# Duct water cooling units

# KWK

## for rectangular air ducts

## Use

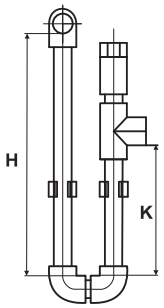
- Supply air cooling for ventilation systems in various premises.
- Suitable for installation into supply vetilation or into air handling units to provide air cooling.

## 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

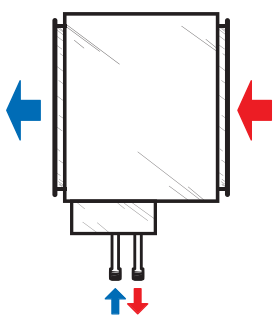
- Only horizontal mounting by means of flanged connection. Air evacuation and condensate drainage must be provided.
- Air filter installation upstream of the cooling unit to prevent the unit soiling.
- Installation position must ensure uniform air flow distribution in the section.
- Installation upstream or downstream of the supply fan. The minimum air duct length downstream of the fan must be 1-1.5 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.



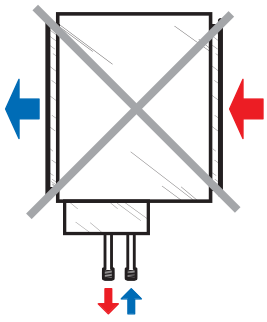

| H [mm] | K [mm] | P [Pa] |
|---|---|---|
| 100 | 55 | 600 |
| 200 | 105 | 1100 |
| 260 | 140 | 1400 |

