Warm water heater battery for rectangular duct connection.

Casing made of galvanised steel with flanges on both sides to fit the HELIOS rectangular fan range.
Heating elements made of copper with aluminium fins.
Max. operating temp.: $t_{max.}$ 120 °C.
Max. operating pressure: 8 bar.
Water pipes with male thread.
Equipped with water and air outlets.

Installation

The heater must be installed downstream of the fan. If installing it before the fan, make sure that the air flow temperature at the fan does not exceed the fan's max. temperature.
To protect the heater from dirt and to prevent it from being clogged (reducing air flow and heat output) we recommend the use of the air filter KLF..
A rectangular duct with a length of at least 1 metre must be installed between fan and heater in order to ensure a balanced air flow. An air bleed valve and a water drain valve must be provided for releasing air and water from the unit.
Note: In order to avoid water freezing in the pipes, frost protection shall be provided onsite.

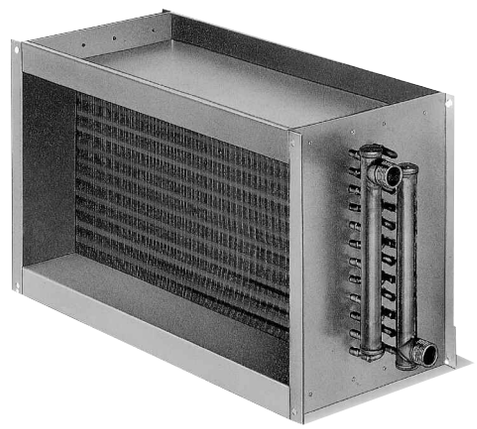
Selection

The actual temperature increase depends on the air flow volume, heater output and inlet water temperature.

Follow steps ⓐ – ⓒ to determine the required heater.

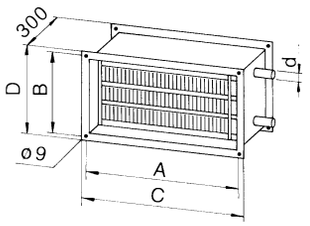
When selecting a fan (air flow volume decision) the resistance of the heater (pressure drop) must be (chart ⓓ) considered.

WHR Duct

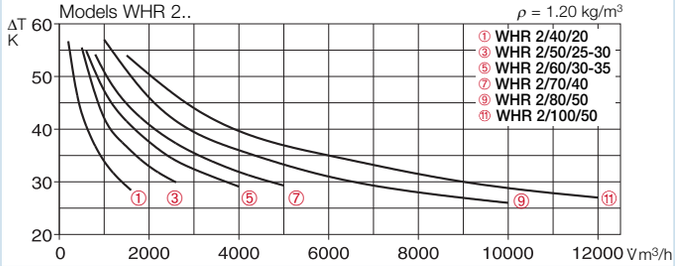


Accessories	Page
Temperature controller WHS	316

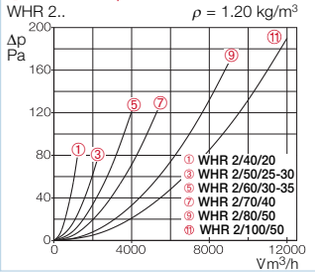
Dimensions in mm see chart



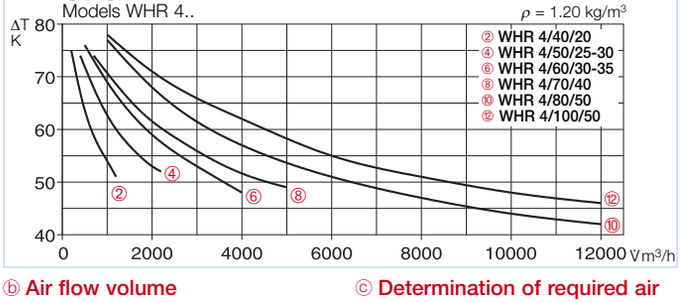
ⓐ – ⓒ Temperature increase-Air flow volume PWW 70 °/50 °C
Models WHR 2.. ρ = 1.20 kg/m³



