

User's Manual
**Bench-Top Type Temperature
and Humidity Chamber**

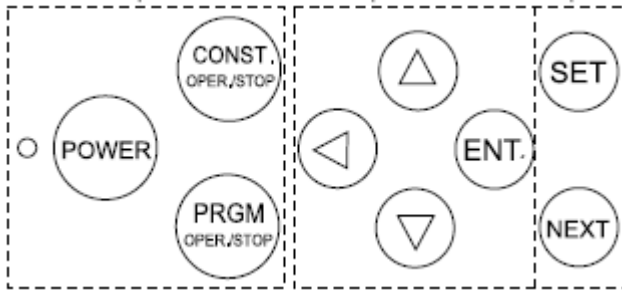
SH-221, 241, 261, 641, 661 SU-221, 241, 261, 641, 661



 **J & S Engineering Corp.**
|주제이 에스 엔지니어링

ESPEC

WWW.JSEC.CO.KR



POWER: 전원 ON/OFF

CONST: 장치 운전 동작/정지

PRGM: 프로그램 동작/정지

◁: 자릿수 이동

△, ▽: 값의 증감 설정

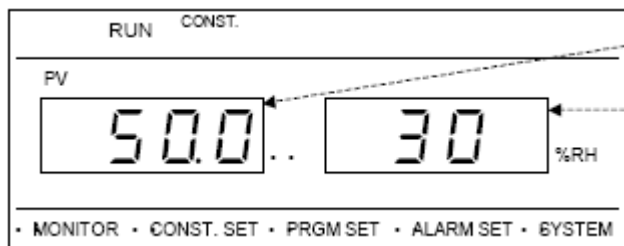
ENTER: 저장

SET: 설정 이동

NEXT: 차 항 이동

1. MONITOR

1) CONSTANT MONITOR



P V (process value): 현재 온도와 습도 값

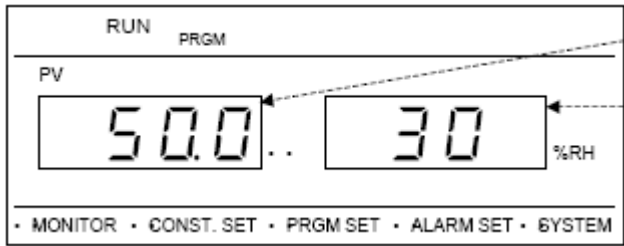
S V (set value): 설정 온도와 습도 값

NEXT 로 PV/ SV 변환

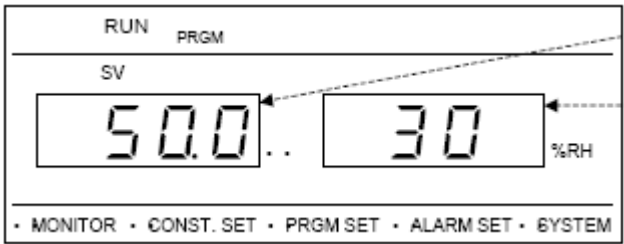
2) PROGRAM MONITOR

1. PV(process value): 현재 온도와 습도 값

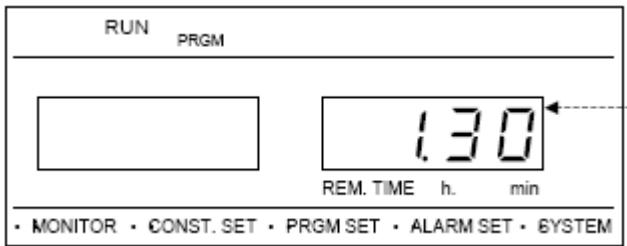
NEXT 버튼으로 다음 설정 화면으로 넘어감



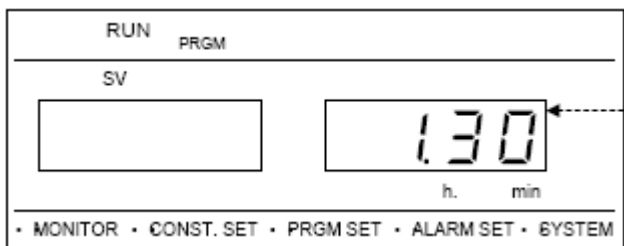
2. SV(set value): 설정 온도와 습도 값



3. STEP(구간)의 남은 시간

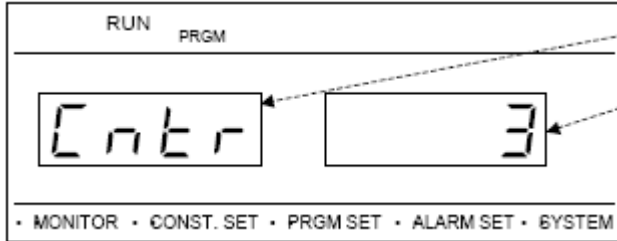


4. STEP(구간)의 설정 시간

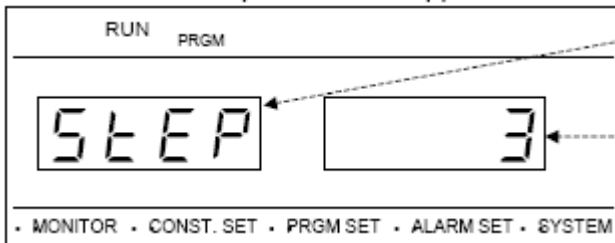


5. 현재 진행중인 프로그램의 반복 횟수

(만약 COUNTER 가 0 으로 설정 되었다면 이 설정 화면은 자동으로 넘어감)



6. 현재 진행중인 STEP(구간)

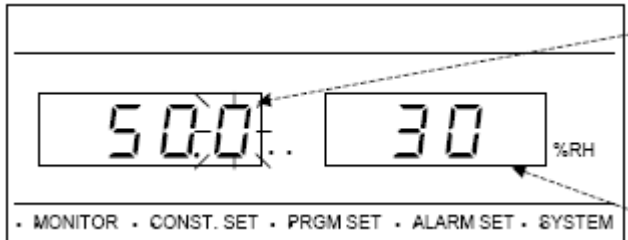


2. CONSTANT(장치운전)

1) SETUP(설정)

SET 로 CONSTANT MODE 선택

1. 온도 설정

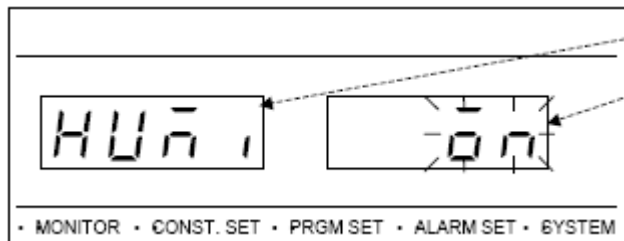


◁: 자릿수 이동

△, ▽: 온도 값 설정

온도 설정이 끝이 난 후 ENT 를 눌러야만 현재 값이 저장됨
NEXT 로 다음 단계로 이동

2. 습도 사용 설정(SH TYPE 만 가능)