**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.



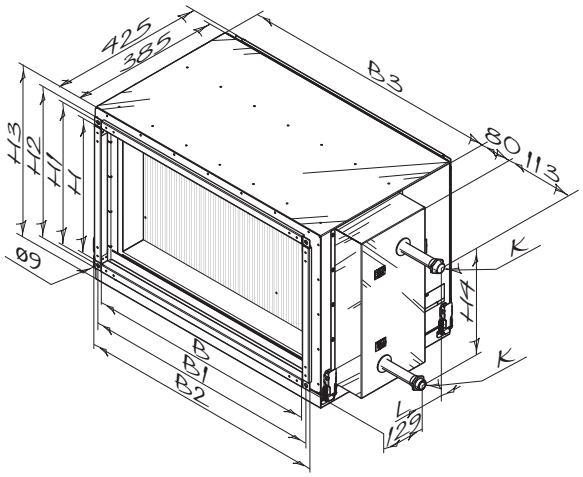
Counter air flow connection



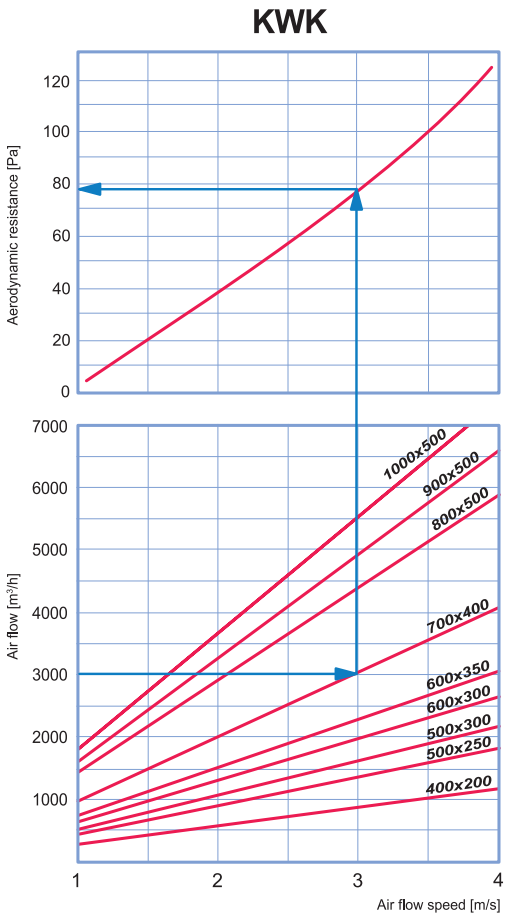
Air flow streamwise connection

## Overall dimensions

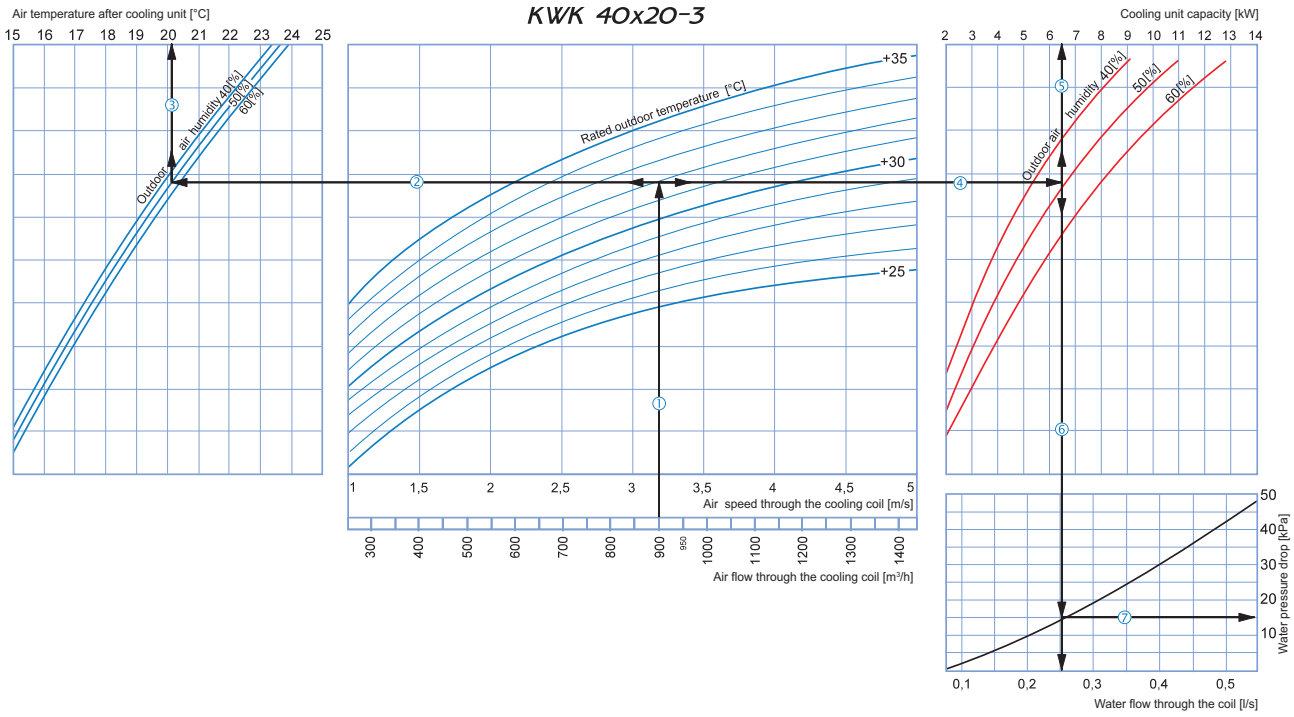
| Type | Dimensions [mm] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | B1 | B2 | B3 | H | H1 | H2 | H3 | H4 | L | K |
| KWK 40x20-3 | 400 | 420 | 440 | 470 | 200 | 220 | 240 | 295 | 124 | 56 | G 3/4'' |
| KWK 50x25-3 | 500 | 520 | 540 | 570 | 250 | 270 | 290 | 345 | 188 | 45 | G 3/4'' |
| KWK 50x30-3 | 500 | 520 | 540 | 570 | 300 | 320 | 340 | 395 | 252 | 56 | G 3/4'' |
| KWK 60x30-3 | 600 | 620 | 640 | 670 | 300 | 320 | 340 | 395 | 252 | 56 | G 3/4'' |
| KWK 60x35-3 | 600 | 620 | 640 | 670 | 350 | 370 | 390 | 445 | 268 | 56 | G 3/4'' |
| KWK 70x40-3 | 700 | 720 | 740 | 770 | 400 | 420 | 440 | 495 | 314 | 56 | G 3/4'' |
| KWK 80x50-3 | 800 | 820 | 840 | 870 | 500 | 520 | 540 | 595 | 442 | 56 | G 3/4'' |
| KWK 90x50-3 | 900 | 920 | 940 | 970 | 500 | 520 | 540 | 595 | 442 | 56 | G 3/4'' |
| KWK 100x50-3 | 1000 | 1020 | 1040 | 1070 | 500 | 520 | 540 | 595 | 442 | 56 | G 1'' |