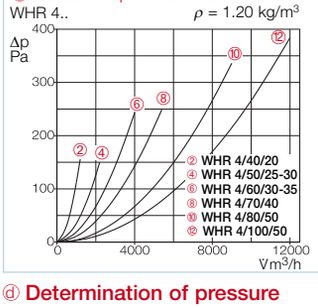
ⓓ Pressure drop-Air flow volume
WHR 2.. ρ = 1.20 kg/m³



ⓐ – ⓒ Temperature increase-Air flow volume PWW 70 °/50 °C
Models WHR 4.. ρ = 1.20 kg/m³



ⓓ Pressure drop-Air flow volume
WHR 4.. ρ = 1.20 kg/m³



ⓐ Temperature increase

Definition: $\Delta T = \vartheta_i - \vartheta_a$ [K]
ΔT: Temperature difference of air [K]
ϑ_i: Air temp., off air heater [°C]
ϑ_a: Air temp., on air heater [°C]

ⓑ Air flow volume

Shown on the performance curve whereby the total resistance of the system and heater (see chart ⓓ) (pressure drop) must be taken into account.

ⓒ Determination of required air

$$Q_H = \frac{\dot{V} \cdot \Delta T \cdot c_{PL} \cdot \rho_L}{3600} \text{ [kW]}$$

V: Air flow volume [m³/h]
ΔT: Temperature difference of air [K]
c_{PL}: Specific heat capacity of air (1,0) [KJ/kg K]
ρ_L: Air density (1.2) [kg/m³]

ⓓ Determination of pressure drop

The pressure drop of the heaters at air flow volumes is illustrated in the above charts.

Type	Ref. No.	Fits fan nominal size	Air Data: heat output		Air Data: Δ T air		Air Data: at V̇	Water data[1]: pressure drop	Water data[1]: at water flow rate	Dimensions: A	B	C	D	Connection d" [3]	Nominal weight	Suitable temperature controller: Type	Ref. No.
		NG cm	kW[1]	kW[2]	K[1]	K[2]	m³/h	Δp_w kPa	l/h	mm	mm	mm	mm	ø"	kg		
WHR 2/40/20	8782	40/20	14	7.7	32	18	1200	10	610	420	220	450	250	3/4	7.0	**WHS 1100**	8815
WHR 4/40/20	8783	40/20	22	12.6	51	29	1200	7	980	420	220	450	250	3/4	7.3	**WHS 1100**	8815
WHR 2/50/25-30	8784	50/25-30	24	14	33	18	2200	7	1050	520	270/320	550	350	3/4	9.3	**WHS 1100**	8815
WHR 4/50/25-30	8785	50/25-30	38	21	52	28	2200	5	1680	520	270/320	550	350	1	11.1	**WHS 2200**	8816
WHR 2/60/30-35	8786	60/30-35	32	18	34	19	2600	8	1420	620	320/370	650	400	3/4	11.2	**WHS 2200**	8816
WHR 4/60/30-35	8787	60/30-35	51	30	55	32	2600	7	2270	620	320/370	650	400	1	14.0	**WHS 2200**[4]	8816
WHR 2/70/40	8788	70/40	50	28	30	17	4500	6	2200	720	420	750	450	1	17.0	**WHS 2200**	8816
WHR 4/70/40	8789	70/40	81	44	50	27	4500	4	3570	720	420	750	450	1	17.0	—	—
WHR 2/80/50	8795	80/50	82	46	28	16	8000	11	3630	820	520	850	550	1	15.0	—	—
WHR 4/80/50	8796	80/50	138	80	48	28	8000	15	6110	820	520	850	550	1	20.0	—	—
WHR 2/100/50	8797	100/50	104	59	29	18	10000	19	4630	1020	520	1050	550	1	18.0	—	—
WHR 4/100/50	8798	100/50	172	99	48	28	10000	14	7640	1020	520	1050	550	1	24.0	—	—

The values apply for an intake air temp. of 0 °C and flow/return water temp: [1] 90/70 °C, [2] 60/40 °C [3] 3/4"= 19.05 mm, 1"= 25.4 mm, male thread [4] under reduced heat output at ca. 2200 l/h

Warm water heater battery for circular in-duct installation.

