KWK

Duct water cooling units for rectangular air ducts

Features

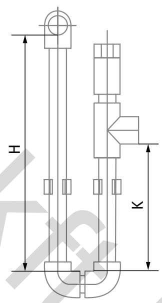
- Supply air cooling for ventilation systems in various premises.
- Suitable for installation into supply ventilation or into air handling units to provide air cooling.

Design

- Galvanized steel casing.
- The cooling elements are made of copper tubes and aluminum plates.
- Available in three-coil modifications and rated for maximum operating pressure 1.5 MPa (15 bar).
- Polypropylene droplet separator and drain pan for condensate drainage and removal included.
- Droplet separator is efficient at an air flow not exceeding 4 m/s.

Mounting

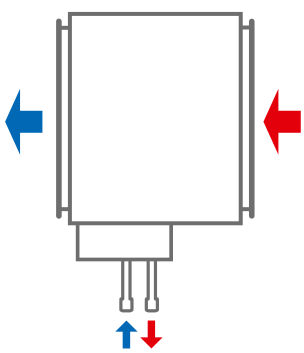
- Only horizontal mounting by means of flanged connection. Air evacuation and condensate drainage must be provided.
- Air filter installation upstream of the cooling unit to prevent the unit soiling.
- Installation position must ensure uniform air flow distribution in the section.
- Mounting upstream or downstream of the supply fan. The minimum air duct length downstream of the fan must be 1 m to ensure air flow stabilization.
- The maximum cooling capacity is attained if the cooling unit is connected on counter-flow basis. The attached charts are valid for counter-flow connection.
- If water is used as a cooling agent, the cooling unit is suitable for indoor use only with the ambient temperature not below 0 °C.
- If antifreezing solution, for example, ethylene glycol solution, is used as a cooling agent, the cooling unit is suitable for outdoor use as well.
- While mounting the cooling unit provide condensate drainage through the U-trap. The U-trap height must be selected with respect to the total fan pressure, refer to the table and diagram below.



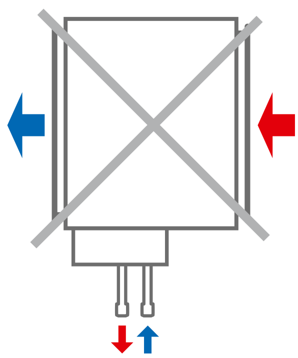
H [mm]	K [mm]	P [Pa]
100	55	600
200	105	1100
260	140	1400

H – U-trap height
K – drain height
P – total fan pressure

- For a proper and safe operation of the cooling unit it should be connected to a control system for integral control and automatic cooling capacity regulation.



Counter air flow connection



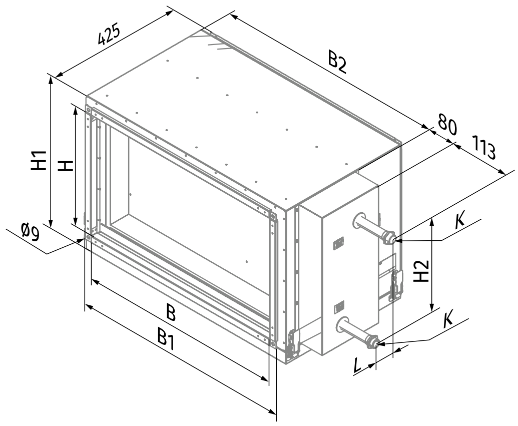
Air flow streamwise connection

Designation key

Series	Flange size (WxH) [cm]		Number of water (glycol) coil rows
KWK	40x20; 50x25; 50x30; 60x30; 60x35; 70x40; 80x50; 90x50; 100x50	–	3

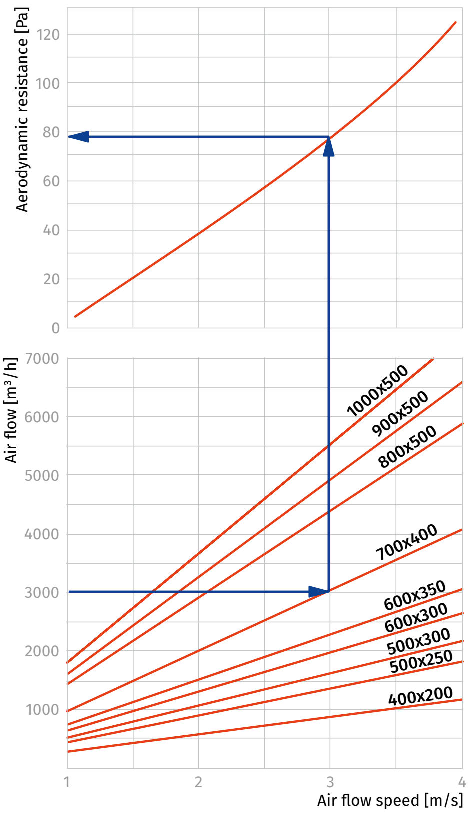
Overall dimensions [mm]

Model	B	B1	B2	H	H1	H2	L	K
KWK 40x20-3	400	440	470	200	295	124	56	G 3/4"
KWK 50x25-3	500	540	570	250	345	188	45	G 3/4"
KWK 50x30-3	500	540	570	300	395	252	56	G 3/4"
KWK 60x30-3	600	640	670	300	395	252	56	G 3/4"
KWK 60x35-3	600	640	670	350	445	268	56	G 3/4"
KWK 70x40-3	700	740	770	400	495	314	56	G 3/4"
KWK 80x50-3	800	840	870	500	595	442	56	G 3/4"
KWK 90x50-3	900	940	970	500	595	442	56	G 3/4"
KWK 100x50-3	1000	1040	1070	500	595	442	56	G 1"



