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▶ 성능 곡선 – 공조



인클로저

배전

공조

IT 인프라

소프트웨어 및 서비스

FRIEDHELM LOH GROUP



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배전

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성능 곡선

주변 공기를 활용한 냉각

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인클로저 히터

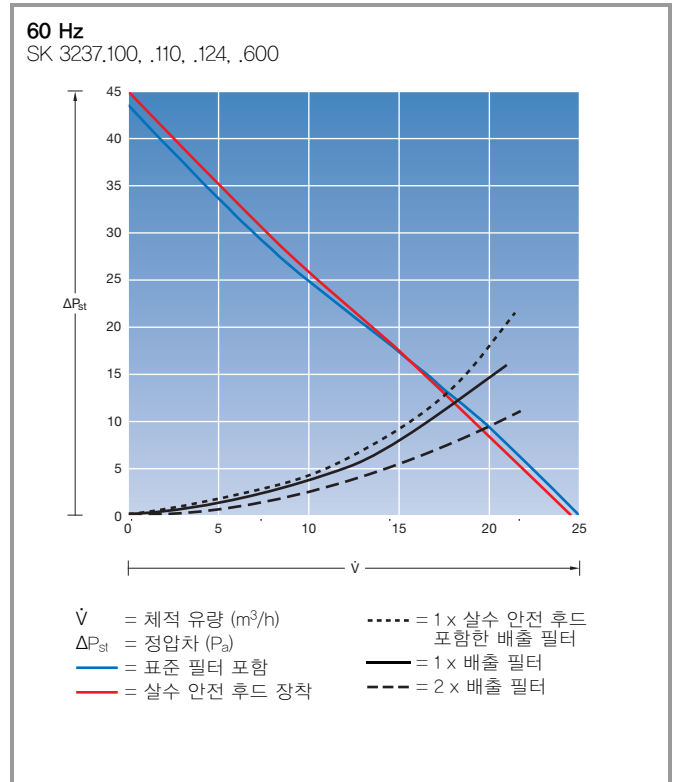
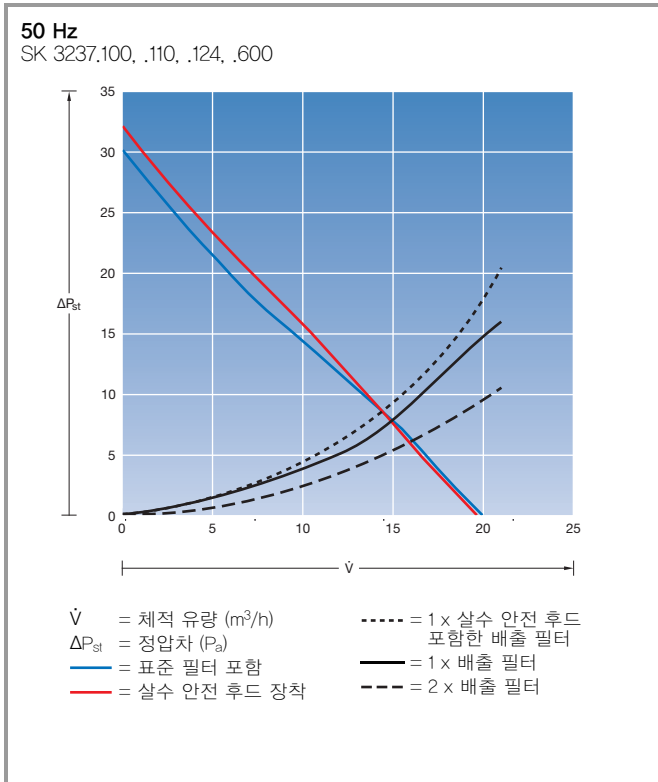
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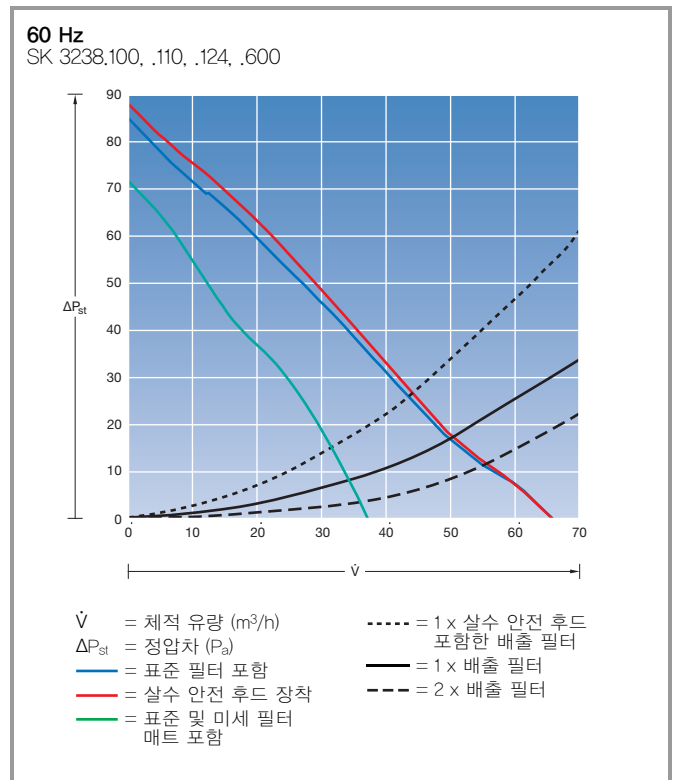
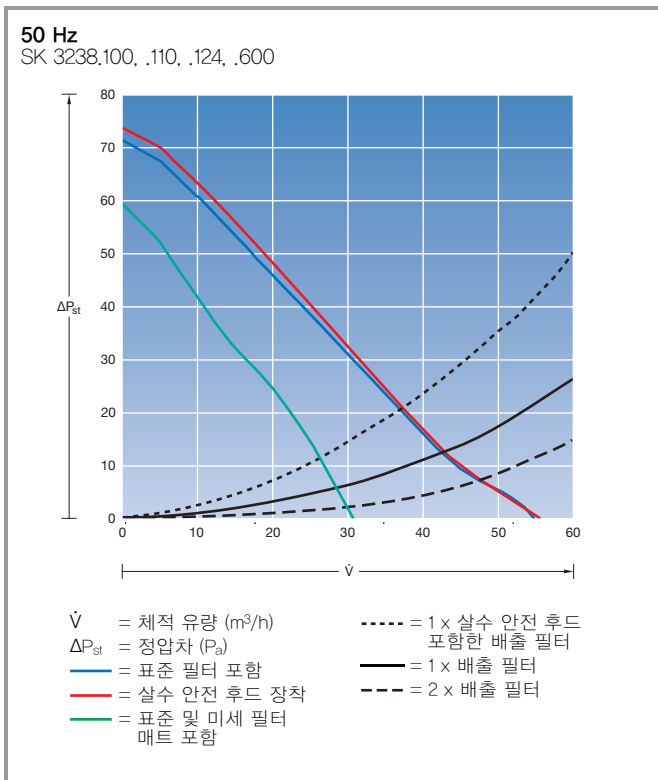
주변 공기를 활용한 냉각

TopTherm 팬 필터 장치, TopTherm 팬 필터 장치 EMC

공기 처리 능력 20/25 m³/h

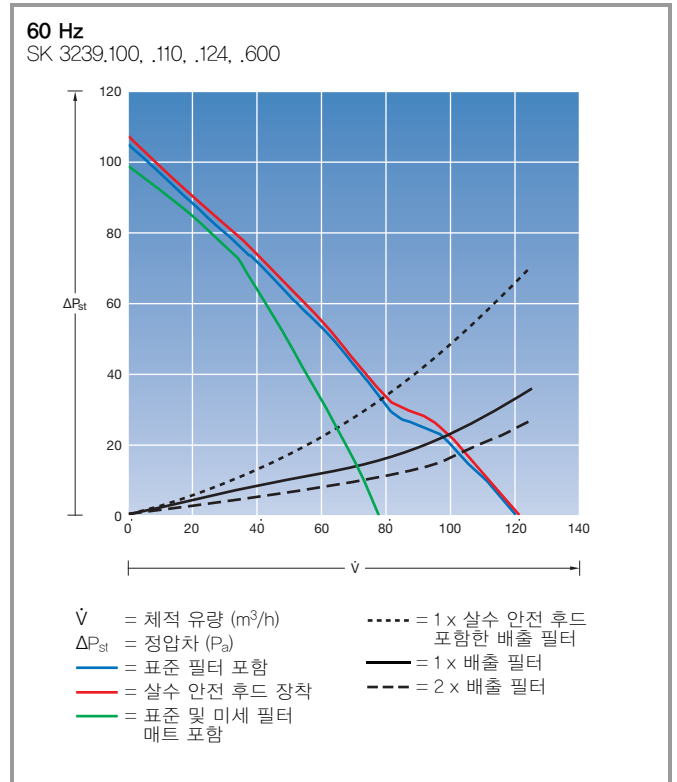
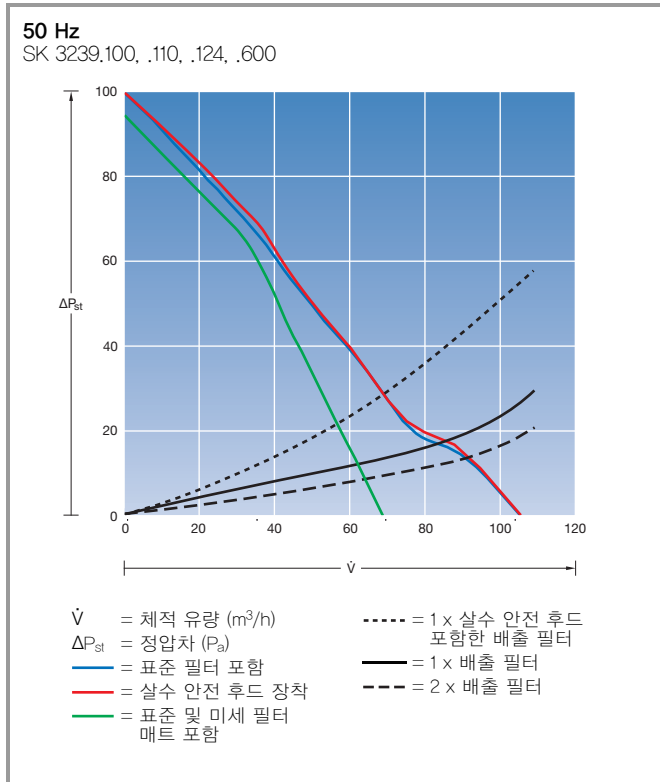


공기 처리 능력 55/66 m³/h

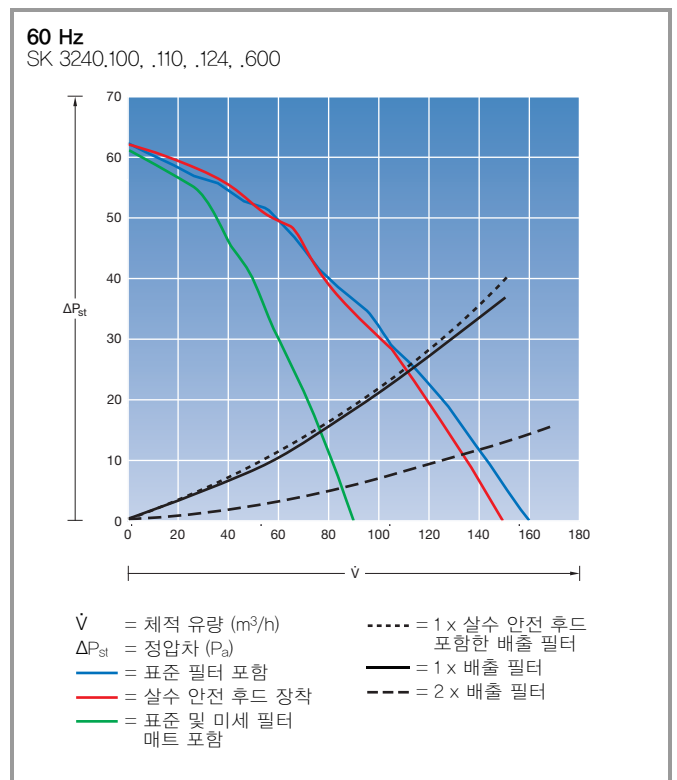
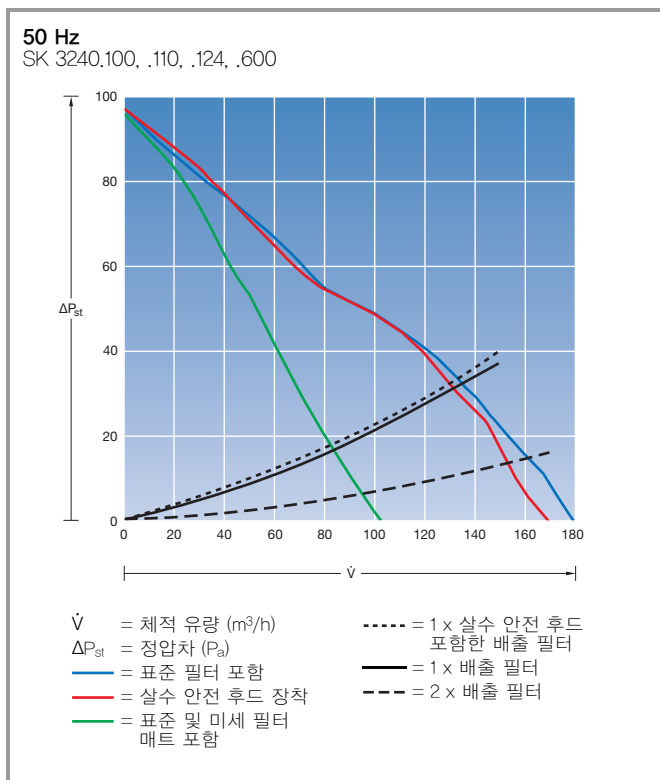


TopTherm 팬 필터 장치, TopTherm 팬 필터 장치 EMC

공기 처리 능력 105/120 m³/h



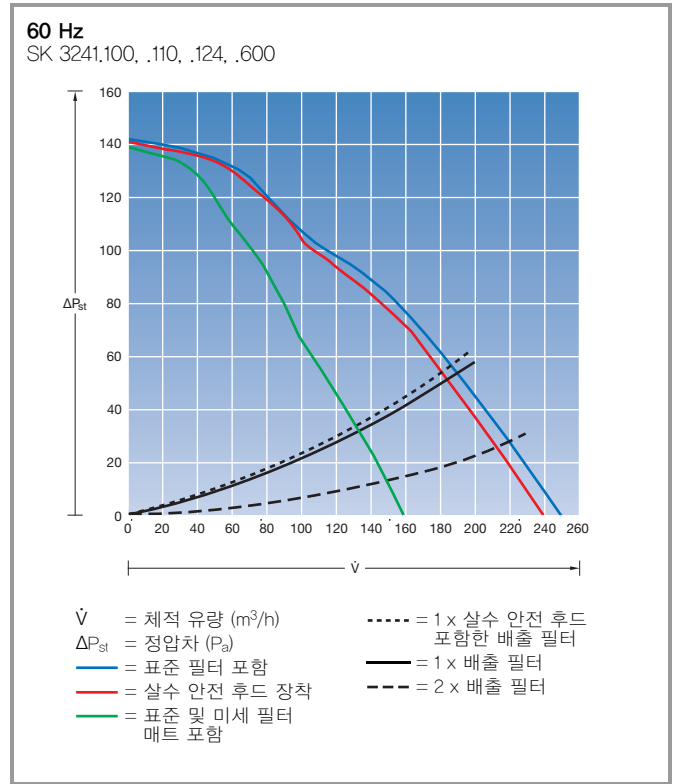
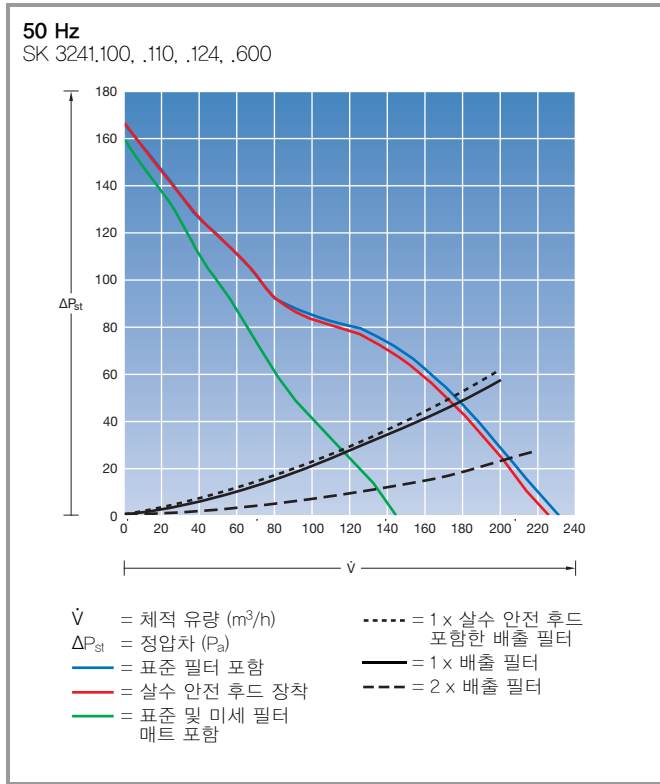
공기 처리 능력 180/160 m³/h



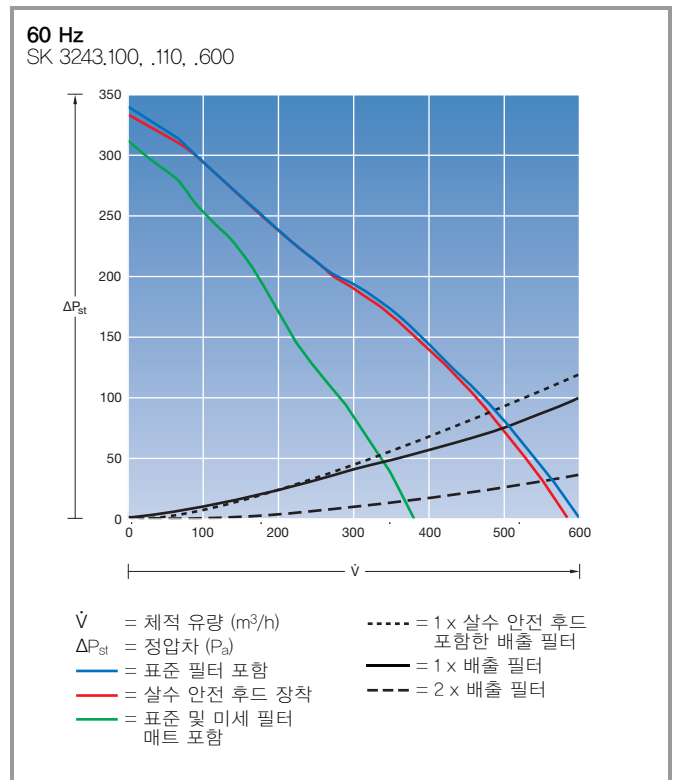
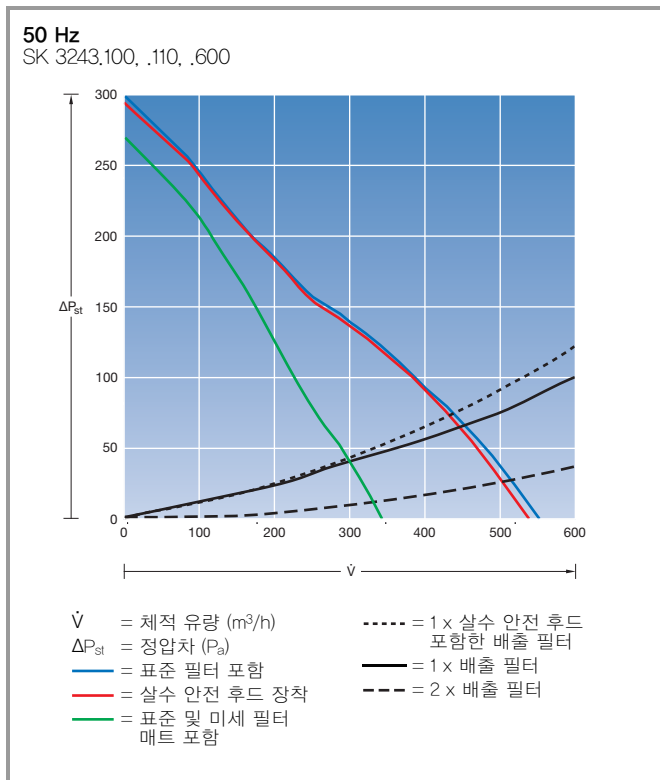
주변 공기를 활용한 냉각

TopTherm 팬 필터 장치, TopTherm 팬 필터 장치 EMC

공기 처리 능력 230/250 m³/h

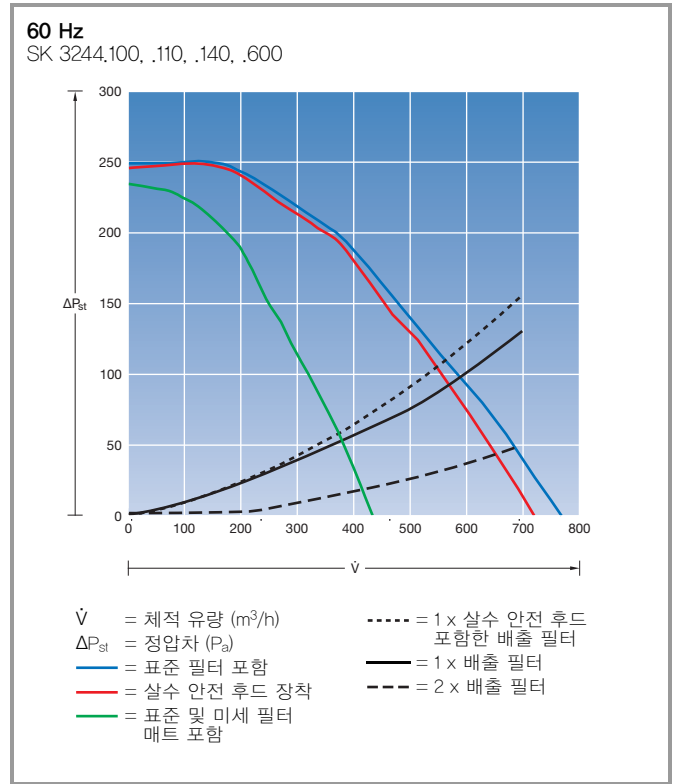
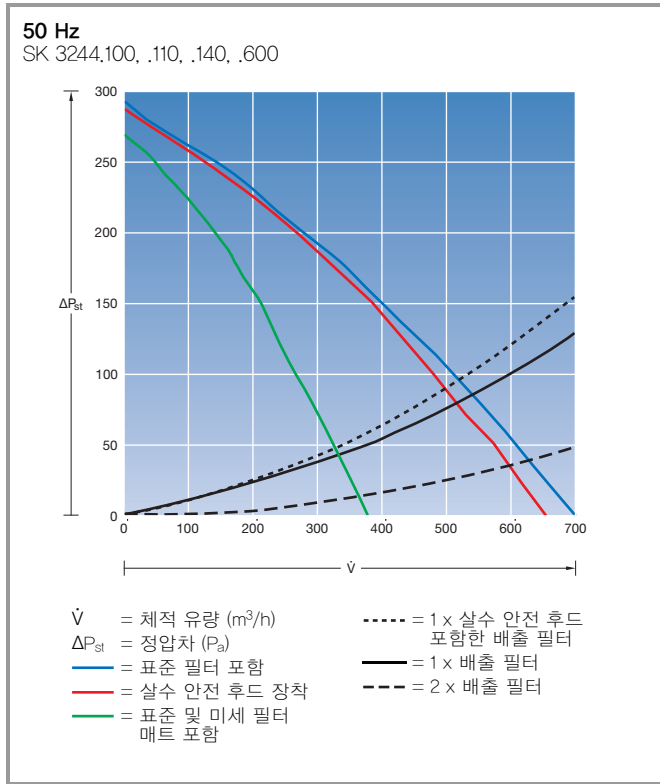