Casing made of galvanised steel, fits the HELIOS fan range. Spigots have double lip rubber seals on both sides to fit the nominal duct size. Heating elements made of copper with aluminium fins.
Max. operating temp.: $t_{max.}$ 100 °C.
Max. operating pressure: 8 bar.
Water pipes with male thread. Two access valves for water and air outlet for easy cleaning.

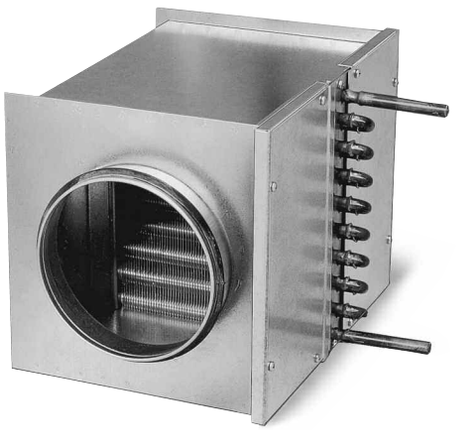
Installation

The heater must be installed downstream of the fan. If installing it before the fan, make sure that the air flow temperature at the fan does not exceed the fan's max. temperature.
To protect the heater from dirt and to prevent it from being clogged (reducing air flow and heat output) we recommend the use of the air filter LFBR..
A circular duct with a length of at least 1 metre must be installed between fan and heater in order to ensure a balanced air flow.
An air bleed valve and a water drain valve must be provided for releasing air and water from the unit.
Note: In order to avoid water freezing in the pipes, frost protection shall be provided onsite.

Selection

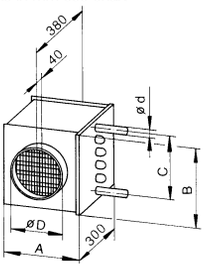
The actual temperature increase depends on the air flow volume, heater output and inlet water temperature.
Follow steps ⓐ – ⓒ to determine the required heater.
The heat output for several volumes is also given in the chart.
When selecting a fan (air flow volume decision) the resistance of the heater (pressure drop) must be (chart ⓓ) considered.

WHR Circular

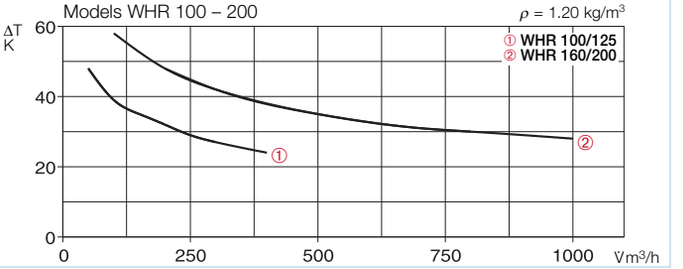


Accessories	Page
Temperature controller WHS	315 on

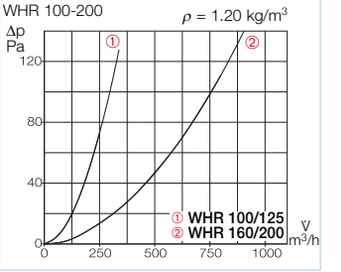
Dimensions in mm see chart



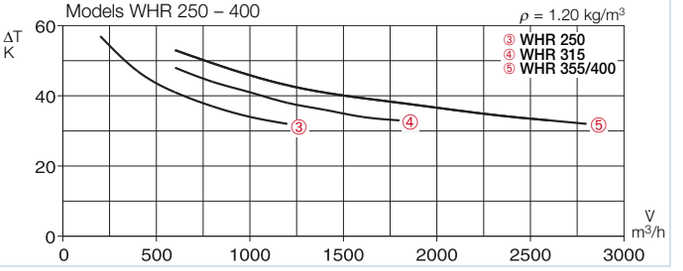
ⓐ – ⓒ Temperature increase-Air flow volume PWW 80 °/60 °C
Models WHR 100 – 200



