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► Performance diagrams – Climate control



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ENCLOSURES

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Performance diagrams

Cooling with ambient air

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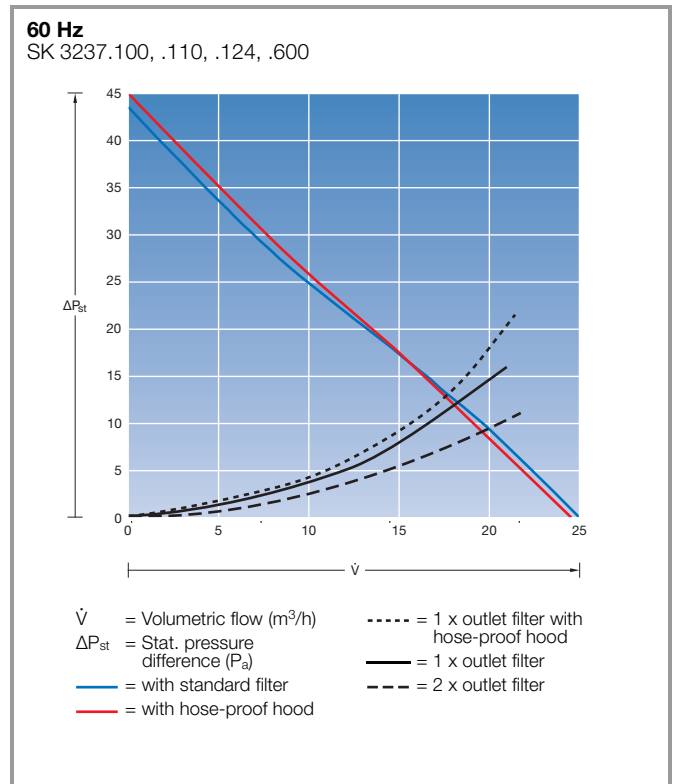
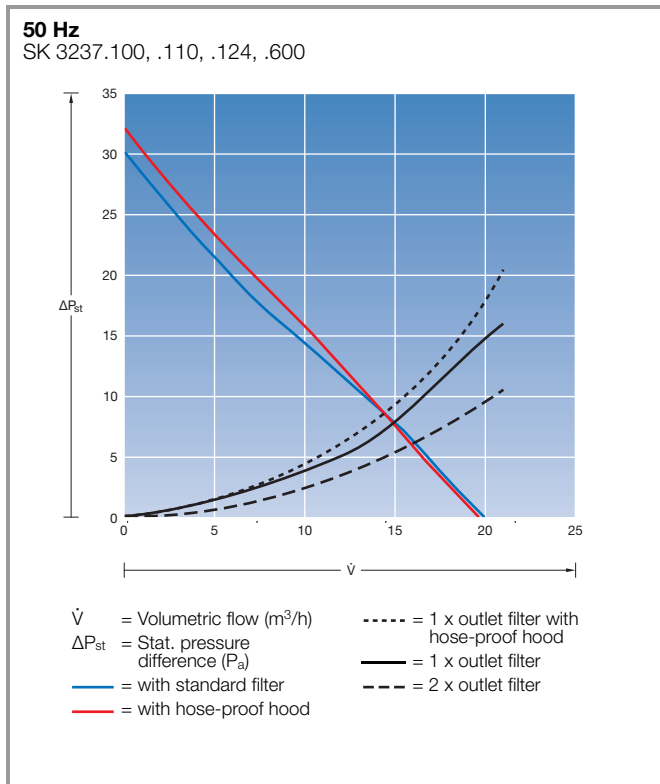
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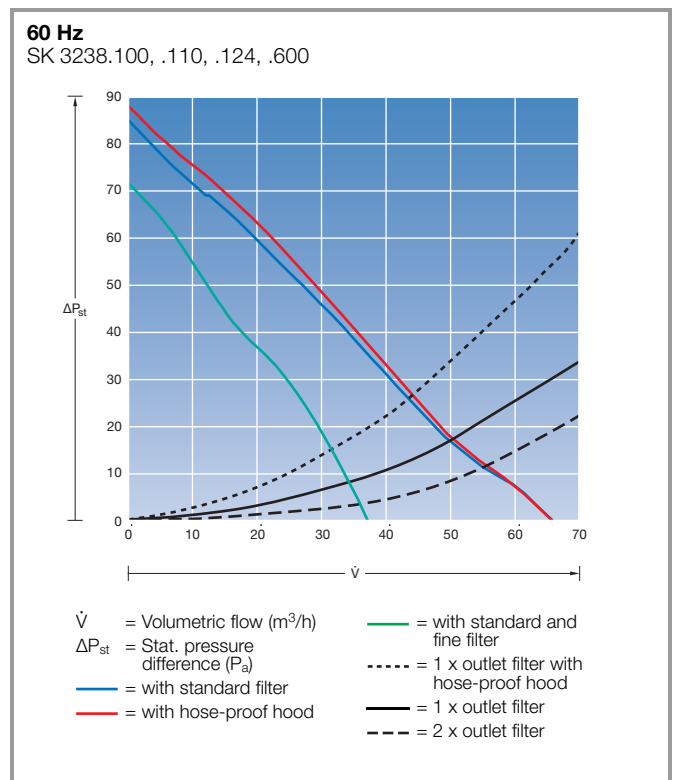
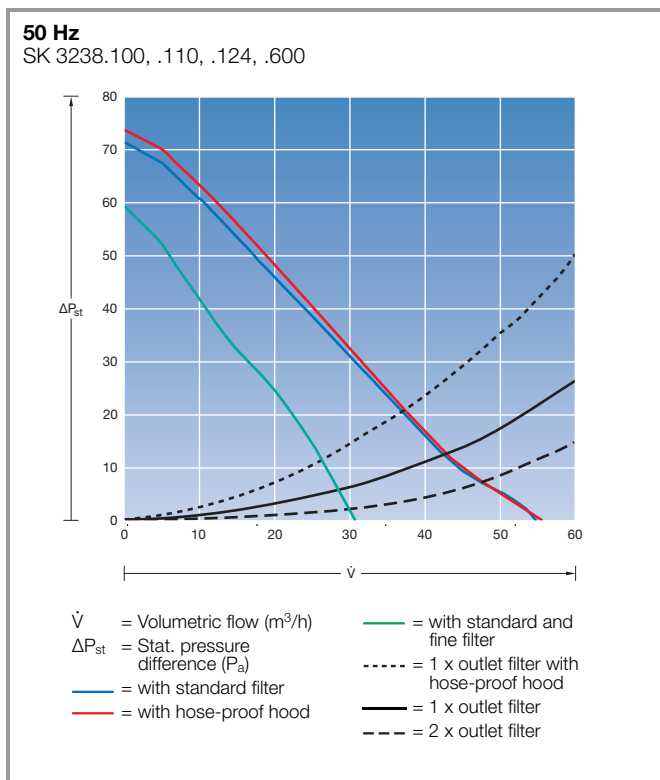
Cooling with ambient air

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

Air throughput 20/25 m³/h

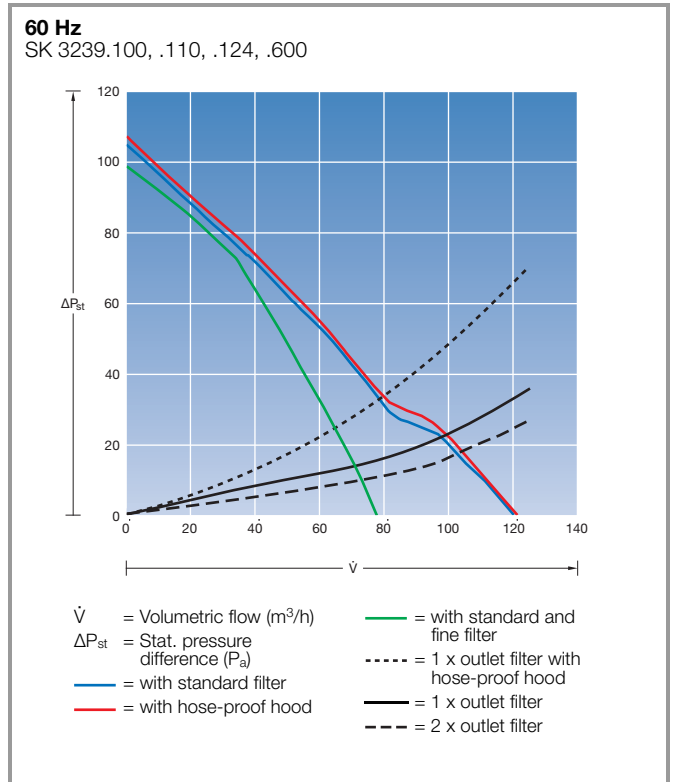
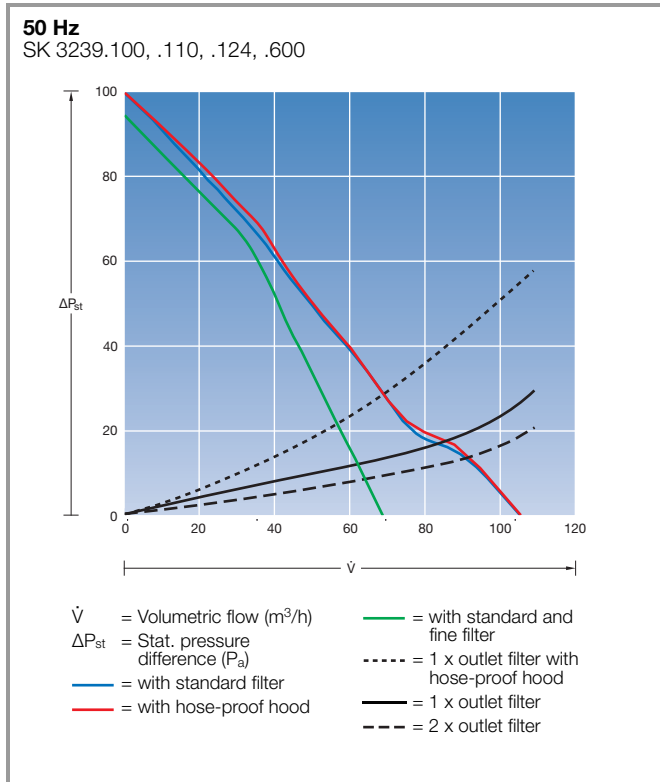


Air throughput 55/66 m³/h

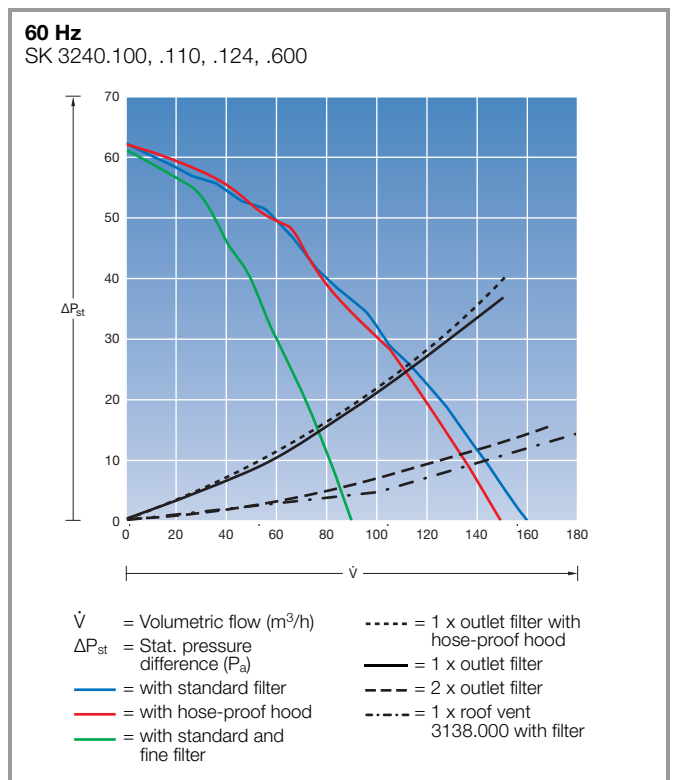
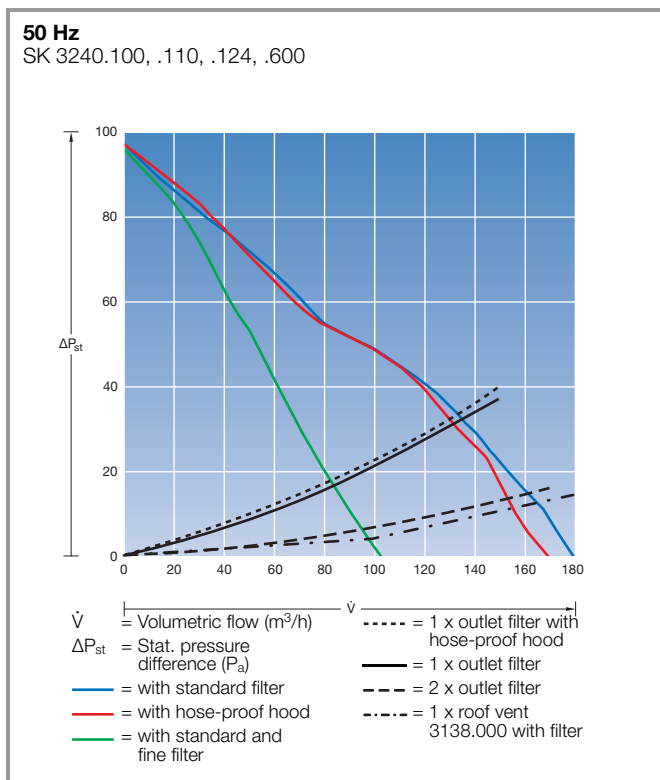


TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

Air throughput 105/120 m³/h



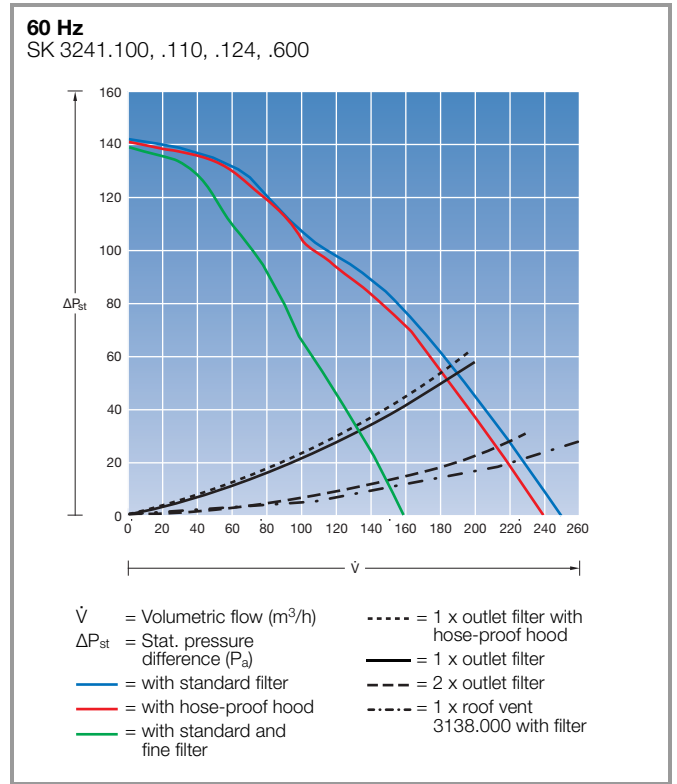
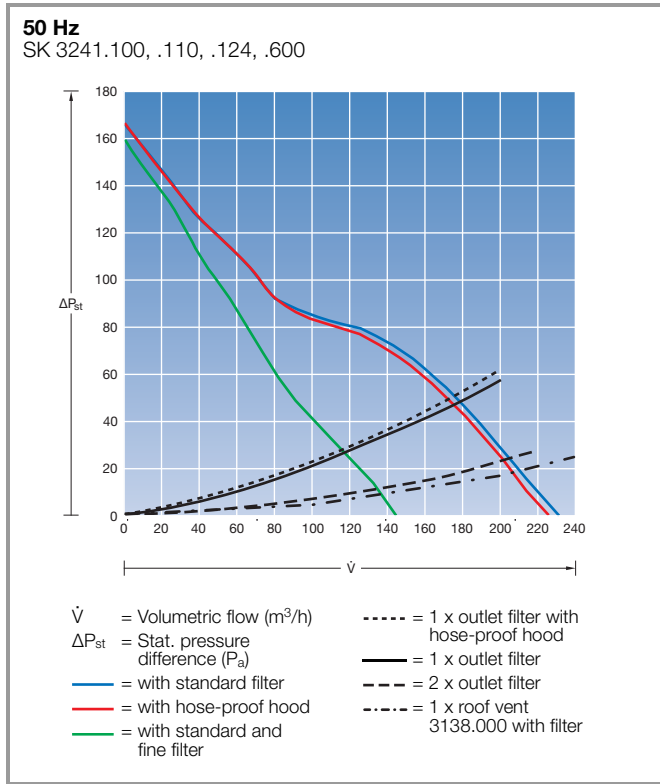
Air throughput 180/160 m³/h



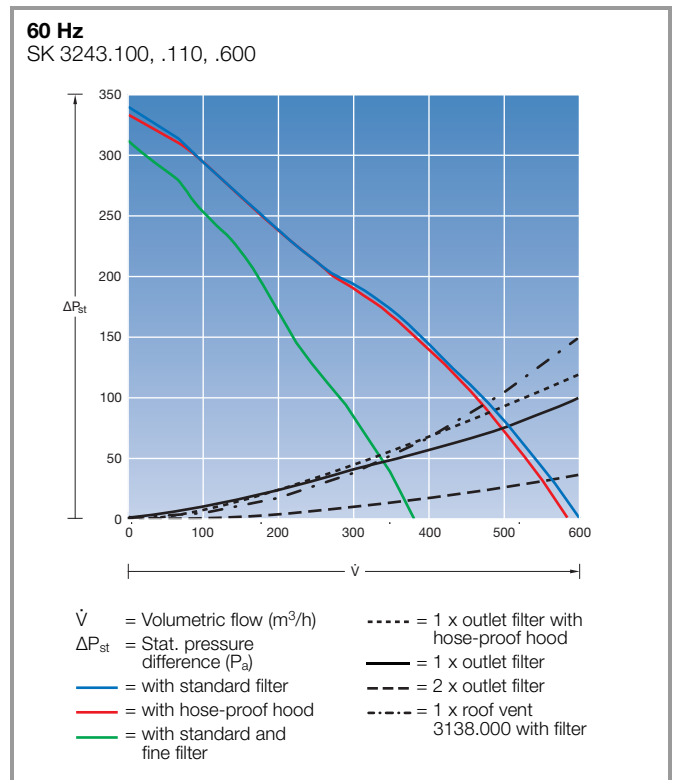
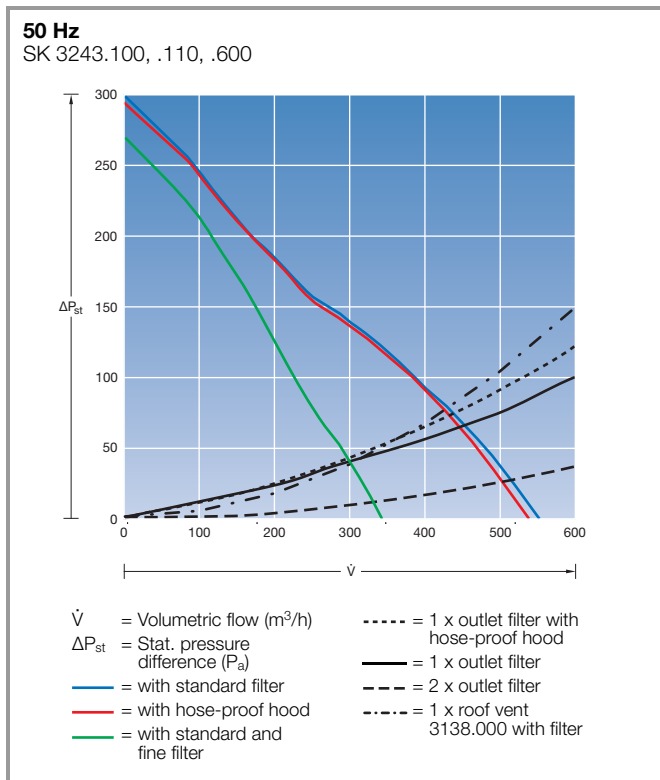
Cooling with ambient air

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

Air throughput 230/250 m³/h

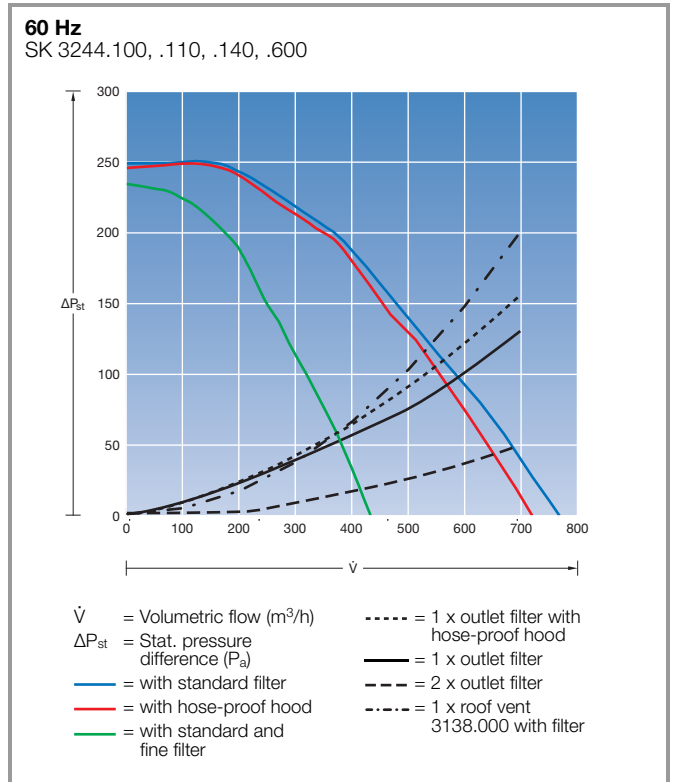
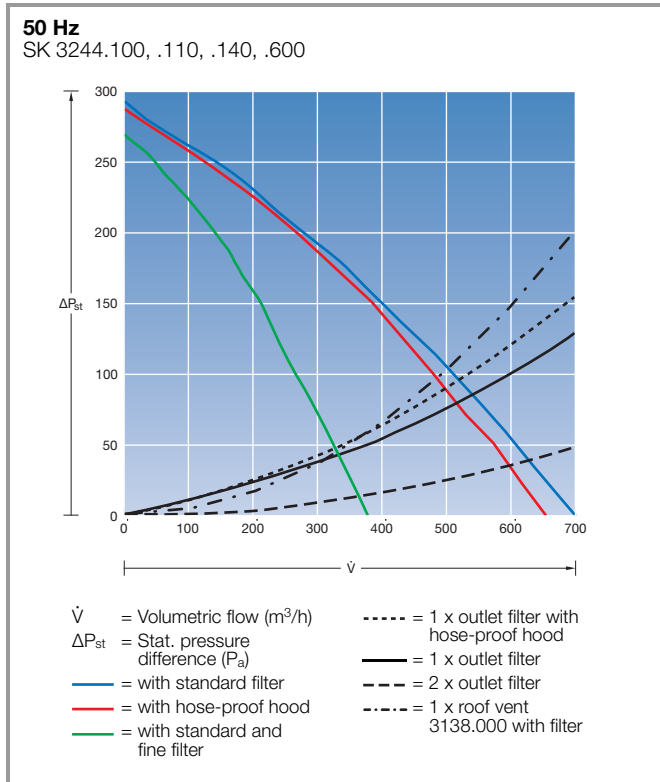


Air throughput 550/600 m³/h



TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

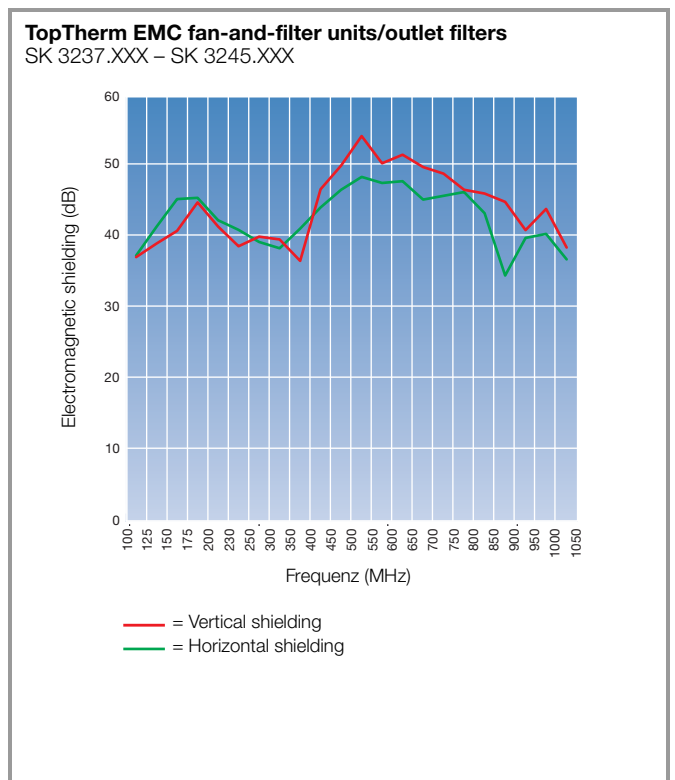
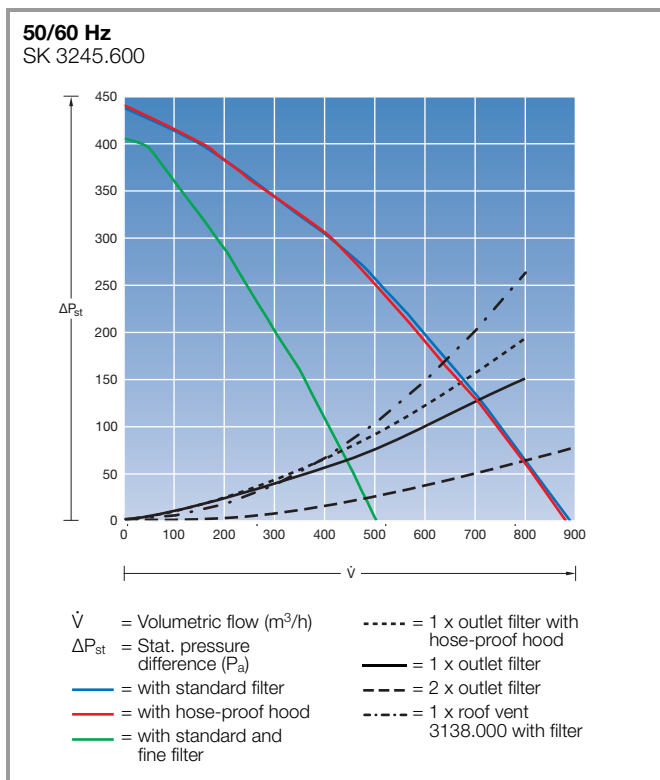
Air throughput 700/770 m³/h



Air throughput 900 m³/h

Shielding diagram

Test to EN 61587-3:2006 – Electromagnetic shielding performance test for cabinets, racks and subracks