공기 처리 능력 550/600 m³/h

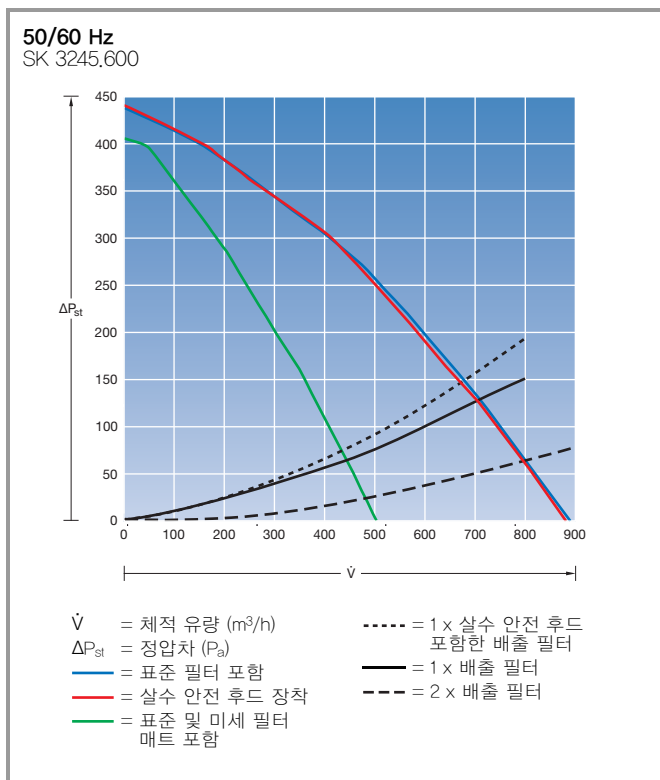


TopTherm 팬 필터 장치, TopTherm 팬 필터 장치 EMC

공기 처리 능력 700/770 m³/h



공기 처리 능력 900 m³/h

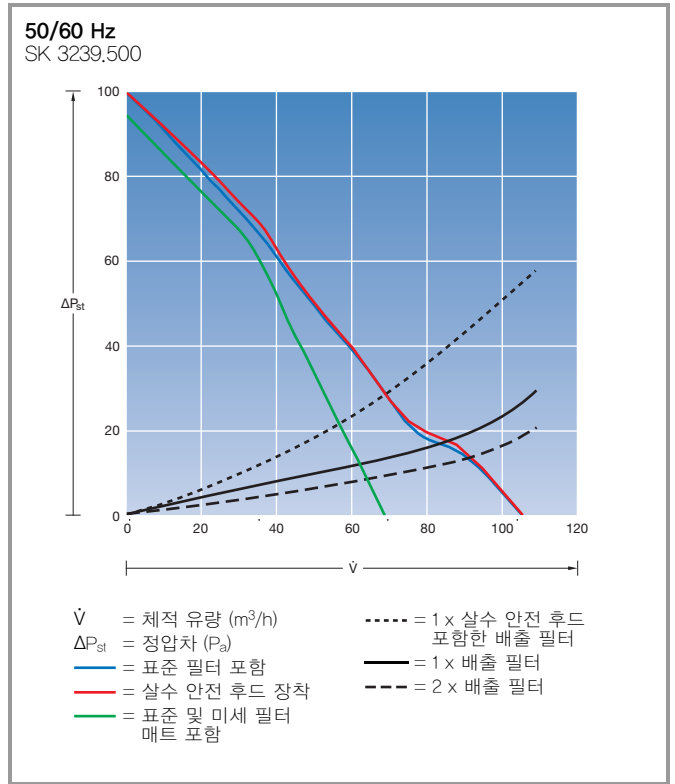
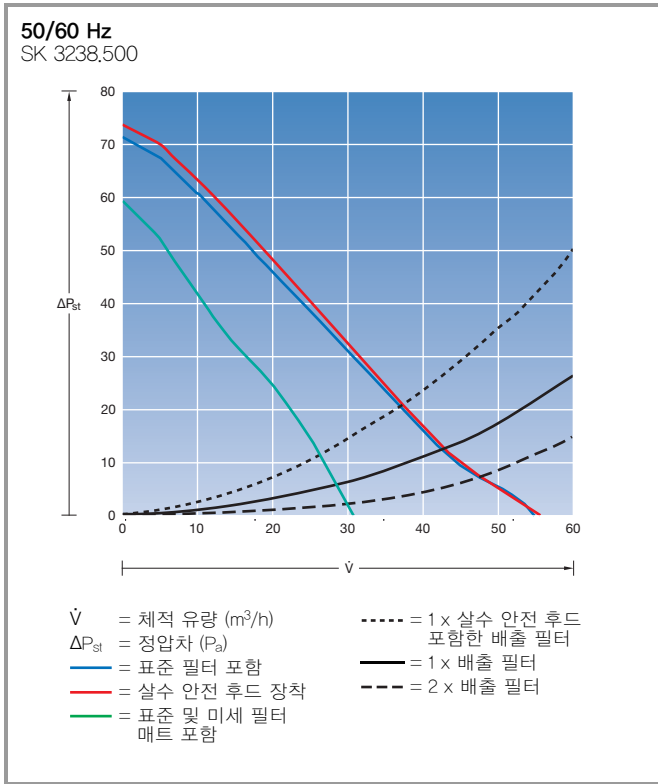


주변 공기를 활용한 냉각

EC 기술 TopTherm 팬 필터 장치

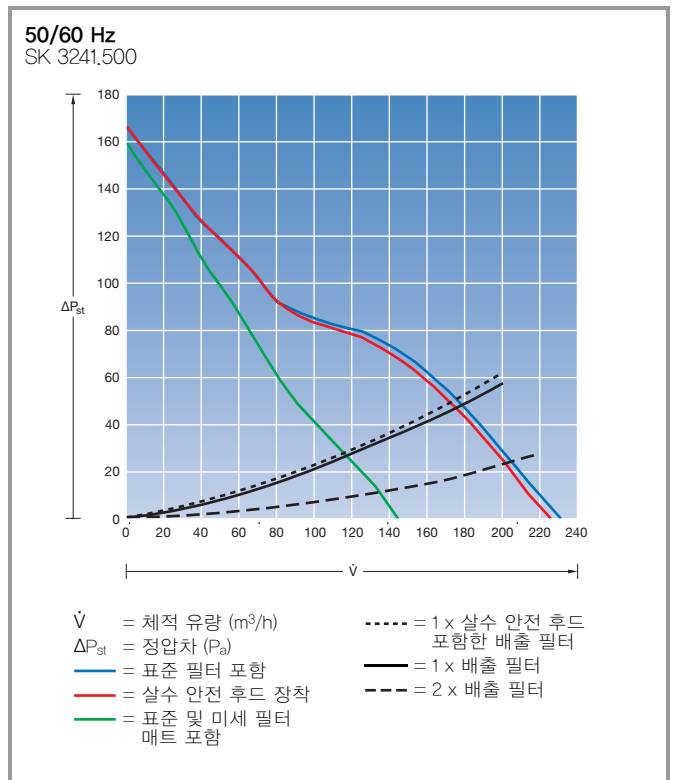
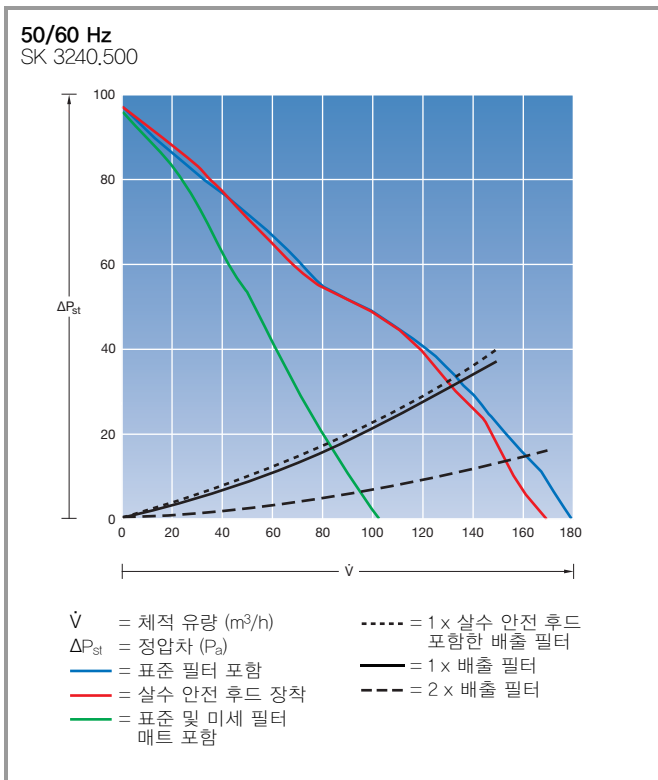
공기 처리 능력 55 m³/h

공기 처리 능력 105 m³/h



공기 처리 능력 180 m³/h

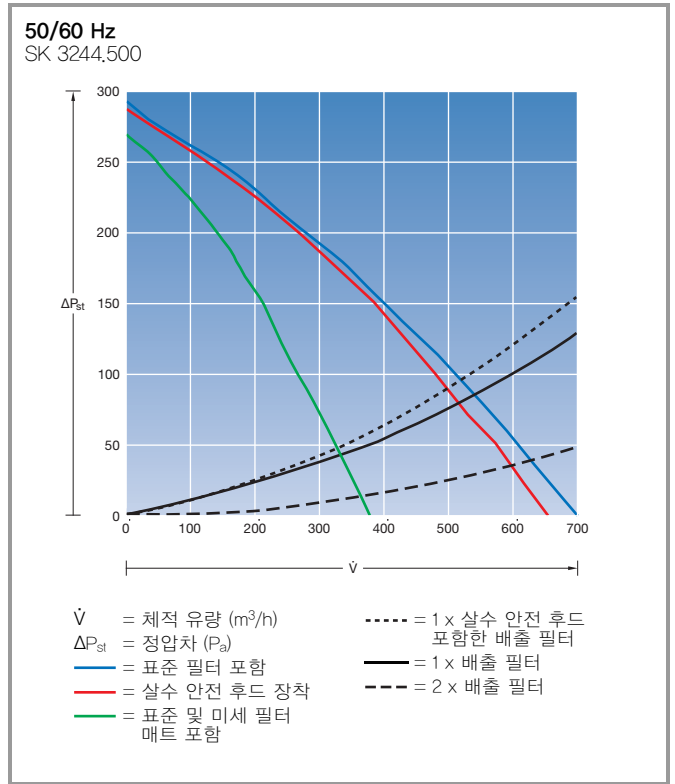
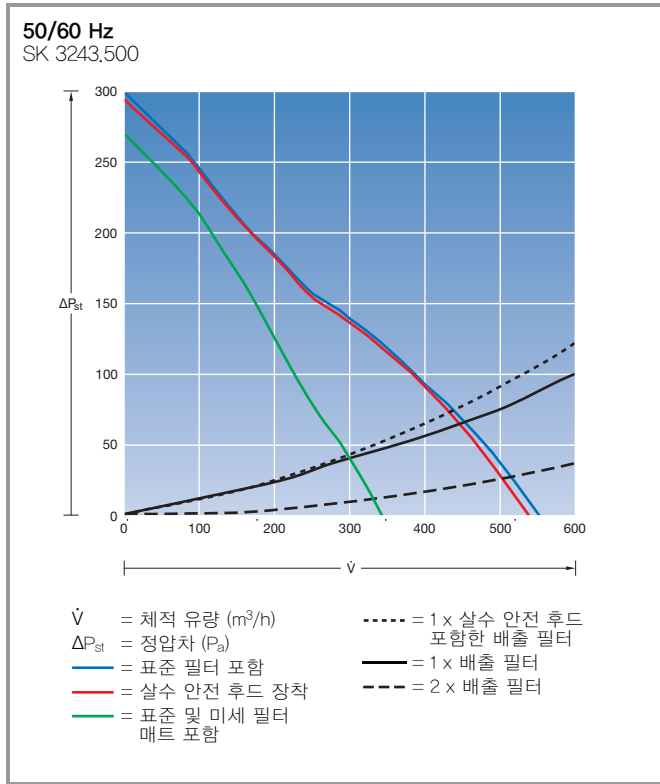
공기 처리 능력 230 m³/h



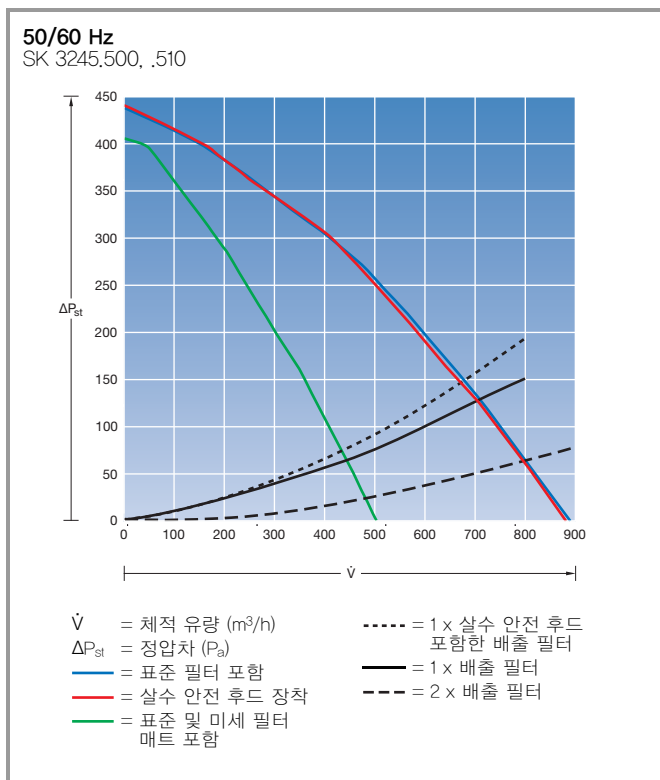
EC 기술 TopTherm 팬 필터 장치

공기 처리 능력 550 m³/h

공기 처리 능력 700 m³/h



공기 처리 능력 900 m³/h

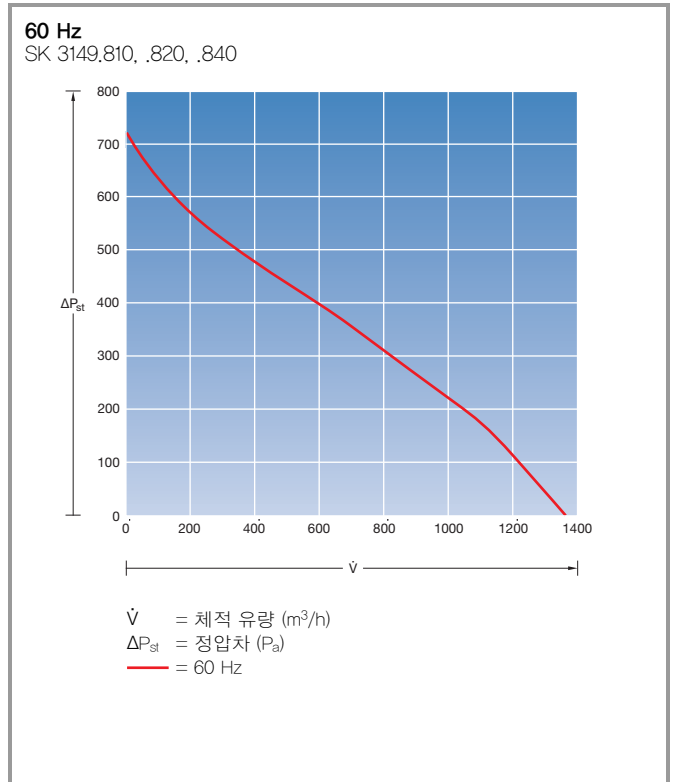
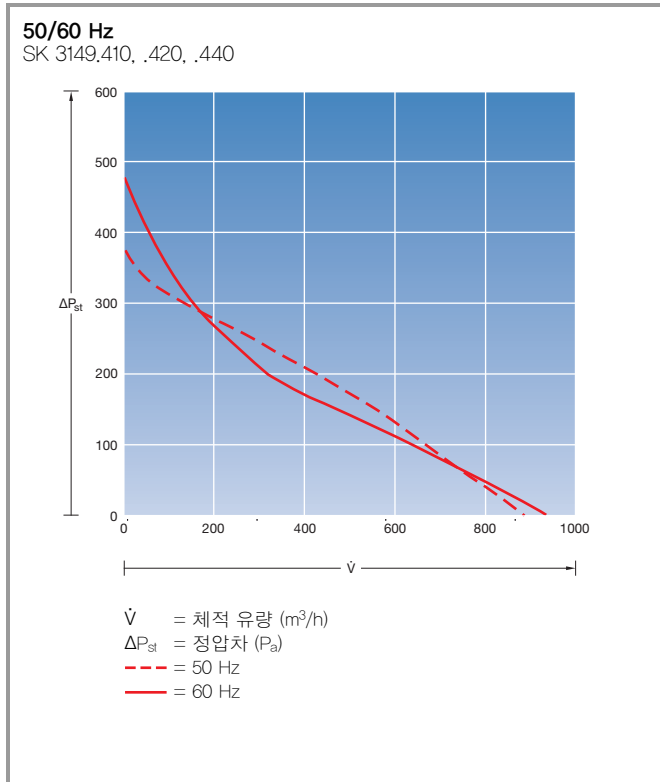


주변 공기를 활용한 냉각

TopTherm 루프 장착형 팬

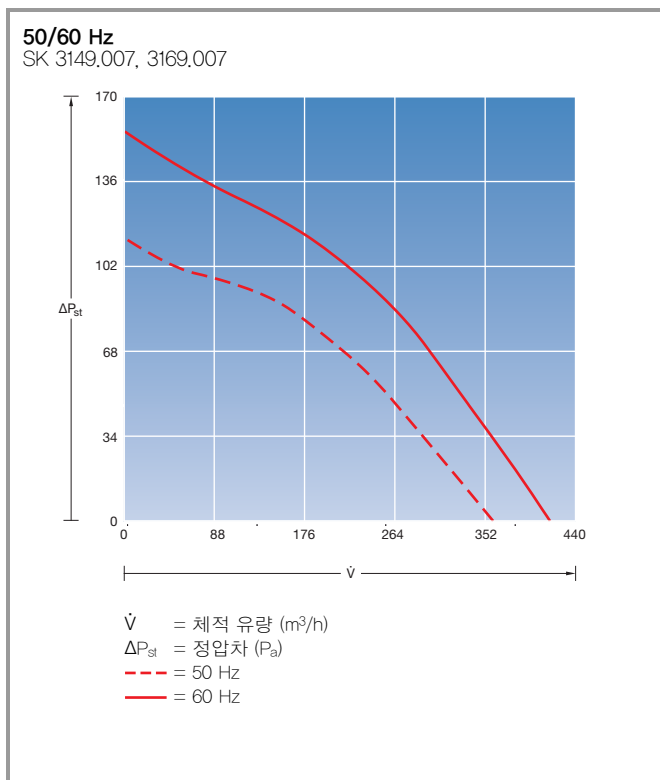
공기 처리 능력 400 m³/h

공기 처리 능력 800 m³/h



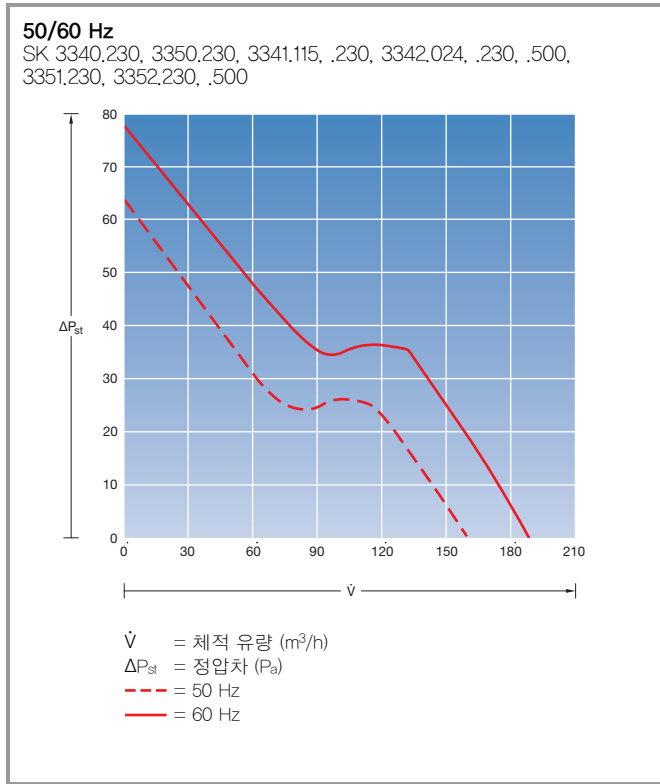
루프 장착형 팬, 루프 배기구

공기 처리 능력 360 m³/h



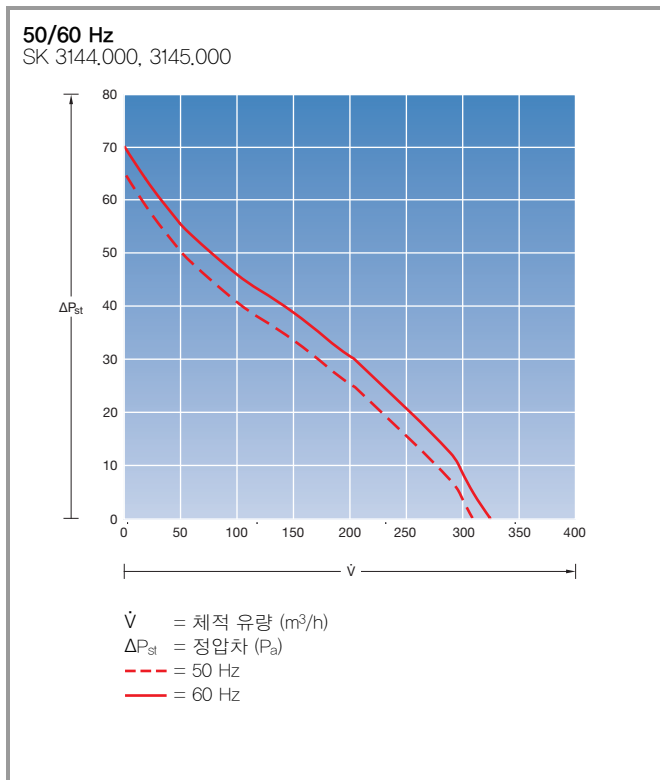
19"(482.6 mm) 용 랙 장착형 팬

공기 처리 능력 320/480 m³/h



19"(482.6 mm) 용 횡류팬

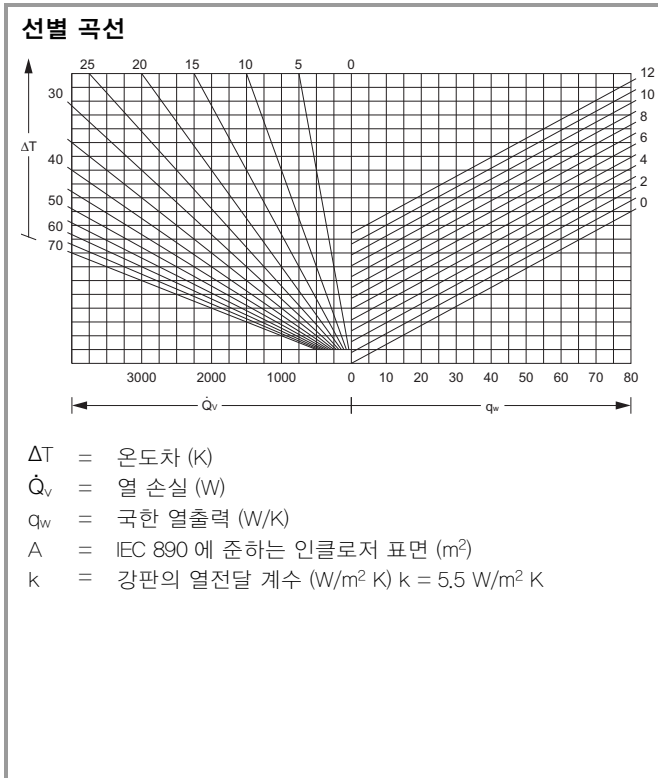
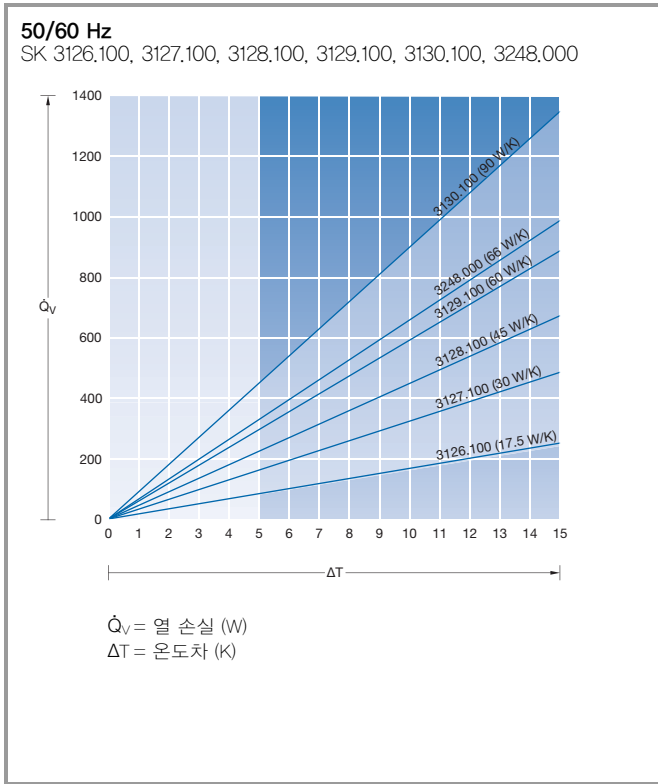
공기 처리 능력 320 m³/h



