Panasonic

Service Manual Pharmaceutical Refrigerator

KM-RS16A1
KM-RS34A1

Panasonic Healthcare Co., Ltd.
Medical System Business Unit

SM9910293

Effective models

This service manual is effective for following models.

Model name	Product code	Voltage and Frequency	
KM-RS16A1E	903 649 54	220~240V	50Hz
KM-RS16A1K	903 649 53	220V	60Hz
KM-RS16A1T	903 649 57	220V	60Hz
KM-RS16A1R	903 649 55	220V	60Hz

Model name	Product code	Voltage and Frequency	
KM-RS34A1A	903 650 51	110/115V	60Hz
KM-RS34A1E	903 650 54	230/240V	50Hz
KM-RS34A1K	903 650 53	220V	50/60Hz
KM-RS34A1T	903 650 57	220V	50/60Hz
KM-RS34A1R	903 650 55	220V	50/60Hz

Contents

Features

1. Both saving energy and stable chamber temperature are managed by new cycle defrost control.
 * Saving energy about 15% comparing with previous model (set temp.: 5℃, ambient temp.: 23℃)
 * There is no regular temperature increasing by defrost like home use freezer
 * Light in chamber: LED (high luminance SMD chip)

2. Satisfying alarm function
 * High and Low temperature alarm
  Set temperature: ±2~±14℃ changeable (default: ±5℃)
  Temperature alarm buzzer delay time: 0~15 minutes changeable (default: 15 min)
 * Door alarm
  Buzzer delay time: 0~15 minutes changeable (default: 2 min)
 * Alarm buzzer ring back (prevent alarm buzzer left with off condition)
  Recovery time: 0~60 minutes changeable (unit: 10 min, default: 30 min)

3. Option
 * Recorder : MTR-0621LH, MTR-G04
  (Alarm contact of MTR-0621LH is not interlocked with buzzer)
 * Power failure alarm battery mounting box (KM-RPP01BB1)
  Power failure alarm battery, remote alarm terminal, connection harness are included
 * Communication interface can be installed (MTR-480, MTR-L03)

4. Custom made support
 * Glass door for high humidity ambience

Caution

*** Parts replacement and option unit installation must be done by trained serviceman.**

*** Serviceman must refer to the section "Electric parts" and "Cooling unit parts" about the parts for those operation.**

Specifications

■Structural specifications

Item	KM-RS16A1	KM-RS34A1
Name	Pharmaceutical Refrigerator	
External dimensions	W800 mm x D465 x H1090 mm	W800 mm x D465 x H1800 mm
Internal dimensions	W720 mm x D300 mm x H725 mm	W720 mm x D350 mm x H1435 mm
Effective capacity	158 L	340 L
Exterior	Painted steel	
Interior	Stainless steel	
Door	Double layer pair glass Heat ray reflection film 2 doors	Double layer pair glass Heat ray reflection film 4 doors
Shelf	Hard steel wire on clear coating Inner dimensions: W700 mm x D238 mm Allowable load: 20 kg/shelf, 2pcs	Hard steel wire on clear coating Inner dimensions: W700 mm x D238 mm Allowable load: 20 kg/shelf, 5pcs
Access port	Inner diameter 30 mm (Rear side)	
Insulation	Rigid polyurethane foamed-in place	
Cooling method	Forced air circulation, Direct cooling	
Compressor	Hermetic reciprocating type, Output: 90 W	Hermetic reciprocating type, Output: 160 W
Fan motor	For air circulation, Output: 1W x1pc	
Evaporator	Fin and tube type	
Condenser	Wire and tube	
Refrigerant	R-407D	
Defrosting	New cycle defrost and forced defrost	
Defrost heater	87 W	91 W (USA only), 101 W (Other area)
Drain-pan heater	25W	
Temperature controller	Electronic control system	
Temperature display	Digital display (in 1°C increments)	
Thermal sensor	Thermister sensor	
Lighting	LED Light	
Alarms/ Safety functions	High temp. alarm (all digital display blink, lamp blinks) Low temp. alarm (all digital display blink, lamp blinks) Over-heat protection: defrost heater OFF when temp. fuse is over about 70℃ Over-cool protection: compressor OFF when temp. fuse is below about -1℃	
Power source	220~240V 50Hz 220V 60Hz	110/115V 60Hz 230/240V 50Hz 220V 50/60Hz
Weight	71 kg	100 kg
Accessories	1 set of key	
Optional components	Temperature recorder (MTR-0621LH-PA or MTR-0621LH-PE), Temperature recorder (MTR-G04A-PA or MTR-G04C-PE), Recorder fixing for MTR-0621LH-PA or MTR-0621LH-PE (MPR-S30-PW), Recorder fixing for MTR-G04A-PA or MTR-G04C-PE (MPR-S7-PW) Recorder sheet (RP-G04), Recorder Pen (PG-R) Battery mounting box (KM-RPP01BB1W) Data acquisition system (MTR-5000-PW) Interface board (MTR-480-PW), LAN interface board (MTR-L03-PW)	

■KM-RS16A1 / 34A1 Recorder Table

Model	Rating	Recorder		Remark
KM-RS16A1E	220-240V 50Hz	MTR-0621LH-PE	MTR-G04C-PE	-
KM-RS16A1K	220V 60Hz	MTR-0621LH-PA	MTR-G04A-PA	Rating 220V, 60Hz models are used step-down transformer to convert voltage from AC220V to AC100V.
KM-RS16A1R				
KM-RS16A1T				
KM-RS34A1A	110/115V 60Hz	MTR-0621LH-PA	MTR-G04A-PA	All KM-RS34R1 models are not used step-down transformer, so they are operated by local voltage.
KM-RS34A1E	230/240V 50Hz	MTR-0621LH-PE	MTR-G04C-PE	
KM-RS34A1K	220V 50/60Hz			
KM-RS34A1R				
KM-RS34A1T				

■Control specifications

Item	KM-RS16A1	KM-RS34A1
Temperature controller	Micro computer control system Temperature setting range: 2℃~14℃ (Unit: 1℃), Non-volatile memory	
Temperature sensor	502AT	
Temperature display	Green LED digital display, 3digits (Unit : 1℃), Display range : -50℃~+50℃	
Lamps and keys on control panel	DOOR: Door lamp (red), ALARM: Alarm lamp (red) BUZZER: Buzzer stop key (after 30 min ring back, ring back time changeable, ring back can be cancelled) SET: Switch set value and chamber temperature ▶: shift set digit, ▲: change value, LIGHT: LED light ON/OFF	
Defrost function	Cycle defrost New cycle defrost system: Detect evaporator temperature and operate defrosting by turning on electricity to DEF heater during compressor is OFF. * Can be changed to usual cycle defrost in function mode. Forced defrost When evaporator is icing, operate forced defrost.	
Lighting function	Door open/close interlocking Door opened: light ON / Door closed: light OFF Can be changed to “always OFF” for light shielding storage. Manual operation Press LIGHT key on control panel to turn ON/OFF light. Automatic turn OFF When set time (1~15min) passed after light turn on, light automatically turn off.	
Alarm function (standard)	Temperature alarm High temp. alarm: set temp. +2~+14℃ (default: +5℃) Low temp. alarm: set temp. -2~-14℃ (default: -5℃) ALARM lamp blinks and buzzer sounds intermittently. Buzzer delay time (0~15min) can be set (default: 15min). But, if the temperature becomes below 0℃, low temp. alarm operates immediately. Ring back Buzzer sound (intermittent) ring back function Ring back time can be set to 0~60min (unit:10min, default: 30min) Door alarm DOOR lamp turns on and buzzer sounds intermittently. Buzzer delay time can be set to 0~15min (default: 2min) Fan motor / Battery replacement time alarm Fan motor (about 6 years after power supplied): chamber temperature (4sec) and F-1 (1sec) are displayed alternately. Battery for optional power failure alarm (about 3 years after power supplied): chamber temperature (4sec) and F-1 (1sec) are displayed alternately.	

Alarm function (optional)	Power failure alarm ALARM lamp blinks, buzzer sounds intermittently, turn off temperature display and reverse remote alarm contact. * Need to install KM-RPP01BB1 (option). Remote alarm Remote alarm terminal: DC30V, 2A N.C.-COM. N.O.-COM. (temp. alarm, reverse during power failure) * Need to install KM-RPP01BB1 (option). Communication MTR-480, MTR-L03
Self-diagnosis	Chamber temp. sensor, Defrost sensor Error code and chamber temperature are displayed alternately. Reverse remote alarm contact (no voltage) Buzzer sounds intermittently.
Key Lock	Press ▶ key for 5 seconds. L0 : Key Lock is OFF L1 : Key Lock is ON
Compressor protection	Overload relay
Safety function	Over-heat protection Defrost heater OFF when temp. fuse is over about 70℃. Over-cool protection Compressor OFF when temp. fuse is below about -1℃.

■Performance specifications

Item	KM-RS16A1K KM-RS16A1T KM-RS16A1R	KM-RS16A1E
Temperature control range	+2℃~+14℃	
Noise level	35 dB (A scale)	
Maximum pressure	1800 kPa	
Rated voltage	AC 220 V	AC 220 V / 230 V / 240 V
Rated frequency	60 Hz	50 Hz
Power consumption	140 W	130 W
Amount of power consumption	2.8 kwh / day	2.8 kwh / day
Usable condition	-5℃ to +35℃, 80%R.H. or less	

Item	KM-RS34A1A	KM-RS34A1K KM-RS34A1T KM-RS34A1R	KM-RS34A1E
Temperature control range	+2℃~+14℃		
Noise level	40 dB (A scale)		
Maximum pressure	2000 kPa		
Rated voltage	AC 110 V / 115 V	AC 220 V	AC 230 V / 240 V
Rated frequency	60 Hz	50 Hz / 60 Hz	50 Hz
Power consumption	200 W	185 W / 195 W	185 W
Amount of power consumption	3.7 kwh / day	3.4 / 3.6 kwh / day	3.8 kwh / day
Usable condition	-5℃ to +35℃, 80%R.H. or less		

***** Measurement condition of power consumption: AT23℃, SV5℃

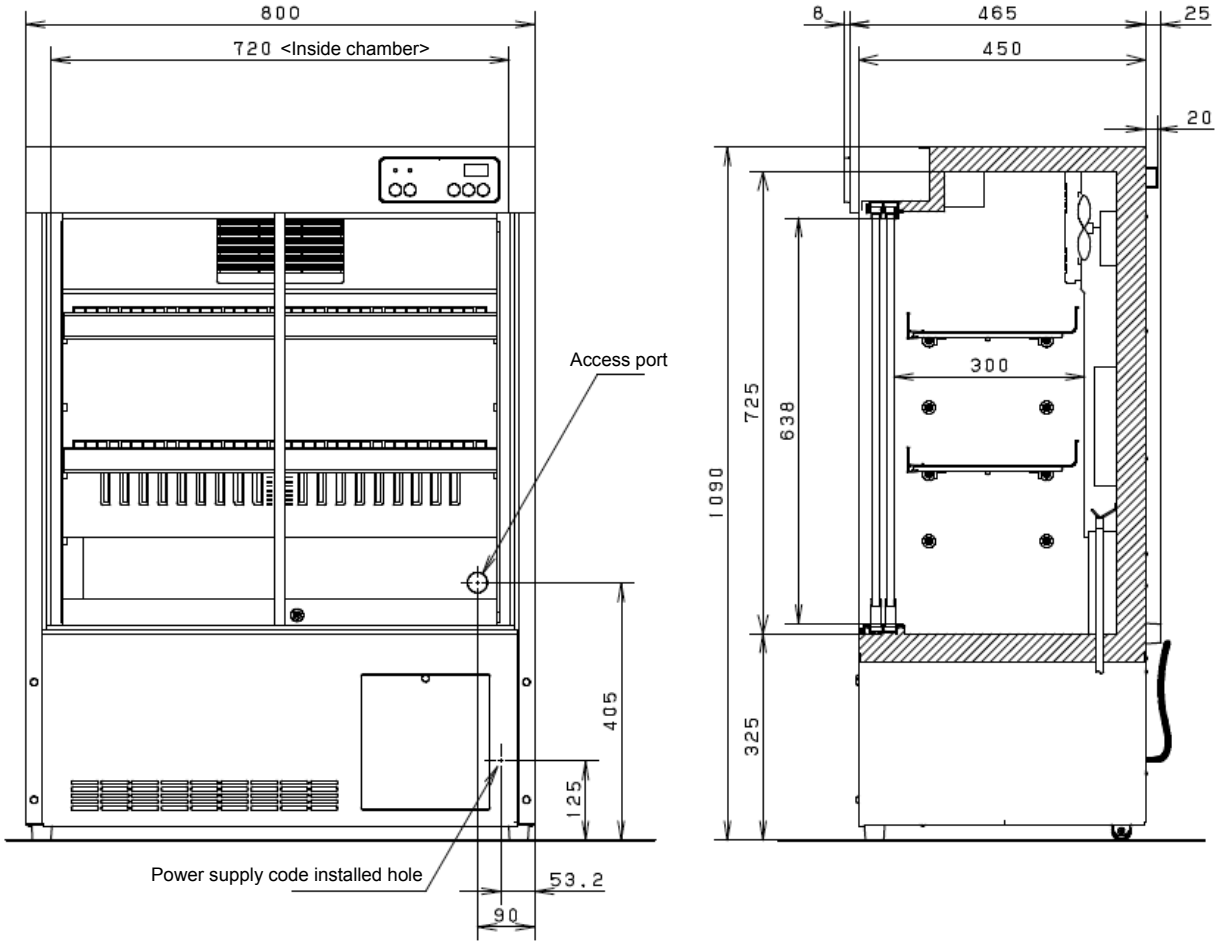
***** Measurement condition of Amount of power consumption: AT30℃, reaching (continuous) operation

Note: Design or specification will be subject to change without notice.

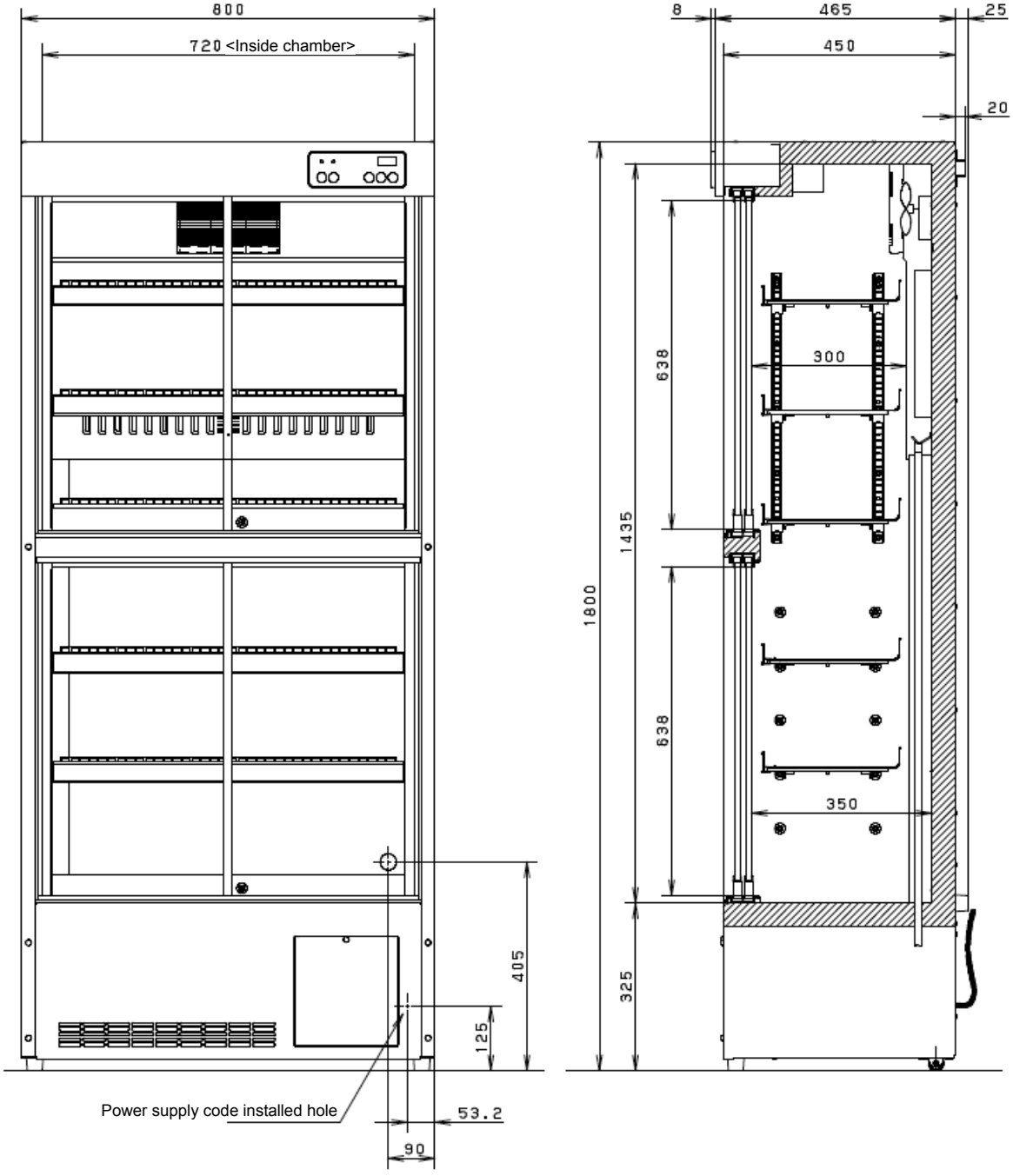
The unit with CE mark complies with EC directives.

Dimensions

KM-RS16A1



KM-RS34A1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720 <Inside chamber>
8
465
25
450
20
638
300
1435
1800
638
350
325
405
125
Power supply code installed hole
53.2
90

Cooling unit parts

KM-RS16A1

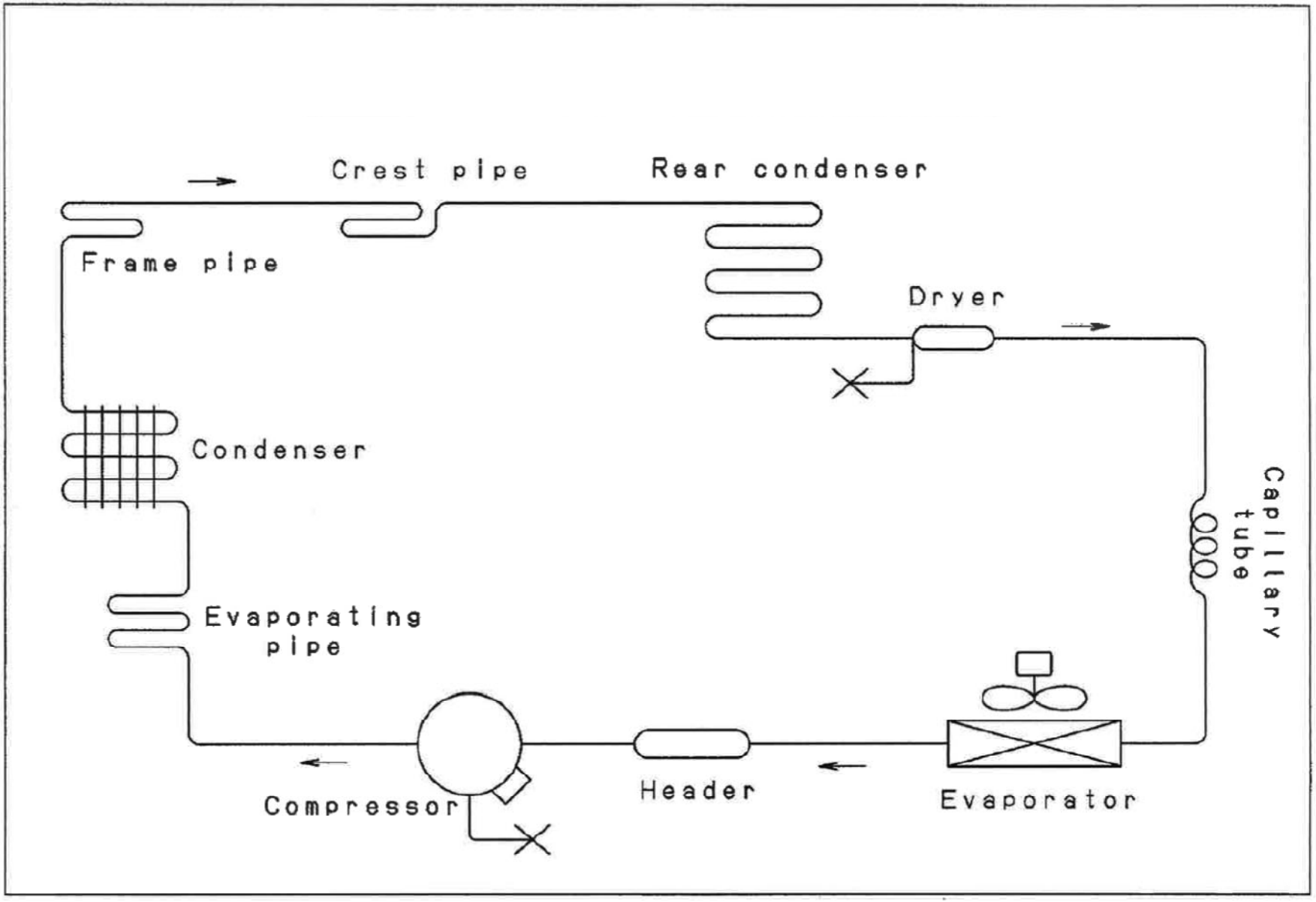
Item	Specifications	
	KM-RS16A1E	KM-RS16A1K KM-RS16A1R KM-RS16A1T
Compressor		
Type	C-B90L5F	C-B90L0F
Code	80109115	80109110
Rating	230/240V 50Hz	100V 60Hz
Refrigerant oil	Ze-NIUSL22SA, q'ty 280±10cc	
Cooling system	Natural air cooling	
Starting relay	S18C	S46C
Overload relay	P43HS	P12AS
Starting capacitor	20μF/300VAC	100μF/125V
Condenser (Type)		
Condenser	Wire and tube type, Φ4.76mm x T0.7mm	
Evaporating pipe	Φ4.76mm x T0.7mm	
Frame pipe	Φ4.0mm x T0.5mm	
Crest pipe	Φ4.2mm x T0.5mm	
Rear condenser	Φ4.0mm x T0.5mm	
Evaporator (Type)		
Evaporator	Fin and tube type, 1 line x 4 columns, P=10mm, Fin 54pcs	
Accumulator	Φ25mm x T0.8mm x L130mm	
Capillary		
Resistance PSI・kgf/cm^2	4±0.1/12kgf/cm^2	
Length	2000mm	
Outer diameter	Φ1.8mm	
Inner diameter	Φ0.9mm	
Refrigerant	R-407D+6pt, Charged q'ty 80±5g	
Dryer	XH-9, Charged q'ty 8g	
Cooling fan	Propeller fan, Φ100mm, 4pcs	
Cooling fan motor	FL2-012BM5P	FL2-011BMP
Fuse	SF70V, 70℃ OFF	
Heater	230V, 87.0W (203V, 70.0W) resistance 607.8Ω	100V, 88.8W (88V, 77.0W) resistance 112.6Ω
Drain pan heater	230V, 25W	100V, 24.6W
Temp. sensor	502AT-1N	
Alarm sensor		
Defrost sensor		
Remark	-----	ALL electric parts are based on 100V rating since using transformer

KM-RS34A1

Item	Specifications		
	KM-RS34A1A	KM-RS34A1E	KM-RS34A1K KM-RS34A1R KM-RS34A1T
Compressor			
Type	C-B161L9W	C-B160L5V	C-B160L6V
Code	80116519	80116115	80116116
Rating	115V 60Hz	230/240V 50Hz	220V 60Hz
Refrigerant oil	Ze-NIUSL22SA, q'ty 280±10cc		
Cooling system	Natural air cooling (with OC)		
Starting relay	S85C	S32C	S38C
Overload relay	P15KS	P63AS	P72HS
Starting capacitor	150μF/160V	40μF/300V	40μF/300V
Condenser (Type)			
Condenser	Wire and tube type, Φ4.76mm x T0.7mm		
Evaporating pipe	Φ4.76mm x T0.7mm		
Frame pipe	Φ4.0mm x T0.5mm		
Crest pipe	Φ4.2mm x T0.5mm		
Rear condenser	Φ4.0mm x T0.5mm		
Evaporator (Type)			
Evaporator	Fin and tube type, 1 line x 5 columns, P=10mm, Fin 54pcs		
Accumulator	Φ25mm x T0.8mm x L180mm		
Capillary			
Resistance PSI・kgf/cm^2	4±0.1/12kgf/cm^2		
Length	2500mm		
Outer diameter	Φ1.8mm		
Inner diameter	Φ0.9mm		
Refrigerant	R-407D+6pt, Charged q'ty 150±5g		
Dryer	XH-9, Charged q'ty 8g		
Cooling fan	Propeller fan, Φ100mm, 4pcs		
Cooling fan motor	FL2-011B1MP	FL2-012BM5P	FL2-012BM5P
Fuse	SF70V, 70℃ OFF		
Heater	115V, 91.2W (109V, 82.0W) resistance 145.0Ω	230V, 100.9W, resistance 524.4Ω	220V, 92.3W, resistance 524.4Ω
Drain pan heater	115V, 25W	230V, 25W	230V, 25W
Temp. sensor	502AT-1N		
Alarm sensor			
Defrost sensor			

