

INSTRUCTION MANUAL

UNIT AIR HEATER TYPE WWH-EC; WWH-LT

Version EN 402f



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

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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.

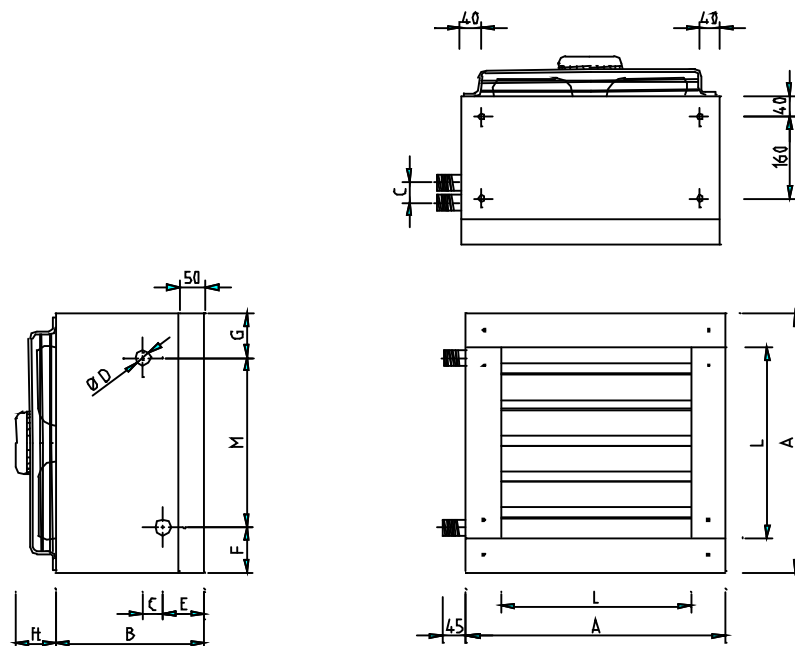
1.4 Guarantee

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.

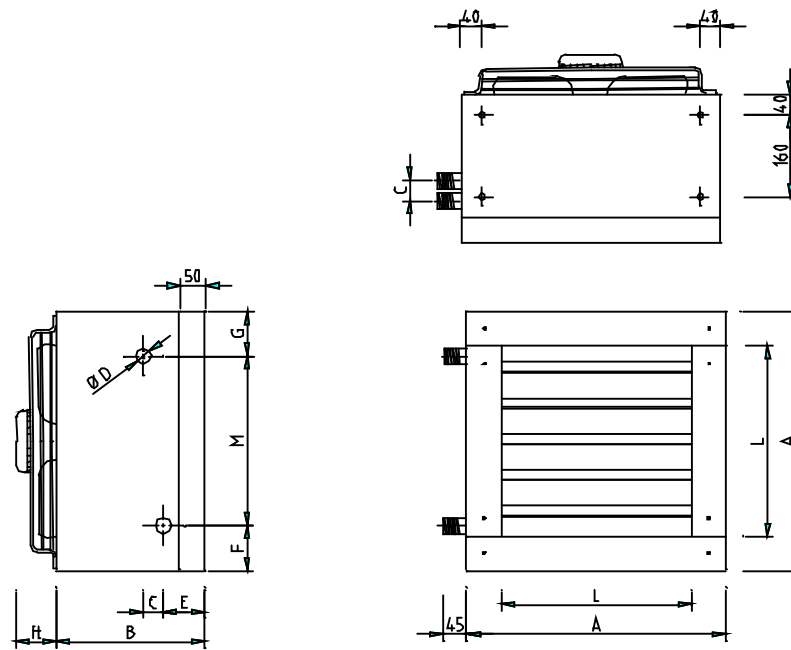


Type	115EC	120EC	235EC	245EC	350EC	365EC	380EC
Model size	1	1	2	2	3	3	3
A	505	505	679	679	834	834	834
B	290	290	290	290	340	340	340
C	40	40	43	40	40	40	43
D	3/4"	3/4"	3/4"	1"	1"	1"	1"
E	81	79.5	81	79.5	81	81	79.5
F	87.5	75	87	74.5	89.5	89.5	77
G	87.5	87.5	87	87	89.5	89.5	89.5
H	85	85	140	140	100	46	46
L	375	375	535	535	690	690	690
M	330	343	505	518	655	655	668