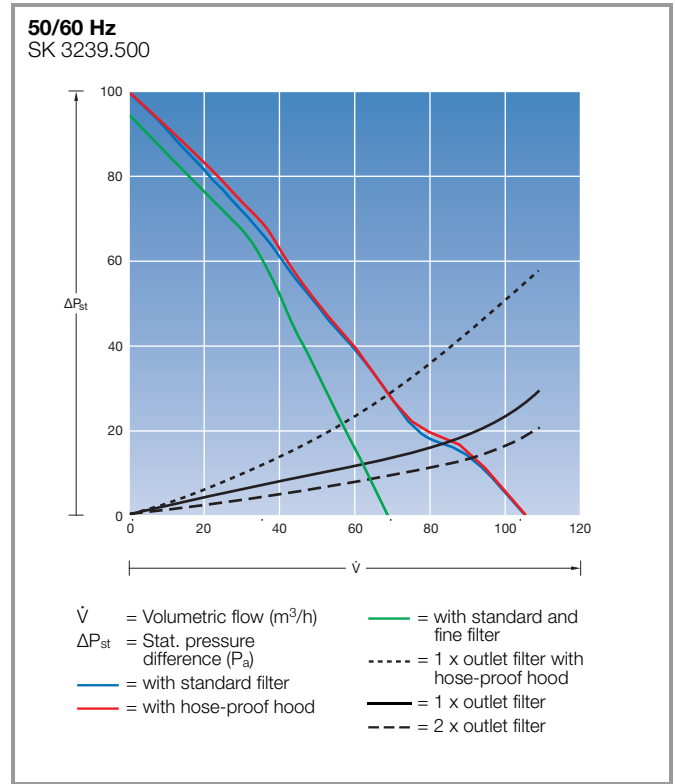
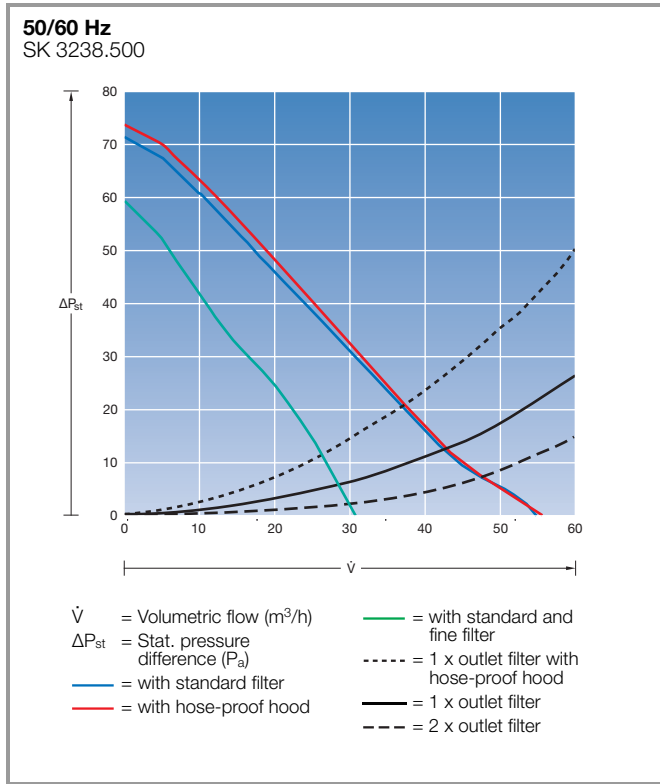


Cooling with ambient air

TopTherm fan-and-filter units with EC technology

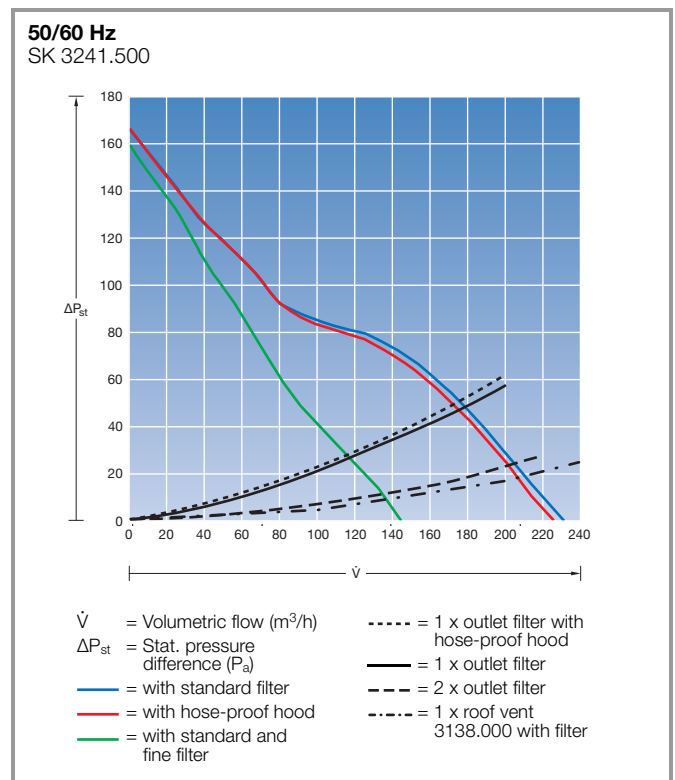
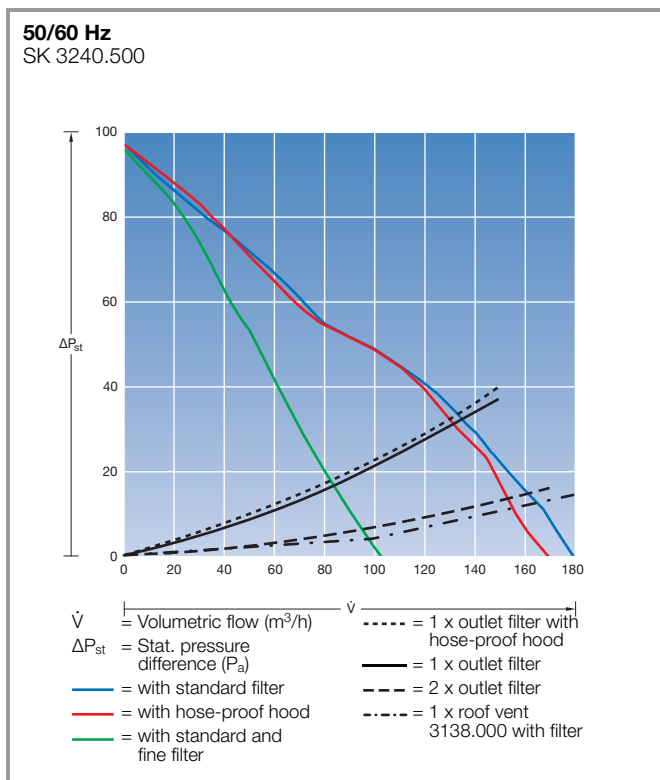
Air throughput 55 m³/h

Air throughput 105 m³/h



Air throughput 180 m³/h

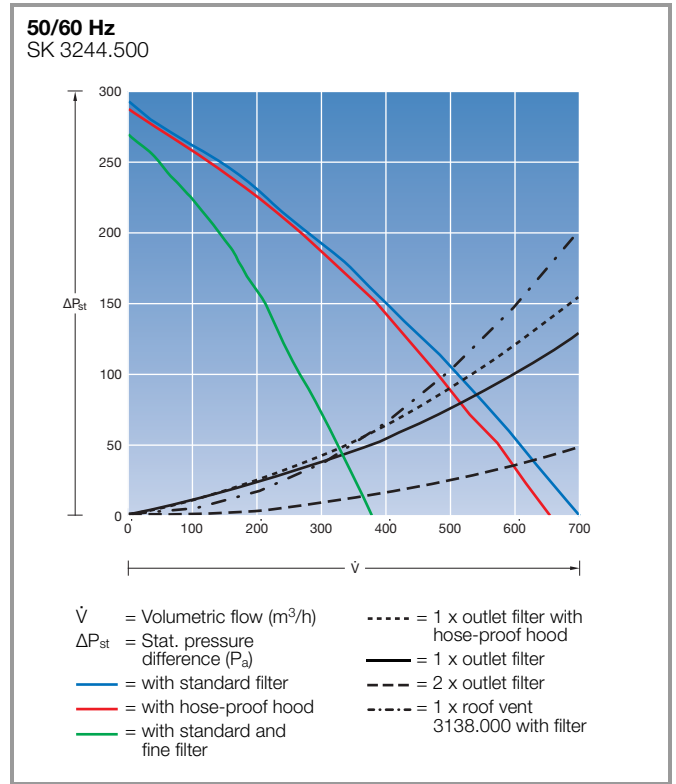
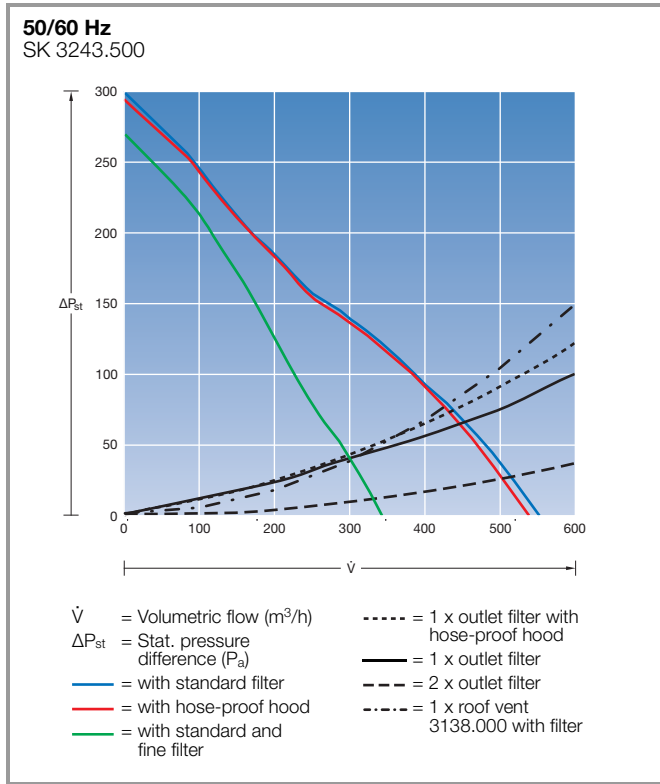
Air throughput 230 m³/h



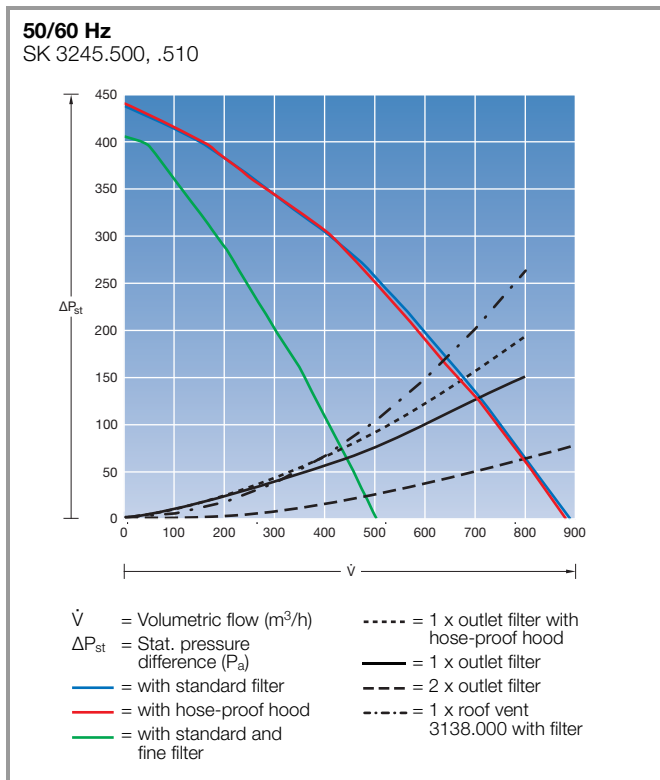
TopTherm fan-and-filter units with EC technology

Air throughput 550 m³/h

Air throughput 700 m³/h



Air throughput 900 m³/h

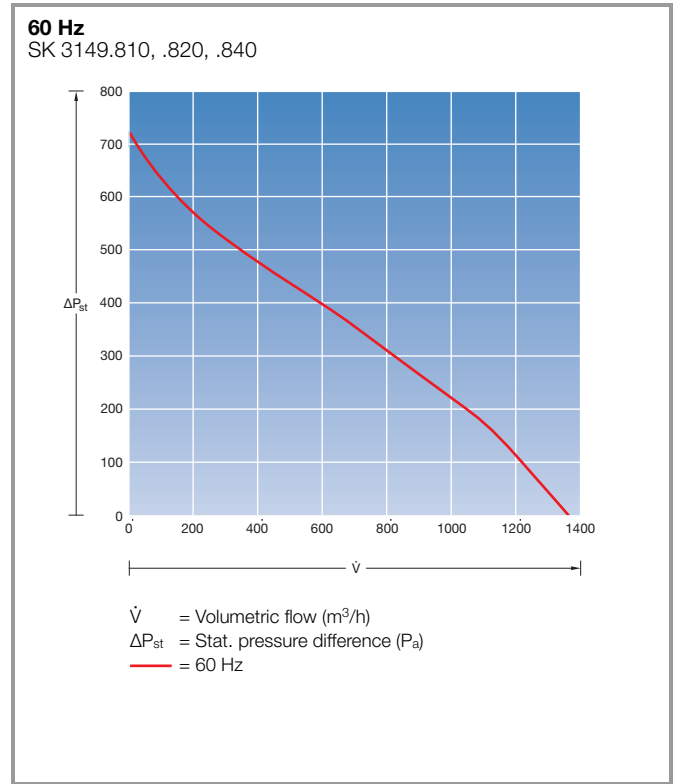
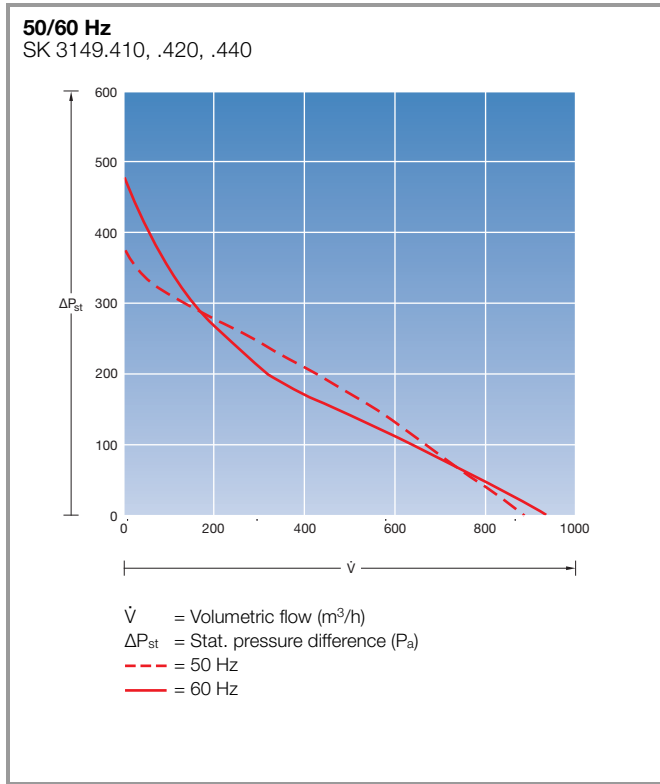


Cooling with ambient air

TopTherm roof-mounted fans available till March 2017

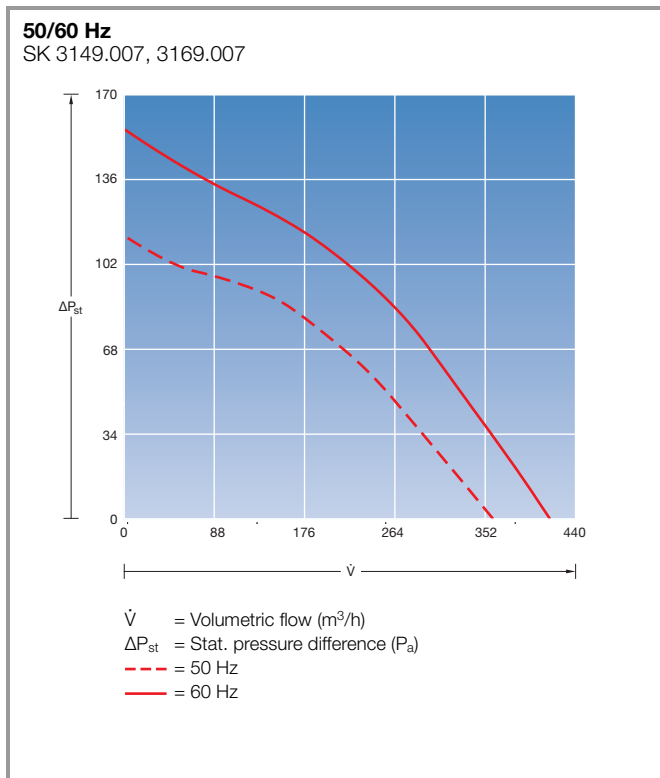
Air throughput 400 m³/h

Air throughput 800 m³/h



Roof-mounted fan, roof vent available till March 2017

Air throughput 360 m³/h



Roof-mounted fans

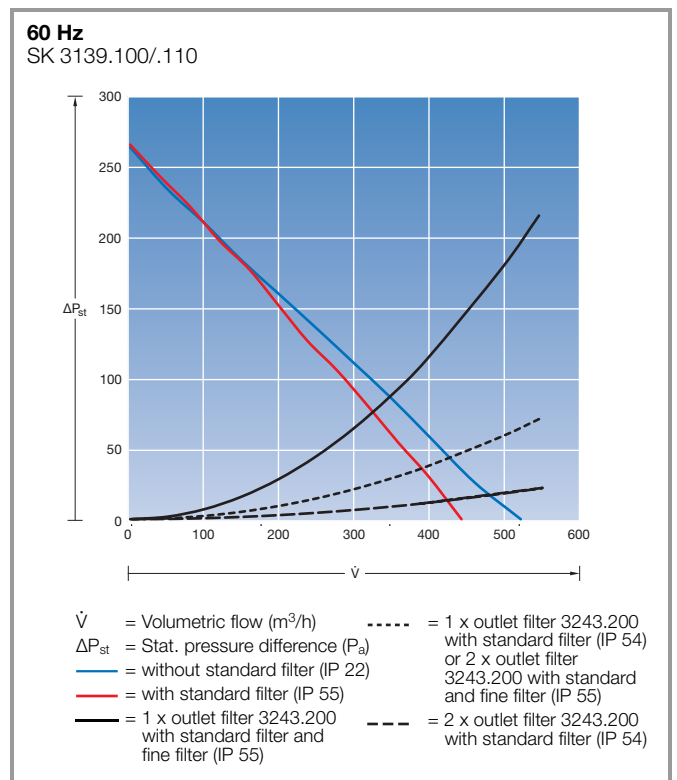
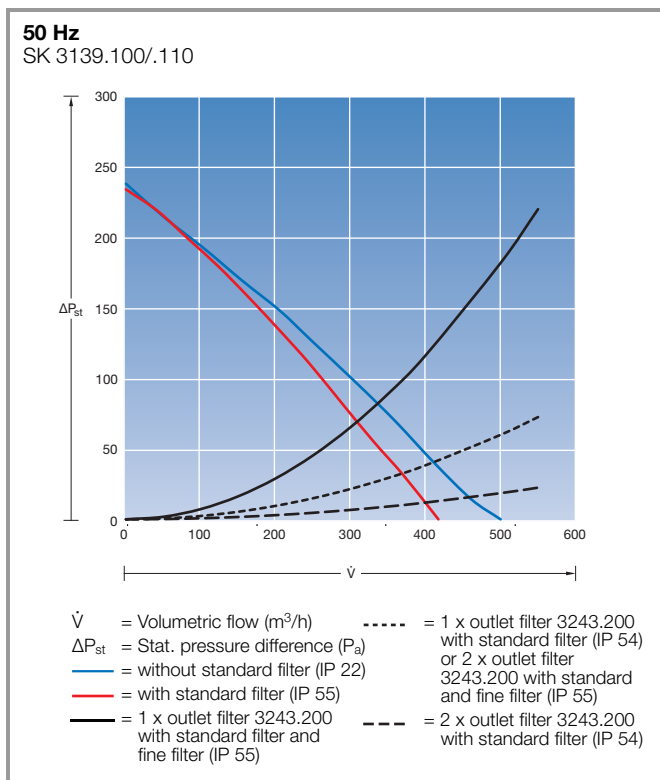
Use of Flex-Block base/plinth:

If the vented Flex-Block base/plinth is used as an air inlet, the resistance curves as indicated in the performance diagrams will apply as follows:

- 1 x vented base/plinth 8100.602 with filter
- 2 x vented base/plinth 8100.602 with filter
- 1 x vented base/plinth 8100.602 without filter

Roof-mounted fans

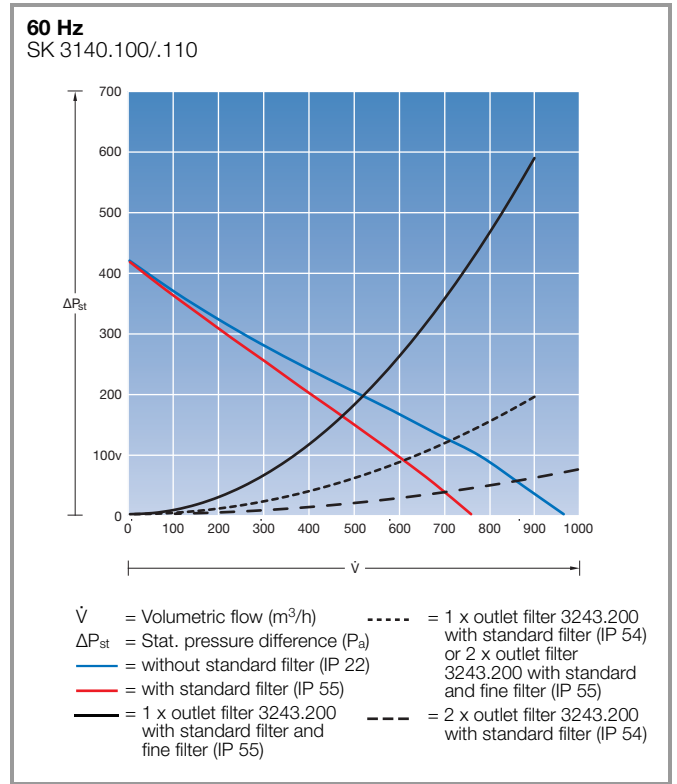
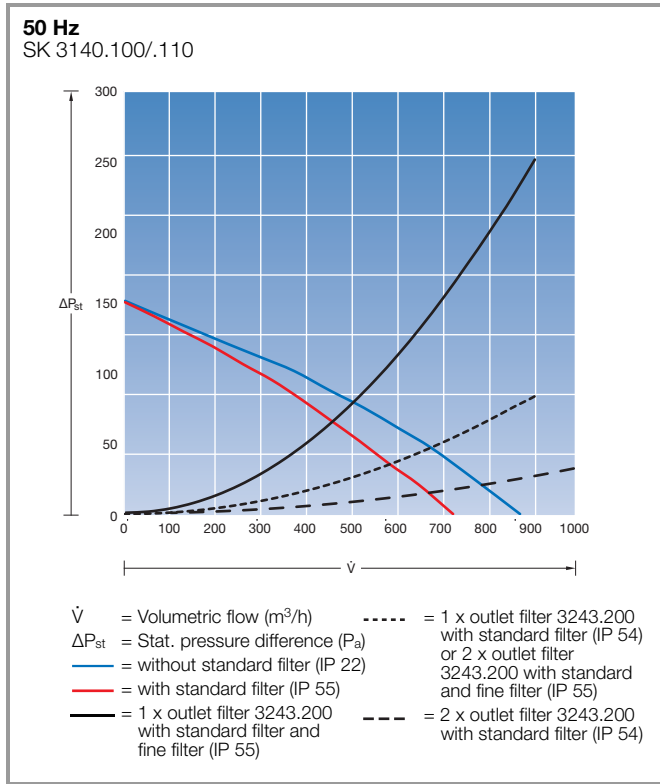
Air throughput 500/525 m³/h



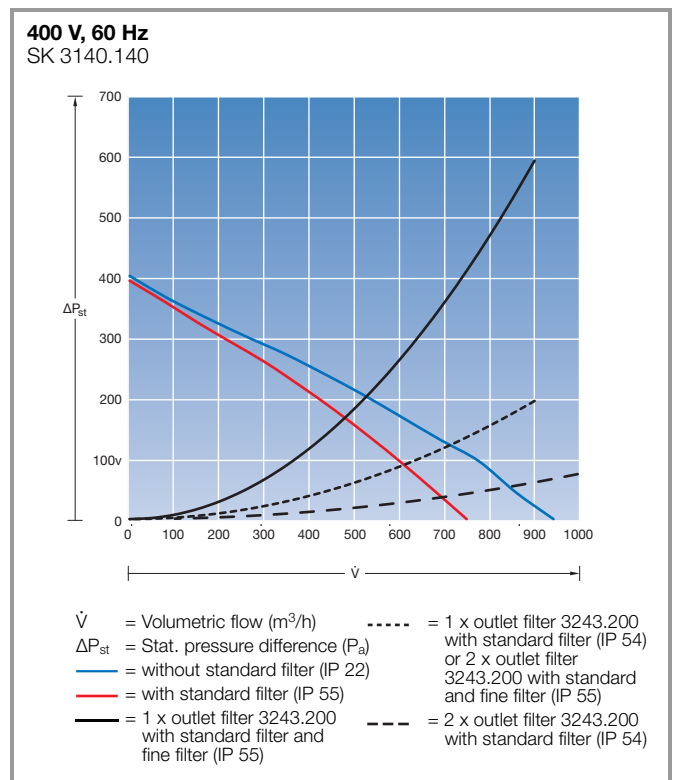
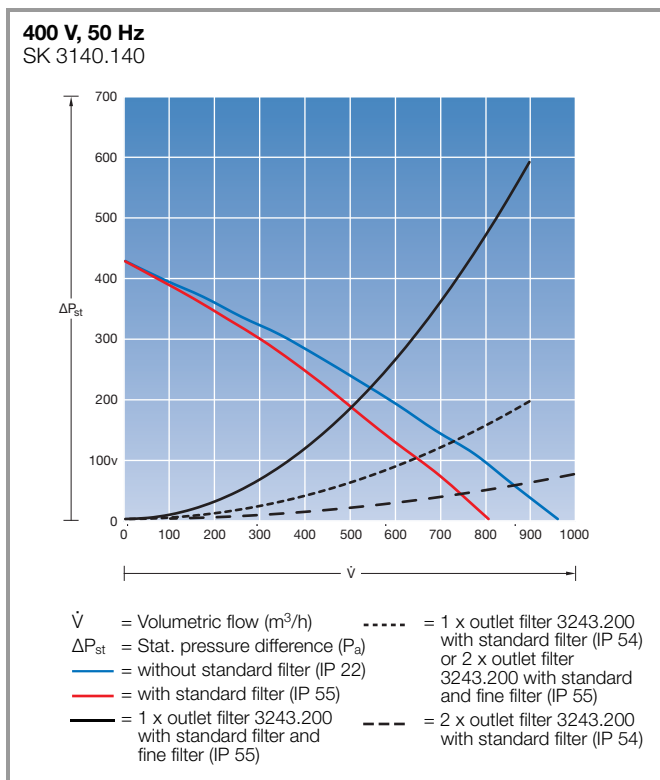
Cooling with ambient air

Roof-mounted fans

Air throughput 873/965 m³/h



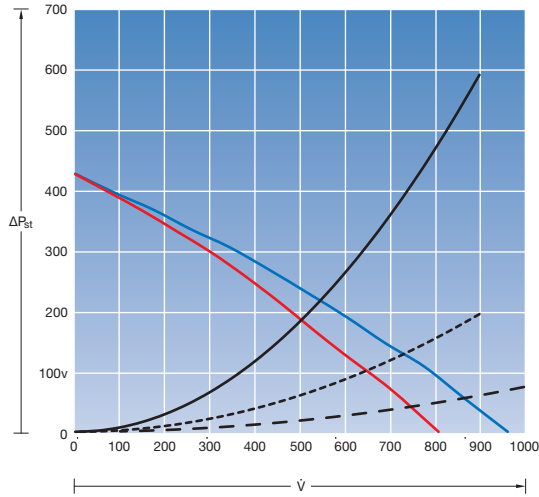
Air throughput 863/942 m³/h



Roof-mounted fans

Air throughput 963 m³/h

460 V, 60 Hz
SK 3140.140

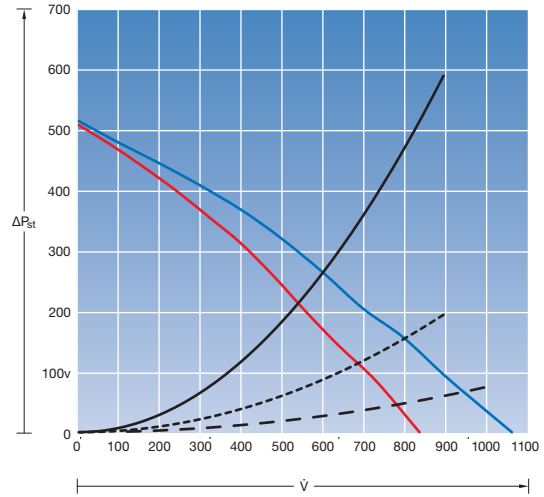


\dot{V} = Volumetric flow (m³/h)
 ΔP_{st} = Stat. pressure difference (Pa)
 — = without standard filter (IP 22)
 — = with standard filter (IP 55)
 - - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
 - - - = 2 x outlet filter 3243.200 with standard filter (IP 54) with standard filter (IP 55)