Refrigeration circuit

KM-RS16A1



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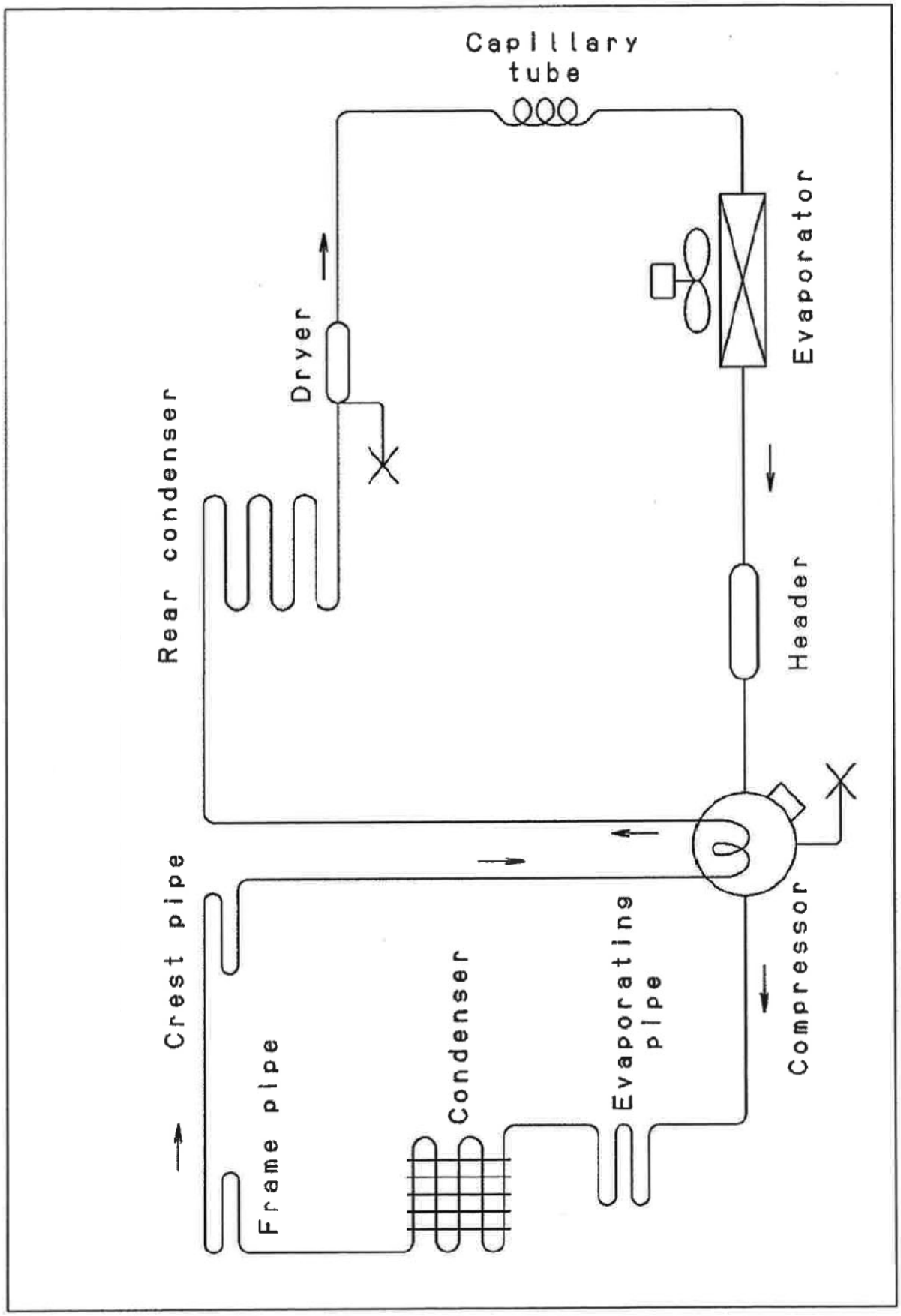
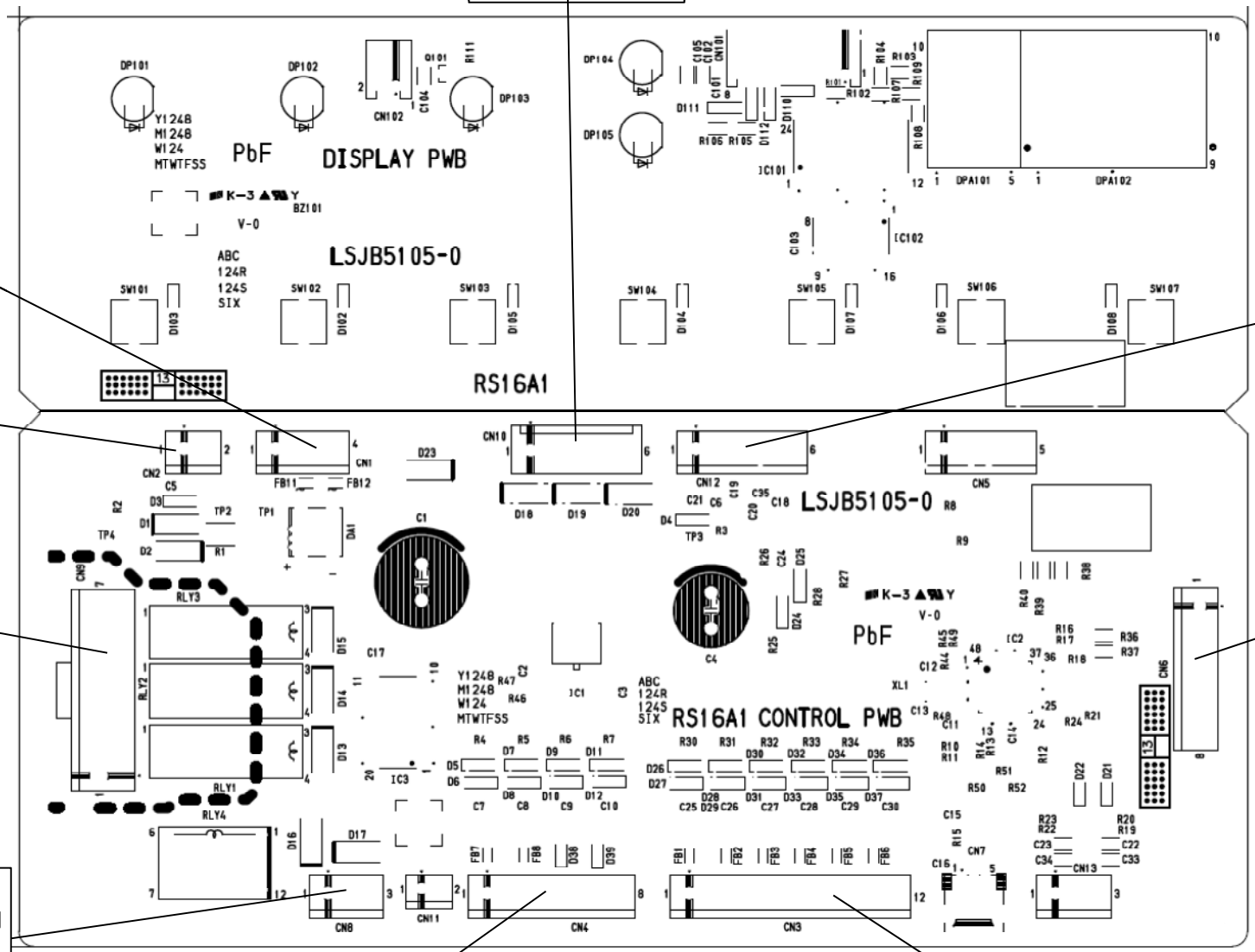

Capillary tube
Evaporator
Dryer
Rear condenser
Header
Crest pipe
Frame pipe
Condenser
Evaporating pipe
Compressor

Components on PCB



CN10
#1-#2: Control relay
#3-#6: LED

CN1
#3-#4:
Power trans.

CN12
#1-#6:
MTR-480 or MTR-L03
(option)

CN2
#1-#2:
Battery SW
Battery (option)

CN9
#1: LIVE
#3: Defrost heater
#5: Cooling fan motor
#7: Drain pan heater

CN6
#1-#8:
Display PCB (CN101)

CN8
Remot alarm terminal
#1: COM
#2: N.C.
#3: N.O.

CN4
#1-#2:
Lead switch

CN3
#1-#2: Temp. sensor
#3-#4: Defrost sensor

Connection on PCB

The following shows the connections of connectors on the Temp. controller PCB.

Connector	Connects to	Usage
CN1	#3-#4: Power trans.	
CN2	#1~#2: Battery SW, Battery (6V) (option)	To connect battery for power failure alarm
CN3	#1-#2: Temp. sensor #3-#4: Defrost sensor	
CN4	#1-#2: Lead switch	
CN5	Unused	
CN6	#1-#8: Display PCB (CN101)	
CN7	Unused	
CN8	Remote alarm terminal #1: COM #2: N.C. #3: N.O.	Remote alarm contact outputs
CN9	#1: LIVE #3: Defrost heater #5: Cooling fan motor #7: Drain pan heater	
CN10	#1-#2: Control relay #3-#6: LED	
CN11	Unused	
CN12	#1-#6: MTR-480 or MTR-L03 (option)	To connect option
CN13	Unused	

Electric Parts

KM-RS16A1		230/240V 50Hz	220V 60Hz
Compressor	Type	C-B90L5F	C-B90L0F
	Code	801-0-9115	801-0-9110
	Rating (50/60Hz)	AC230/240V, 50Hz	AC100V, 60Hz
Starting capacitor	Rating	20μF, 300V	100μF, 125V
Starting relay	Type	S18C	S46C
Overload relay	Type	P43HS	P12AS
Fan motor lead wire (Fan motor)	Type	FL2-012BM5	FL2-011BMP
	Rating	AC230V, 1W	AC100V, 1W
Defrost heater	Rating	AC230V, 87.0W	AC100V, 88.8W
Drain pan heater lead wire	Rating	AC230V, 25W	AC100V, 24.6W
Power relay	Type	DF12D1-F (M)	DF12D1-F (M)
	Rating	20A	20A
Temp. sensor lead wire	Type	502AT (black)	502AT (black)
	Rating	5kΩ=25℃	5kΩ=25℃
Defrost sensor assy	Type	502AT (white)	502AT (white)
	Rating	5kΩ=25℃	5kΩ=25℃
3P terminal	Type	AYBN023-5	AYBN023-5
	Rating	600V, 25A	600V, 25A
Power transformer	Type	SAB4114NS	A41-U098PV
	Rating	P: 115/230V, S: 9V	P: 100/200V, S: 9V
Power code	Type	GTVD-2	KP-30B
	Rating	K3, 16A, 250V, AWG#14	U3, 15A, 125V, AWG#14
Low temp. alarm therm	Type	WPF6.3K-014-010	WPF6.3K-014-010
	Rating	Normal notch, ON: 6℃, OFF: -1℃	Normal notch, ON: 6℃, OFF: -1℃
Temp. fuse	Type	SF70U	SF70U
	Rating	250V, 70℃, 7A	250V, 70℃, 7A
Lead switch lead wire (Lead switch)	Type	HR-3M	HR-3M
Breaker switch	Type	BAM215131	-----
	Rating	250V, 15A	
Step-down transformer	Type	-----	ATR-C600
	Rating		Input: AC220V Output: AC100V, 600VA

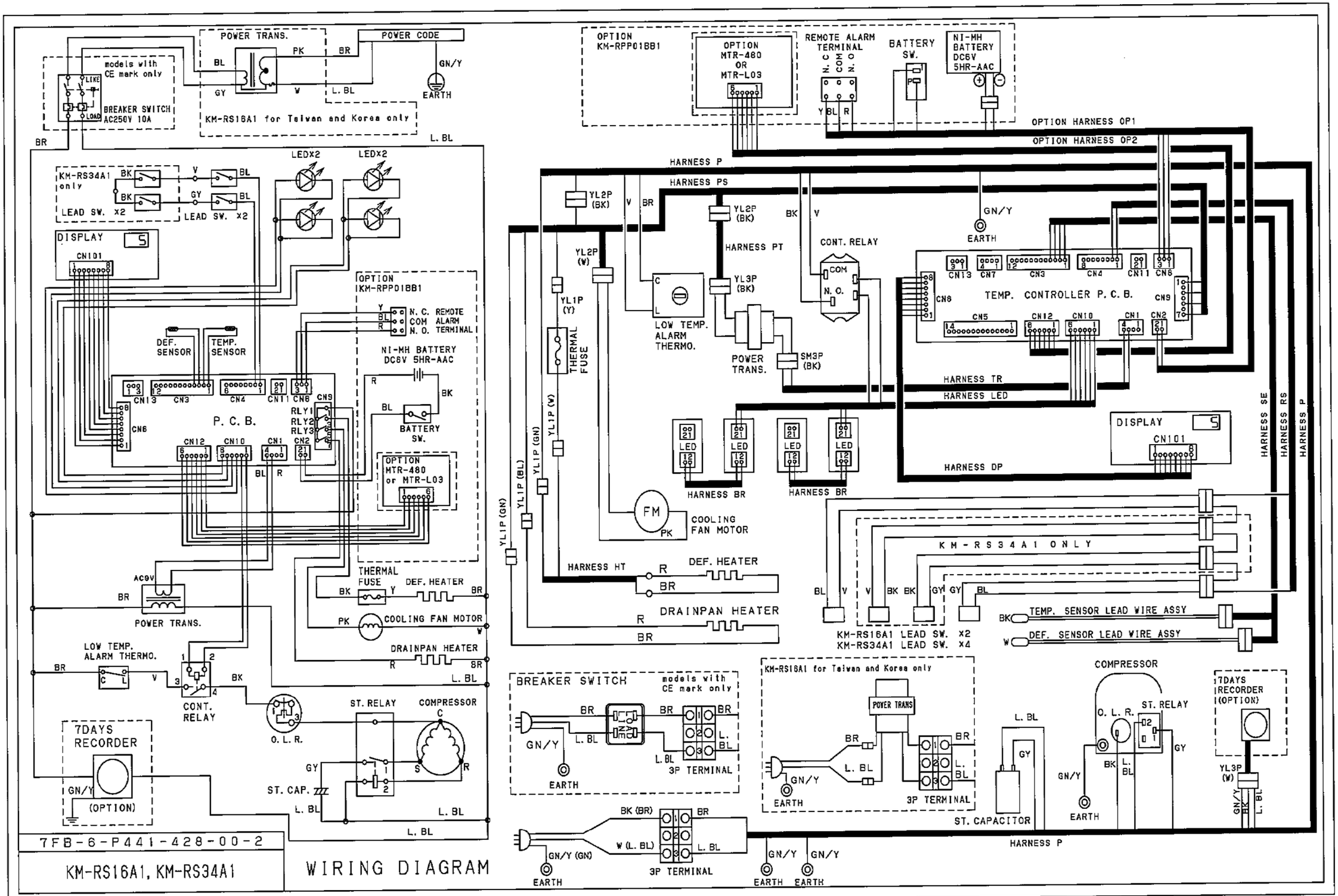
KM-RS34A1		110/115V 60Hz	230/240V 50Hz	220V 60Hz
Compressor	Type	C-B161L9W	C-B160L5V	C-B160L6V
	Code	801-1-6519	801-1-6115	801-0-6116
	Rating (50/60Hz)	AC115V, 60Hz	AC230/240V, 50Hz	AC220V, 60Hz
Starting capacitor	Rating	150μF, 160V	40μF, 300V	40μF, 300V
Starting relay	Type	S85C	S32C	S38C
Overload relay	Type	P15KS	P63AS	P72HS
Fan motor lead wire (Fan motor)	Type	FL2-011BM1M	FL2-012BM5	FL2-012BM5
	Rating	AC115V, 1W	AC230V, 1W	AC230V, 1W
Defrost heater	Rating	AC115V, 91.2W	AC230V, 100.9W	AC230V, 100.9W
Drain pan heater lead wire	Rating	AC115V, 25W	AC230V, 25W	AC230V, 25W
Power relay	Type	DF12D1-F (M)	DF12D1-F (M)	DF12D1-F (M)
	Rating	20A	20A	20A
Temp. sensor lead wire	Type	502AT (black)	502AT (black)	502AT (black)
	Rating	5kΩ=25℃	5kΩ=25℃	5kΩ=25℃
Defrost sensor assy	Type	502AT (white)	502AT (white)	502AT (white)
	Rating	5kΩ=25℃	5kΩ=25℃	5kΩ=25℃
3P terminal	Type	AYBN023-5	AYBN023-5	AYBN023-5
	Rating	600V, 25A	600V, 25A	600V, 25A
Power transformer	Type	SAB4114NS	SAB4114NS	SAB4114NS
	Rating	P: 115/230V, S: 9V	P: 115/230V, S: 9V	P: 115/230V, S: 9V
Power code	Type	GTVD-2	GTVD-2	GTVD-2
	Rating	K3, 16A, 250V, AWG#14	K3, 16A, 250V, AWG#14	K3, 16A, 250V, AWG#14
Low temp. alarm therm	Type	WPF6.3K-014-010	WPF6.3K-014-010	WPF6.3K-014-010
	Rating	Normal notch, ON: 6℃, OFF: -1℃	Normal notch, ON: 6℃, OFF: -1℃	Normal notch, ON: 6℃, OFF: -1℃
Temp. fuse	Type	SF70U	SF70U	SF70U
	Rating	250V, 70℃, 7A	250V, 70℃, 7A	250V, 70℃, 7A
Lead switch lead wire (Lead switch)	Type	HR-3M	HR-3M	HR-3M
Breaker switch	Type	-----	BAM215131	-----
	Rating		250V, 15A	

Specifications of sensor

The following shows the temperature in thermal sensor (502AT) and its resistance value.

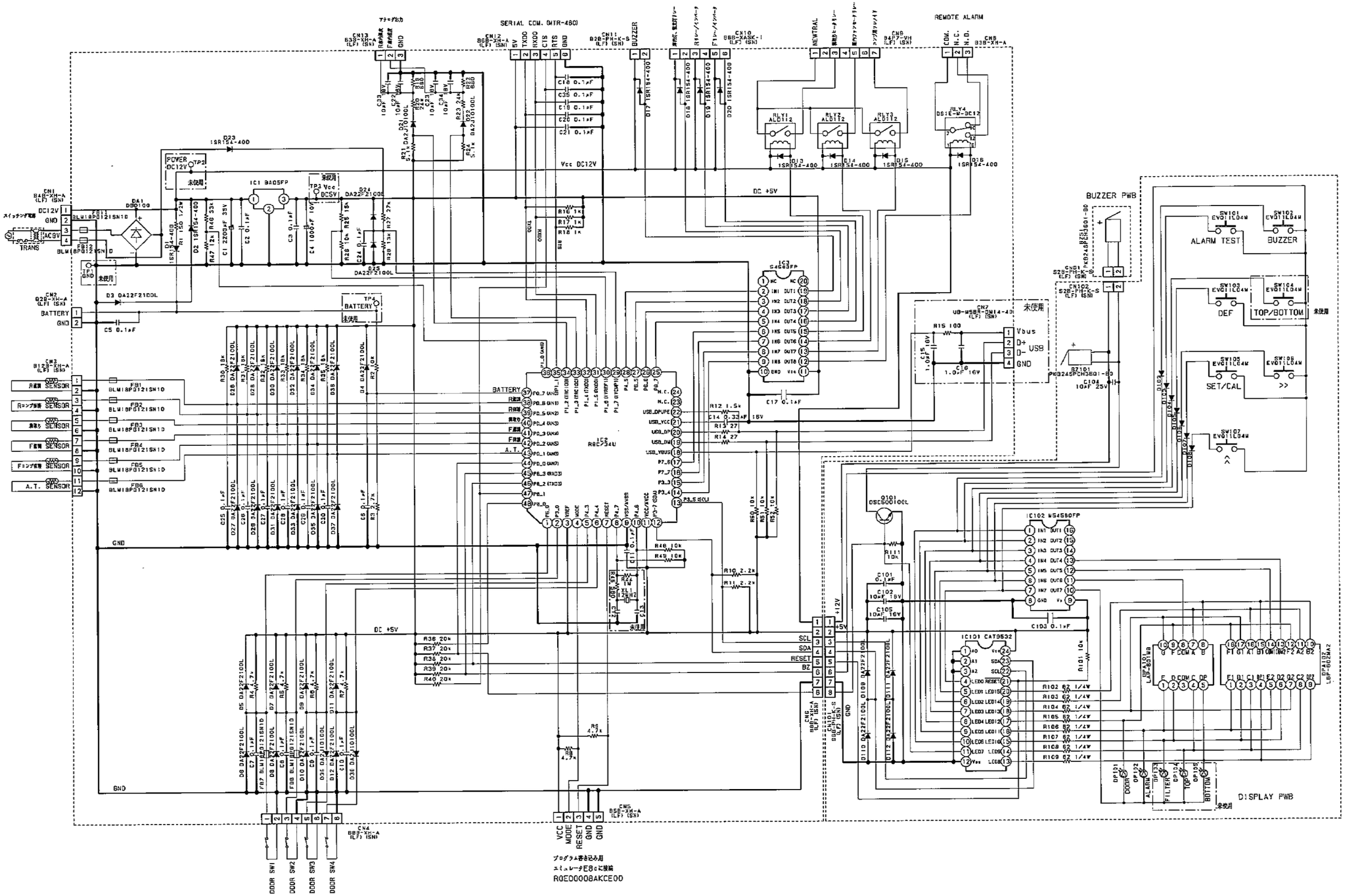
Temp. (C)	Resistance Value (kΩ)	Temp. (C)	Resistance Value (kΩ)	Temp. (C)	Resistance Value (kΩ)
−50	154.50	−7	17.92	12	8.17
−45	116.50	−6	17.16	13	7.85
−40	88.85	−5	16.43	14	7.55
−35	68.15	−4	15.74	15	7.27
−30	52.84	−3	15.08	16	6.99
−25	41.19	−2	14.45	17	6.73
−20	32.43	−1	13.86	18	6.48
−19	30.92	0	13.29	19	6.24
−18	29.50	1	12.74	20	6.01
−17	28.14	2	12.22	25	5.00
−16	26.87	3	11.72	30	4.18
−15	25.65	4	11.25	35	3.51
−14	24.51	5	10.80	40	2.96
−13	23.42	6	10.37	45	2.51
−12	22.39	7	9.96	50	2.14
−11	21.41	8	9.57	55	1.83
−10	20.48	9	9.20	60	1.57
−9	19.58	10	8.84		
−8	18.73	11	8.49		

KM-RS16A1/KM-RS34A1



Circuit Diagram

KM-RS16A1/KM-RS34A1



Control specifications

1. Keys on control panel

BUZZER — Stop buzzer sound and remote alarm output

Press this key in alarm condition, stop buzzer sound, but alarm display on control panel continues. When remote alarm interlocking (F24) is set as interlocking (001), remote alarm stops as well. Stopped buzzer sound and remote alarm recover after set time passes. Recovery time can be set in F25 (refer to 5. Function mode).

Operation when battery is connected

When battery is connected and battery setting is set as valid (001) in F42, press this key to display chamber temperature for about 5 seconds. When battery setting is set as valid (001) in F42, but battery is not connected or battery switch is off though battery is connected, press this key to display battery error (E09) (refer to 3-1. Error codes).

SET — Press this key once to enter chamber temperature setting mode (1st digit of numerical value blinks). Press this key again in chamber temperature setting mode, store the set value. This key is also used to decide and store the value in other function and setting modes.

LIGHT — Press this key once to turn on or off lights. Lights are automatically turned off after set time that is set in lighting time setting (F45) (refer to 6-8. Light control).

▶ (digit shift key) — In setting mode, press this key to shift set digit (3rd digit → 2nd digit → 1st digit → 3rd digit ……). Shifted digit is based on setting data.
In chamber temperature display condition, press this key for more than about 5 seconds, “L_0” or “L_1” is displayed and move to key lock setting mode.

▲ (value change key) — In setting mode, increase blinked digit value one by one.
In chamber temperature display condition, press this key for more than about 5 seconds, “F00” is displayed and move to function mode.

When inputting service code, press ▶ and ▲ key at same time for about 5 seconds to move to condition display mode (refer to 4. Other function).

2. Settings by key operation

2-1. Temperature setting

Setting range	:	+2℃~+14℃ * Automatically offset set temperature based on running rate of compressor. (refer to 6-2. Set temperature offset based on compressor running rate)
Display range	:	-50℃~+50℃, unit: 1℃ (if it is below -20℃, “-“ sign is not displayed)
Setting method	:	Press SET key to enter chamber temperature setting mode. Use ▶ and ▲ key to set values. Press SET key again to store the set value and return to chamber temperature display.
Out of setting range	:	If press SET key with value that is out of setting range, buzzer sounds continuously and keep setting mode.

Note) If key lock is set as ON, it can be entered temperature setting mode, but cannot change value.

2-2. Key lock function

Setting range : 0, 1

Setting method : In chamber temperature display condition, press ▶ key for more than about 5 seconds to display “L_X” (default: “L_0”) and enter key lock mode. “X” value blinks, so use ▲ key to change value and press SET key to store the change in non-volatile memory.

0: Key lock is OFF

1: Key lock is ON

Note) If key lock is set as ON, it can be entered temperature setting mode, but cannot change value. Function mode is valid if key lock is ON.

2-3. Function mode

Setting range : 0~59

Display range : 0~59 (05, 14~16, 18~20, 23, 27~29, 31, 32, 38~41, 43, 44, 46, 49 are unused)

Setting method : In chamber temperature display condition, press ▲ key for more than about 5 seconds, “F00” is displayed and move to function mode. 1st digit blinks, so use ▶ and ▲ key to set values and press SET key to enter each function setting condition. Press SET key with “F00” to return to chamber temperature display.

Out of setting range : If press SET key with value that is out of setting range, buzzer sounds continuously and keep setting mode.

3. Self diagnosis

3-1. Error codes

E01 : Temp. sensor open circuit

E02 : Temp. sensor short circuit

E03 : Defrost sensor open circuit

E04 : Defrost sensor short circuit

E09 : Battery error

E16 : Lighting diagram short circuit

F-1 : Battery replacement time

F-2 : Condensing fan motor replacement time

E2P : Non-volatile memory writing error

Temp. sensor error (E01 / E02)

When temp. sensor reading is….

* below -60℃: it is judged as open circuit and E01 / -50℃ are displayed alternately.

* over +60℃: it is judged as short circuit and E02 / 50℃ are displayed alternately.

Buzzer sound intermittently and remote alarm is on at the same time.

(refer to 7. Display and buzzer for cycle of display and buzzer)

Defrost sensor error (E03 / E04)

When defrost sensor reading is….

* below -60℃: it is judged as open circuit and E03 / chamber temperature are displayed alternately.

* over +60℃: it is judged as short circuit and E04 / chamber temperature are displayed alternately.

Buzzer sound intermittently and remote alarm is on at the same time.

(refer to 7. Display and buzzer for cycle of display and buzzer)

Defrost does not operate at this time. If defrost is operating, it stops.

In alarm condition, press BUZZER key to stop buzzer sound. If remote alarm interlocking (F24) is set as interlocking (001), stop remote alarm as well.