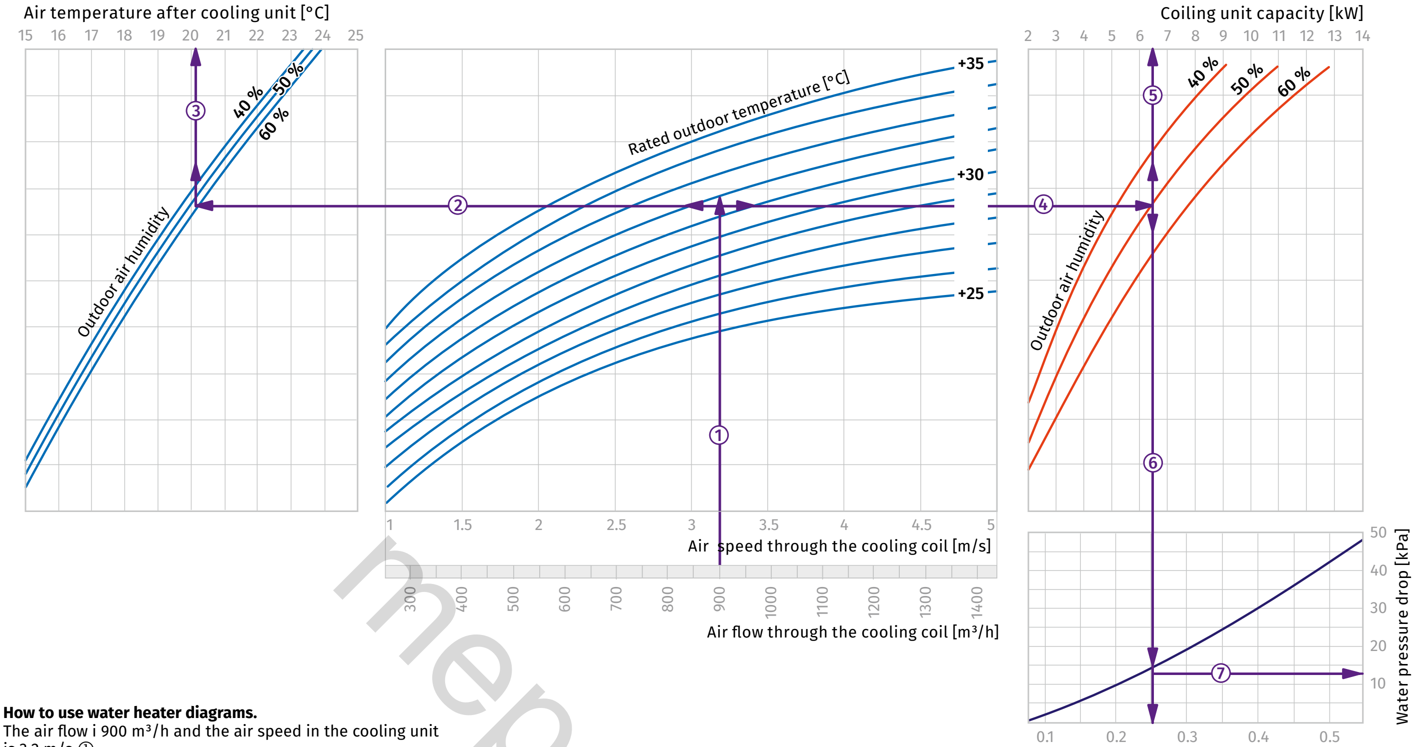
KWK

Pressure losses in water cooling coils



DX cooling unit calculation diagram

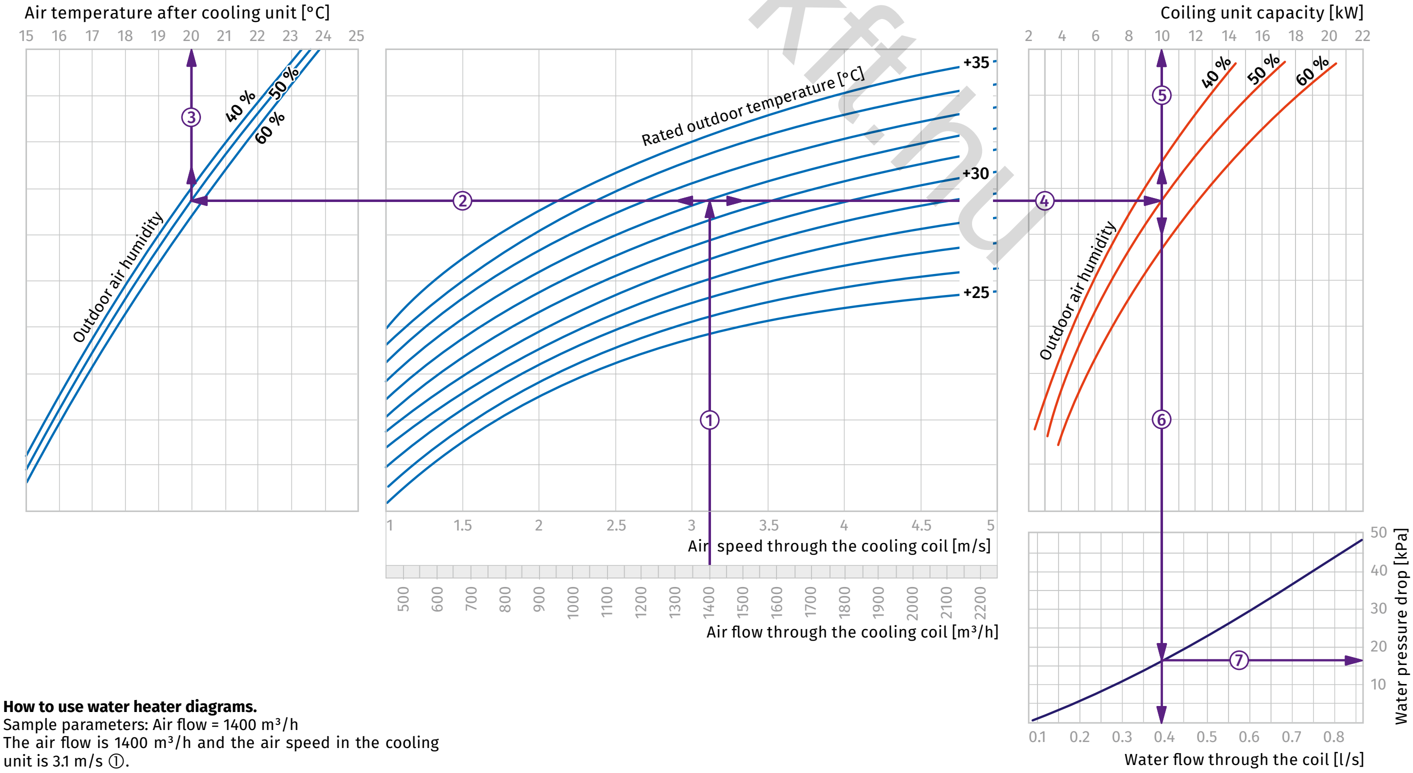
KWK 40x20-3



How to use water heater diagrams.
The air flow i 900 m³/h and the air speed in the cooling unit is 3.2 m/s ①.

- To calculate the coldest air temperature find the intersection point of the air flow line ① with the rated outer summer temperature shown in blue line (e.g., +32 °C) and draw the line ② to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line to the supply air temperature downstream of the cooling unit (+20.1 °C) ③.
- To calculate the power of the cooling unit find the intersection point of the air flow ① with the rated summer