Roof-mounted fans, with EC technology

Air throughput 1069 m³/h

50/60 Hz
SK 3140.500/510

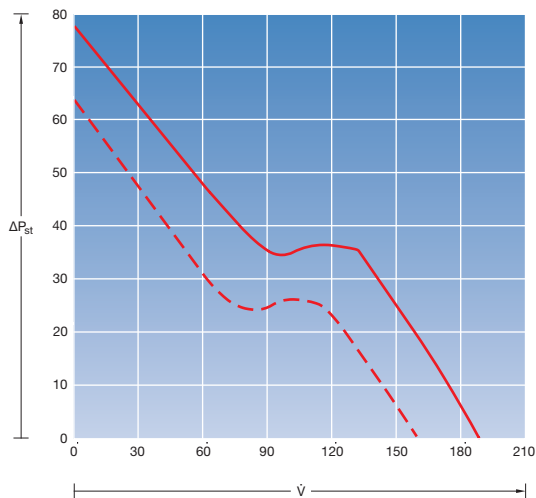


\dot{V} = Volumetric flow (m³/h)
 ΔP_{st} = Stat. pressure difference (Pa)
 — = without standard filter (IP 22)
 — = with standard filter (IP 55)
 - - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
 - - - = 2 x outlet filter 3243.200 with standard filter (IP 54) with standard filter (IP 55)

Rack-mounted fans for 482.6 mm (19")

Air throughput 320/480 m³/h

50/60 Hz
SK 3340.230, 3350.230, 3341.115, .230, 3342.024, .230, .500, 3351.230, 3352.230, .500

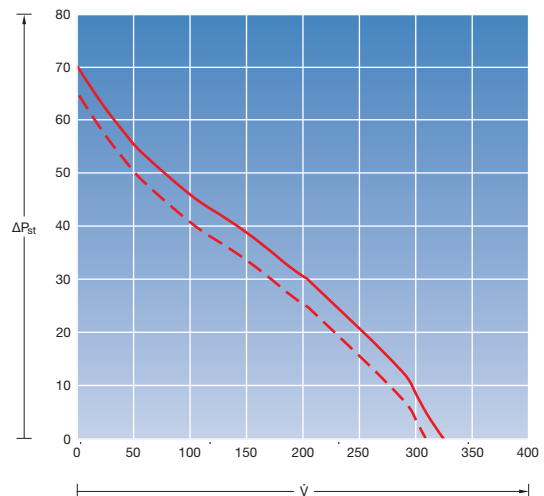


\dot{V} = Volumetric flow (m³/h)
 ΔP_{st} = Stat. pressure difference (Pa)
 - - - = 50 Hz
 — = 60 Hz

Tangential fans for 482.6 mm (19")

Air throughput 320 m³/h

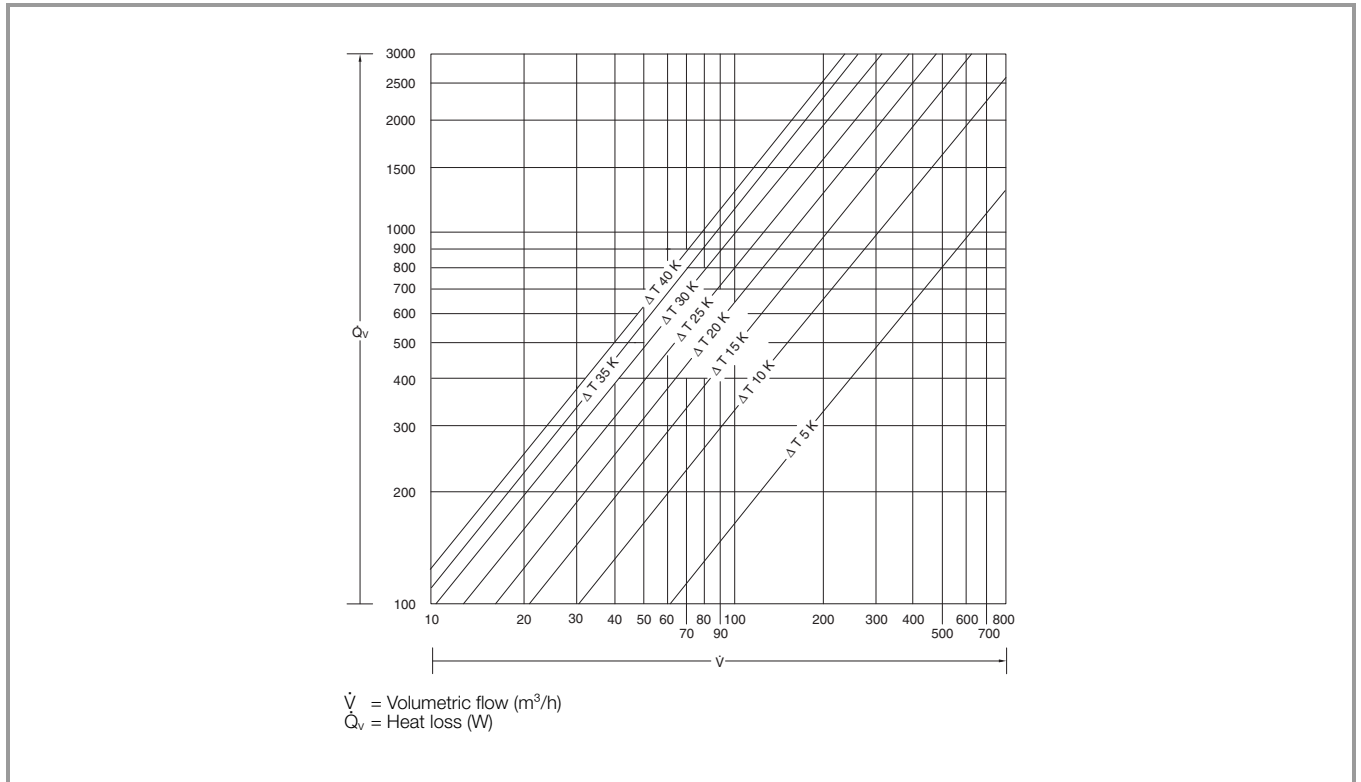
50/60 Hz
SK 3144.000, 3145.000



\dot{V} = Volumetric flow (m³/h)
 ΔP_{st} = Stat. pressure difference (Pa)
 - - - = 50 Hz
 — = 60 Hz

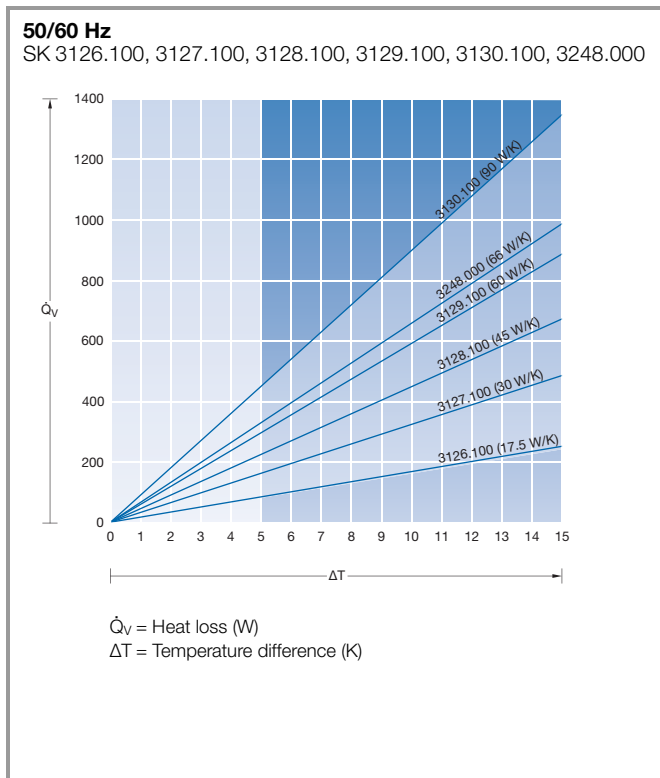
Cooling with ambient air

Selection diagram for fans



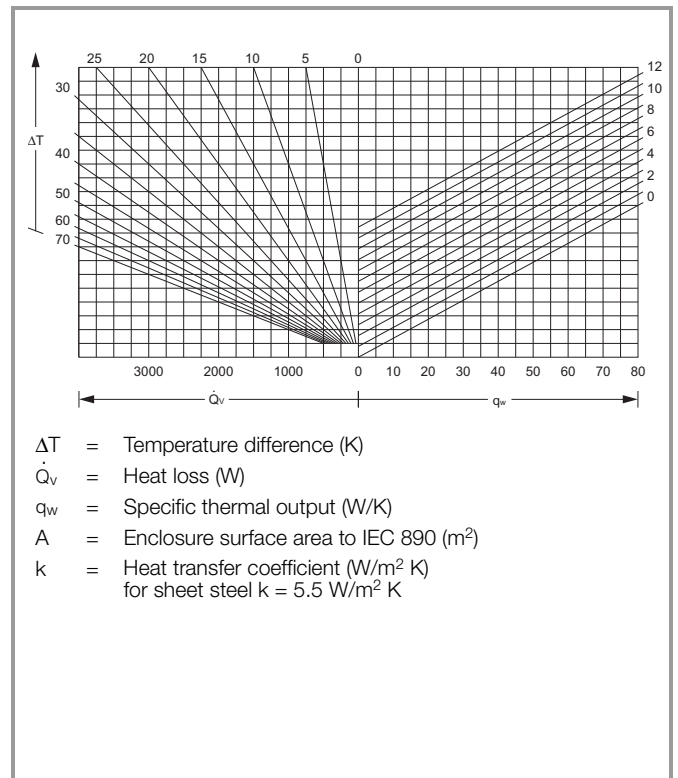
TopTherm air/air heat exchangers

Specific thermal output 17,5 – 90 W/K,
wall-mounted with controller



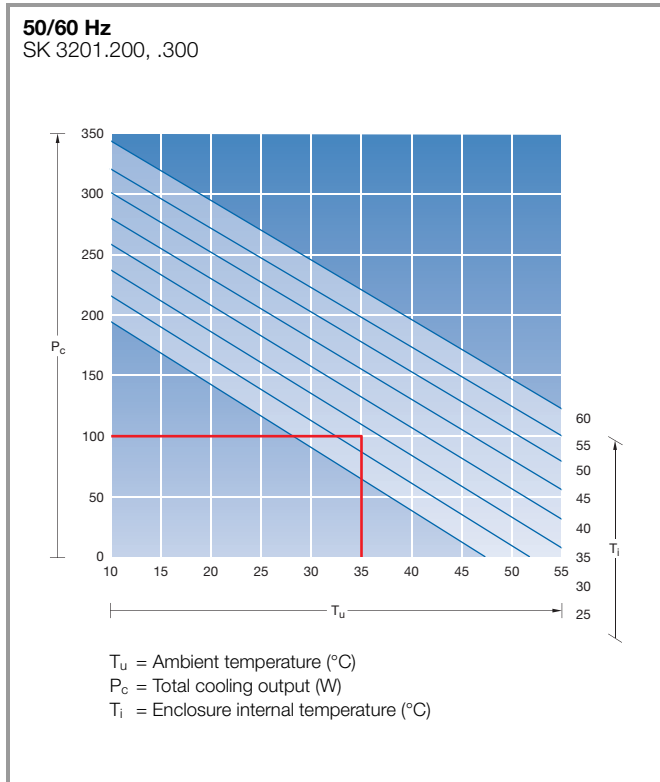
Selection diagram for air/air heat exchangers

Specific thermal output 17,5 – 90 W/K,
wall-mounted with controller

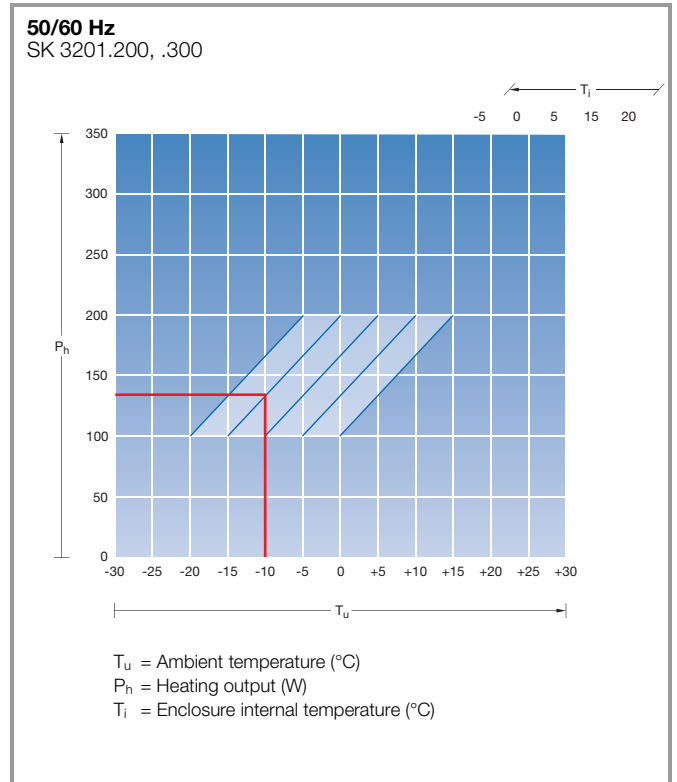


Thermoelectric coolers

Cooling output

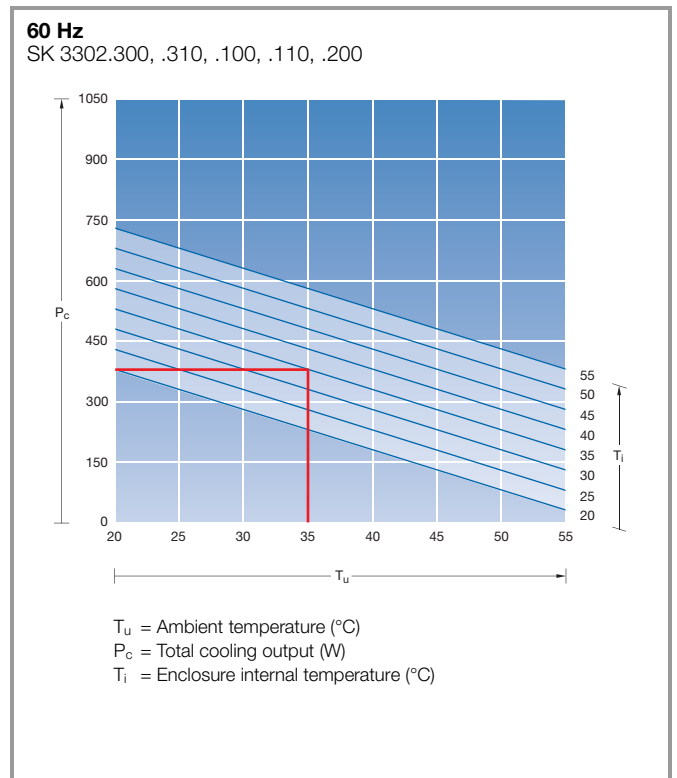
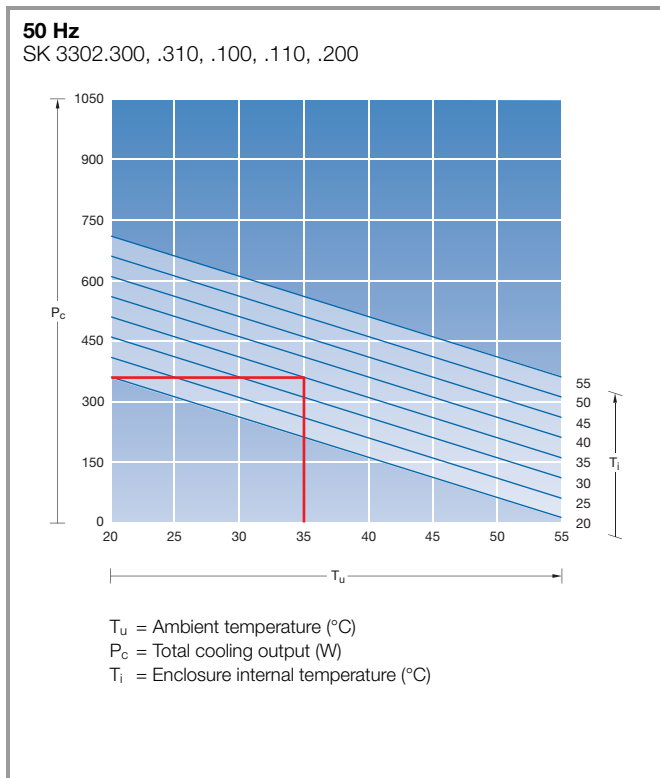


Heating output



TopTherm wall-mounted cooling units

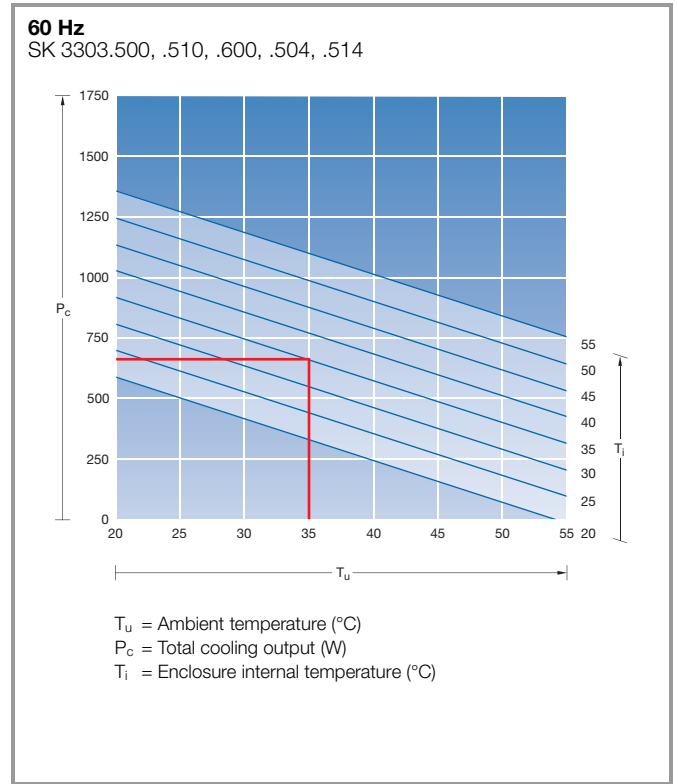
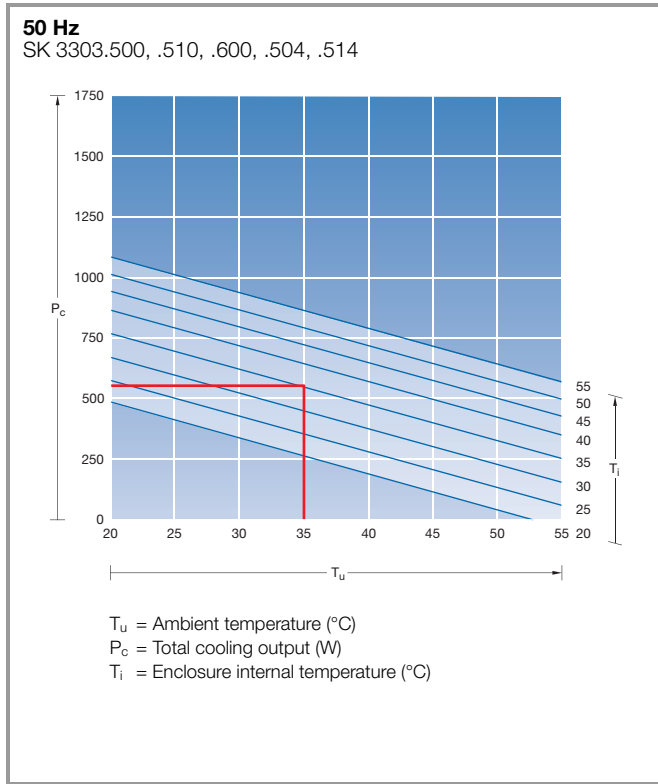
Output class 300 W (115/230 V, 1~)



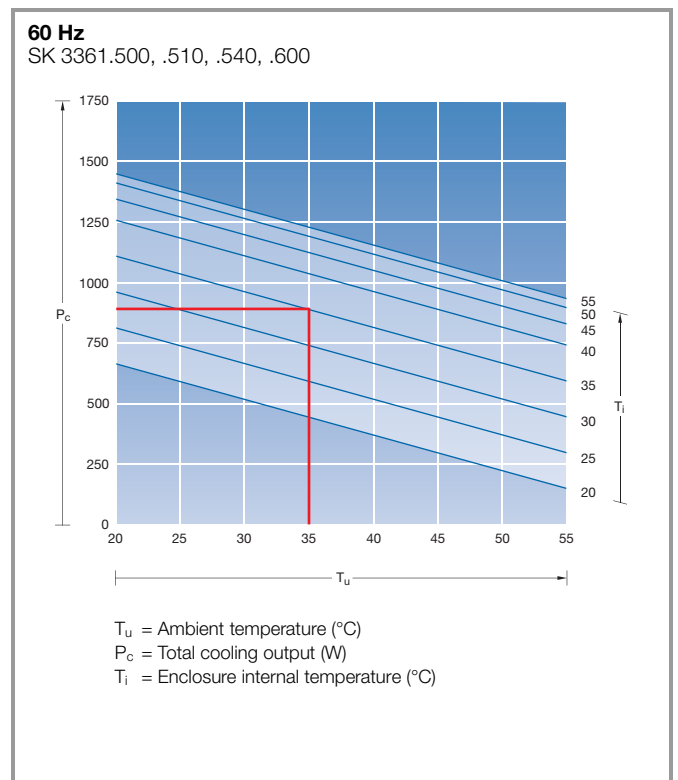
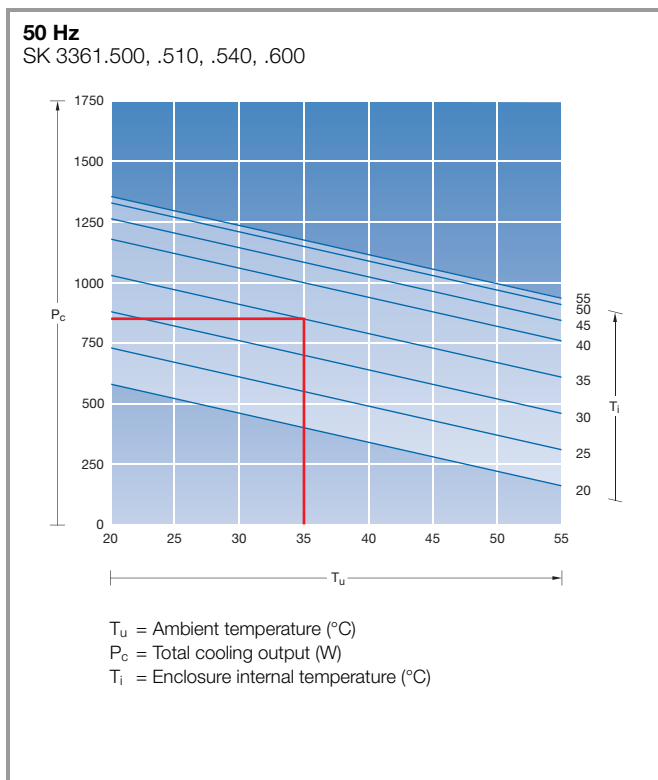
Cooling units

TopTherm wall-mounted cooling units "Blue e"

Output class 500 W (115/230 V, 1~)

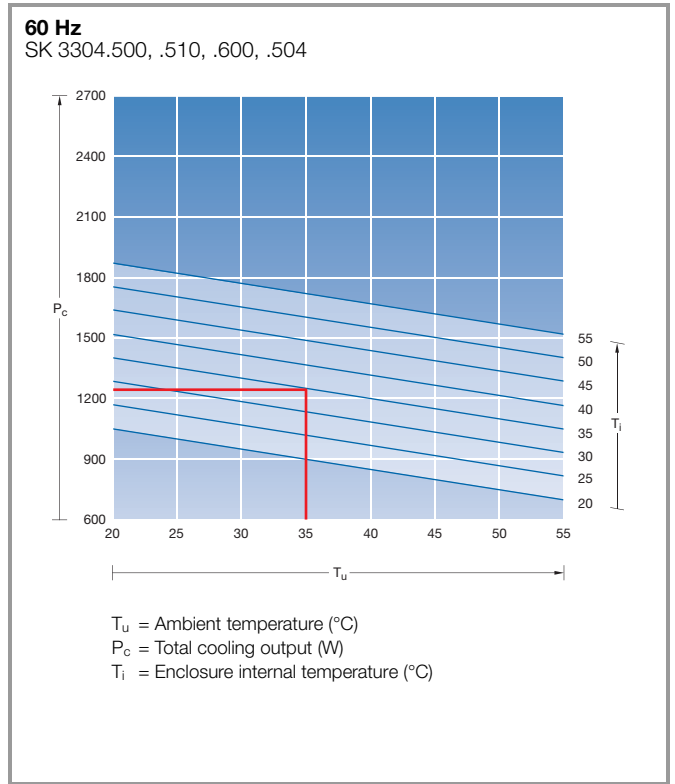
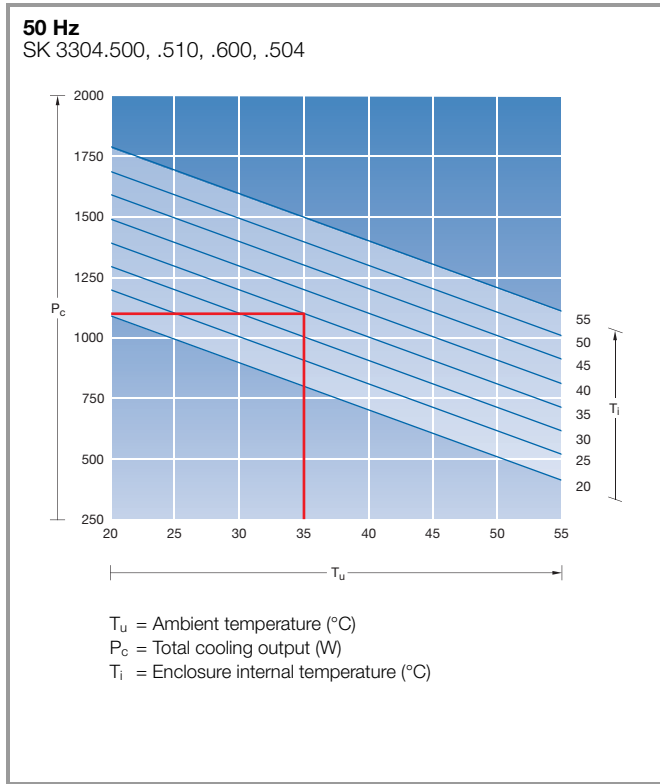


Output class 750 W (115/230 V, 1~, 400 V, 2~)

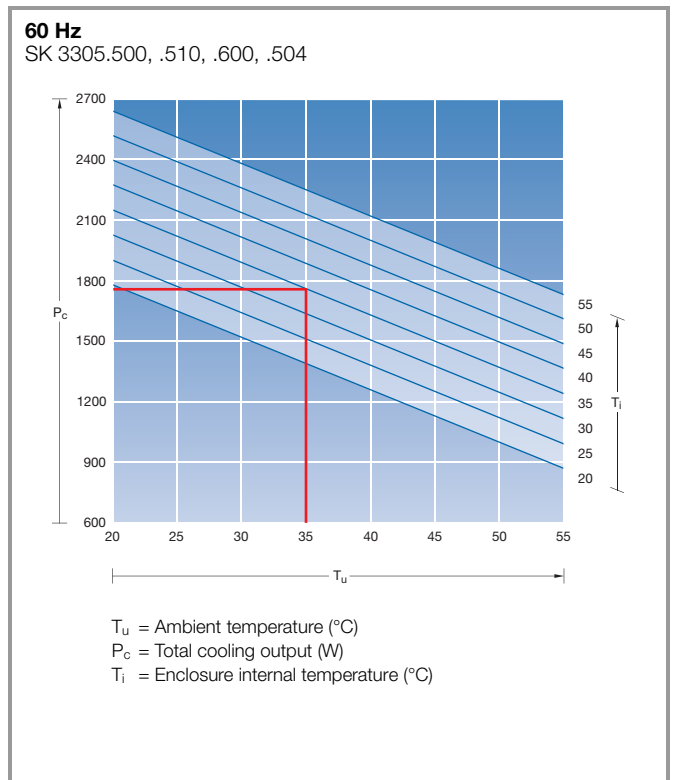
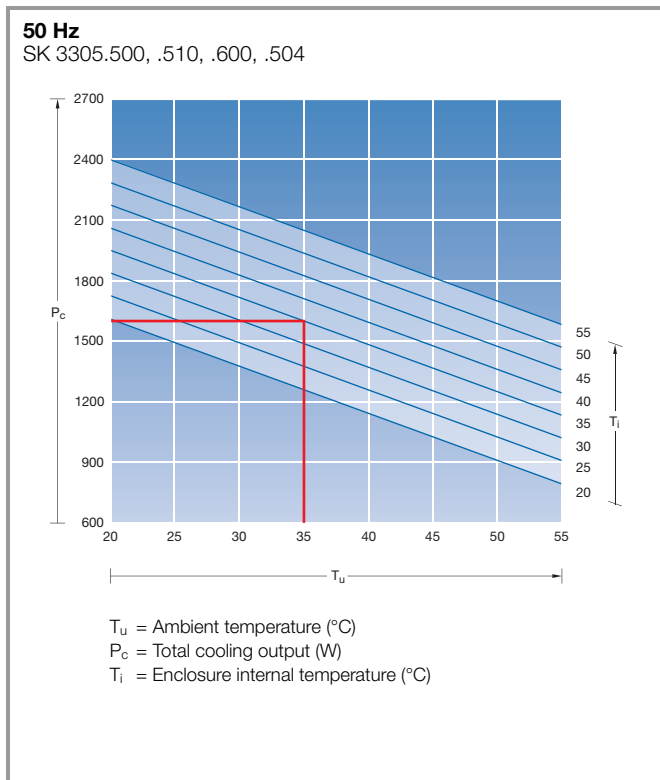