Battery error (E09)

If BUZZER key is pressed when battery setting is set as valid (001) in F42, but battery is not connected or battery switch is off though battery is connected, E09 is displayed for about 5 seconds and buzzer sounds intermittently. If battery is connected when battery setting is set as invalid (000) in F42, E09 and chamber temperature are displayed alternately and buzzer sounds intermittently. (refer to 7. Display and buzzer for cycle of display and buzzer)

This buzzer sound cannot be stopped by BUZZER key. Set battery setting to valid (001) or remove battery connection (battery switch is turned off) to stop buzzer.

Lighting diagram short circuit (E16)

When PCB input voltage is below 8.5V, it is judged as lighting diagram is short circuit. E16 and chamber temperature are displayed alternately. Buzzer sounds intermittently and remote alarm is ON at same time. (refer to 7. Display and buzzer for cycle of display and buzzer) Light is off in this time. Once this failure is detected, it continues for 15 minutes. During this time, it does not recover even if voltage is recovered. It detects again after 15 minutes passed.

In alarm condition, press BUZZER key to stop buzzer sound. If remote alarm interlocking (F24) is set as interlocking (001), stop remote alarm as well.

Battery replacement time (F-1)

When battery setting is set as valid (001) in F42, timer is counted every 24 hours. If it passes 1022 days (about 2.8 years), F-1 and chamber temperature are displayed alternately. Buzzer sound and remote alarm is not on. (refer to 7. Display and buzzer for cycle of display and buzzer)

Input 409 in F06 (service code input) and press SET key to reset timer to 0.

If the power is off before 24 hours passes, timer does not count until another 24 hours passes. It does not count during power failure as well.

Non-volatile memory writing error (E2P)

When writing to non-volatile memory is not done normally, E2P and chamber temperature are displayed alternately. Buzzer sound and remote alarm is not on. (refer to 7. Display and buzzer for cycle of display and buzzer)

Power is off or writing is done normally to cancel the error.

Error code priority

No.1:	Temp. sensor error (E01 / E02)	High/Low temp. alarm cannot be detected
No.2:	Defrost sensor error (E03 / E04)	Cancel defrost
No.3:	Lighting diagram short circuit (E16)	Turn off lighting
No.4:	Battery error (E09)	Setting and install condition discordance
No.5:	Battery replacement time (F-1)	Replacement time notice
No.6:	Non-volatile memory writing error (E2P)	Setting cannot be stored

3-2. Alarms

High temp. alarm (default: +5℃)

When PV > SV + high temp. alarm setting value + 0.09, ALARM lamp and numerical LED blink, buzzer sounds intermittently after delay time passes (default: 15 min.) and remote alarm is on. (PV = chamber temperature, SV = set temperature)

When PV ≤ SV + high temp. alarm setting value, ALARM lamp is turned off and LED blinking, buzzer sound, remote alarm are off.

In alarm condition, press BUZZER key to stop buzzer sound. If remote alarm interlocking (F24) is set as interlocking (001), remote alarm is off as well.

High temp. alarm setting value can be changed in F01. Delay time can be changed in F50.

High temp. alarm is not detected when temp. sensor is open / short circuit.

Low temp. alarm (default: -5℃)

When PV < SV + low temp. alarm setting value - 0.09, ALARM lamp and numerical LED blink, buzzer sounds intermittently after delay time passes (default: 15 min.) and remote alarm is on. (PV = chamber temperature, SV = set temperature)

When PV ≥ SV + low temp. alarm setting value, ALARM lamp is turned off and LED blinking, buzzer sound, remote alarm are off.

In alarm condition, press BUZZER key to stop buzzer sound. If remote alarm interlocking (F24) is set as interlocking (001), remote alarm is off as well.

Low temp. alarm setting value can be changed in F02. Delay time can be changed in F50.

Low temp. alarm is not detected when temp. sensor is open / short circuit.

0℃ alarm

When PV < 0.0, ALARM lamp and numerical LED blink, buzzer sounds intermittently (no delay time) and remote alarm is on. (PV = chamber temperature)

When PV ≥ 0.0, ALARM lamp is turned off and LED blinking, buzzer sound, remote alarm are off.

In alarm condition, press BUZZER key to stop buzzer sound. If remote alarm interlocking (F24) is set as interlocking (001), remote alarm is off as well.

This alarm operates prior to low temp. alarm.

0℃ alarm is not detected when temp. sensor is open / short circuit.

Door alarm

When the door is opened, DOOR lamp (DP101: red) is turned on. After delay time (default: 2 min.) passes, buzzer sounds intermittently. Remote alarm is not on. Press BUZZER key to stop buzzer sound and it is not recovered (no ring back function).

Power failure alarm

Power failure condition is when battery is connected or battery setting (F42) is set as 001, battery switch is on but unit power switch is off or power supply is stopped. In this condition, ALARM lamp blinks, buzzer sounds intermittently and remote alarm is on.

When it is recovered from power failure, it starts running as initial condition of power on reset. Remote alarm is off.

Press BUZZER key to stop buzzer sound but remote alarm cannot be off.

Press BUZZER key during power failure, chamber temperature is displayed for about 5 seconds.

4. Other functions

Auto return

If there is no operation for about 90 seconds while set temp. / function code / function values / key lock setting is input, it automatically returns to chamber temperature display.

In this case, changing value is not stored.

* Note) Auto return does not work in F09, F10, F35 and F37.

Ring back (default: 30 min.)

Recover buzzer sound after set time passes when buzzer sound is stopped by pressing BUZZER key during alarm sounding. This is to prevent that the buzzer sound is stopped by third person pressing BUZZER key during alarm condition and the alarm does not work. Ring back time can be changed in F25 (refer to 5. Function mode).

If another alarm is happened during buzzer stopping, buzzer sounds regardless of ring back time.

Battery accumulation time

F03: Display battery accumulation time (ex. 2.8 years → “02.8”)

When battery accumulation time is more than about 2.8 years, “F-1” is displayed on temperature display. Buzzer sound and remote alarm is not output.

Accumulation time counts every 24 hours. If the power is off before 24 hours passes, it does not count.

Input “409” and press SET key in F06 to reset memory to “00.0”.

If battery setting (F42) is set as invalid (0: default), it does not count. In this case, “————” is displayed in F03.

Sensor value display

F12: Display chamber temperature in 1st decimal point.

F13: Display defrost sensor temperature in 1st decimal point.

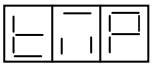
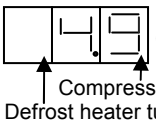
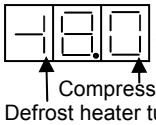
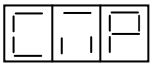
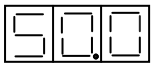
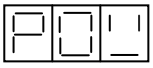
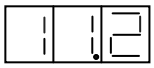
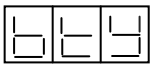
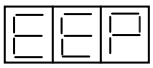
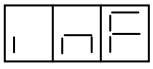
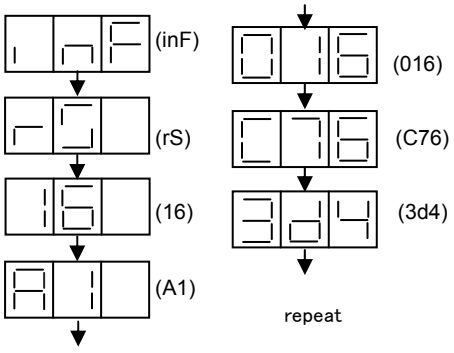
ROM version display

F30: Display ROM version (ex. Ver.1.00 → “1.00”)

Status display

In chamber temperature display, press ▶ and ▲ key at the same time for about 5 seconds, move to status display mode (this mode is valid when service code is input).

In this mode, press ▲ key to change display in order. Press ▲ key to display title for about 1 second and then change to data display.

Contents	Title	Data (example)	Remarks
Chamber temp. (1st decimal point) Defrost heater turns on electricity Compressor operation	 (tMP)	 (4.9℃) Compressor operation Defrost heater turns on electricity	Display chamber temperature in 1st decimal point. When compressor is in operation, dot in 1st decimal point blinks. When defrost heater turns on electricity, dot of 3rd digit blinks.
Defrost sensor temp. (1st decimal point) Defrost heater turns on electricity Compressor operation	 (dEF)	 (-18.0℃) Compressor operation Defrost heater turns on electricity	Display defrost sensor temperature in 1st decimal point. When compressor is in operation, dot in 1st decimal point blinks. When defrost heater turns on electricity, dot of 3rd digit blinks.
Compressor running rate	 (CMP)	 (50.0%)	Display compressor running rate of the latest 2 cycles.
PCB input voltage	 (POW)	 (11.2V)	Display PCB input voltage.
Battery voltage	 (bty)	 (6.4V)	Display battery voltage. If battery is not connected, it is almost same as PCB input voltage.
Non-volatile memory delete count	 (EEP)	 (0 thousand)	Display the number of times that non-volatile memory is deleted. Display total deleted number of A block and B block. Unit: thousand
Model information Software revision checksum	 (inF)	 (inF) (rS) (16) (A1) (016) (C76) (3d4) repeat	Example) Model: RS16A1 Revision: 16 Checksum: C763D4

5. Function mode

F05, F14~F16, F18~F20, F23, F27~F29, F31, F32, F38~F41, F43, F44, F46, F49 are unused. When these are selected, buzzer sounds.

F00 : Return to chamber temperature display
F01 : High temp. alarm setting
F02 : Low temp. alarm setting
F03 : Battery accumulation time display
F04 : Door alarm delay time setting
F06 : Service code setting
F07 : Temp. sensor zero adjustment
F08 : Defrost sensor zero adjustment
F09 : For factory use only
F10 : For factory use only
F11 : For factory use only
F12 : Temp. sensor temperature display
F13 : Defrost sensor temperature display
F17 : Model code setting (initialize memory)
F21 : Communication ID setting
F22 : Communication mode setting
F24 : Remote alarm interlocking mode
F25 : Ring back time setting
F26 : Compressor running rate display
F30 : ROM version display
F33 : Defrost start temperature setting
F34 : Defrost finish temperature setting
F35 : For factory use only
F36 : Defrost count display
F38 : For factory use only
F42 : Battery setting
F45 : Lighting time setting
F47 : Temp. sensor temperature analog output calibration
F48 : Defrost senor temperature analog output calibration
F50 : Temp. alarm delay time setting
F51 : For factory use only
F52 : Running rate upper limit threshold setting
F53 : Running rate lower limit threshold setting
F54 : Set temperature off set value setting
F55 : Memory dump transmission
F56 : Energy saving mode
F57 : Defrost heater OFF temperature
F58 : Compressor ON point setting
F59 : Compressor OFF point setting

How to use

1. In chamber temperature display, press ▲ key for about 5 seconds.
2. “F00” is displayed, so use ▶ and ▲ key to input 2 digit code.
3. Press SET key to enter each function mode.

F00 <Purpose> No function in order for the user enters by mistake to return
<Operation> Press SET key in “F00” display to return to chamber temperature display.

F01 <Purpose> Input high temp. alarm setting value

<Operation> Input F01 and press SET key. “005” (default value) is displayed.
Use ▶ and ▲ key to change the value between “002”~”014” (+2℃~+14℃).
Press SET key to store the value and return to chamber temperature display.

F02 <Purpose> Input low temp. alarm setting value

<Operation> Input F02 and press SET key. “-05” (default value) is displayed.
Use ▶ and ▲ key to change the value between “-02”~”-14” (-2℃~-14℃).
Press SET key to store the value and return to chamber temperature display.

F03 <Purpose> Display battery accumulation time

<Operation> Input F03 and press SET key. F03 and battery accumulation time (add 0.1 in every about 36.5 days) are displayed alternately. Input “409” in F06 to reset the value to “00.0”. If F42 is set as “000” (no battery connection), accumulation time is not counted and stay “00.0”.

<Cancel> Press SET key to return to chamber temperature display

F04 <Purpose> Set door alarm delay time

<Operation> Input F04 and press SET key. “002” (default value) is displayed.
Use ▶ and ▲ key to change the value between “000”~”015” (0~15 min.).
Press SET key to store the value and return to chamber temperature display.

F06 <Purpose> Input service code / Reset accumulation time

<Operation> Input F06 and press SET key. “000” (default value) is displayed.
Use ▶ and ▲ key to change the value to “384”. Press SET key to store the value and return to chamber temperature display (384: all function code is available).
In same way, input “409” to reset battery accumulation time and “410” to reset fan motor accumulation time.

<Cancel> Input F06 again to display “384”.
Use ▶ and ▲ key to change the value to “000”. Press SET key to store the value and return to chamber temperature display. Service code is not cancelled after each accumulation time is reset.
Its value to return to “000” by power ON/OFF. (not stored in non-volatile memory)
* Note: when DC5V is supplied to microcomputer (during back up), the value is still “384”.

F07 <Purpose> Use temp. sensor temperature correction <service code is necessary>

<Operation> Input F07 and press SET key. “00.0” (default value) is displayed.
Use ▶ and ▲ key to change the value between “-4.9”~”04.9”.
Press SET key to store the value and return to chamber temperature display.

F08 <Purpose> Use defrost sensor temperature correction <service code is necessary>

<Operation> Input F08 and press SET key. “00.0” (default value) is displayed.
Use ▶ and ▲ key to change the value between “-4.9”~”04.9”.
Press SET key to store the value and return to chamber temperature display.

F09 <Purpose> For factory use only

F10 <Purpose> For factory use only

F11 <Purpose> For factory use only

F12 <Purpose> Display temp. sensor temperature <service code is necessary>
in 1st decimal point
<Operation> Input F12 and press SET key. F12 and temp. sensor temperature are displayed alternately.
<Cancel> Press SET key to return to chamber temperature display

F13 <Purpose> Display defrost sensor temperature <service code is necessary>
in 1st decimal point
<Operation> Input F13 and press SET key. F13 and defrost sensor temperature are displayed alternately.
* Note) displayed digit is 3 digits, so if the value is below -20℃, "-" sign is not displayed. Ex.: -22.5℃ → "22.5"
<Cancel> Press SET key to return to chamber temperature display

F17 <Purpose> Change model code <service code is necessary>
<Operation> Input F17 and press SET key. Current model code is displayed.
Use ▶ and ▲ key to change the value to "001". Press SET key to store the initial value and return to chamber temperature display. Refer to following table for each model code and its representative model. Refer to "15. Control difference by model code" for control difference.

Model code	Representative model
001	KM-RS16A1
002	KM-RS34A1

Function that is not initialized by F17

Item	How to initialize	Remarks
F03: Battery accumulation time	Input "409" in F06	* When its initial startup of micro computer, set initial value.
F07: Temp. sensor zero adjustment	Input "00.0" in F07	
F08: Defrost sensor zero adjustment	Input "00.0" in F08	
F32: Fan motor accumulation time	Input "410" in F06	
F47: Chamber temp. analog output calibration value	Input "100" in F47	
F48: Defrost sensor analog output calibration value	Input "100" in F48	

F21 <Purpose> Set communication ID
<Operation> Input F21 and press SET key. "000" (default value) is displayed.
Use ▶ and ▲ key to change the value between "000"~"255".
Press SET key to store the value and return to chamber temperature display.

F22 <Purpose> Set communication mode
<Operation> Input F22 and press SET key. "000" (default value) is displayed.
Use ▶ and ▲ key to change the value based on following table.
Press SET key to store the value and return to chamber temperature display.

Control mode (3rd digit) 0: Local (initial)
1: Remote
Baud rate (2nd digit) 0: 2400bps (initial)
1: 4800bps
2: 9600bps

1st digit is not used.

* Note) When control mode is set as "1: Remote", set temperature cannot be changed in unit.

F24 <Purpose> Set interlocking of buzzer and remote alarm

<Operation> Input F24 and press SET key. “000” (default value) is displayed.
Use ▲ key to change the value to “000” or “001”. Press SET key to store the value and return to chamber temperature display.
000: not interlocking
001: interlocking

F25 <Purpose> Set ring back time

<Operation> Input F25 and press SET key. “030” (default value) is displayed.
Use ▶ and ▲ key to change the value between “000”~”060”.
Press SET key to store the value and return to chamber temperature display.

000: No ring back	040: 40 minutes
010: 10 minutes	050: 50 minutes
020: 20 minutes	060: 60 minutes
030: 30 minutes	

F26 <Purpose> Display compressor running rate <service code is necessary>
(the latest 2 cycles)

<Operation> Input F26 and press SET key. F26 and compressor running rate (50% → “50”) are displayed alternately.

<Cancel> Press SET key to return to chamber temperature display.

F30 <Purpose> Display ROM version <service code is necessary>
(ROM version of defrost heater)

<Operation> Input F30 and press SET key. F30 and “X.XX” (Ver.1.00 → “1.00”) are displayed alternately.

<Cancel> Press SET key to return to chamber temperature display.

F33 <Purpose> Input defrost start temperature set value <service code is necessary>

<Operation> Input F33 and press SET key. “-18.0” (default value, -18℃: KM-RS16A1 / -21℃: KM-RS34A1) is displayed.
Use ▶ and ▲ key to change the value between “-5.0”~”-30.0”.
Press SET key to store the value and return to chamber temperature display.
* Note) displayed digit is 3 digits, so if the value is below -20℃, “-“ sign is not displayed. Ex.: -22.5℃ → “22.5”

F34 <Purpose> Input defrost finish temperature set value <service code is necessary>

<Operation> Input F34 and press SET key. “05.0” (default value) is displayed.
Use ▶ and ▲ key to change the value between “0.1”~”9.9”.
Press SET key to store the value and return to chamber temperature display.

F35 <Purpose> For factory use only

F36 <Purpose> Display defrost count

<Operation> Input F36 and press SET key. F36 and defrost count after power is supplied are displayed alternately. Count is reset by power off or press ▲ key for more than about 5 seconds in F36. Maximum display is “999”.

<Cancel> Press SET key to return to chamber temperature display.

F38 <Purpose> For factory use only

F42 <Purpose> Set battery installed condition <service code is necessary>
<Operation> Input F42 and press SET key. “000” (default value) is displayed.
Use ▲ key to change the value to “000” or “001”.
Press SET key to store the value and return to chamber temperature display.
000: battery is not connected
001: battery is connected

F45 <Purpose> Set lighting time
<Operation> Input F45 and press SET key. “010” (default value) is displayed.
Use ▶ and ▲ key to change the value between “000”~”015”.
Press SET key to store the value and return to chamber temperature display.
000: LIGHT key invalid
001~015: time (min.) until the light is automatically turned off after light is turned on by pressing LIGHT key during the door is closed.

F47 <Purpose> Temp. sensor temperature analog output calibration <service code is necessary>
<Operation> Input F47 and press SET key. “100” (default value) is displayed.
Use ▶ and ▲ key to change the value between “000”~”199”.
Press SET key to store the value and return to chamber temperature display.
During F47 display, analog 1 outputs 100mV. Analog output voltage is measured during F47 display and set analog output voltage (mV) value (below decimal point omitted) in F47.
Ex.) measured analog voltage is 96mV: the value in F47 change to 96

F48 <Purpose> Defrost sensor temperature analog output calibration <service code is necessary>
<Operation> Input F48 and press SET key. “100” (default value) is displayed.
Use ▶ and ▲ key to change the value between “000”~”199”.
Press SET key to store the value and return to chamber temperature display.
During F48 display, analog 2 outputs 100mV. Analog output voltage is measured during F48 display and set analog output voltage (mV) value (below decimal point omitted) in F48.
Ex.) measured analog voltage is 104mV: the value in F48 change to 104

F50 <Purpose> Set high / low temp. alarm delay time <service code is necessary>
<Operation> Input F50 and press SET key. “015” (default value) is displayed.
Use ▶ and ▲ key to change the value between “000”~”015” (0~15min.).
Press SET key to store the value and return to chamber temperature display.

F51 <Purpose> For factory use only

F52 <Purpose> Set upper limit of compressor running rate <service code is necessary>
<Operation> Input F52 and press SET key. “075” (default value) is displayed.
Use ▶ and ▲ key to change the value between “055”~”090” (55~90%).
Press SET key to store the value and return to chamber temperature display.

F53 <Purpose> Set lower limit of compressor running rate <service code is necessary>
<Operation> Input F53 and press SET key. “020” (default value) is displayed.
Use ▶ and ▲ key to change the value between “010”~”045” (10~45%).
Press SET key to store the value and return to chamber temperature display.

F54 <Purpose> Set offset value of set temperature <service code is necessary>
<Operation> Input F54 and press SET key. “00.0” (default value) is displayed.
Use ▶ and ▲ key to change the value between “00.0”~”02.0” (0.0~2.0℃).
Press SET key to store the value and return to chamber temperature display.

F55 <Purpose> Transmit the contents of non-volatile memory <service code is necessary>
by serial communication
<Operation> Input F55 and press SET key. “000” is displayed.
Use ▶ and ▲ key to change the value between “001”~”004” (number of memory block transmitted).
Press SET key to transmit the selected block and return to chamber temperature display. When “000” is selected, nothing is done.
9600bps, Data length: 8 bit, Stop bit: 1, Parity: none

F56 <Purpose> Change program mode <service code is necessary>
<Operation> Input F56 and press SET key. “000” (default value) is displayed.
Use ▲ key to change the value to “000” or “001”.
Press SET key to store the value and return to chamber temperature display.
000: new cycle defrost
001: cycle defrost (compressor / heater reverse output)

F57 <Purpose> Set OFF temperature of defrost heater <service code is necessary>
<Operation> Input F57 and press SET key. “02.5” (default value) is displayed.
Use ▶ and ▲ key to change the value between “00.0”~”09.9” (0.0~9.9℃).
Press SET key to store the value and return to chamber temperature display.

F58 <Purpose> Set ON point of compressor <service code is necessary>
(refer to 6-1. Temperature control)
<Operation> Input F58 and press SET key. “00.2” (default value) is displayed.
Use ▶ and ▲ key to change the value between “00.0”~”09.9” (+0.0~+9.9℃).
Press SET key to store the value and return to chamber temperature display.

F59 <Purpose> Set OFF point of compressor <service code is necessary>
(refer to 6-1. Temperature control)
<Operation> Input F59 and press SET key. “-0.2” (default value) is displayed.
Use ▶ and ▲ key to change the value between “-0.0”~”-9.9” (-0.0~-9.9℃).
Press SET key to store the value and return to chamber temperature display.

6. Control

6-1. Temperature control

Control to have the period that both compressor and defrost heater are OFF.

Compressor starts when it becomes Comp. ON point and stops when it becomes Comp. OFF point. But, it does not re-start 2 minutes after compressor is turned off (refer to “8. Delay time”). Set temperature (SV) is automatically offseted based on running rate of compressor (refer to “6-2. Set temp. offset based on compressor running rate”).

Defrost heater is ON when defrost sensor temperature is less than 2.4℃ and is OFF when it is over 2.5℃. But, it does not turn on electricity during compressor running.

ON and OFF action of drain pan heater is interlocked with defrost heater. But, drain pan heater is not turned on if the compressor running rate is less than 60% (Both Model code 001/002) (refer to “6-6. Drain pan heater control”).

1. Comp. ON point — PV ≥ SV + 0.2℃
2. Comp. OFF point — PV ≤ SV - 0.2℃
3. Def. heater ON point — D.T ＜ 2.4℃ (but, it is not ON during compressor running)
4. Def. heater OFF point — D.T ≤ 2.5℃
5. Drain pan heater ON point
   - Model code 001 — Interlock with defrost heater (does not turn ON if compressor running rate is less than 60%)
   - Model code 002 — When SV ＞ 6℃ and interlock with defrost heater (does not turn ON if compressor running rate is less than 60%)
     When SV ≤ 5℃, PV ≤ SV
6. Drain pan heater OFF point
   - Model code 001 — Interlock with defrost heater
   - Model code 002 — PV ≥ Comp. ON point

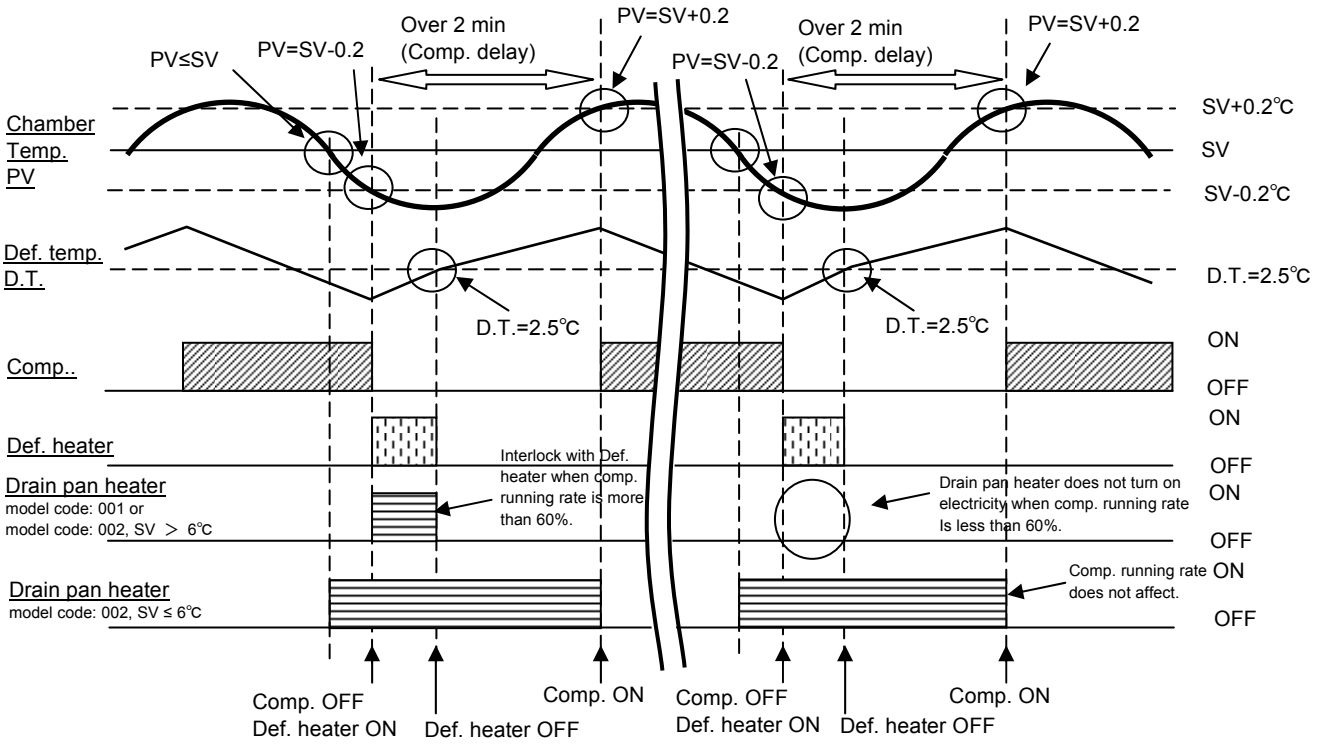


Figure. 6-1. Operation chart of compressor and defrost heater during cycle

6-2. Set temperature offset based on compressor running rate

If the compressor running rate is high (OFF time is short), it judges ambient temperature is high and offsets set temperature to minus direction. So, it controls with predicting increased temperature after compressor is off. If the compressor running rate is low, it offsets set temperature to plus direction. Running rate is calculated based on latest 2 cycles of compressor on and off time (initial value is 50%). The value is back to initial value when the power is supplied or power failure. In figure 6-2 below, offset value is 0.7℃, but initial value is 0.0℃ (no offset). It can be changed in F54.