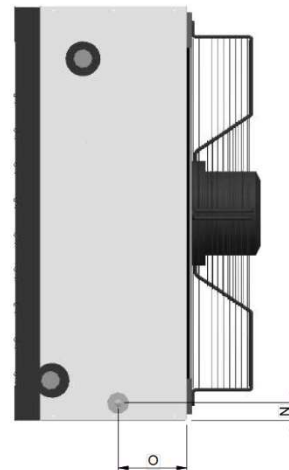
Type	Unit	115EC	120EC	235EC	245EC	350EC	365EC	380EC
Heating capacity (*)	kW	14.7	19.7	27.8	42.4	46.4	54.4	76.7
Air output	m ³ /h	2200	1950	3900	3500	6150	8500	7600
Throw horizontally	m	16	14	22	19	21	25	21
Throw vertical	m	5	5	7	6	7	8	7
Electrical supply	V	230	230	230	230	230	230	230
Consumed current	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	3/4	3/4	3/4	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.

De 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	505	679	834	834
B	290	290	354	354
C	65	65	65	65
D	3/4"	1"	1"	1"
E	81	79.5	81	79.5
F	87.5	74.5	89.5	77
	87.5	87	89.5	89.5
H	85	140	46	46
L	375	535	690	690
M	330	518	655	668
N	34,5	34,5	36	36
O	93	93	137	137



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	m ³ /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	3/4	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

2.2 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 :	IPO0B

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

2.3 Pre-check

Before installing the heater, please check if the heater is in accordance with the order, and whether it suits 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

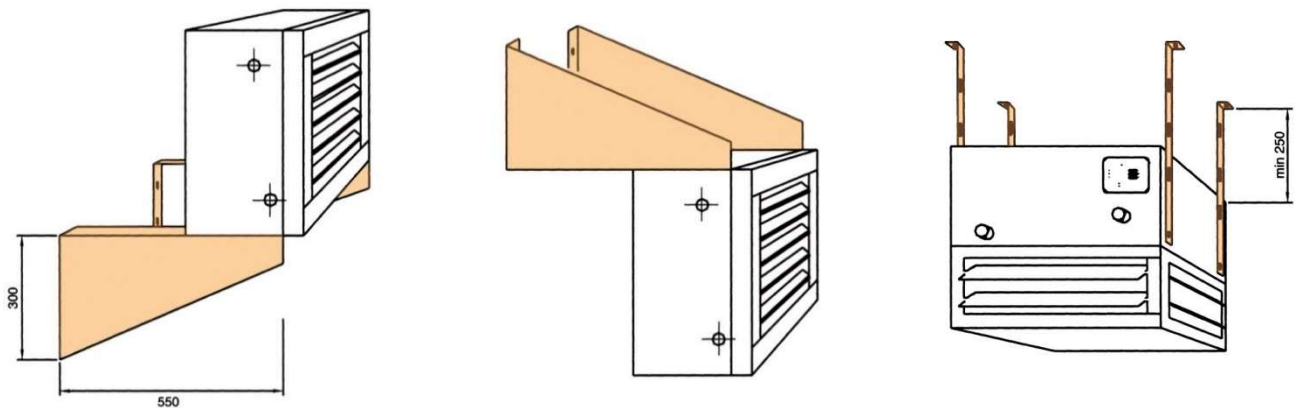
3.1 Suspension

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

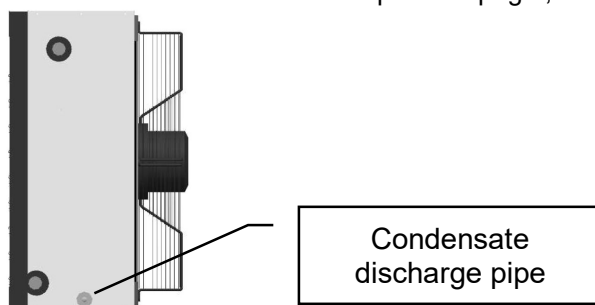
Use preferably the specially designed cantilever brackets or the ceiling mounting-set.