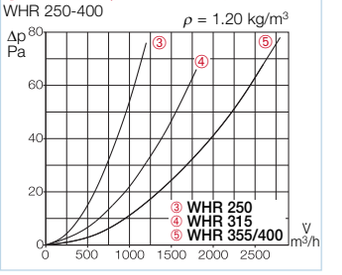
ⓓ Pressure drop-Air flow volume
WHR 100-200



ⓐ – ⓒ Temperature increase-Air flow volume PWW 80 °/60 °C
Models WHR 250 – 400



ⓓ Pressure drop-Air flow volume
WHR 250-400



ⓐ Temperature increase

Definition: $\Delta T = \vartheta_i - \vartheta_a$ [K]
ΔT: Temperature difference of air [K]
ϑ_i: Air temp., off air heater [°C]
ϑ_a: Air temp., on air heater [°C]

ⓑ Air flow volume

Shown on the performance curve whereby the total resistance of the system and heater (see chart ⓓ) (pressure drop) must be taken into account.

ⓒ Determination of required air

$$Q_H = \frac{\dot{V} \cdot \Delta T \cdot c_{PL} \cdot \rho_L}{3600} [kW]$$

V̇: Air flow volume [m³/h]
ΔT: Temperature difference of air [K]
c_{PL}: Specific heat capacty of air (1,0) [KJ/kg K]
ρ_L: Air density (1.2) [kg/m³]

ⓓ Determination of pressure drop

The pressure drop of the heaters at air flow volumes is illustrated in the above charts.

Type	Ref. No.	Fits duct diameters	Air data: Heat output		Air data: Δ T air		Air data: at V̇	Water data[1]: pressure drop	Water data[1]: at water flow rate	Dimensions: A	B	C	D	Connection d" [3]	Nominal weight	Suitable temperature controller: Type	Ref. No.
		ø mm	kW[1]	kW[2]	K[1]	K[2]	m³/h	Δp_w kPa	l/h	mm	mm	mm	mm	ø"	ca. kg		
WHR 100	9479	100	1.9	0.9	35	17	150	1	84	165	180	140	100	3/4	3.2	**WHST 300 T38**[4]	8817
WHR 125	9480	125	2.6	1.1	29	13	250	2	115	165	180	140	125	3/4	3.2	**WHST 300 T38**[4]	8817
WHR 160	9481	160	5.5	3.1	38	22	400	11	245	240	255	215	160	3/4	4.9	**WHST 300 T38**[4]	8817
WHR 200	9482	200	7.2	4.1	33	19	600	17	317	245	255	215	200	3/4	4.9	**WHST 300 T38**[4]	8817
WHR 250	9483	250	10.7	6	37	21	800	8	470	315	330	290	250	3/4	6.9	**WHS 1100**	8815
WHR 315	9484	315	18.3	10.4	36,2	21	1400	9	810	400	405	365	315	3/4	9.0	**WHS 1100**	8815
WHR 355	8790	355	24.5	14	38	21,6	1800	9	1080	465	480	420	355	3/4	12.5	**WHS 1100**	8815
WHR 400	9524	400	26.2	15	36	21	2000	11	1060	465	480	420	400	3/4	12.5	**WHS 1100**	8815

The values apply for an intake temp. 0 °C and flow/return temperatures: [1] 90/70 °C [2] 60/40 °C [3] 3/4"= 19.05 mm, 1"= 25.4 mm, male thread [4] alternative WHST 300 T50, s. page 113 (Ref. No. 8820)

Temperature controller WHST 300 T38 for warm water heater batteries up to 5,5 kW and 300 l/h

WHST 300 T38

Note

Air temperature control for warm water heater batteries WHR. For constant supply air temperature between 20 – 50 °C, we recommend **WHST 300 T50**

see page 113 Ref. No. 8820

Air temperature control WHST 300 T38 for warm water heater batteries

- To control air heating of the warm water heater batteries for lower output to 5.5 kW and flow rate to 300 l/h.
- An ideal supplement for ventilation units with heat recovery and integrated PWW after heating (Helios models KWL.. WW) as well as for warm water heater batteries WHR 100 to WHR 200.
- A simple, cost effective and easy-to-install solution.