TopTherm wall-mounted cooling units "Blue e"

Output class 1000 W (115/230 V, 1~)



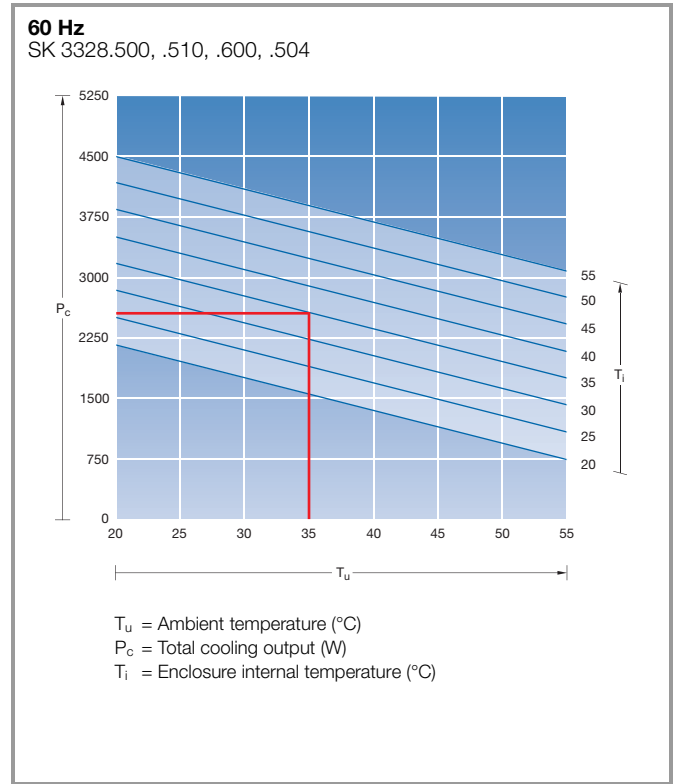
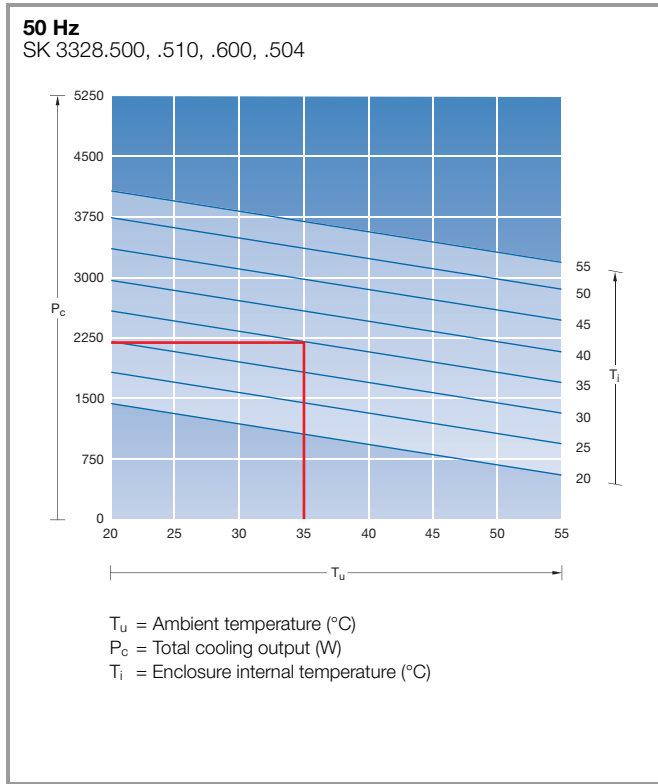
Output class 1500 W (115/230 V, 1~)



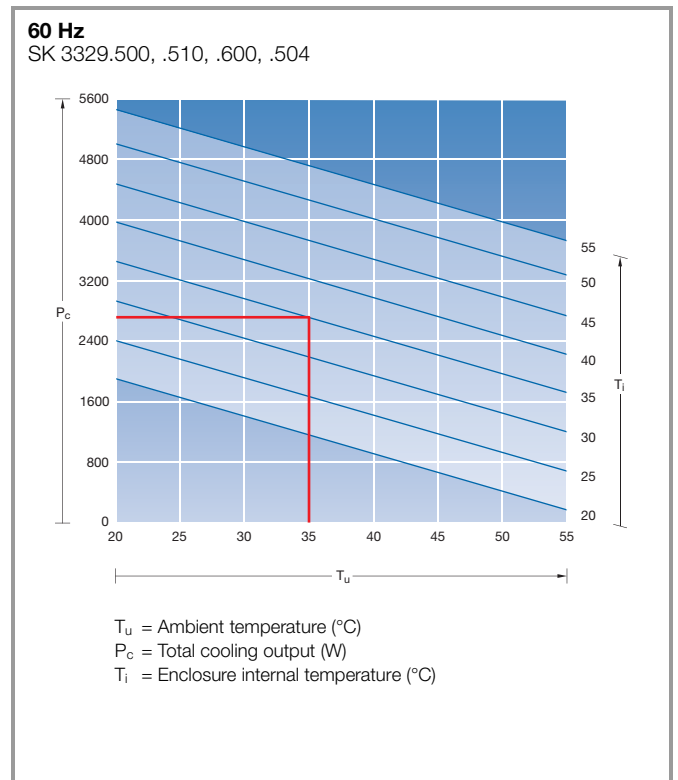
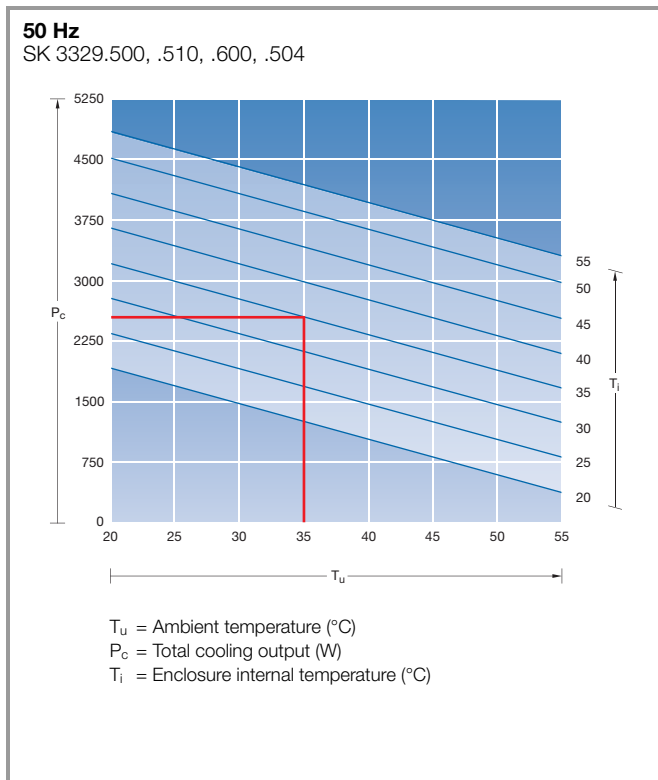
Cooling units

TopTherm wall-mounted cooling units "Blue e"

Output class 2000 W (115/230 V, 1~)

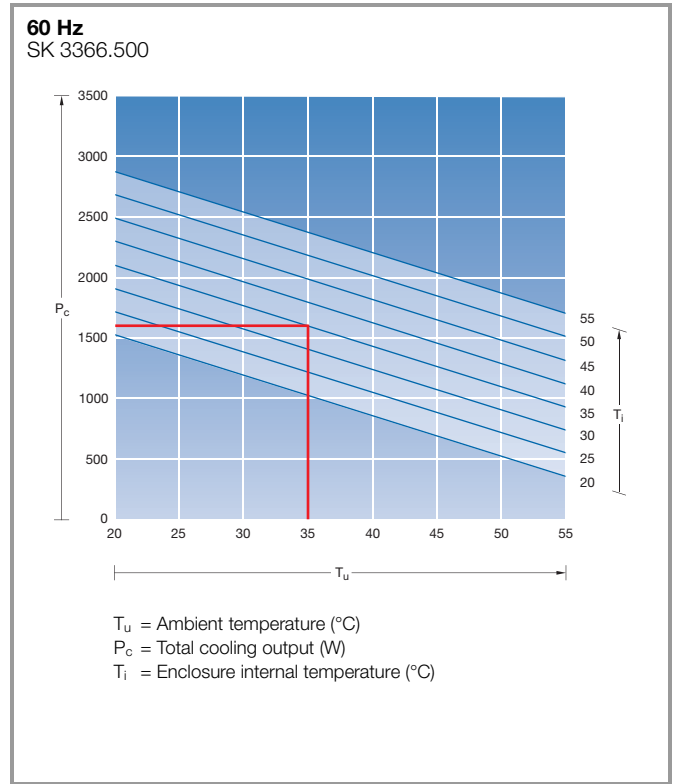
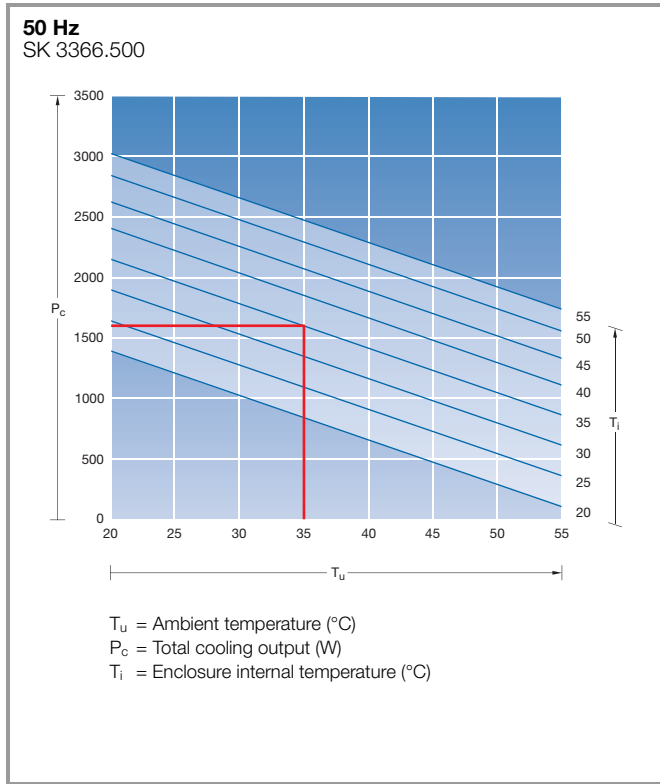


Output class 2500 W (115/230 V, 1~)

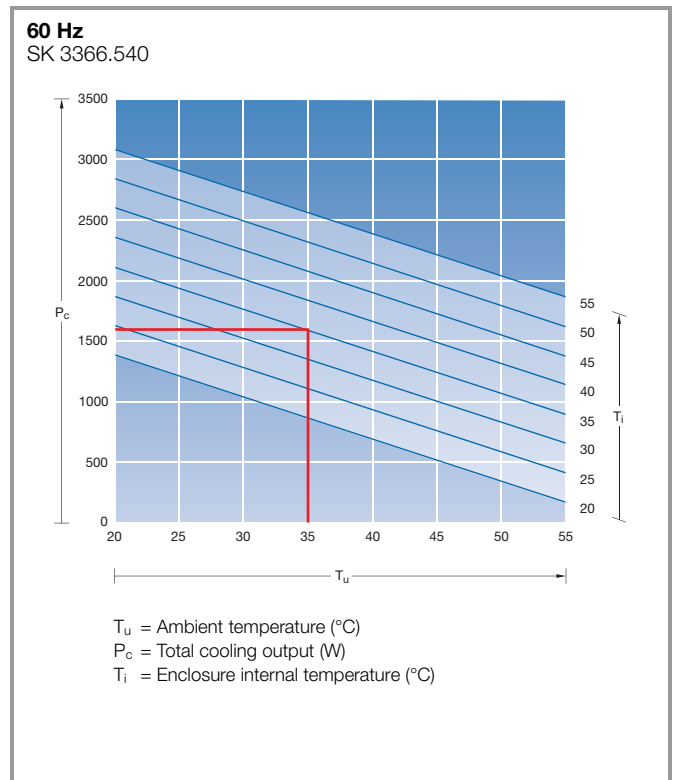
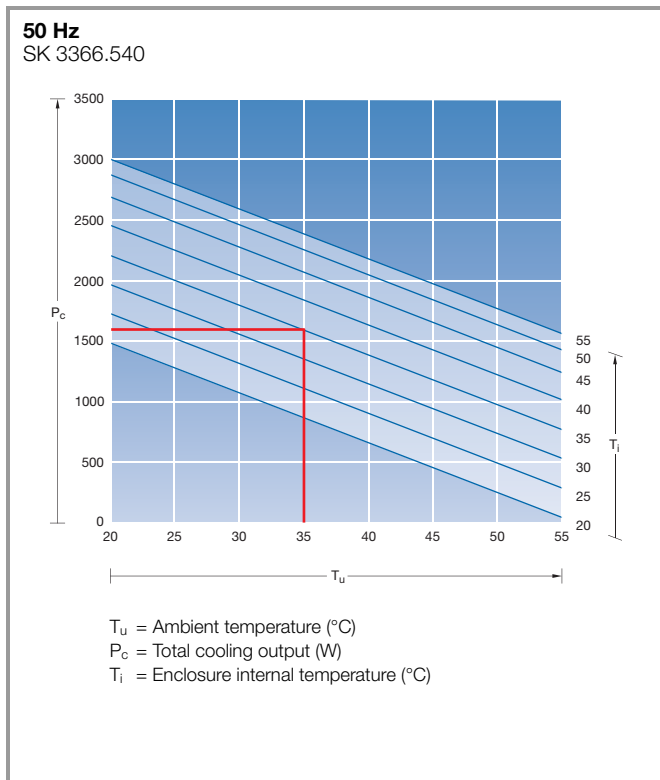


TopTherm wall-mounted cooling units "Blue e", slimline

Output class 1500 W (230 V, 1~)



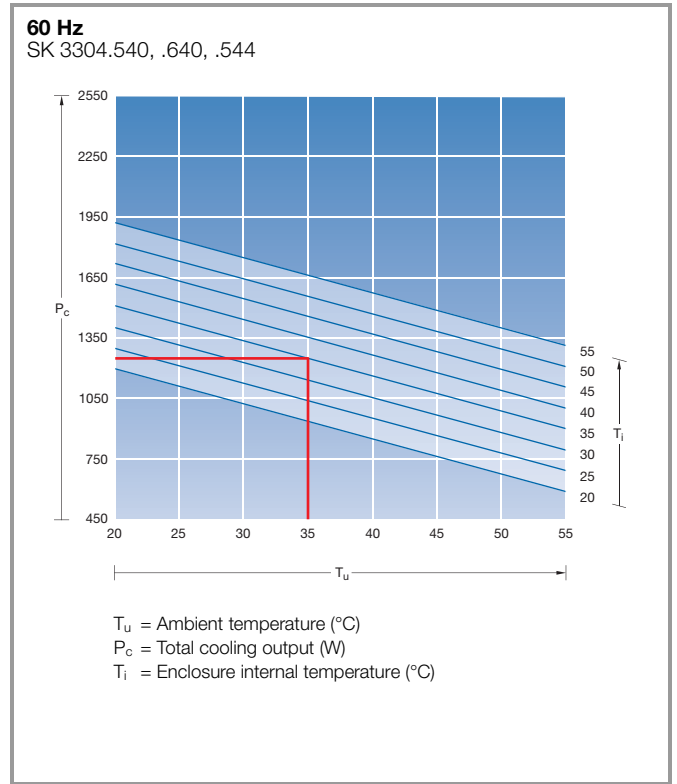
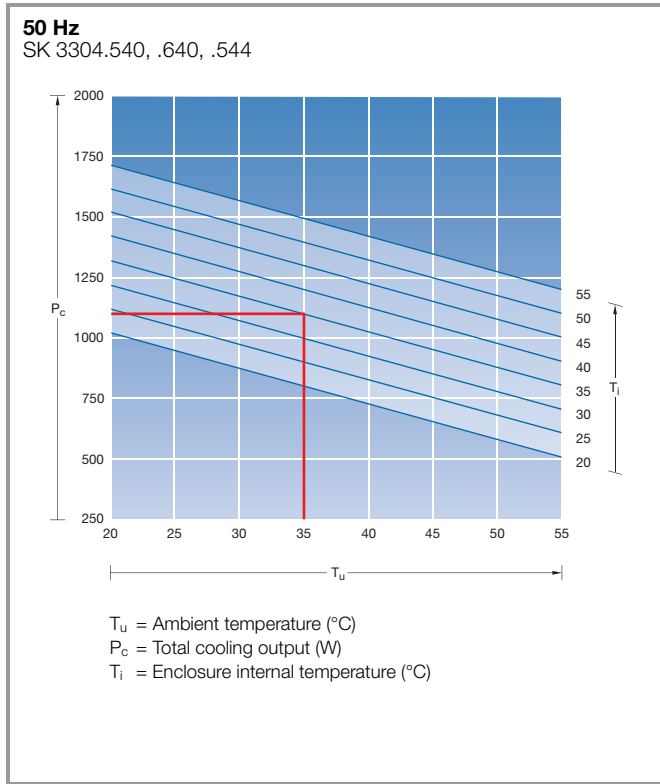
Output class 1500 W (400/460 V, 3~)



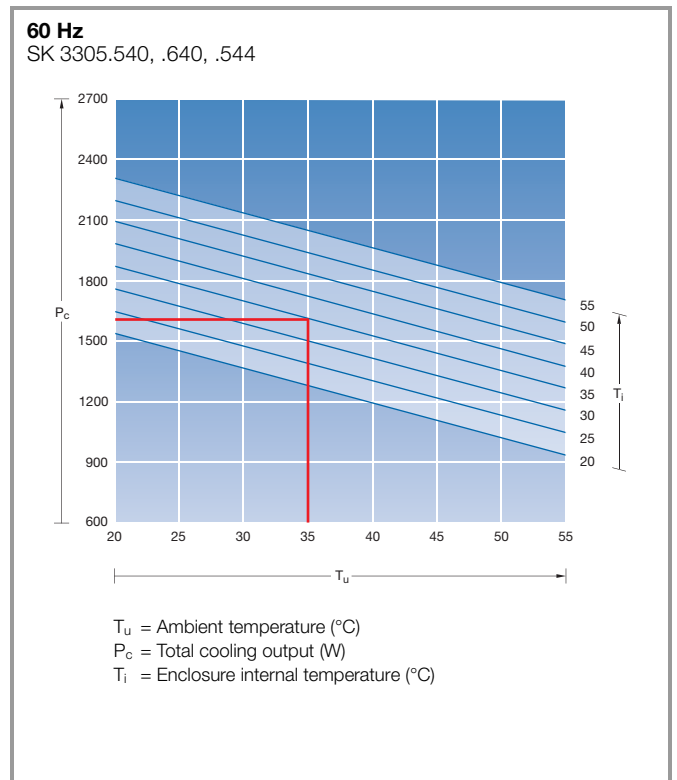
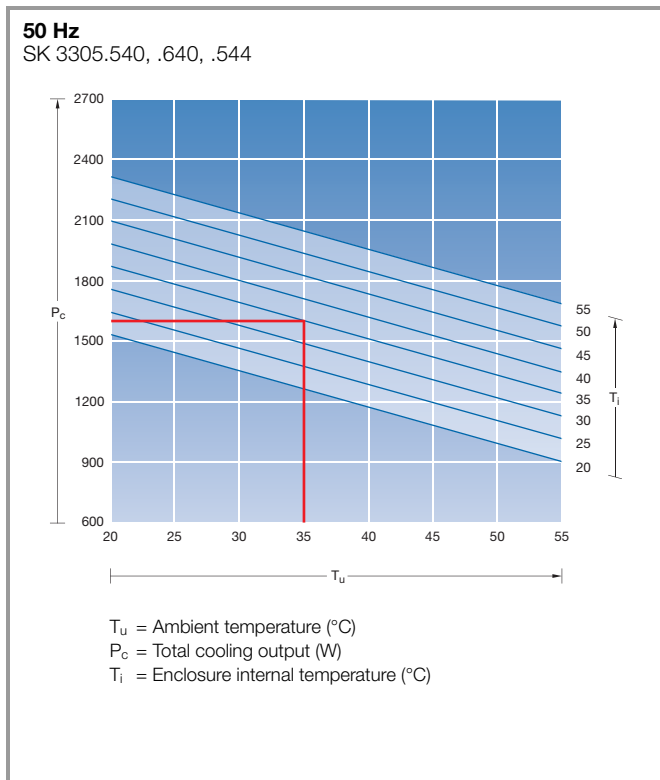
Cooling units

TopTherm wall-mounted cooling units "Blue e"

Output class 1000 W (400/460 V, 3~)

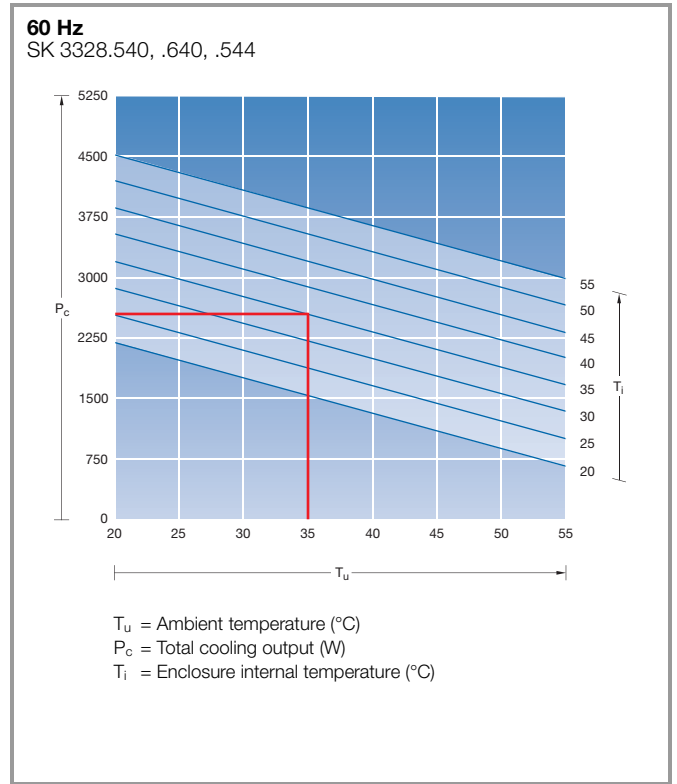
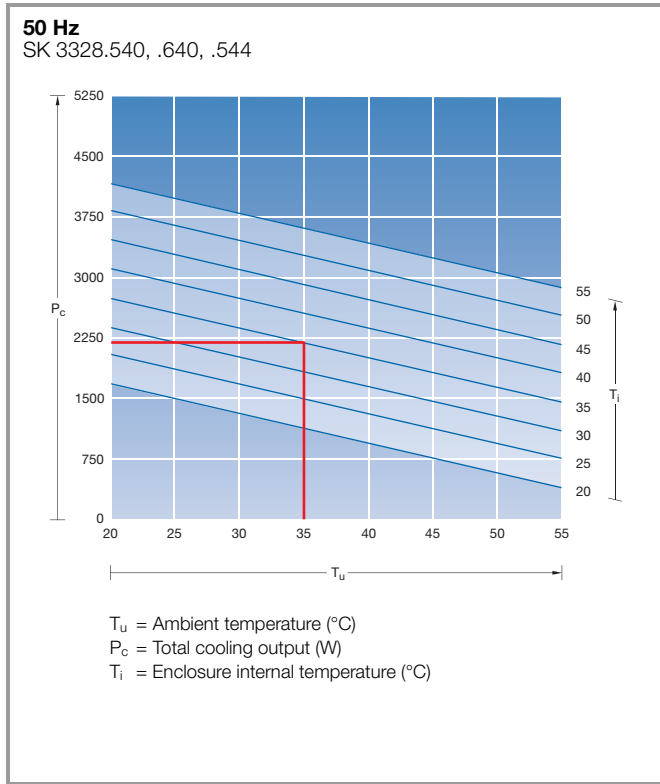


Output class 1500 W (400/460 V, 3~)

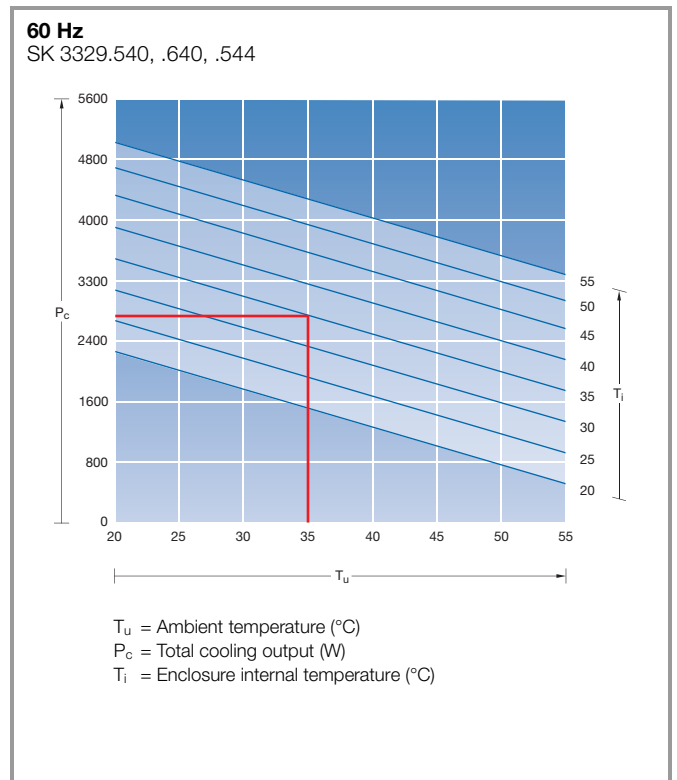
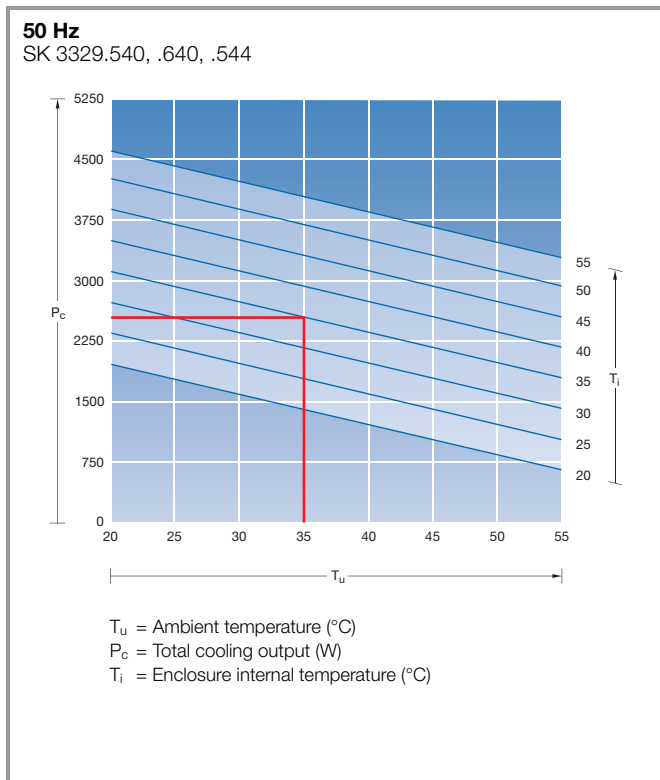


TopTherm wall-mounted cooling units "Blue e"

Output class 2000 W (400/460 V, 3~)