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

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.



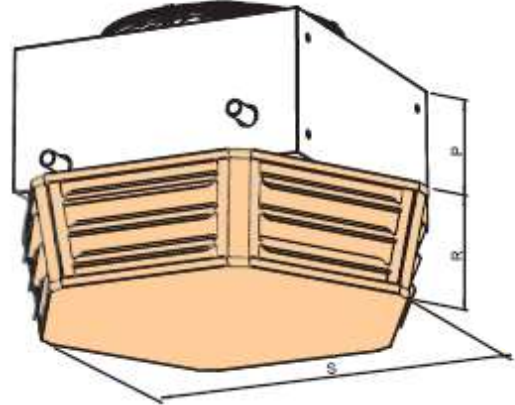
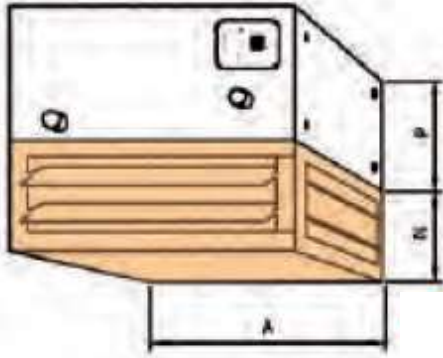
In case de WWH-LT is used for cooling, make sure that the condensate discharge pipe is on the bottom and that the air heater has been placed upright, enabling condensate to run out of the discharge system.



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.**

*4-way downflow plenum
(do not apply in situation with cooling)*

*6-way downflow plenum
(do not apply in situation with cooling)*

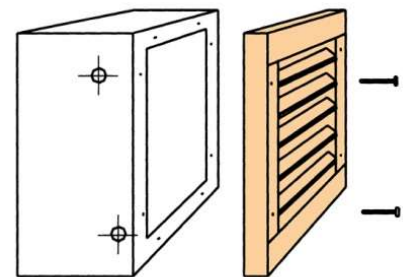


Types	115EC 120EC 110LT	235EC 245EC 220LT	350EC 365EC 380EC 330LT
Model size	1	2	3
A	505	679	834
N	200	200	200
P	240	240	290
R	181	181	-
S	714	957	-

The outlet grill can easily be taken off, turned around and replaced, to direct the discharge in any desirable direction.

Attention: When replacing the grill, always use the same screws (or screws of same length). A longer screw could pierce the exchanger!

See to it that the discharge is not blocked and that the heater has a free suction. Make sure that there's sufficient circulation of air in the room (enough ventilation) without the airstream being considered as draft. Heaters suspended to the wall should always blow in direction of the cold regions.



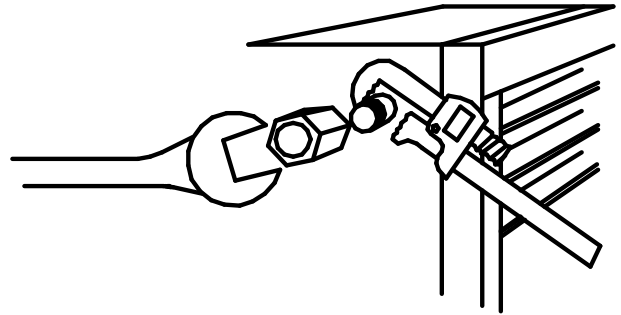
3.2 Water connections

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.



