented.

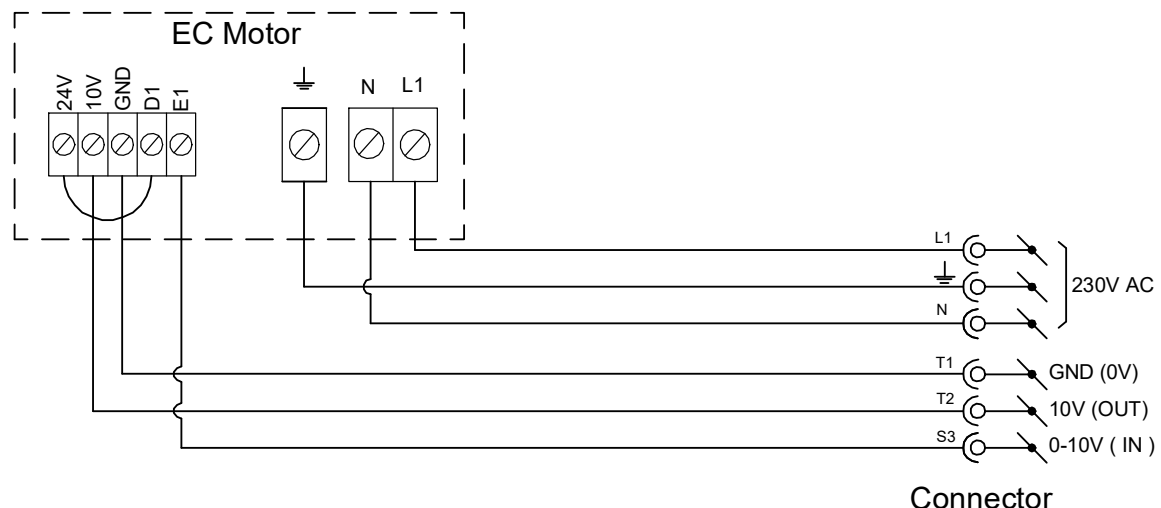
The installation should have some kind of control to make turning on/off the hot water boiler and the fan of the WWH separately, possible. The WWH and the boiler are 2 separate systems. Both systems need to be controlled. There are several ways to do this. It depends on the situation and needs of the user, what combination of controls will work best.

4.3 Connection options

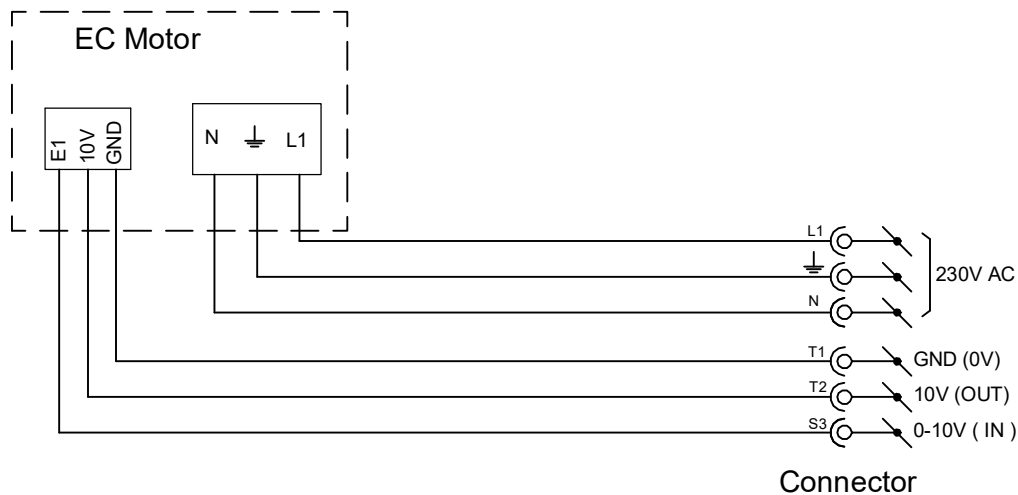
4.3.1 Variants

WWH with EC motor is available in several variants.