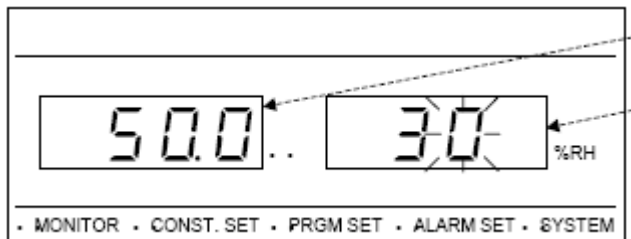
ON, OFF 선택 후 ENT 를 눌러 저장

ON: 습도 사용시

OFF: 습도 미 사용시

※습도를 설정 하지 않을 경우 0%가 아닌 HUM. CONTROL에서 OFF해야 함

3. 습도 설정(SH TYPE 만 가능)

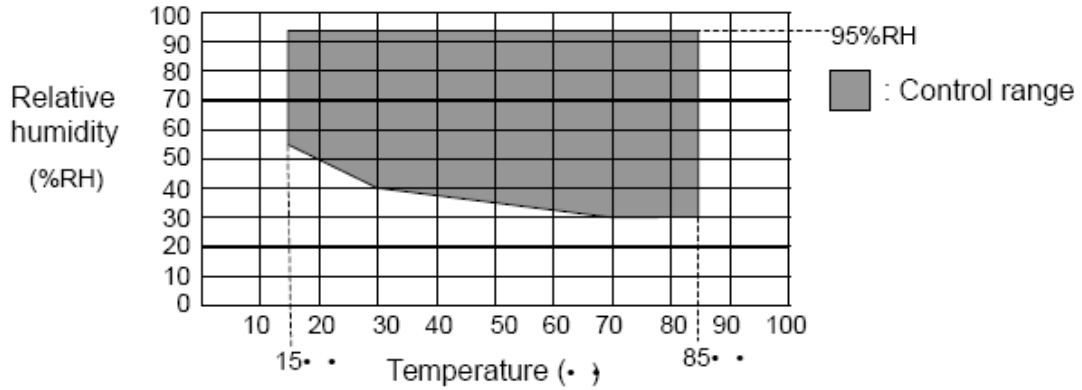


◁: 자릿수 이동

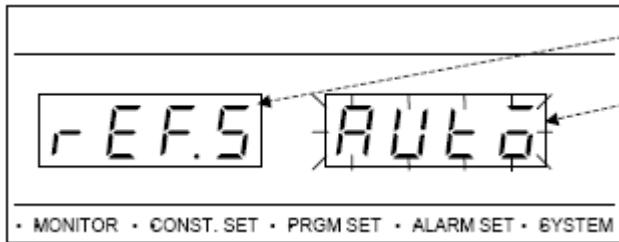
△, ▽: 습도 값 설정

습도 설정이 끝이 난 후 ENT 를 눌러야만 현재 값이 저장됨

※습도 사용시 아래의 온/습도 혼용범위 확인



4. 냉동기 설정



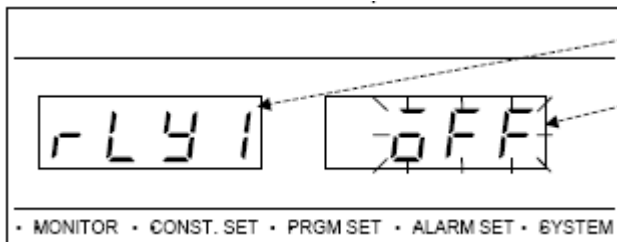
OFF: 냉동기가 항상 꺼짐

ON: 냉동기가 항상 켜짐

AUTO: 자동으로 냉동기가 제어됨(기본 값)

☆냉동기는 항상 AUTO 설정☆

5. RELAY

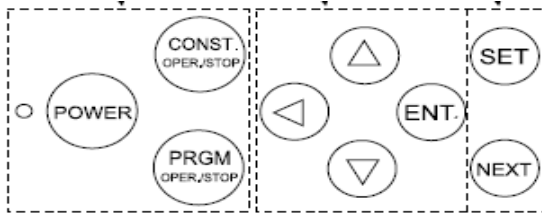


TIME SIGNAL OUTPUT ON/OFF

불필요할 경우 OFF

2) CONSTANT OPERATION(장치 운전 동작)

1. SET 키로 MONITOR MODE 이동



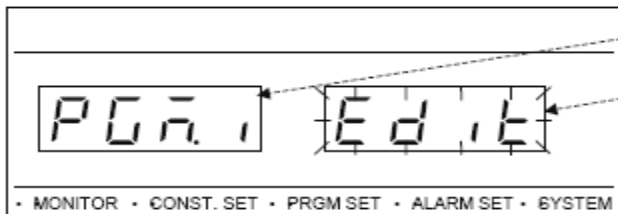
2. CONSTANT OPER. /STOP 키로 동작(RUN 화면에 불이 점등)
한번 더 누르면 정지

3. PROGRAM

SET 로 PROGRAM MODE 선택

1) PROGRAM SETUP(프로그램 설정)

1. PROGRAM EDIT(편집) 및 CLEAR(지움)



△ or ▽ 버튼으로 EDIT 선택 후 ENT 로 저장->다음 화면으로 이동

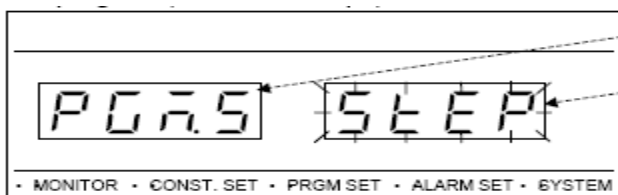
* EDIT: PROGRAM 편집

* CLEAR: 이전에 저장했던 PROGRAM 삭제

PROGRAM 은 하나만 지원되면 스텝은 9 스텝까지 있음..