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 Connecting options

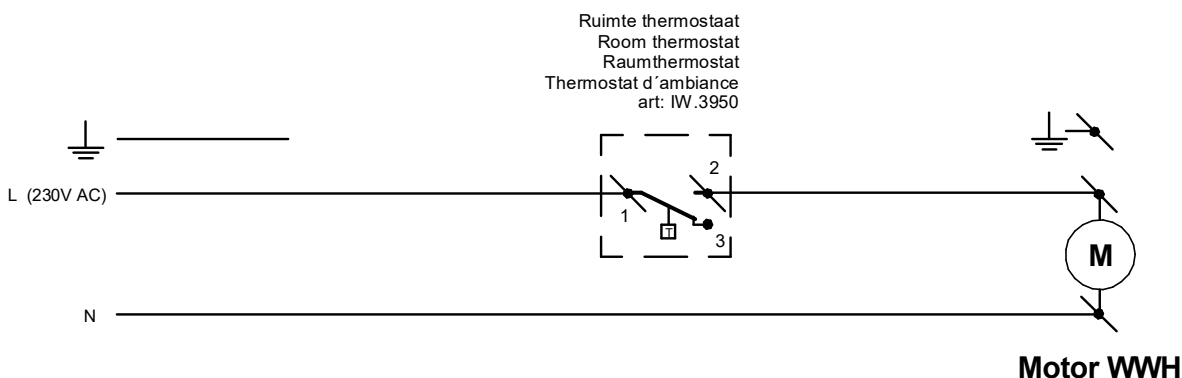
4.3.1 Connection with only a room thermostat

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 switch on the fan of the WWH when there is heat demand. The fan will blow air over the heat exchanger. If the water is hot, the heater will discharge hot air. If the water is cold the heater will blow cold air, this can be experienced as draught.

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



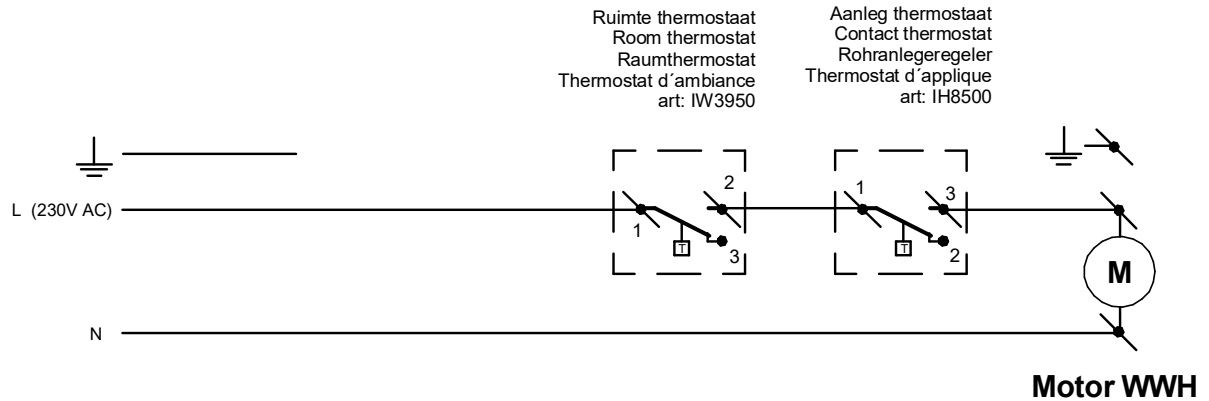
4.3.2 Connection with room thermostat combined with contact thermostat

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

Operation:

The on/off thermostat will switch when there is heat demand. The contact thermostat will not close (connect) before the water has reached the pre-set temperature. In this situation, the fan of the WWH will transport hot air. This will prevent draught.

The boiler must be turned on and off separately.



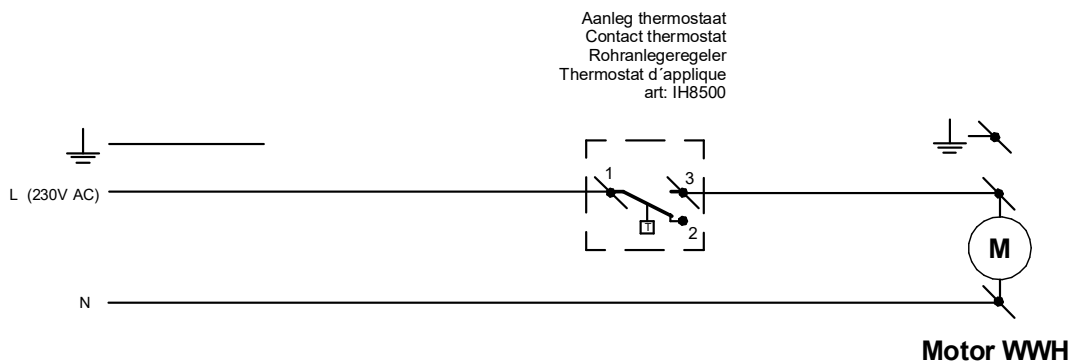
4.3.3 Connection with contact thermostat.