* Running rate is below 20% : +0.7℃
* Running rate is between 20% and 60% : offset value is in proportion to running rate
* Running rate is over 60% : -0.7℃

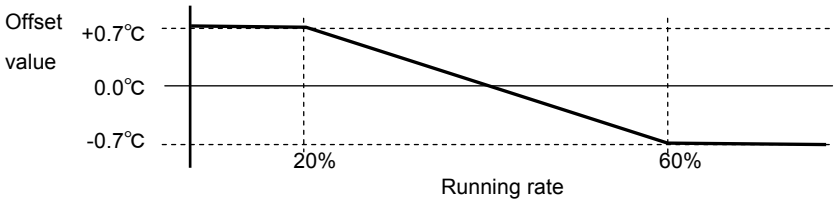


Figure. 6-2. Relation of running rate and offset value (F54:0.7℃)

6-3. Compressor operation when temperature sensor failure occurs

When temp. sensor failure occurs (E01/E02), compressor is controlled based on def. sensor temperature.

* Def. sensor temperature ≥ 7.0℃ Compressor ON
* Def. sensor temperature ≤ 0.0℃ Compressor OFF

6-4. Defrost heater operation in low ambient temperature

If chamber temperature does not increase to SV-1.0℃ within 3minutes after compressor stopped during cycle running, it is judged as low ambient temperature and defrost heater is turned on electricity. When it increases until PV ≥ SV, defrost heater is stopped turning on electricity.

6-5. Defrost heater operation in alarm condition

When defrost sensor failure is occurred or in alarm condition, defrost heater operates safety action.

Def. sensor failure (E03/E04)	Compressor and reverse output (cycle defrost operation)
PV ≥ SV	Defrost heater OFF
0℃ alarm	Defrost heater ON (only when compressor is OFF)
Low temp. alarm	Defrost heater ON (only when compressor is OFF)

6-6. Drain pan heater control

Model code 001

ON/OFF of drain pan heater interlock with defrost heater. But, drain pan heater is OFF when compressor running rate is below 60%. Refer to “6-2. Set temperature offset based on compressor running rate” for running rate.

Model code 002

When set temperature is more than 6℃: Same as model code 001.

When set temperature is below 5℃: Turn on electricity to drain pan heater when the compressor is OFF whatever its running rate. But, the turning on electricity to drain pan heater is at most 10 minutes. If it does not reach compressor OFF point, stop turning on electricity.

6-7. Chamber fan control

Always ON.

6-8. Light control

Turn ON/OFF of light interlock with door switch. It can also be controlled by LIGHT key (latest operation has priority). Light is automatically turned off after set time in F45 (default: 10 min.). If set time is 0 minute, light is not turned on.

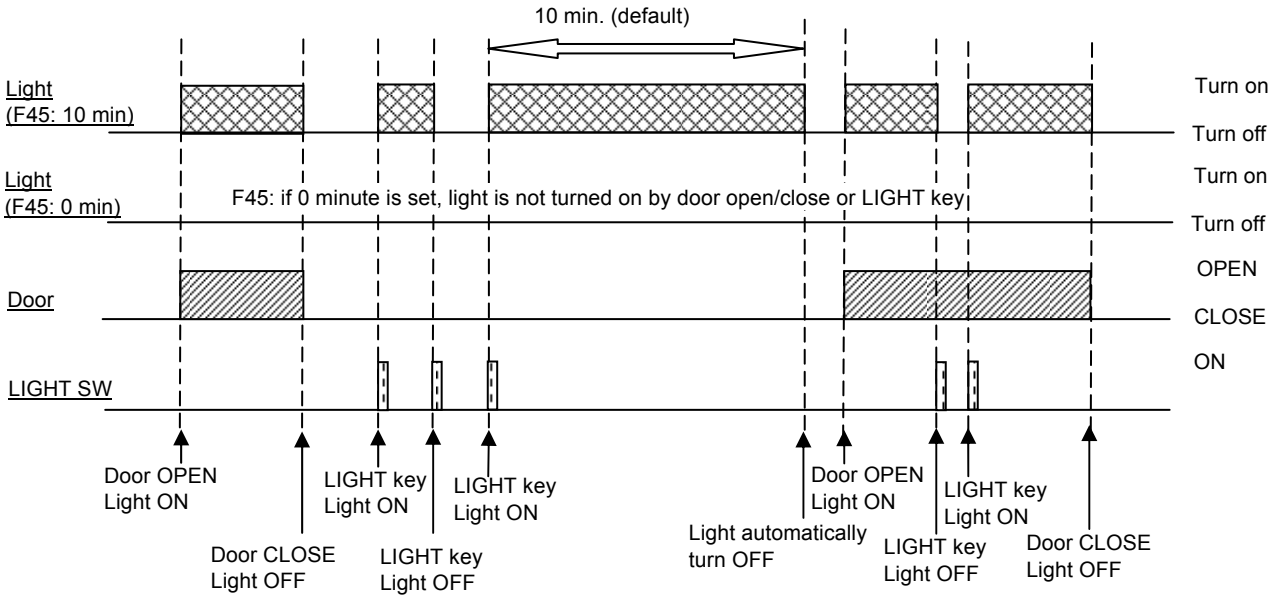


Figure. 6-8. Operation chart of light ON/OFF

7. Defrost operation with detected evaporator temperature

When defrost sensor detects evaporator pipe temperature and its temperature is less than the temperature of starting defrost, stop compressor and turn on electricity to defrost heater and drain pan heater. Chamber temperature and “dF” are displayed alternately during defrost operation.

When defrost sensor temperature reaches to defrost finishing temperature, defrost operation is finished and return to normal cycle running. But, ON/OFF of defrost heater is reverse with compressor for 24 hours after finishing defrost operation. Drain pan heater is always ON.

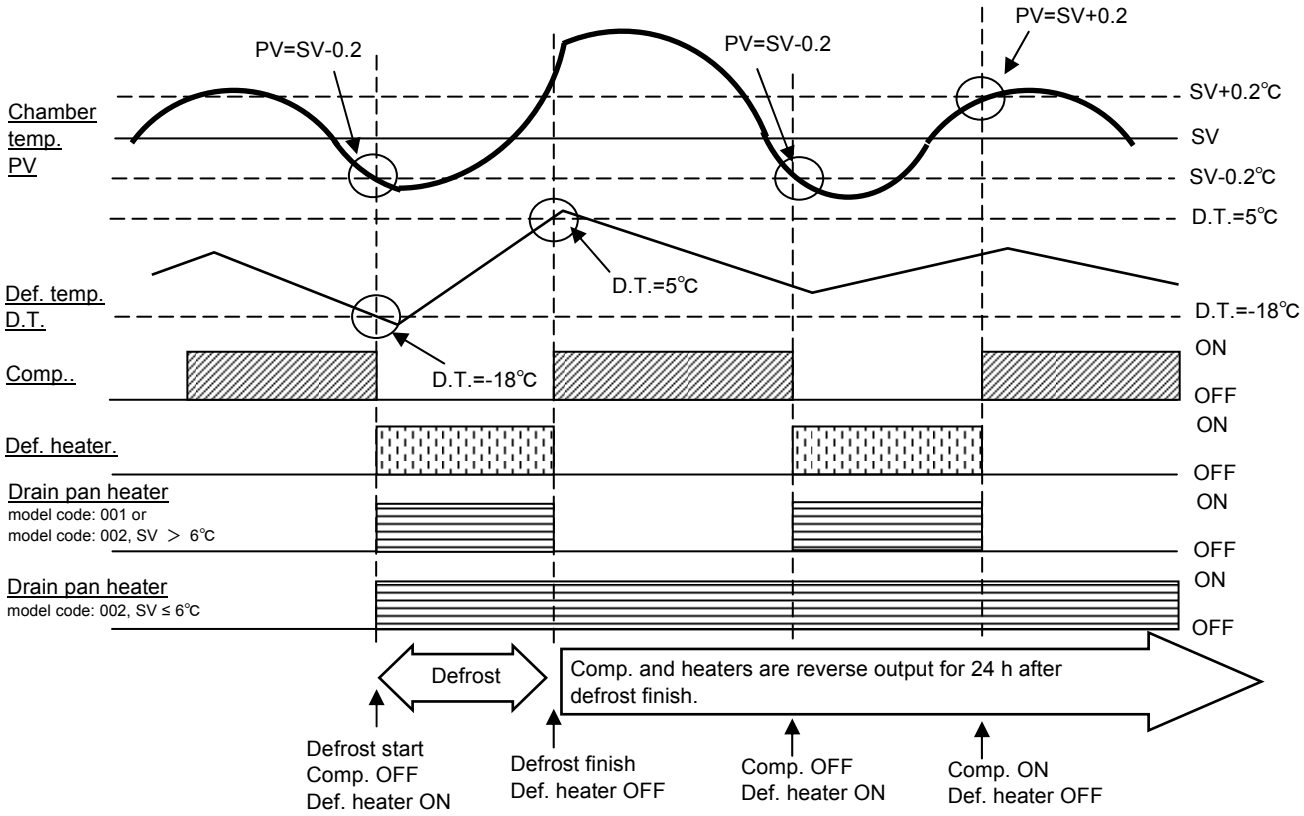


Figure. 7. Operation chart of compressor and defrost heater during defrost operation

7-1. Defrost operation by decreasing evaporator temperature

When defrost sensor temperature in evaporator pipe decreased is less than the temperature of starting defrost, start defrost operation. When the temperature exceeds its defrost finish temperature, defrost operation is finished.

List.7-1. Defrost start/finish temperature (default)

Model code	Defrost start temp.	Defrost finish temp.	Used model
001	-18℃	5.0℃	KM-RS16A1
002	-21℃	5.0℃	KM-RS34A1

7-2. Defrost operation by compressor continuous running time

In addition to defrost operation mentioned above, start defrost by counting compressor continuous running time and if it fulfills condition.

This defrost operation starts only when following conditions are all fulfilled.

1. Compressor ON time is more than 180 minutes.
2. Defrost sensor temperature is less than 0℃.

7-3. Counting defrost operation with detected evaporator temperature

Count and save the number of defrost operation with detected evaporator temperature from power supplied. Counted number can be checked in “F36”. Refer to “5. Function mode”.

8. Delay time

Compressor delay time (2 min.)

Delay time from stopped compressor to starting operation again is set as 2 minutes.
There is no delay time after power supplied (after reset).

Alarm delay time (default value: 15 min.)

Delay time from chamber temperature goes into high/low alarm range to remote alarm and buzzer operation. Can be set in F50. (refer to “3-2. Alarms”, “5. Function mode”)

Door alarm delay time (default value: 2 min.)

Delay time from door opened to buzzer operation. Can be set in F04. (refer to “3-2. Alarms”, “5. Function mode”)

9. Remote alarm terminal

Operation

When the alarm is occurred, remote alarm terminal is changed to alarm condition. When alarm occurring condition is cancelled, it returns to normal condition.
Press BUZZER key during alarm condition and if remote alarm interlock setting (F24) is set as interlocking (001), remote alarm terminal is back to normal condition. If F24 is set as not interlocking (000), alarm condition continues.
If alarm condition is cancelled by pressing BUZZER key, it returns to alarm condition after set time. This is to prevent that the buzzer sound is stopped by third person pressing BUZZER key during alarm condition and the alarm does not work. Recovery time can be set in F25. (refer to “5. Function mode”)

Alarm condition
* Power failure
* Sensor failure (breaking wire/short circuit)
* 0℃ alarm
* High/Low temp. alarm (after delay time)

	Between 1-2 (N.O.)	Between 1-3 (N.C.)
Normal condition	Open	Short
Alarm condition	Short	Open

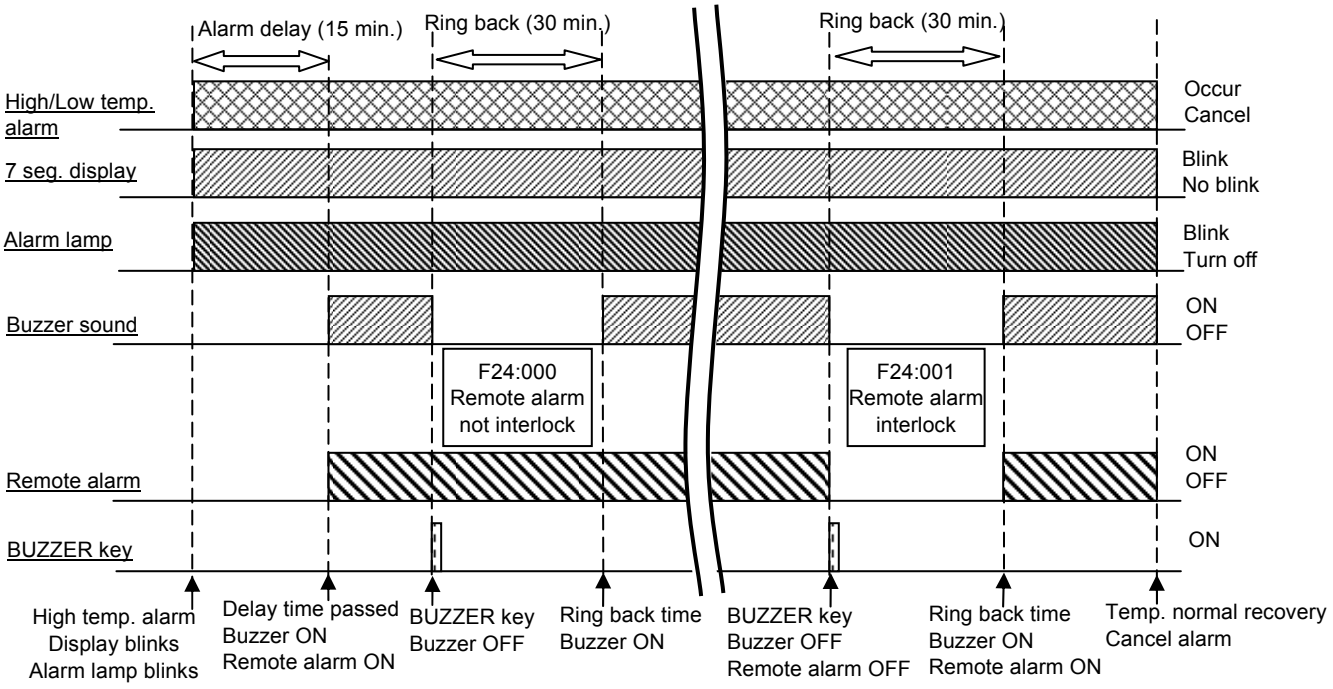


Figure. 9. Operation chart of remote alarm

10. Analog output

Chamber temperature 1.0mV/℃ (resolution: 0.012℃) <output range: 0~100mV/-20~30℃>

Def. sensor temperature 1.0mV/℃ (resolution: 0.012℃) <output range: 0~100mV/-20~30℃>

Each analog output can be calibrated in F47 and F48 (refer to “5. Function mode”).

11. Calibration (offset)

11-1. Temperature sensor

Add offset value in “List.12-1” to revise temperature difference between temperature sensor detected temperature and temperature at chamber centre. Also, increase/decrease offset value within ±4.9℃ in F07 (Temp. sensor zero adjustment). Defrost sensor temp. is also adjusted within ±4.9℃ in F08 (Defrost sensor zero adjustment). There is no offset value for defrost sensor (refer to “5. Function mode”).

List. 11-1. Offset value for temp. sensor

Model code	Offset value	Used model
001	-1.1℃	KM-RS16A1
002	-1.6℃	KM-RS34A1

12. Setting after reset

12-1. Setting after power on reset (power supplied)

Alarms	OFF
Compressor	OFF
Defrost operation	OFF
Remote alarm	OFF
Ring back	OFF
Timers	Reset
Set data	Read setting from non-volatile memory

13. Display and buzzer

13-1. Lamp operation

Display PCB

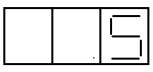
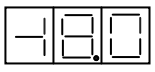
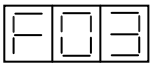
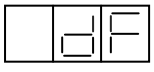
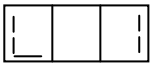
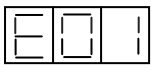
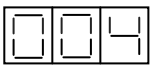
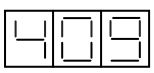
DP101: Red DOOR

Door opened Turn ON

DP102: Red ALARM

Alarm occurring Blink

13-2. Display example

Chamber temperature	5℃		Defrost start temp	-18.0℃.	
Function	F03		Forced defrost running	dF	
Key lock ON	L1		Error code	E01	
Input set value	004		Input service code	409	

13-3. Display cycle of chamber temperature and error code

1. High temp. / Low temp. / 0℃ alarm
   Chamber temp. blinks (ON: 300 msec / OFF: 300 msec)
2. Temp./Def sensor failure
   Alternately display: Exx (600 msec) / Chamber temp. (600 msec)
3. Short circuit of light circuit
   Alternately display: E16 (600 msec) / Chamber temp. (600 msec)
4. Battery connected and battery setting is “not connected”
   Alternately display: E09 (600 msec) / Chamber temp. (600 msec)
5. Battery not connected and battery setting is “connected”
   E09 blinks (ON: 300 msec / OFF: 300 msec)
6. Battery replacement notice
   Alternately display: F-1 (1 sec) / Chamber temp. (4 sec)
7. Fan motor replacement notice
   Alternately display: F-2 (1 sec) / Chamber temp. (4 sec)

* above 6 and 7 happen at same time
   Alternately display: F-1 (1 sec) / F-2 (1 sec) / Chamber temp. (4 sec)

8. Non-volatile memory writing error
   Alternately display: E2P (600 msec) / Chamber temp. (600 msec)

13-4. Buzzer sound

1. Power supplied
   Non-volatile normal — Intermittent sound 2 times (ON: 140 ms / OFF: 100 ms)
   Non-volatile abnormal — Error sound (1 sec)
2. Alarm occurring — Intermittent sound (ON: 240 ms / OFF: 240 ms)
3. Key operation — Short sound (120 ms)
4. Input set value
   Saved input value — Short sound (120 ms)
   Input value is out of range — Error sound (1 sec)
5. Power failure occurring / battery abnormal — Intermittent sound (ON: 100 ms / OFF: 800 ms)

14. Control difference of model code

Model code	001	002
Model name	KM-RS16A1	KM-RS34A1
Fan motor in chamber	Not interlock with door open/close Always ON	Not interlock with door open/close Always ON
Defrost start temp. (default)	-18℃	-21℃
Drain pan heater control	Exist	Exist SV ≤ 5℃: previous cycle defrost SV ≤ 5℃: always ON for 24 hours after defrost
Condensing fan motor control	None	None
	Display “---”in F32	Display “---”in F32
	Not display fan motor replacement notice “F-2”	Not display fan motor replacement notice “F-2”
Temp. sensor offset value	-1.1℃	-1.6℃
Door switch	Open: Open Close: Short	Open: Open Close: Short

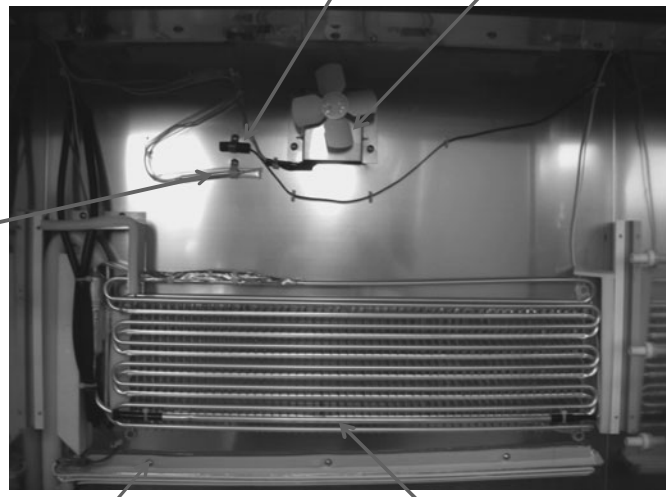
Parts layout

KM-RS16A1

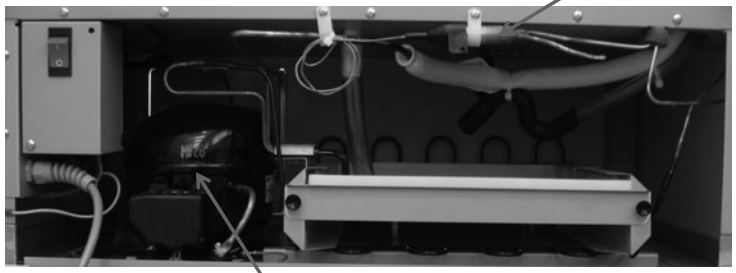
<Top front inside>

<Control panel>

<Behind inner wall>



<Bottom of back side>

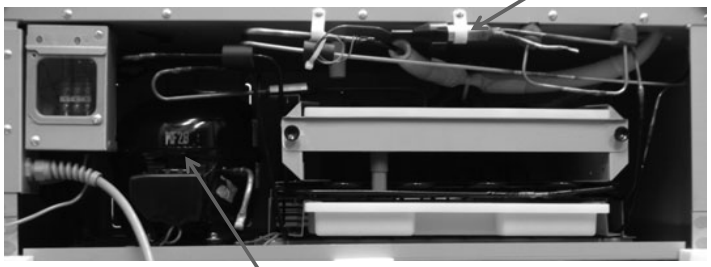


KM-RS34A1

<Top front inside>

<Control panel>

<Bottom of back side>



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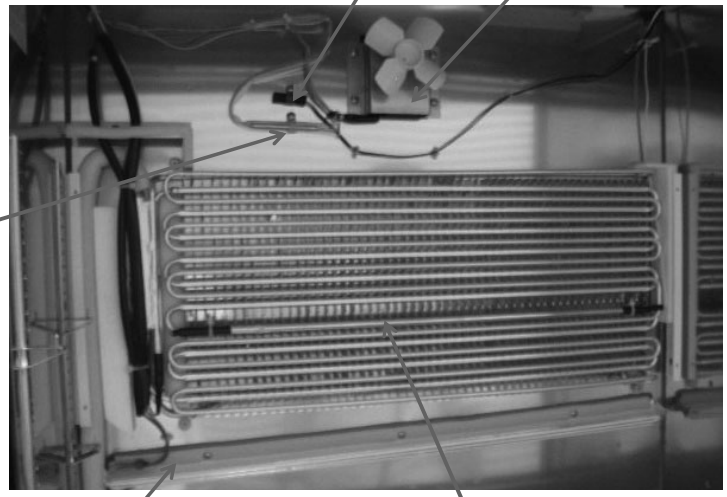
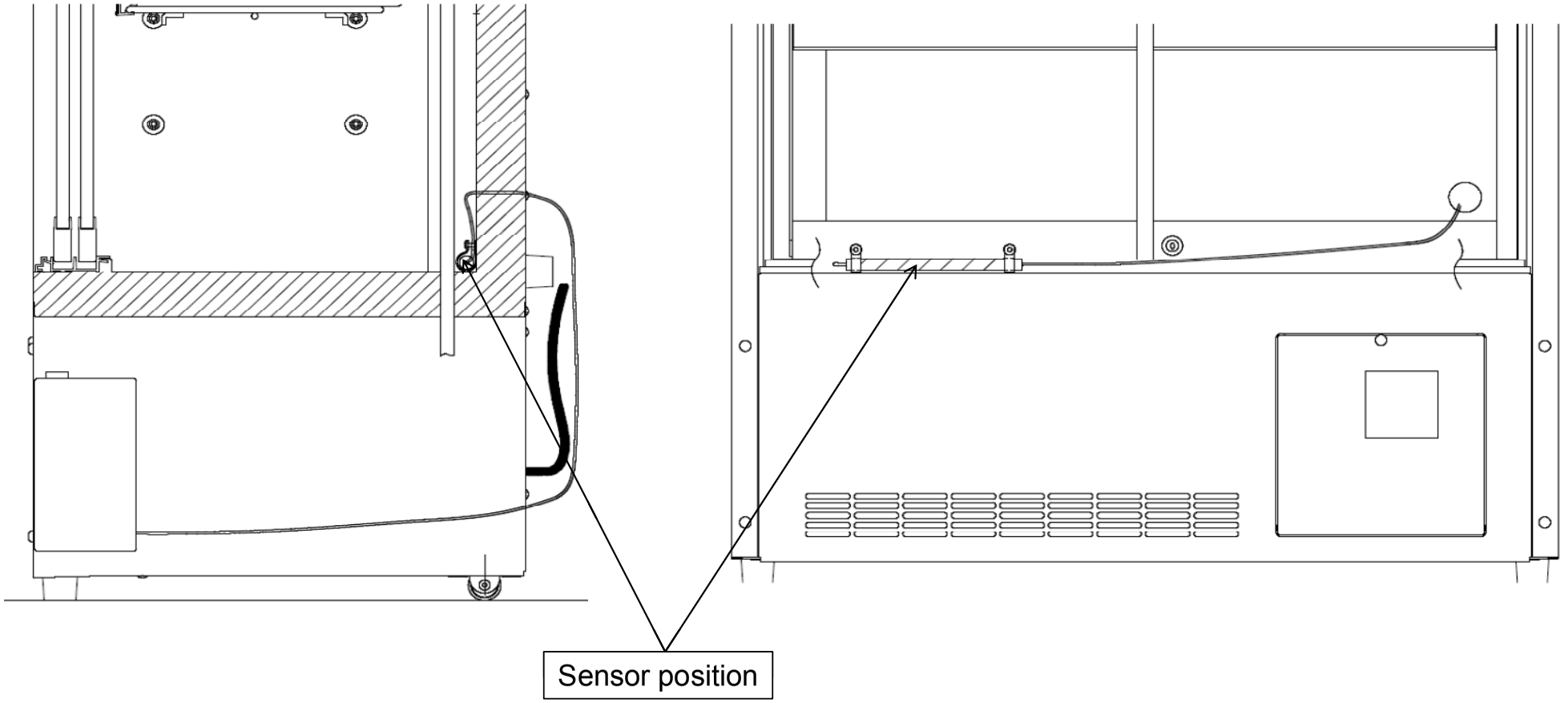