Specification / Application

WHST 300 T38 consists of a thermostat with remote control and remote sensor and is suitable for systems in which the water pressure of heating circuit can provide this application. The proportional controller, which operates as a conventional heating valve without electrical supply energy, is continuously adjustable and changes the temperature through diversification of hot water flows.

Control options

Control options through modification of the hot water flow:

- **Constant supply air temperature control** via positioning the capillary tube sensor in the air flow.
- **Constant room temperature control** via positioning the capillary tube sensor in the room.
- **Arbitrary limitation of the temperature range** through the definition of minimum and maximum values.
- **Frost protection** is activated at + 8 °C.

Product contents

Complete set, inclusive
- Thermostat for room installation,
- Straight way valve
- Set piston
- Capillary tube - remote sensor
- Fittings

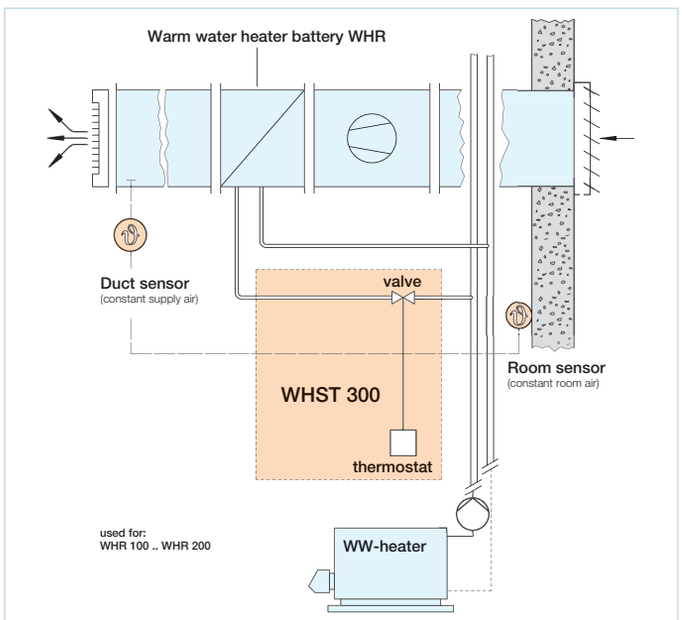
Installation

The capillary tube must be located in a position so that it is not buckled or flattened.

To keep the room temperature constant the remote sensor should be installed in the room where the predetermined temperature conditions are present.

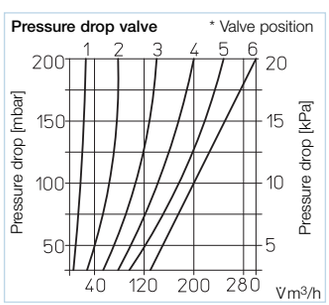
Design

The WHST 300 T38 control can be used in heater batteries up to 300 l/h water flow rate. The pressure drop, which must be overcome by an on site pump, appears as the sum of Δp heater battery, Δp valve (see diagram) and Δp ducting.



Technical data

Type	WHST 300 T38
Ref. No.	8817
Max. operating pressure	10 bar
Max. operating temperature	120 °C
Connection DN 20	3/4"
Max. air flow	300 l/h
Differential pressure	0.1–0.7 K / 0.5 bar
Desired value range (Thermostat)	8–38 °C
Dimensions in mm	
– Thermostat	W 80 x H 80 x D 50
– Remote sensor	W 35 x H 85 x D 30
Mounting thread DN 20	G 3/4"
Capillary tube length	5 m
Weight (complete)	0.5 kg



* Note: The valve is factory-adjusted in the position 6. For lower volumes of water it can be adjusted between 1 and 6 in order to optimise the control mode.