This option is applied if the thermostat of the boiler is in the same room as the WWH.

Operation:

The contact thermostat will close if the water has reached the pre-set temperature. In this situation the WWH will only discharge hot air.

The boiler thermostat will switch on the boiler. The boiler will pump hot water around. The contact thermostat of the WWH will close if the water is hot enough. The fan will blow hot air into the room. If the boiler is shut off by the boiler thermostat, the water will cool down and the contact thermostat will open (disconnect) and will cause the WWH to stop blowing

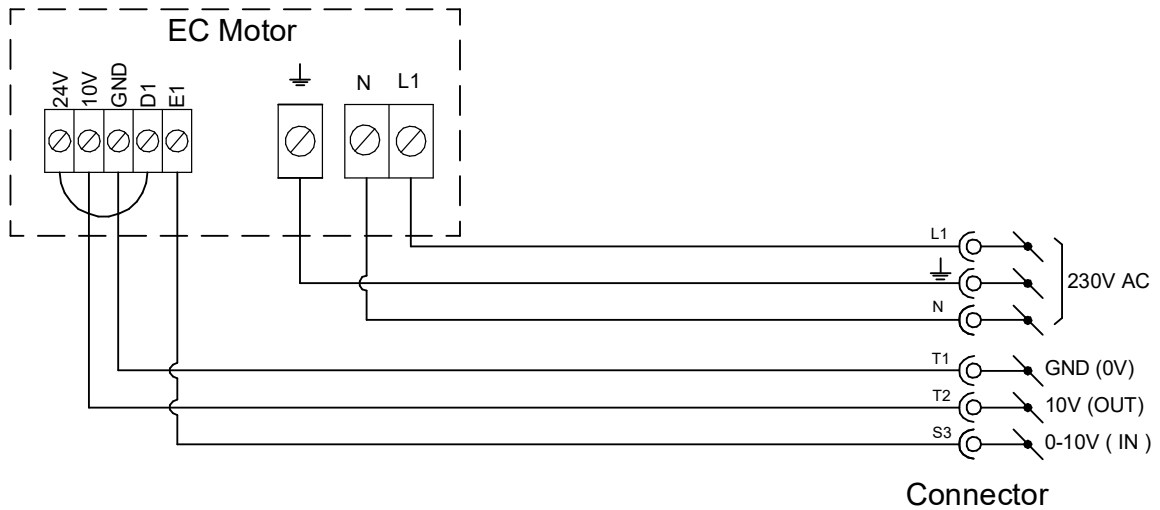


4.3.4 Combinations with a stepless switch.

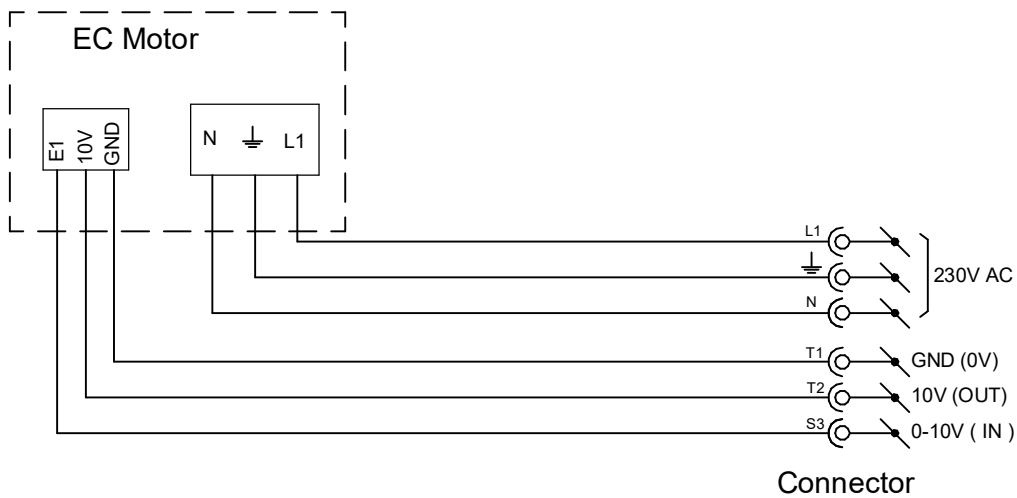
To reduce the noise level of the WWH, it's possible to install an optional stepless fan switch. This switch will regulate the fan speed of the WWH. Please note that if the fan speed is lower, the heat discharge of the heater will be lower as well.