temperature (e.g., +32 °C) and draw the line ④ to the right until it crosses the air humidity curve (e.g., 50 %). From this point draw a vertical line to the cooling unit power axis (6.5 kW) ⑤.
- To calculate the required water flow in the cooling unit prolong this line ⑥ downwards to the water flow axis (0.26 l/s).
- To calculate the water pressure drop in the cooling unit find the intersection point of the line ⑥ with the pressure loss curve and prolong the line ⑦ to the right on the water pressure axis (15.0 kPa).

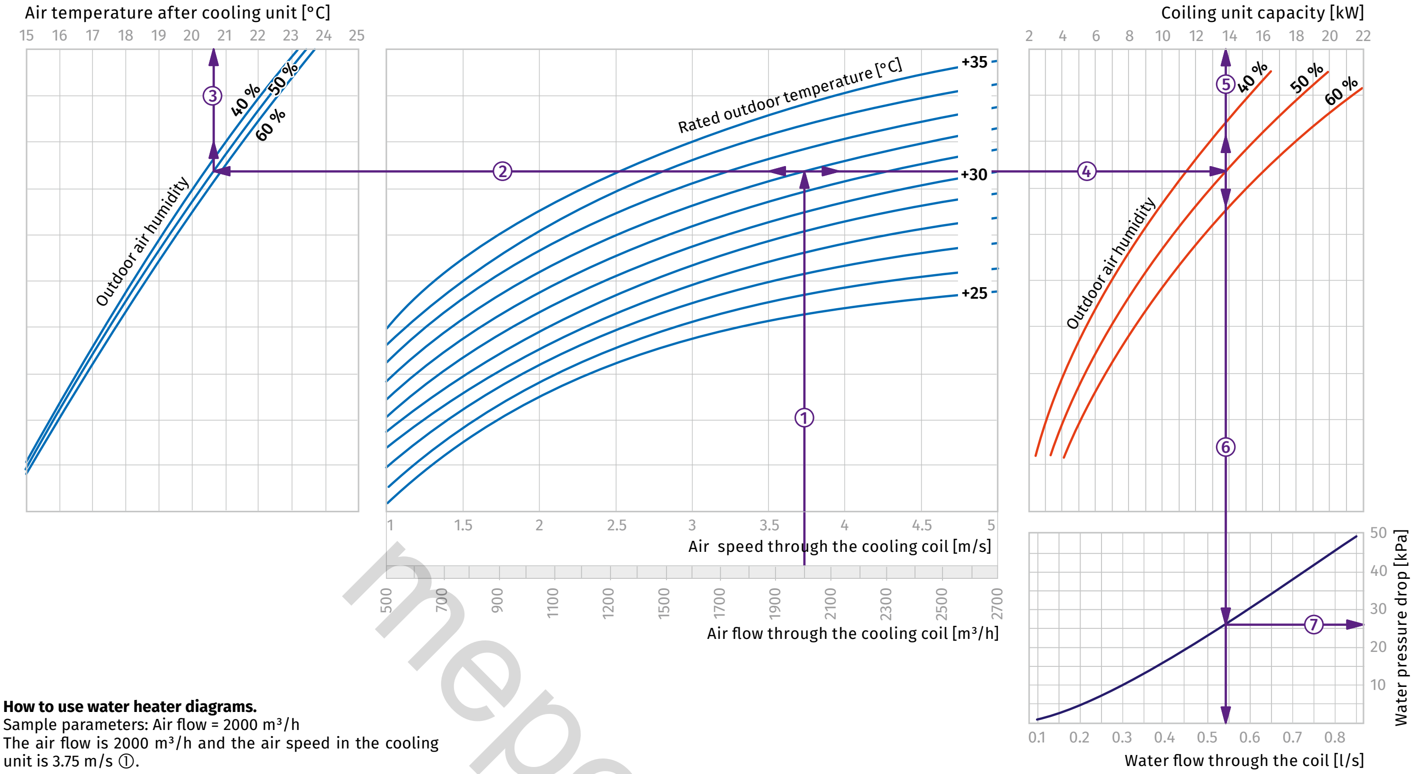
KWK 50x25-3



How to use water heater diagrams.
Sample parameters: Air flow = 1400 m³/h
The air flow is 1400 m³/h and the air speed in the cooling unit is 3.1 m/s ①.