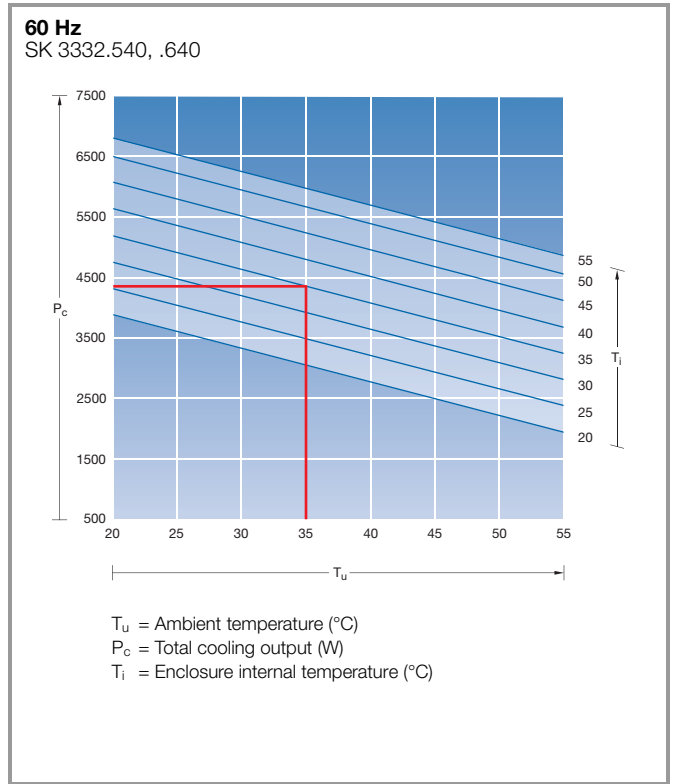
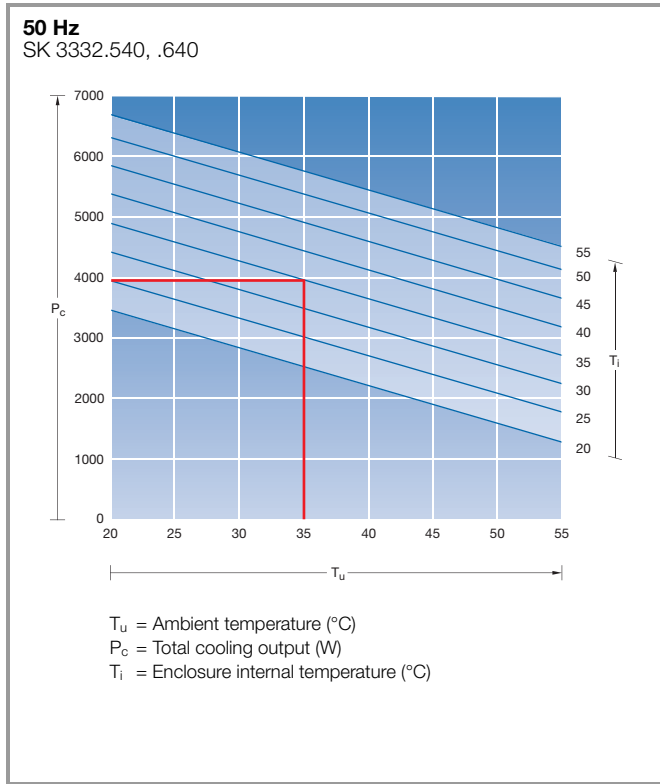
Output class 2500 W (400/460 V, 3~)



Cooling units

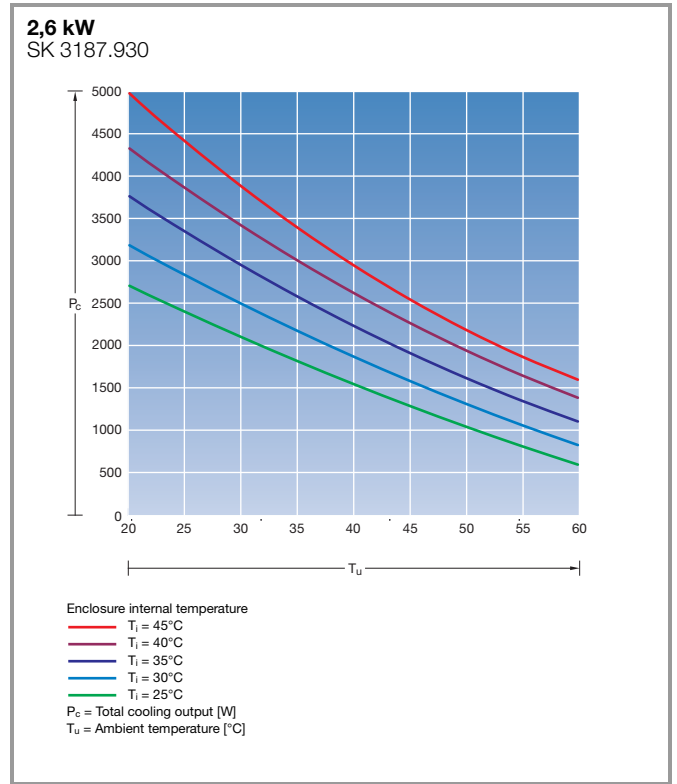
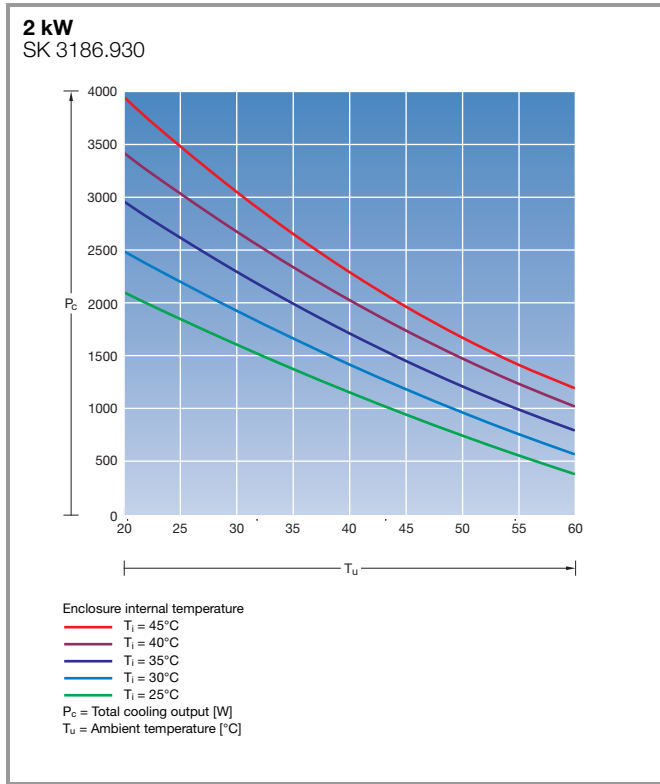
TopTherm wall-mounted cooling units "Blue e"

Output class 4000 W (400/460 V, 3~)

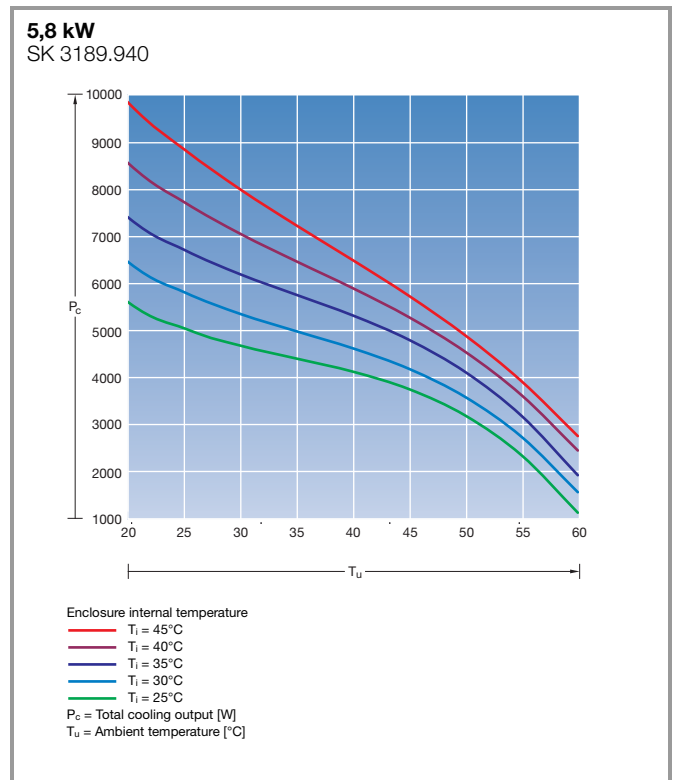
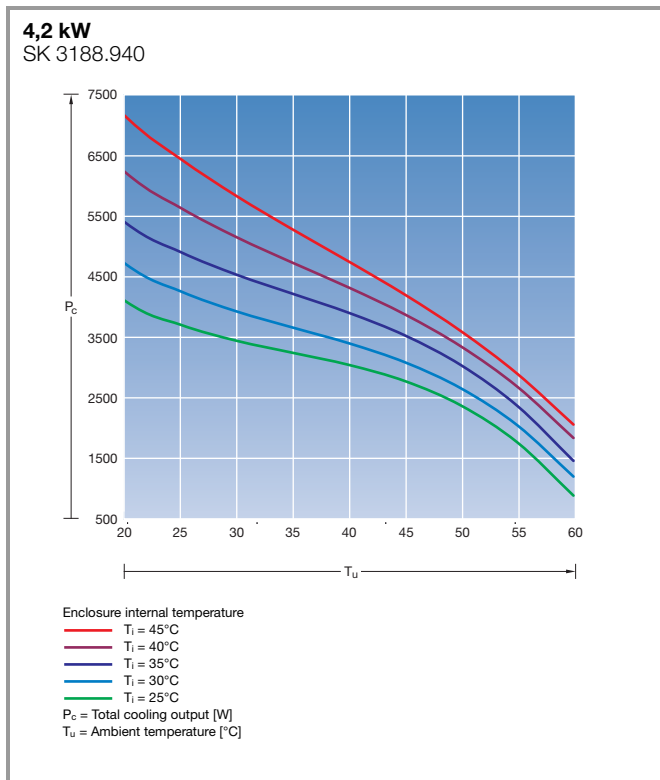


TopTherm wall-mounted cooling units "Blue e+"

Output class 2000/2600 W (110 - 240 V, 1 ~, 50 - 60 Hz / 380 - 480 V, 3 ~, 50 - 60 Hz)



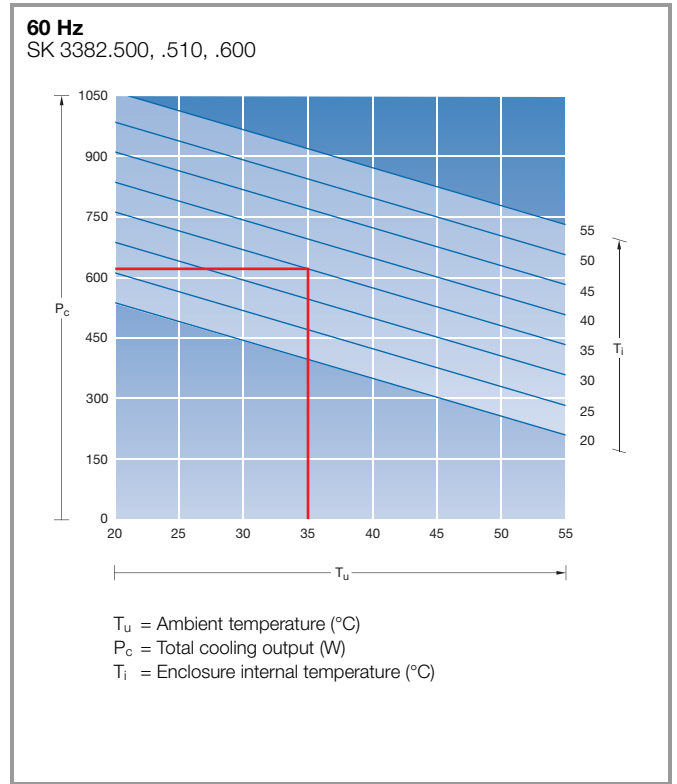
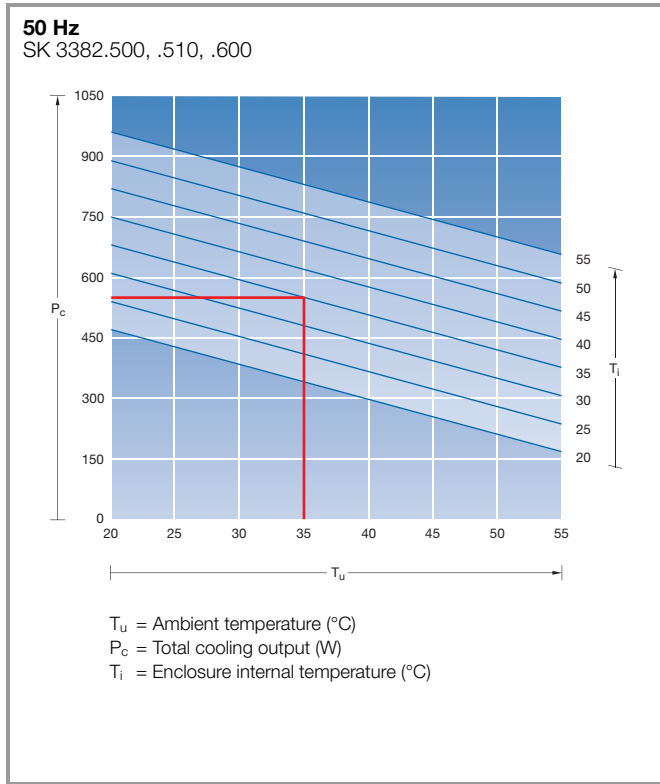
Output class 4200/5800 W (380 - 480 V, 3 ~, 50 - 60 Hz)



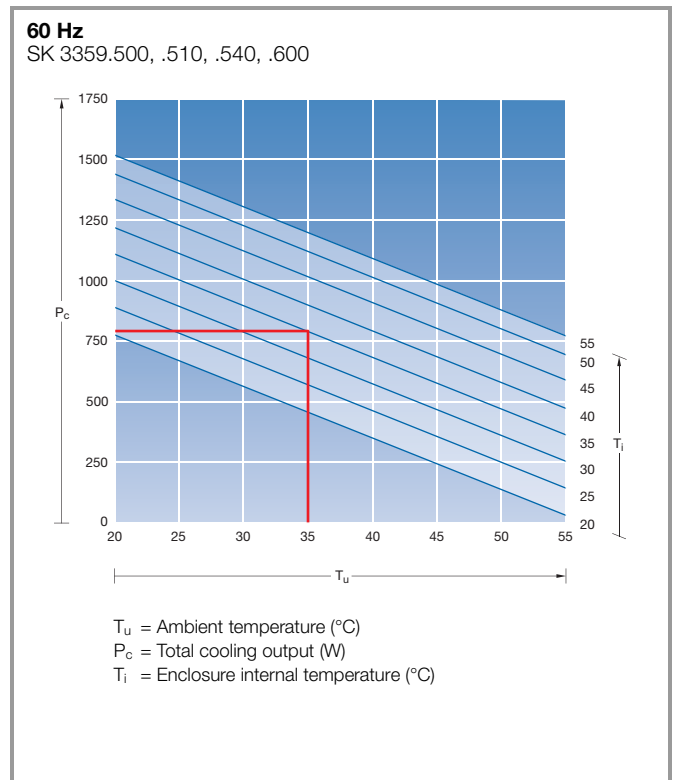
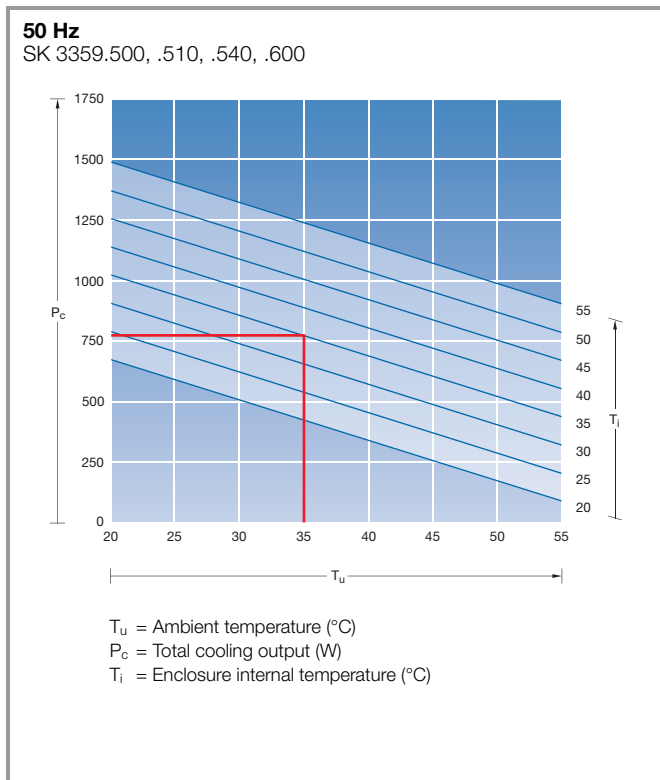
Cooling units

TopTherm roof-mounted cooling units "Blue e"

Output class 500 W (115/230 V, 1~)



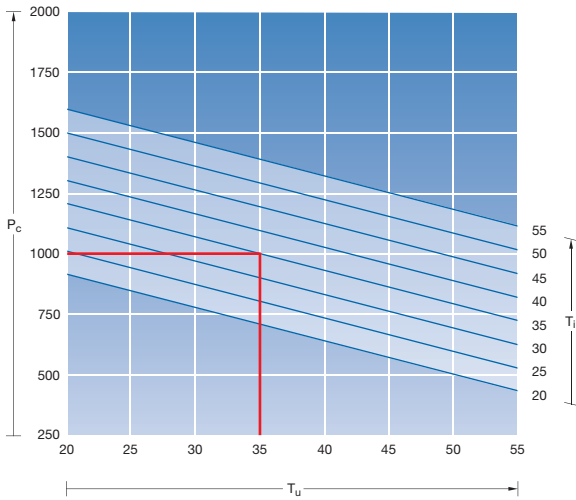
Output class 750 W (115/230 V, 1~, 400 V, 2~)



TopTherm roof-mounted cooling units "Blue e"

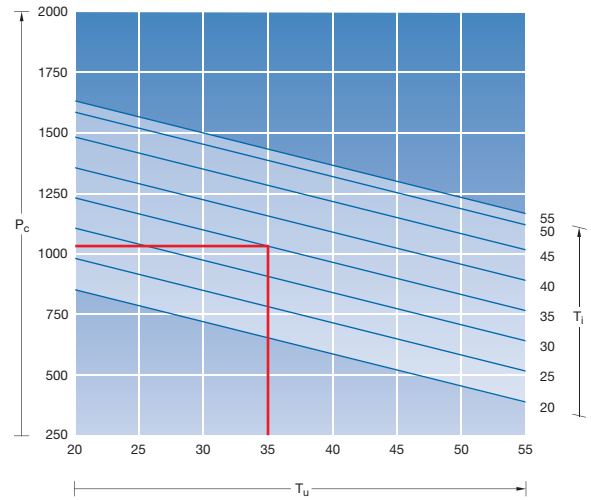
Output class 1000 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3383.500, .510, .540, .600



T_u = Ambient temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

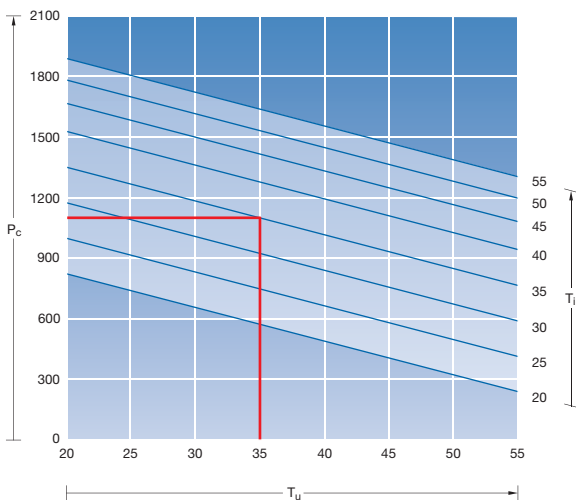
60 Hz
SK 3383.500, .510, .540, .600



T_u = Ambient temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

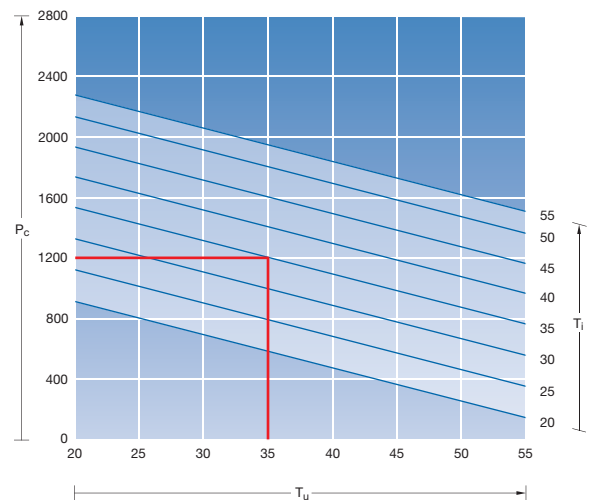
Output class 1100 W (115/230 V, 1~)

50 Hz
SK 3273.500, .515



T_u = Ambient temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

60 Hz
SK 3273.500, .515

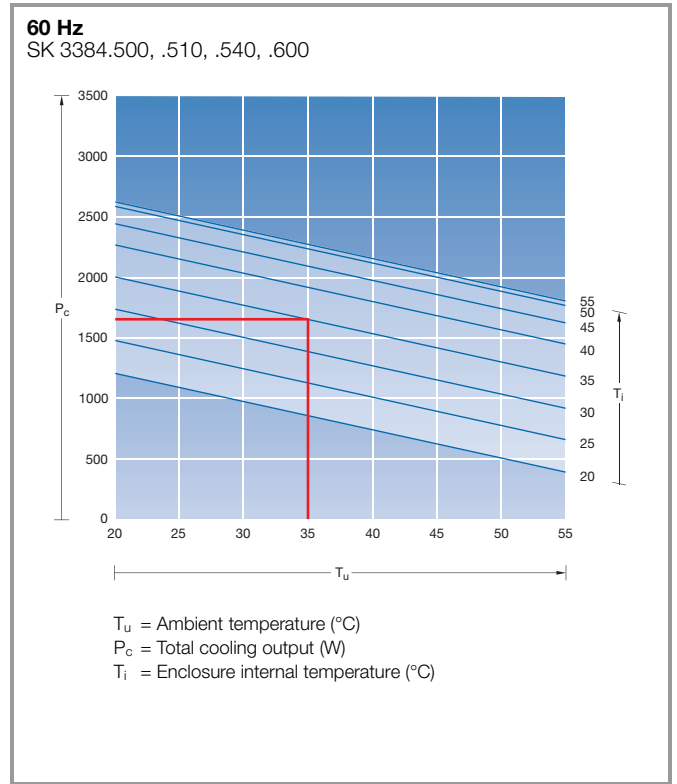
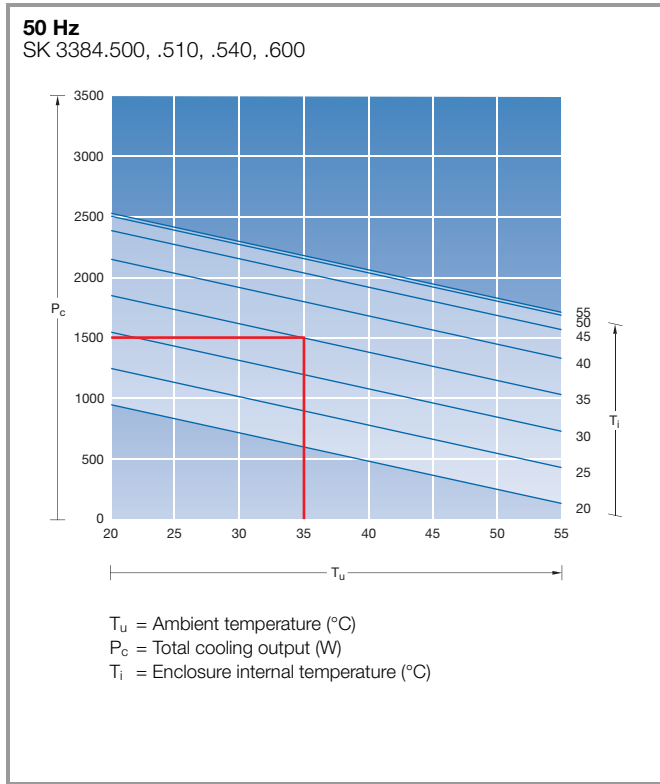


T_u = Ambient temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

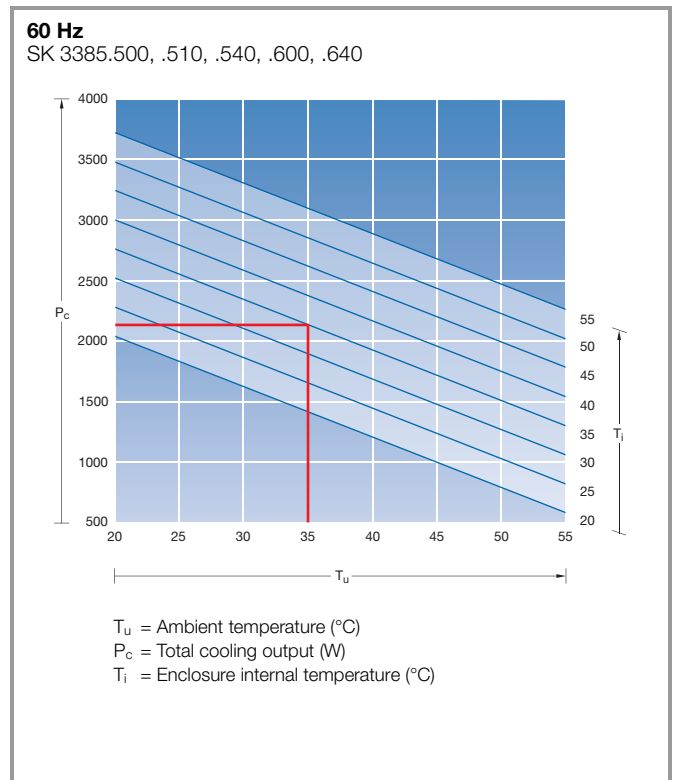
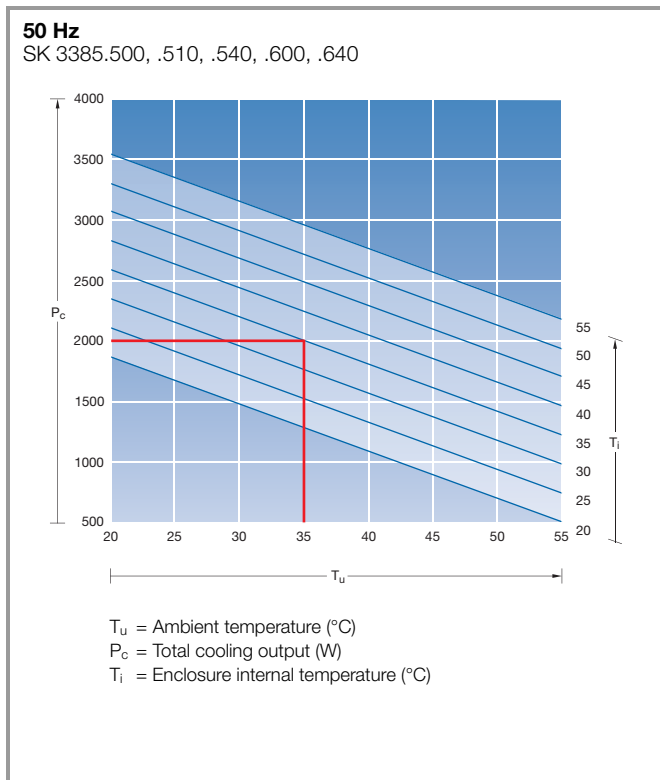
Cooling units

TopTherm roof-mounted cooling units "Blue e"

Output class 1500 W (115/230 V, 1~, 400 V, 2~)