Pressure losses in water cooling coils




## DX cooling unit calculation diagram

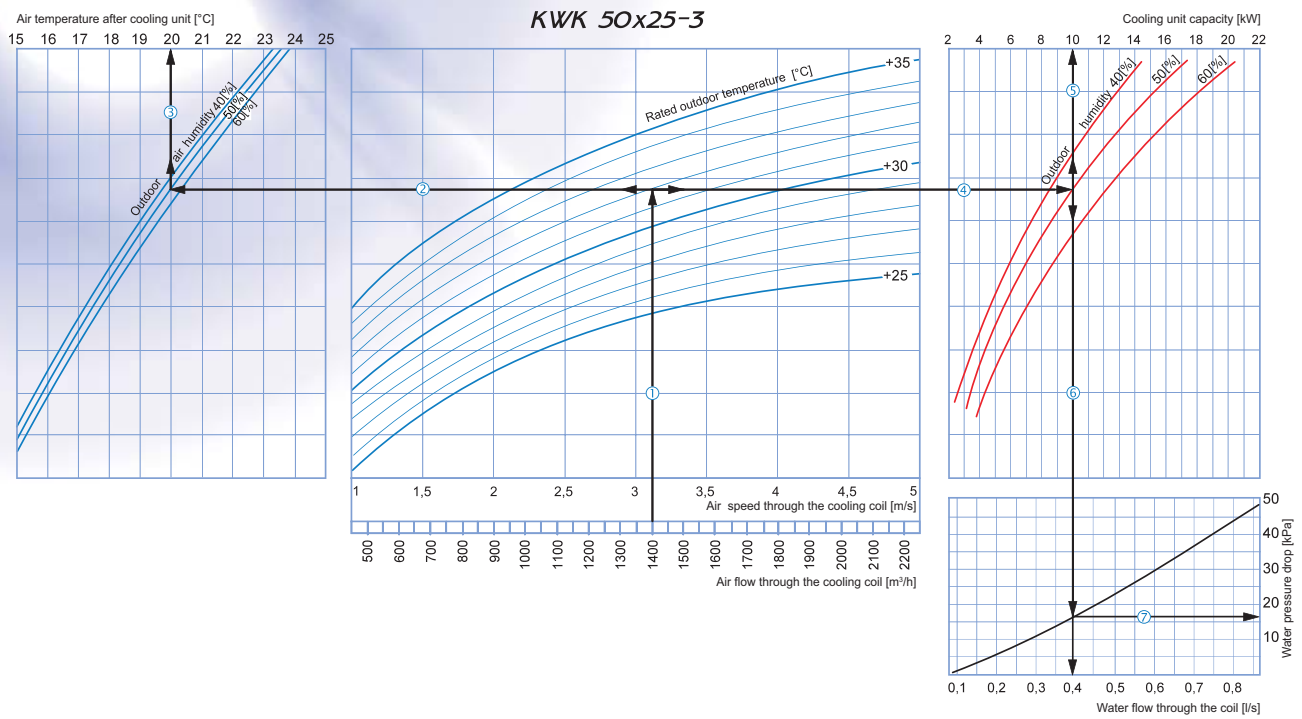



**How to use water cooling coil diagrams:**

Sample parameters: Air flow = 900 m³/h, air flow speed through the cooling coil = 3.2 m/s ①.

- **Supply air temperature:** prolong the line of air flow (e.g. 900 m³/h) ① up to the point where it crosses the outside air temperature (e.g. +32 °C); then draw a horizontal line ② from this point to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line ③ to the supply air temperature axis on top of the graphic (20.1 °C).
- **Cooling coil capacity:** Prolong the line ① up to the point where it crosses the outside air temperature (e.g. +32 °C) and draw a horizontal line ④ from this point to the right until it crosses the outdoor air humidity curve (e.g. 50 %). From here draw a vertical line ⑤ up to the scale representing the cooling coil capacity (6.5 kW).
- **Water flow through the coil:** Prolong the line ⑤ down to the water flow axis ⑥ at the bottom of the graphic (0.26 l/s).
- **Water pressure drop:** Draw the line ⑦ from the point where the line ⑥ crosses the black curve to the pressure drop axis (15.0 kPa).

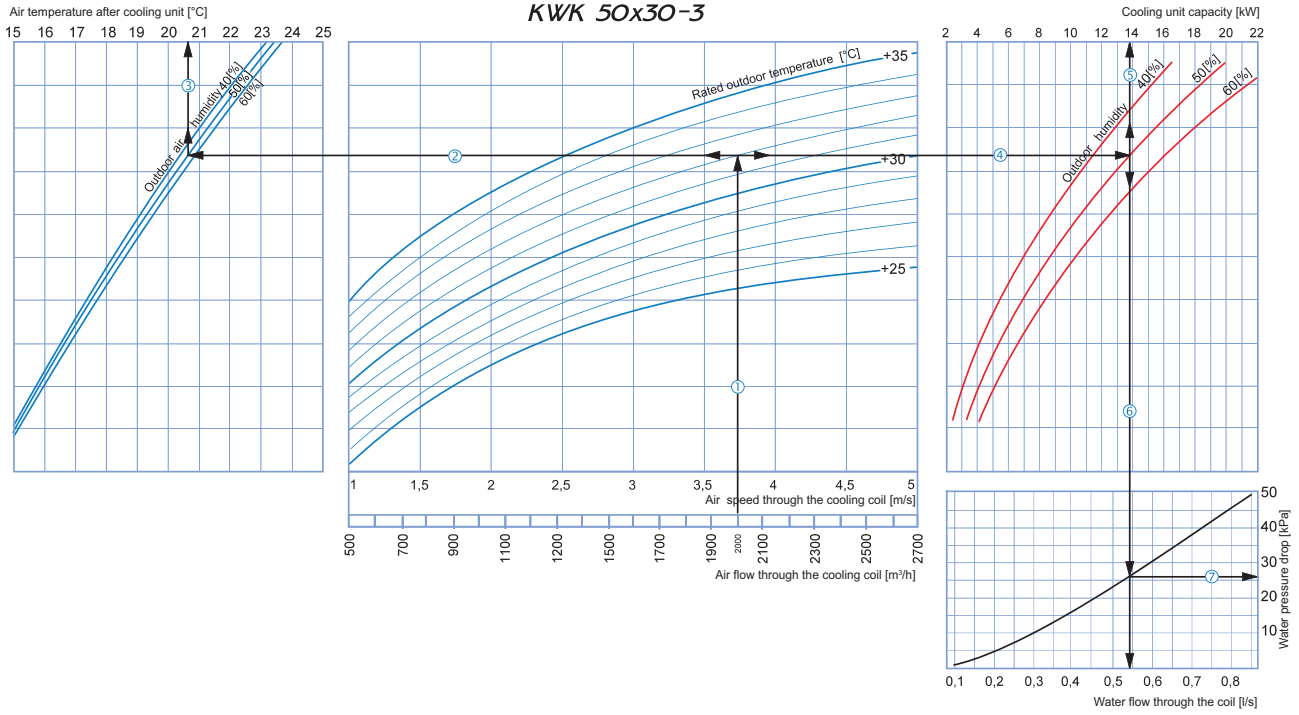
## Water cooling unit calculation diagram




**How to use water cooling coil diagrams:**

Sample parameters: Air flow = 1400 m³/h, air flow speed through the cooling coil = 3.1 m/s ①.