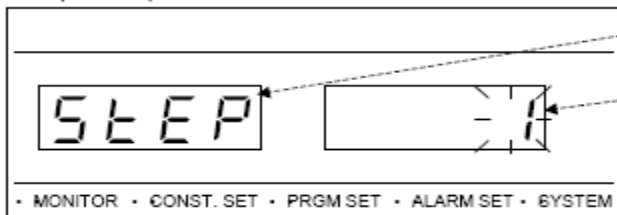
새로 프로그램을 만들기 위해서는 CLEAR 로 전 프로그램을 삭제 후 EDIT

2. PROGRAM STEP(구간)



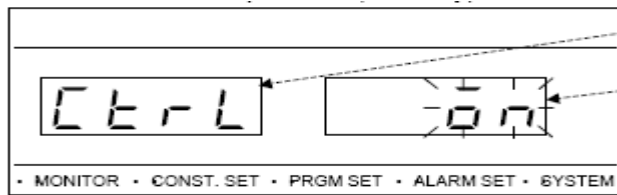
STEP(구간) 선택 후 ENT 다음페이지로 이동
 △ or ▽ 버튼으로 STEP/ END/ SAVE 선택 가능
 STEP: 구간 설정
 END: COUNTER(반복 횟수)와 END MODE 설정
 SAVE: 입력한 프로그램 저장

3. STEP(구간)



STEP 선택 (처음에는 “1” 선택): STEP 범위 (1 ~ 9) △ or ▽ ENT NEXT

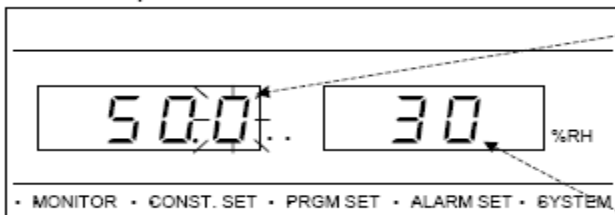
4. CONTROL(온도와 습도 제어)



ON: 온도와 습도를 제어 할 수 있음

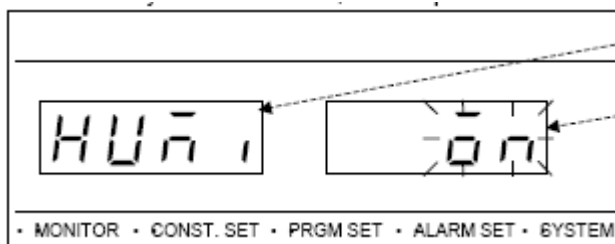
OFF: 온도와 습도가 제어가 불가능하고 바로 시간 설정으로 넘어감

5. TEMP(온도) 설정



△ or ▽ 버튼으로 온도 값을 설정 후 ENT 를 눌러 저장 후 NEXT

6. HUMI. (습도) 사용여부 설정(SH TYPE 만 가능)

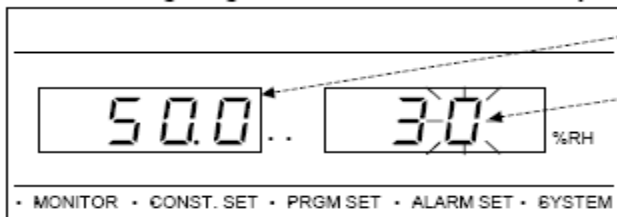


습도 설정 ON, OFF 선택 후 ENT 를 눌러 저장

ON: 습도 사용시

OFF: 습도 미 사용시

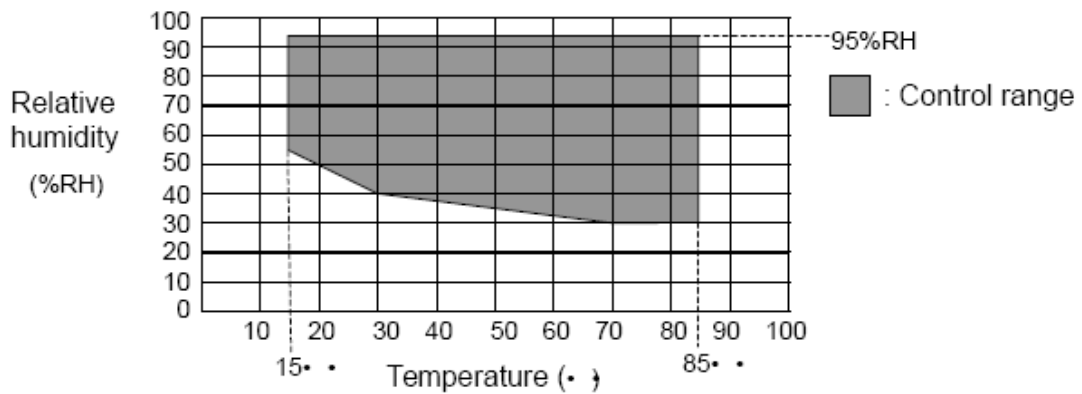
7. 습도 설정(SH TYPE 만 가능)



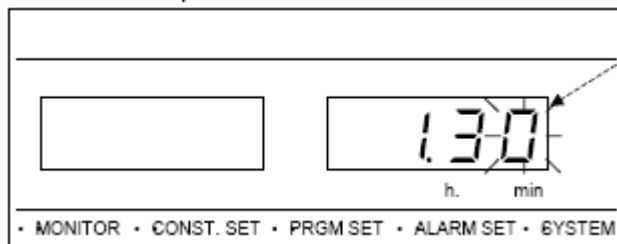
습도 설정을 ON 으로 선택하면 습도 값을 설정 할 수 있음

원하는 습도 값을 Δ or ∇ 버튼으로 설정 후 ENT 를 눌러 저장 후 NEXT

※습도 사용시 아래의 온/습도 혼용범위 확인



8. STEP 시간 설정

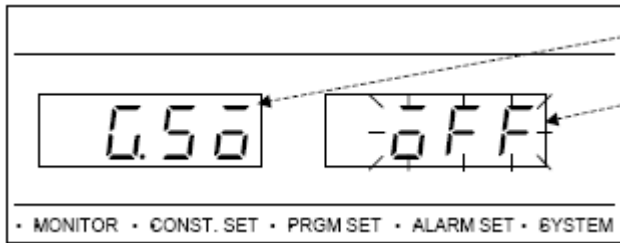


\triangleleft , Δ , ∇ 버튼으로 시간 설정 (시간. 분)

(99 시간 59 분에서 시간 값을 Δ 키로 값을 더 올리면 백 단위 시간 제어가 가능하게 나옴 최대 999 시간)

선택 후 ENT 눌러서 저장 후 NEXT

9. GUARANTEED SOAK CONTROL(시간 보상 제어)

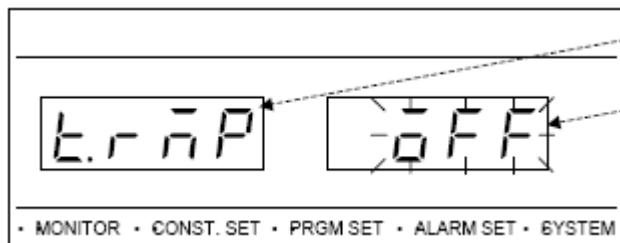


GUARANTEED SOAK CONTROL ON/OFF △, ▽ ENT NEXT

-ON: 설정 온도에 도달한 후 부터 시간이 흘러감

-OFF: 동작과 동시에 시간이 흘러감

10. TEMPERATURE RAMP CONTROL(온도 경사 제어)



TEMPERATURE RAMP CONTROL ON/OFF △, ▽ ENT NEXT

-ON: 장비의 기본 능력을 무시하고 시간에 비례하게 상승, 하강 곡선을 그림.