Alternative 1, motor with internal connectors



Alternative 2, motor without connectors:



4.3.2 Combinations with a stepless switch.

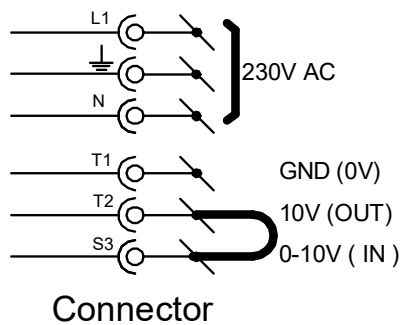
To reduce the noise level of the WWH, it is possible to install a stepless fan switch. This switch regulates the fan speed of the WWH. Please note that if the fan speed is lower, the heat output from the heater will also be lower.

There are 3 alternatives for speed control:

1. Maximum speed only (factory setting)
2. With speed regulation
3. External via 0-10V

1. Only maximum speed (factory setting):

This can be achieved with a cable jumper on the motor between [10V] and [E1] or between [T2] and [S3] on the 6-pin connector. This will cause the fan to run at maximum speed permanently. This bridge has been connected by default.

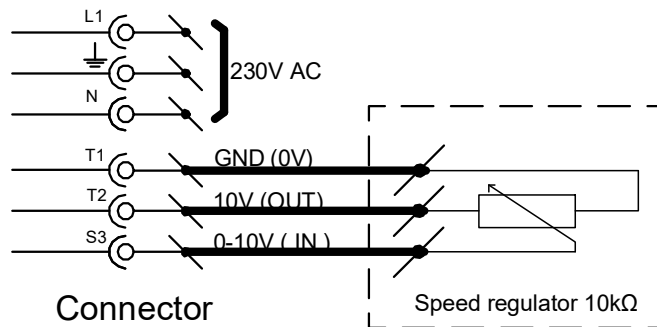


2. With a speed control (potential meter)

A 3-wire speed control (GA3955) or other potential meter can be connected to:

- plug [10V] [GND] and [E1] in the fan motor
- or to GND[T1], 10V[T2] and 0-10V IN[S3] in the 6-pin connector.

Make sure the potentiometer has a resistive value of 10kΩ.



3. 0-10V External control

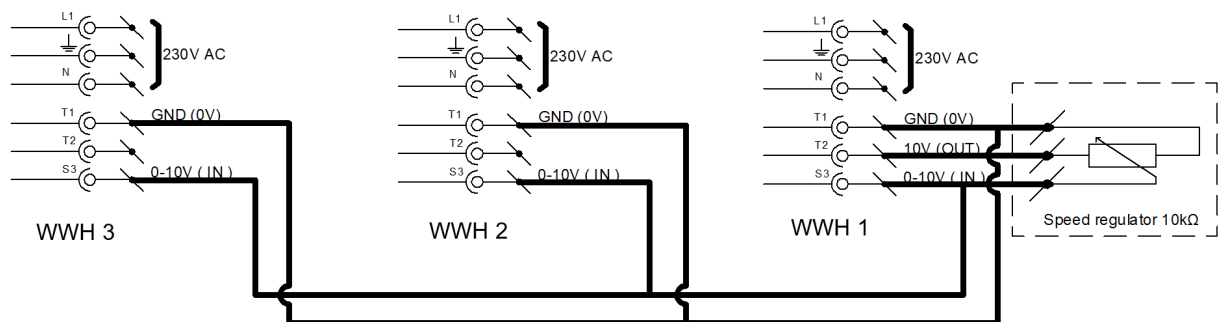
An external 0-10V current can be set:

- on connectors [GND] and [E1] in the fan motor
- or on GND[T1] and 0-10V IN[S3] on the 6-pin connector

Multiple WWHs on one control

Eight WWHs can be connected to 1 speed controller.

The 10V[T2] power supply must only be required from 1 WWH, the others must not be connected!



