

WKH

Duct water heaters for rectangular ducts

Use

- For warming up of supply air in ventilation systems installed in various premises.
- Suitable for installation in supply or air handling units to warm up the supply air flow.
- For indoor use only if water serves as a heat carrier.
- For outdoor use antifreezing mixture (ethylene glycol solution).
- Compatible with 400x200 up to 1000x500 mm rectangular air ducts.



Design

- Galvanized steel case.
- Copper pipe manifold.
- Heat exchange surface made of aluminium plates.
- Equipped with a nipple for the system deaeration.
- Outlet header is equipped with a spigot for installation of an immersion temperature sensor or freezing protection mechanism.
- Available in two, three- or four-row tube modifications.
- Suitable for operation at maximum operating pressure 1.6 MPa (16 bar) and maximum transported air temperature +100 °C.

Mounting

HEATERS

- Fixing to rectangular ducts with flange connection.
- Any mounting position that ensures the heater deaeration.
- Install a filter upstream to the heater to protect heating elements against dirt ingress.
- Install the heater in front or behind the fan. In case of mounting behind the fan ensure the distance no less than 1-1.5 m for air flow stabilization and keep the maximum permissible air temperature inside the fan.
- Connect the heater on counter-flow basis, otherwise its capacity drops by 5–15 %. All the nomographic charts are rated for counter-flow connection.
- For correct and safe heater operation an automatic control and protection system is recommended, including the following functions:
 - regulation of the heating capacity and temperature of the air heated up;
 - filter clogging control by a differential air pressure sensor;
 - · ventilation system start-up with pre-heated heater;
 - use of air dampers with a servo actuator with a return spring;
 - fan turning off in case of the heater freezing danger.



Connection against air flow



Connection along air flow

Designation key			
Series	Flange size (WxH) [cm]		Number of water (glycol) coil rows
WKH	40x20; 50x25; 50x30; 60x30; 60x35; 70x40; 80x50; 90x50; 100x50	-	2; 3; 4
		-	



Overall dimensions [mm]

Model	В	B1	B2	B3	н	H1	H2	H3	L	ព	L2	к	Number of water coil rows	Weight [kg]
WKH 40x20-2	400	420	440	565	200	220	240	150	200	43	43	G 3/4"	2	7.6
WKH 40x20-4	400	420	440	565	200	220	240	150	200	38	65	G 3/4"	4	8.1
WKH 50x25-2	500	520	540	665	250	270	290	200	200	43	43	G 3/4"	2	15.8
WKH 50x25-4	500	520	540	665	250	270	290	200	200	38	65	G 3/4"	4	16.3
WKH 50x30-2	500	520	540	665	300	320	340	250	200	43	43	G 1"	2	11.5
WKH 50x30-4	500	520	540	665	300	320	340	250	200	38	65	G 1"	4	12.0
WKH 60x30-2	600	620	640	765	300	320	340	250	200	43	43	G 1"	2	21.8
WKH 60x30-4	600	620	640	765	300	320	340	250	200	38	65	G 1"	4	22.3
WKH 60x35-2	600	620	640	765	350	370	390	300	200	43	43	G 1"	2	22.4
WKH 60x35-4	600	620	640	765	350	370	390	300	200	38	65	G 1"	4	22.9
WKH 70x40-2	700	720	740	865	400	420	440	350	200	36	47	G 1"	2	27.8
WKH 70x40-3	700	720	740	865	400	420	440	350	200	42	58	G 1"	3	28.4
WKH 80x50-2	800	820	840	965	500	520	540	450	200	36	47	G 1"	2	36.5
WKH 80x50-3	800	820	840	965	500	520	540	450	200	42	58	G 1"	3	37.2
WKH 90x50-2	900	920	940	1065	500	520	540	450	200	36	47	G 1"	2	40.4
WKH 90x50-3	900	920	940	1065	500	520	540	450	200	42	58	G 1"	3	41.2
WKH 100x50-2	1000	1020	1040	1165	500	520	540	450	200	36	47	G 1"	2	44.3
WKH 100x50-3	1000	1020	1040	1165	500	520	540	450	200	42	58	G 1"	3	45.2

AIR PRESSURE LOSS FOR WATER HEATERS WKH





Water heaters calculation diagram

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WKH 40x20-2







How to use water heater diagrams.