- **Supply air temperature:** prolong the line of air flow (e.g. 1400 m³/h) ① up to the point where it crosses the outside air temperature (e.g. +32 °C); then draw a horizontal line ② from this point to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line ③ to the supply air temperature axis on top of the graphic (20 °C).
- **Cooling coil capacity:** Prolong the line ① up to the point where it crosses the outside air temperature (e.g. +32 °C) and draw a horizontal line ④ from this point to the right until it crosses the outdoor air humidity curve (e.g. 50 %). From here draw a vertical line ⑤ up to the scale representing the cooling coil capacity (10.0 kW).
- **Water flow through the coil:** Prolong the line ⑤ down to the water flow axis ⑥ at the bottom of the graphic (0.4 l/s).
- **Water pressure drop:** Draw the line ⑦ from the point where the line ⑥ crosses the black curve to the pressure drop axis (17.0 kPa).

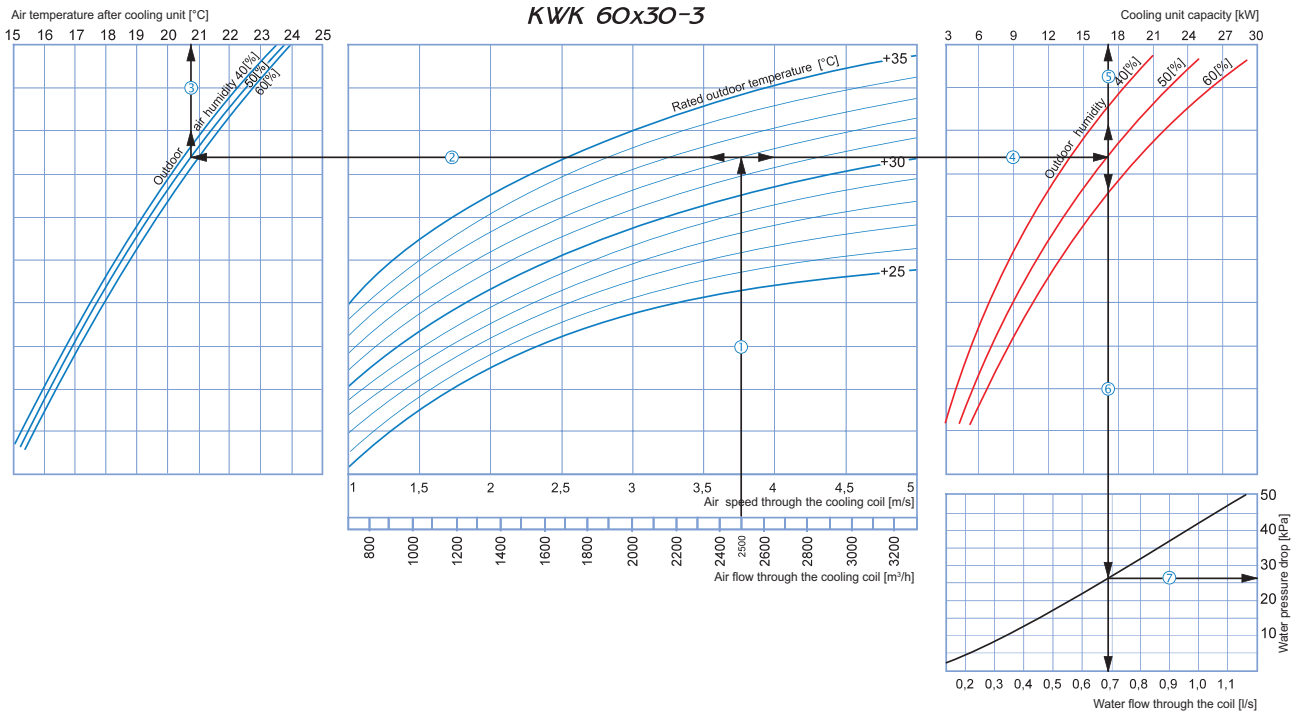



**How to use water cooling coil diagrams:**

Sample parameters: Air flow = 2000 m³/h, air flow speed through the cooling coil = 3.75 m/s ①.

- **Supply air temperature:** prolong the line of air flow (e.g. 2000 m³/h) ① up to the point where it crosses the outside air temperature (e.g. +32 °C); then draw a horizontal line ② from this point to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line ③ to the supply air temperature axis on top of the graphic (20.6 °C).
- **Cooling coil capacity:** Prolong the line ① up to the point where it crosses the outside air temperature (e.g. +32 °C) and draw a horizontal line ④ from this point to the right until it crosses the outdoor air humidity curve (e.g. 50 %). From here draw a vertical line ⑤ up to the scale representing the cooling coil capacity (13.6 kW).
- **Water flow through the coil:** Prolong the line ⑤ down to the water flow axis ⑥ at the bottom of the graphic (0.54 l/s).
- **Water pressure drop:** Draw the line ⑦ from the point where the line ⑥ crosses the black curve to the pressure drop axis (27 kPa).