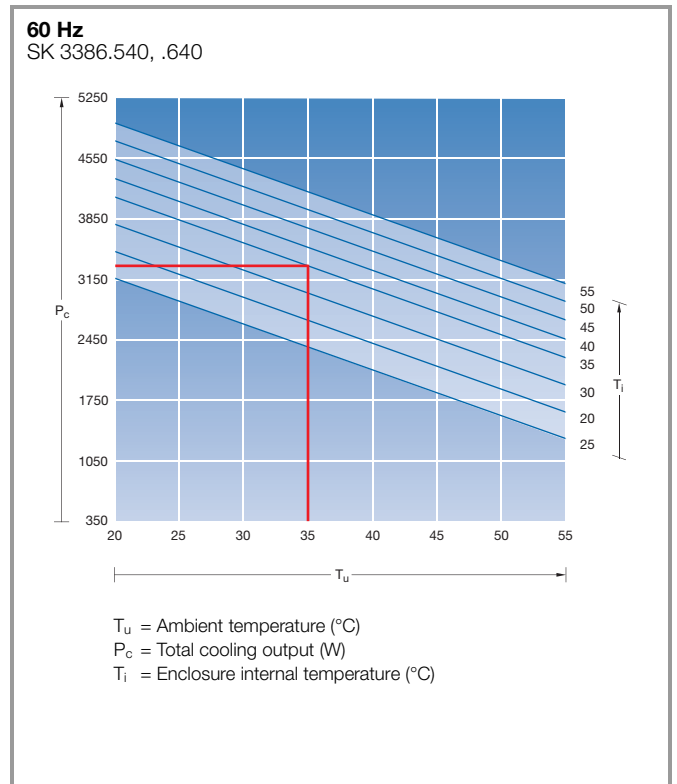
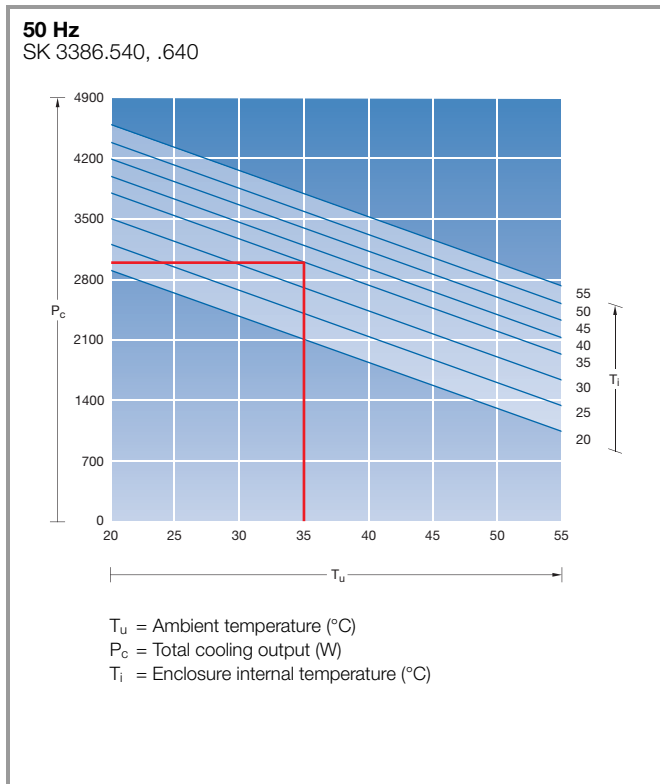


Output class 2000 W (115/230 V, 1~, 400 V, 2~)

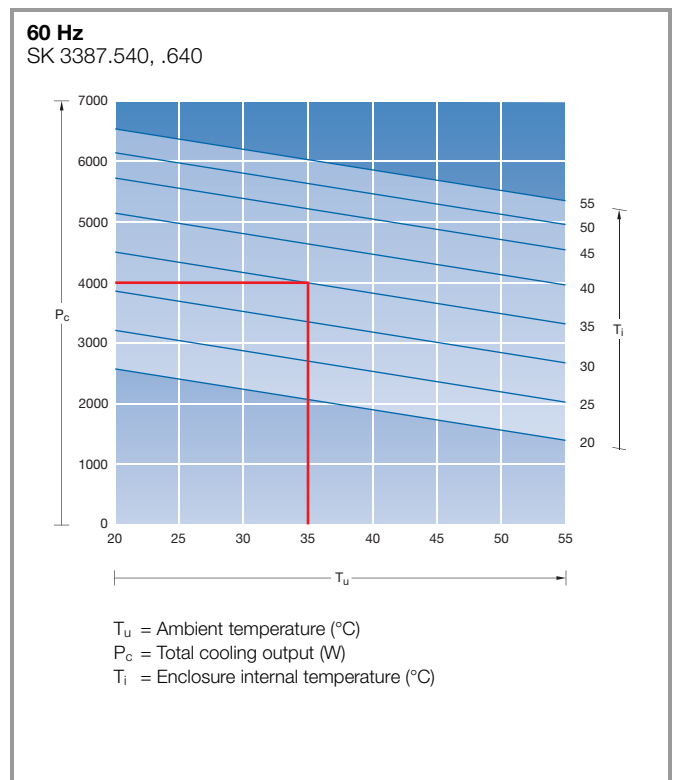
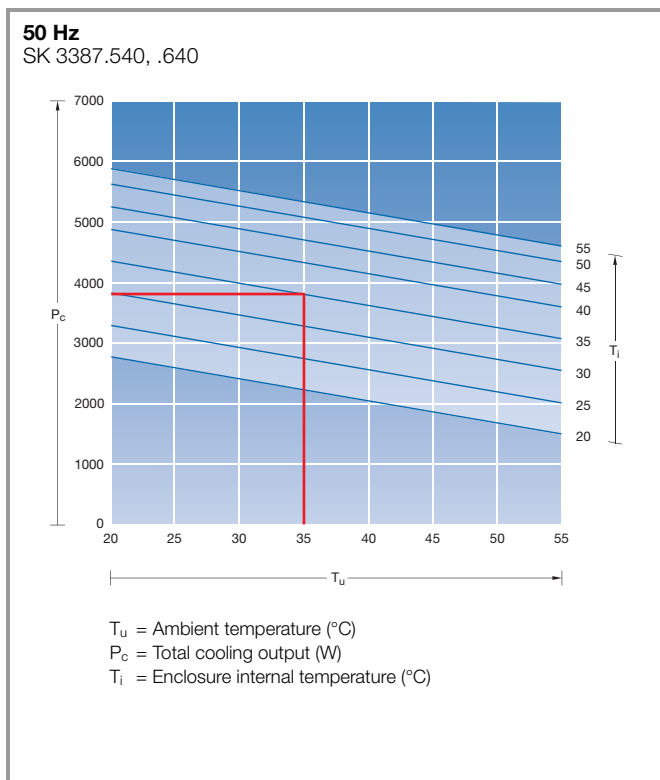


TopTherm roof-mounted cooling units "Blue e"

Output class 3000 W (400/460 V, 3~)



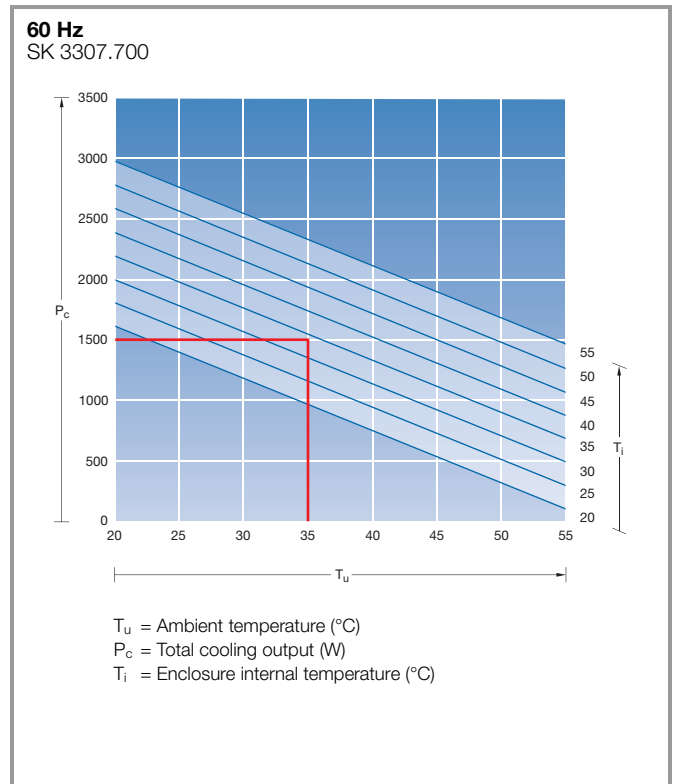
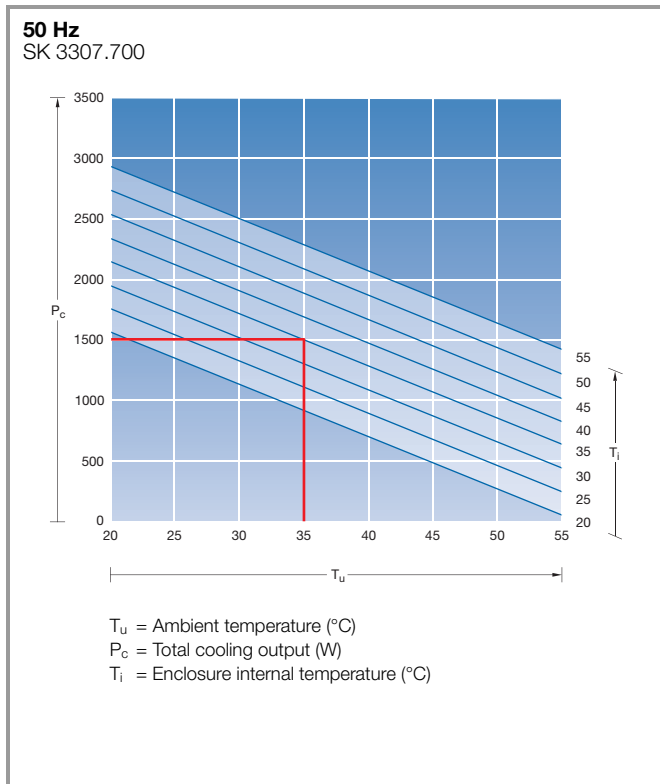
Output class 4000 W (400/460 V, 3~)



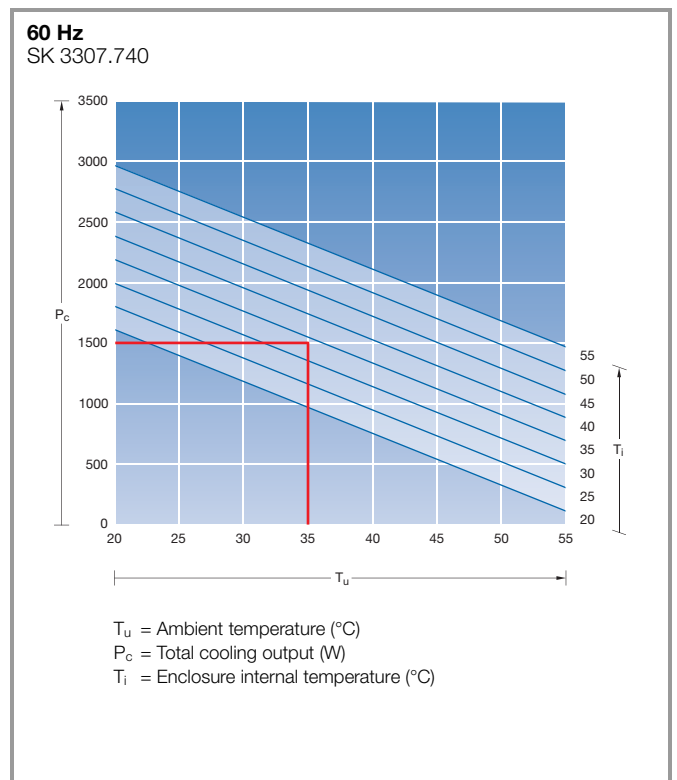
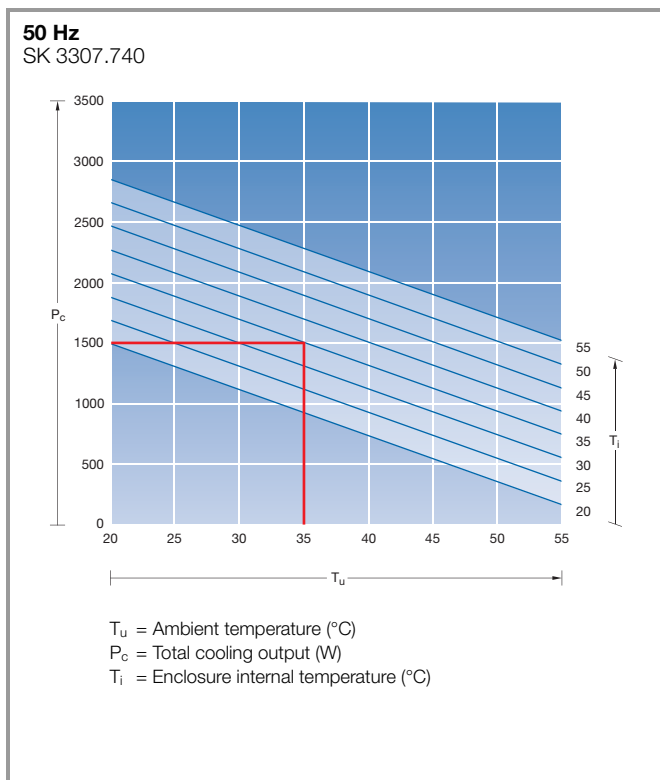
Cooling units

Modular climate control concept – Cooling module “Blue e”

Output class 1500 W (230 V, 1~)

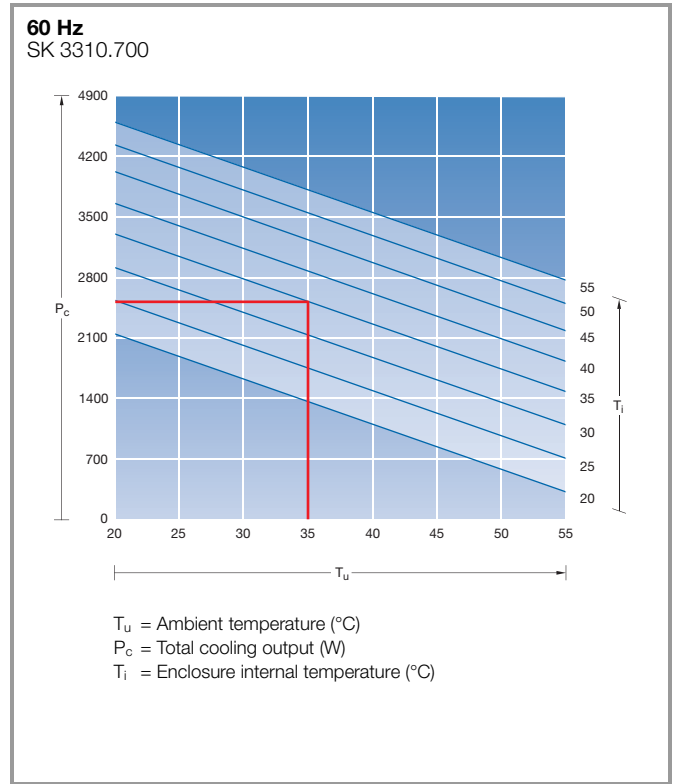
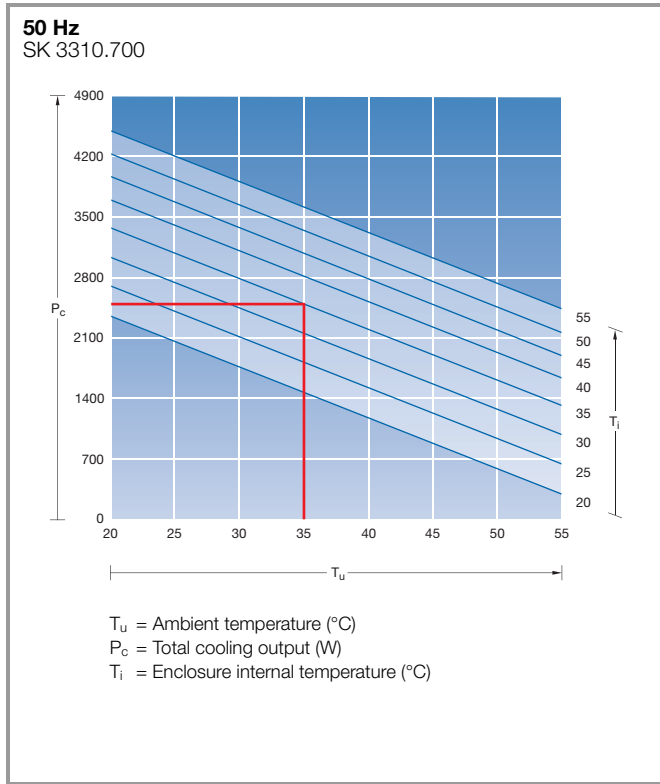


Output class 1500 W (400/460 V, 3~)

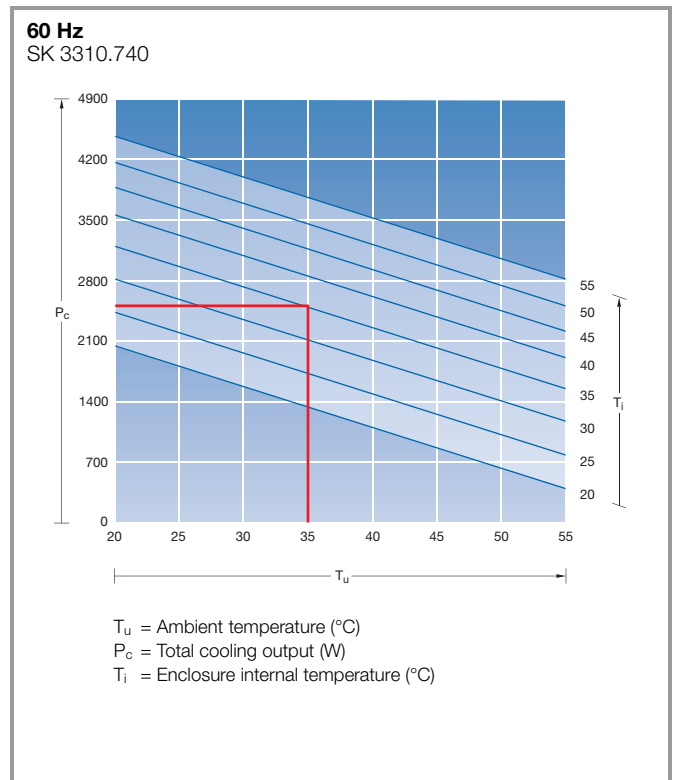
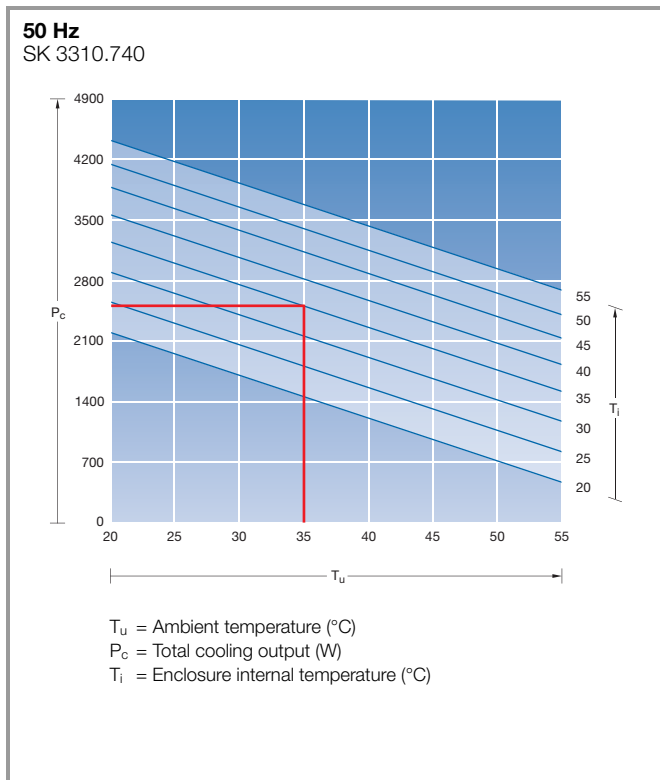


Modular climate control concept – Cooling module “Blue e”

Output class 2500 W (230 V, 1~)



Output class 2500 W (400/460 V, 3~)



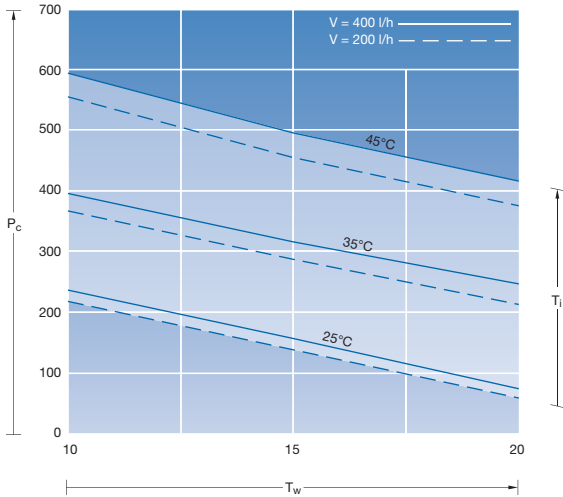
Cooling with water

Wall-mounted air/water heat exchangers

Output class 300 W

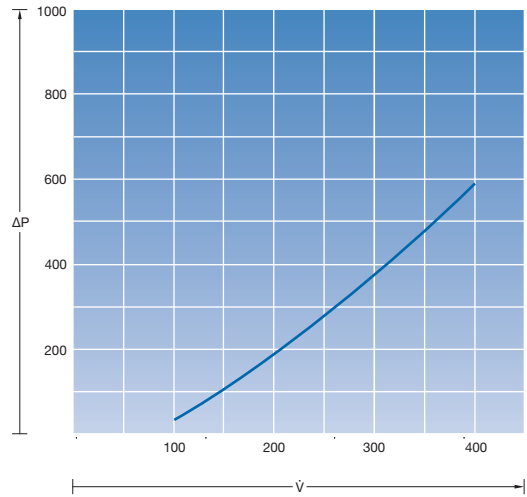
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3212.024, .115, .230



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3212.024, .115, .230

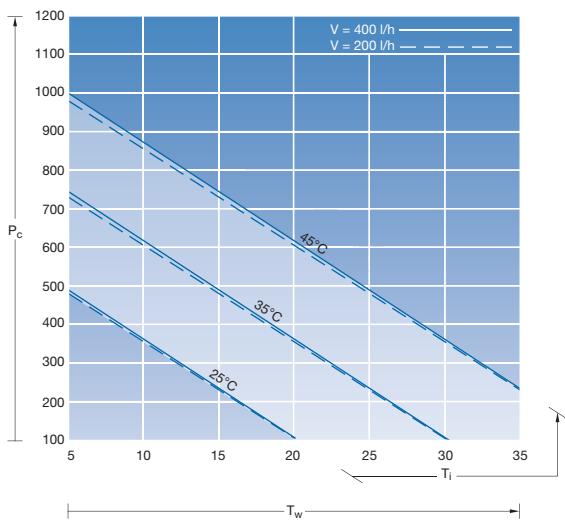


\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Output class 600 W

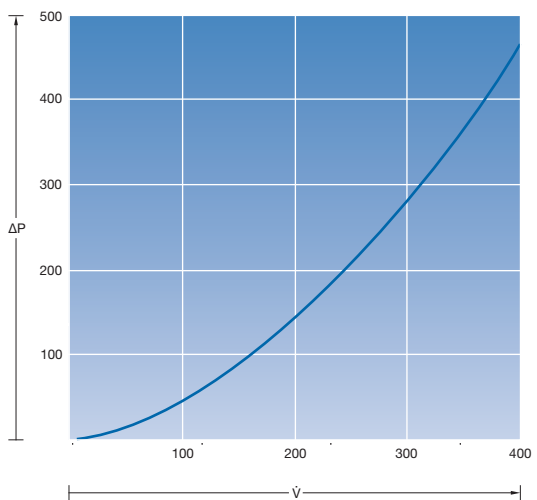
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3214.100



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3214.100

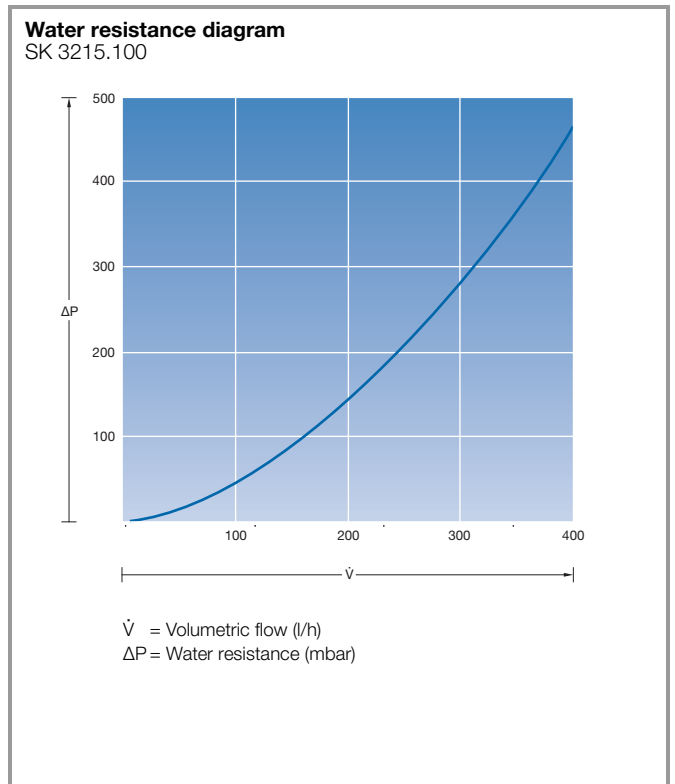
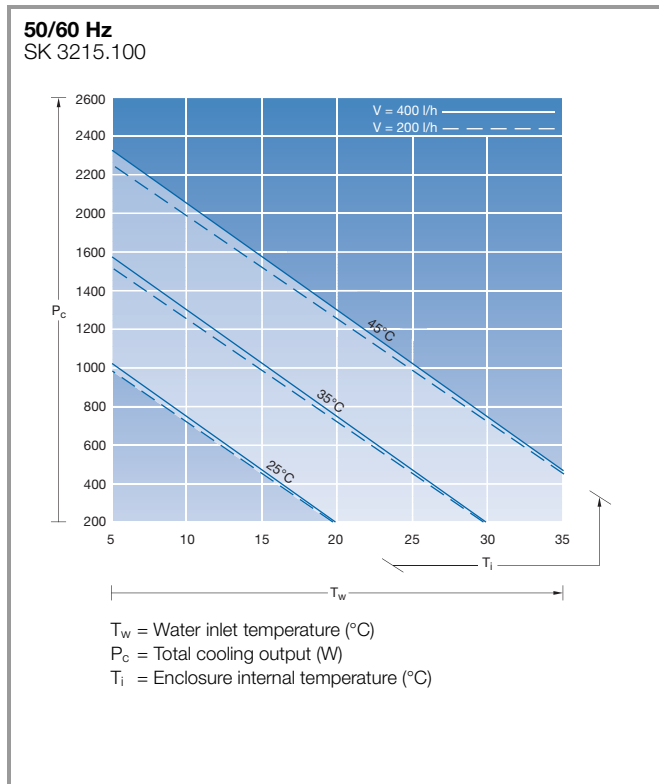


\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

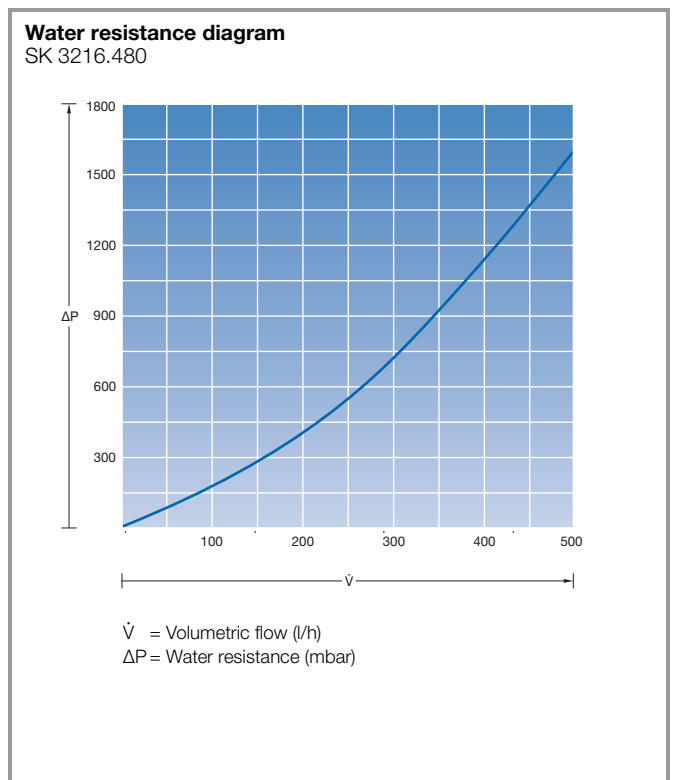
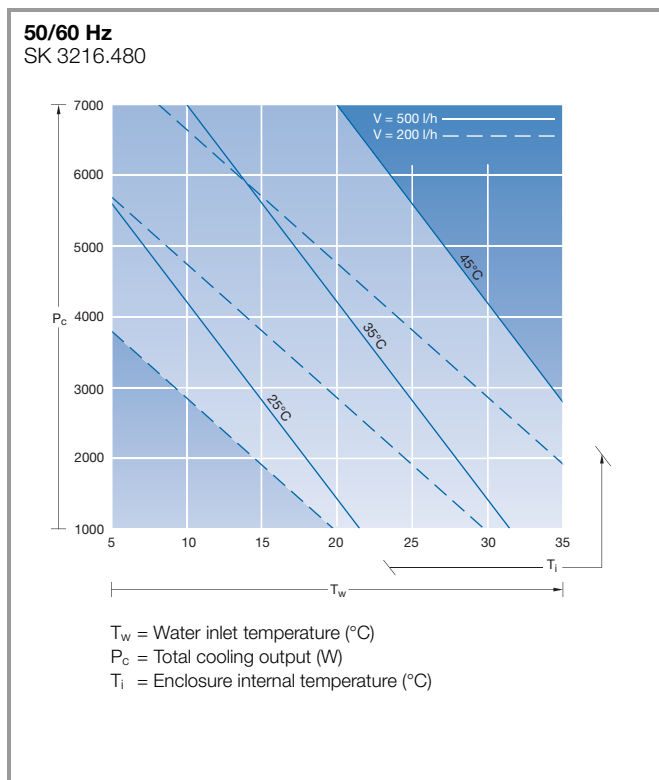
Output class 1250 W