- To calculate the coldest air temperature find the intersection point of the air flow line ① with the rated outer summer temperature shown in blue line (e.g., +32 °C) and draw the line ② to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line to the supply air temperature downstream of the cooling unit (+20 °C) ③.
- To calculate the power of the cooling unit find the intersection point of the air flow ① with the rated summer temperature (e.g., +32 °C) and draw the line ④ to the right until it crosses the air humidity curve (e.g., 50 %). From this point draw a vertical line to the cooling unit power axis (10.0 kW) ⑤.
- To calculate the required water flow in the cooling unit prolong this line ⑥ downwards to the water flow axis (0.4 l/s).
- To calculate the water pressure drop in the cooling unit find the intersection point of the line ⑥ with the pressure loss curve and prolong the line ⑦ to the right on the water pressure axis (17.0 kPa).

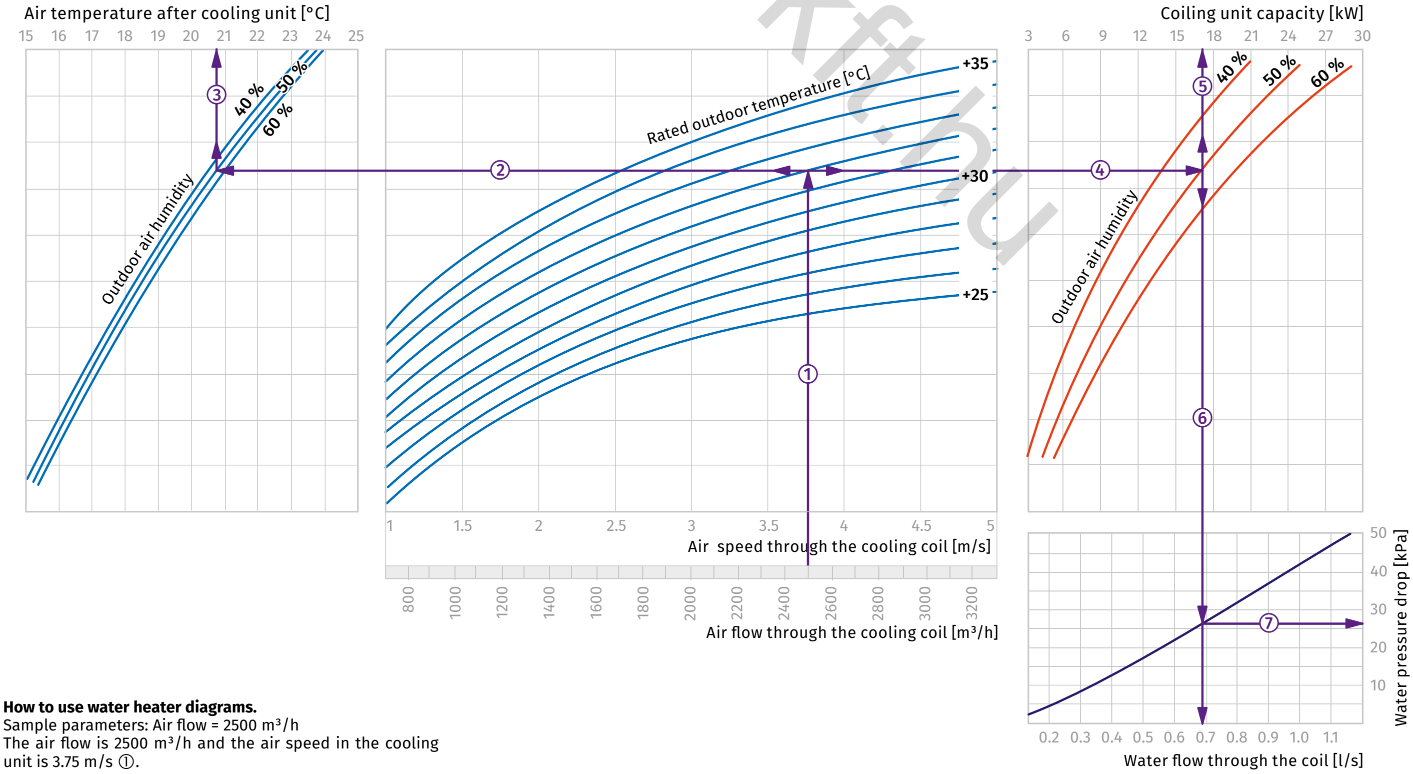
KWK 50x30-3



How to use water heater diagrams.
Sample parameters: Air flow = 2000 m³/h
The air flow is 2000 m³/h and the air speed in the cooling unit is 3.75 m/s ①.

- To calculate the coldest air temperature find the intersection point of the air flow line ① with the rated outer summer temperature shown in blue line (e.g., +32 °C) and draw the line ② to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line to the supply air temperature downstream of the cooling unit (+20.6 °C) ③.
- To calculate the power of the cooling unit find the intersection point of the air flow ① with the rated summer temperature (e.g., +32 °C) and draw the line ④ to the right until it crosses the air humidity curve (e.g., 50 %). From this point draw a vertical line to the cooling unit power axis (13.6 kW) ⑤.
- To calculate the required water flow in the cooling unit prolong this line ⑥ downwards to the water flow axis (0.54 l/s).
- To calculate the water pressure drop in the cooling unit find the intersection point of the line ⑥ with the pressure loss curve and prolong the line ⑦ to the right on the water pressure axis (27.0 kPa).