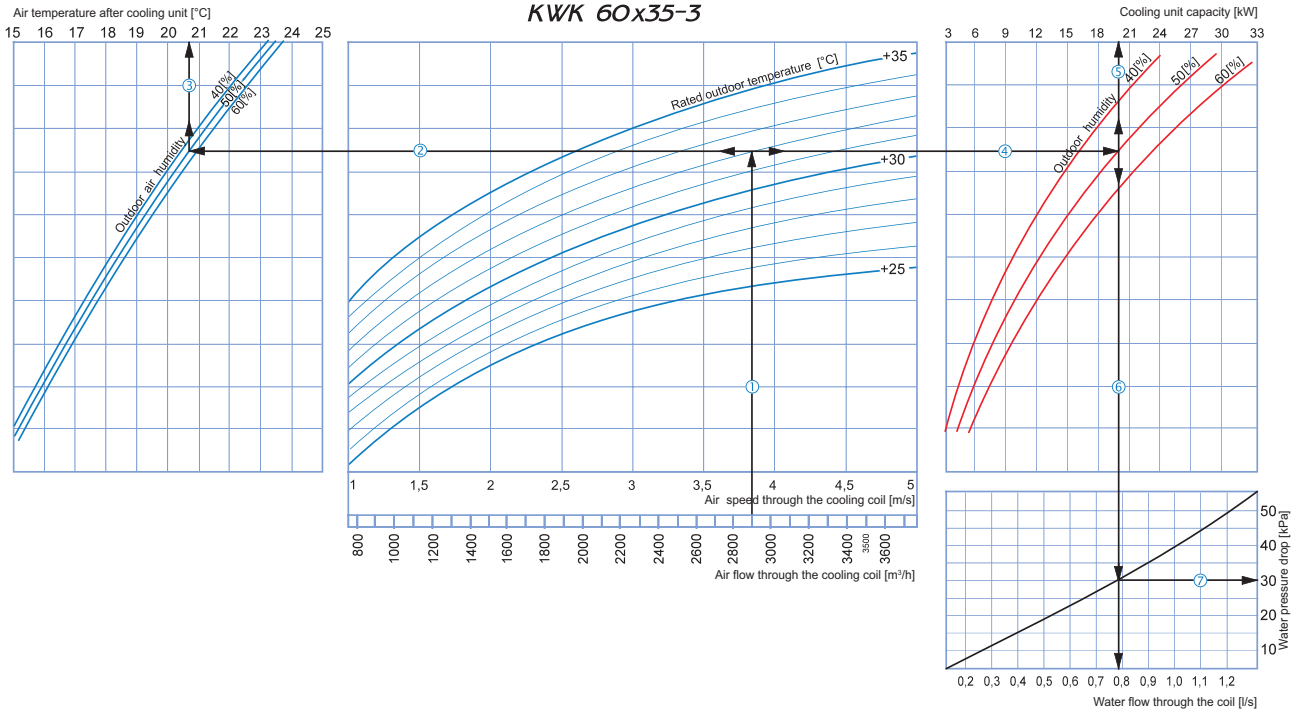
## Water cooling unit calculation diagram




**How to use water cooling coil diagrams:**

Sample parameters: Air flow = 2500 m³/h, air flow speed through the cooling coil = 3.75 m/s ①.

- **Supply air temperature:** prolong the line of air flow (e.g. 2500 m³/h) ① up to the point where it crosses the outside air temperature (e.g. +32 °C); then draw a horizontal line ② from this point to the left until it crosses the outdoor air humidity curve (e.g. 50%). From this point draw a vertical line ③ to the supply air temperature axis on top of the graphic (20.7 °C).
- **Cooling coil capacity:** Prolong the line ① up to the point where it crosses the outside air temperature (e.g. +32 °C) and draw a horizontal line ④ from this point to the right until it crosses the outdoor air humidity curve (e.g. 50 %). From here draw a vertical line ⑤ up to the scale representing the cooling coil capacity (17.0 kW).
- **Water flow through the coil:** Prolong the line ⑤ down to the water flow axis ⑥ at the bottom of the graphic (0.68 l/s).
- **Water pressure drop:** Draw the line ⑦ from the point where the line ⑥ crosses the black curve to the pressure drop axis (27 kPa).