Water-carrying parts: Copper/brass (Cu/CuZn)



Output class 7000 W

Water-carrying parts: Copper/brass (Cu/CuZn)



Cooling with water

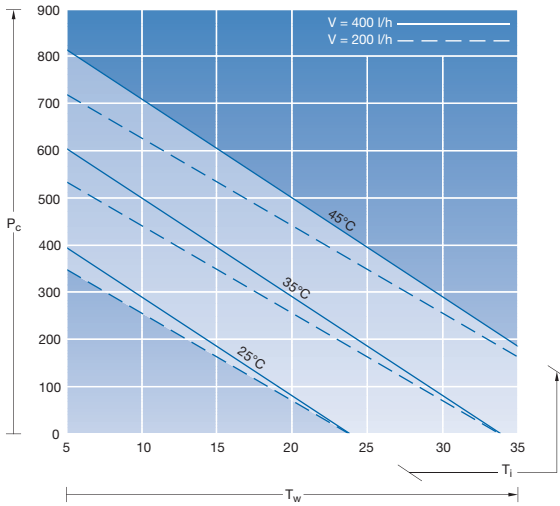
Wall-mounted air/water heat exchangers

Output class 500 W

Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz

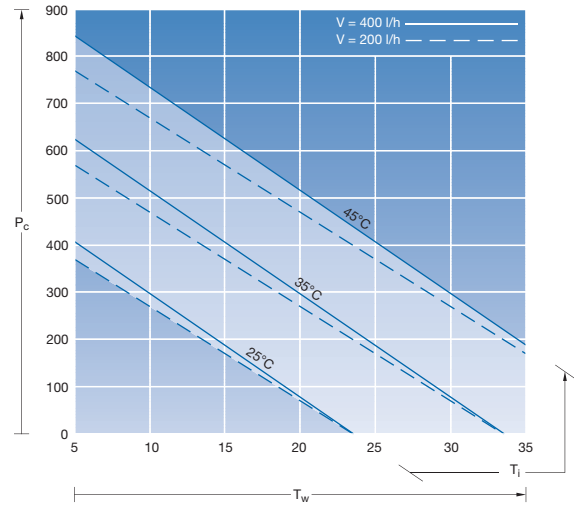
SK 3363.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

60 Hz

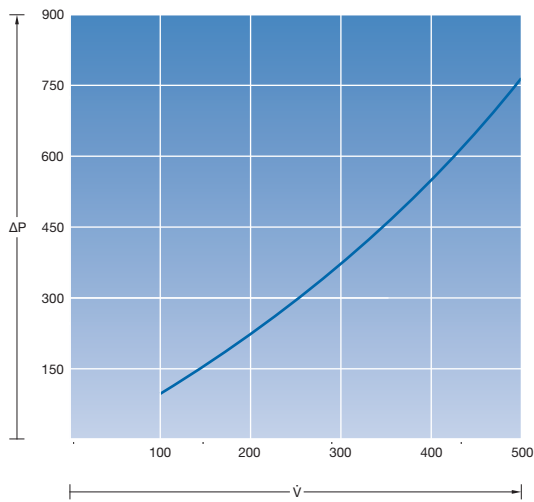
SK 3363.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3363.100, .500



\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

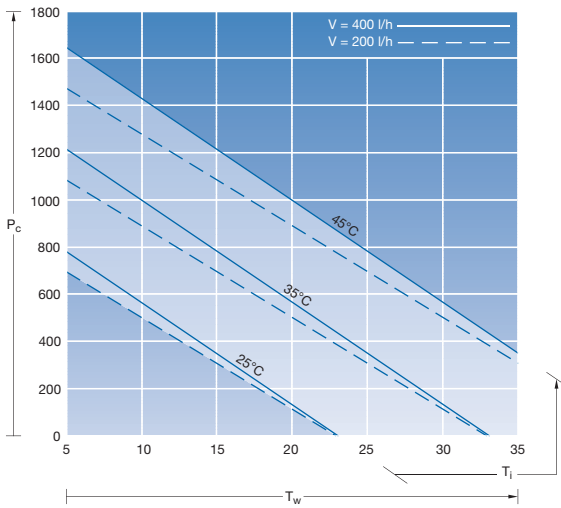
Wall-mounted air/water heat exchangers

Output class 1000 W

Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz

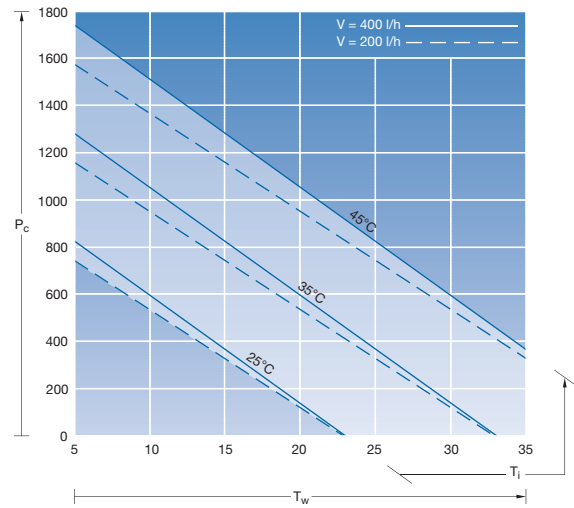
SK 3364.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

60 Hz

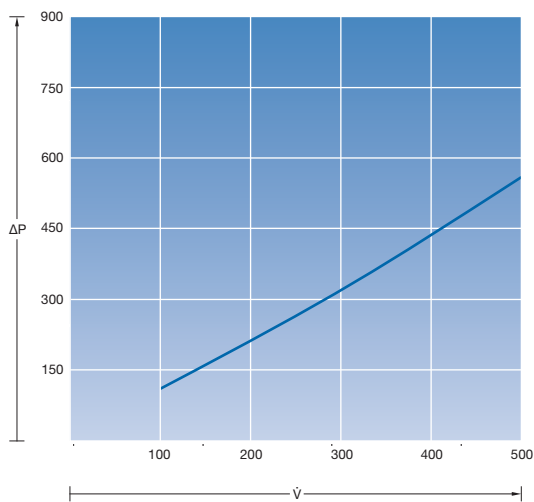
SK 3364.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3364.100, .500



\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

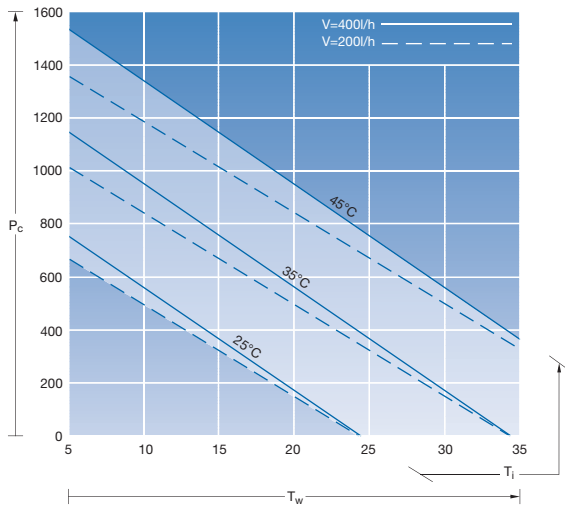
Cooling with water

Wall-mounted air/water heat exchangers

Output class 1000 W

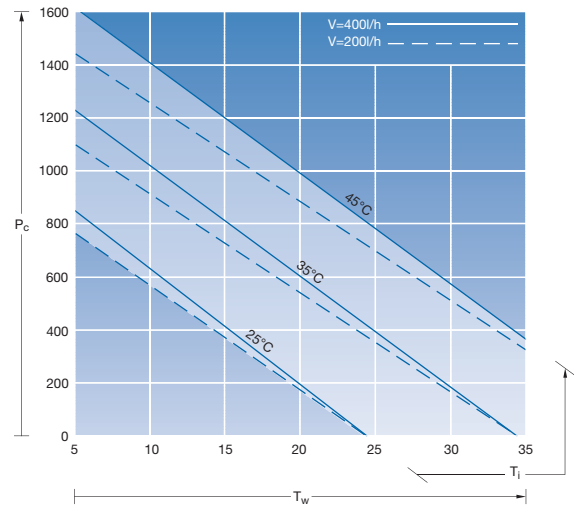
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3364.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

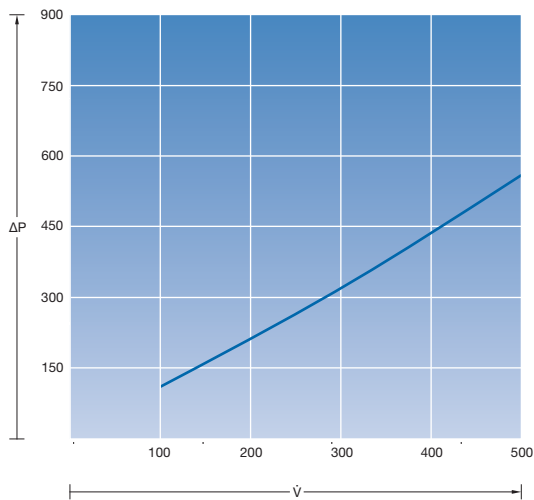
60 Hz
SK 3364.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3364.504



\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

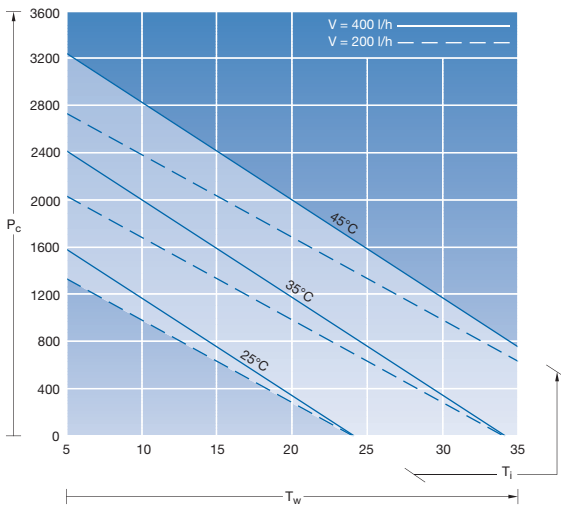
Wall-mounted air/water heat exchangers

Output class 2000 W

Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz

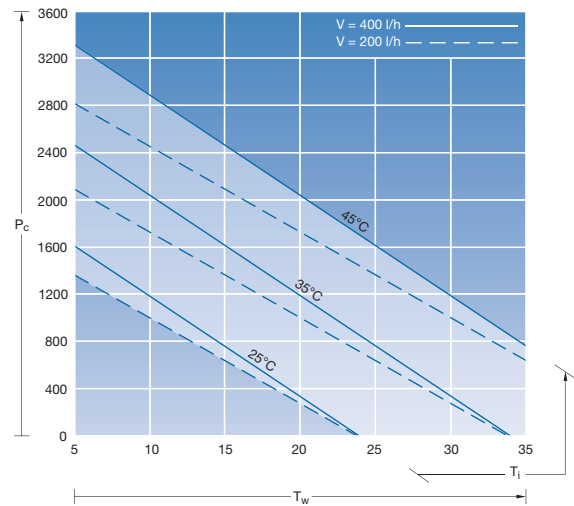
SK 3373.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

60 Hz

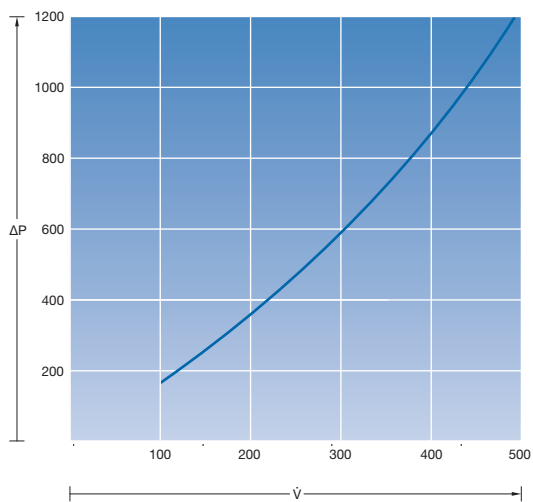
SK 3373.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3373.100, .500



\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Cooling with water

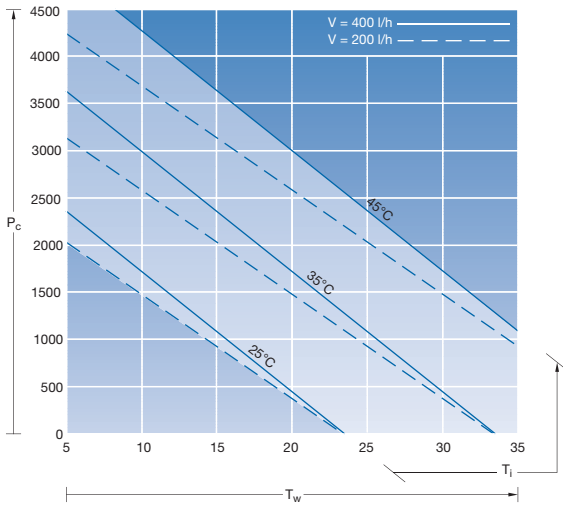
Wall-mounted air/water heat exchangers

Output class 3000 W

Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz

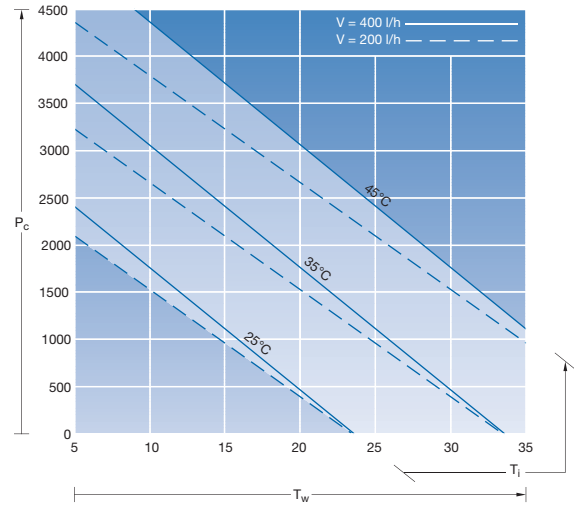
SK 3374.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

60 Hz

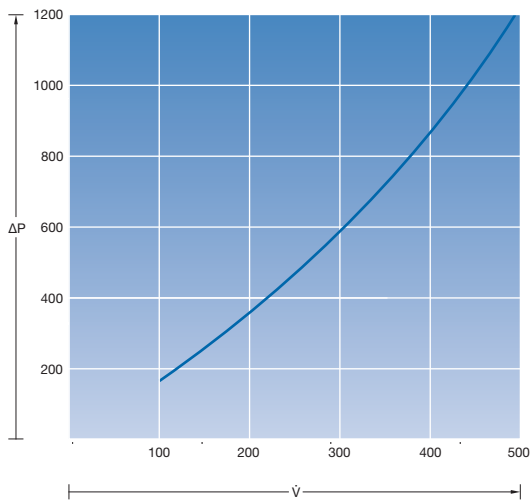
SK 3374.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3374.100, .500



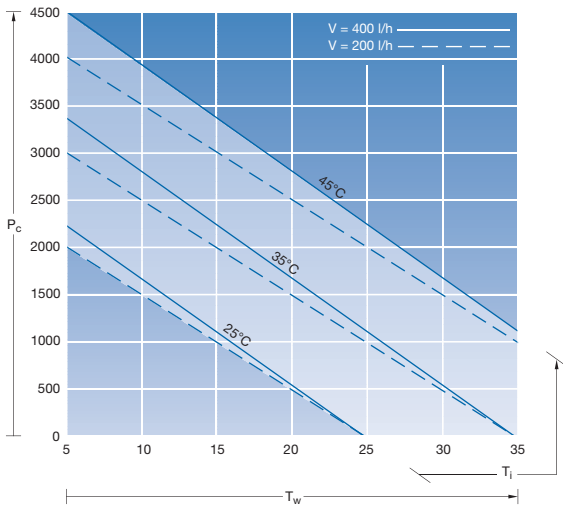
\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

Output class 2500 W

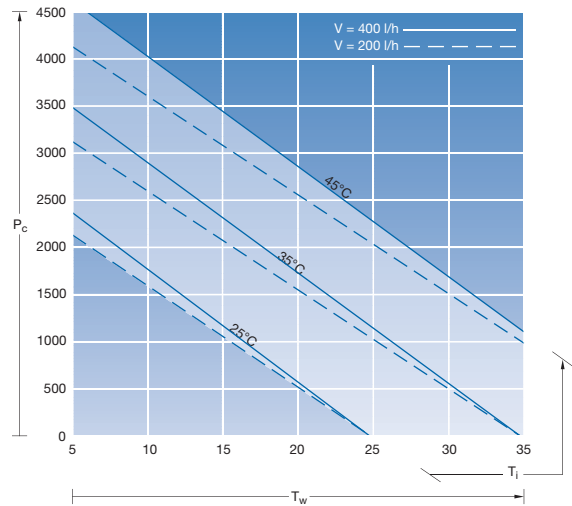
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3374.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

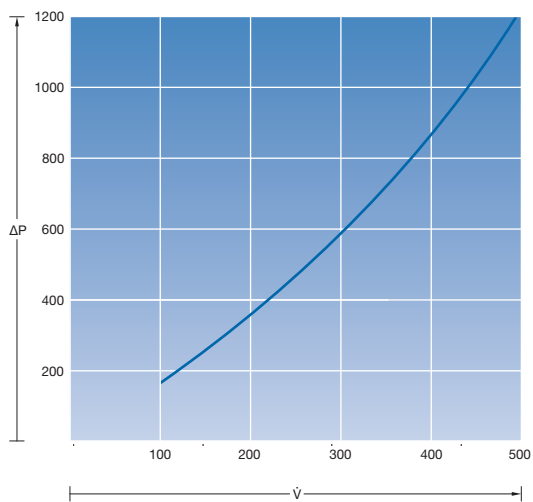
60 Hz
SK 3374.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3374.504



\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Cooling with water

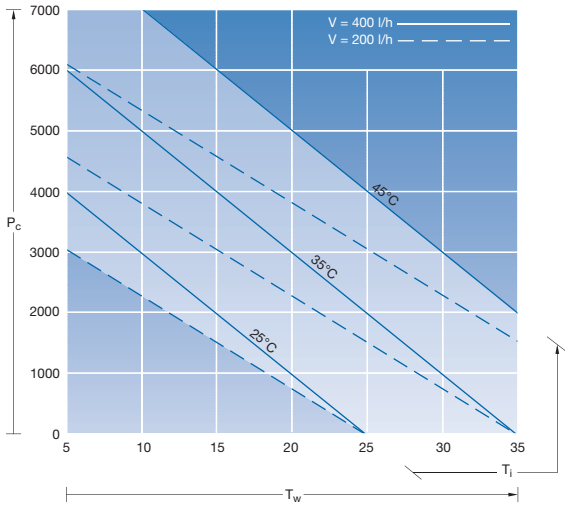
Wall-mounted air/water heat exchangers

Output class 5000 W

Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz

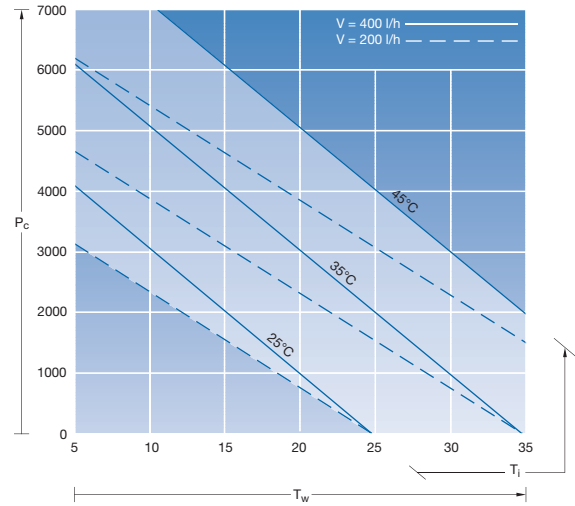
SK 3375.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

60 Hz

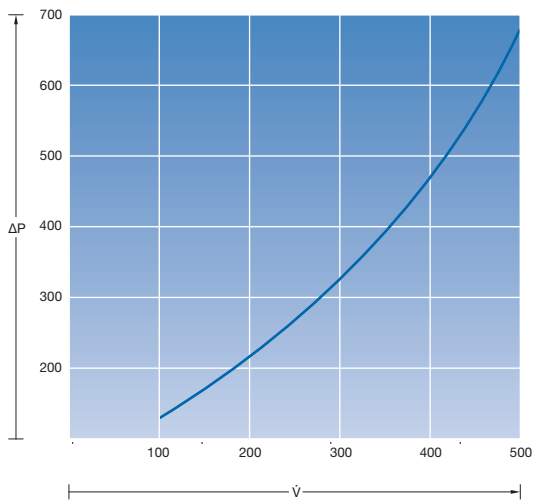
SK 3375.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3375.100, .500



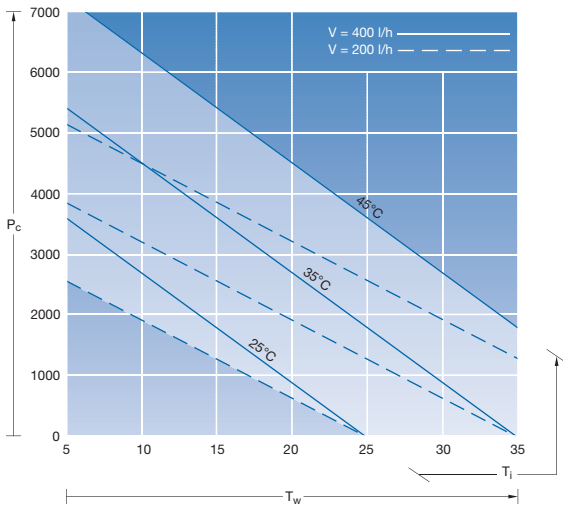
\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

Output class 4000 W

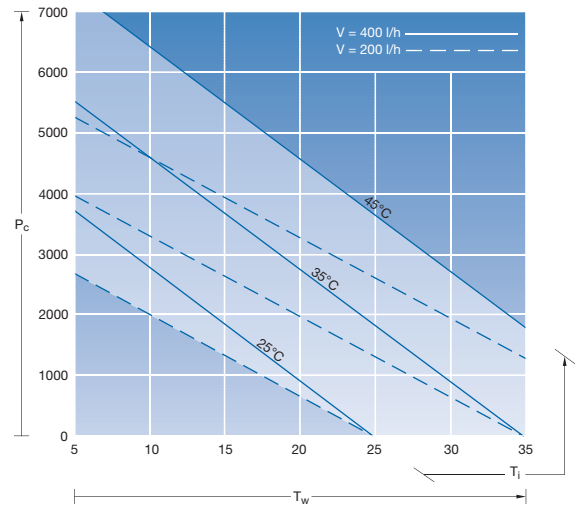
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3375.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

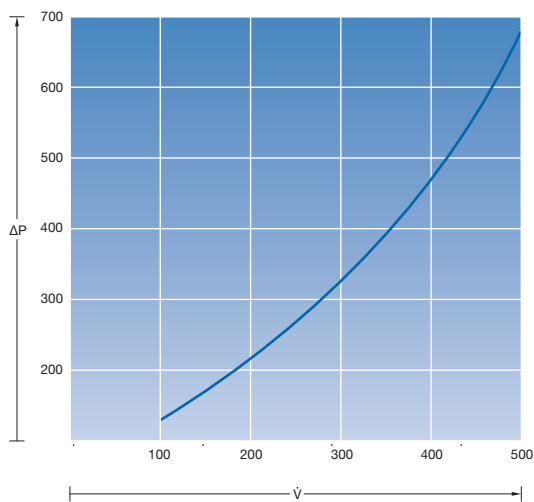
60 Hz
SK 3375.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3375.504



\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Cooling with water

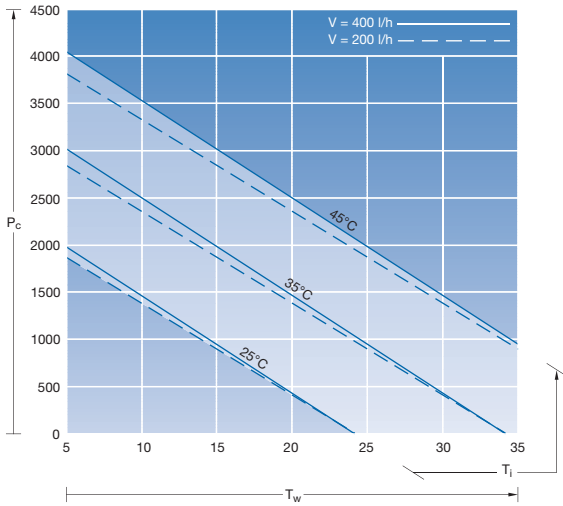
Roof-mounted air/water heat exchangers

Output class 2500 W

Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz

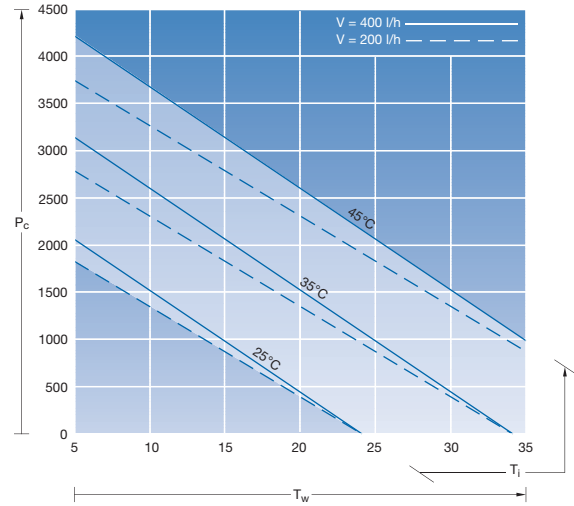
SK 3209.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

60 Hz

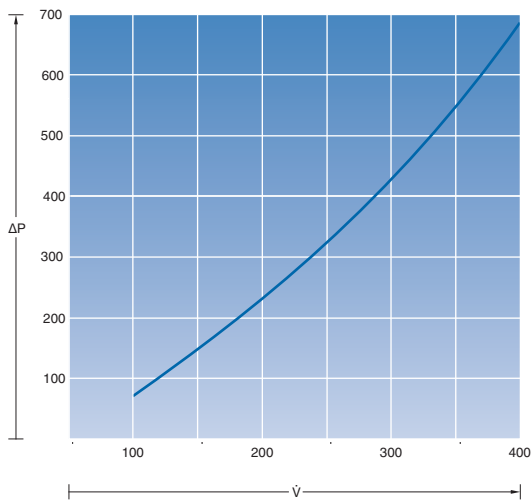
SK 3209.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3209.100, .500



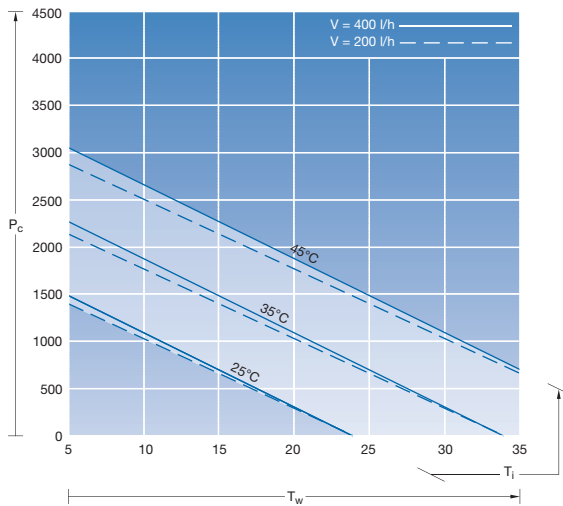
\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