4.3.3 Connection with only one room thermostat

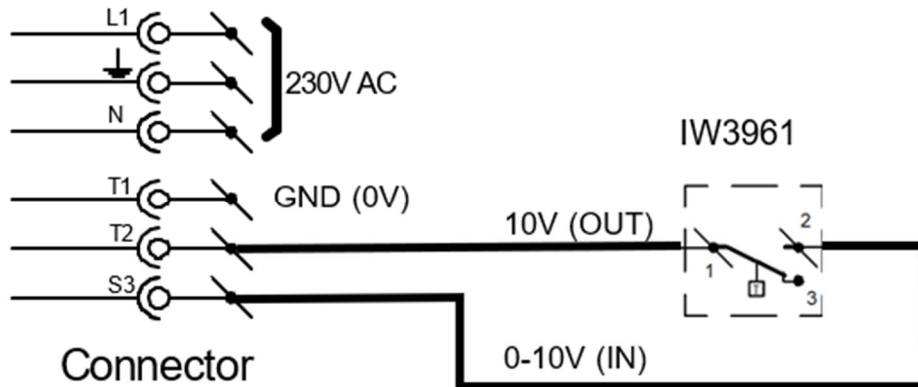
This setting is only possible when there is a continuous hot water supply. The hot water boiler must have its own control.

Operation:

The on/off room thermostat turns on the WWH's fan when there is a need for heat. The fan will blow air over the heat exchanger. If the water is hot, the heater will emit hot air. If the water is cold, the heater will blow cold air, which can be experienced as a draft.

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

The thermostat IW3961 is a special thermostat with gold-plated contacts that controls the low steam in 0-10V circuit can switch.



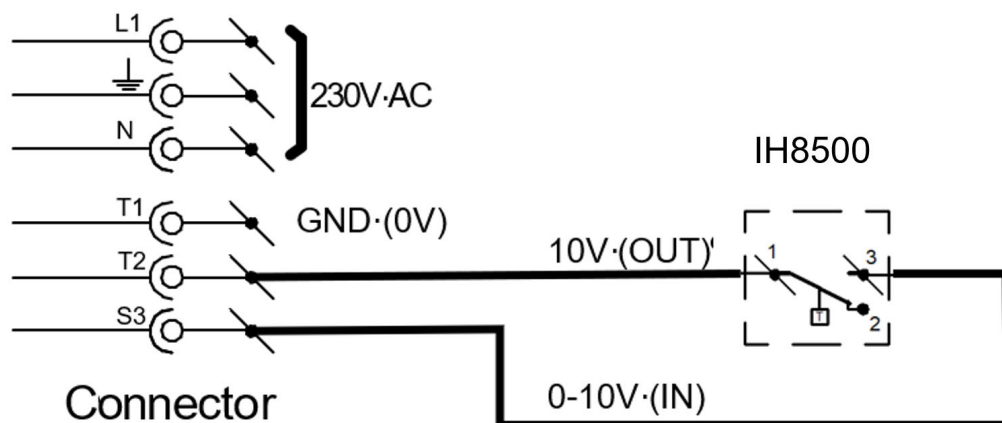
4.3.4 Connection with contact thermostat.

This setting is used if the boiler's thermostat is in the same room as the WWH.

Operation:

The contact thermostat closes if the water has reached the preset temperature. In this situation, the WWH will only discharge warm air.

The boiler thermostat will switch on the boiler. The boiler will pump hot water around. The contact thermostat on the WWH will close if the water is hot enough. The fan will blow hot air out into the room. If the boiler is switched off by the boiler thermostat, the water will cool and the contact thermostat will open.



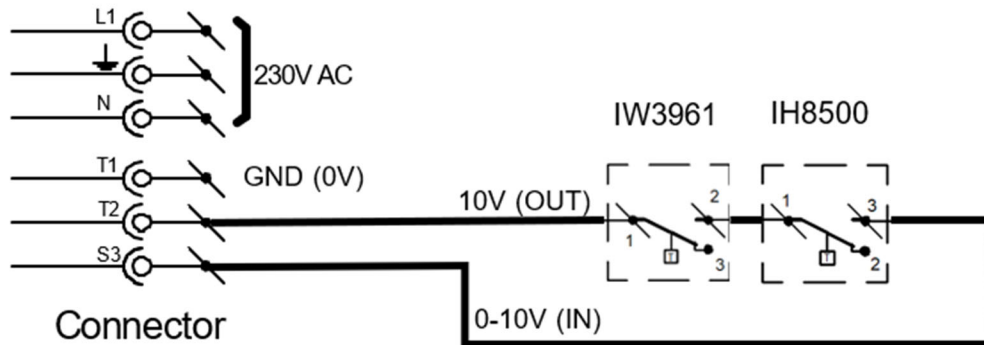
4.3.5 Connection with room thermostat combined with contact thermostat

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

Operation:

The on/off thermostat changes when there is a need for heat. The contact thermostat will not close (connect) until the water has reached the preset temperature. In this situation, WWH's fan will transport hot air. This will prevent drafts.