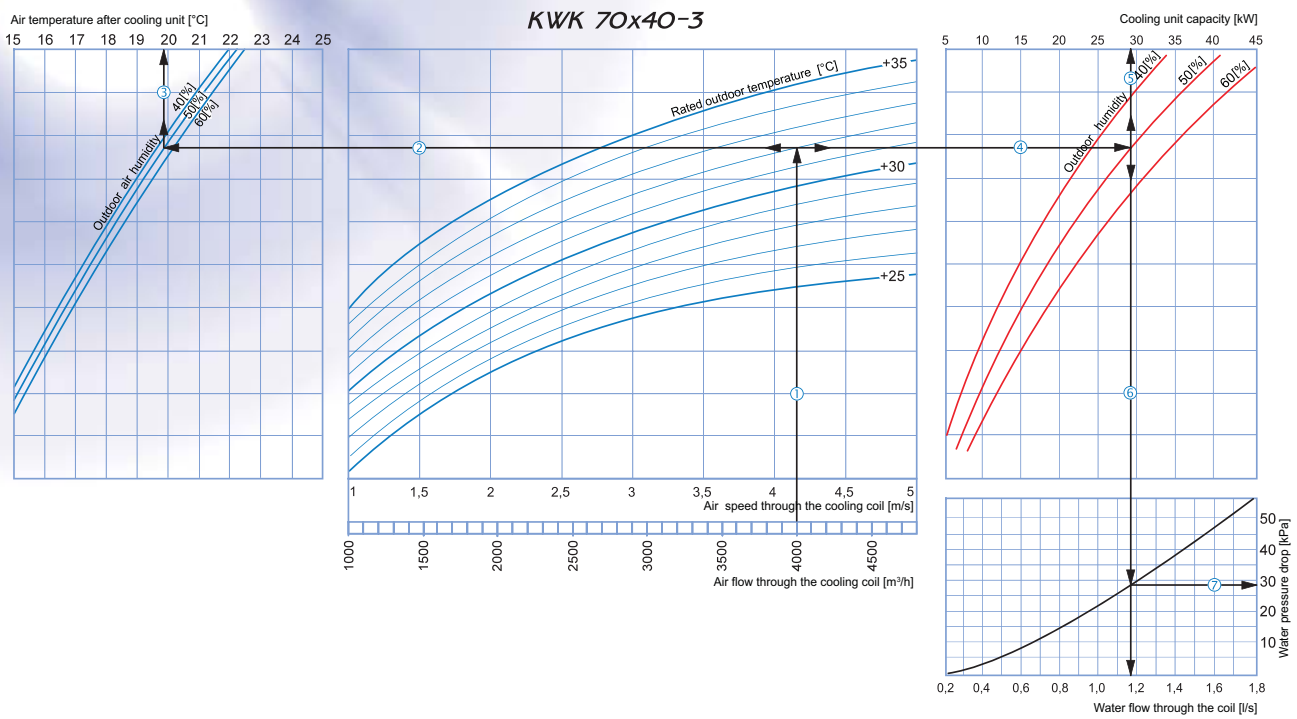



**How to use water cooling coil diagrams:**

Sample parameters: Air flow = 2850 m³/h, air flow speed through the cooling coil = 3.85 m/s ①.

- **Supply air temperature:** prolong the line of air flow (e.g. 2850 m³/h) ① up to the point where it crosses the outside air temperature (e.g. +32 °C); then draw a horizontal line ② from this point to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line ③ to the supply air temperature axis on top of the graphic (20.7 °C).
- **Cooling coil capacity:** Prolong the line ① up to the point where it crosses the outside air temperature (e.g. +32 °C) and draw a horizontal line ④ from this point to the right until it crosses the outdoor air humidity curve (e.g. 50 %). From here draw a vertical line ⑤ up to the scale representing the cooling coil capacity (19.8 kW).
- **Water flow through the coil:** Prolong the line ⑤ down to the water flow axis ⑥ at the bottom of the graphic (0.75 l/s).
- **Water pressure drop**: Draw the line ⑦ from the point where the line ⑥ crosses the black curve to the pressure drop axis (30 kPa).

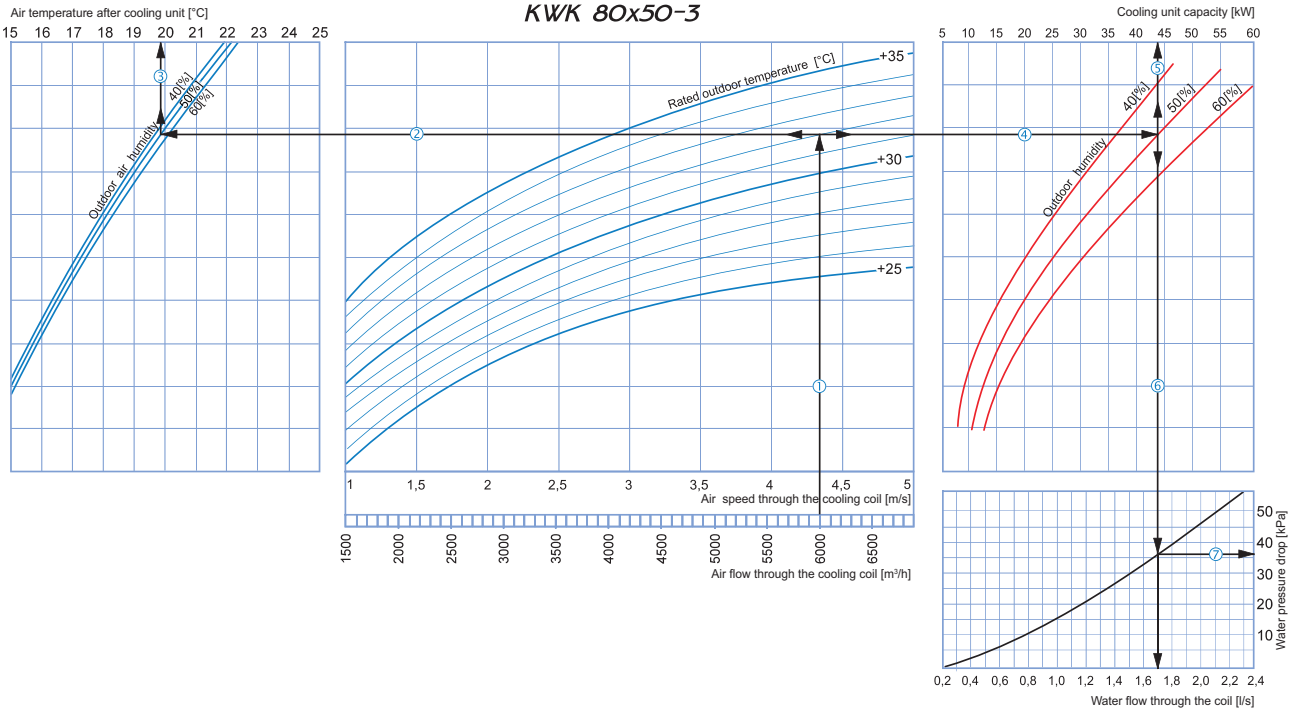
## Water cooling unit calculation diagram




**How to use water cooling coil diagrams:**

Sample parameters: Air flow = 4000 m³/h, air flow speed through the cooling coil = 4.15 m/s ①.