주변 공기를 활용한 냉각

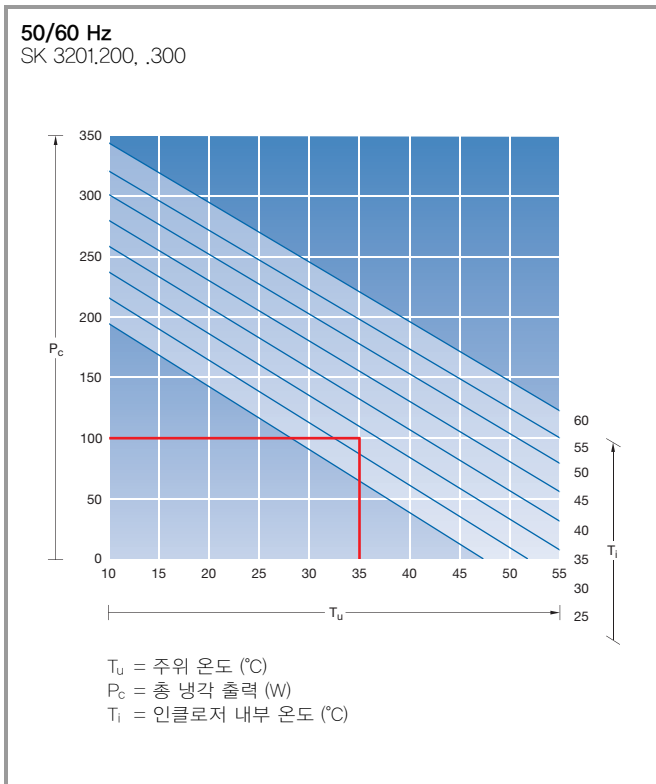
TopTherm 공기 대 공기 열교환기

국한 열출력 17.5 - 90 W/K, 제어 기능이 있는 벽면 장착형

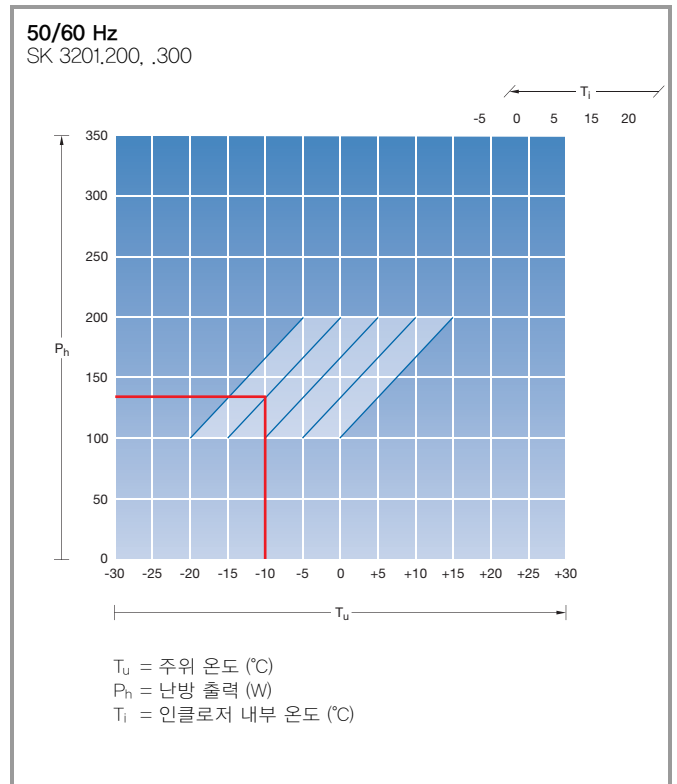


열전기 쿨러

냉각 출력

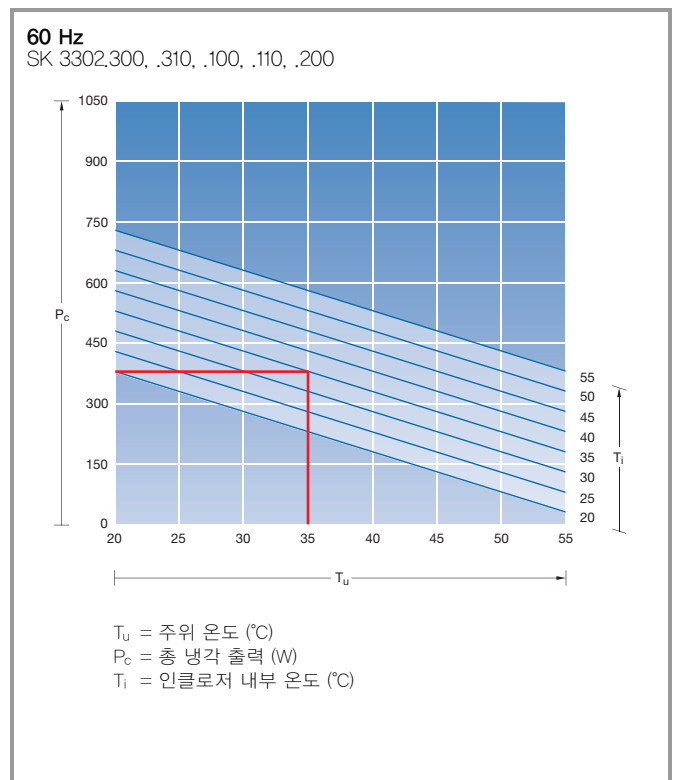
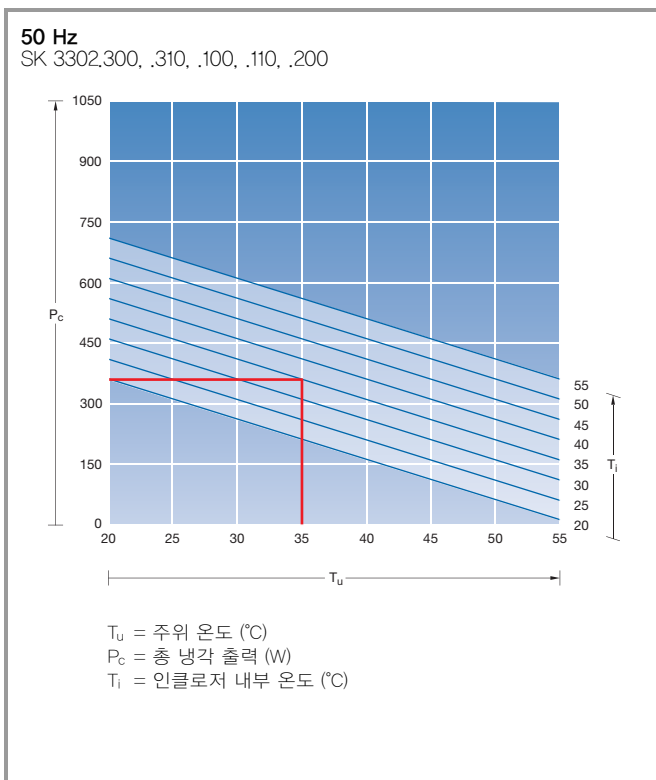


난방 출력



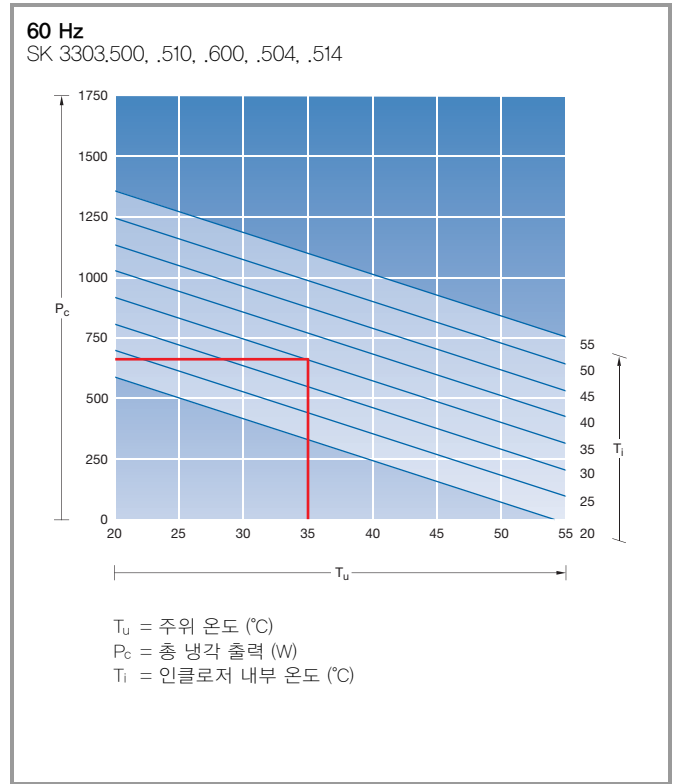
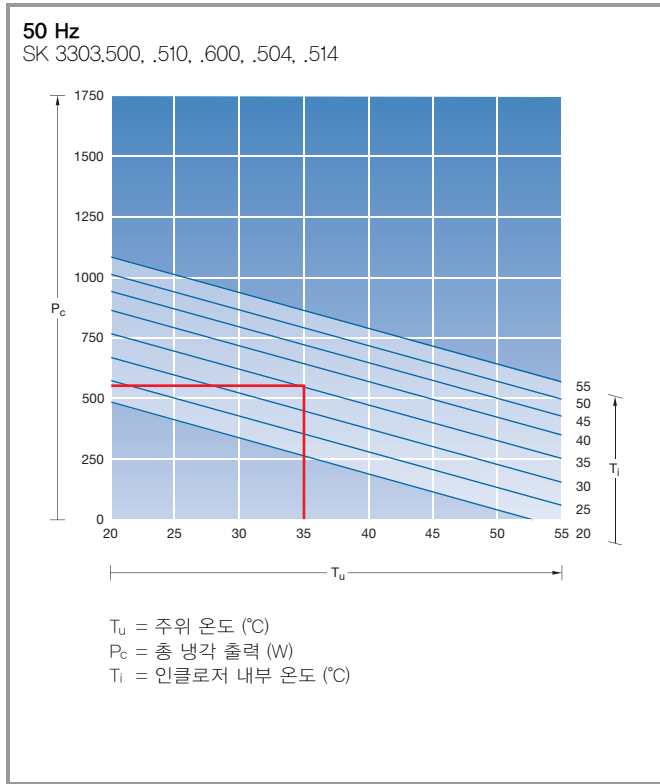
TopTherm 벽면 장착형 냉각 장치

출력 등급 300 W (115/230 V, 1~)

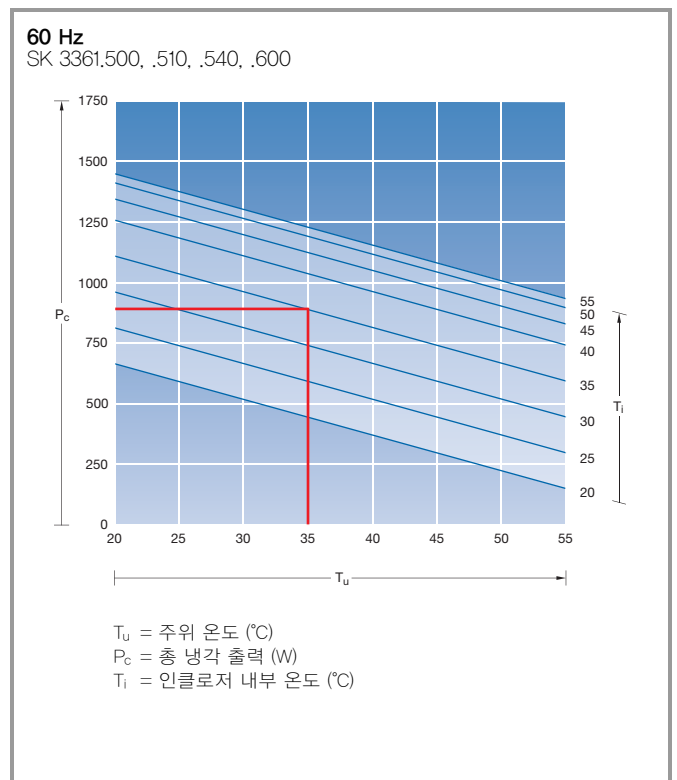
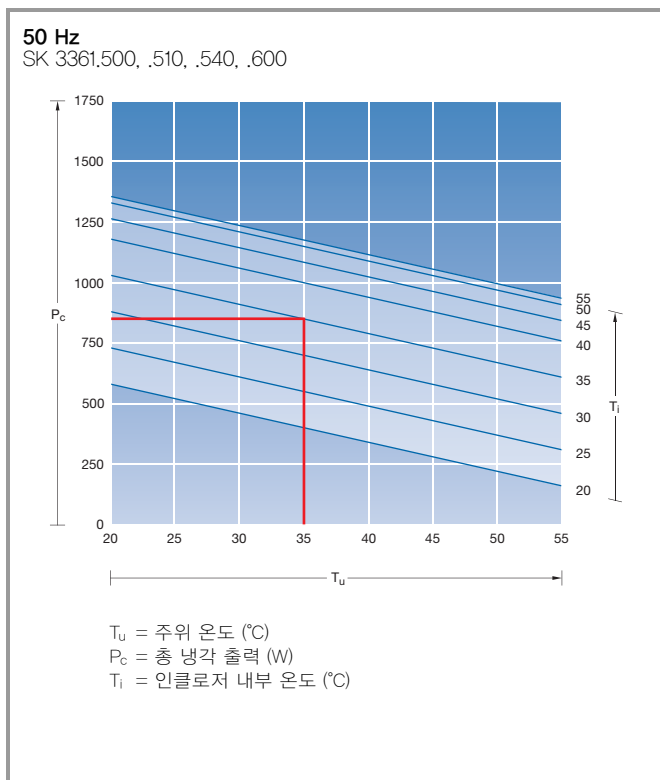


냉각 장치

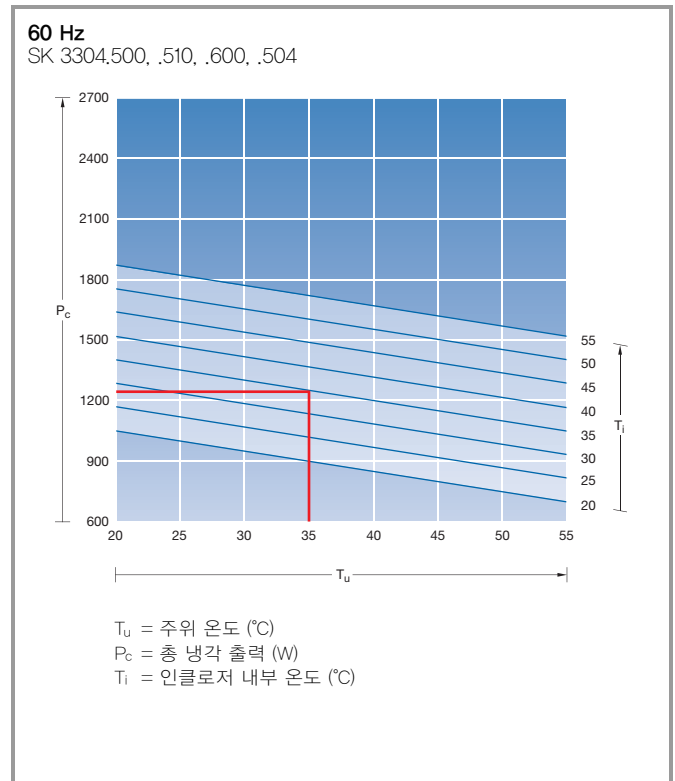
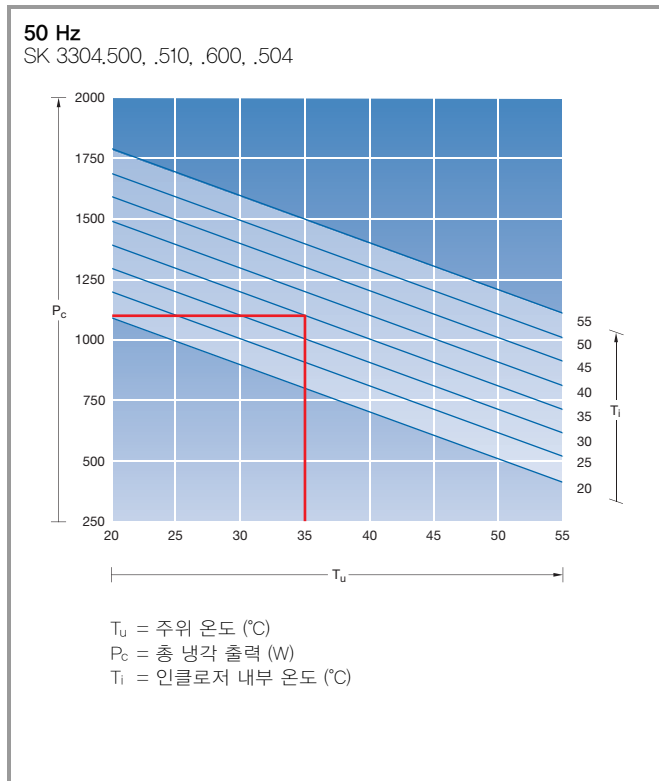
TopTherm 벽면 장착형 냉각 장치 “Blue e” 출력 등급 500 W (115/230 V, 1~)



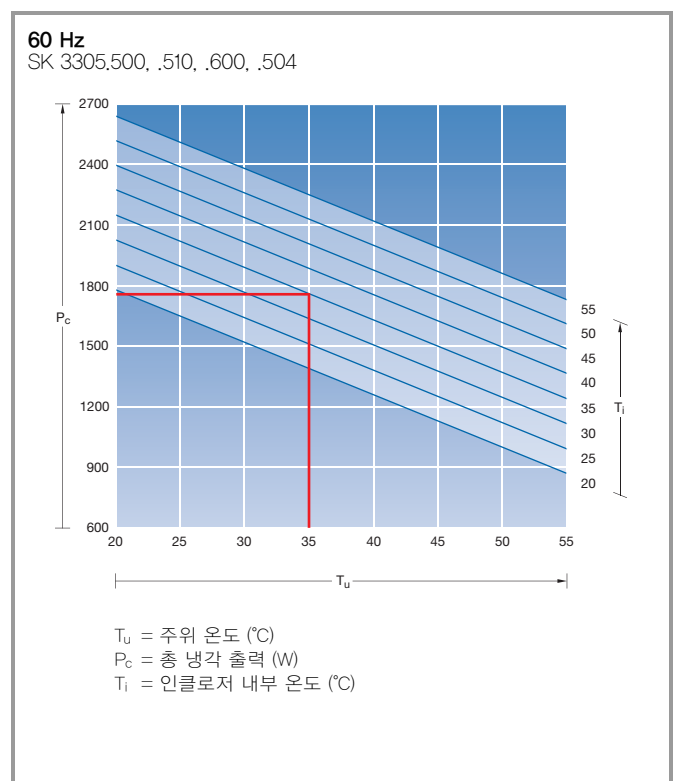
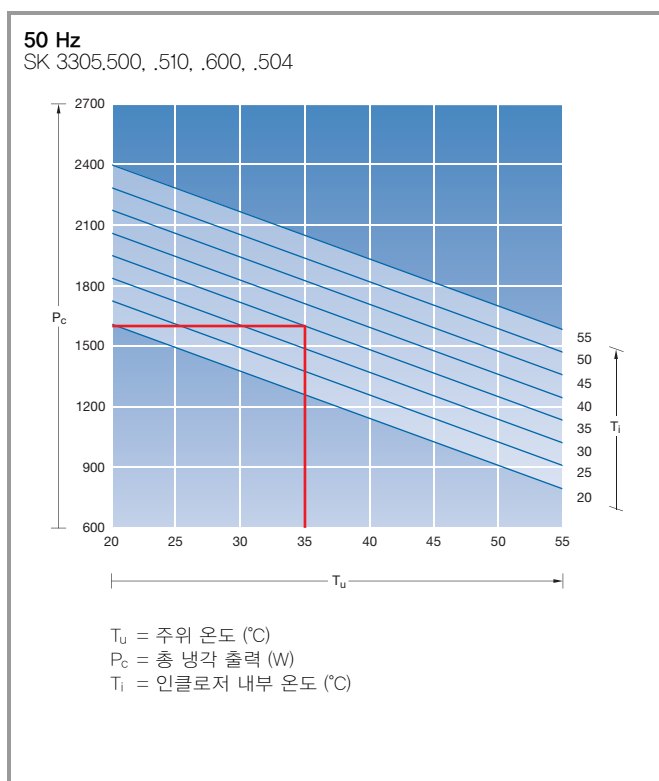
출력 등급 750 W (115/230 V, 1~, 400 V, 2~)



TopTherm 벽면 장착형 냉각 장치 “Blue e” 출력 등급 1000 W (115/230 V, 1~)

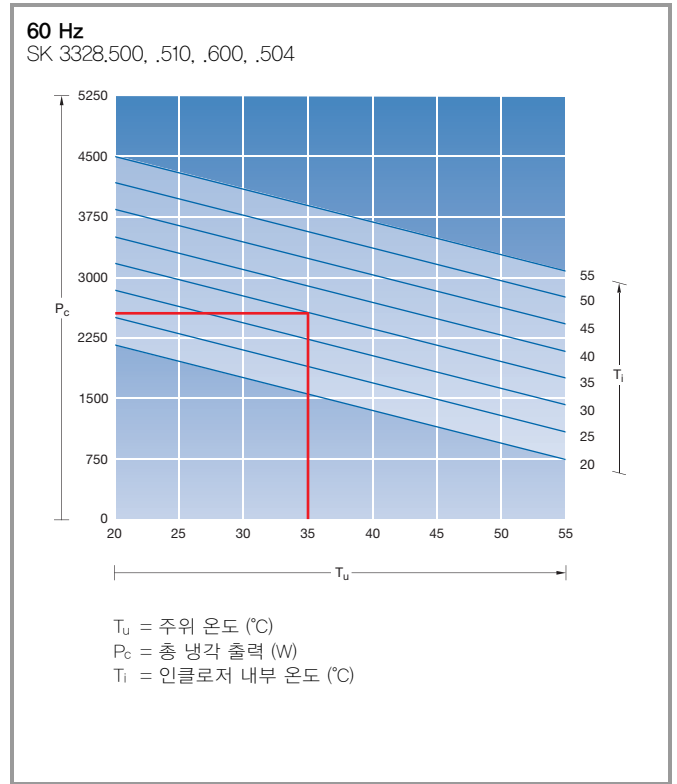
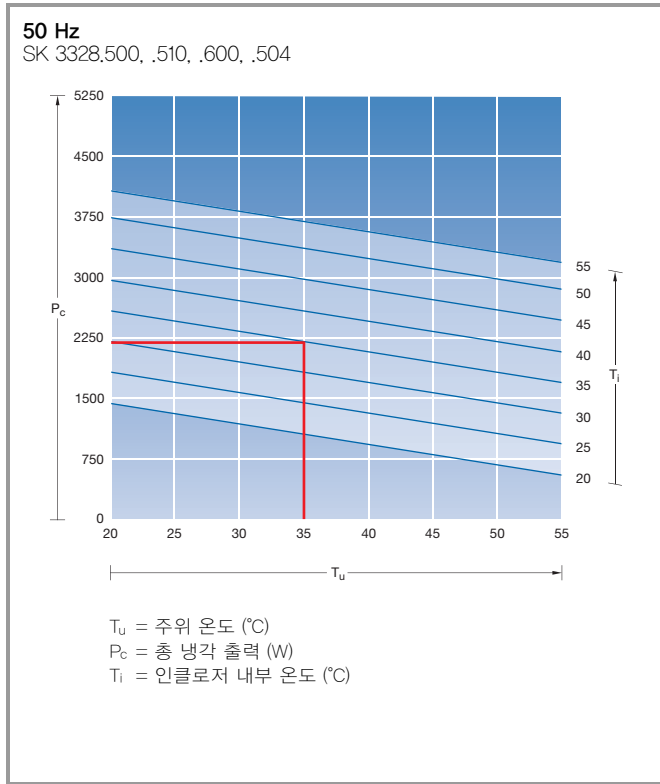


출력 등급 1500 W (115/230 V, 1~)

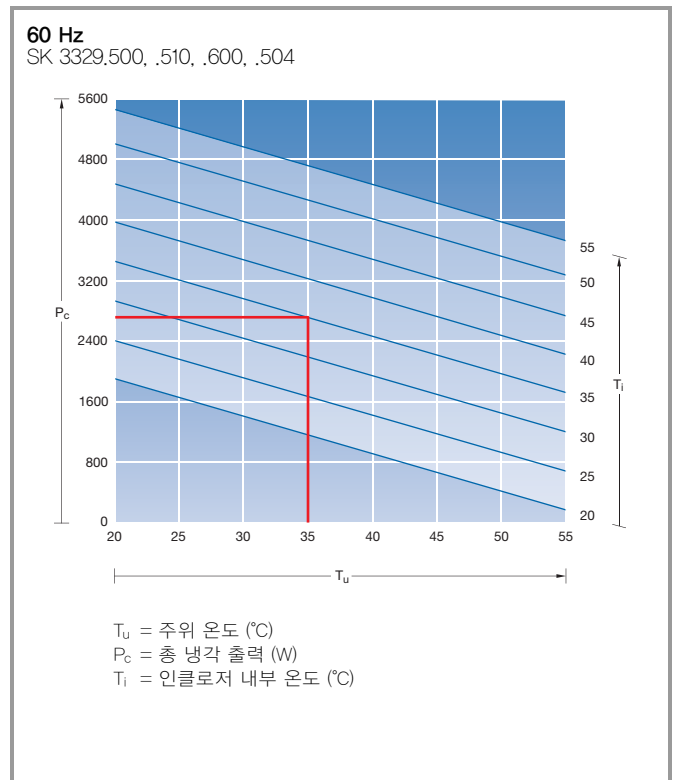
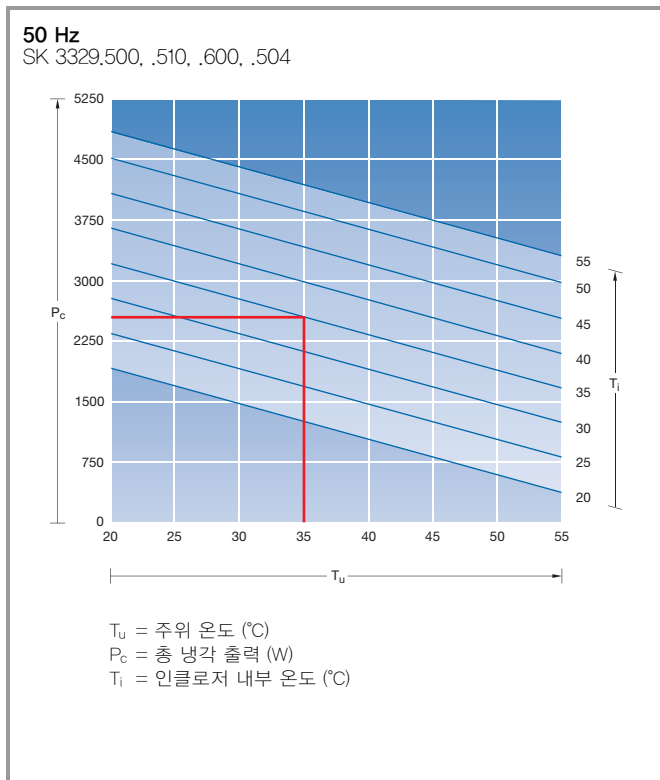