-OFF: 장비의 기본 능력에 맞게 설정 온도가 상승과 하강을 한 후 남은 시간 동안 설정온도를 유지할 함

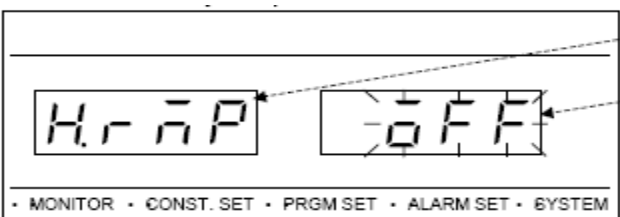
EX)

전 STEP 이 20℃이고 다음 STEP 이 50℃ 에 시간이 30 분으로 설정 되었다고 하면

-ON 설정 시: 20℃에서 상승하기 시작하여 정확하게 30 분이 지나면 50℃에 도달함

-OFF 설정 시: 20℃에서 상승하기 시작하여 장비 능력에 따라(온도 상승은 분당 3℃씩 상승 /온도 하강은 분당 1℃씩 하강) 10 분 만에 50℃까지 상승하고 나머지 20 분 동안은 50℃를 유지하게 된다.

11. HUMIDITY RAMP CONTROL(습도 경사 제어)

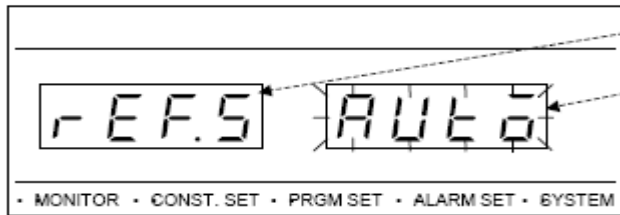


습도 사용을 ON 을 하였을 경우 습도 경사 제어 가능

HUMIDITY RAMP CONTROL ON/OFF △, ▽ ENT NEXT

온도 경사 제어와 같이 설정 가능(ON/OFF 로 제어)

12. 냉동기 설정



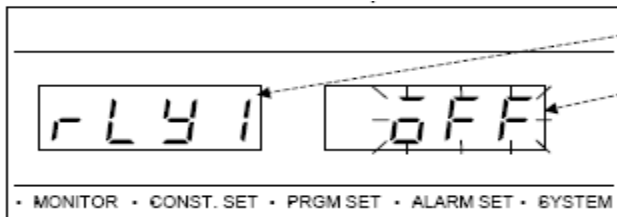
OFF: 냉동기가 항상 꺼짐

ON: 냉동기가 항상 켜짐

AUTO: 자동으로 냉동기가 제어됨(기본 값)

☆냉동기는 항상 **AUTO** 설정☆

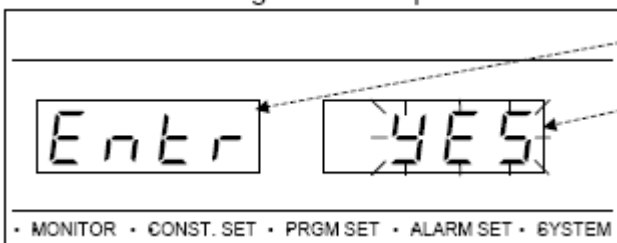
13. RELAY



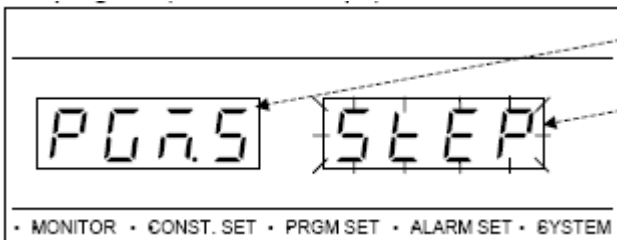
TIME SIGNAL OUTPUT ON/OFF

불필요할 경우 OFF

12. ENTER YES/ NO(설정 저장)



지금까지 입력정보들이 맞을 경우는 YES 선택 틀릴 경우는 NO 선택
위의 설정이 다 끝나면 자동적으로 다시 2번 화면으로 이동



2 번으로 화면으로 이동 후 STEP/ END/ SAVE 중 선택 후 입력

△, ▽ 버튼으로 상 하 이동 하여 설정

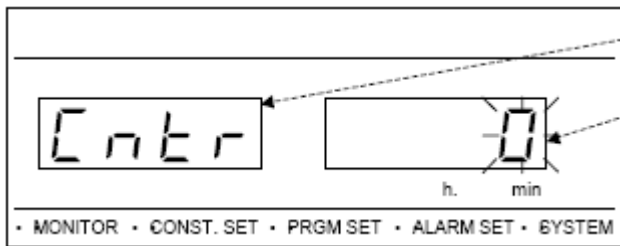
- * STEP: 다음 STEP 이 있을 경우 위와 동일하게 입력.
- * END: 모든 STEP 의 입력이 끝났을 경우 END 선택.
- * SAVE: END MOE 설정까지 끝났을 경우 PROGRAM 저장.

14. END(프로그램 설정 끝)

END MODE 에서는 CYCLE 과 LAST MODE 를 설정 할 수 있음.