The WWH with EC motor comes with several varieties.

Alternative 1, motor with internal connectors



Alternative 2, motor without connectors:

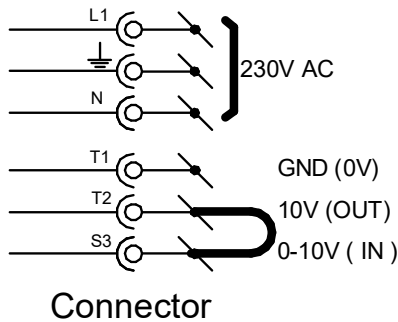


There are 3 alternatives for speed control:

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

Maximum speed only (factory setting):

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

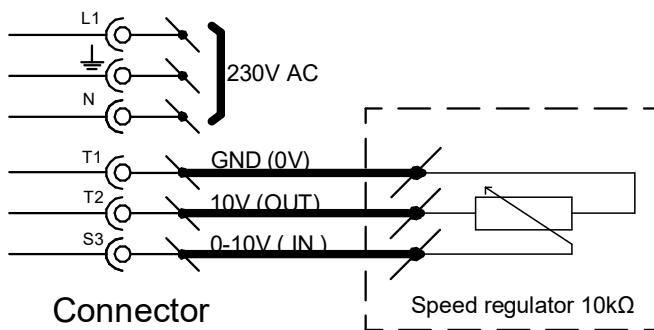


With a speed control (potential meter)

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

- connectors [10V] [GND] and [E1] in de fan motor
- or to **GND**[T1], **10V**[T2] and **0-10V IN**[S3] of the 6-pole connector.

Make sure that the potentiometer has a resistant value of 10kΩ.



0-10V External control

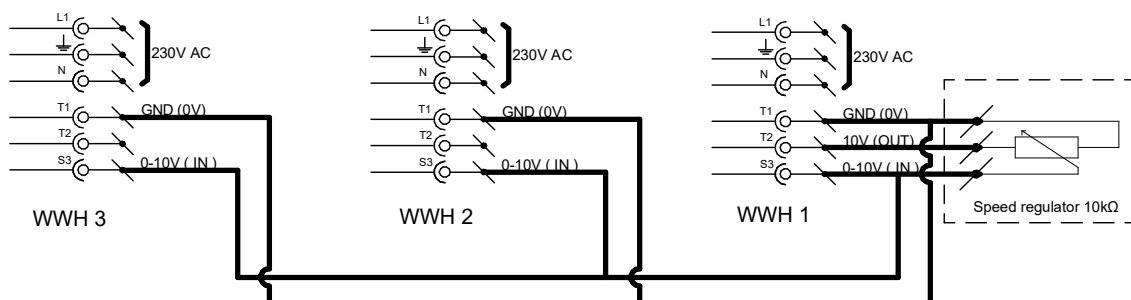
An external 0-10V current can be put:

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

Multiple WWH's on one control

Eigh WWH's can be connected to 1 speed control.