냉각 장치

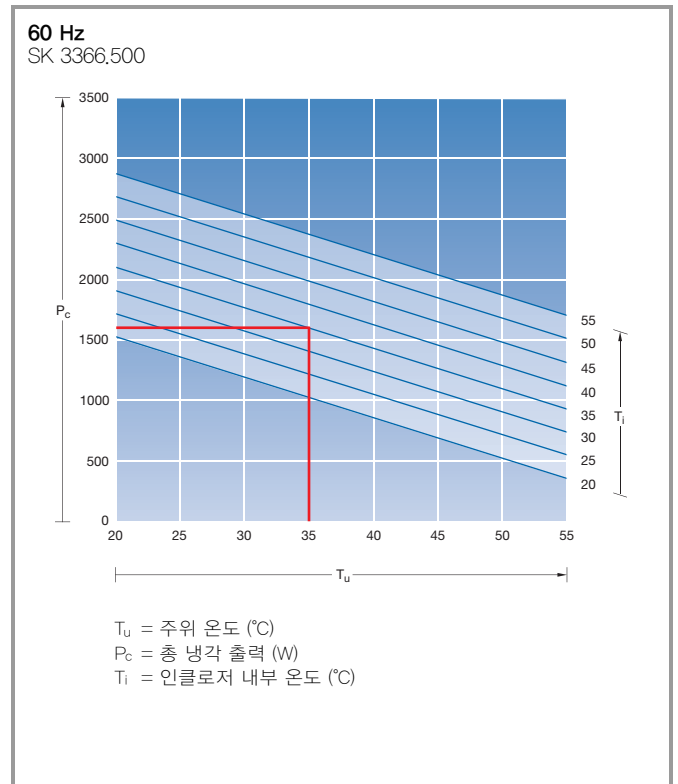
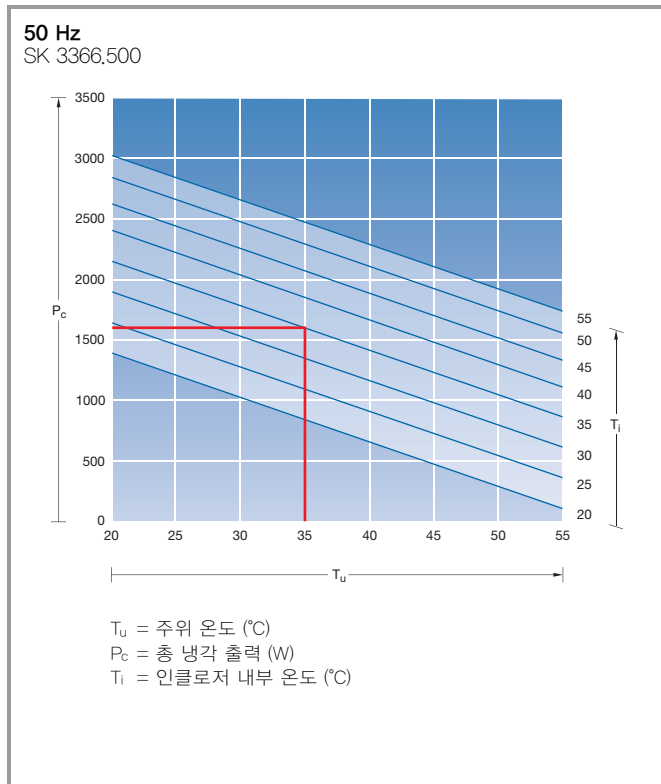
TopTherm 벽면 장착형 냉각 장치 “Blue e” 출력 등급 2000 W (115/230 V, 1~)



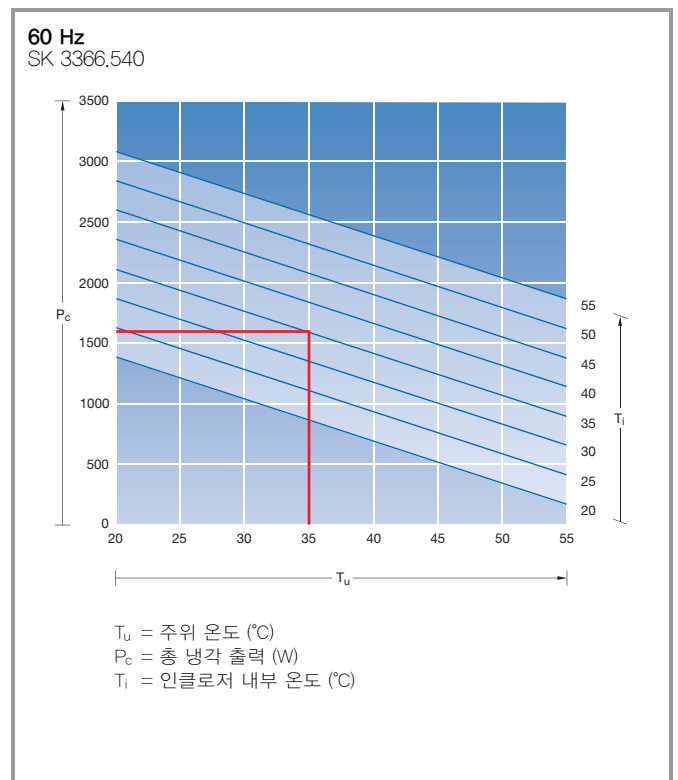
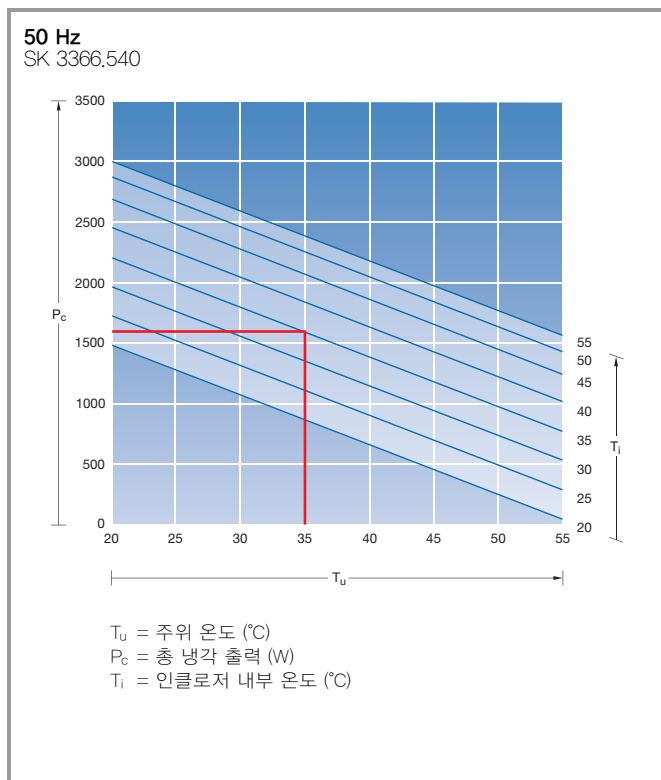
출력 등급 2500 W (115/230 V, 1~)



TopTherm 벽면 장착형 냉각 장치 “Blue e”, 슬림형 출력 등급 1500 W (230 V, 1~)



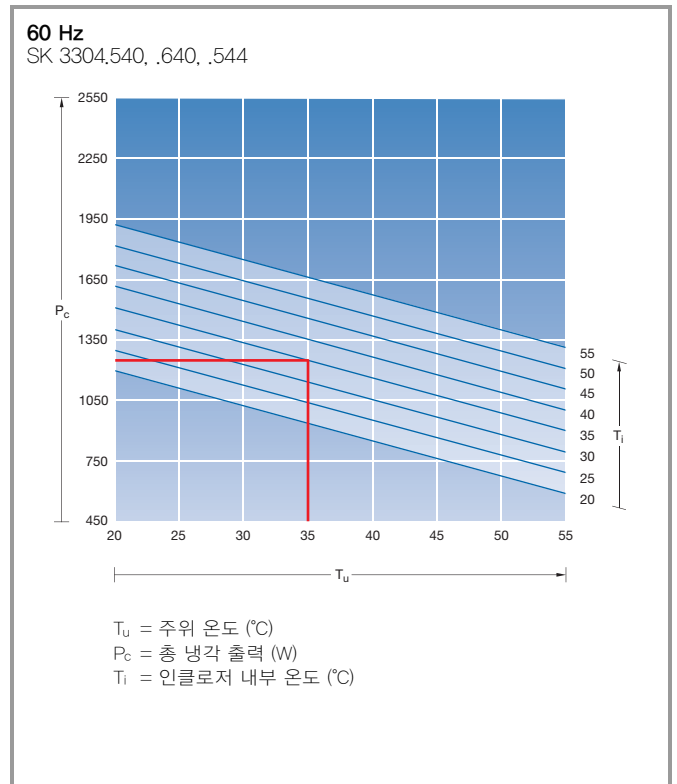
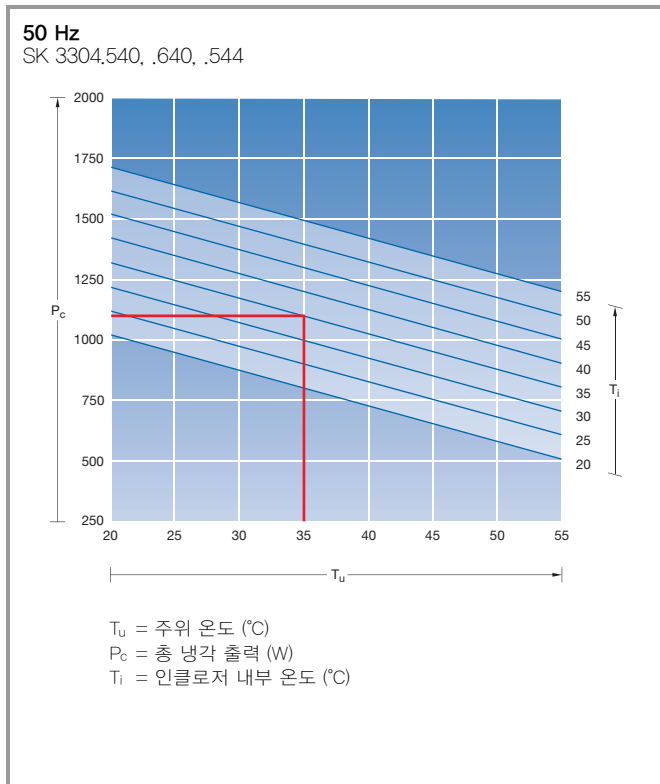
출력 등급 1500 W (400/460 V, 3~)



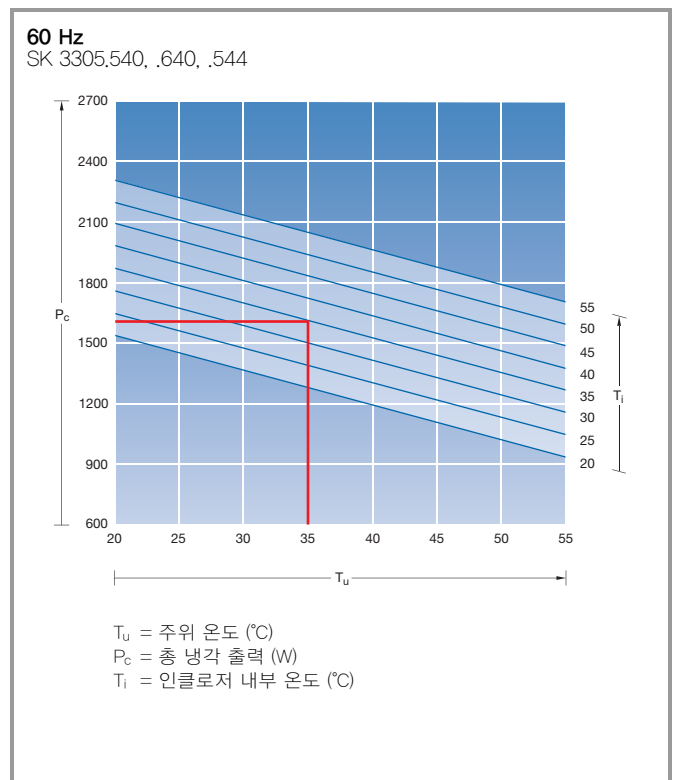
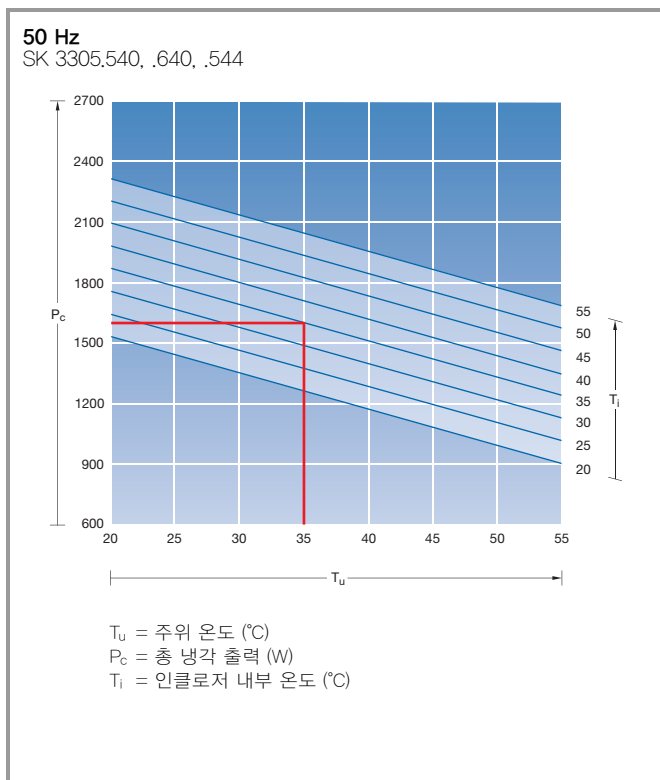
냉각 장치

TopTherm 벽면 장착형 냉각 장치 “Blue e”

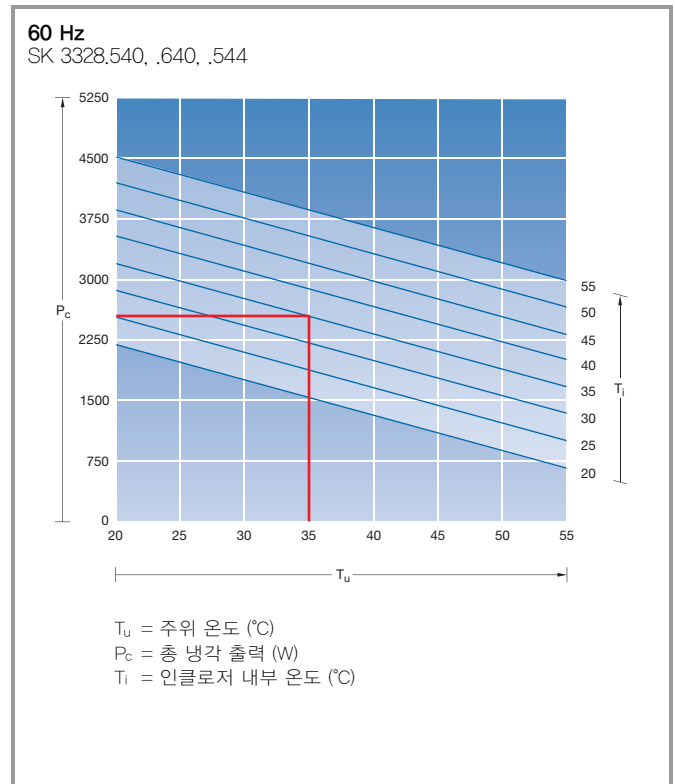
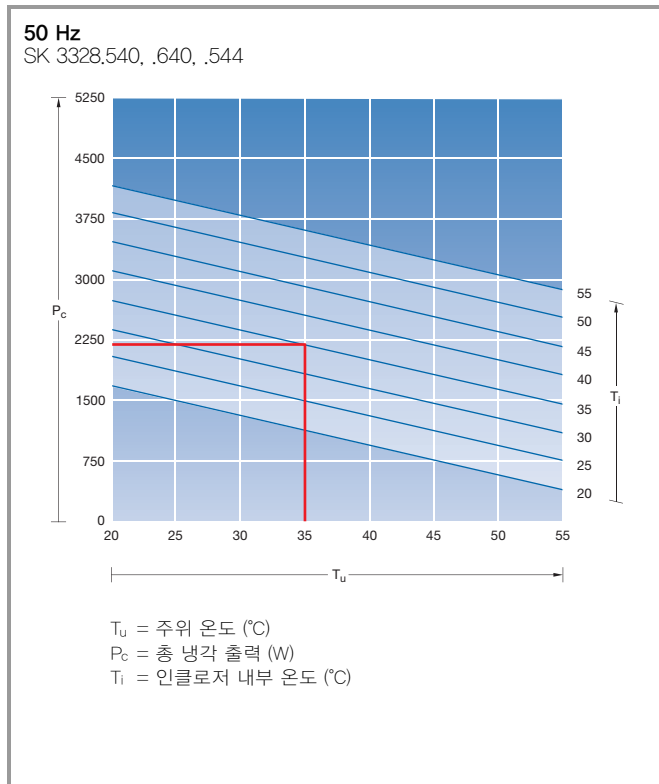
출력 등급 1000 W (400/460 V, 3~)



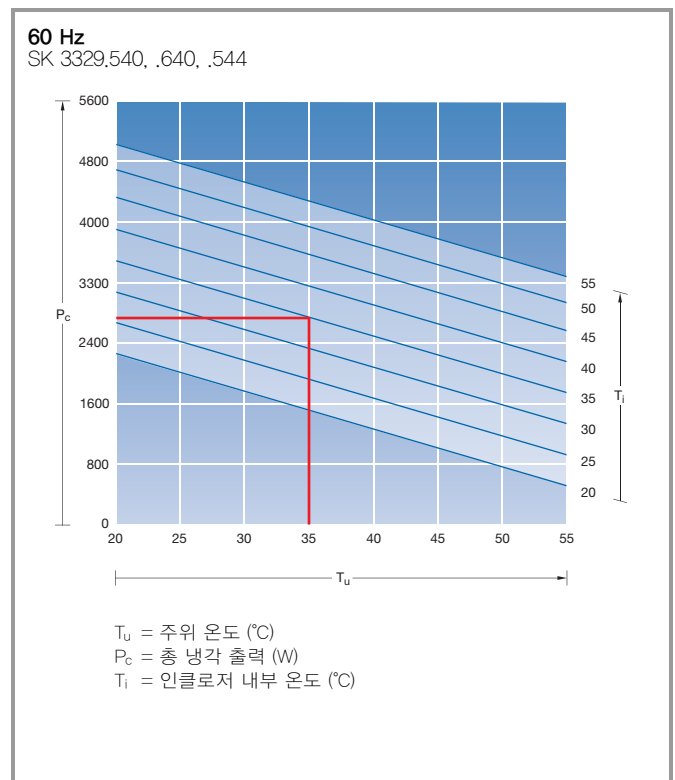
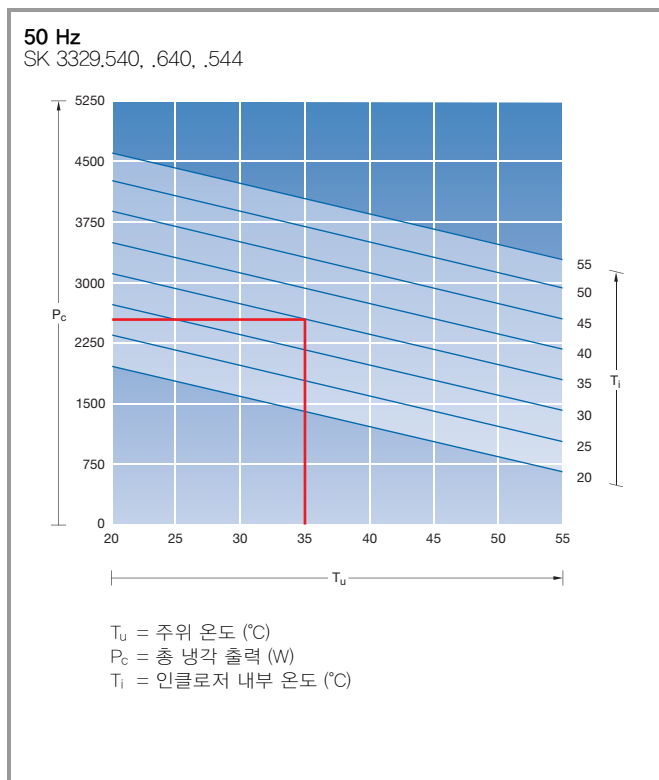
출력 등급 1500 W (400/460 V, 3~)



TopTherm 벽면 장착형 냉각 장치 "Blue e" 출력 등급 2000 W (400/460 V, 3~)

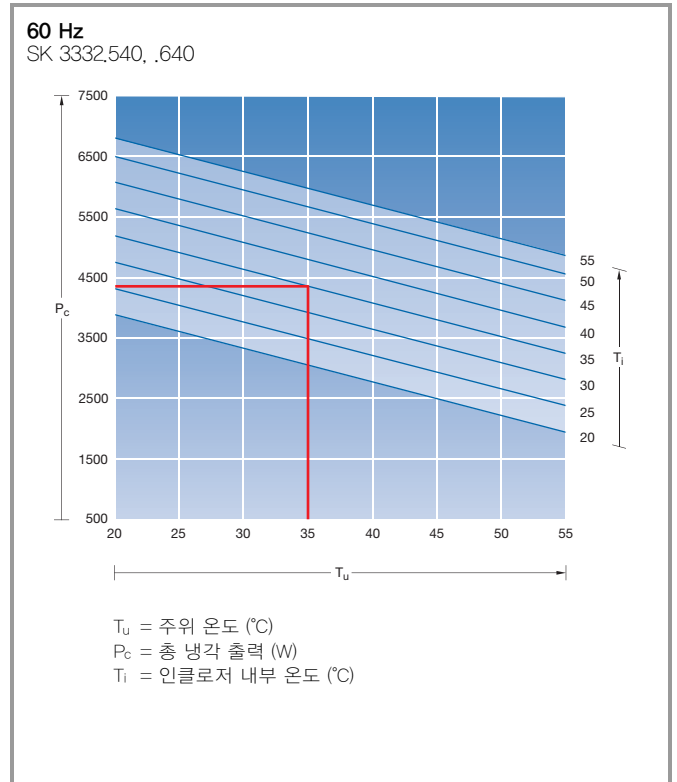
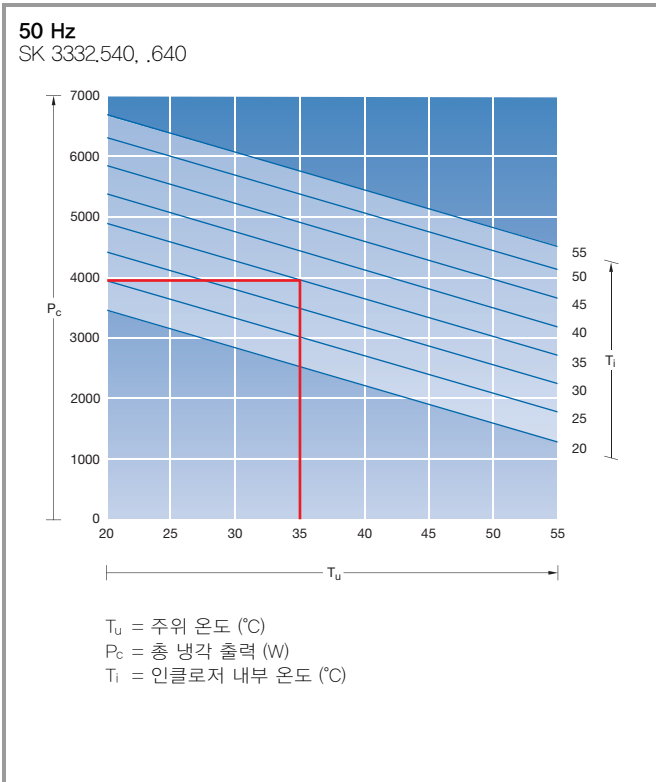


출력 등급 2500 W (400/460 V, 3~)

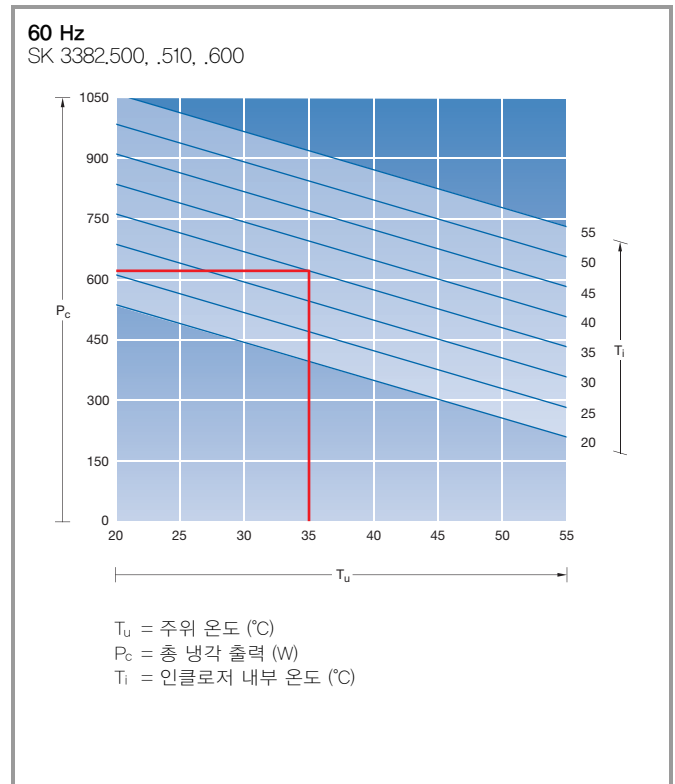
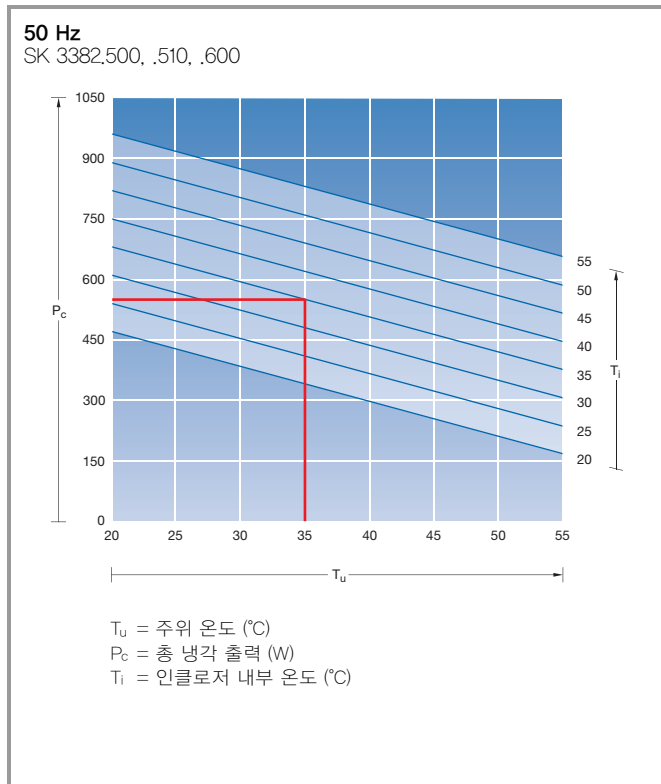