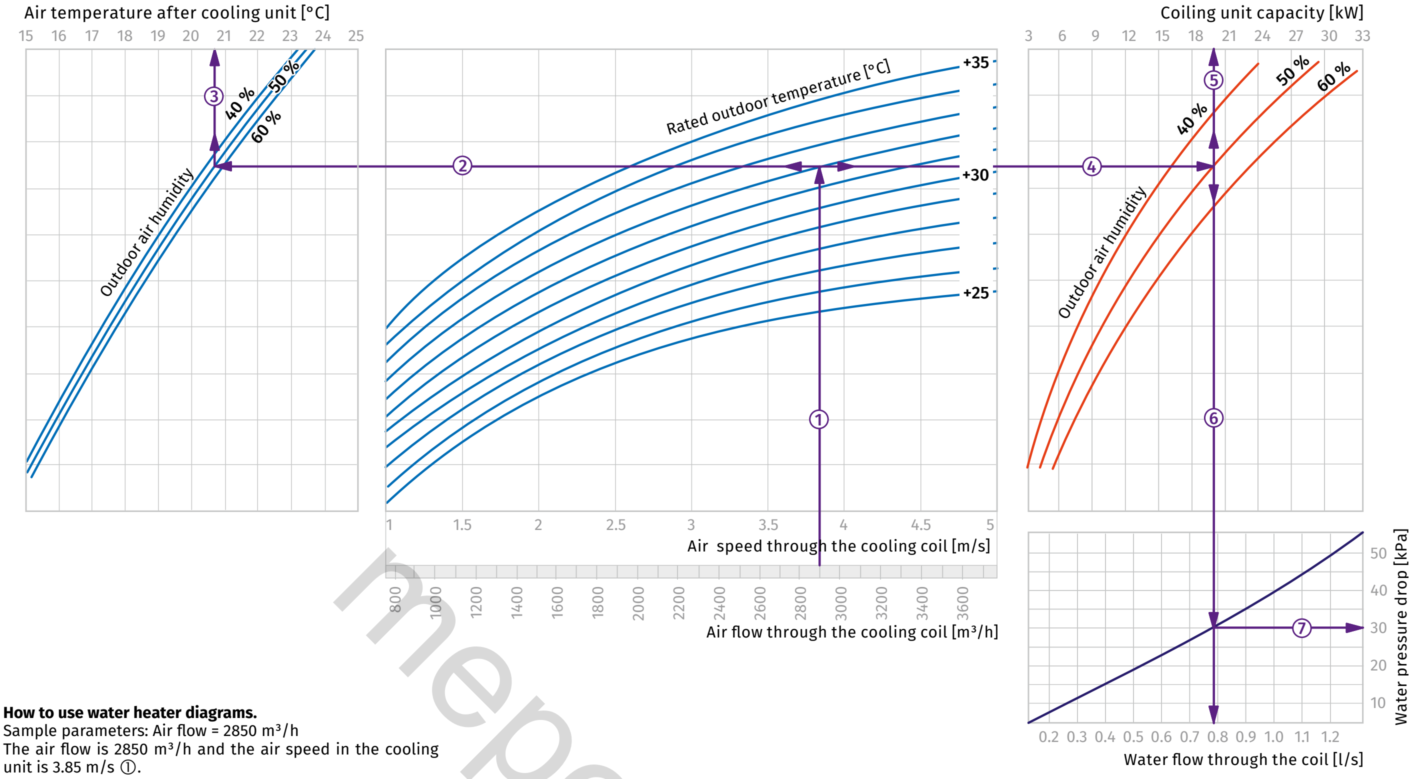
KWK 60x30-3



How to use water heater diagrams.
Sample parameters: Air flow = 2500 m³/h
The air flow is 2500 m³/h and the air speed in the cooling unit is 3.75 m/s ①.

- To calculate the coldest air temperature find the intersection point of the air flow line ① with the rated outer summer temperature shown in blue line (e.g., +32 °C) and draw the line ② to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line to the supply air temperature downstream of the cooling unit (+20.7 °C) ③.
- To calculate the power of the cooling unit find the intersection point of the air flow ① with the rated summer temperature (e.g., +32 °C) and draw the line ④ to the right until it crosses the air humidity curve (e.g., 50 %). From this point draw a vertical line to the cooling unit power axis (17.0 kW) ⑤.
- To calculate the required water flow in the cooling unit prolong this line ⑥ downwards to the water flow axis (0.68 l/s).
- To calculate the water pressure drop in the cooling unit find the intersection point of the line ⑥ with the pressure loss curve and prolong the line ⑦ to the right on the water pressure axis (27.0 kPa).

KWK 60x35-3



How to use water heater diagrams.
Sample parameters: Air flow = 2850 m³/h
The air flow is 2850 m³/h and the air speed in the cooling unit is 3.85 m/s ①.