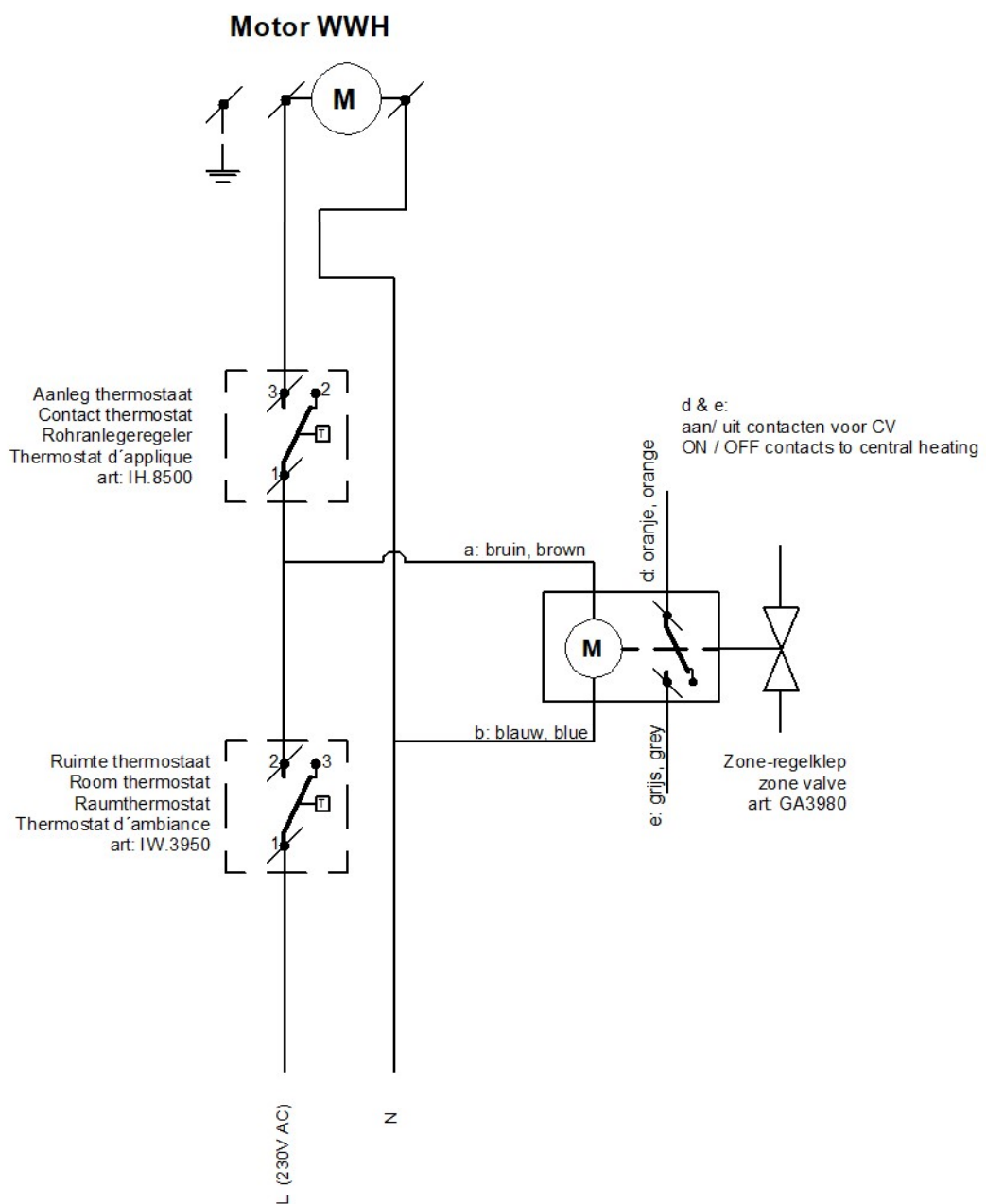
The **10V**[T2] power supply may only be demanded from 1 WWH, the others should not be connected!



4.4 Control with zone valve

The zone valve is applied on the WWH when one boiler has to heat several rooms separately. In this situation the zone-valve will control the hot water boiler and hot water supply to the WWH. Operation in short can be summarized as follows;

- Heat demand is created through the room thermostat. RT switches 230Volt and powers the zone-valve, this will switch the boiler on.
- Boiler makes hot water.
- Contact thermostat measures water temperature. If water temperature is higher than the temperature set, CT will supply power to the WWH. The fan will blow. If a voltage regulator or external 0-10V signal has been applied, this signal determines the fan speed.
- If the requested temperature has been reached, the RT will open the contact and cut off power supply to the zone-valve; the boiler will be shut off eventually.
- CT measures a water temperature that is lower than the temperature set and will open the contact. The fan will stop!



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.

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

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.

Water temperature	Air 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 $0.91 \times 27.8 \text{ kW} = 25.3 \text{ kW}$.