Recorder sensor installing Position

MTR-0621H

<Right side>

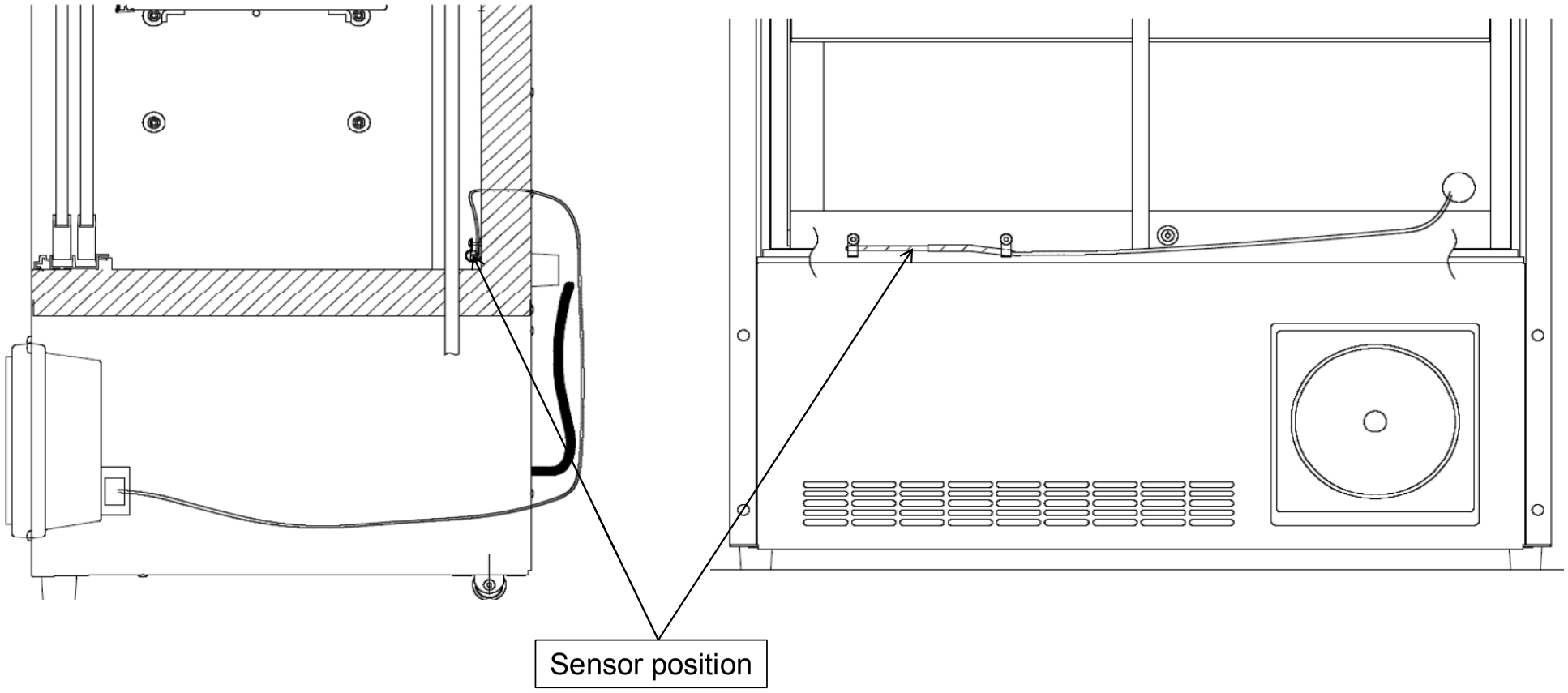
<Front>



MTR-G04

<Right side>

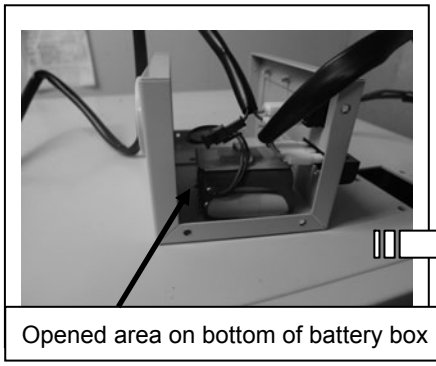
<Front>

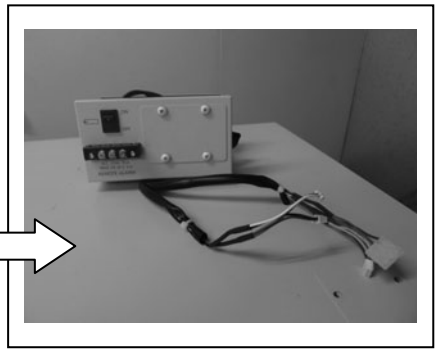


Battery mounting box for power failure alarm installing procedure(KM-RPP01BB1)

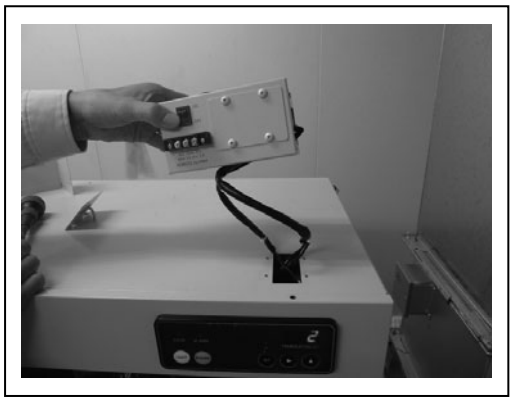
1. Battery box installing procedure

1. Take off screws (4pcs) and remove top cover on top right front of unit.
2. Take off screws for control panel.
   Upper side: 2pcs
   Lowe side: 3pcs

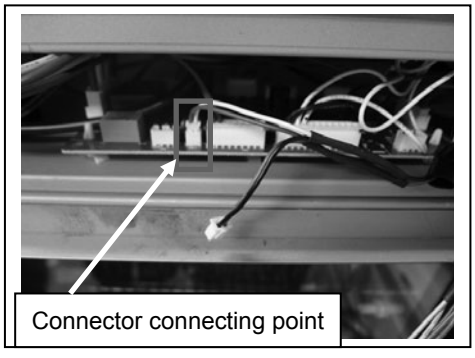




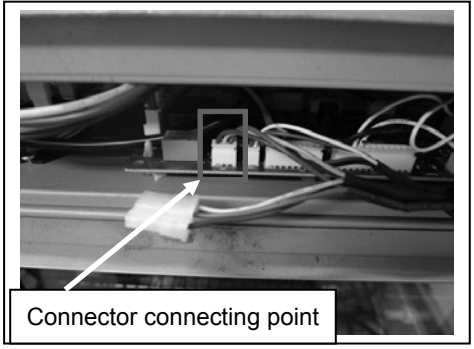
3. Pull out harness of battery box from opened area on bottom of battery box.



4. Put harness from battery box into opened area under top cover.



5. Connect harnesses (2pcs) for battery to PCB.
* Be careful that both 2 harnesses are forked.



Connector connecting point

6. Connect harnesses (2pcs) for remote alarm to PCB.

* Be careful that both 2 harnesses are forked.

Note) Install battery box terminal and battery switch face to back side of unit.

Fix by screws on circled 4 points.

7. Tie up excess part of harness in battery box like left photo.

8. Use screws for top cover and screw battery box and battery cover together.
(Fix by 4 screws, 2 screws are used to screw with battery cover)

9. Put cover to battery box and screw 6pcs (left and right: 3pcs each).

Note) Pay attention to battery box direction.

2. Setting procedure after installing battery

2-1. F42: <Purpose> Set battery installing condition. (service code is necessary F06: 384)

<Operation> Input F42 and press SET key. “000” (default value) is displayed.

Use ▲ key to change the value “000” or “001”. Press SET key to store the value and return to chamber temperature display.

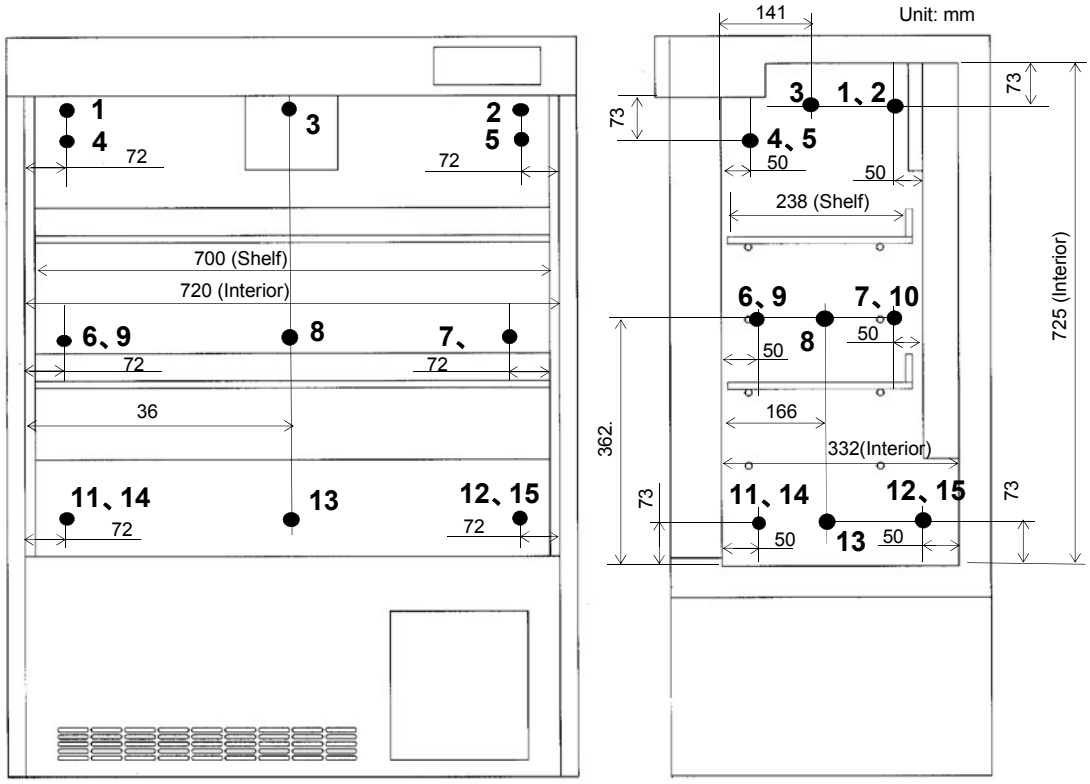
000: Battery is not connected

001: Battery is connected

2-2. Turn the battery switch from OFF to ON.

Test Data

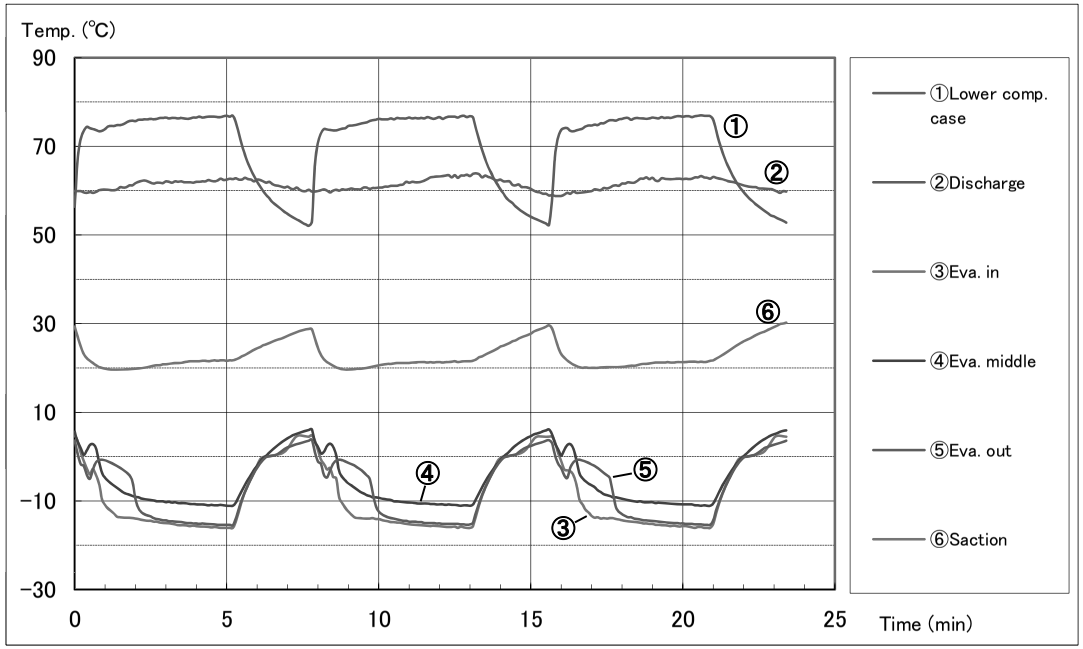
1·2·4·5 : From upper shelf corner W 72mm D 50mm H 73mm Air temperature
3 : From upper shelf corner W 360mm D 141mm H 73mm Air temperature
6·7·9·10 : From middle shelf corner W 72mm D 50mm H 362.5mm Air temperature
8 : From middle shelf corner W 360mm D 166mm H 362.5mm Air temperature
11·12·14·15 : From bottom corner W 72mm D 50mm H 73mm Air temperature
13 : From bottom corner W 360mm D 166mm H 73mm Air temperature



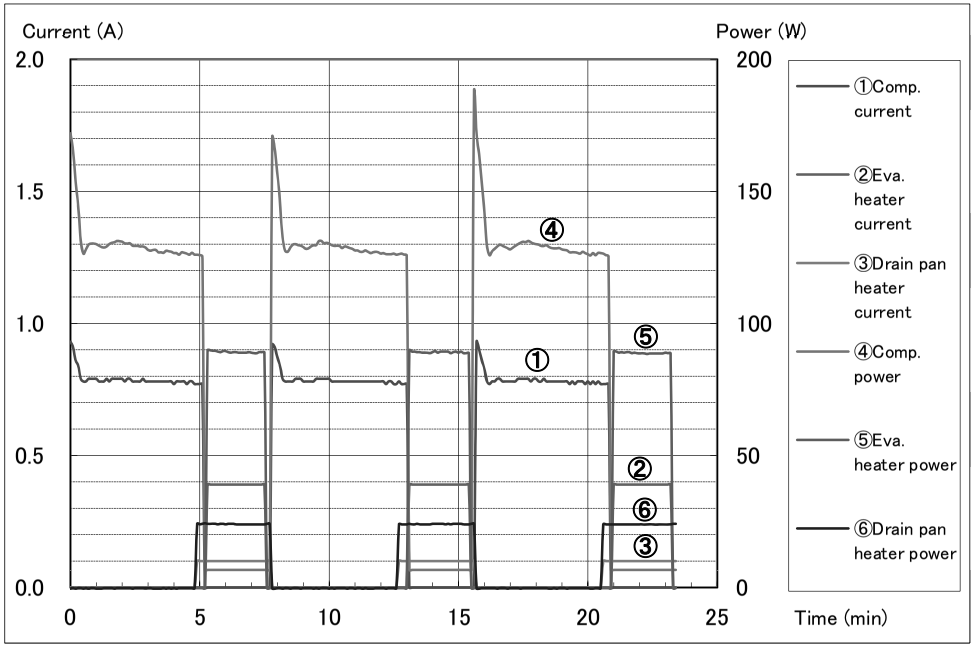
Model name	KM-RS16A1E											
Ambient temperature	23℃											
Rated voltage	230V50Hz											
Set temp. (SV)	2℃				5℃				14℃			
Temp. offset (F07)	±0.0℃				±0.0℃				±0.0℃			
	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)
①	4.3	5.0	3.4	±0.8	6.7	7.3	5.9	±0.7	14.7	15.8	13.8	±1.0
②	4.3	5.2	3.3	±1.0	6.7	7.6	5.8	±0.9	14.8	16.1	13.7	±1.2
③	4.6	6.3	3.1	±1.6	7.0	8.3	5.4	±1.5	14.9	16.7	13.2	±1.8
④	5.4	6.6	4.1	±1.3	7.7	8.7	6.5	±1.1	15.2	16.6	14.0	±1.3
⑤	4.5	6.2	3.0	±1.6	7.0	8.3	5.4	±1.5	14.9	16.9	13.0	±2.0
⑥	2.7	4.4	1.2	±1.6	5.4	6.8	3.6	±1.6	14.3	16.5	12.3	±2.1
⑦	3.9	4.9	2.7	±1.1	6.5	7.4	5.3	±1.1	14.6	16.5	13.2	±1.7
⑧	2.5	5.4	0.1	±2.7	5.2	7.5	2.5	±2.5	13.9	17.2	10.6	±3.3
⑨	2.5	4.7	0.7	±2.0	5.2	7.0	3.2	±1.9	14.1	16.9	11.6	±2.7
⑩	3.2	4.9	1.5	±1.7	5.9	7.4	4.1	±1.7	14.3	16.5	12.3	±2.1
⑪	1.8	4.6	-0.5	±2.6	4.6	6.9	2.1	±2.4	13.9	17.2	10.8	±3.2
⑫	2.1	4.7	-0.2	±2.5	4.9	7.2	2.4	±2.4	13.8	17.2	10.5	±3.4
⑬	2.2	5.0	-0.2	±2.6	4.9	7.2	2.3	±2.5	13.8	17.0	10.7	±3.2
⑭	2.1	4.8	-0.1	±2.5	4.8	7.0	2.4	±2.3	13.9	17.2	10.9	±3.2
⑮	3.0	4.9	1.2	±1.9	5.7	7.4	3.8	±1.8	14.3	16.7	12.0	±2.4
⑧ with copper loaded (PT sensor)	2.4	2.7	2.0	±0.4	5.1	5.4	4.8	±0.3	13.8	14.3	13.5	±0.4
Temp. sensor	3.1	4.2	1.9	±1.2	5.7	6.7	4.6	±1.1	14.3	16.0	13.1	±1.5
Def. sensor	-1.2	3.6	-5.4	±4.5	2.3	6.5	-2.4	±4.5	12.2	19.2	5.9	±6.7
A T	23.3	23.9	22.7	±0.6	23.3	23.8	22.7	±0.6	23.4	24.1	22.8	±0.7
Max temp.	5.4	6.6	-	-	7.7	8.7	-	-	15.2	17.2	-	-
Min temp.	1.8	-	-0.5	-	4.6	-	2.1	-	13.8	-	10.5	-
Average temp.	3.3	-	-	-	5.9	-	-	-	14.4	-	-	-
Temp. accuracy	+0.5				+0.2				-0.1			
Temp. distribution	±1.8 (+3.4 / -0.2)				±1.6 (+2.7 / -0.4)				±0.7 (+1.2 / -0.2)			
Temp. distribution range	3.6				3.1				1.4			
Peak to Peak	7.1				6.6				6.7			
Display temp.	1 ~ 3 ℃				4 ~ 5 ℃				12 ~ 14 ℃			

KM-RS16A1E : AT23℃ 230V50Hz SV 2℃

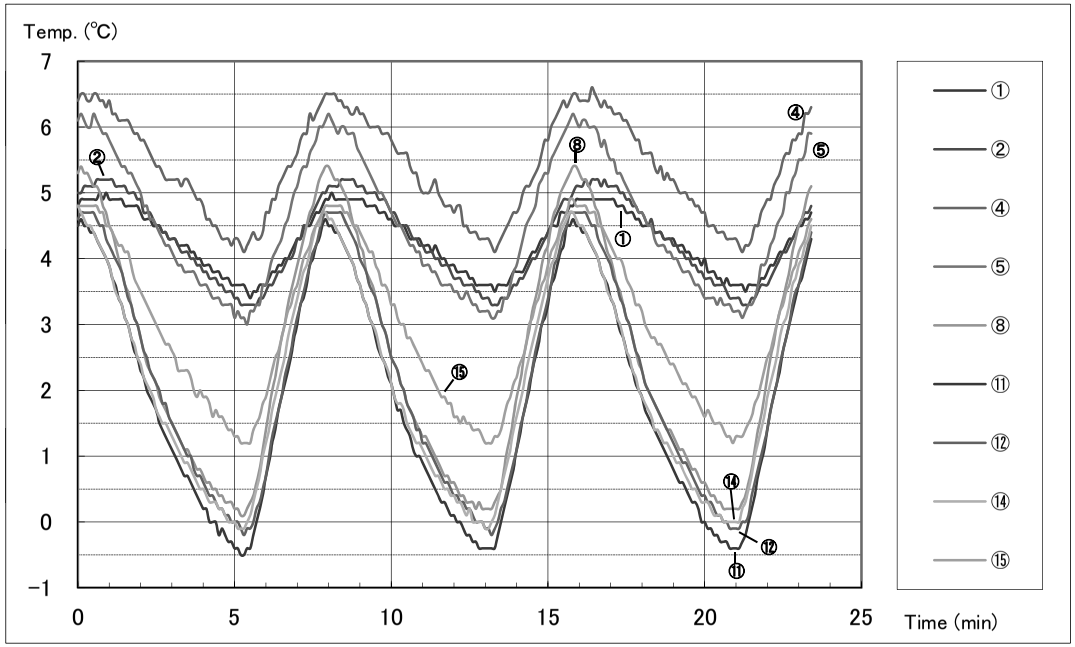
Unit area temp. and ambient temp.



Current and input

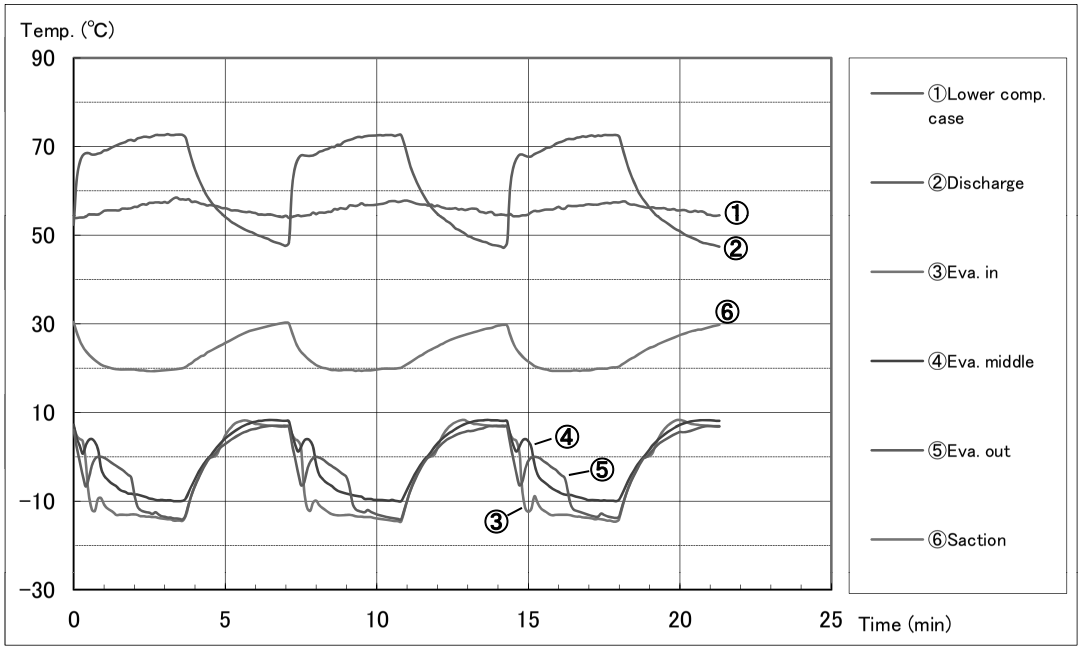


Chamber temp. (thermocouple)

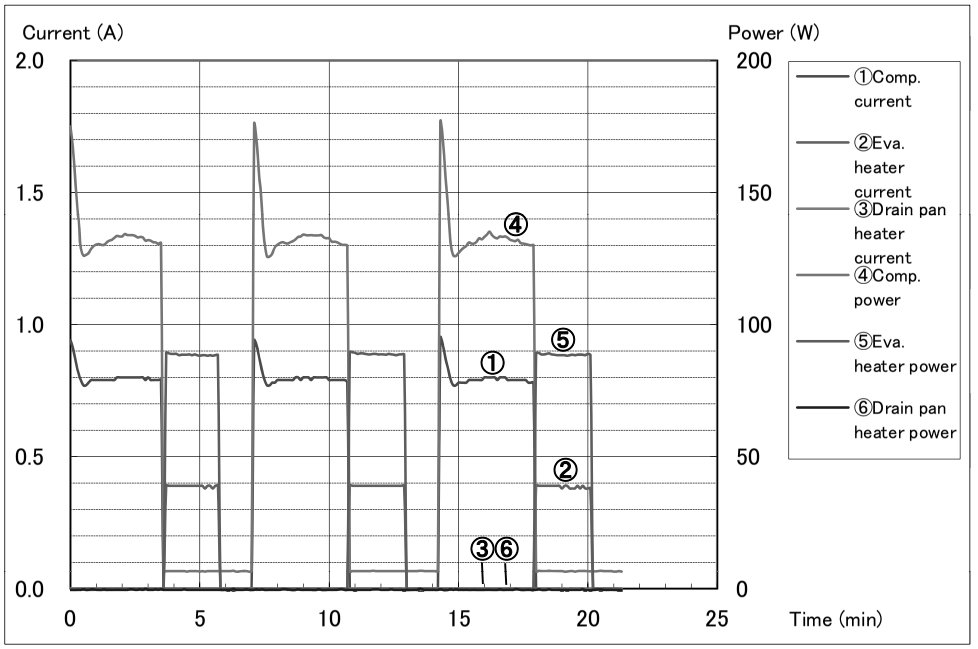


KM-RS16A1E : AT23℃ 230V50Hz SV 5℃

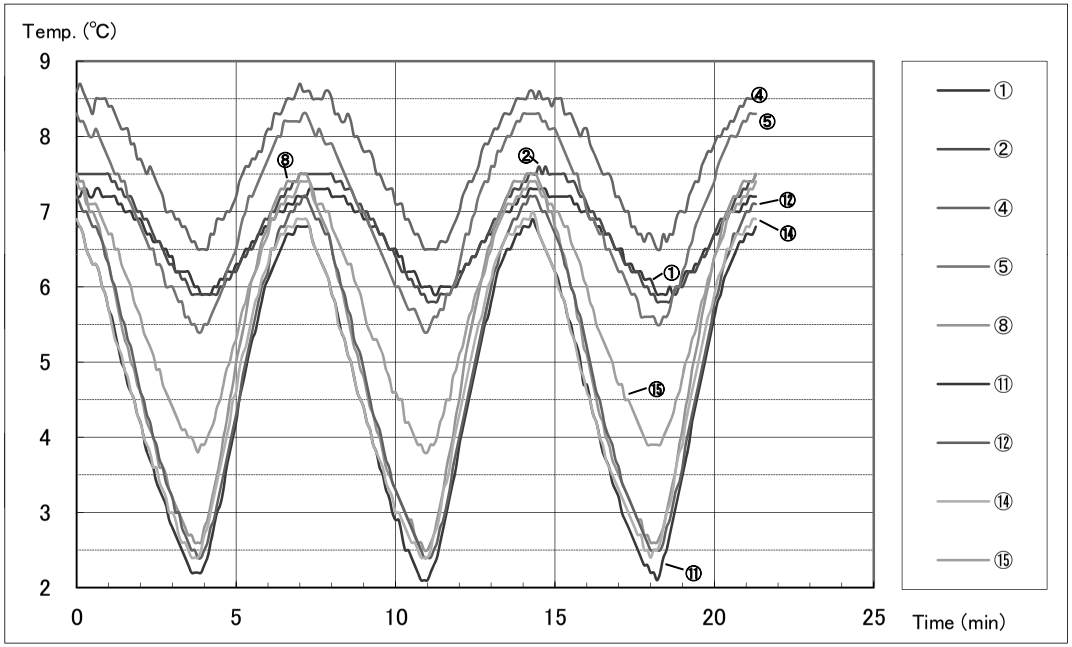
Unit area temp. and ambient temp.