Temperature controller WHS
for warm water heater batteries up to 70 kW and 2200 l/h

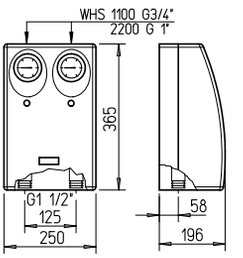
WHS

Hydraulic unit WHSH


Electronic control unit WHSE


Room temperature sensor TFR


Duct temperature sensor TFK



Other dimensions in mm see chart

Air temperature controller WHS for warm water heater batteries

- ☐ To control air heating of the warm water heater batteries for a maximum output of 70 kW and a flow rate of between 200 and 2200 l/h.
- ☐ Fits to HELIOS heater batteries WHR-R 250-400 and WHR-K up to 2200 l/h.
- ☐ Complete system with diverse control options where all the components are compatible with each other.

Application

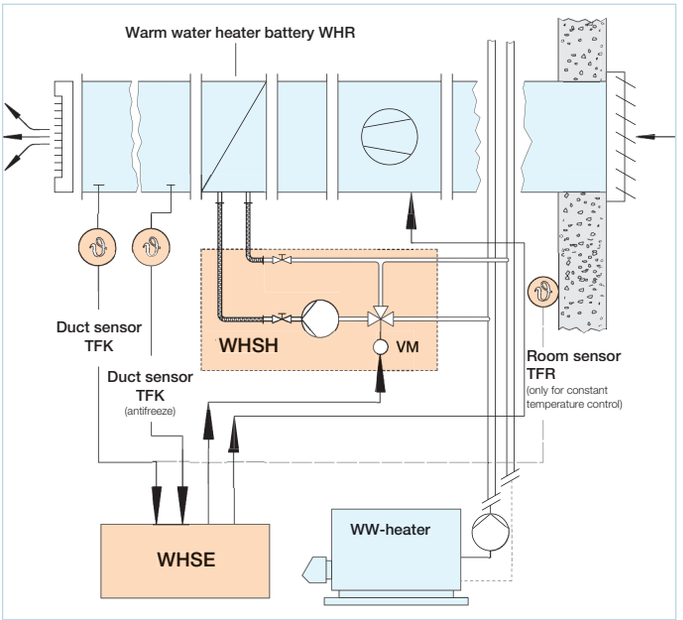
- ☐ Connection on existing heating circuit to supply e.g. a separate cord. A separate heating circuit creation is achieved by means of an integrated pump.
- ☐ WHS controls the air flow of the warm water heater batteries by means of three-point valve actuators and in this way also the thermal output which is conveyed to the air. The control is achieved by an impulse/pause signal where its relation is proportional to control deviation that means the difference between the actual and desired value.
- ☐ Delivered as a fully wired and easy-to-install set with preinstalled, thermally insulated hydraulic unit. It also includes a pump in order to avoid the upstream pressure drop.

Control options

- ☐ Constant supply air temperature control by means of duct sensor TFK.
- ☐ Constant room temperature control by means of external room sensor TFR.
- ☐ Constant room temperature control with minimum limitation of the supply temperature by using room and duct sensors.
- ☐ Frost protection for all the three versions by using a second duct sensor TFK.
- ☐ Additionally, WHS offers desired value control e.g. for the night and weekend cutout as well as the connection of other sensors or desired value encoders.

Product content/Specification

- ☐ Hydraulic unit WHSH with
  - – Pump with 3 power stages, on site connection cable.
  - – Flow/response temperature display, concurrent cut-off valves.
  - – 24 V-servo motor with limit switch and three-point mixing valve. Manual operation possible, connection cable 2.2 m.
  - – Thermal jacket made of EPP-foam.
  - – Gasket set and two flexible hoses (50 cm long) for connection.
- ☐ Electronic control unit WHSE, for positioning in switchboard. Functions:
  - – Preset temperature guidance for operation with constant supply air temperature.
  - – Adjustment to cascade factors.
  - – Minimum limitation.
  - – Adjustment/selection of the control mode.
  - – Operation display.
  - – Frost protection: Alarm and reset.
  - – Operation display servo motor.
  - – Potentialfree output for 24 V alarm and 230 V electric circuit.
- ☐ Two temperature sensors TFK for in-duct installation.
- ☐ Single room temperature sensor TFR.