STEP/ END/ SAVE 에서 END 를 선택 후 ENT 눌러서 NEXT 로 다음 단계 넘어감

① CYCLE(프로그램 반복 횟수)



COUNTER 입력 ◀, Δ, ▽ ENT NEXT

0 부터 99 까지 입력가능

$N(\text{원하는 반복 횟수}) - 1 = \text{입력 반복 횟수}$

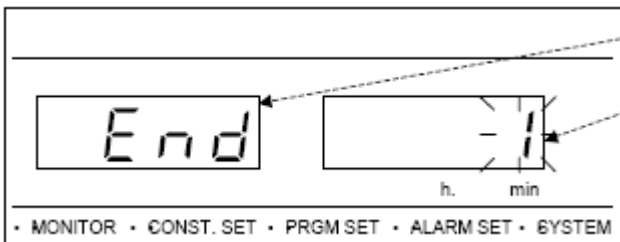
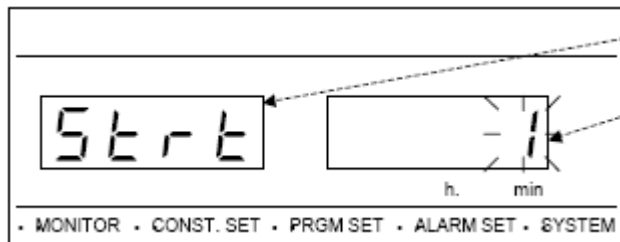
EX)

10 CYCLE 을 사용하고 싶다면 $10 - 1 = 9$ 번

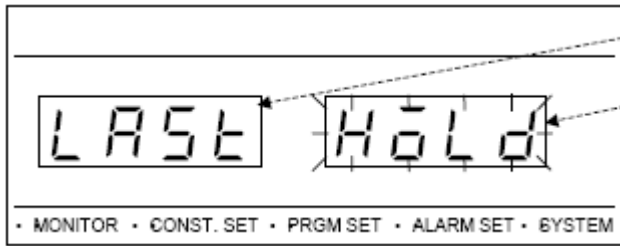
즉 입력을 9 로 하면 프로그램이 10 CYCLE 돌아감.

(0 을 입력하면 프로그램이 1 CYCLE 돌아가고 시작과 끝 구간 결정이 필요 없기 때문에 LAST MODE 로 바로 넘어감.)

CYCLE 을 START STEP(시작할 구간)과 END STEP(끝날 구간)을 결정



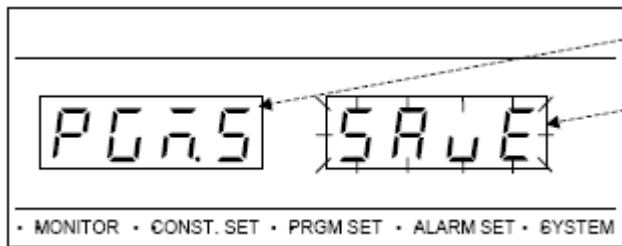
② LAST MODE(프로그램이 끝났을 때 설정)



HOLD/ OFF/ CNST Δ, ▽ ENT 눌러 저장 후 NEXT

- * HOLD: PROGRAM 의 CYCLE 시험이 모두 끝난 후 마지막 스텝의 설정한 온도 값과 습도 값으로 장비 작동
- * OFF: 장비 전원 OFF
- * CNST: CONSTANT MODE 에 저장된 온도 값과 습도 값으로 이동 후 동작

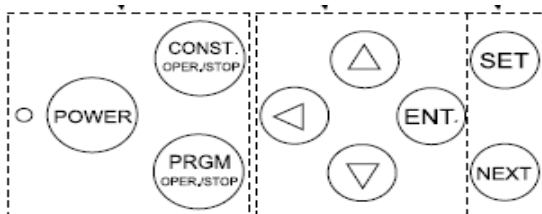
17. SAVE(프로그램 저장)



PROGRAM MODE 에서 Δ, ▽버튼을 눌러서 SETP/END/SAVE 중에 SAVE 선택
SAVE(모든 PROGRAM 정보가 저장)에서 ENT 를 눌러서 저장
단, 하나의 PROGRAM 만 저장가능

2) PROGRAM OPERATION(프로그램 동작)

1. SET 키로 MONITOR MODE 이동

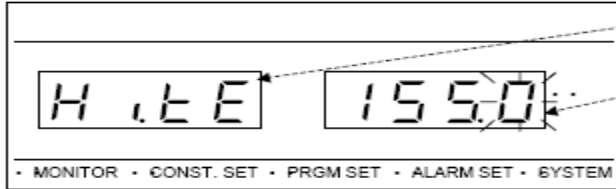


2. PROGRAM OPER. /STOP 키로 동작(RUN 화면에 불이 점등)
한번 더 누르면 정지

4. ALARM SET UP

아래의 온, 습도의 제한 값을 넘으면 **ALARM** 발생

1) HIGH LIMIT (최고 온도 제한): 기본값 155°C

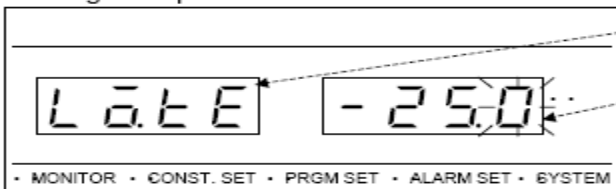


2) LOW LIMIT(최저 온도 제한):

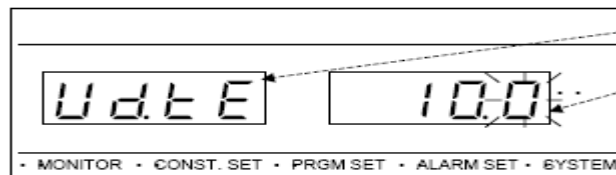
SH&SU-221의 기본 값: -25°C

SH&SU-241, 641의 기본 값: -45°C

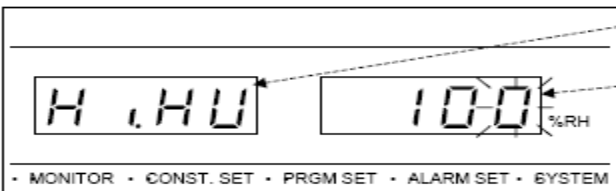
SH&SU-261, 661의 기본 값: -65°C



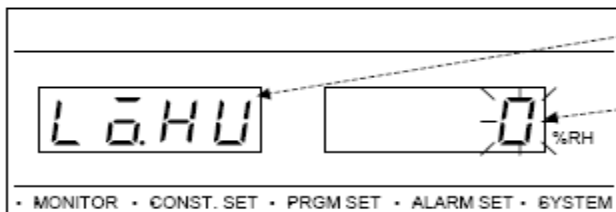
3) UPER DEVIATION LIMIT(내부 편차치 제한): 10°C



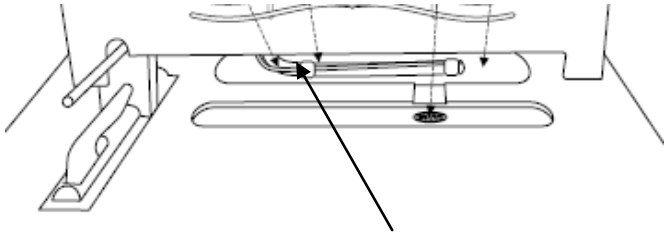
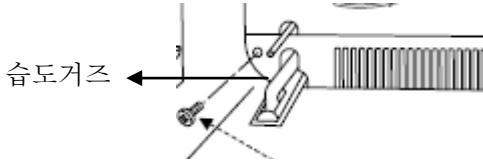
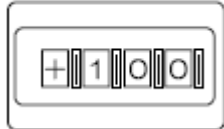
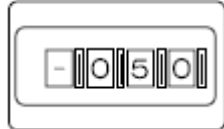
4) HIGH HUM. LIMIT (최고 습도 제한): 기본값 100%(오직 SH TYPE만 설정 가능)