System Parameters: Air flow = 950 m³/h. Outside air temperature = -15 °C. Water temperature (in/out) = +90/+70 °C.

The air flow is 950 m³/h and the air speed in the heater is 3.35 m/s ①.

To calculate the maximum air temperature find the intersection point of the air flow line () with the rated outer temperature shown in blue line (e.g., -15 °C) and draw the line (0 to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the supply air temperature downstream of the heater (+23 $^\circ$ C) 3.

To calculate the heater power find the intersection point of the air flow (1) with the rated winter temperature shown in red line (e.g., -15 °C) and draw the line (4) to the right until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis (13.5 kW) (5).

• To calculate the required water flow in the heater prolong this line © downwards to the water flow axis (0.14 1/s). • To calculate the water pressure drop in the heater find the intersection point of the line © with the pressure loss curve and prolong the line \bigcirc to the right on the water pressure drop axis (1.5 kPa).

WKH 40x20-4

Air temperature downstream of the water heating coils [°C]







How to use water heater diagrams. System Parameters: Air flow = 250 m³/h. Outside air temperature = -15 °C.

Water temperature (in/out) = +70/+50 °C. The air flow is 950 m³/h and the air speed in the heater is

3.35 m/s ①.

To calculate the maximum air temperature find the To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -15 °C) and draw the line ② to the left until it crosses the water in/out temperature curve (e.g., +70/+50). From this point draw a vertical line to the supply air temperature downstream of the heater (+29 $^{\circ}\text{C})$ 3.

 To calculate the heater power find the intersection point To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -15 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +70/+50).
 From this point draw a vertical line to the heater power axis (16.0 kW) (5).

 To calculate the required water flow in the heater prolong To calculate the required water flow in the heater prolong this line (\$\overline\$) downwards to the water flow axis (0.2 l/s).
 To calculate the water pressure drop in the heater find the intersection point of the line (\$\overline\$) with the pressure loss curve and prolong the line (\$\overline\$) to the right on the water pressure drop axis (2.1 kPa).



WKH 50x25-2







How to use water heater diagrams.

System Parameters: Air flow = 1450 m³/h. Outside air temperature = -15 °C. Water temperature (in/out) = +90/+70 °C.

The air flow is 1450 m³/h and the air speed in the heater is 3.2 m/s ①.

To calculate the maximum air temperature find the intersection point of the air flow line 0 with the rated outer temperature shown in blue line (e.g., -15 °C) and draw the line ② to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the supply air temperature downstream of the heater (+24 °C) ③.

WKH 50x30-4

Air temperature downstream of the water heating coils [°C]



To calculate the heater power find the intersection point of the air flow (1) with the rated winter temperature shown in red line (e.g., -15 °C) and draw the line (4) to the right until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis (21.5 kW) ⑤.

To calculate the required water flow in the heater prolong this line (6) downwards to the water flow axis (0.27 l/s). • To calculate the water pressure drop in the heater find the intersection point of the line (6) with the pressure loss curve and prolong the line \bigcirc to the right on the water pressure drop axis (3.2 kPa).

Coil heating capacity [kW] 10 30 40 50 60 ů -35 temperature -30 60/140 TOLSO -25 00000 -20 00170 -15 air -10 External -5 0 0 -5 -10 -15 -20 -25 -30 î -35 4.5 18 16 Wasserdruckabfall, kPa Air speed inside the coil [m/s] 14 12 Air flow through the coil [m³/h] 6 4 0.8 0.2 0.4 0.5 0.6 0.7 Water flow through the coil $\left[l/s \right]$

How to use water heater diagrams. System Parameters: Air flow = 2000 m³/h. Outside air temperature = -15 °C. Water temperature (in/out) = +70/+50 °C. The air flow is 2000 m³/h and the air speed in the heater is 3.75 m/s ①.

• To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -15 °C) and draw the line ② to the left until it crosses the water in/out temperature curve (e.g., +70/+50). From this point draw a vertical line to the supply air temperature downstream of the heater (+31 °C) 3

 To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -15 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +70/+50). From this point draw a vertical line to the heater power axis (35.0 kW) (5).

2.5

1300

100

700

• To calculate the required water flow in the heater prolong To calculate the required water flow in the heater prolong this line (6) downwards to the water flow axis (0.43 l/s).
 To calculate the water pressure drop in the heater 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 drawneid (0.010) drop axis (9.0 kPa).