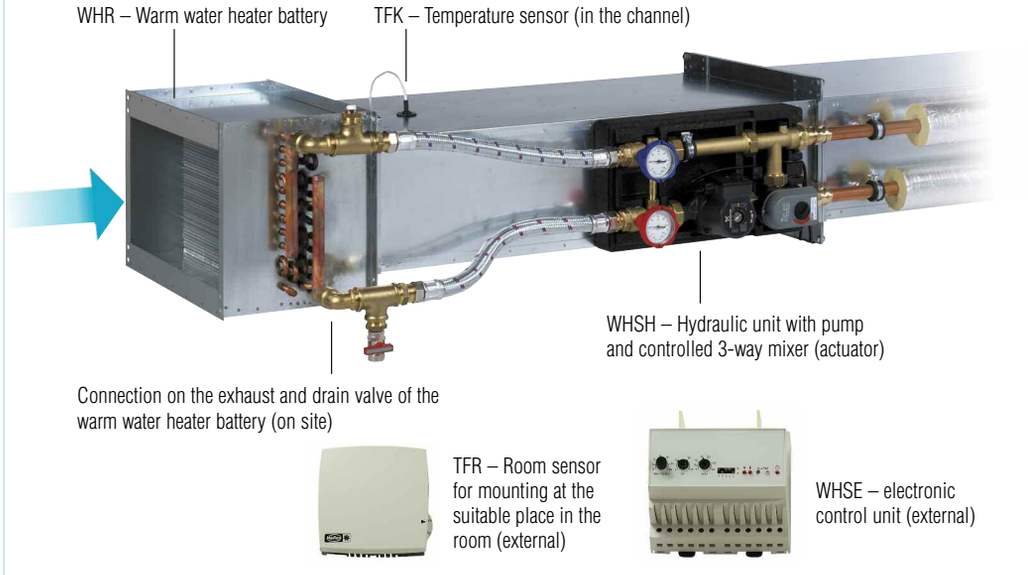
Type		WHS 1100	WHS 2200
Ref. No.		8815	8816
Max. operating pressure / operating temperature		10 bar / 110 °C	10 bar / 110 °C
Max. operating temperature		110 °C	110 °C
Connection DN 20 (Pump)		3/4"	1"
Min. / Max. air flow		200[1] - 1100 l/h	400[1] - 2200 l/h
Differential pressure		0.1 – 0.7 K/0.5 bar	0.1 – 0.7 K/0.5 bar
Desired value range (Thermostat)		7 – 28 °C	7 – 28 °C
Ambient temperature (electronic control system)		0 – 50 °C	0 – 50 °C
Protection to (electronic control system)		IP 20	IP 20
Power consumption	– Pump (3 steps)	30/46/65 W	46/67/93 W
	– Servo motor	2.5 W	2.5 W
	– Electronic control system	5 W	5 W
Voltage	– Pump / el. control system	230 V, 1 ph. / 50 Hz	230 V, 1 ph. / 50 Hz
	– Servo motor	24 V, 1 ph. / 50/60 Hz	24 V, 1 ph. / 50/60 Hz
Connection to wiring diagram No.		SS-953	SS-953
Dimensions in mm	– Hydraulic unit[3]	see drawing	see drawing
	– El. control system WHSE[3]	H 80 x W 100 x D 85	H 80 x W 100 x D 85
	– Room sensor TFR	H 80 x W 85 x D 30	H 80 x W 85 x D 30
	– Duct sensor TFK	130/50[2], Ø 10	130/50[2], Ø 10
Weight approx. kg		9	10

[1] In lower water flow volumes, control problems may occur [2] Length inside/outside
[3] Single order of WHS system components by request.

Installation

The heater battery WHR and the duct sensor TFK must be installed downstream of the fan in ducting.
The hydraulic unit WHSH must be fixed independently and safely. The expansion forces or the dead weight of ducting must not burden the connections.
The exhaust valve shall be installed at the highest position whereas the drain valve shall be installed at the lowest position of the circuit.
The electronic control unit WHSE (IP 20) can be mounted on the DIN-profile rail in the switchboard.