Current and input

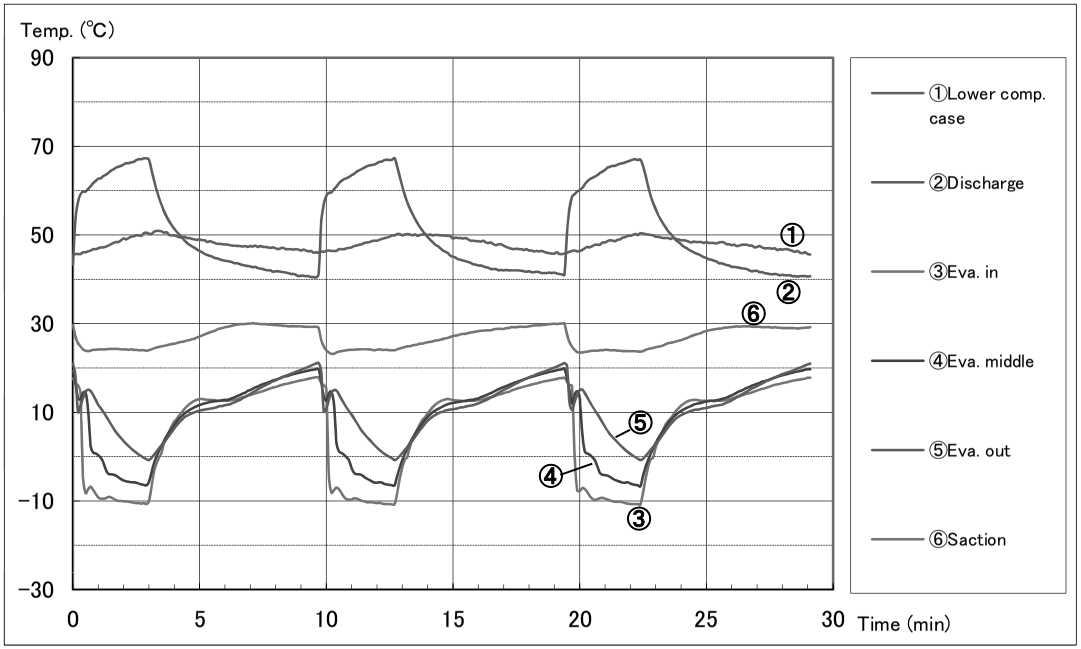


Chamber temp. (thermocouple)

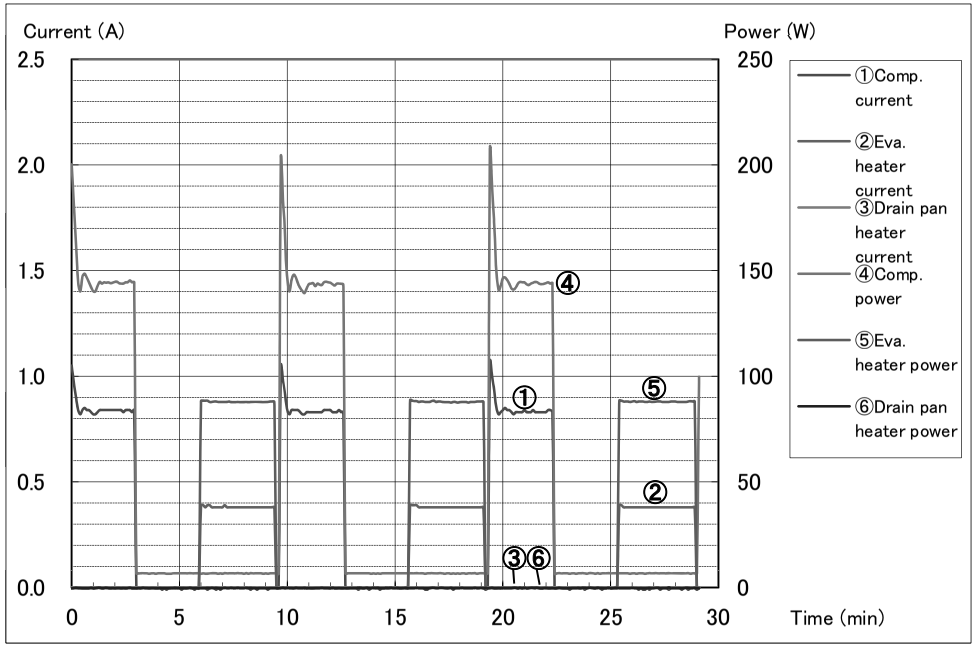


KM-RS16A1E : AT23℃ 230V50Hz SV14℃

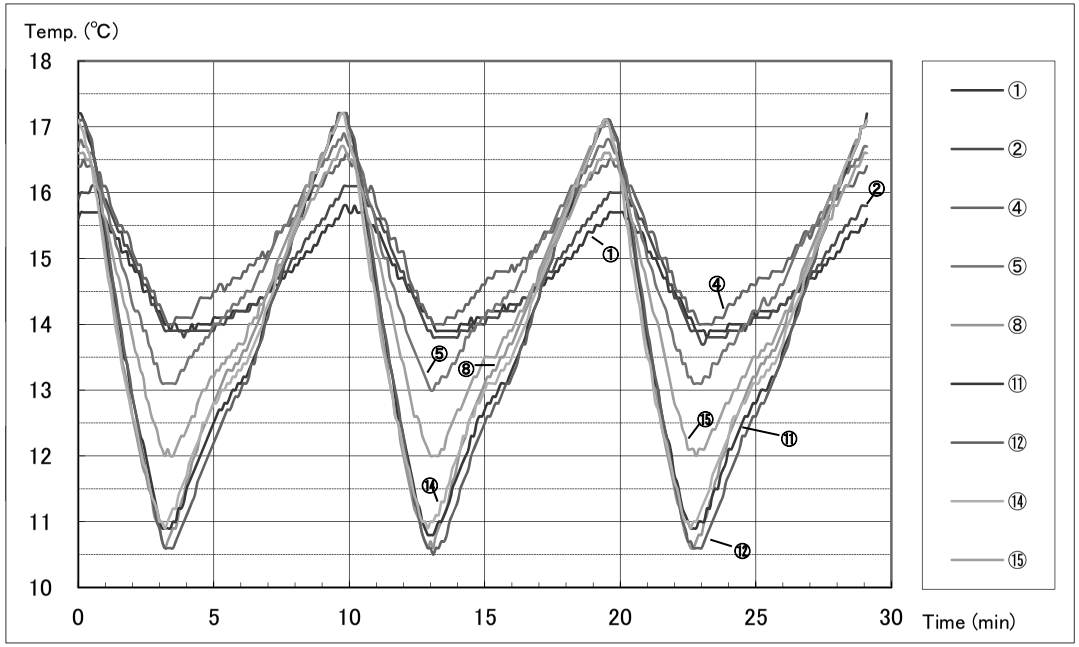
Unit area temp. and ambient temp.



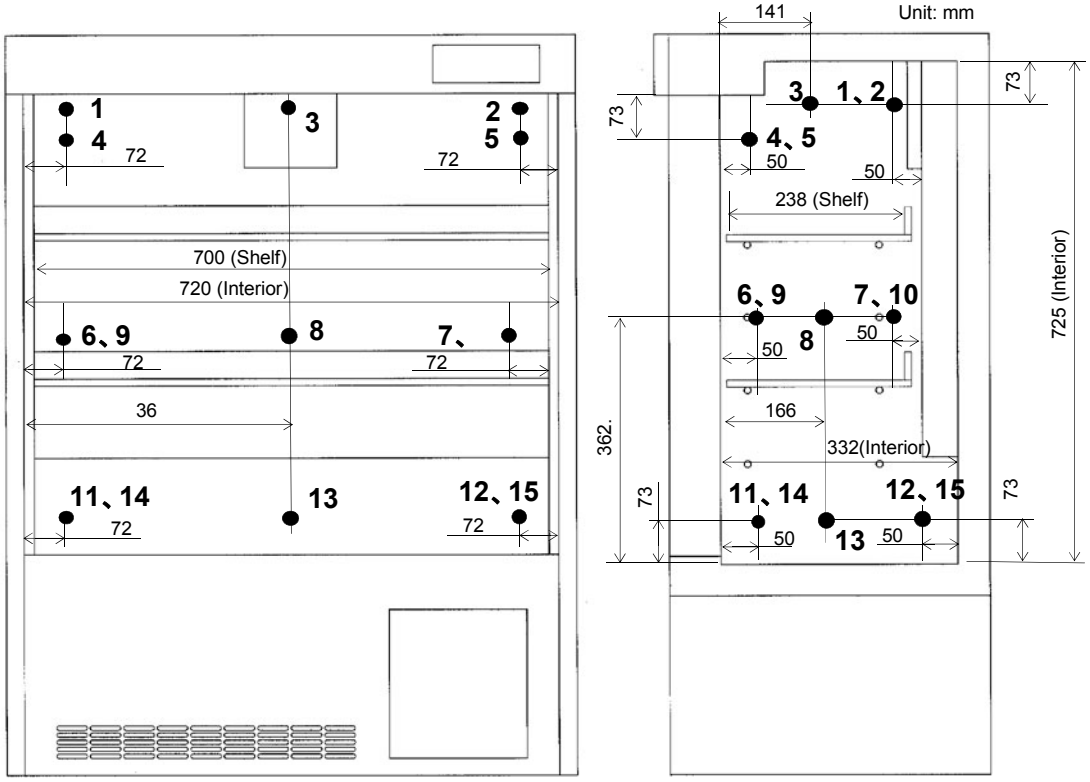
Current and input



Chamber temp. (thermocouple)



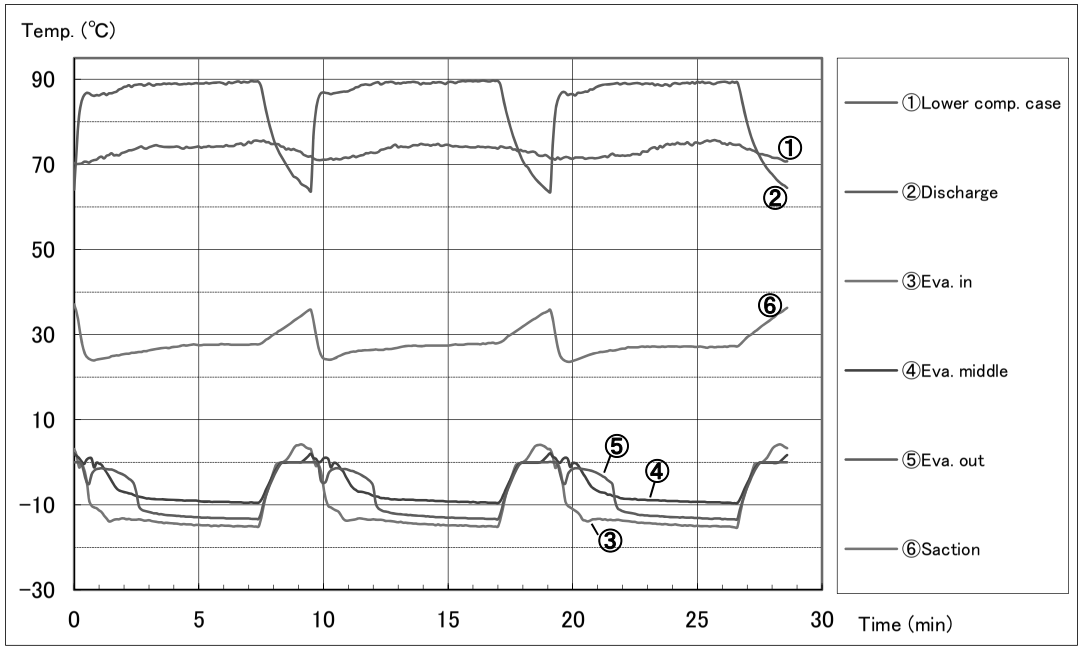
1·2·4·5 : From upper shelf corner W 72mm D 50mm H 73mm Air temperature
3 : From upper shelf corner W 360mm D 141mm H 73mm Air temperature
6·7·9·10 : From middle shelf corner W 72mm D 50mm H 362.5mm Air temperature
8 : From middle shelf corner W 360mm D 166mm H 362.5mm Air temperature
11·12·14·15 : From bottom corner W 72mm D 50mm H 73mm Air temperature
13 : From bottom corner W 360mm D 166mm H 73mm Air temperature



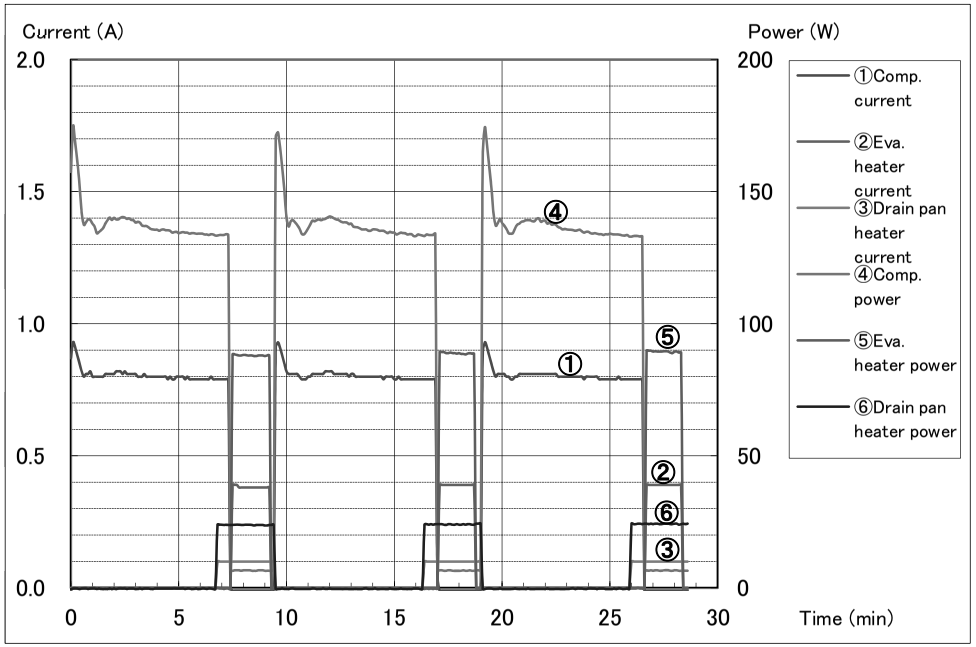
Model name	KM-RS16A1E											
Ambient temperature	30℃											
Rated voltage	230V50Hz											
Set temp. (SV)	2℃				5℃				14℃			
Temp. offset (F07)	±0.0℃				±0.0℃				±0.0℃			
	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)
①	5.0	5.5	4.3	±0.6	7.6	8.1	6.8	±0.7	15.4	16.3	14.6	±0.9
②	4.9	5.7	4.1	±0.8	7.6	8.4	6.6	±0.9	15.5	16.6	14.5	±1.1
③	5.2	6.7	4.1	±1.3	7.9	9.4	6.5	±1.5	15.8	17.5	14.1	±1.7
④	6.7	7.5	5.7	±0.9	9.2	10.1	8.0	±1.1	16.1	17.4	15.0	±1.2
⑤	5.2	6.5	4.1	±1.2	7.9	9.4	6.6	±1.4	15.6	17.5	13.9	±1.8
⑥	2.7	4.1	1.5	±1.3	5.5	7.0	4.0	±1.5	14.4	16.4	12.5	±2.0
⑦	4.3	5.2	3.1	±1.1	7.1	8.0	5.8	±1.1	15.0	16.6	13.6	±1.5
⑧	2.4	4.9	0.7	±2.1	5.4	8.0	3.1	±2.5	14.1	17.2	11.0	±3.1
⑨	2.5	4.2	1.0	±1.6	5.4	7.2	3.5	±1.9	14.2	16.6	12.0	±2.3
⑩	3.5	4.9	2.1	±1.4	6.3	7.9	4.7	±1.6	14.7	16.7	12.8	±2.0
⑪	1.6	3.7	-0.2	±2.0	4.5	6.7	2.4	±2.2	13.7	16.7	10.9	±2.9
⑫	2.0	4.1	0.3	±1.9	5.0	7.3	2.8	±2.3	13.8	17.0	10.9	±3.1
⑬	2.0	4.3	0.2	±2.1	5.0	7.5	2.7	±2.4	13.9	16.8	10.9	±3.0
⑭	1.9	4.0	0.3	±1.9	4.9	7.0	2.9	±2.1	13.8	16.8	11.1	±2.9
⑮	3.2	4.7	1.9	±1.4	6.2	7.7	4.6	±1.6	14.6	16.8	12.3	±2.3
⑧ with copper loaded (PT sensor)	2.4	2.7	2.0	±0.4	5.3	5.6	5.0	±0.3	14.0	14.4	13.7	±0.4
Temp. sensor	3.2	4.1	2.2	±1.0	6.1	7.0	5.0	±1.0	14.6	16.0	13.5	±1.3
Def. sensor	-2.2	1.5	-5.3	±3.4	1.1	5.4	-2.9	±4.2	11.2	17.2	5.6	±5.8
A T	30.6	31.2	29.9	±0.7	30.4	30.9	29.8	±0.6	30.6	31.2	29.9	±0.7
Max temp.	6.7	7.5	-	-	9.2	10.1	-	-	16.1	17.5	-	-
Min temp.	1.6	-	-0.2	-	4.5	-	2.4	-	13.7	-	10.9	-
Average temp.	3.6	-	-	-	6.4	-	-	-	14.7	-	-	-
Temp. accuracy	+0.4				+0.4				+0.1			
Temp. distribution	±2.6 (+4.7 / -0.4)				±2.4 (+4.2 / -0.5)				±1.2 (+2.1 / -0.3)			
Temp. distribution range	5.1				4.7				2.4			
Peak to Peak	7.7				7.7				6.6			
Display temp.	1 ~ 3 ℃				4 ~ 6 ℃				12 ~ 14 ℃			

KM-RS16A1E : AT30℃ 230V50Hz SV 2℃

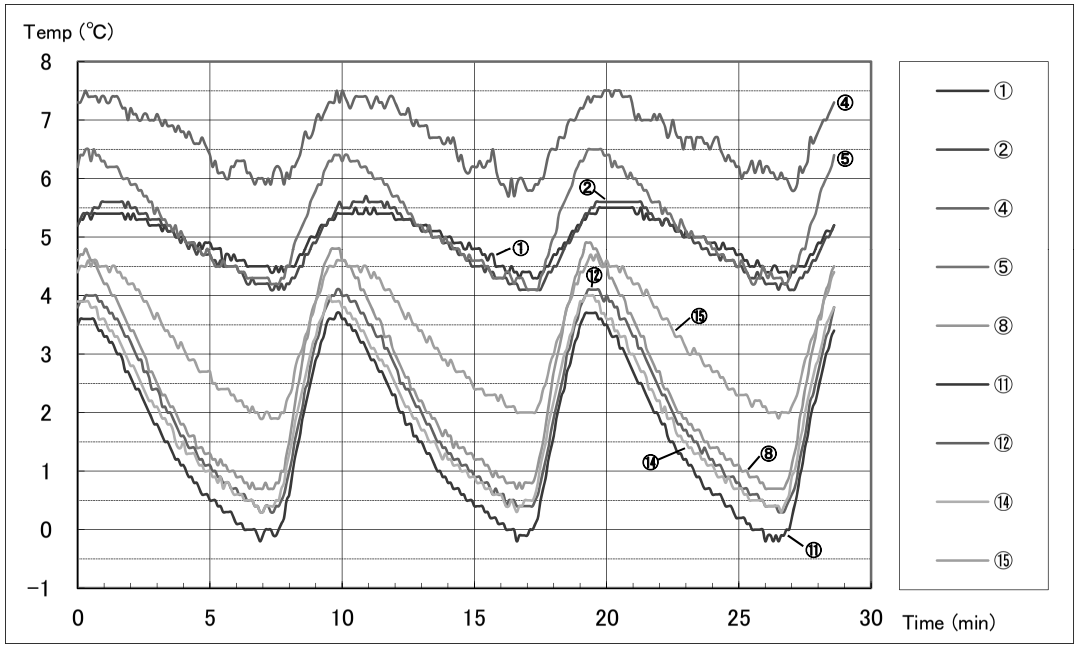
Unit area temp. and ambient temp.



Current and input

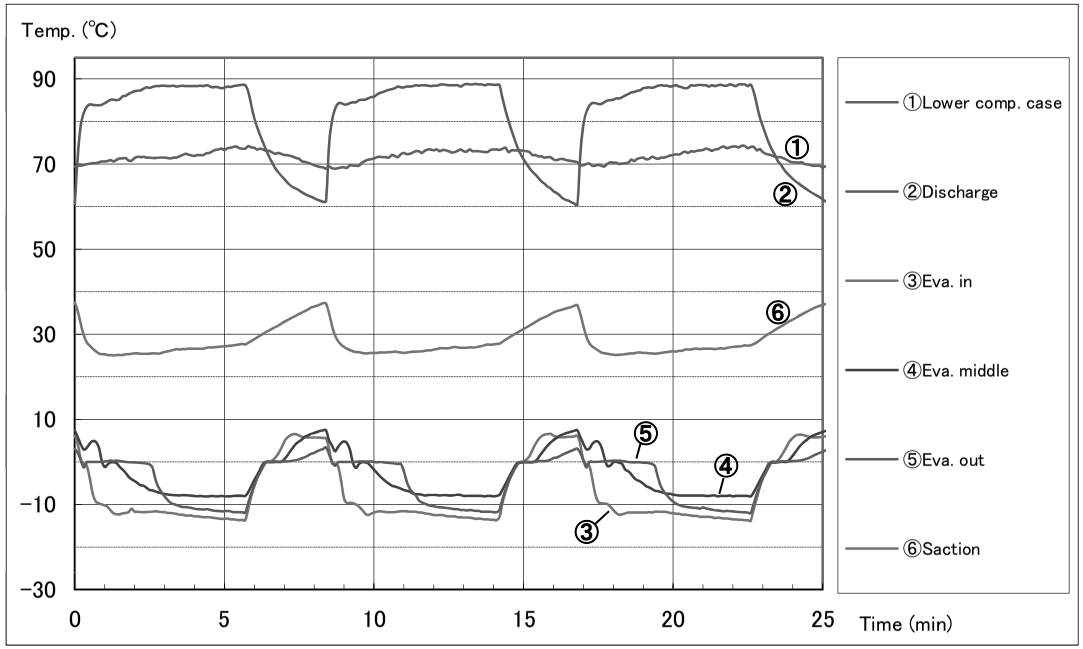


Chamber temp. (thermocouple)

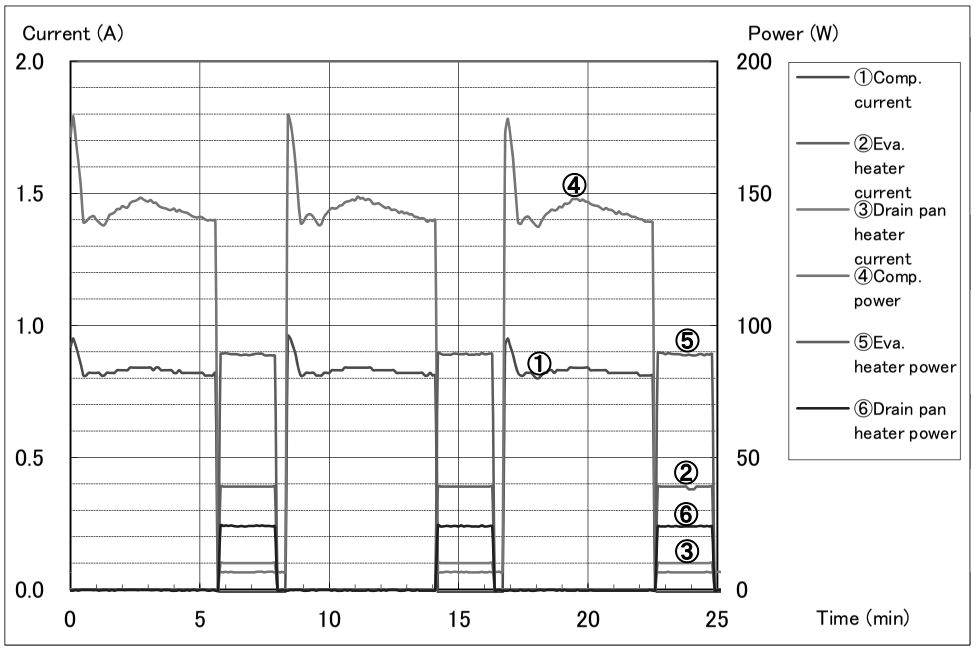


KM-RS16A1E : AT30℃ 230V50Hz SV 5℃

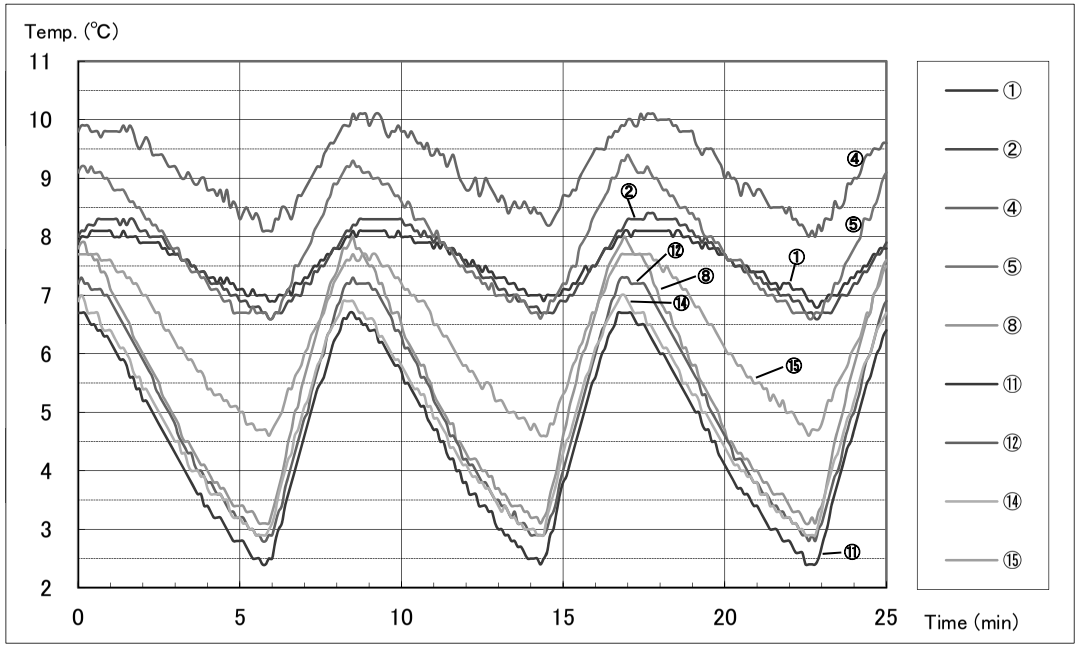
Unit area temp. and ambient temp.