WKH 60x30-2







How to use water heater diagrams

System Parameters: Air flow = $2500 \text{ m}^3/\text{h}$. Outside air temperature = -20 °C. Water temperature (in/out) = +90/+70 °C.

The air flow is 2500 m³/h and the air speed in the heater is 3.75 m/s ①.

• To calculate the maximum air temperature find the intersection point of the air flow line \bigcirc with the rated outer temperature shown in blue line (e.g., -20 °C) and draw the line \oslash to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the supply air temperature downstream of the heater (+20 °C) (3).

To calculate the heater power find the intersection point of the air flow (1) with the rated winter temperature shown in red line (e.g., -20 °C) and draw the line (4) to the right until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis (37.0 kW) (5).

To calculate the required water flow in the heater prolong this line (a) downwards to the water flow axis (0.46 l/s).
To calculate the water pressure drop in the heater find the intersection point of the line (a) with the pressure loss curve and prolong the line O to the right on the water pressure drop axis (6.7 kPa).

WKH 60x30-4

Air temperature downstream of the water heating coils [°C]



-35 -30 -25 -20 -15 External a -5 -10 -15 -20 -25 -30 -35 ሰ 4 5 Air speed inside the coil [m/s] 1400 1800 Air flow through the coil [m³/h]

How to use water heater diagrams.

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System Parameters: Air flow = 2500 m³/h. Outside air temperature = -20 °C. Water temperature (in/out) = +70/+50 °C. The air flow is 2500 m³/h and the air speed in the heater is $\frac{1}{2}$

3.75 m/s ①.

To calculate the maximum air temperature find the To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -20 °C) and draw the line ② to the left until it crosses the water in/out temperature curve (e.g., +70/+50). From this point draw a vertical line to the supply air temperature downstream of the heater (+29 $^{\circ}\text{C})$ 3.

 To calculate the heater power find the intersection point To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -20 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +70/+50).
 From this point draw a vertical line to the heater power axis (is a line) for draw a vertical line to the heater power axis (48.0 kW) (5).



 To calculate the required water flow in the heater prolong To calculate the required water flow in the heater prolong this line (\$\overline\$) downwards to the water flow axis (0.6 l/s).
 To calculate the water pressure drop in the heater find the intersection point of the line (\$\overline\$) with the pressure loss curve and prolong the line (\$\overline\$) to the right on the water pressure drop axis (14.0 kPa).



Coil heating capacity [kW]

50

40

30

WKH 60x35-2

Air temperature downstream of the water heating coils [°C]







How to use water heater diagrams

System Parameters: Air flow = $3500 \text{ m}^3/\text{h}$. Outside air temperature = -10 °C. Water temperature (in/out) = +90/+70 °C.

The air flow is 2500 m³/h and the air speed in the heater is 4.65 m/s ①.

• To calculate the maximum air temperature find the intersection point of the air flow line \bigcirc with the rated outer temperature shown in blue line (e.g., -10 °C) and draw the line \oslash to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the supply air temperature downstream of the heater (+22.5 °C) (3).

To calculate the heater power find the intersection point of the air flow (1) with the rated winter temperature shown in red line (e.g., -10 °C) and draw the line (4) to the right until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis (42.0 kW) (5).

To calculate the required water flow in the heater prolong this line (6) downwards to the water flow axis (0.5 l/s). This time O downwards to the water now axis (0.5 (1.5). • To calculate the water pressure drop in the heater find the intersection point of the line O with the pressure loss curve and prolong the line O to the right on the water pressure drop axis (6.5 kPa).

> 30 40 50 60 70 80 90 100

Coil heating capacity [kW]

WKH 60x35-4

Air temperature downstream of the water heating coils [°C]







How to use water heater diagrams.

System Parameters: Air flow = 3500 m³/h. Outside air temperature = -25 °C. Water temperature (n/out) = +70/+50 °C. The air flow is 3500 m³/h and the air speed in the heater is 4.65 m/s ①.

• To calculate the maximum air temperature find the intersection point of the air flow line \bigcirc with the rated outer temperature shown in blue line (e.g., -25 °C) and draw the line \bigcirc to the left until it crosses the water in/out temperature curve (e.g., +70,+50). From this point draw a vertical line to the supply air temperature downstream of the heater (+24 $^\circ C)$ (3.

 To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -25 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +70/+50). From this point draw a vertical line to the heater power axis (68.0 kW) (5).