5) LOW HUM. LIMIT(최저 습도 제한): 기본값 0%(오직 SH TYPE만 설정 가능)



SH 점검 및 보수 리스트

보수 항목 및 시기와 방법	그림 및 설명
<p>가습 용기 청소(1 개월)</p> <p>청소 법</p> <ol style="list-style-type: none"> 1. 가습 히터 덮개의 나사 2 개 풀 다음 덮개 제거 2. 수동으로 가습 용기의 물 제거 챔버 뒤 가습 용기의 배수(DRAIN)에 배수 호수를 결합하여 물을 제거 3. 브러시와 같은 것으로 가습 용기와 가습 용 히터의 표면 청소 	<p style="text-align: center;">가습 히터</p> 
<p>FINE WICK(습도 용 거즈) 교체시기 (1 개월)</p> <ol style="list-style-type: none"> 1. 거즈의 색깔 변질 시(황갈색) 2. 거즈의 물 흡수력이 떨어졌을 때 3. 거즈가 딱딱하게 굳어 있을 때 	 <p style="text-align: center;">습도거즈</p>
<p>주위 온도</p>	<p>실험실 내 25°C 전후 유지(냉각 방식이 공 냉식 이기 때문에 주위 온도 중요)</p>
<p>성에 제거 운전</p> <p>60~80°C에서 약 3시간 정도 운전</p> <p>-REF(냉동기)은 OFF로 설정-</p>	<p>온도가 원하는 값까지 잘 안 떨어 질 때 냉동기 설정 부분이 AUTO상태가 맞으면 증발기에 성에 가 발생된 것임.</p>
<p>온도 과승/냉 방지기 (OVERHEAT/COOL PROTECTOR)</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>OVERHEAT PROTECTOR</p>  </div> <div style="text-align: center;"> <p>OVERCOOL PROTECTOR</p>  </div> </div> <p>OVER HEAT/COOL PROTECTOR 는 장비의 최고/최저 온도에 +/-10° C 정도 되어 있어야 함. +/-설정이 바뀌거나 잘못된 온도 설정 시 OVER HEAT/COOL ALARM 발생</p>

A. Major Specifications

Table A.1 Major specifications (SH/SU-221, 241)

Model		SH-221	SH-241	SU-221	SU-241
Temperature/humidity control system		Balanced temperature and humidity control system (BTHC system)		Balanced temperature control system (BTC system)	
Power supply *1		100V AC 1 ϕ 2W 50/60Hz 115V AC 1 ϕ 2W 60Hz 220V AC 1 ϕ 2W 50/60Hz 230V AC 1 ϕ 2W 50Hz * 115, 220 and 230V AC power supplies are options.			
Maximum current (A) *2	100V AC	12.5A		10.0A	
	115V AC	12.0A		9.5A	
	220V AC	7.0A		6.0A	
	230V AC	6.5A		5.5A	
Ambient temperature		Allowable operating range: +5 to +35°C			
Performance *3	Temperature control range	-20 to +150°C	-40 to +150°C	-20 to +150°C	-40 to +150°C
	Humidity control range	30 to 95%RH See temperature-humidity control range diagram. *4		—	
	Temperature constancy	$\pm 0.3^{\circ}\text{C}$ (-20 to +100°C)	$\pm 0.3^{\circ}\text{C}$ (-40 to +100°C)	$\pm 0.3^{\circ}\text{C}$ (-20 to +100°C)	$\pm 0.3^{\circ}\text{C}$ (-40 to +100°C)
		$\pm 0.5^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.5^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.5^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.5^{\circ}\text{C}$ (+100.1 to +150°C)
	Humidity constancy	$\pm 3\%RH$		—	
	Temperature uniformity	$\pm 0.5^{\circ}\text{C}$ (-20 to +100°C)	$\pm 0.5^{\circ}\text{C}$ (-40 to +100°C)	$\pm 0.5^{\circ}\text{C}$ (-20 to +100°C)	$\pm 0.5^{\circ}\text{C}$ (-40 to +100°C)
		$\pm 0.8^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.8^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.8^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.8^{\circ}\text{C}$ (+100.1 to +150°C)
	Humidity uniformity	$\pm 3\%RH$		—	
	Temperature heat-up rate	Within 55 min from -20 to +150°C	Within 60 min from -40 to +150°C	Within 55 min from -20 to +150°C	Within 60 min from -40 to +150°C
	Temperature pull-down rate	Within 20 min from +20 to -20°C	Within 50 min from +20 to -40°C	Within 20 min from +20 to -20°C	Within 50 min from +20 to -40°C
Lowest attainable temperature	-20°C	-40°C	-20°C	-40°C	
Construction	External	Cold-rolled rust-proof steel plate (Melamine baked finish)			
	Internal	18-8 Cr-Ni stainless steel plate			
	Insulation	Rigid polyurethane foam + Glass wool			
	Air circulator	Propeller fan			
	Heater	Nichrome stripped-wire heater			
	Humidifier	18-12-2.5 Cr-Ni-Mo stainless steel sheathed heater		—	
	Refrigerator	Air-cooled hermetically sealed (R404A)			

Cont. from the previous page

Temperature (Humidity) indicator-controller	Operation modes	Program + Constant setting	
	Setter	Mechanical key input	
	Program memory capacity	1 program with 9 steps (Repeat cycles: 1 to 99)	
	Control principle	PID control	
	Communications	RS-485, E-BUS (option), GP-IB (option), RS-232C (option)	
	Functions	Input burnout detection function, upper and lower temperature limit alarm function, self-diagnostic function (watchdog timer), alarm indication function, power cut protection function, timer function (automatic start/stop), refrigerator capacity auto control	
Accessories	Specimen power supply control terminal, external alarm signal terminal, external output signal terminal, temperature (humidity) recorder terminal (for test area temperature/humidity recording) *5, cable port (φ 25 mm, 1 each left/right sides), 3-plug + GND power cable (110/115V AC chambers only), water tank, humidifying tray drain nipple, water tank level sensor tank drain nipple, drain pipe		
Capacity (L)	Approx. 22.5		
Inside dimensions (W x H x D mm)	300 × 300 × 250 (Excluding projections)		
Outside dimensions (W x H x D mm)	440 × 630 × 695 (730) *6	440 × 560 × 695 (730) *6	
Weight (kg) *7	71 (76)	66 (71)	

*1 Ensure power supply voltage fluctuates only to within ±10% of the rated voltage when the refrigerator starts up.