Current and input

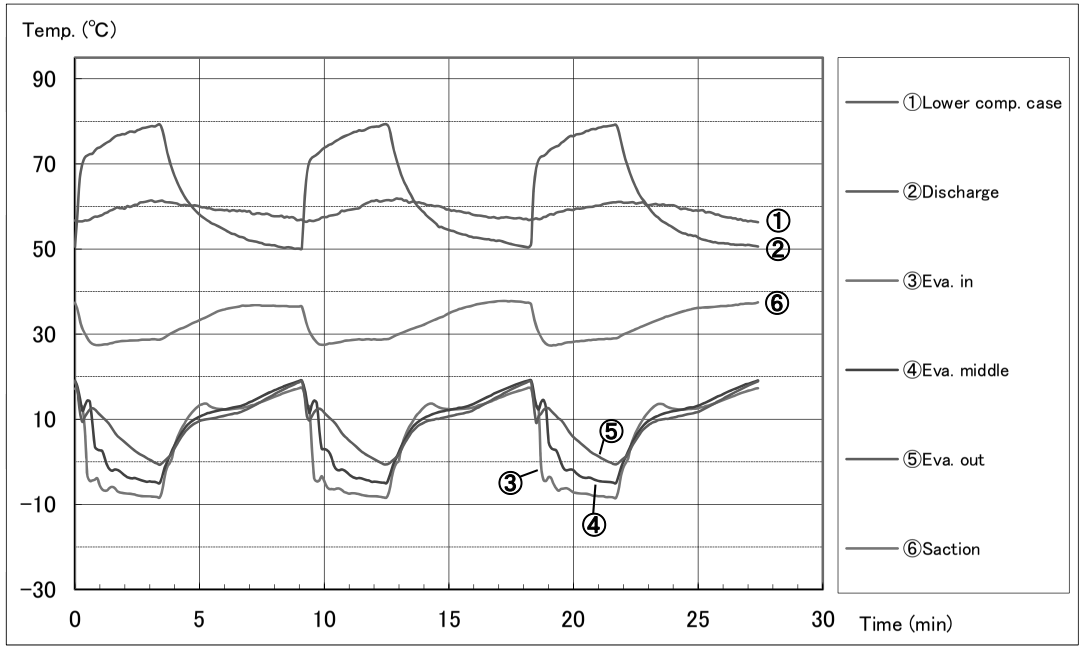


Chamber temp. (thermocouple)

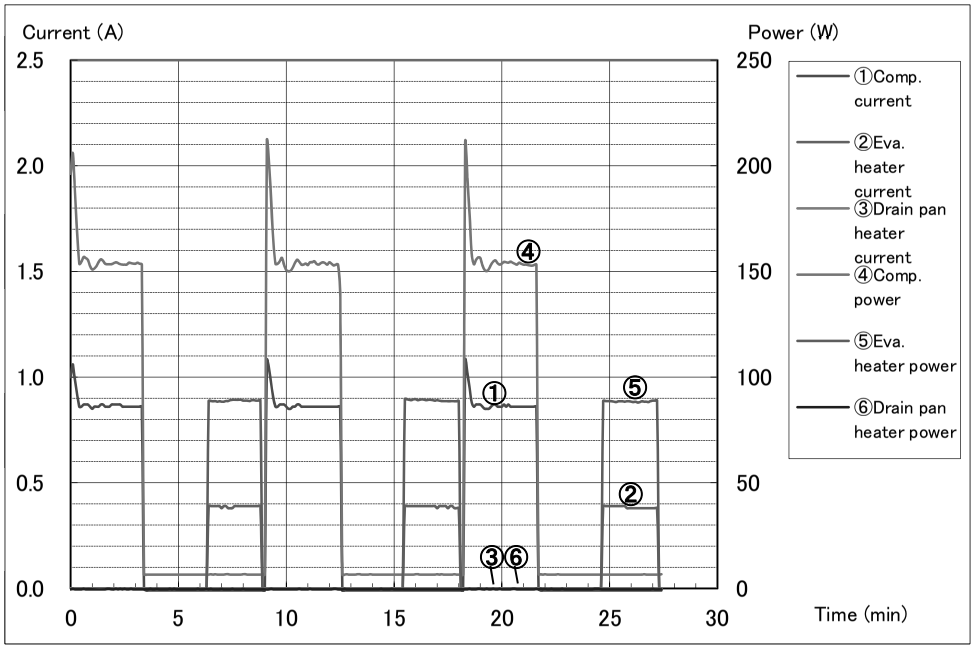


KM-RS16A1E : AT30℃ 230V50Hz SV14℃

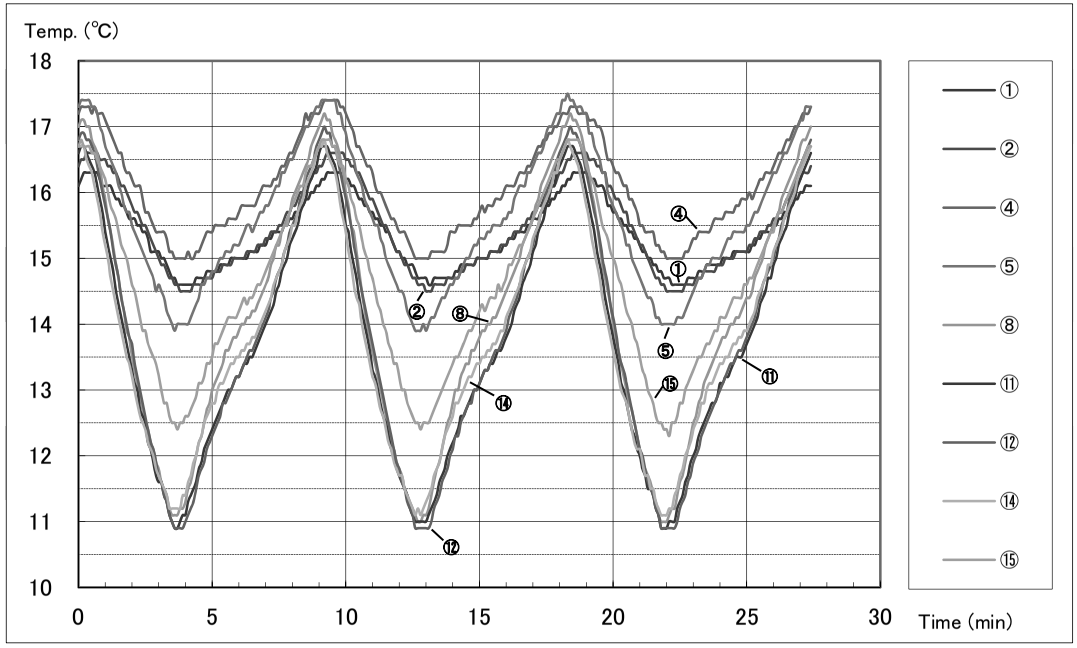
Unit area temp. and ambient temp.



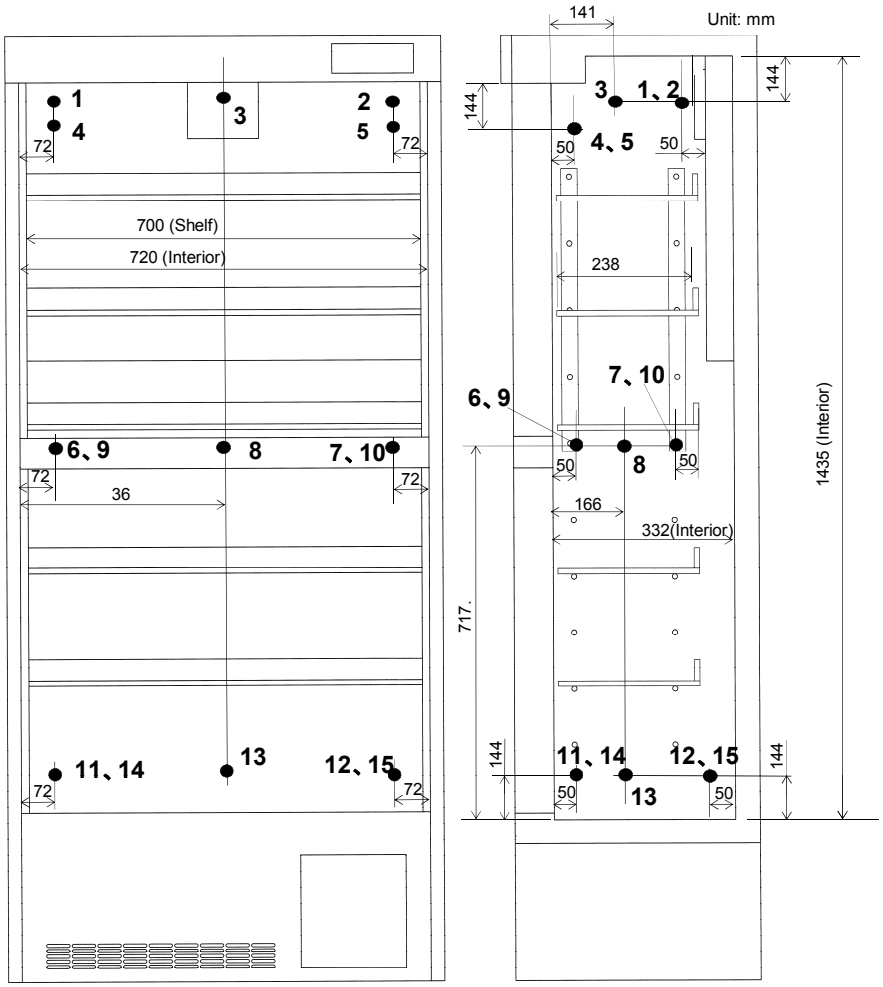
Current and input



Chamber temp. (thermocouple)



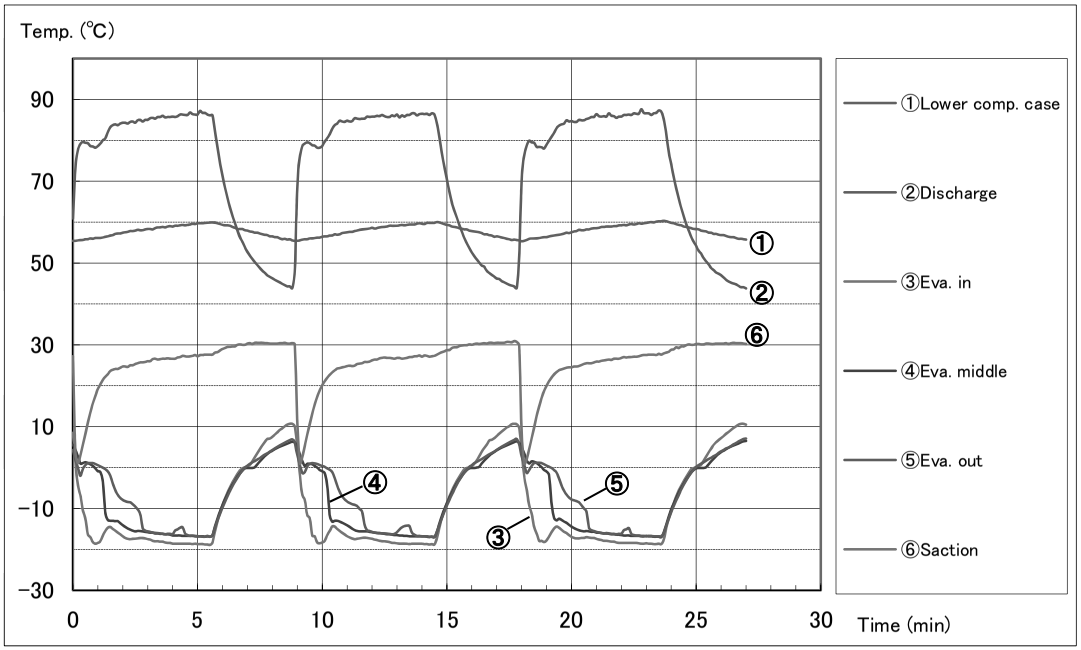
1･2･4･5 : From upper shelf corner W 72mm D 50mm H 144mm Air temperature
3 : From upper shelf corner W 360mm D 141mm H 144mm Air temperature
6･7･9･10 : From middle shelf corner W 72mm D 50mm H 717.5mm Air temperature
8 : From middle shelf corner W 360mm D 166mm H 717.5mm Air temperature
11･12･14･15 : From bottom corner W 72mm D 50mm H 144mm Air temperature
13 : From bottom corner W 360mm D 166mm H 144mm Air temperature



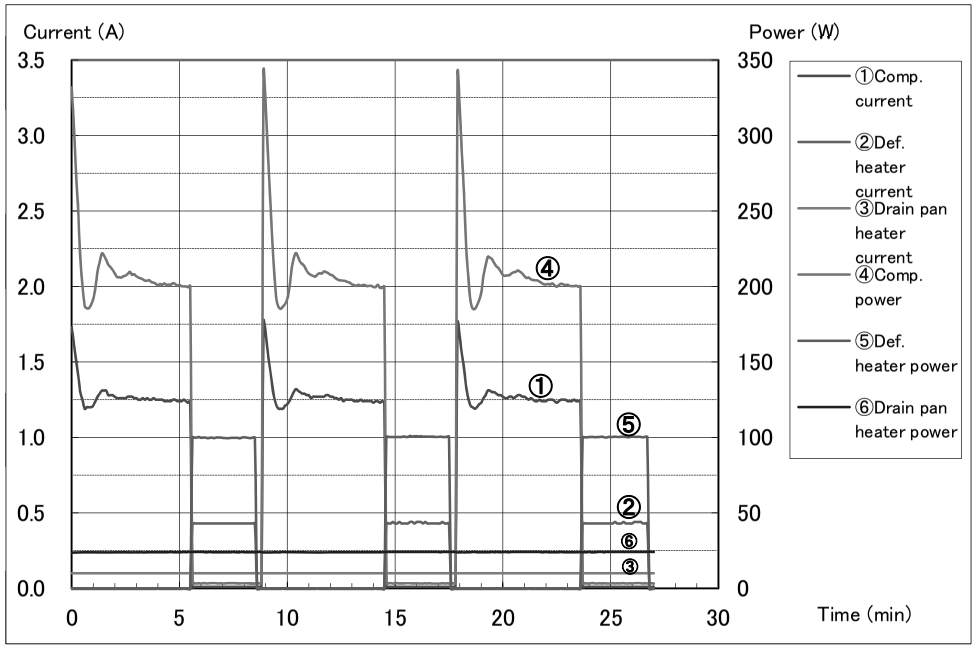
Model name	KM-RS34A1E											
Ambient temperature	23℃											
Rated voltage	230V50Hz											
Set temp. (SV)	2℃				5℃				14℃			
Temp. offset (F07)	±0.0℃				±0.0℃				±0.0℃			
	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)
①	3.0	4.3	1.4	±1.5	6.0	7.3	4.4	±1.5	14.6	16.4	12.9	±1.8
②	3.7	5.3	2.1	±1.6	6.6	7.9	4.9	±1.5	14.4	16.1	12.9	±1.6
③	3.9	5.3	2.6	±1.4	6.5	7.9	5.0	±1.5	14.7	16.8	12.8	±2.0
④	3.8	5.6	1.9	±1.9	6.6	8.0	4.6	±1.7	14.7	16.7	12.4	±2.2
⑤	5.2	6.2	4.1	±1.1	7.6	8.6	6.3	±1.2	14.9	16.8	13.3	±1.8
⑥	1.7	3.6	-0.1	±1.9	4.5	6.4	2.5	±2.0	13.7	16.6	11.1	±2.8
⑦	1.8	3.8	-0.2	±2.0	4.9	6.7	2.7	±2.0	13.8	16.3	11.2	±2.6
⑧	2.2	4.2	0.5	±1.9	4.9	6.6	3.1	±1.8	13.9	16.3	11.6	±2.4
⑨	2.3	4.4	0.0	±2.2	5.2	7.0	2.9	±2.1	14.0	16.6	11.2	±2.7
⑩	2.3	4.5	0.0	±2.3	5.3	7.3	2.7	±2.3	14.0	17.0	10.7	±3.2
⑪	2.6	4.9	0.4	±2.3	4.8	7.0	2.4	±2.3	13.9	16.7	10.9	±2.9
⑫	2.9	4.5	1.2	±1.7	5.4	7.0	3.6	±1.7	14.2	16.1	12.2	±2.0
⑬	2.0	4.3	-0.3	±2.3	4.7	6.7	2.3	±2.2	13.8	16.5	10.9	±2.8
⑭	2.4	4.9	0.2	±2.4	4.7	7.0	2.2	±2.4	13.8	16.8	10.7	±3.1
⑮	2.9	4.7	1.2	±1.8	5.6	7.2	3.7	±1.8	14.3	16.3	12.1	±2.1
⑧ with copper loaded (PT sensor)	2.6	2.8	2.3	±0.3	5.1	5.4	4.9	±0.3	14.0	14.6	13.6	±0.5
Temp. sensor	3.5	4.4	2.5	±1.0	6.1	7.0	5.2	±0.9	14.7	16.2	13.4	±1.4
Def. sensor	-2.7	3.1	-7.2	±5.2	1.7	6.5	-3.2	±4.9	12.0	18.1	5.3	±6.4
A T	22.7	23.3	22.1	±0.6	22.7	23.5	22.0	±0.8	22.6	23.4	21.8	±0.8
Max temp.	5.2	6.2	-	-	7.6	8.6	-	-	14.9	17.0	-	-
Min temp.	1.7	-	-0.3	-	4.5	-	2.2	-	13.7	-	10.7	-
Average temp.	2.8	-	-	-	5.6	-	-	-	14.2	-	-	-
Temp. accuracy	+0.2				-0.1				-0.1			
Temp. distribution	±1.8 (+3.2 / -0.3)				±1.6 (+2.6 / -0.5)				±0.6 (+0.9 / -0.3)			
Temp. distribution range	3.5				3.1				1.2			
Peak to Peak	6.5				6.4				6.3			
Display temp.	1 ~ 3 ℃				4 ~ 5 ℃				12 ~ 14 ℃			

KM-RS34A1E : AT23℃ 230V50Hz SV 2℃

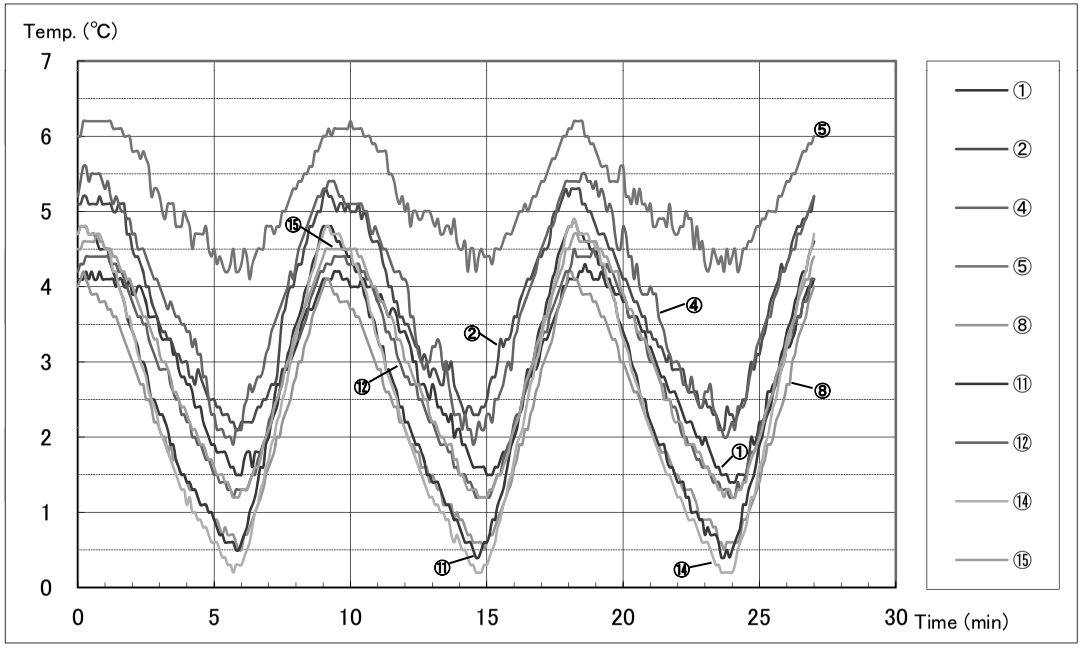
Unit area temp. and ambient temp.