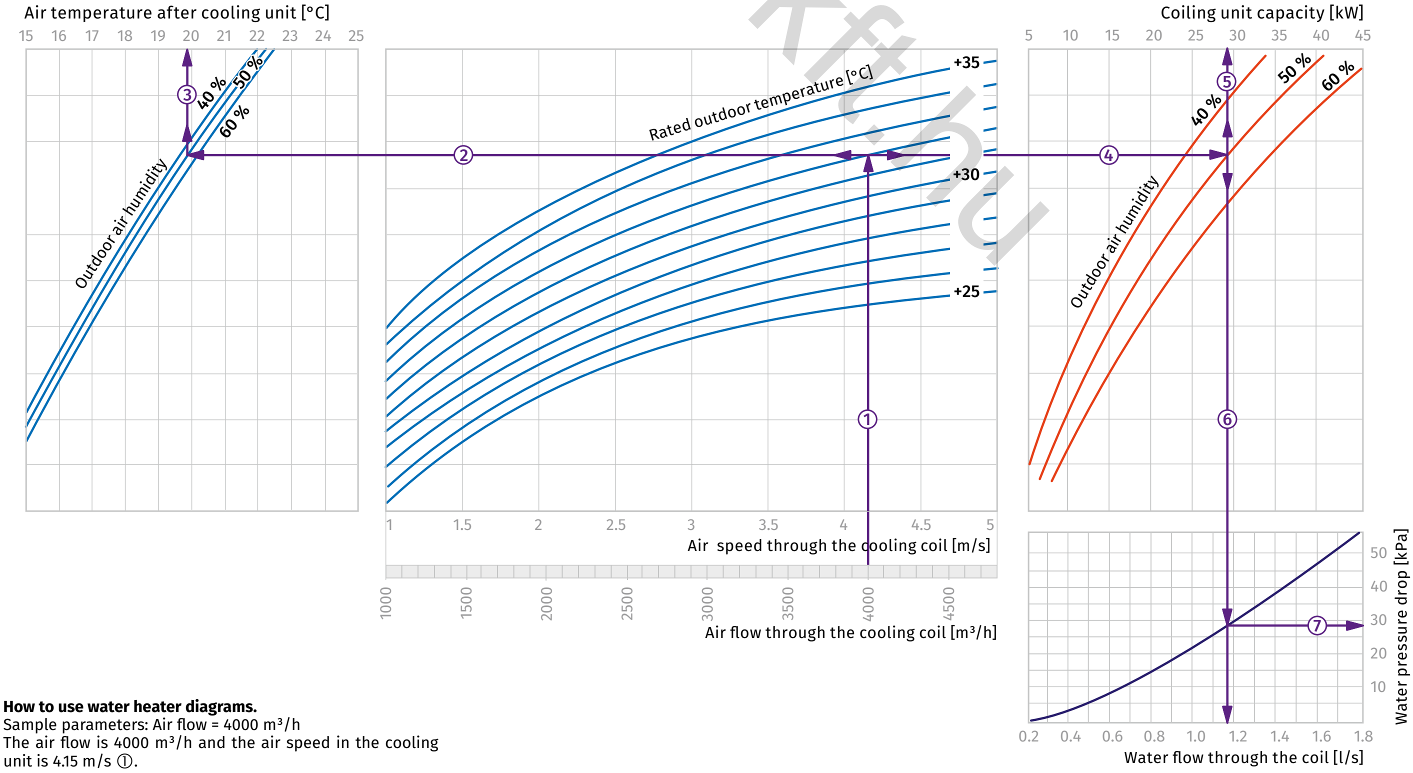
- To calculate the coldest air temperature find the intersection point of the air flow line ① with the rated outer summer temperature shown in blue line (e.g., +32 °C) and draw the line ② to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line to the supply air temperature downstream of the cooling unit (+20.7 °C) ③.

- To calculate the power of the cooling unit find the intersection point of the air flow ① with the rated summer temperature (e.g., +32 °C) and draw the line ④ to the right until it crosses the air humidity curve (e.g., 50 %). From this point draw a vertical line to the cooling unit power axis (19.8 kW) ⑤.

- To calculate the required water flow in the cooling unit prolong this line ⑥ downwards to the water flow axis (0.78 l/s).
- To calculate the water pressure drop in the cooling unit find the intersection point of the line ⑥ with the pressure loss curve and prolong the line ⑦ to the right on the water pressure axis (30 kPa).

COOLERS

KWK 70x40-3



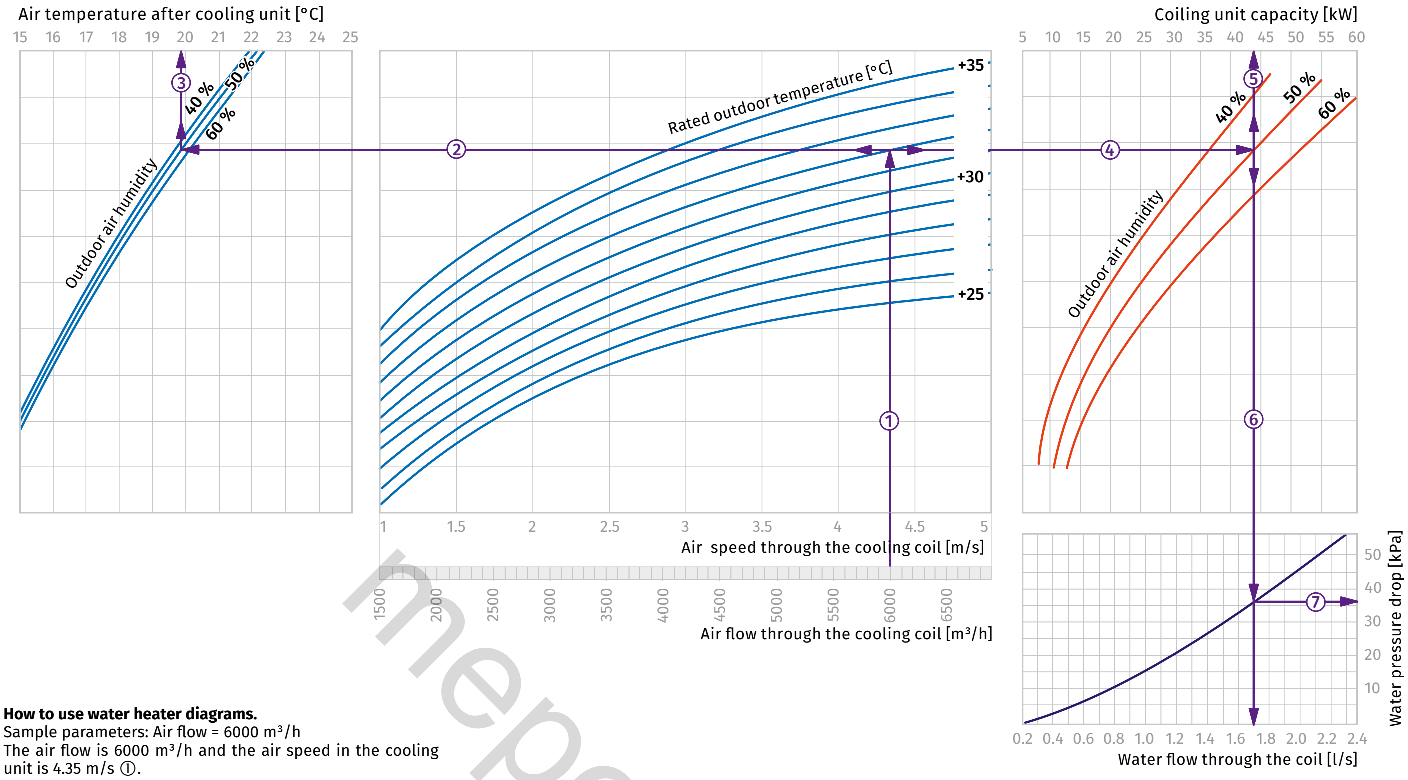
How to use water heater diagrams.
Sample parameters: Air flow = 4000 m³/h
The air flow is 4000 m³/h and the air speed in the cooling unit is 4.15 m/s ①.