• To calculate the required water flow in the heater prolong To calculate the required water flow in the heater prolong this line (6) downwards to the water flow axis (0.84 l/s).
 To calculate the water pressure drop in the heater 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 draw prolong the line (7) to the right on the water pressure drop axis (18.0 kPa).

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WKH 70x40-2







How to use water heater diagrams. System Parameters: Air flow = 4500 m³/h. Outside air temperature = -10 °C. Water temperature (in/out) = -900/+70 °C. The air flow is 2500 m³/h and the air speed in the heater is 4.45 m/s ①.

To calculate the maximum air temperature find the To calculate the heater power find the intersection point intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -10 °C) and draw the line ② to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to of the air flow ① with the rated winter temperature shown in red line (e.g., -10 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis the supply air temperature downstream of the heater (+24 (55.0 kW) (5).

• To calculate the required water flow in the heater prolong this line (a downwards to the water flow rate probing this line (b downwards to the water flow ratio $(0.68 \ l/s)$). • To calculate the water pressure drop in the heater find the intersection point of the line (b) with the pressure loss curve and prolong the line (c) to the right on the water pressure downward (c) (b). drop axis (9.2 kPa).

WKH 70x40-3



-35 -30 -25 -20 -15 -10 -5 0 -0 -5 -10 -15 2 -20 -25 -30 -35 Air speed inside the coil [m/s] 1250 1500 2250 2500 2750 3000 3750 000 4250



• To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -20 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis (82.0 kW) (5).



• To calculate the required water flow in the heater prolong this line (6) downwards to the water flow axis (1.02 l/s). • To calculate the water pressure drop in the heater find the intersection point of the line ⁽⁶⁾ with the pressure loss curve and prolong the line O to the right on the water pressure drop axis (13.0 kPa).

HEATERS

°C) (3.

Air temperature downstream of the water heating coils [°C]



System Parameters: Air flow = 4500 m³/h. South a data temperature (in/out) = +90 (n / n $^{-100}$ C. Water temperature (in/out) = +90/+70 °C. The air flow is 2500 m³/h and the air speed in the heater is

4.45 m/s ①.

 To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -20 °C) and draw the line ② to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to a vertical line to the supply air temperature downstream of the heater (+27 °C) 3.



Coil heating capacity [kW]

20 30 40 50 60 70 80 90 100 110

10

WKH 80x50-2

Air temperature downstream of the water heating coils [°C]







How to use water heater diagrams. System Parameters: Air flow = 5500 m³/h. Outside air temperature = -10 °C.

Water temperature (in/out) = +90/+70 °C. The air flow is 5500 m³/h and the air speed in the heater is 3.8 m/s ①.

• To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -10 °C) and draw the line @ to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the supply air temperature downstream of the heater (+24.5 °C) (3.

• To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -10 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis (73.0 kW) (5).

• To calculate the required water flow in the heater prolong this line (a) downwards to the water flow ratio water flow ratio (0.9 I/s). • To calculate the water pressure drop in the heater find the intersection point of the line (b) with the pressure loss curve and prolong the line (c) to the right on the water pressure flow ratio (0.9 I/s). drop axis (11.0 kPa).

> 40 60 80 100

Coil heating capacity [kW]

140 160

WKH 80x50-3

Air temperature downstream of the water heating coils [°C]







How to use water heater diagrams. System Parameters: Air flow = 6750 m³/h. Outside air temperature = -20 °C. Water temperature (in/out) = +90/+70 °C. The air flow is 6750 m³/h and the air speed in the heater is 4.7 m/s ①.

• To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -20 °C) and draw the line © to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the supply air temperature downstream of the heater (+26 °C) 3.

• To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -20 °C) and draw the line ④ to the right until it crosses the water in /out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis (123.0 kW) (5).

- To calculate the required water flow in the heater prolong this line 6 downwards to the water flow axis (1.54 l/s). To calculate the water pressure drop in the heater find the intersection point of the line O with the pressure loss curve and prolong the line O to the right on the water pressure drop avic (30 kPa). drop axis (27.0 kPa).



WKH 90x50-2







How to use water heater diagrams. System Parameters: Air flow = 7000 m³/h. Outside air temperature = -20 °C. Water temperature (in/out) = +90/+70 °C.

The air flow is 7000 m³/h and the air speed in the heater is 4.4 m/s ①.