Output class 1875 W

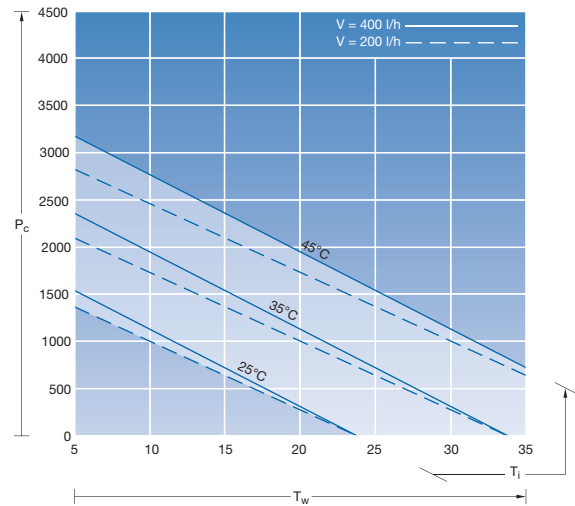
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3209.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

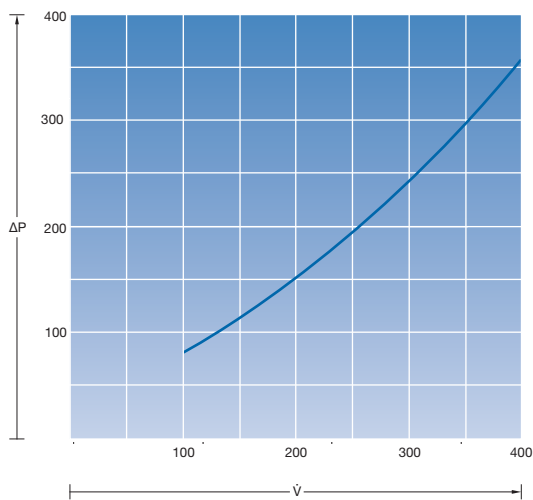
60 Hz
SK 3209.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3209.504



\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Cooling with water

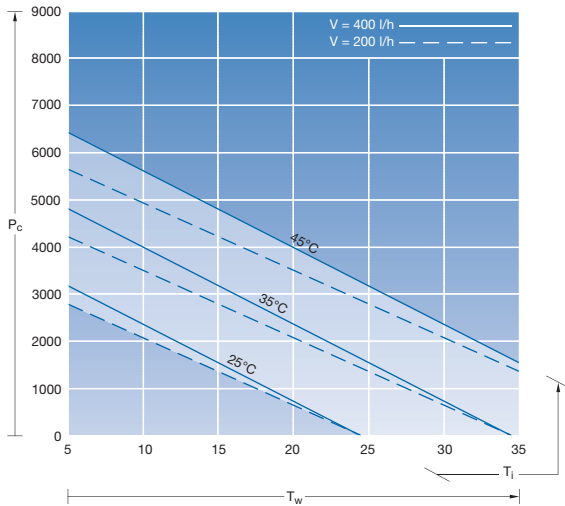
Roof-mounted air/water heat exchangers

Output class 4000 W

Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz

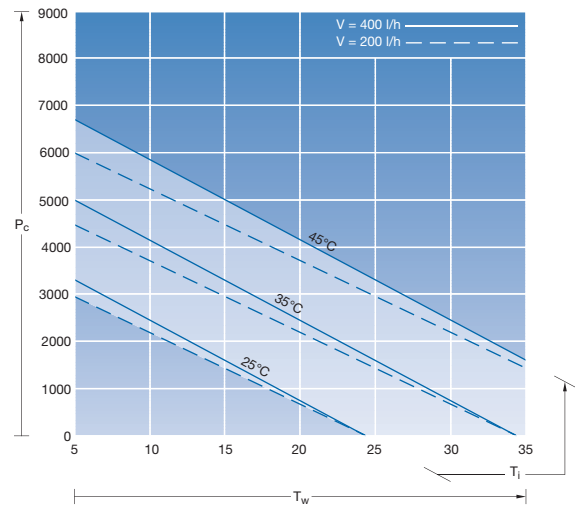
SK 3210.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

60 Hz

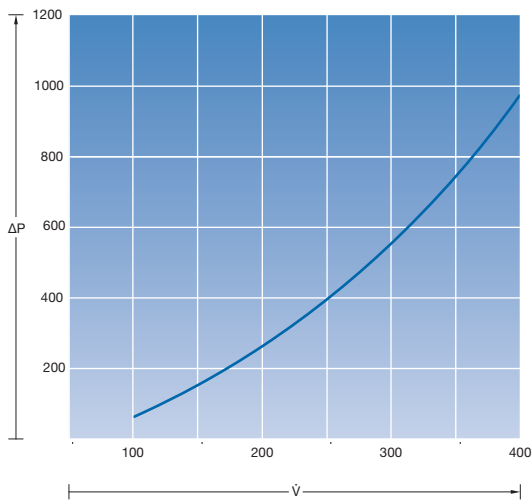
SK 3210.100, .500



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3210.100, .500



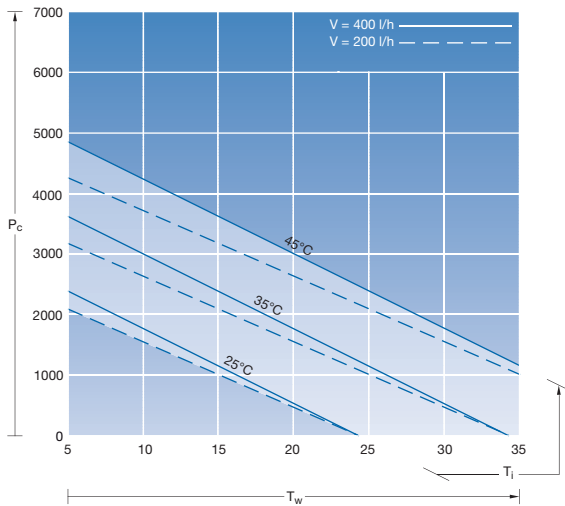
\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

Output class 3000 W

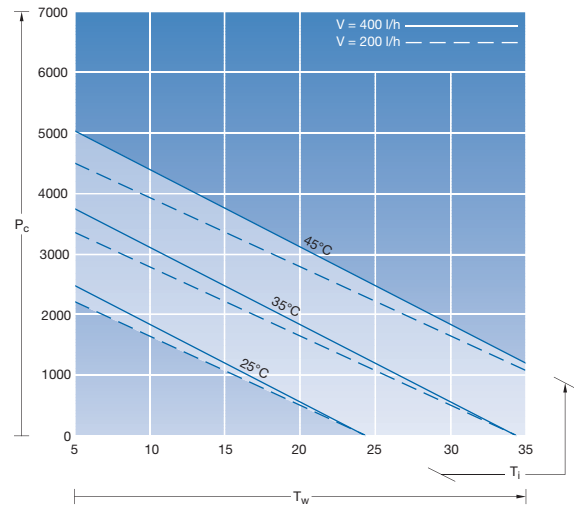
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3210.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

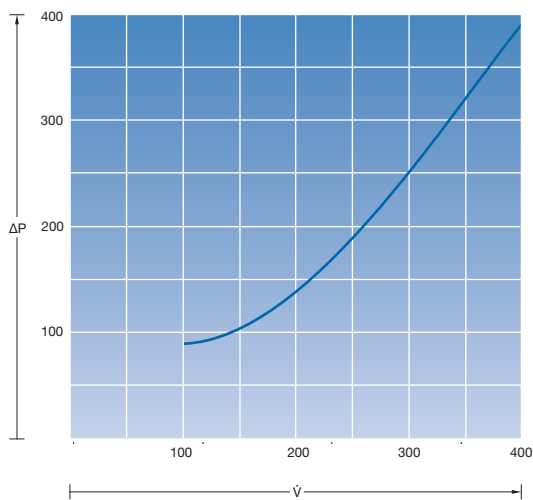
60 Hz
SK 3210.504



T_w = Water inlet temperature (°C)
 P_c = Total cooling output (W)
 T_i = Enclosure internal temperature (°C)

Water resistance diagram

SK 3210.504



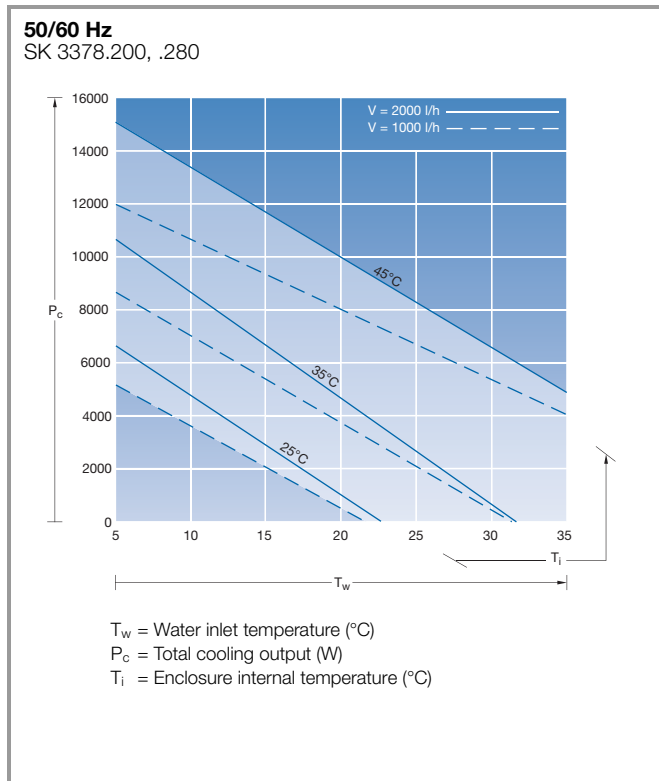
\dot{V} = Volumetric flow (l/h)
 ΔP = Water resistance (mbar)

Cooling with water

Liquid Cooling Package

Output class 10 kW, LCP Rack Industry

Water-carrying parts: Copper/brass (Cu/CuZn)

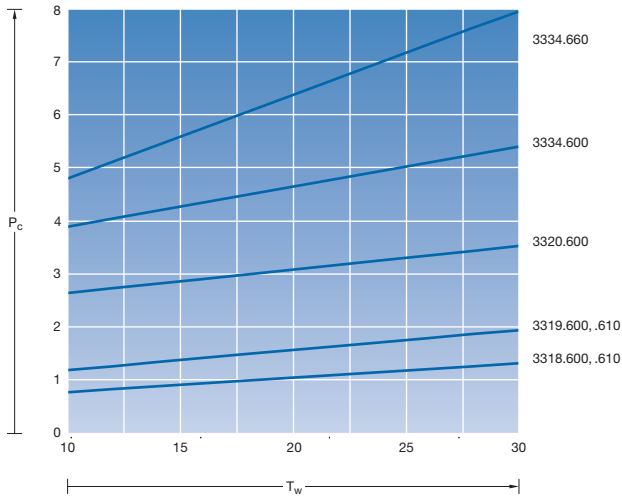


TopTherm chillers

Output class 1 – 6 kW

50 Hz at $T_u = 32^\circ\text{C}$ (ambient temperature)

SK 3318.600, .610, 3319.600, .610, 3320.600, 3334.600, .660

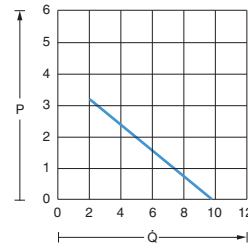


T_w = Water inlet temperature ($^\circ\text{C}$)
 P_c = Total cooling output (kW)

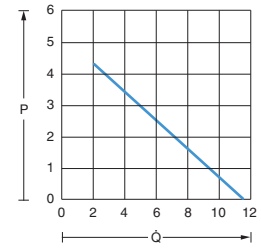
Characteristic curves of pump

SK 3318.600/SK 3318.610/SK 3319.600/SK 3319.610

50 Hz

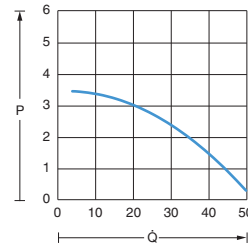


60 Hz

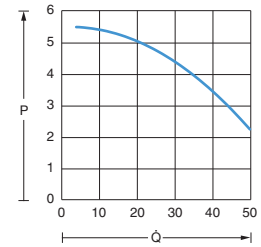


SK 3320.600/SK 3334.600/SK 3334.660

50 Hz



60 Hz

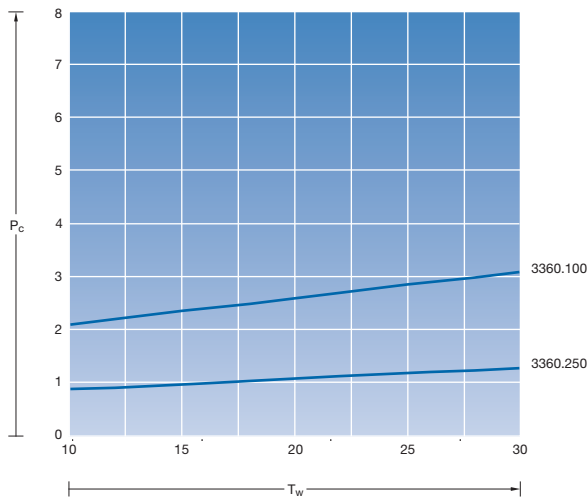


P = External static pressure [bar]
 Q = Delivery flow Q [l/min]

Output class 1 – 2.5 kW, wall-mounted

50 Hz at $T_u = 32^\circ\text{C}$ (ambient temperature)

SK 3360.100, .250

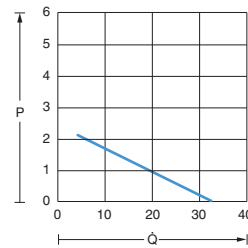


T_w = Water inlet temperature ($^\circ\text{C}$)
 P_c = Total cooling output (kW)

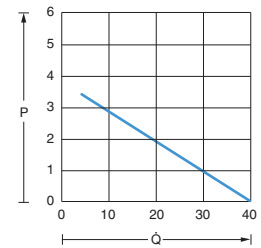
Characteristic curves of pump

SK 3360.100/SK 3360.250

50 Hz



60 Hz



P = External static pressure [bar]
 Q = Delivery flow Q [l/min]

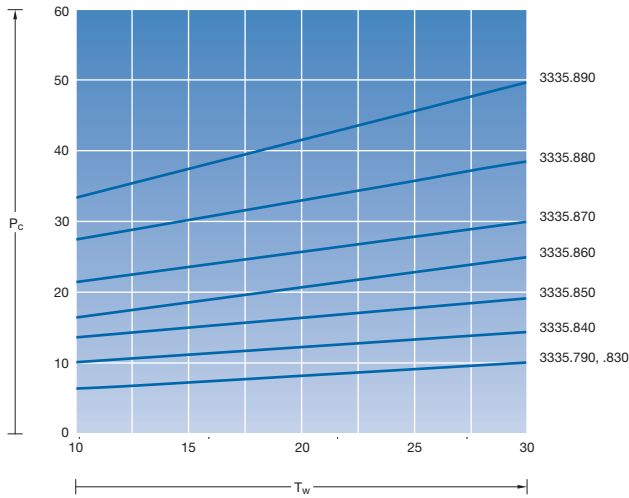
Cooling with water

TopTherm chillers

Output class 8 – 40 kW

50 Hz at $T_u = 32^\circ\text{C}$ (ambient temperature)

SK 3335.790, .830, .840, .850, .860, .870, .880, .890

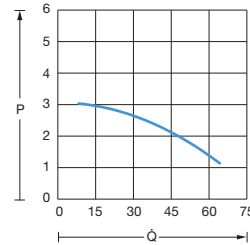


T_w = Water inlet temperature ($^\circ\text{C}$)
 P_c = Total cooling output (kW)

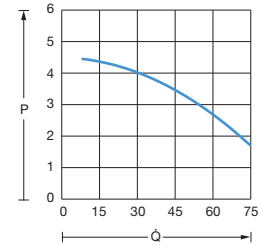
Characteristic curves of pump

SK 3335.850

50 Hz

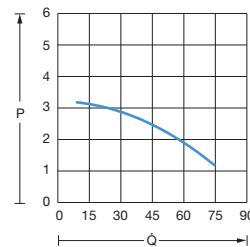


60 Hz

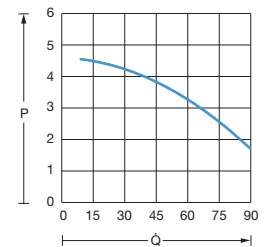


SK 3335.860

50 Hz

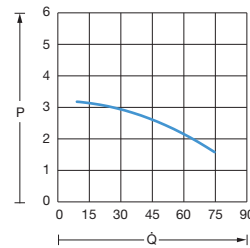


60 Hz

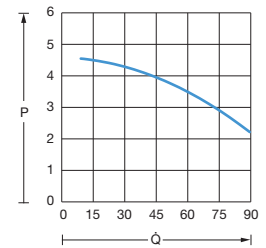


SK 3335.870

50 Hz



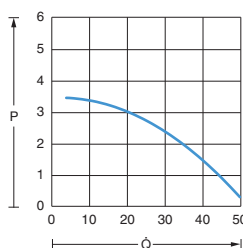
60 Hz



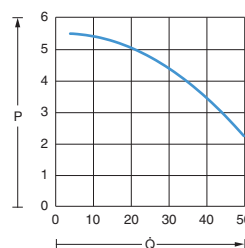
Characteristic curves of pump

SK 3335.790/SK 3335.830

50 Hz

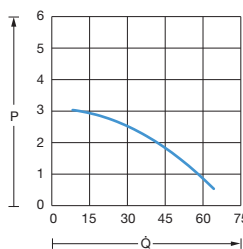


60 Hz

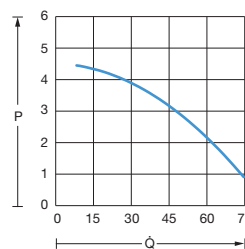


SK 3335.840

50 Hz

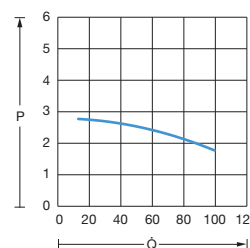


60 Hz

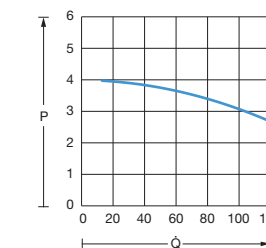


SK 3335.880

50 Hz

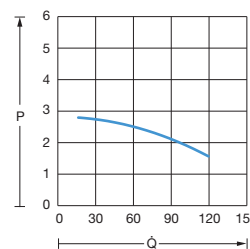


60 Hz

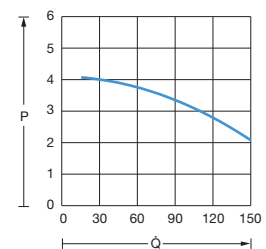


SK 3335.890

50 Hz



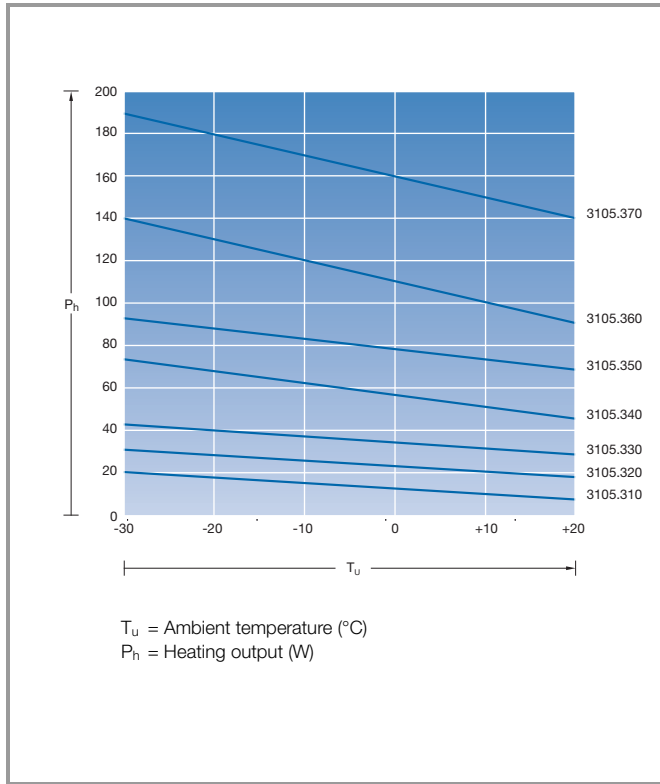
60 Hz



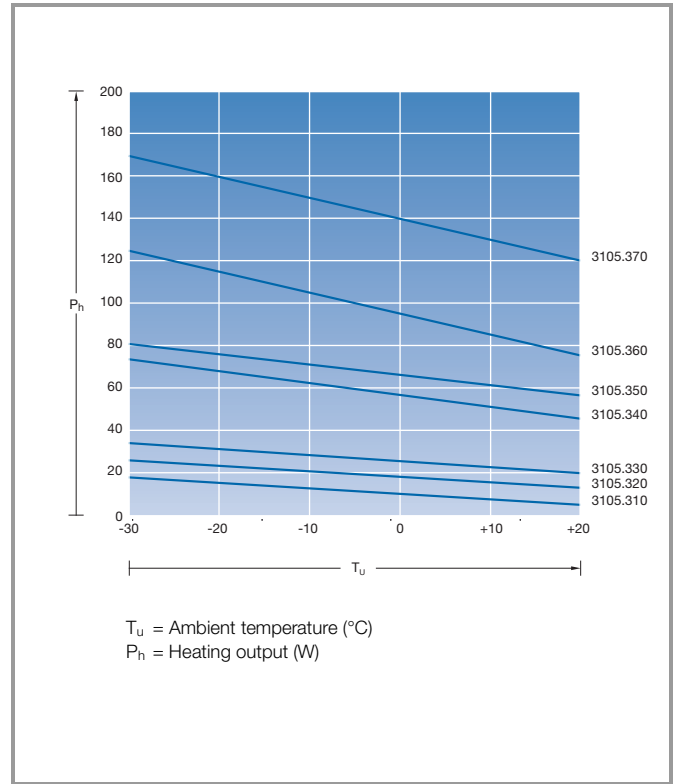
P = External static pressure [bar]
 \dot{Q} = Delivery flow Q [l/min]

Enclosure heaters without fan

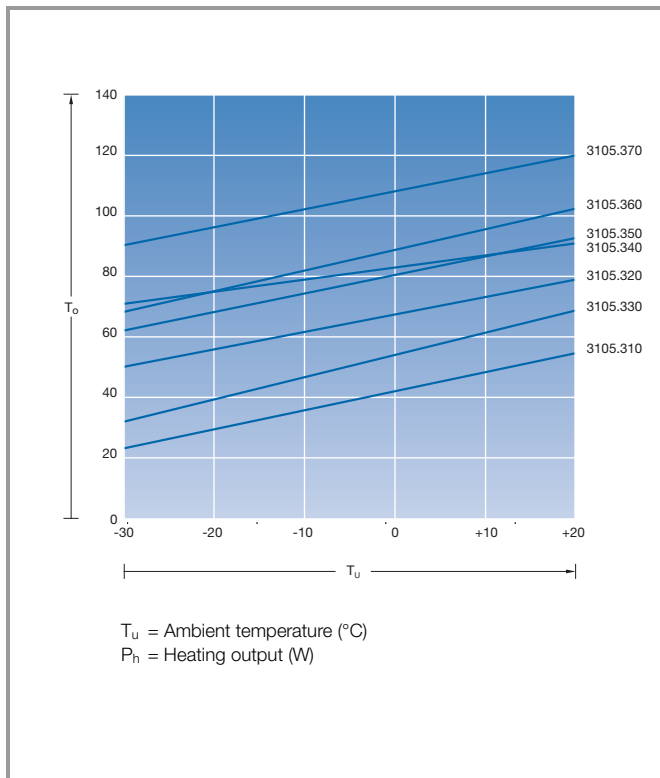
Heating output 230 V



Heating output 110 V



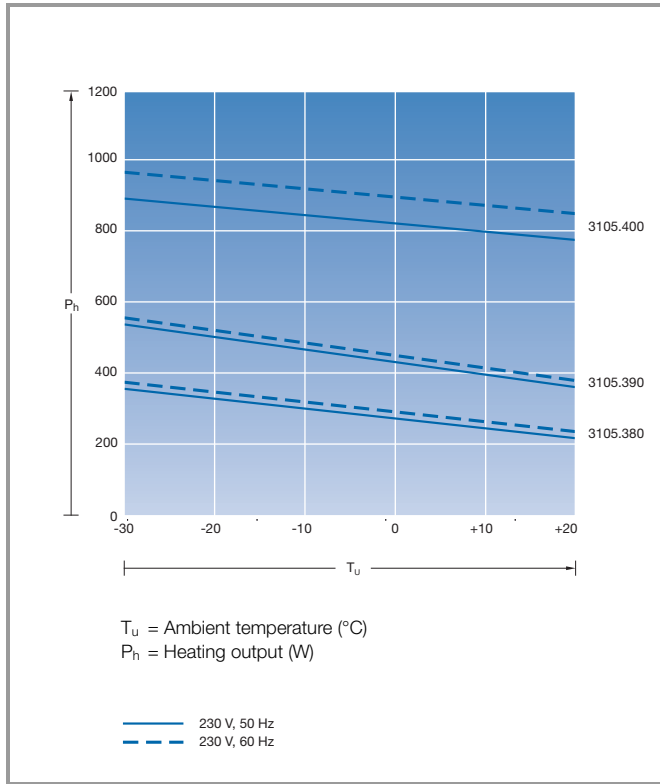
Maximum surface temperature



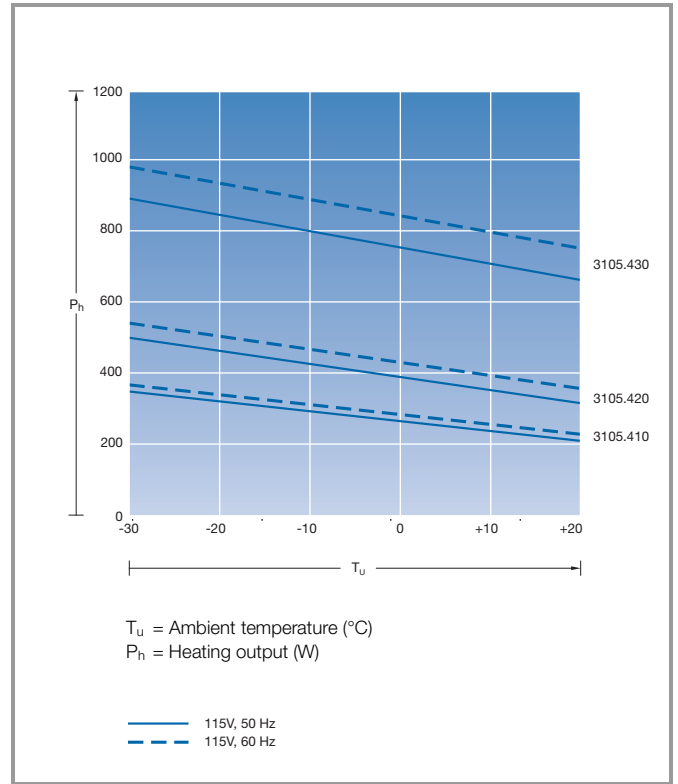
Enclosure heaters

Enclosure heaters with fan

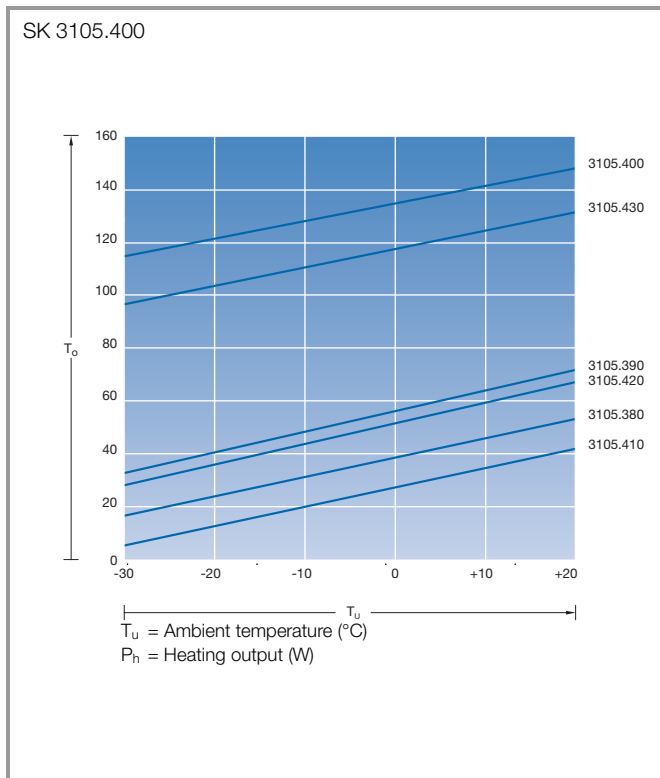
Heating output 230 V, 50/60 Hz



Heating output 115 V, 50/60 Hz



Maximum surface temperature



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