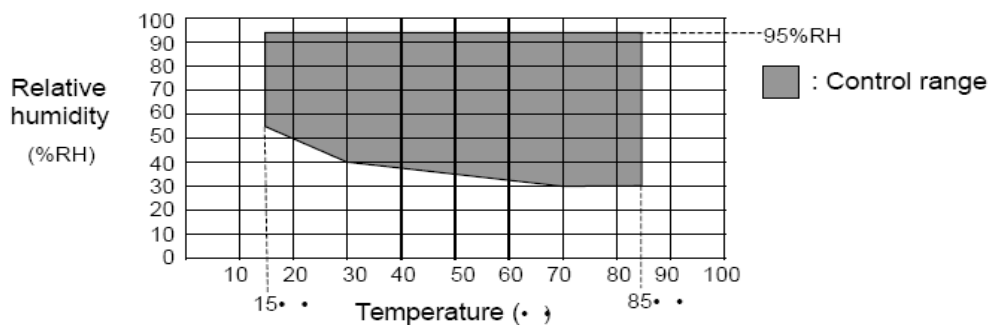
*2 At ambient temperature of +23°C, rated voltage.

*3 • At ambient temperature of +23°C, rated voltage and no specimens inside test area.

However, the lowest attainable temperature is for a maximum ambient temperature of +30°C.

• Performance figures are based on JTM K 01-1998 (Humidity chambers-test and indications method for performance by Japan Testing Machinery Association).

*4 Temperature-Humidity control range (SH chambers only)



*5 SU chambers have temperature detection only.

*6 Dimensions in () include projections.

*7 Weight for 115, 220 and 230V AC chambers given in ().

Table A.2 Major specifications (SH/SU-261)

Model		SH-261	SU-261
Temperature/humidity control system		Balanced temperature and humidity control system (BTHC system)	Balanced temperature control system (BTC system)
Power supply *1		100V AC 1 ϕ 2W 50/60Hz 115V AC 1 ϕ 2W 60Hz 220V AC 1 ϕ 2W 50/60Hz 230V AC 1 ϕ 2W 50Hz * 115, 220 and 230V AC power supplies are options.	
Maximum current (A) *2	100V AC	13.5A	
	115V AC	13.0A	
	220V AC	7.5A	
	230V AC	7.0A	
Ambient temperature		Allowable operating range: +5 to +35°C	
Performance *3	Temperature control range	-60 to +150°C	-60 to +150°C
	Humidity control range	30 to 95%RH See temperature-humidity control range diagram. *4	—
	Temperature constancy	$\pm 0.3^\circ\text{C}$ (-60 to +100°C)	$\pm 0.3^\circ\text{C}$ (-60 to +100°C)
		$\pm 0.5^\circ\text{C}$ (+100.1 to +150°C)	$\pm 0.5^\circ\text{C}$ (+100.1 to +150°C)
	Humidity constancy	$\pm 3\%RH$	—
	Temperature uniformity	$\pm 0.5^\circ\text{C}$ (-60 to +100°C)	$\pm 0.5^\circ\text{C}$ (-60 to +100°C)
		$\pm 0.8^\circ\text{C}$ (+100.1 to +150°C)	$\pm 0.8^\circ\text{C}$ (+100.1 to +150°C)
	Humidity uniformity	$\pm 3\%RH$	—
	Temperature heat-up rate	Within 70 min from -60 to +150°C	Within 70 min from -60 to +150°C
	Temperature pull-down rate	Within 70 min from +20 to -60°C	Within 70 min from +20 to -60°C
Lowest attainable temperature	-60°C	-60°C	
Construction	External	Cold-rolled rust-proof steel plate (Melamine baked finish)	
	Internal	18-8 Cr-Ni stainless steel plate	
	Insulation	Rigid polyurethane foam + Glass wool	
	Air circulator	Propeller fan	
	Heater	Nichrome stripped-wire heater	
	Humidifier	18-12-2.5 Cr-Ni-Mo stainless steel sheathed heater	—
	Refrigerator	Air-cooled hermetically sealed (R404A, R23)	

Cont.

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Temperature (Humidity) indicator-controller	Operation modes	Program + Constant setting	
	Setter	Mechanical key input	
	Program memory capacity	1 program with 9 steps (Repeat cycles: 1 to 99)	
	Control principle	PID control	
	Communications	RS-485, E-BUS (option), GP-IB (option), RS-232C (option)	
	Functions	Input burnout detection function, upper and lower temperature limit alarm function, self-diagnostic function (watchdog timer), alarm indication function, power cut protection function, timer function (automatic start/stop), refrigerator capacity auto control	
Accessories	Specimen power supply control terminal, external alarm signal terminal, external output signal terminal, temperature (humidity) recorder terminal (for test area temperature/humidity recording) *5, RS-485, cable port (φ 25 mm, 1 each left/right sides), 3-plug + GND power cable, water tank, humidifying tray drain nipple, water tank level sensor tank drain nipple, drain pipe		
Capacity (L)	Approx. 22.5		
Inside dimensions (W x H x D mm)	300 × 300 × 250 (Excluding projections)		
Outside dimensions (W x H x D mm)	440 × 630 × 785 (825) *6	440 × 560 × 785 (825) *6	
Weight (kg) *7	100	95	

*1 Ensure power supply voltage fluctuates only to within ±10% of the rated voltage when the refrigerator starts up.

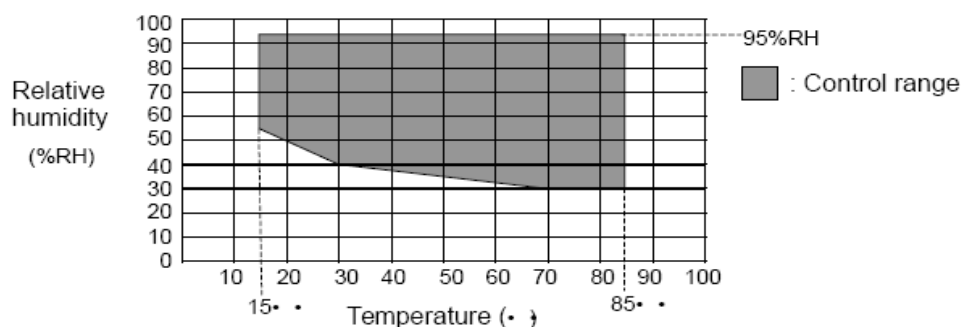
*2 At ambient temperature of +23°C, rated voltage.