 To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -20 °C) and draw the line ② to the left until it crosses the water in/out temperature supe (ag. 100/10). From this point draw a until line to curve (e.g., +90/+70). From this point draw a vertical line to the supply air temperature downstream of the heater (+18 °C) 3.

WKH 90x50-3

HEATERS



 To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -20 °C) and draw the line ④ to the right until it crosses the water in /out temperature curve (e.g., +90)+70). From this point draw a vertical line to the heater power axis (102.0 kW) ⑤.

• To calculate the required water flow in the heater prolong this line (6) downwards to the water flow axis (1.23 l/s). To calculate the water pressure drop in the heater find the intersection point of the line **(b)** with the pressure loss curve and prolong the line 7 to the right on the water pressure drop axis (21.0 kPa).

180



How to use water heater diagrams.

System Parameters: Air flow = 7000 m³/h. Outside air temperature = -20 °C. Water temperature $(in/out) = +20 (1 + 20)^{-2}$ The air flow is 7000 m³/h and the air speed in the heater is 4.4 m/s ①.

To calculate the maximum air temperature find the To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -20 °C) and draw the line ② to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the supply air temperature downstream of the heater (+28 $^{\circ}\text{C})$ (3).

 To calculate the heater power find the intersection point To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -20 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +90/+70).
 From this point draw a vertical line to the heater power axis (124.0 kW) (5).

• To calculate the required water flow in the heater prolong To calculate the required water flow in the heater prolong this line (\$\overline\$) downwards to the water flow axis (1.55 l/s).
 To calculate the water pressure drop in the heater find the intersection point of the line (\$\overline\$) with the pressure loss curve and prolong the line (\$\overline\$) to the right on the water pressure drop axis (28.0 kPa).

Water flow through the coil [l/s]

0.6 0.8 

Coil heating capacity [kW]

90 100

30 40 50 60

70 80

WKH 100x50-2







How to use water heater diagrams. System Parameters: Air flow = 7000 m³/h. Outside air temperature = -20 °C.

WKH 100x50-3

Water temperature (in/out) = +90/+70 °C. The air flow is 7000 m³/h and the air speed in the heater is 4.1 m/s ①.

• To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -20 °C) and draw the line @ to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the state of th the supply air temperature downstream of the heater (+20 °C) (3).

 To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -20 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis (101.0 kW) (5).

• To calculate the required water flow in the heater prolong this line (a) downwards to the water flow rate probing this line (b) downwards to the water flow axis (1.25 l/s). • To calculate the water pressure drop in the heater find the intersection point of the line (b) with the pressure loss curve and prolong the line (c) to the right on the water pressure for a line (c) the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water pressure for a line (c) to the right on the water press drop axis (22.0 kPa).

Air temperature downstream of the water heating coils [°C] Coil heating capacity [kW] 60 80 40 45 60 100 140 160 30 °. temperature 10/20 00 00 00000 opto 10150 60/40 20100 optio 0 air -10 -15 Externa -20 -30⁻²⁵ -35 -35 -30 -25 -20 20 -15 -10 -5 0 3 4 5 Air speed inside the coil [m/s]

How to use water heater diagrams.

System Parameters: Air flow = 7000 m³/h. Outside air temperature = -20 °C. Water temperature (in/out) = +90/+70 °C. The air flow is 7000 m³/h and the air speed in the heater is 4.1 m/s ①.

2000

3000

4000

• To calculate the maximum air temperature find the intersection point of the air flow line ① with the rated outer temperature shown in blue line (e.g., -20 °C) and draw the line @ to the left until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the state of th the supply air temperature downstream of the heater (+30 °C) (3.

 To calculate the heater power find the intersection point of the air flow ① with the rated winter temperature shown in red line (e.g., -20 °C) and draw the line ④ to the right until it crosses the water in/out temperature curve (e.g., +90/+70). From this point draw a vertical line to the heater power axis (135.0 kW) (5).

5000

Air flow through the coil [m³/h]

0.6 0.8

• To calculate the required water flow in the heater prolong To calculate the required water flow in the heater prolong this line (6) downwards to the water flow axis (1.7 l/s).
 To calculate the water pressure drop in the heater 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 draw prolong (1.6 lo loc). drop axis (34.0 kPa).

14 16 1 8 2.0 2 '

Water flow through the coil [l/s]

180