- **Supply air temperature:** prolong the line of air flow (e.g. 4000 m³/h) ① up to the point where it crosses the outside air temperature (e.g. +32 °C); then draw a horizontal line ② from this point to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line ③ to the supply air temperature axis on top of the graphic (19.8 °C).
- **Cooling coil capacity:** Prolong the line ① up to the point where it crosses the outside air temperature (e.g. +32 °C) and draw a horizontal line ④ from this point to the right until it crosses the outdoor air humidity curve (e.g. 50 %). From here draw a vertical line ⑤ up to the scale representing the cooling coil capacity (28.5 kW).
- **Water flow through the coil:** Prolong the line ⑤ down to the water flow axis ⑥ at the bottom of the graphic (1.14 l/s).
- **Water pressure drop:** Draw the line ⑦ from the point where the line ⑥ crosses the black curve to the pressure drop axis (28 kPa).

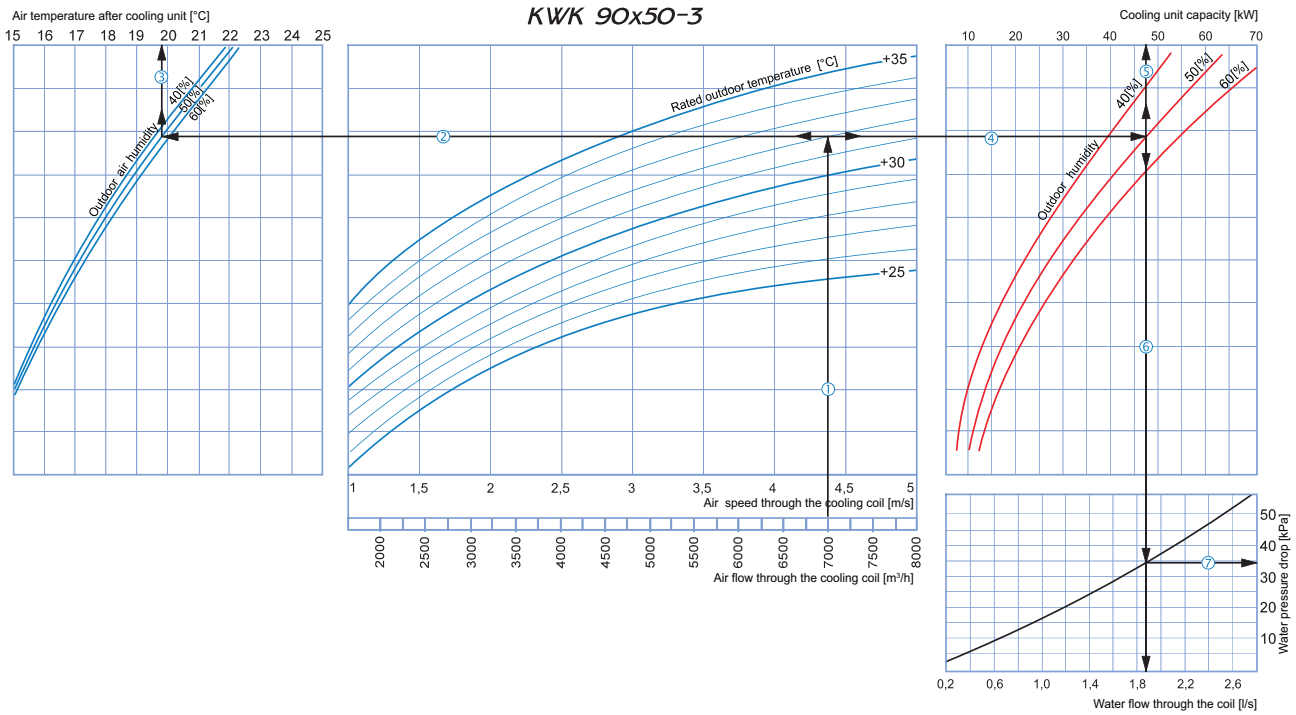



**How to use water cooling coil diagrams:**

Sample parameters: Air flow = 6000 m³/h, air flow speed through the cooling coil = 4.35 m/s ①.

- **Supply air temperature:** prolong the line of air flow (e.g. 6000 m³/h) ① up to the point where it crosses the outside air temperature (e.g. +32 °C); then draw a horizontal line ② from this point to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line ③ to the supply air temperature axis on top of the graphic (19.9 °C).
- **Cooling coil capacity:** Prolong the line ① up to the point where it crosses the outside air temperature (e.g. +32 °C) and draw a horizontal line ④ from this point to the right until it crosses the outdoor air humidity curve (e.g. 50 %). From here draw a vertical line ⑤ up to the scale representing the cooling coil capacity (43 kW).
- **Water flow through the coil:** Prolong the line ⑤ down to the water flow axis ⑥ at the bottom of the graphic (1.7 l/s).
- **Water pressure drop:** Draw the line ⑦ from the point where the line ⑥ crosses the black curve to the pressure drop axis (36 kPa).