- To calculate the coldest air temperature find the intersection point of the air flow line ① with the rated outer summer temperature shown in blue line (e.g., +32 °C) and draw the line ② to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line to the supply air temperature downstream of the cooling unit (+19.8 °C) ③.

- To calculate the power of the cooling unit find the intersection point of the air flow ① with the rated summer temperature (e.g., +32 °C) and draw the line ④ to the right until it crosses the air humidity curve (e.g., 50 %). From this point draw a vertical line to the cooling unit power axis (28.5 kW) ⑤.

- To calculate the required water flow in the cooling unit prolong this line ⑥ downwards to the water flow axis (1.14 l/s).
- To calculate the water pressure drop in the cooling unit find the intersection point of the line ⑥ with the pressure loss curve and prolong the line ⑦ to the right on the water pressure axis (28 kPa).

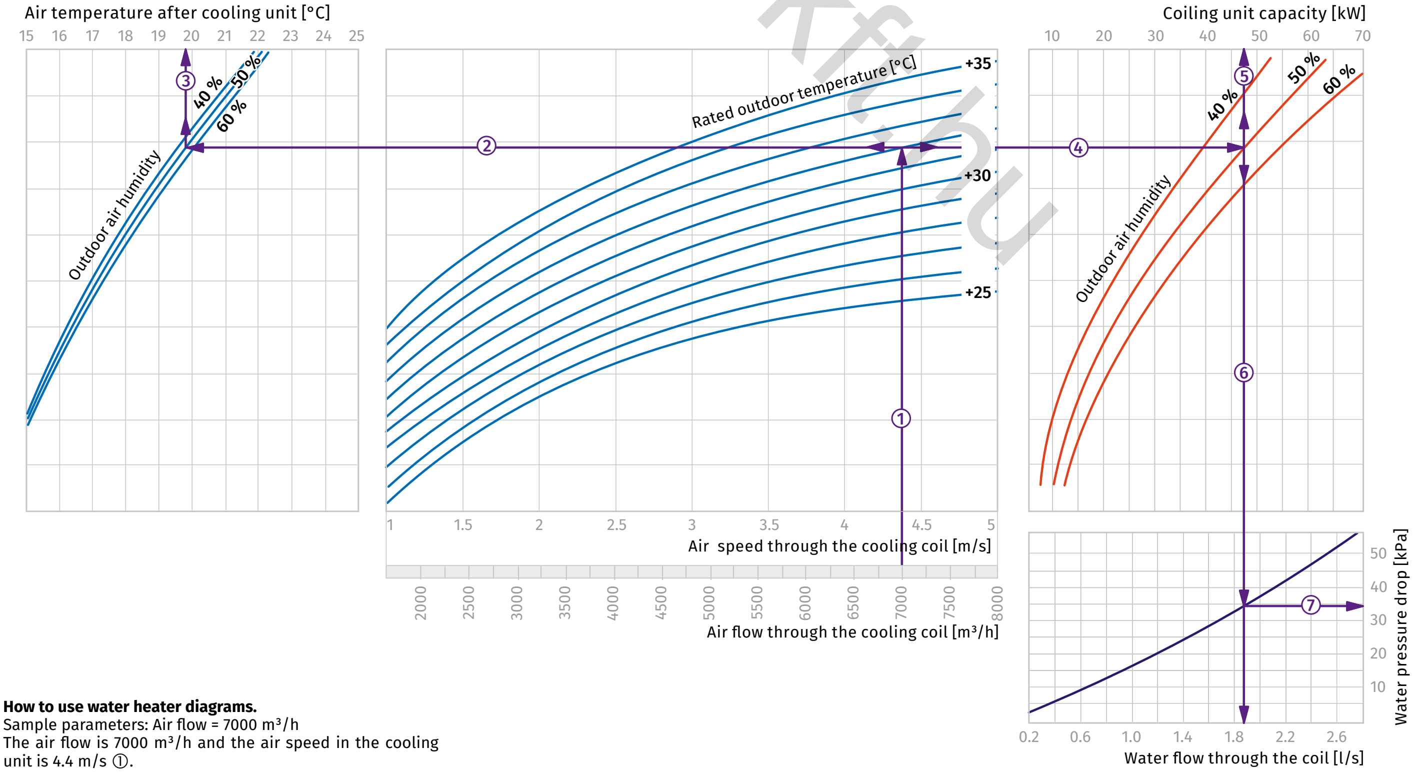
KWK 80x50-3



How to use water heater diagrams.
Sample parameters: Air flow = 6000 m³/h
The air flow is 6000 m³/h and the air speed in the cooling unit is 4.35 m/s ①.

- To calculate the coldest air temperature find the intersection point of the air flow line ① with the rated outer summer temperature shown in blue line (e.g., +32 °C) and draw the line ② to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line to the supply air temperature downstream of the cooling unit (+19.9 °C) ③.
- To calculate the power of the cooling unit find the intersection point of the air flow ① with the rated summer temperature (e.g., +32 °C) and draw the line ④ to the right until it crosses the air humidity curve (e.g., 50 %). From this point draw a vertical line to the cooling unit power axis (43 kW) ⑤.
- To calculate the required water flow in the cooling unit prolong this line ⑥ downwards to the water flow axis (1.7 l/s).
- To calculate the water pressure drop in the cooling unit find the intersection point of the line ⑥ with the pressure loss curve and prolong the line ⑦ to the right on the water pressure axis (36 kPa).