냉각 장치

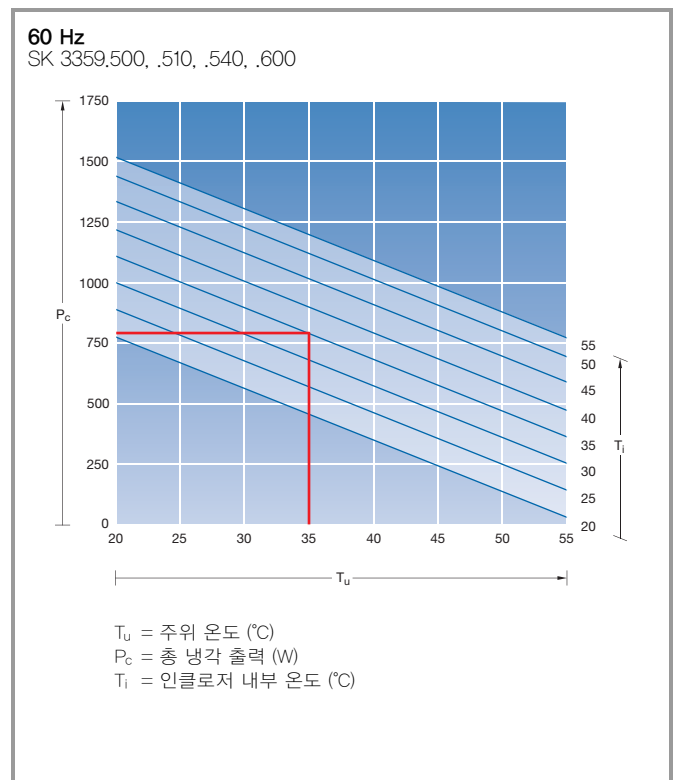
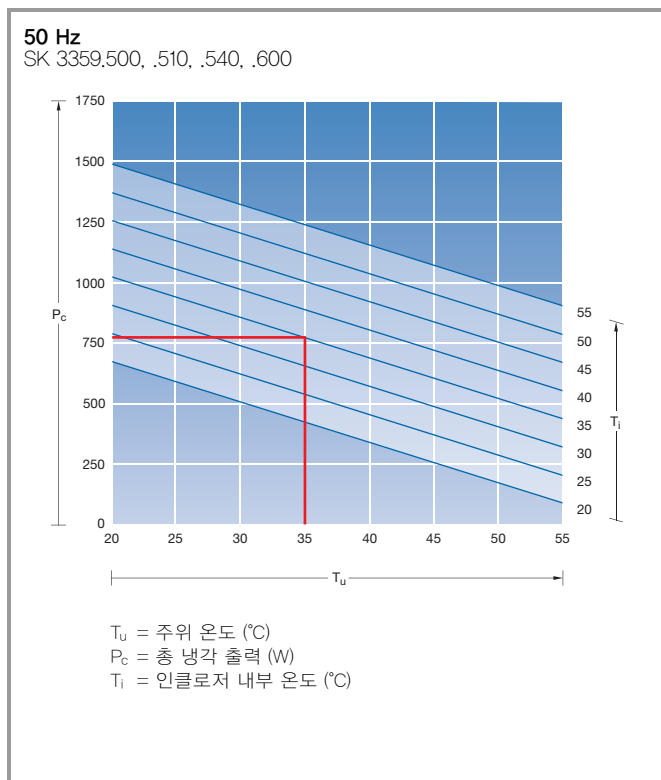
TopTherm 벽면 장착형 냉각 장치 “Blue e” 출력 등급 4000 W (400/460 V, 3~)



TopTherm 루프 장착형 냉각 장치 "Blue e" 출력 등급 500 W (115/230 V, 1~)



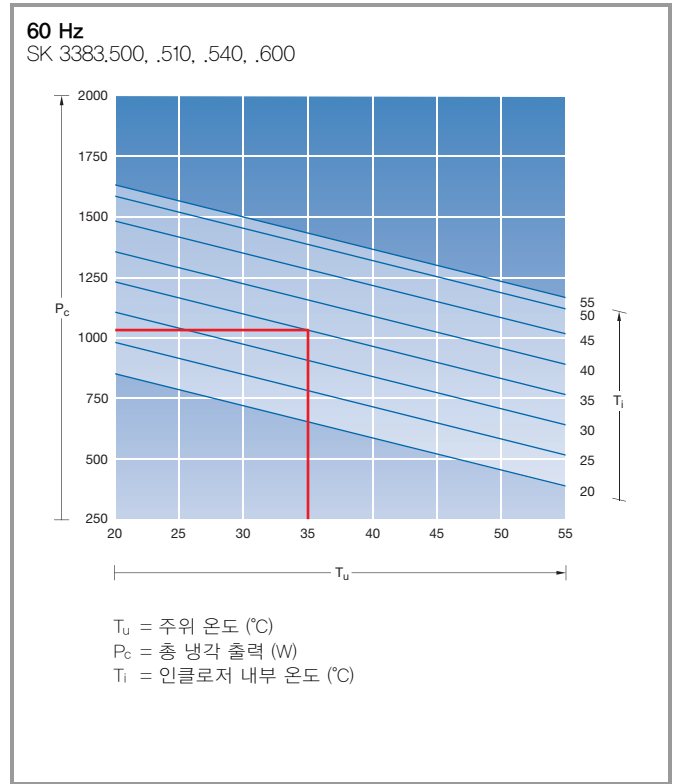
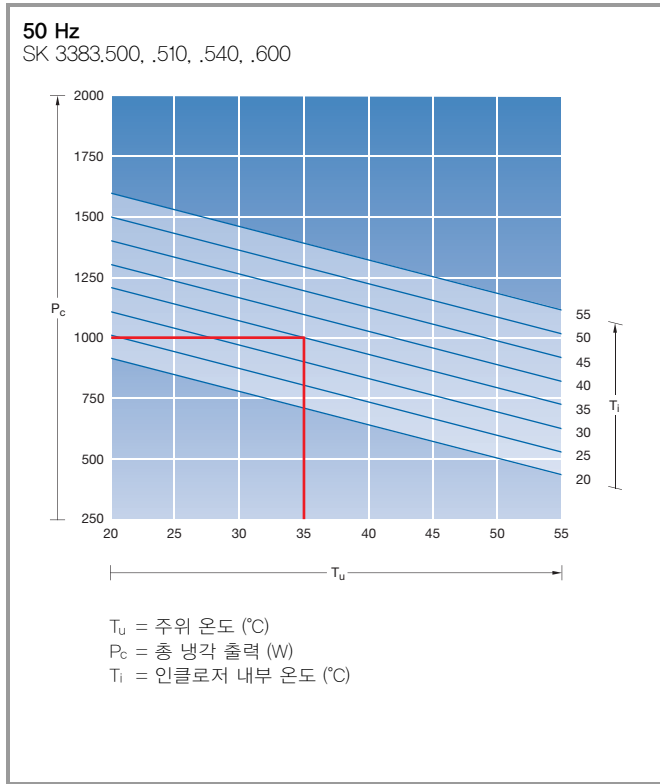
출력 등급 750 W (115/230 V, 1~, 400 V, 2~)



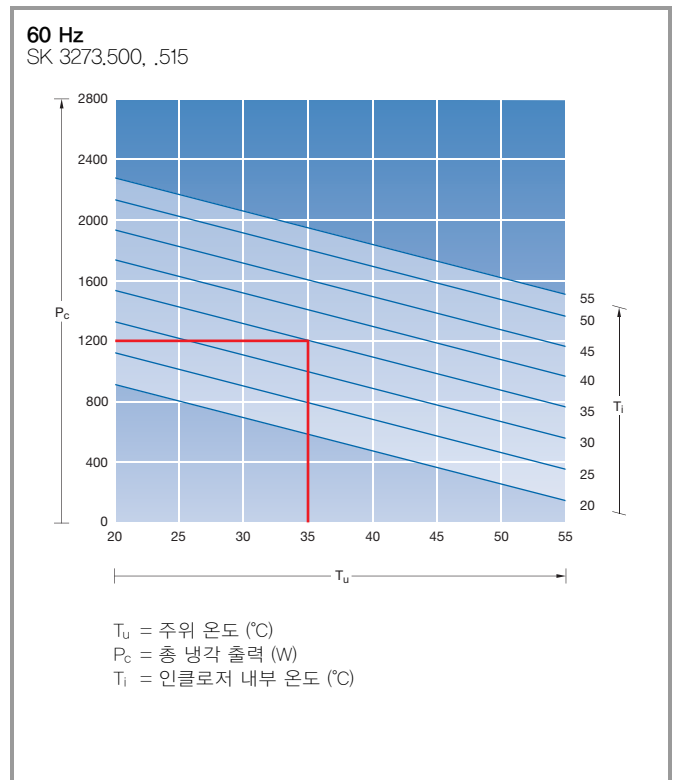
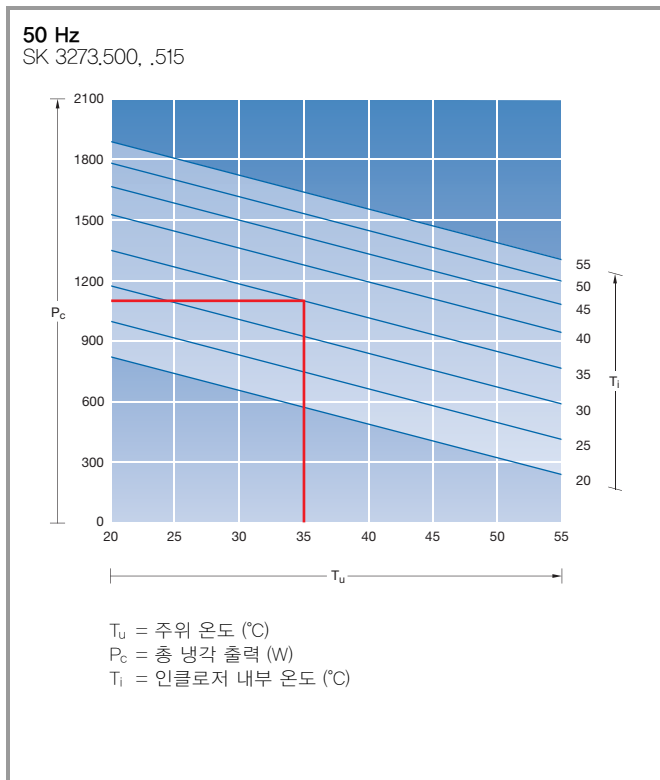
냉각 장치

TopTherm 루프 장착형 냉각 장치 “Blue e”

출력 등급 1000 W (115/230 V, 1~, 400 V, 2~)

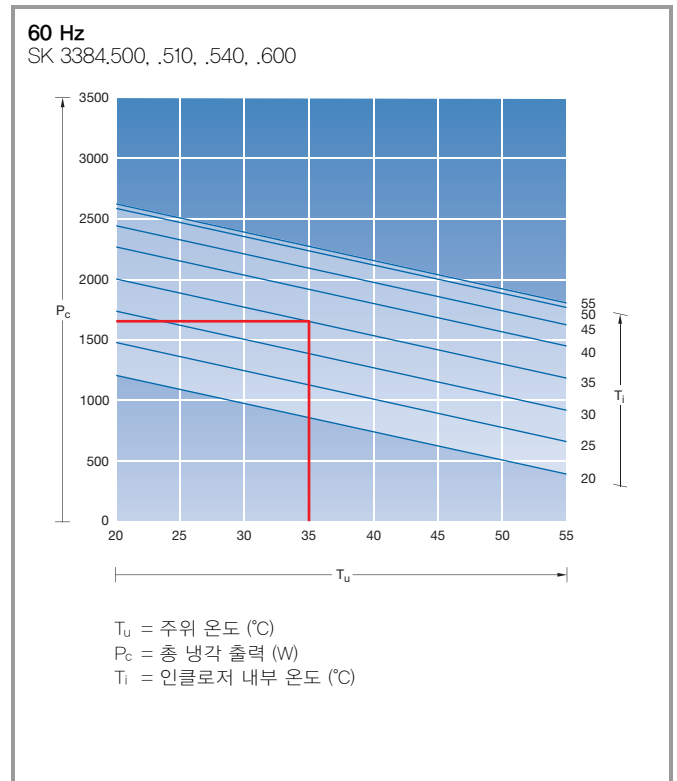
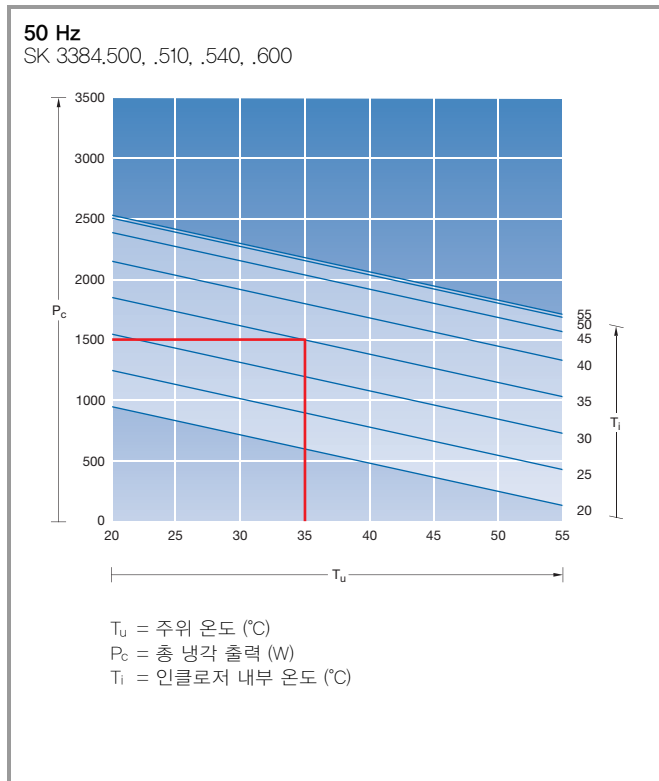


출력 등급 1100 W (115/230 V, 1~)

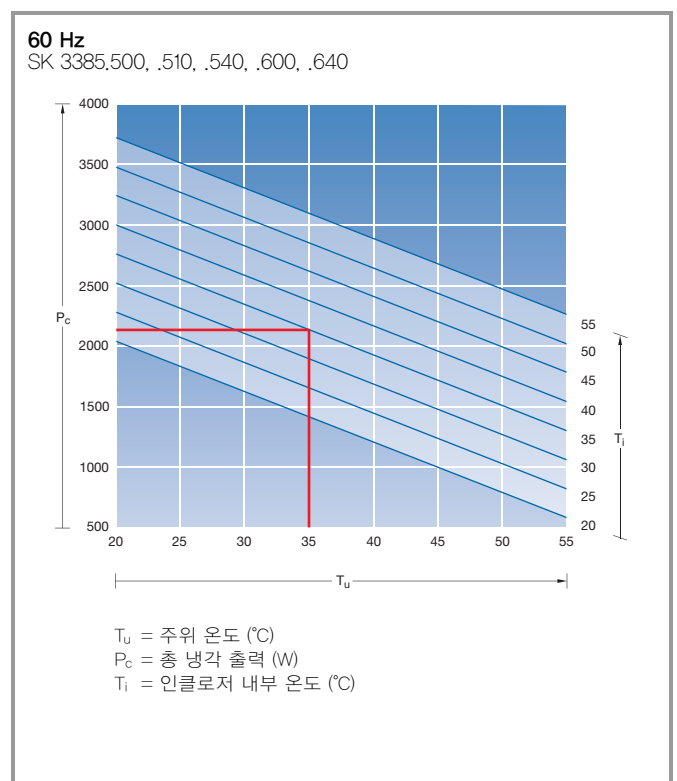
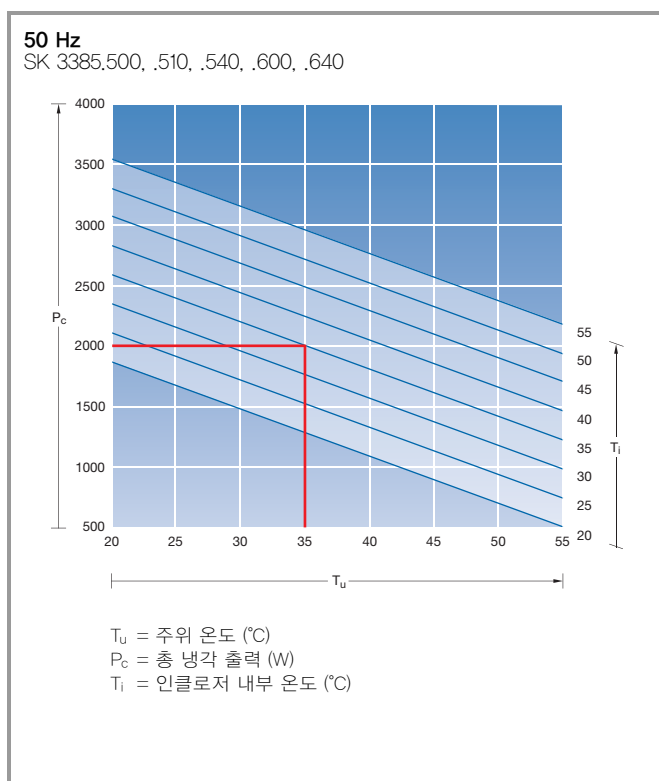


TopTherm 루프 장착형 냉각 장치 "Blue e"

출력 등급 1500 W (115/230 V, 1~, 400 V, 2~)

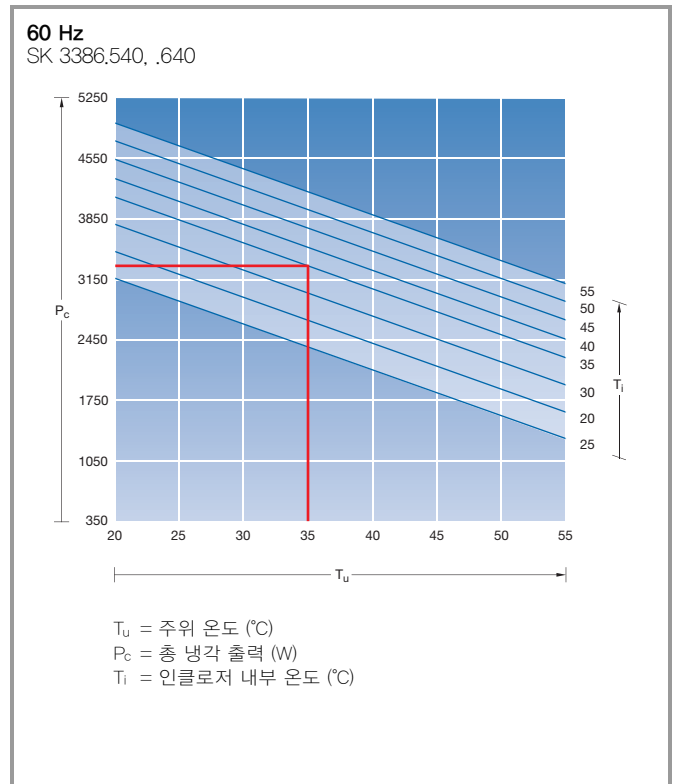
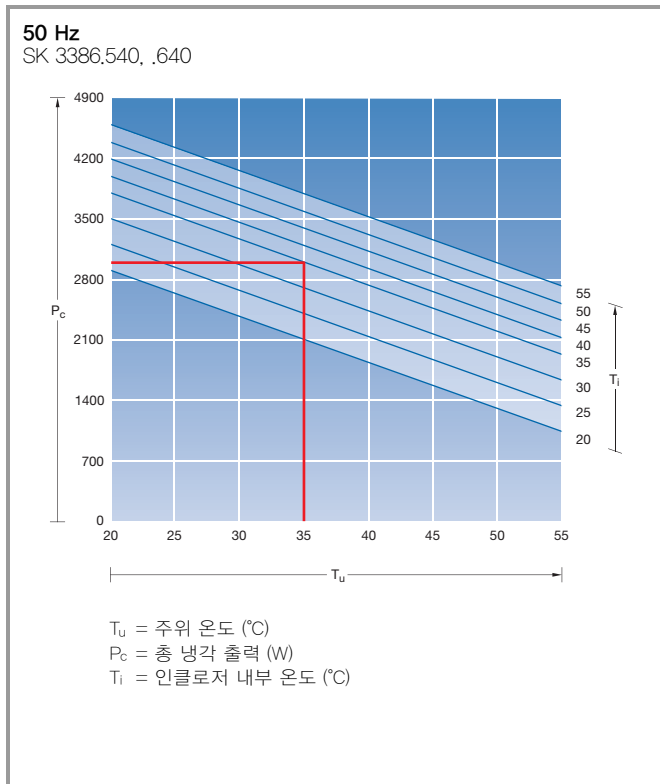


출력 등급 2000 W (115/230 V, 1~, 400 V, 2~)

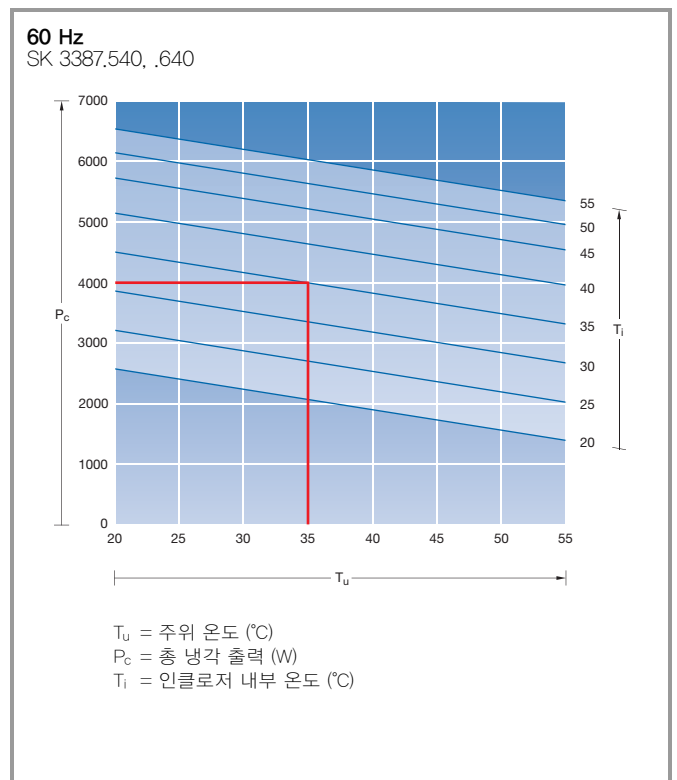
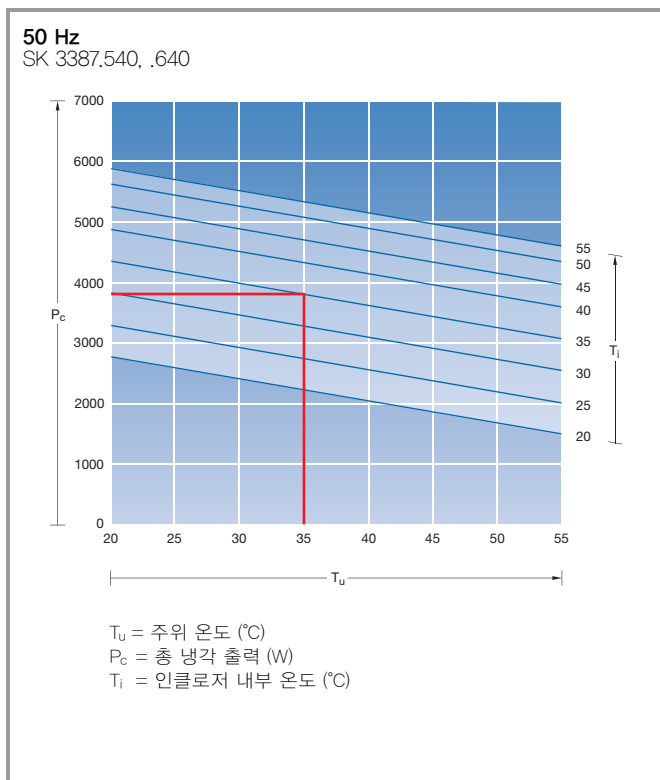


냉각 장치

TopTherm 루프 장착형 냉각 장치 "Blue e" 출력 등급 3000 W (400/460 V, 3~)

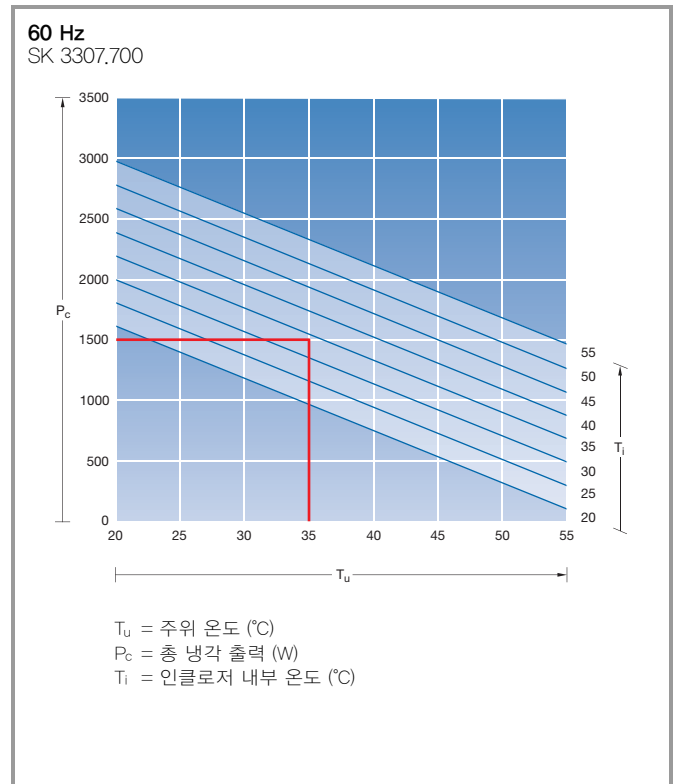
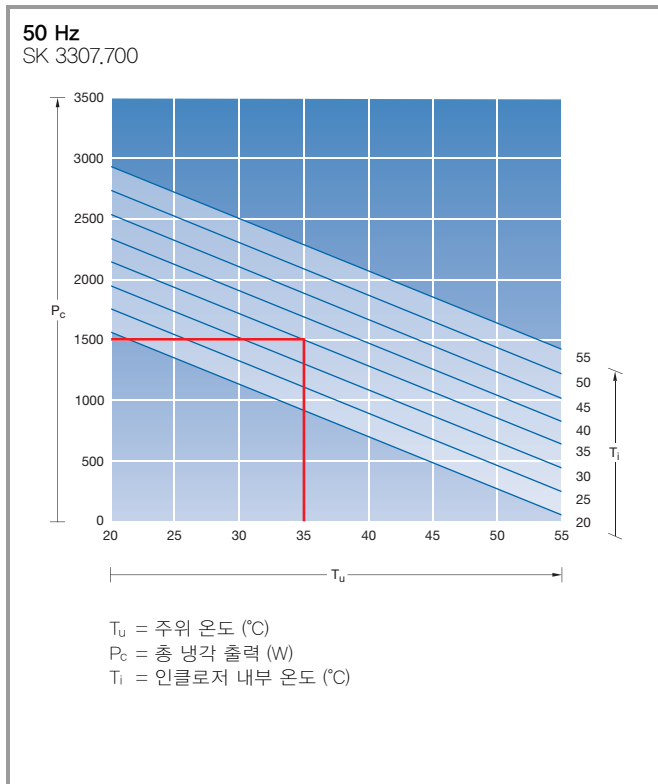