Application



TFR – Room sensor for mounting at the suitable place in the room (external)

WHSE – electronic control unit (external)

Design and calculation

① Selection of the requested PWW heater batteries based on the air flow volume, design (duct dimensions) and heat output.
– WHR-R, circular p. 314
– WHR-K, rectangular p. 313
② Determination of pressure drop of the grid facilities which are provided on site (diagram 1).
③ Sum of the pressure losses of all components:
ΔP Total = ΔP Heater battery + ΔP Ducting.
④ Selection of WHS-unit and the required pumping level

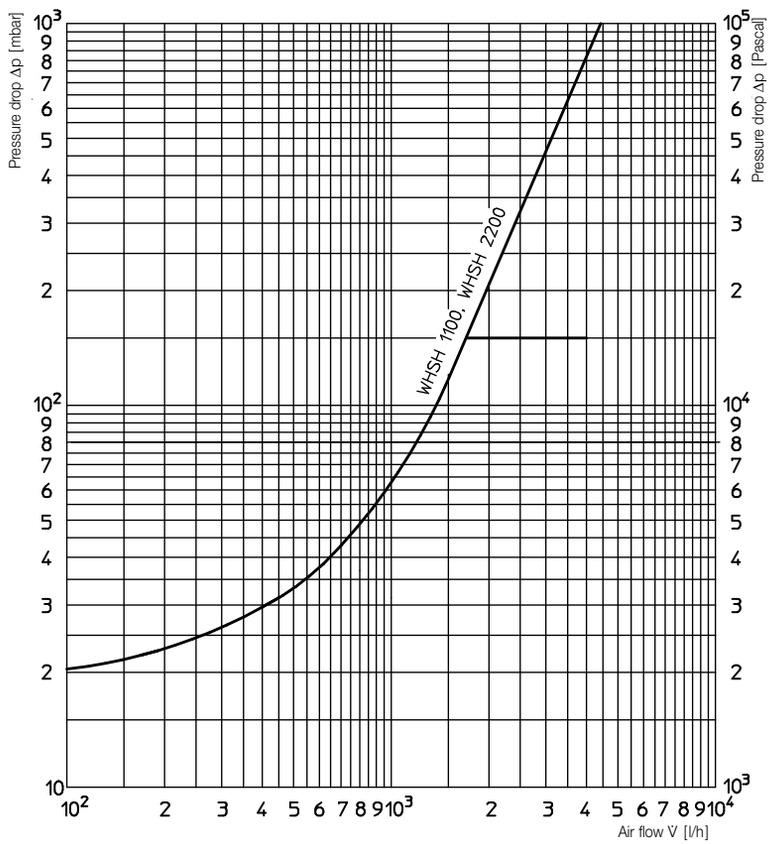
Example:

Internal diameter	22 x 1.2
Current of water	$\dot{m}_h$ = 600 kg/h
Velocity	v = 0.54 m/s
Pressure gradient	R = 170 Pa/m

Diagram

Total pressure drop in WHS incl. Flexduct

Design of the copper pipe, water temperature 80 °C



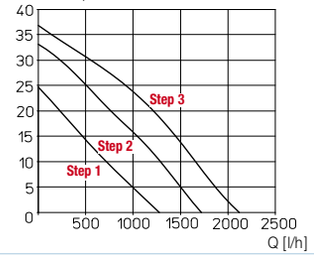
** Shown is the copper pipe with an inclemency of k = 0.0015 mm. For water with 110 °C is the R at 2% smaller whereas it is 6% bigger with 50 °C.*

Information	Page
Other WHSH hydraulic units for ALB.. WW	**210 on**
WHSH 1100 230V	No. 2515
WHSH 2200 230V	No. 2516

Adjusting the pumping level

The recirculation pump in WHSH can be operated in three power stages. The pumping level should be selected depending on the warm water heater battery and ducting (see the opposite performance curves).

P [kPa] **Perf. curve hydraulic unit WHSH 1100**
Pumpe minus internal losses



P [kPa] **Perf. curve hydraulic unit WHSH 2200**
Pump minus internal losses