*3 • At ambient temperature of +23°C, rated voltage and no specimens inside test area.

However, the lowest attainable temperature is for a maximum ambient temperature of +30°C.

• Performance figures are based on JTM K 01-1998 (Humidity chambers-test and indications method for performance by Japan Testing Machinery Association).

*4 Temperature-Humidity control range (SH chambers only)



*5 SU chambers have temperature detection only.

*6 Dimensions in () include projections.

*7 Weight for 115, 220 and 230V AC chambers given in ().

Table A.3 Major specifications (SH/SU-641, 661)

Model		SH-641	SH-661	SU-641	SU-661
Temperature/humidity control system		Balanced temperature and humidity control system (BTHC system)		Balanced temperature control system (BTC system)	
Power supply *1		100V AC 1 ϕ 2W 50/60Hz 200V AC 1 ϕ 2W 50/60Hz 220V AC 1 ϕ 2W 50/60Hz 230V AC 1 ϕ 2W 50Hz * 200, 220 and 230V AC power supplies are options.			
Maximum current (A) *2	100V AC	18.0A			
	200V AC	10.0A			
	220V AC	9.0A			
	230V AC	8.5A			
Ambient temperature		Allowable operating range: +5 to +35°C			
Performance *3	Temperature control range	-40 to +150°C	-60 to +150°C	-40 to +150°C	-60 to +150°C
	Humidity control range	30 to 95%RH See temperature-humidity control range diagram. *4		—	
	Temperature constancy	$\pm 0.3^{\circ}\text{C}$ (-40 to +100°C)	$\pm 0.3^{\circ}\text{C}$ (-60 to +100°C)	$\pm 0.3^{\circ}\text{C}$ (-40 to +100°C)	$\pm 0.3^{\circ}\text{C}$ (-60 to +100°C)
		$\pm 0.5^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.5^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.5^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.5^{\circ}\text{C}$ (+100.1 to +150°C)
	Humidity constancy	$\pm 3\%RH$		—	
	Temperature uniformity	$\pm 0.5^{\circ}\text{C}$ (-40 to +100°C)	$\pm 0.5^{\circ}\text{C}$ (-60 to +100°C)	$\pm 0.5^{\circ}\text{C}$ (-40 to +100°C)	$\pm 0.5^{\circ}\text{C}$ (-60 to +100°C)
		$\pm 0.8^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.8^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.8^{\circ}\text{C}$ (+100.1 to +150°C)	$\pm 0.8^{\circ}\text{C}$ (+100.1 to +150°C)
	Humidity uniformity	$\pm 3\%RH$		—	
	Temperature heat-up rate	Within 70 min from -40 to +150°C	Within 80 min from -60 to +150°C	Within 70 min from -40 to +150°C	Within 80 min from -60 to +150°C
	Temperature pull-down rate	Within 60 min from +20 to -40°C	Within 90 min from +20 to -60°C	Within 60 min from +20 to -40°C	Within 90 min from +20 to -60°C
Lowest attainable temperature	-40°C	-60°C	-40°C	-60°C	
Construction	External	Cold-rolled rust-proof steel plate (Melamine baked finish)			
	Internal	18-8 Cr-Ni stainless steel plate			
	Insulation	Rigid polyurethane foam + Glass wool			
	Air circulator	Propeller fan			
	Heater	Nichrome stripped-wire heater			
	Humidifier	18-12-2.5 Cr-Ni-Mo stainless steel sheathed heater		—	
	Refrigerator	Air-cooled hermetically sealed (R404A)			

Cont.

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Temperature (Humidity) indicator-controller	Operation modes	Program + Constant setting	
	Setter	Mechanical key input	
	Program memory capacity	1 program with 9 steps (Repeat cycles: 1 to 99)	
	Control principle	PID control	
	Communications	RS-485, E-BUS (option), GP-IB (option), RS-232C (option)	
	Functions	Input burnout detection function, upper and lower temperature limit alarm function, self-diagnostic function (watchdog timer), alarm indication function, power cut protection function, timer function (automatic start/stop), refrigerator capacity auto control	
Accessories	Specimen power supply control terminal, external alarm signal terminal, external output signal terminal, temperature (humidity) recorder terminal (for test area temperature/humidity recording) *5, RS-485, cable port (ϕ 25 mm, 1 each left/right sides), GND power cable, water tank, humidifying tray drain nipple, water tank level sensor tank drain nipple, drain pipe		
Capacity (L)	Approx. 64		
Inside dimensions (W x H x D mm)	400 x 400 x 400 (Excluding projections)		
Outside dimensions (W x H x D mm)	540 x 730 x 890 (930) *6	540 x 660 x 890 (930) *6	
Weight (kg) *7	122	115	

*1 Ensure power supply voltage fluctuates only to within $\pm 10\%$ of the rated voltage when the refrigerator starts up.

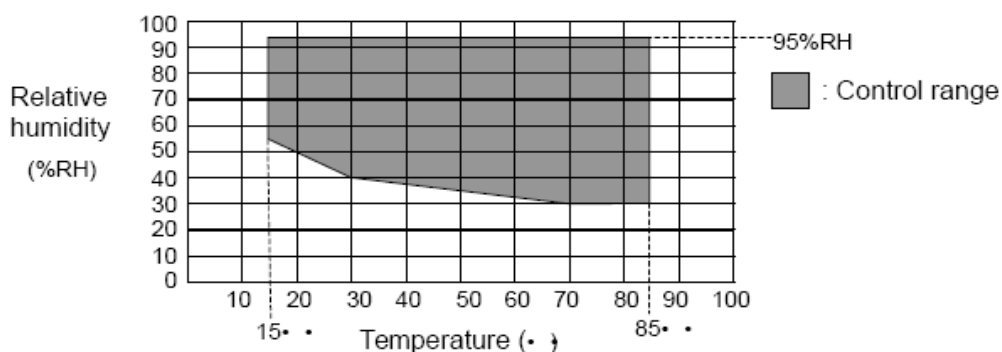
*2 At ambient temperature of $+23^{\circ}\text{C}$, rated voltage.

*3 • At ambient temperature of $+23^{\circ}\text{C}$, rated voltage and no specimens inside test area.

However, the lowest attainable temperature is for a maximum ambient temperature of $+30^{\circ}\text{C}$.

• Performance figures are based on JTM K 01-1998 (Humidity chambers-test and indications method for performance by Japan Testing Machinery Association).

*4 Temperature-Humidity control range (SH chambers only)



*5 SU chambers have temperature detection only.

*6 Dimensions in () include projections.

*7 Weight for 115, 220 and 230V AC chambers given in ().