출력 등급 4000 W (400/460 V, 3~)

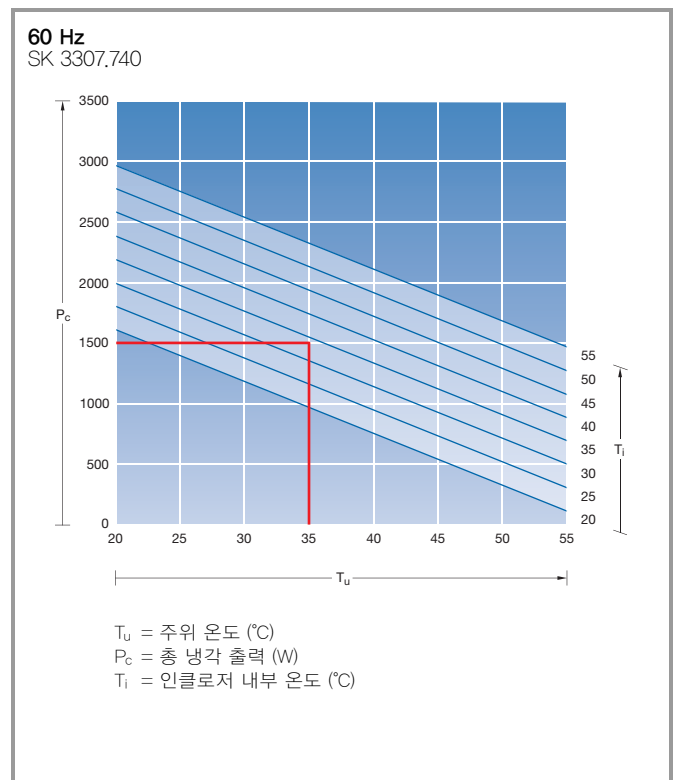
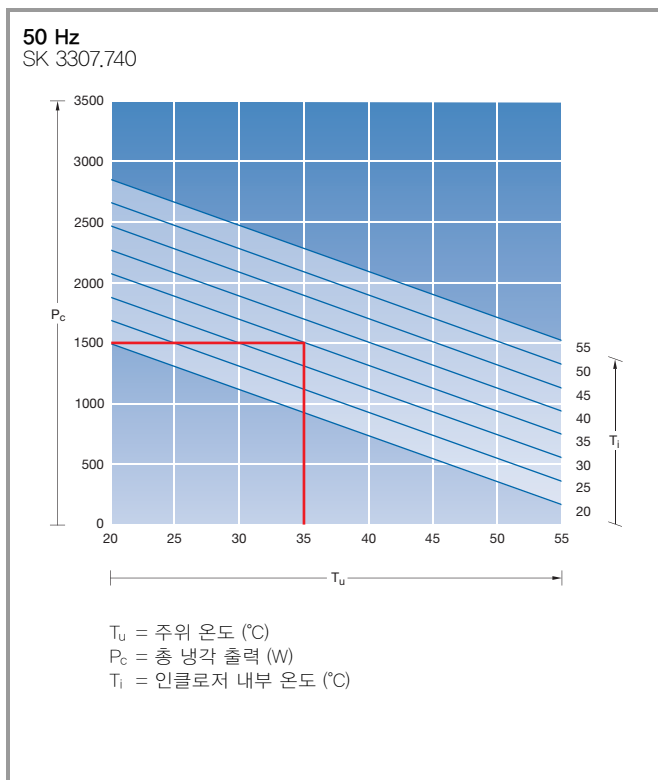


모듈형 공조 컨셉트 - 냉각 모듈 "Blue e"

출력 등급 1500 W (230 V, 1~)



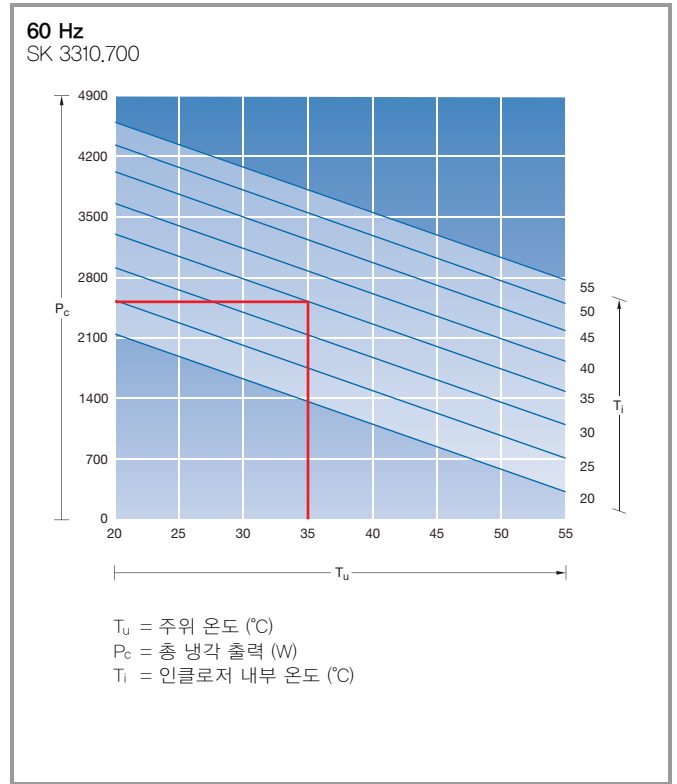
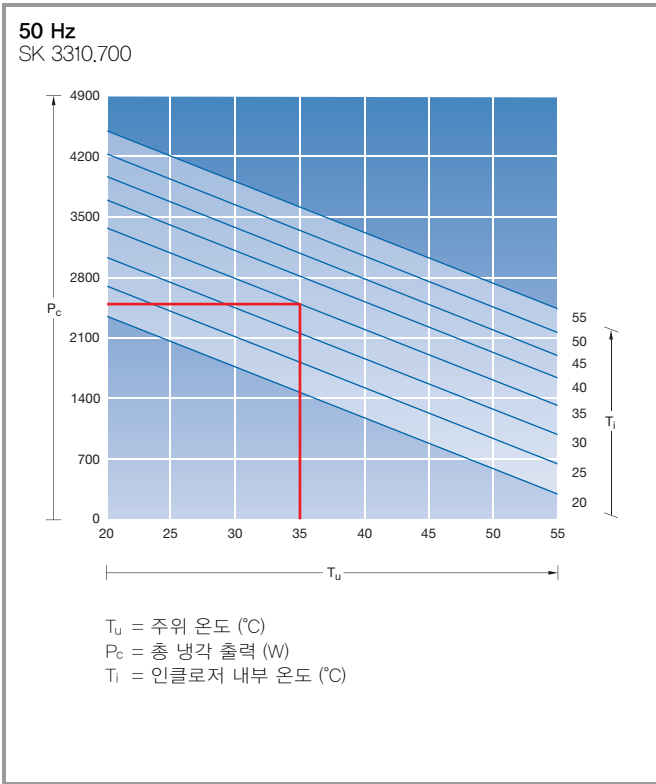
출력 등급 1500 W (400/460 V, 3~)



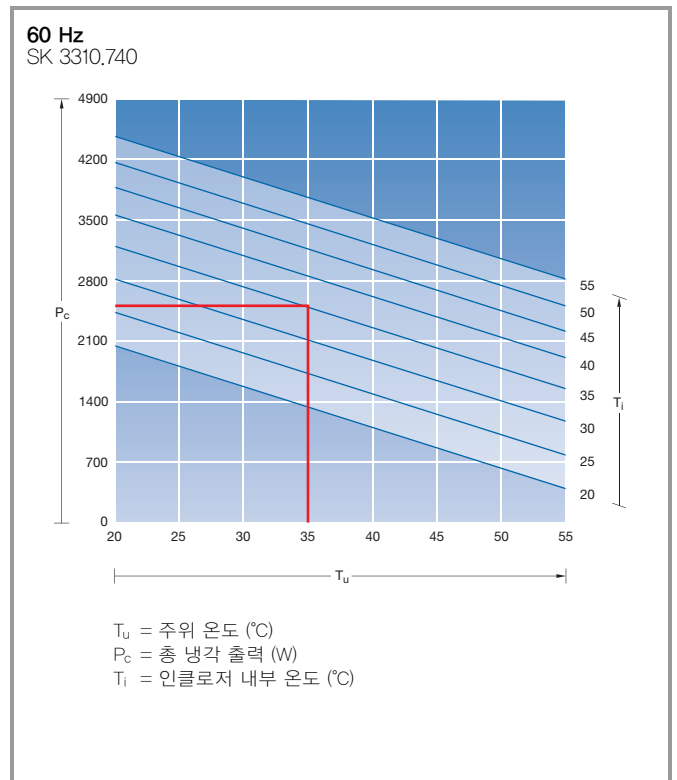
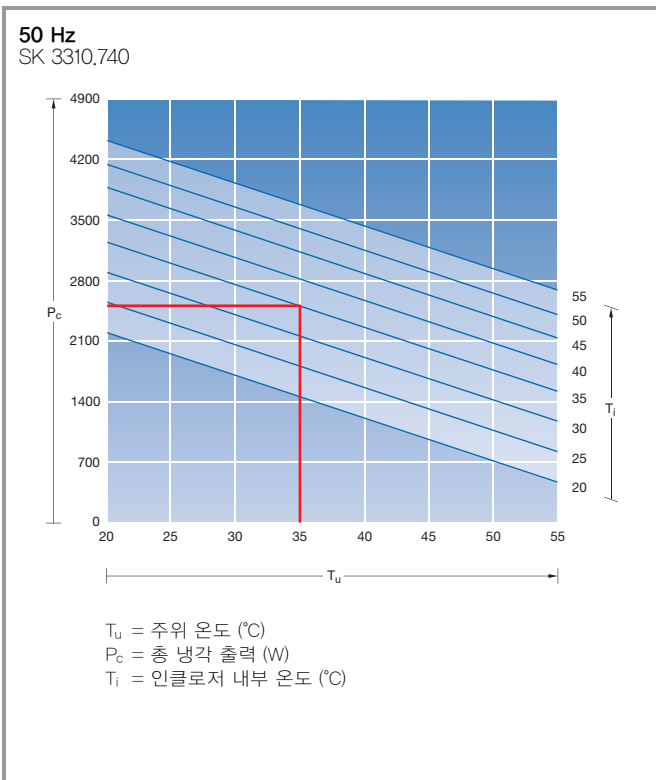
냉각 장치

모듈형 공조 컨셉트 - 냉각 모듈 "Blue e"

출력 등급 2500 W (230 V, 1~)



출력 등급 2500 W (400/460 V, 3~)

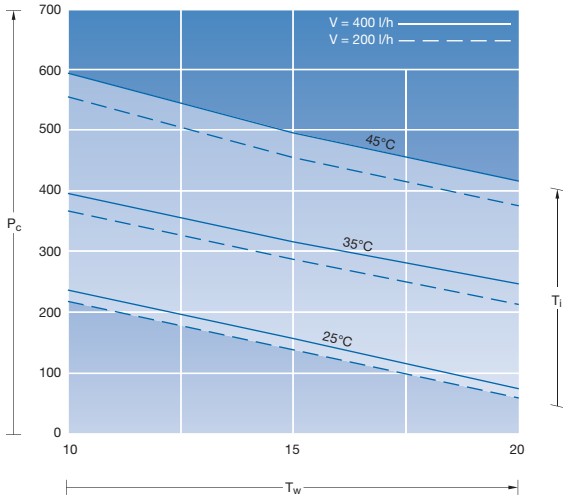


벽면 장착형 공기 대 물 열교환기

출력 등급 300 W

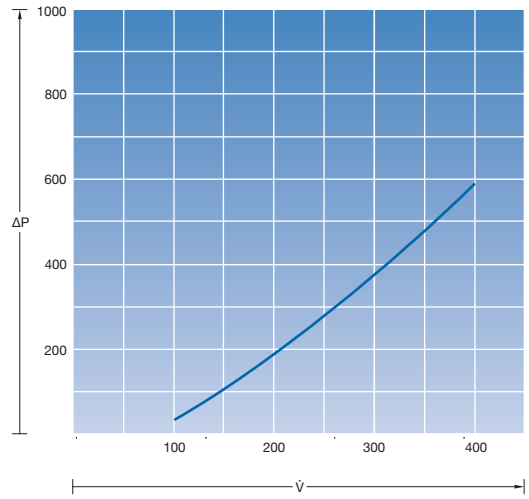
물 운반 부: 구리 / 황동 (Cu/CuZn)

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



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3212.024, .115, .230

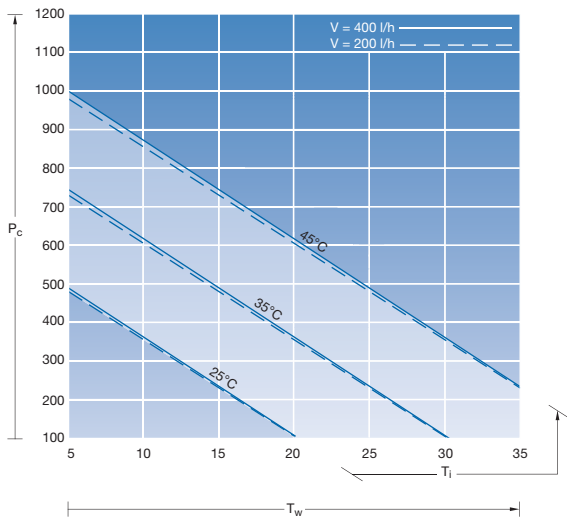


\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

출력 등급 600 W

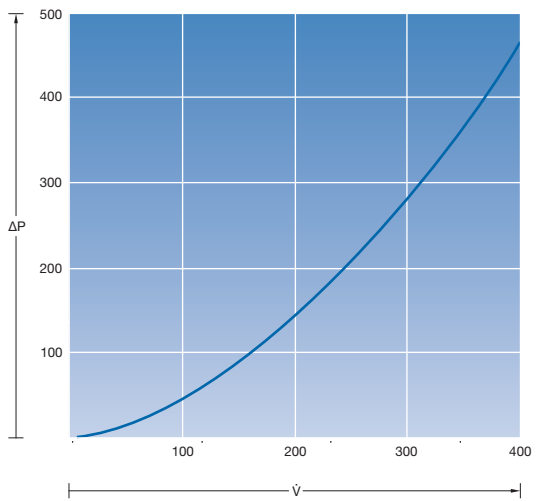
물 운반 부: 구리 / 황동 (Cu/CuZn)

50/60 Hz
SK 3214.100



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3214.100



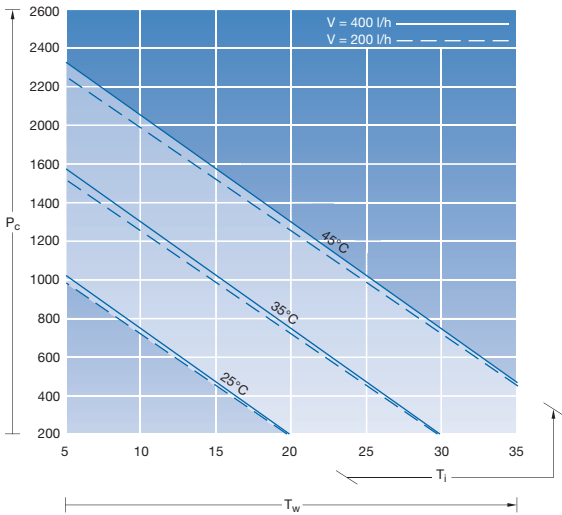
\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

벽면 장착형 공기 대 물 열교환기

출력 등급 1250 W

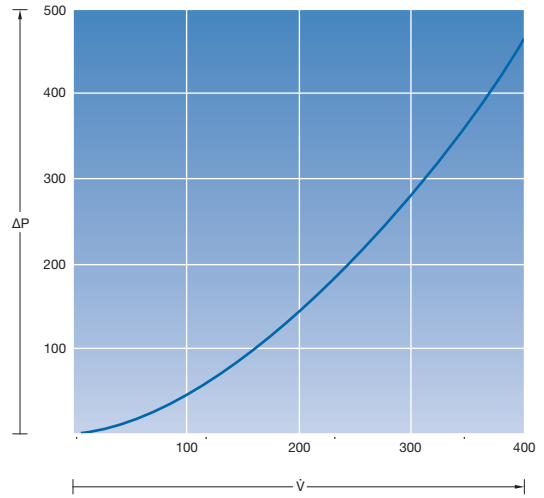
물 운반 부: 구리 / 황동 (Cu/CuZn)

50/60 Hz
SK 3215.100



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3215.100

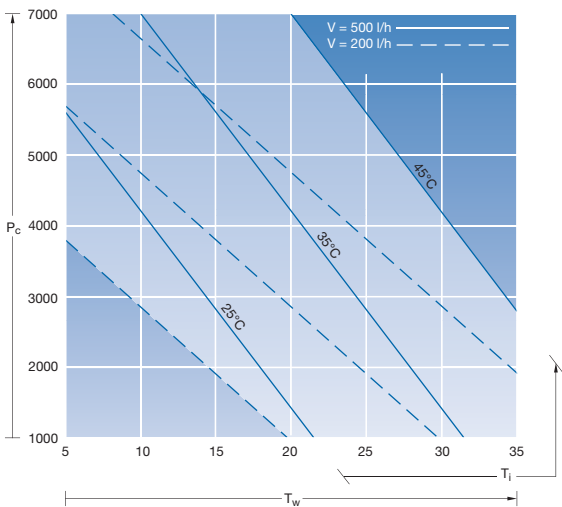


\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

출력 등급 7000 W

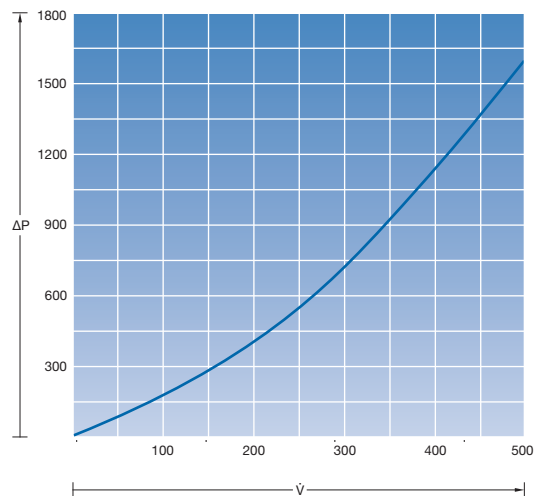
물 운반 부: 구리 / 황동 (Cu/CuZn)

50/60 Hz
SK 3216.480



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3216.480



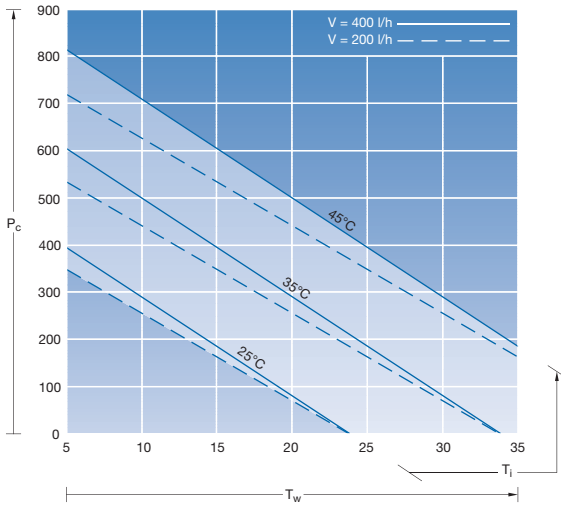
\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

벽면 장착형 공기 대 물 열교환기

출력 등급 500 W

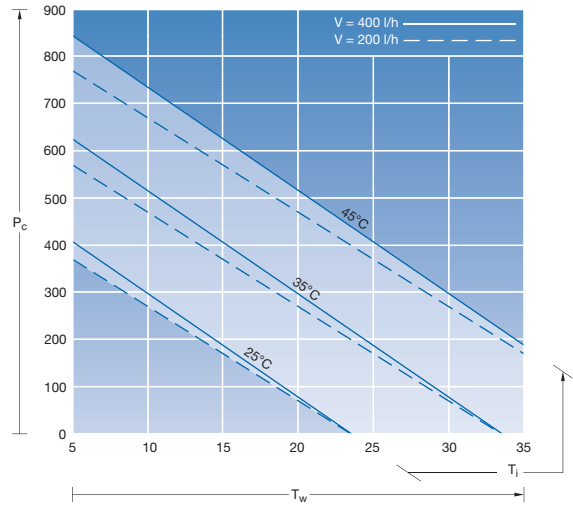
물 운반 부: 구리 / 황동 (Cu/CuZn)

50 Hz
SK 3363.100, .500



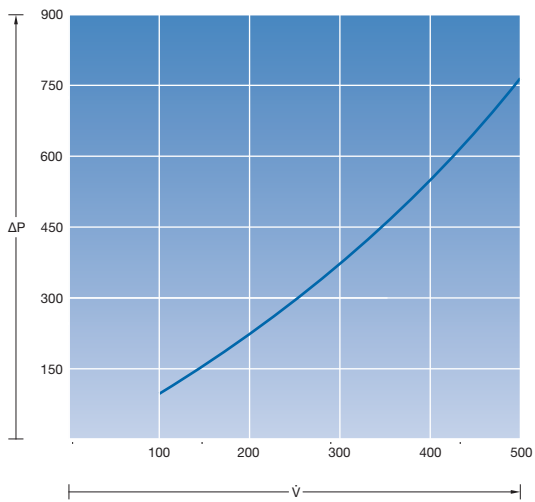
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3363.100, .500



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3363.100, .500



\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

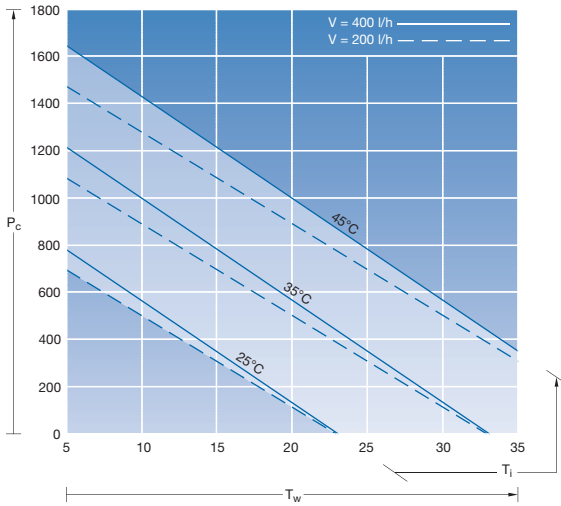
물을 활용한 냉각

벽면 장착형 공기 대 물 열교환기

출력 등급 1000 W

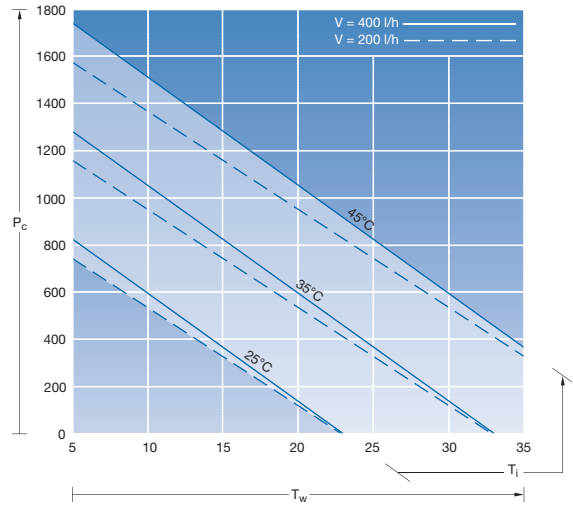
물 운반 부: 구리 / 황동 (Cu/CuZn)

50 Hz
SK 3364.100, .500



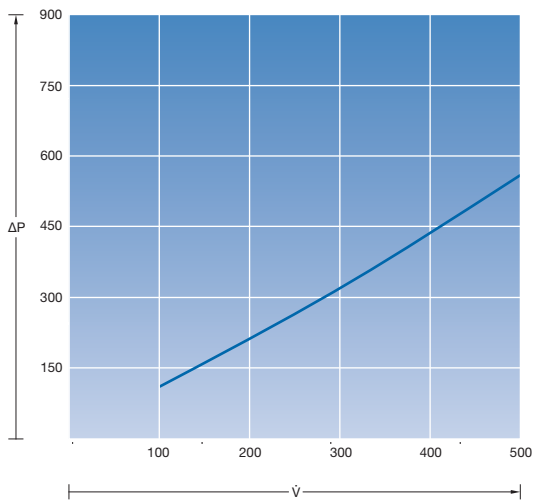
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3364.100, .500



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3364.100, .500



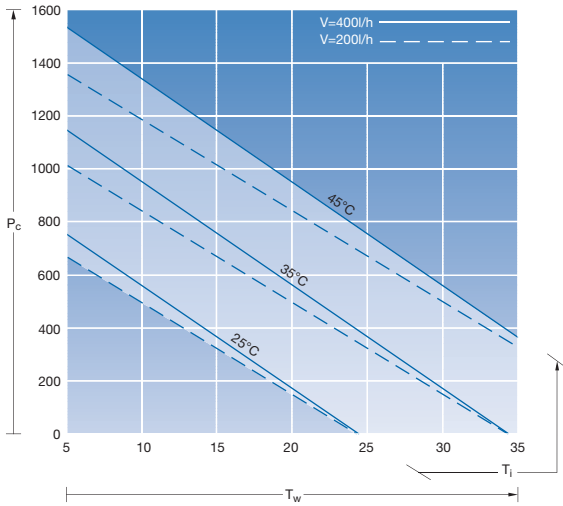
\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