The boiler must be switched on and off separately.



5 Maintenance and operation

Caution:

Make sure that you have turned off the power group that you are working on. The heater must be earthed.

5.1 Maintenance

Especially in dusty spaces, it's important to clean the heater regularly. If the heat exchanger is heavily covered by dust-traps it will not displace the heat sufficiently. Use a vacuum cleaner or compressed air. Avoid damage to the fins. Clean also the fan and the fan grill

5.2 Safe operation

The heater is controlled by the room thermostat and/or the fan (speed) control. 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 voltage regulator or external 0-10V signal

Adjusting direction of the air outlet is normally no user's 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 irrevocable damage to the installation. A constant supply of hot water from the boiler must be ensured. Frost damage is excluded from warranty claims!

6 Water temperatures/ air volumes

The conversion diagram shows heater capacities in kW under different conditions. These conditions may be:

- Water temperature, for example 90/70°C (Regime)
- Air temperature sucked by the fan (Air temp)

6.1 WWH-EC capacities at several water temperatures

In situations where other inlet- and return water temperatures are applied, the original (registered) heater capacity should be multiplied with the value in the table below. The WWH-EC is not classified for steam applications.

	Air temperature					
Water 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

6.2 WWH-LT capacities at several water temperatures

In situations where other inlet- and return water temperatures are applied, the registered heater capacity should be multiplied with the value in the table below. The WWH-LT is not classified for steam applications.

	Air temperature					
Water temperature	0°C	5°C	10°C	15°C	18°C	20°C
45/35°C	1.76	1.51	1.25	1.00	0.81	0.74
50/30°C	1.56	1.30	1.07	0.78	0.64	0.52
60/40°C	2.11	1.85	1.56	1.30	1.16	1.07
70/50°C	2.66	2.37	2.11	1.85	1.62	1.59

6.3 Example

What is the output of a WWH 235-EC with a water supply (regime) of 80/60 °C, in a room with a environment temperature of 10 °C?

The table in paragraph 2.1 states the power of the WWH 235-EC at a regime of 90/70 degrees and an environmental temperature of 15°C. This is 27. kW. With a regime of 80/60 degrees and 10 degrees room temperature, the conversion factor according to the table above in paragraph 9.1 is 0.91.

De capacity will therefore become $0.91 \times 27.8 \text{ kW} = 25.3 \text{ kW}$

Type	Unit	115EC	120EC	235EC	245EC	350EC	365EC	380EC
Heating capacity (*)	kW	14.7	19.7	27.8	42.4	46.4	54.4	76.7
Air output	m³/h	2200	1950	3900	3500	6150	8500	7600
Throw horizontally	m	16	14	22	19	21	25	21
Throw vertical	m	5	5	7	6	7	8	7
Electrical supply	V	230	230	230	230	230	230	230
Consumed current	A	1.0	1.1	0.9	1.1	1.5	1.8	1.4
Power consumption	W	111	123	200	250	320	400	308
Weight (incl. water)	kg	20	21	31	32	44	61	65
Water connection (ext.)	G	¾	¾	¾	1	1	1	1
Water sided pressure loss	kPa	3	3	4	5	4	7	9
Recommended susp. height	m	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Noise level (5m)	dB(A)	35-54	35-54	35-59	35-57	35-60	35-56	35-54

At a regime of 80/60 degrees and a room temperature of 10 degrees, the conversion factor according to the table above in section 9.1 is 0.91.

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

The capacity therefore becomes $0.91 \times 27.8 \text{ kW} = 25.3 \text{ kW}$.

7 Disposal & recycling

Waste treatment

The symbol on the material, accessory or packaging indicates that this product must not be treated as household waste. Dispose of the device via the collection point for the recycling of waste electrical and electronic equipment within the EU and in other European countries that have separate collection systems for used electrical and electronic equipment. By disposing of the device correctly, you help prevent potential environmental and health hazards that could otherwise be caused by improper handling of the waste device. Recycling of materials contributes to the conservation of natural resources. Therefore, do not dispose of your old electrical and electronic equipment with the household waste.