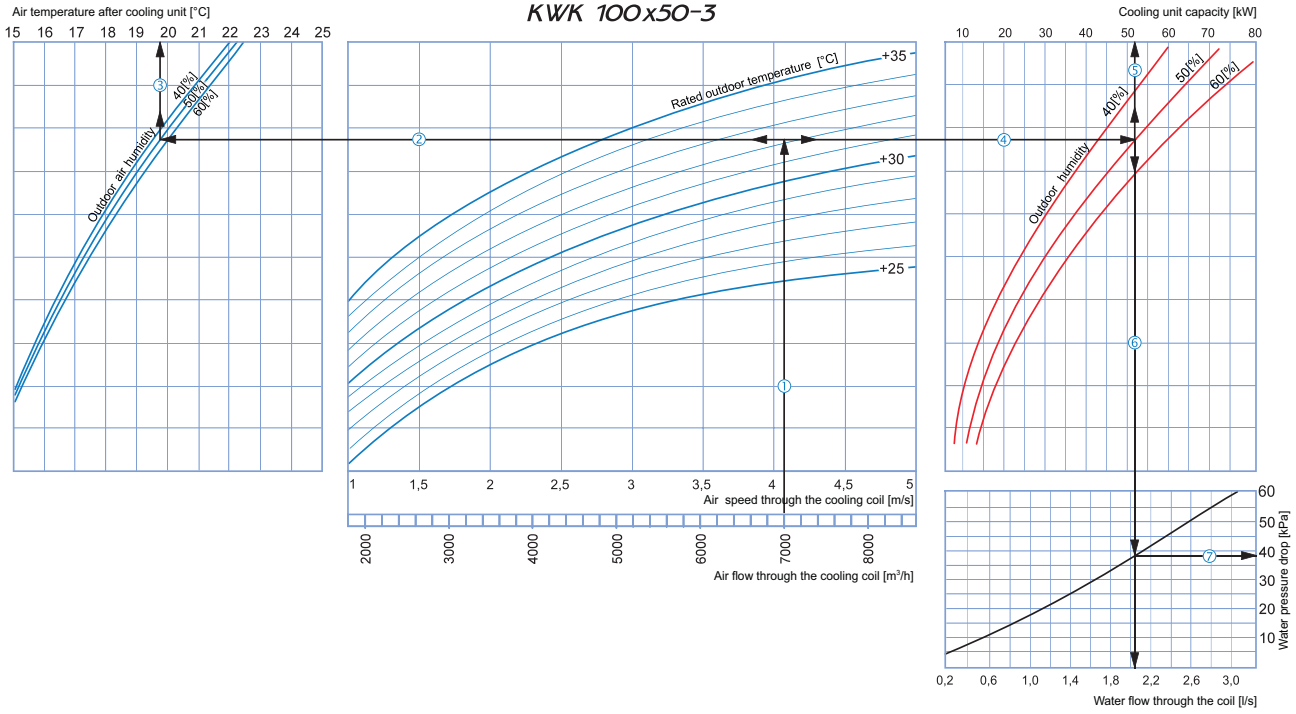
## Water cooling unit calculation diagram




**How to use water cooling coil diagrams:**

Sample parameters: Air flow = 7000 m³/h, air flow speed through the cooling coil = 4.4 m/s ①.

- **Supply air temperature:** prolong the line of air flow (e.g. 7000 m³/h) ① up to the point where it crosses the outside air temperature (e.g. +32 °C); then draw a horizontal line ② from this point to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line ③ to the supply air temperature axis on top of the graphic (19.7 °C).
- **Cooling coil capacity:** Prolong the line ① up to the point where it crosses the outside air temperature (e.g. +32 °C) and draw a horizontal line ④ from this point to the right until it crosses the outdoor air humidity curve (e.g. 50 %). From here draw a vertical line ⑤ up to the scale representing the cooling coil capacity (47 kW).
- **Water flow through the coil:** Prolong the line ⑤ down to the water flow axis ⑥ at the bottom of the graphic (1.9 l/s).
- **Water pressure drop:** Draw the line ⑦ from the point where the line ⑥ crosses the black curve to the pressure drop axis (34 kPa).




**How to use water cooling coil diagrams:**

Sample parameters: Air flow = 7000 m³/h, air flow speed through the cooling coil = 4.1 m/s ①.

- **Supply air temperature:** prolong the line of air flow (e.g. 7000 m³/h) ① up to the point where it crosses the outside air temperature (e.g. +32 °C); then draw a horizontal line ② from this point to the left until it crosses the outdoor air humidity curve (e.g. 50 %). From this point draw a vertical line ③ to the supply air temperature axis on top of the graphic (19.6 °C).
- **Cooling coil capacity:** Prolong the line ① up to the point where it crosses the outside air temperature (e.g. +32 °C) and draw a horizontal line ④ from this point to the right until it crosses the outdoor air humidity curve (e.g. 50 %). From here draw a vertical line ⑤ up to the scale representing the cooling coil capacity (52 kW).
- **Water flow through the coil:** Prolong the line ⑤ down to the water flow axis ⑥ at the bottom of the graphic (2.05 l/s).
- **Water pressure drop:** Draw the line ⑦ from the point where the line ⑥ crosses the black curve to the pressure drop axis (37 kPa).