벽면 장착형 공기 대 물 열교환기

출력 등급 1000 W

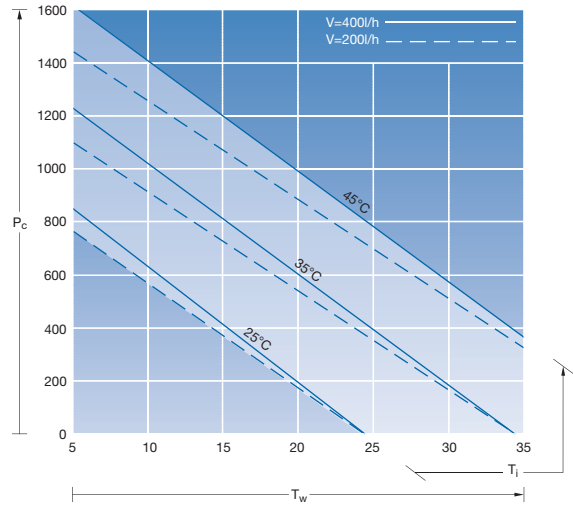
물 운반 부 : 스테인리스 스틸 (1.4571)

50 Hz
SK 3364.504



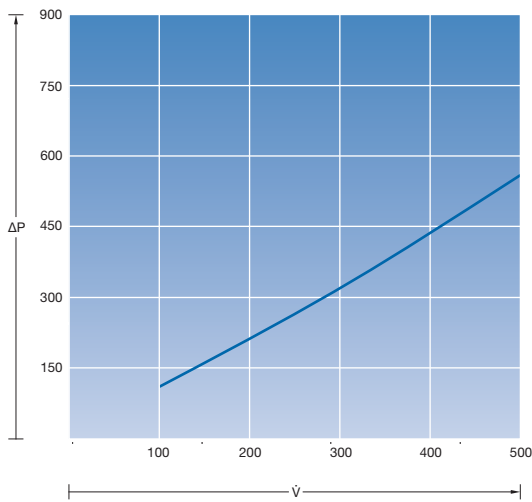
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3364.504



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3364.504



\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

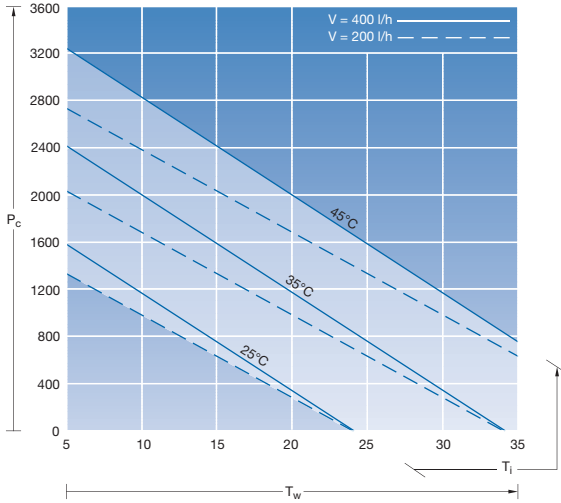
물을 활용한 냉각

벽면 장착형 공기 대 물 열교환기

출력 등급 2000 W

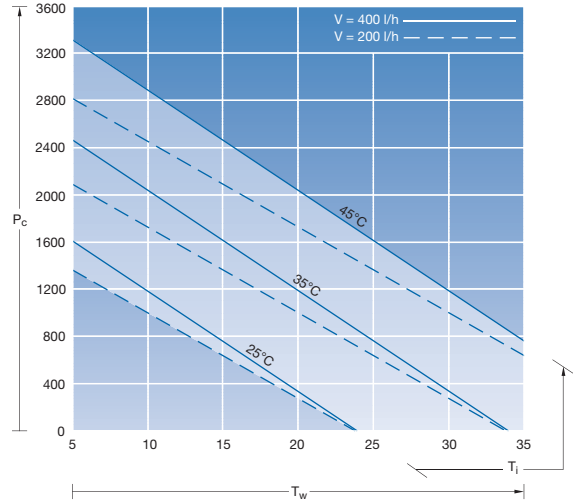
물 운반 부: 구리 / 황동 (Cu/CuZn)

50 Hz
SK 3373.100, .500



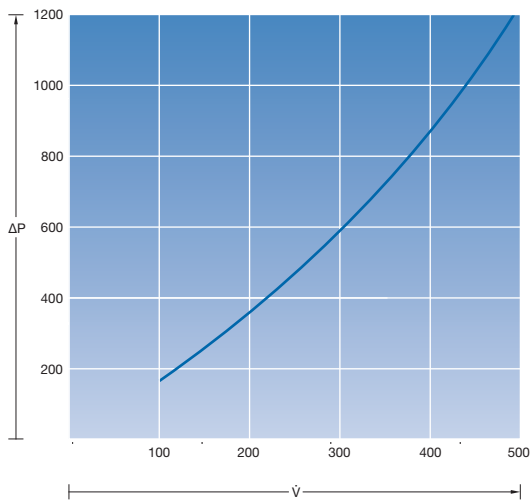
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3373.100, .500



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3373.100, .500



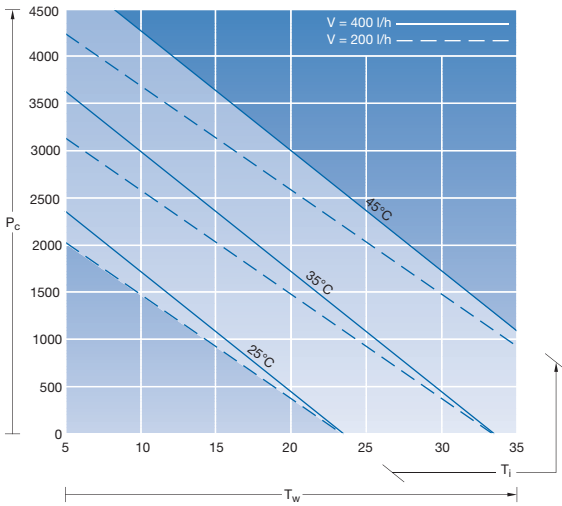
\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

벽면 장착형 공기 대 물 열교환기

출력 등급 3000 W

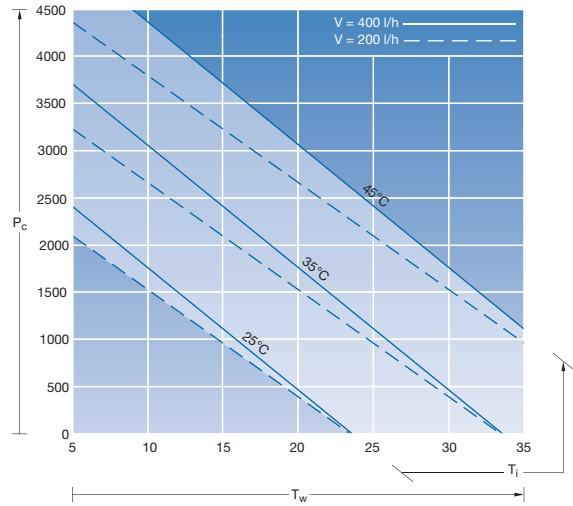
물 운반 부: 구리 / 황동 (Cu/CuZn)

50 Hz
SK 3374.100, .500



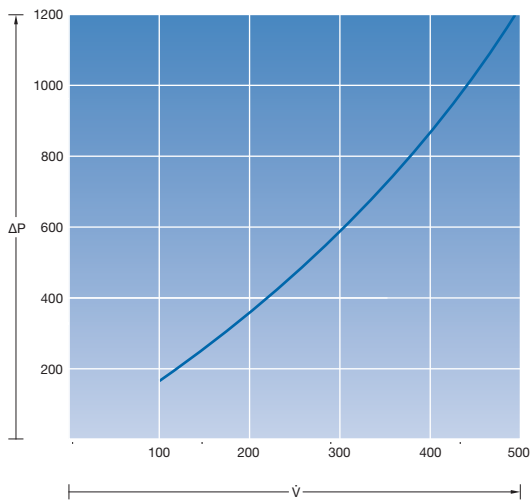
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3374.100, .500



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3374.100, .500



\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

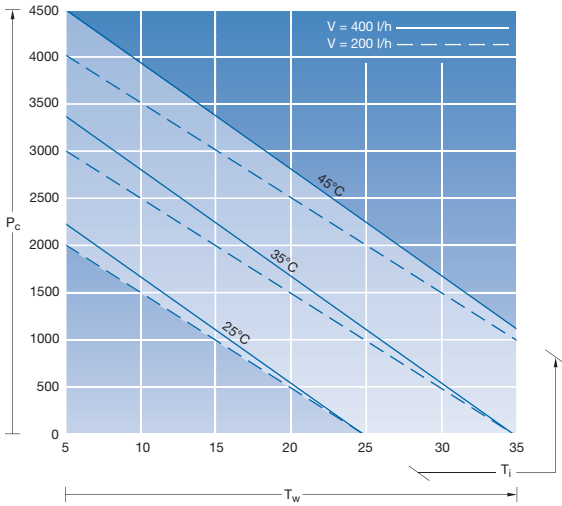
물을 활용한 냉각

벽면 장착형 공기 대 물 열교환기

출력 등급 2500 W

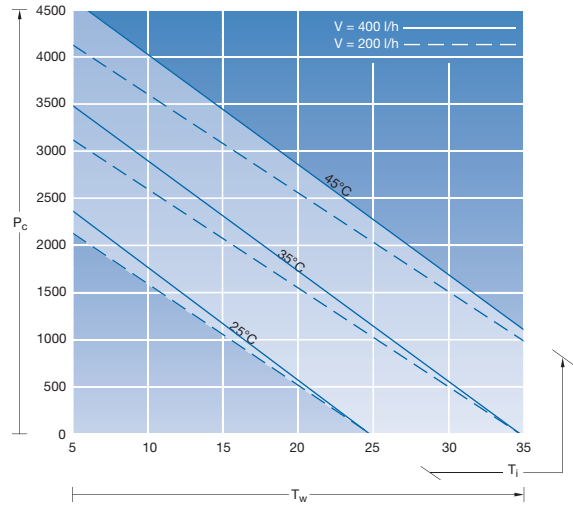
물 운반 부: 스테인리스 스틸 (1.4571)

50 Hz
SK 3374.504



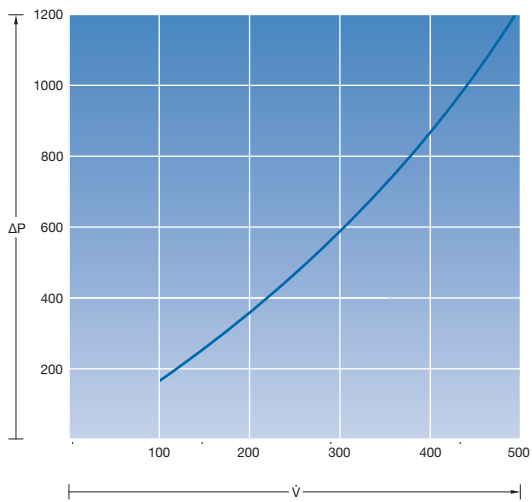
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3374.504



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3374.504



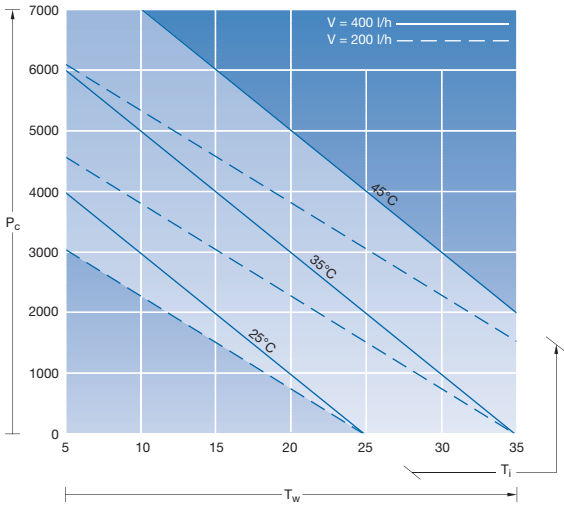
\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

벽면 장착형 공기 대 물 열교환기

출력 등급 5000 W

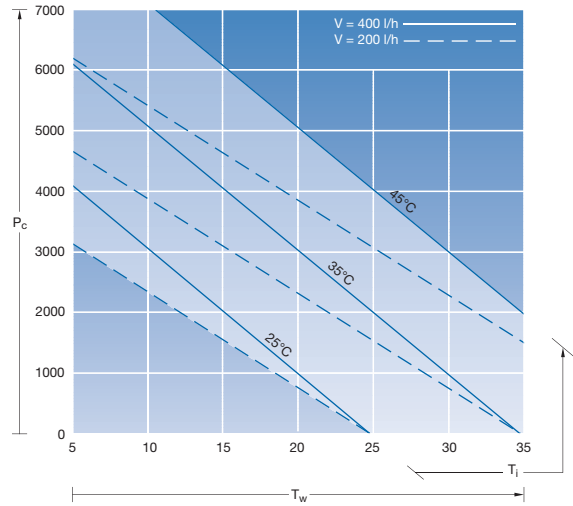
물 운반 부 : 구리 / 황동 (Cu/CuZn)

50 Hz
SK 3375.100, .500



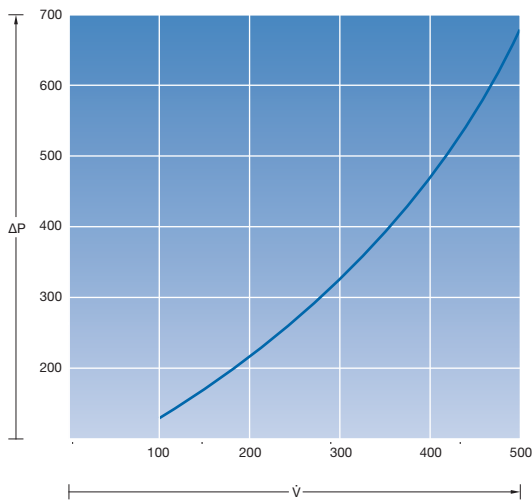
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3375.100, .500



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3375.100, .500



\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

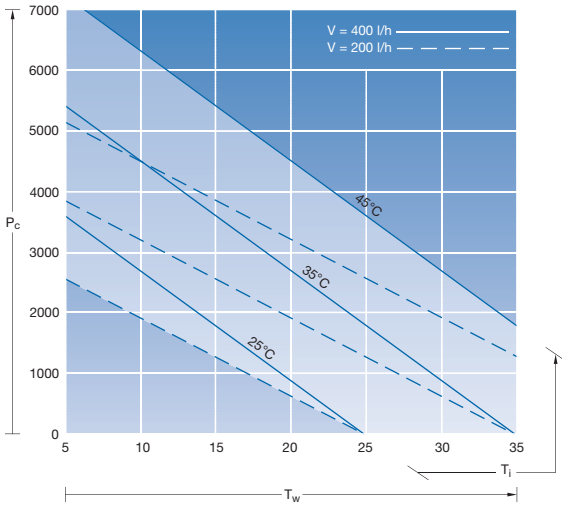
물을 활용한 냉각

벽면 장착형 공기 대 물 열교환기

출력 등급 4000 W

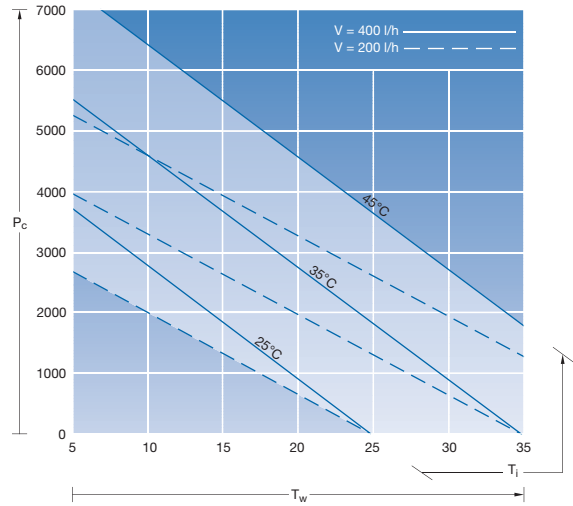
물 운반 부: 스테인리스 스틸 (1.4571)

50 Hz
SK 3375.504



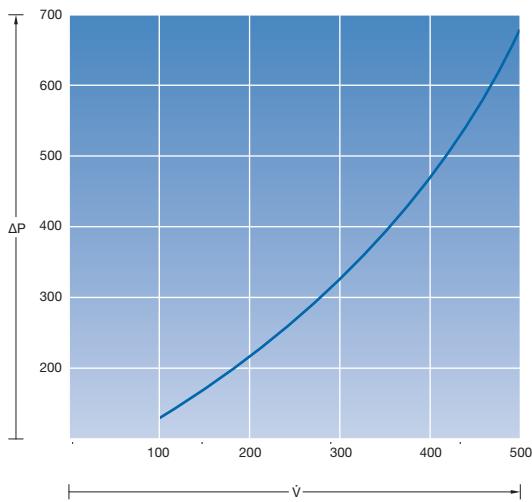
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3375.504



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3375.504



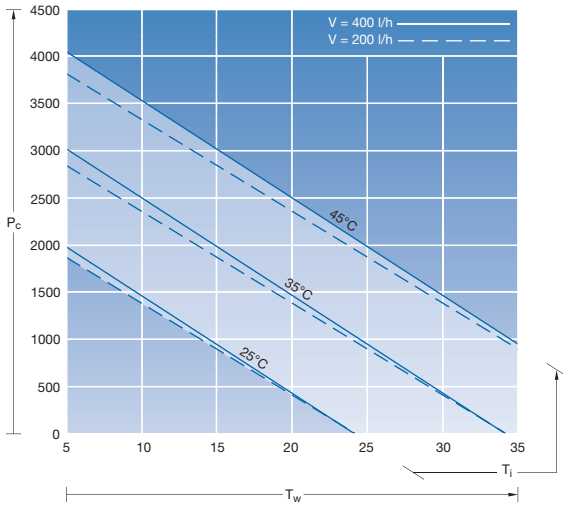
\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

루프 장착형 공기 대 물 열교환기

출력 등급 2500 W

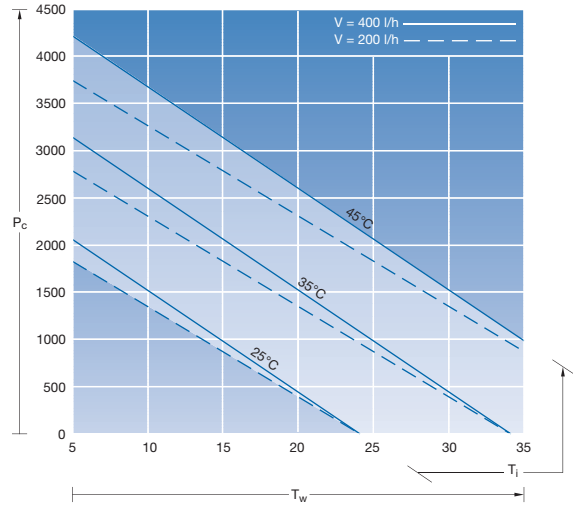
물 운반 부: 구리 / 황동 (Cu/CuZn)

50 Hz
SK 3209.100, .500



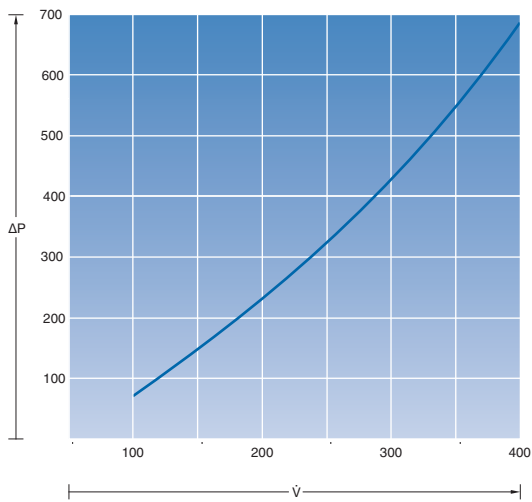
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3209.100, .500



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3209.100, .500



\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

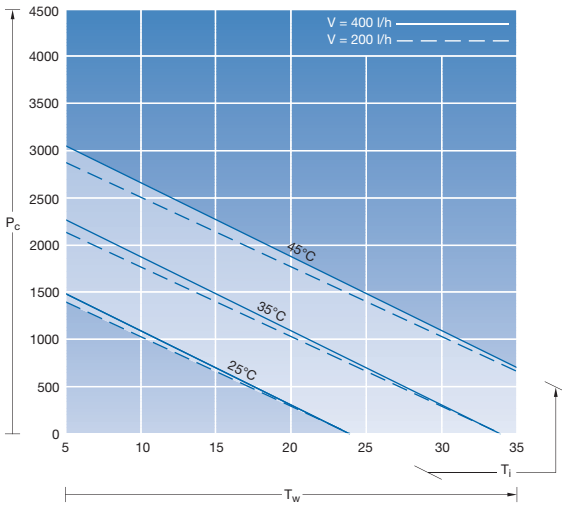
물을 활용한 냉각

루프 장착형 공기 대 물 열교환기

출력 등급 1875 W

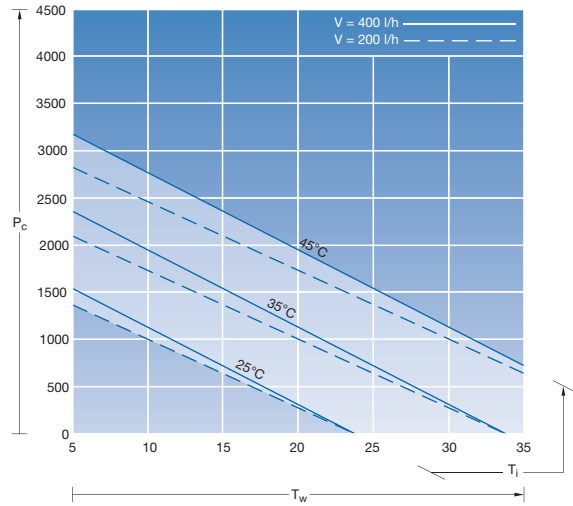
물 운반 부 : 스테인리스 스틸 (1.4571)

50 Hz
SK 3209.504



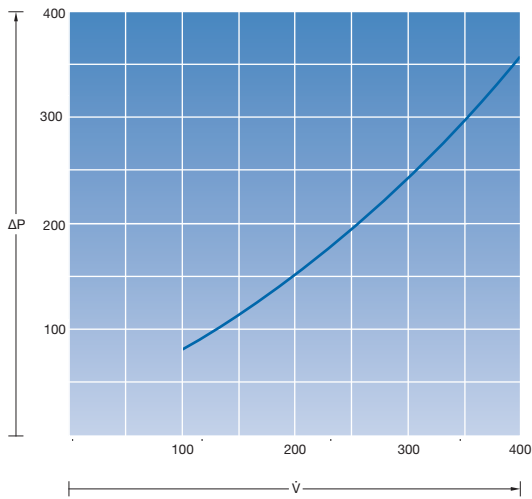
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3209.504



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

수내압 곡선
SK 3209.504

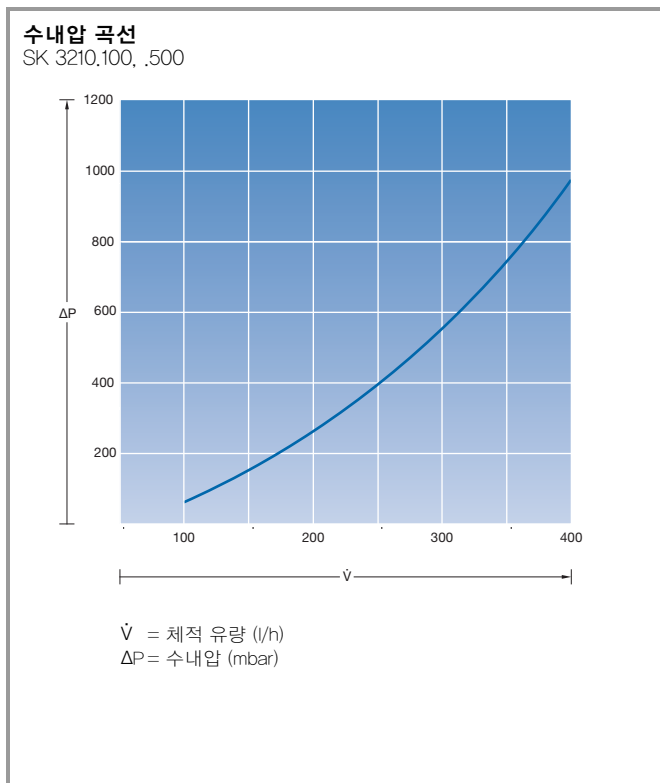
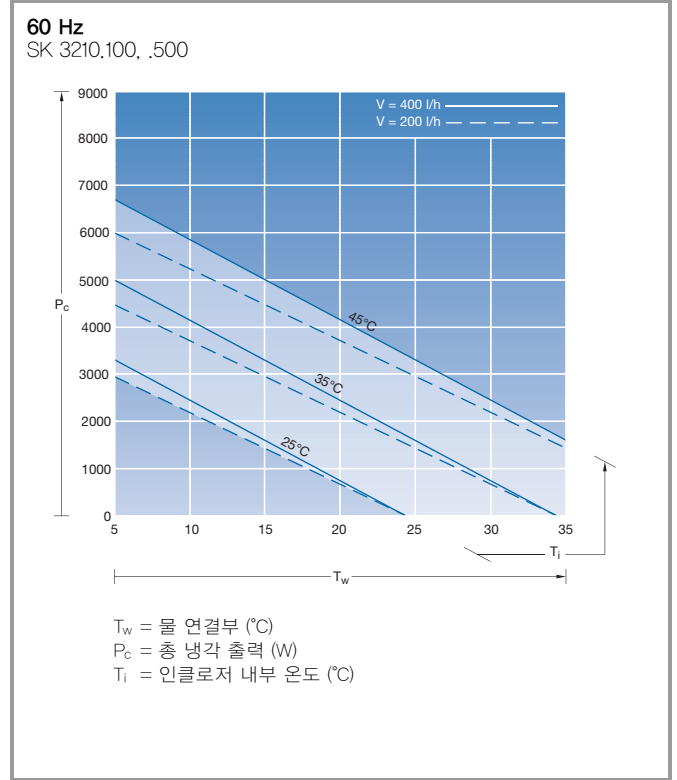
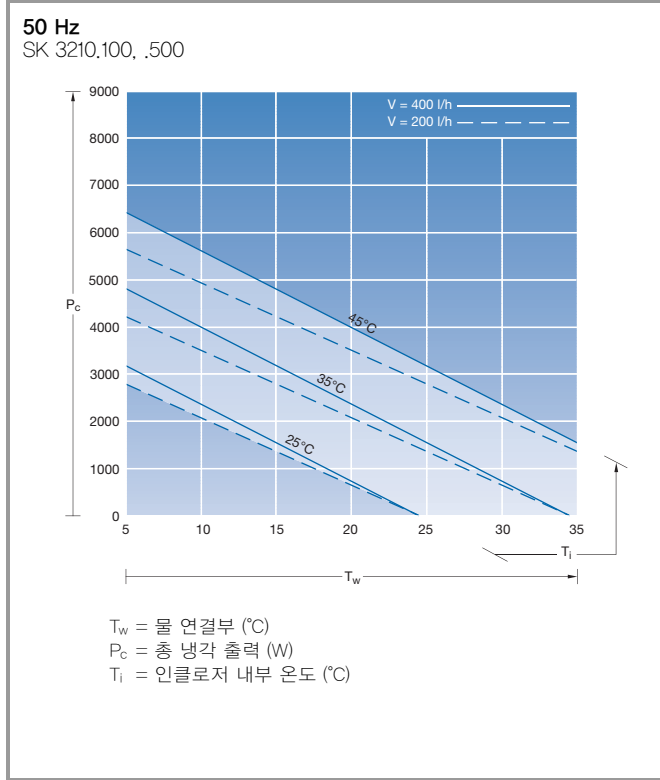