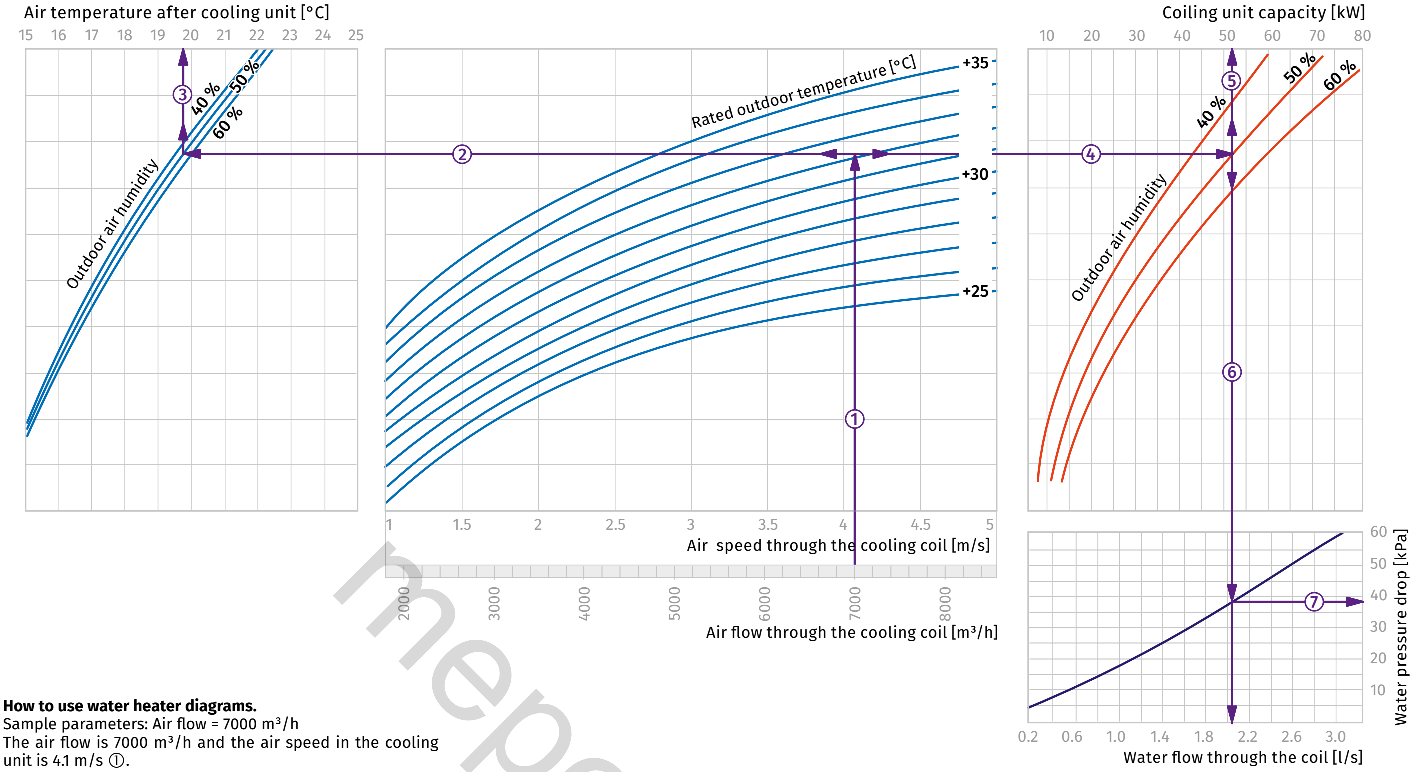
KWK 90x50-3



How to use water heater diagrams.
Sample parameters: Air flow = 7000 m³/h
The air flow is 7000 m³/h and the air speed in the cooling unit is 4.4 m/s ①.

- To calculate the coldest air temperature find the intersection point of the air flow line ① with the rated outer summer temperature shown in blue line (e.g., +32 °C) and draw the line ② to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line to the supply air temperature downstream of the cooling unit (+19.7 °C) ③.
- To calculate the power of the cooling unit find the intersection point of the air flow ① with the rated summer temperature (e.g., +32 °C) and draw the line ④ to the right until it crosses the air humidity curve (e.g., 50 %). From this point draw a vertical line to the cooling unit power axis (47 kW) ⑤.
- To calculate the required water flow in the cooling unit prolong this line ⑥ downwards to the water flow axis (1.9 l/s).
- To calculate the water pressure drop in the cooling unit find the intersection point of the line ⑥ with the pressure loss curve and prolong the line ⑦ to the right on the water pressure axis (34 kPa).

KWK 100x50-3



How to use water heater diagrams.
Sample parameters: Air flow = 7000 m³/h
The air flow is 7000 m³/h and the air speed in the cooling unit is 4.1 m/s ①.

- To calculate the coldest air temperature find the intersection point of the air flow line ① with the rated outer summer temperature shown in blue line (e.g., +32 °C) and draw the line ② to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line to the supply air temperature downstream of the cooling unit (+19.6 °C) ③.

- To calculate the power of the cooling unit find the intersection point of the air flow ① with the rated summer temperature (e.g., +32 °C) and draw the line ④ to the right until it crosses the air humidity curve (e.g., 50 %). From this point draw a vertical line to the cooling unit power axis (52 kW) ⑤.

- To calculate the required water flow in the cooling unit prolong this line ⑥ downwards to the water flow axis (2.05 l/s).
- To calculate the water pressure drop in the cooling unit find the intersection point of the line ⑥ with the pressure loss curve and prolong the line ⑦ to the right on the water pressure axis (37 kPa).

COOLERS