\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

루프 장착형 공기 대 물 열교환기

출력 등급 4000 W

물 운반 부: 구리 / 황동 (Cu/CuZn)



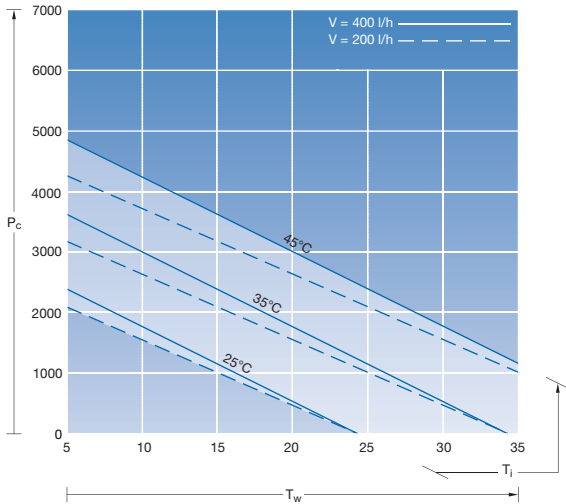
물을 활용한 냉각

루프 장착형 공기 대 물 열교환기

출력 등급 3000 W

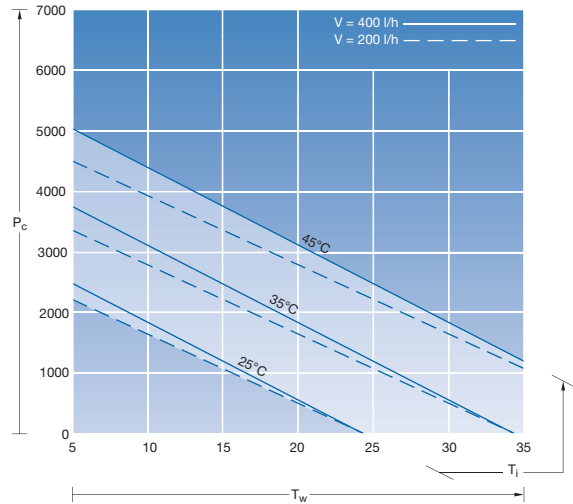
물 운반 부 : 스테인리스 스틸 (1.4571)

50 Hz
SK 3210.504



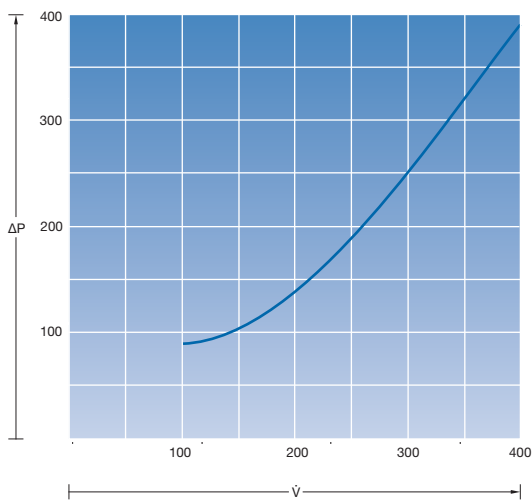
T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

60 Hz
SK 3210.504



T_w = 물 연결부 (°C)
 P_c = 총 냉각 출력 (W)
 T_i = 인클로저 내부 온도 (°C)

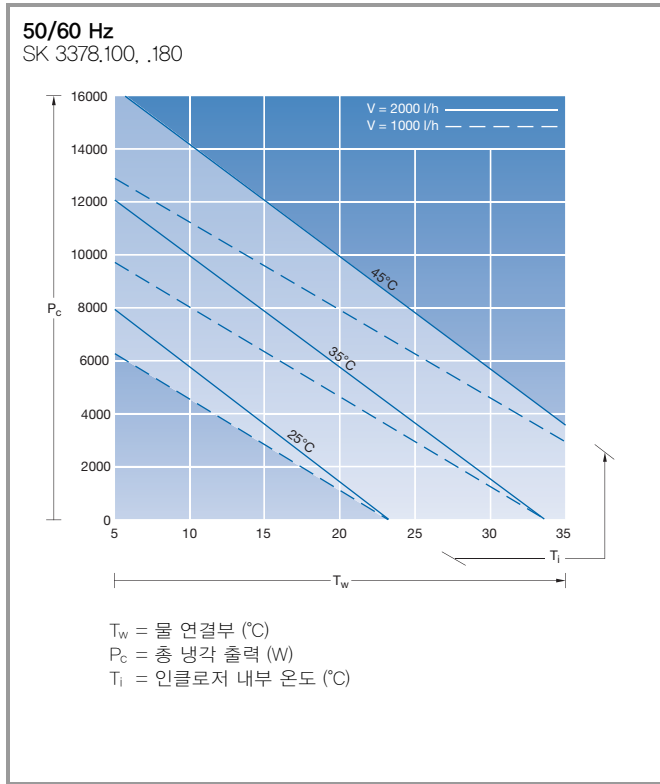
수내압 곡선
SK 3210.504



\dot{V} = 체적 유량 (l/h)
 ΔP = 수내압 (mbar)

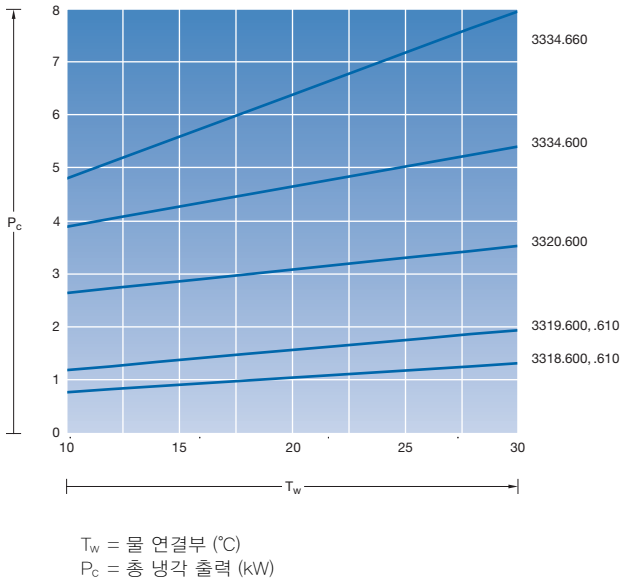
액체 냉각 패키지

출력 등급 10 kW, 산업용 LCP 랙
물 운반 부: 구리 / 황동 (Cu/CuZn)



TopTherm 칠러 출력 등급 1 - 6 kW

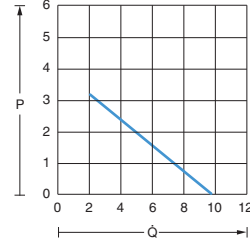
50 Hz 에 $T_u = 32^\circ\text{C}$ (주위 온도)



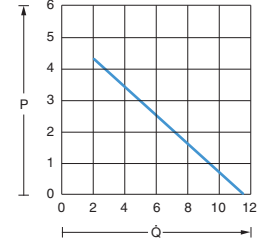
펌프 성능 곡선

SK 3318,600/SK 3318,610/ SK 3319,600/SK 3319,610

50 Hz

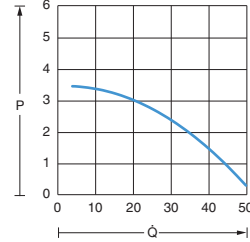


60 Hz

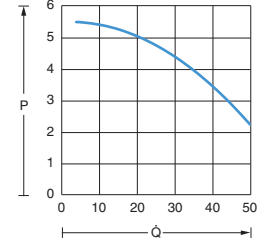


SK 3320,600/SK 3334,600/SK 3334,660

50 Hz



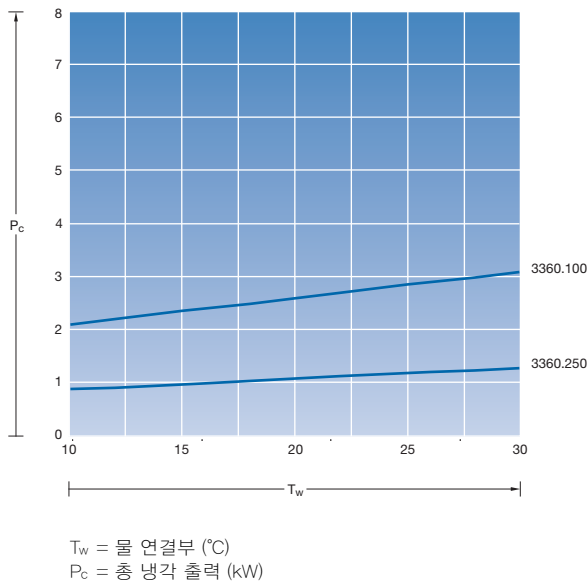
60 Hz



P = 송출 압력 [bar]
Q = 이송량 Q [l/min]

출력 등급 1 - 2.5 kW, 벽면 장착형

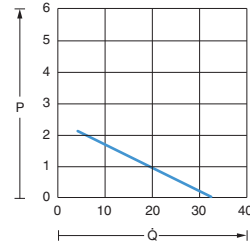
50 Hz 에 $T_u = 32^\circ\text{C}$ (주위 온도)



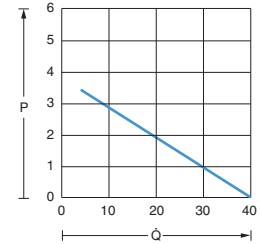
펌프 성능 곡선

SK 3360,100, 250

50 Hz



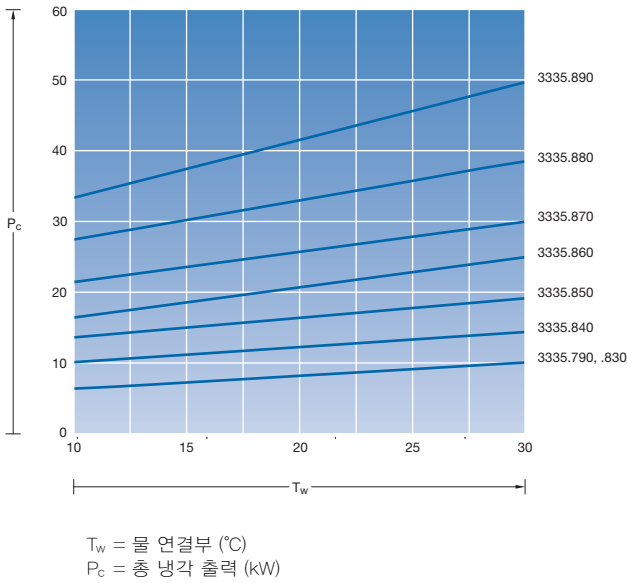
60 Hz



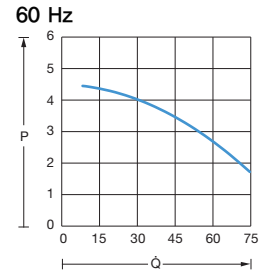
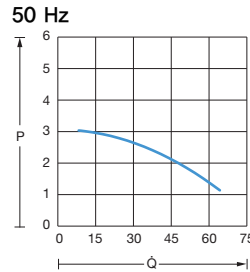
P = 송출 압력 [bar]
Q = 이송량 Q [l/min]

TopTherm 칠러
출력 등급 8 - 40 kW

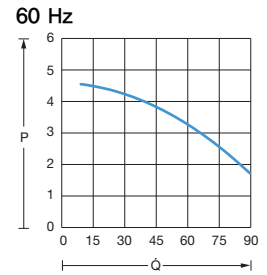
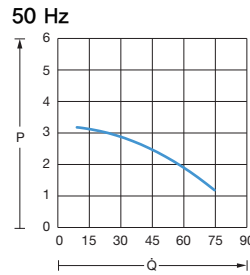
50 Hz 에 $T_u = 32^\circ\text{C}$ (주위 온도)



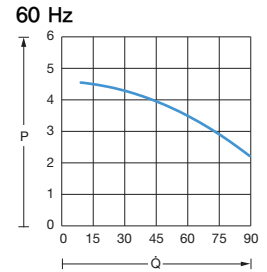
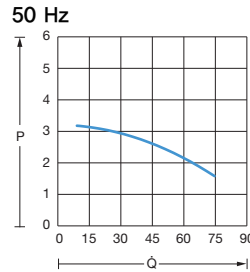
펌프 성능 곡선
SK 3335.850



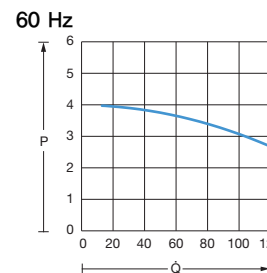
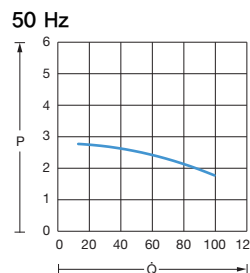
SK 3335.860



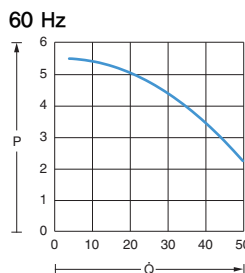
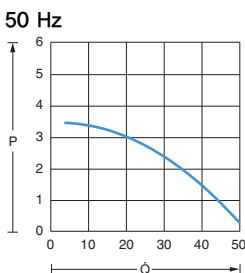
SK 3335.870



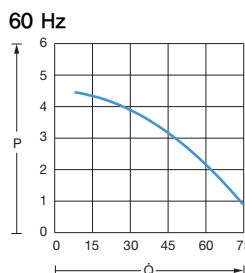
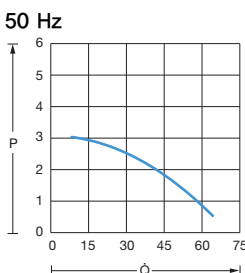
SK 3335.880



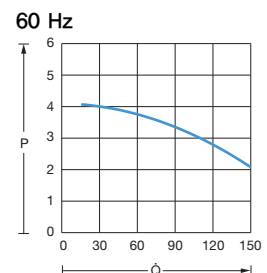
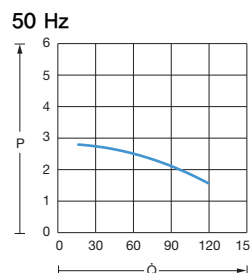
펌프 성능 곡선
SK 3335.790, .830



SK 3335.840



SK 3335.890



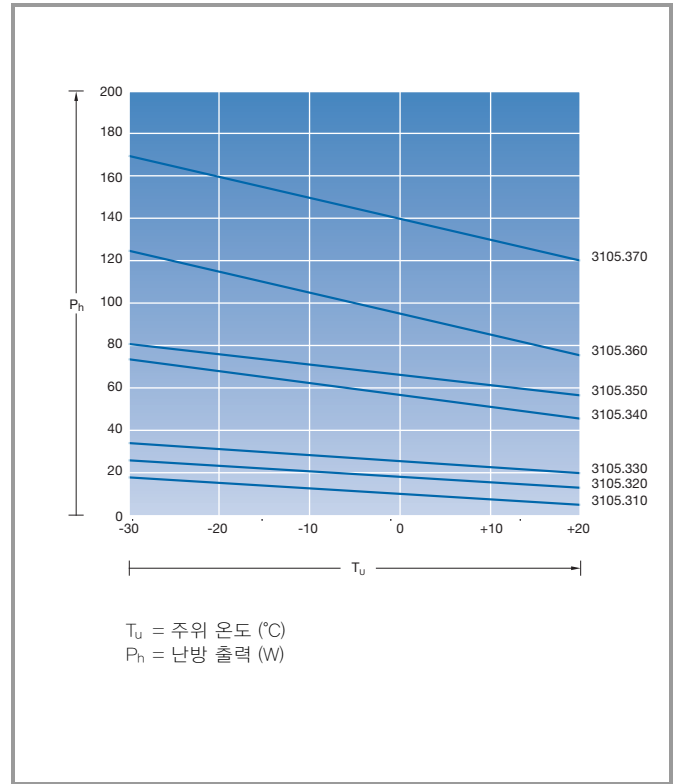
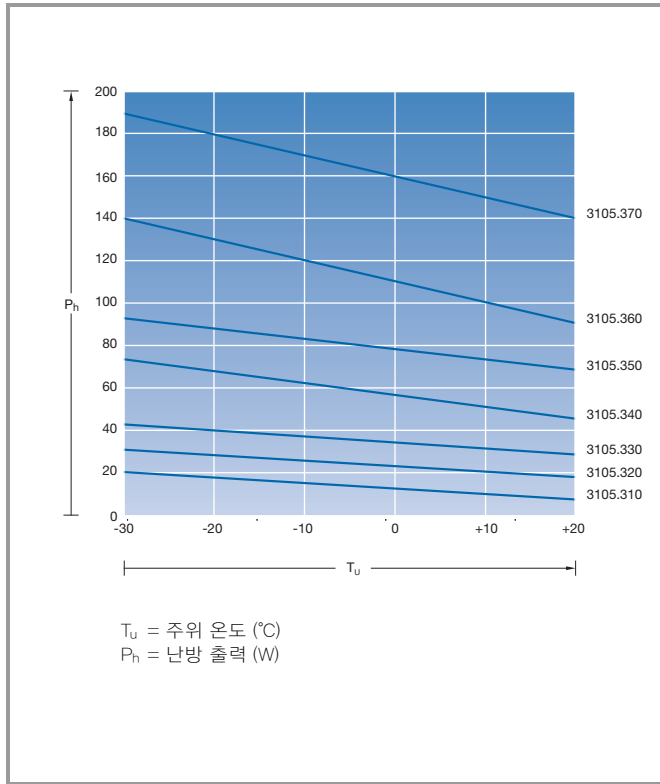
P = 송출 압력 [bar]
 \dot{Q} = 이송량 Q [l/min]

인클로저 히터

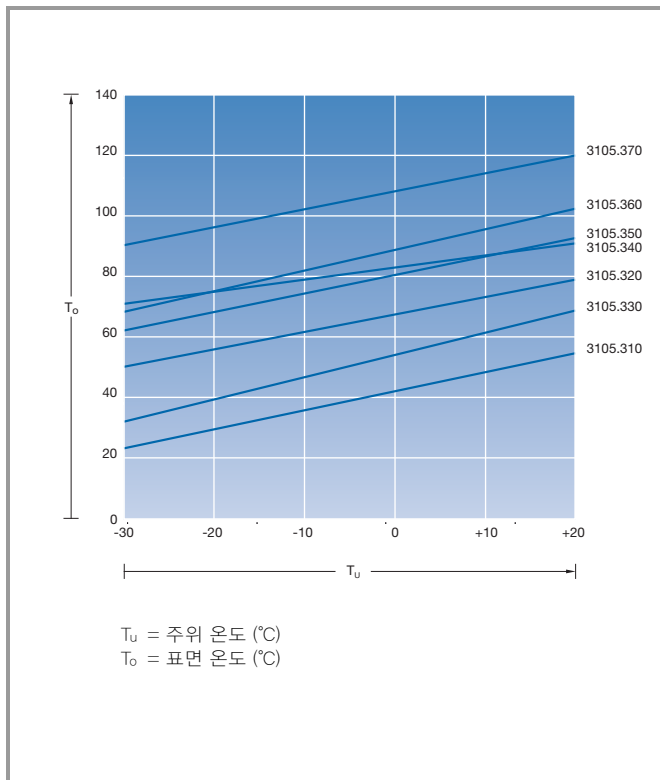
팬이 없는 인클로저 난방 장치

230 V

110 V



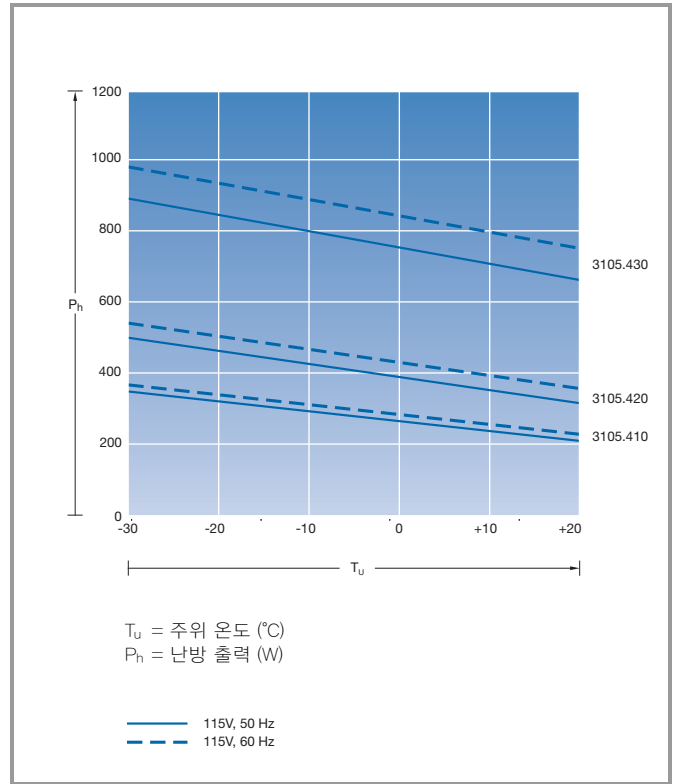
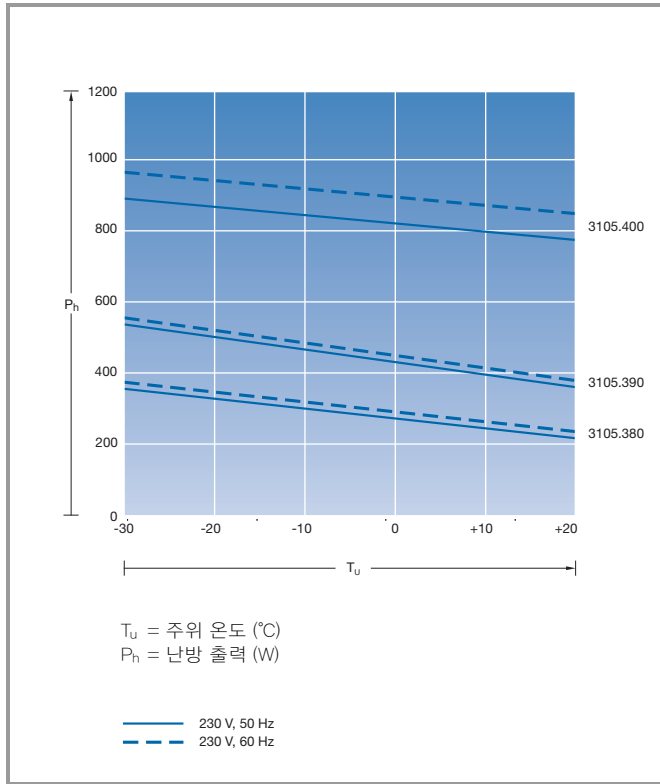
최고 표면 온도



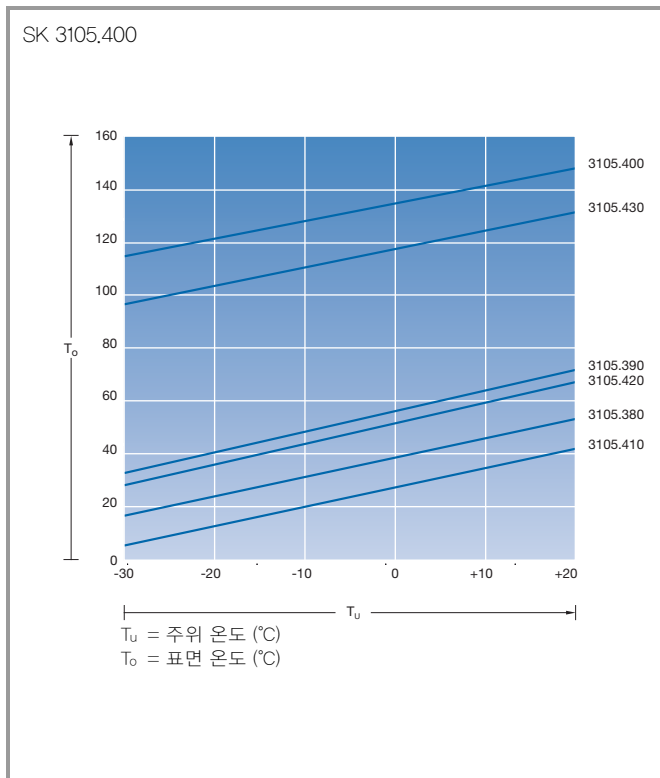
팬이 있는 인클로저 난방 장치

230 V, 50/60 Hz

115 V, 50/60 Hz



최고 표면 온도



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