Current and input

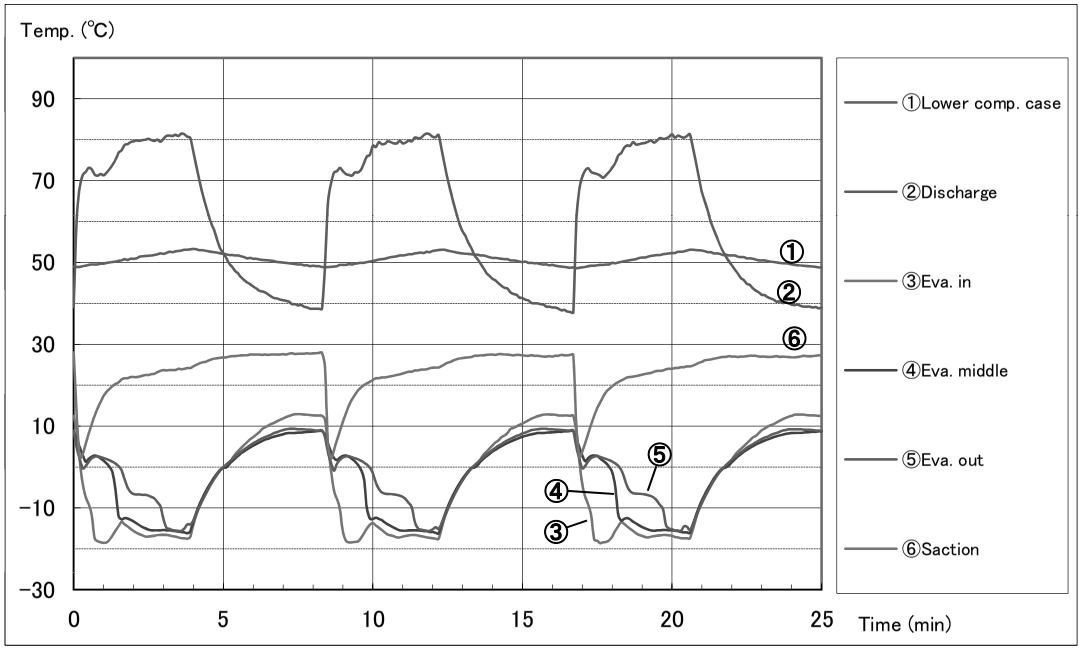


Chamber temp. (thermocouple)

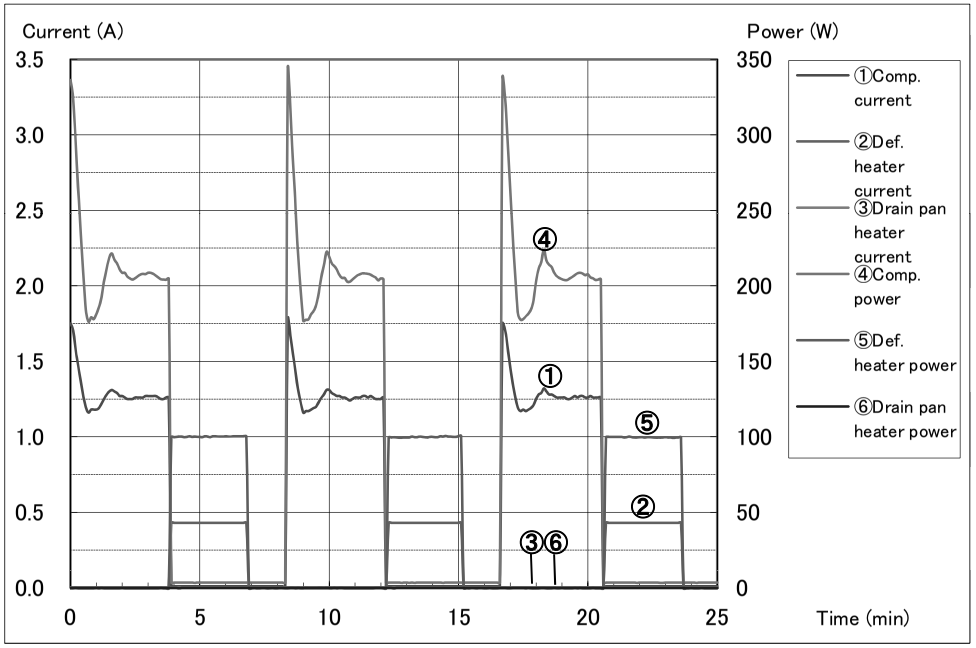


KM-RS34A1E : AT23℃ 230V50Hz SV 5℃

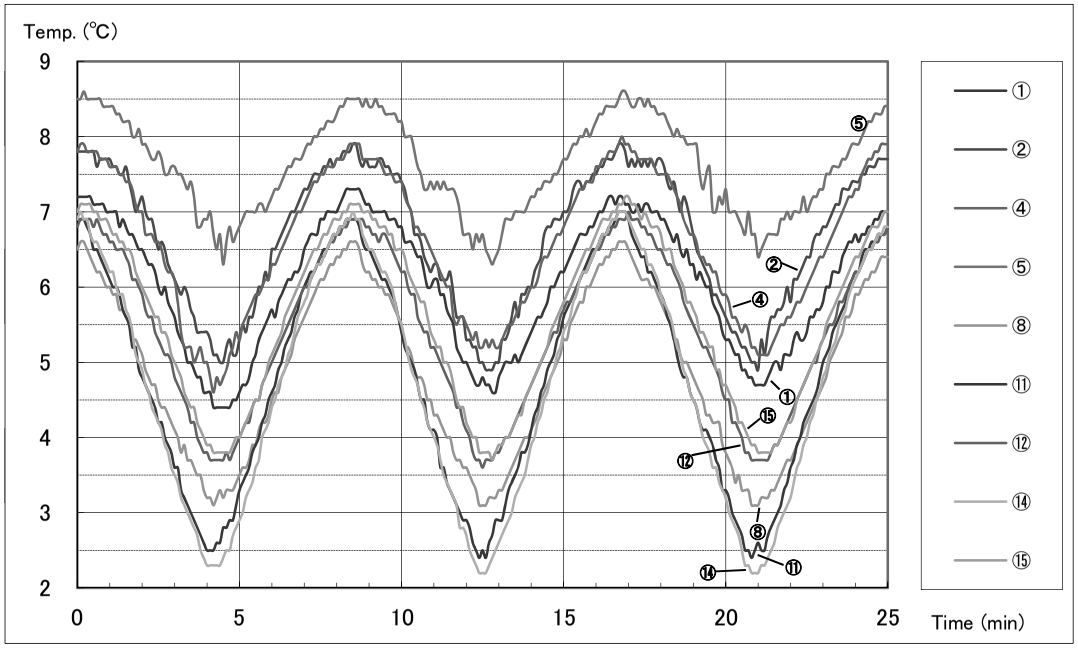
Unit area temp. and ambient temp.



Current and input

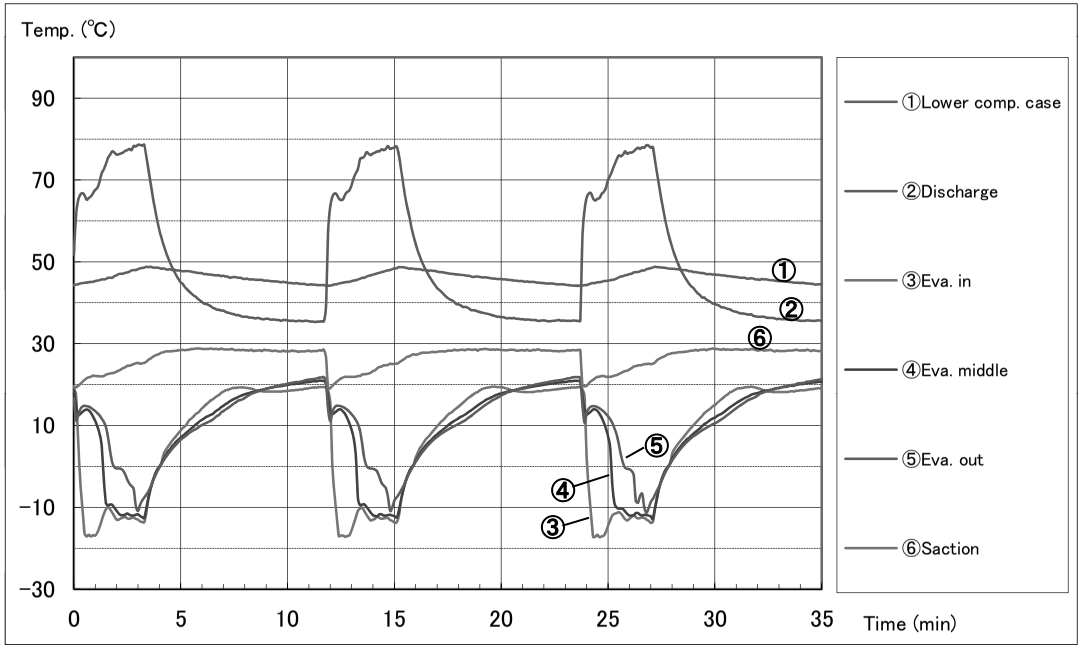


Chamber temp. (thermocouple)

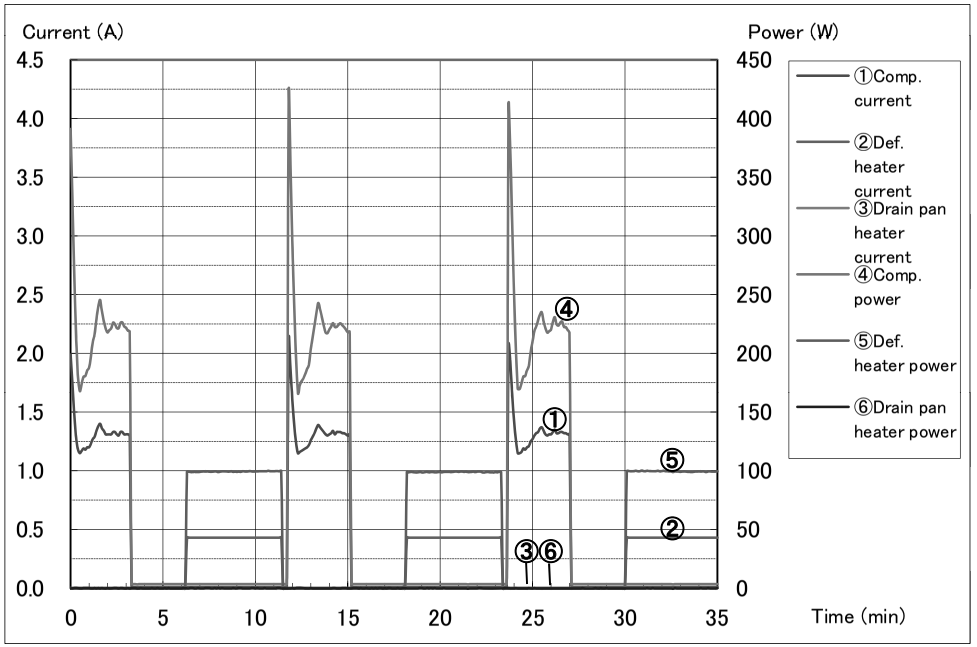


KM-RS34A1E : AT23℃ 230V50Hz SV14℃

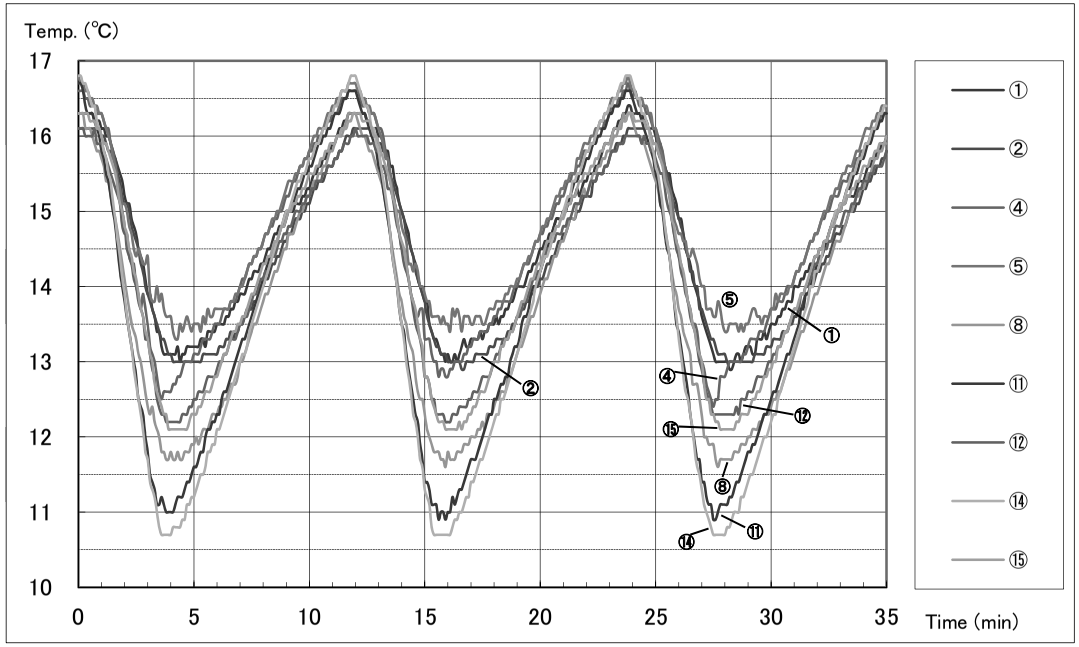
Unit area temp. and ambient temp.



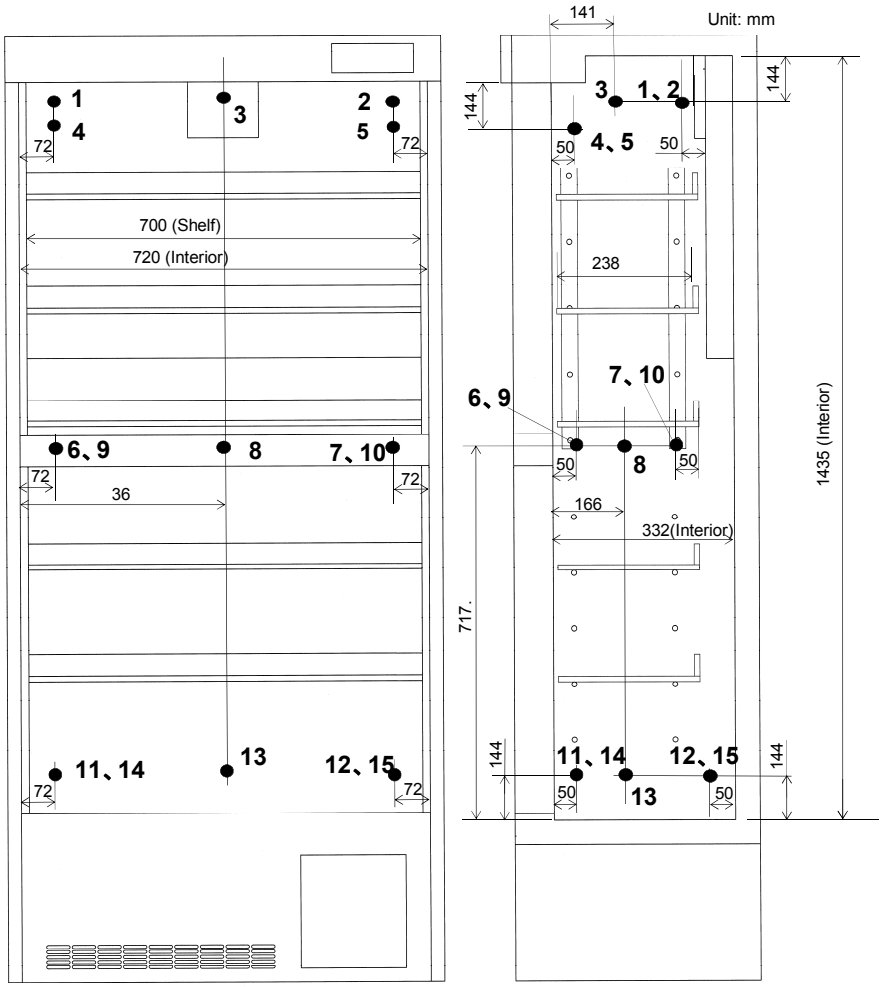
Current and input



Chamber temp. (thermocouple)



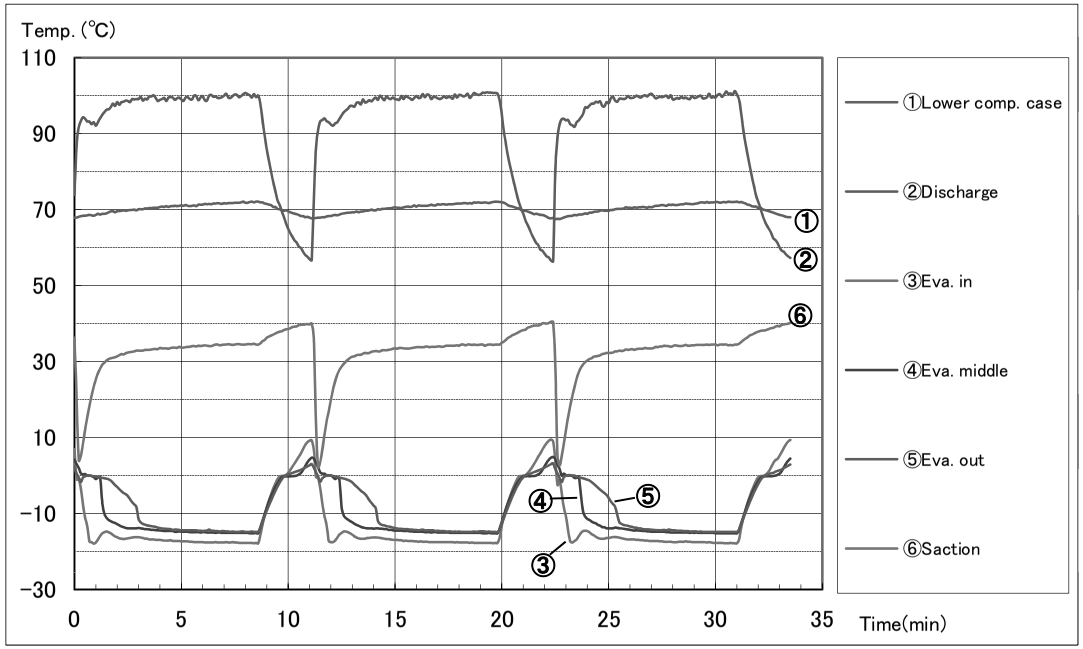
1･2･4･5 : From upper shelf corner W 72mm D 50mm H 144mm Air temperature
3 : From upper shelf corner W 360mm D 141mm H 144mm Air temperature
6･7･9･10 : From middle shelf corner W 72mm D 50mm H 717.5mm Air temperature
8 : From middle shelf corner W 360mm D 166mm H 717.5mm Air temperature
11･12･14･15 : From bottom corner W 72mm D 50mm H 144mm Air temperature
13 : From bottom corner W 360mm D 166mm H 144mm Air temperature



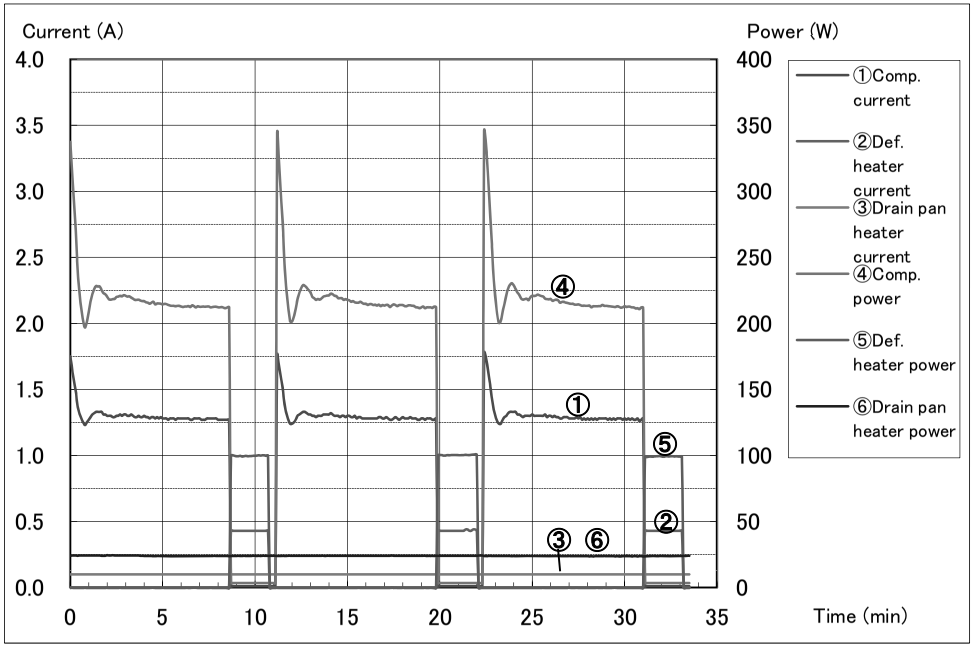
Model name	KM-RS34A1E											
Ambient temperature	30℃											
Rated voltage	230V50Hz											
Set temp. (SV)	2℃				5℃				14℃			
Temp. offset (F07)	±0.0℃				±0.0℃				±0.0℃			
	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)	Middle of cycle (℃)	MAX (℃)	MIN (℃)	Differential (deg.)
①	3.0	4.5	1.6	±1.5	6.1	7.4	4.5	±1.5	15.1	16.5	13.6	±1.5
②	4.1	5.6	2.6	±1.5	7.3	8.6	5.8	±1.4	15.4	17.0	13.8	±1.6
③	4.3	5.4	3.3	±1.1	7.1	8.4	5.8	±1.3	15.3	17.2	13.6	±1.8
④	3.8	5.6	2.2	±1.7	6.8	8.3	4.7	±1.8	15.4	17.1	13.6	±1.8
⑤	6.2	7.2	5.0	±1.1	8.8	9.7	7.7	±1.0	16.2	17.5	14.8	±1.4
⑥	1.4	2.8	-0.1	±1.5	4.3	6.2	2.4	±1.9	13.5	15.8	11.3	±2.3
⑦	1.6	3.2	-0.1	±1.7	4.6	6.5	2.5	±2.0	13.9	16.1	11.4	±2.4
⑧	2.0	3.5	0.6	±1.5	4.8	6.6	3.1	±1.8	13.8	16.1	11.8	±2.2
⑨	2.2	4.1	0.5	±1.8	5.2	7.2	3.0	±2.1	14.1	16.4	11.7	±2.4
⑩	2.5	4.5	0.6	±2.0	5.5	7.6	3.1	±2.3	14.3	17.0	11.5	±2.8
⑪	2.2	4.2	0.5	±1.9	4.8	7.2	2.4	±2.4	13.8	16.4	11.1	±2.7
⑫	2.6	4.1	1.1	±1.5	5.4	7.1	3.5	±1.8	14.4	16.3	12.4	±2.0
⑬	1.5	3.5	-0.3	±1.9	4.4	6.7	1.9	±2.4	13.7	16.3	11.0	±2.7
⑭	2.0	4.1	0.3	±1.9	4.6	7.1	2.2	±2.5	13.7	16.5	10.9	±2.8
⑮	2.7	4.3	1.2	±1.6	5.5	7.3	3.6	±1.9	14.5	16.5	12.4	±2.1
⑧ with copper loaded (PT sensor)	2.4	2.6	2.1	±0.3	5.2	5.4	4.9	±0.3	14.2	14.5	13.8	±0.4
Temp. sensor	3.5	4.3	2.7	±0.8	6.4	7.3	5.4	±1.0	15.0	16.2	13.8	±1.2
Def. sensor	-3.7	1.6	-6.8	±4.2	0.4	6.1	-4.0	±5.1	10.6	16.2	4.6	±5.8
A T	29.4	30.0	28.8	±0.6	29.5	30.4	28.5	±1.0	29.6	30.3	29.0	±0.7
Max temp.	6.2	7.2	-	-	8.8	9.7	-	-	16.2	17.5	-	-
Min temp.	1.4	-	-0.3	-	4.3	-	1.9	-	13.5	-	10.9	-
Average temp.	2.8	-	-	-	5.7	-	-	-	14.5	-	-	-
Temp. accuracy	±0.0				-0.2				-0.2			
Temp. distribution	±2.4 (+4.2 / -0.6)				±2.3 (+3.8 / -0.7)				±1.4 (+2.2 / -0.5)			
Temp. distribution range	4.8				4.5				2.7			
Peak to Peak	7.5				7.8				6.6			
Display temp.	1 ~ 3 ℃				4 ~ 6 ℃				12 ~ 14 ℃			

KM-RS34A1E : AT30℃ 230V50Hz SV 2℃

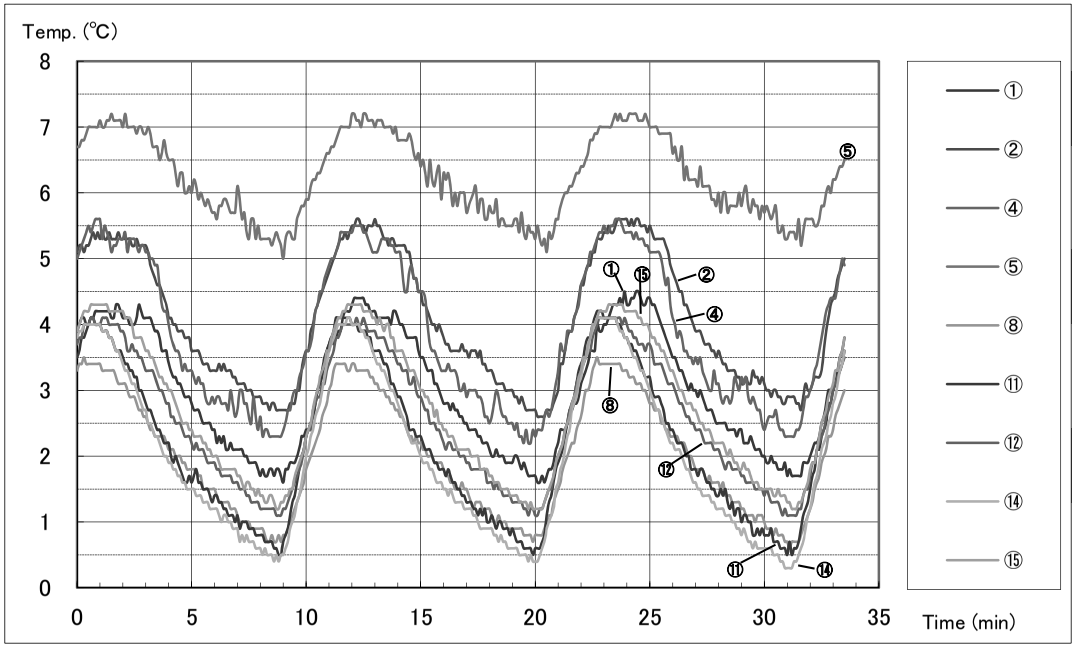
Unit area temp. and ambient temp.



Current and input

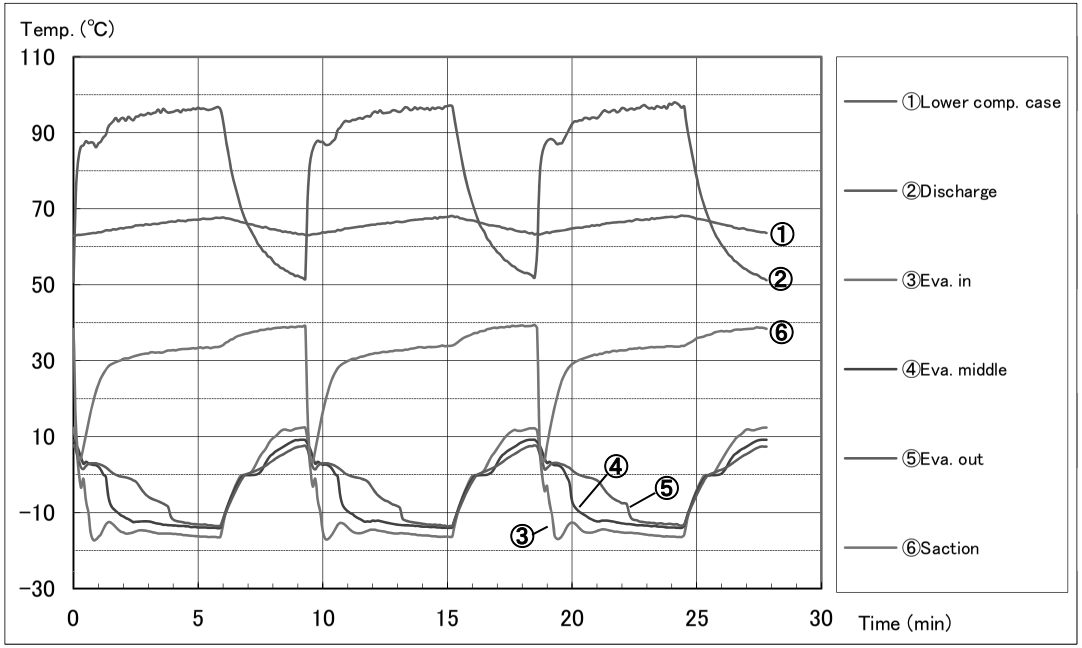


Chamber temp. (thermocouple)

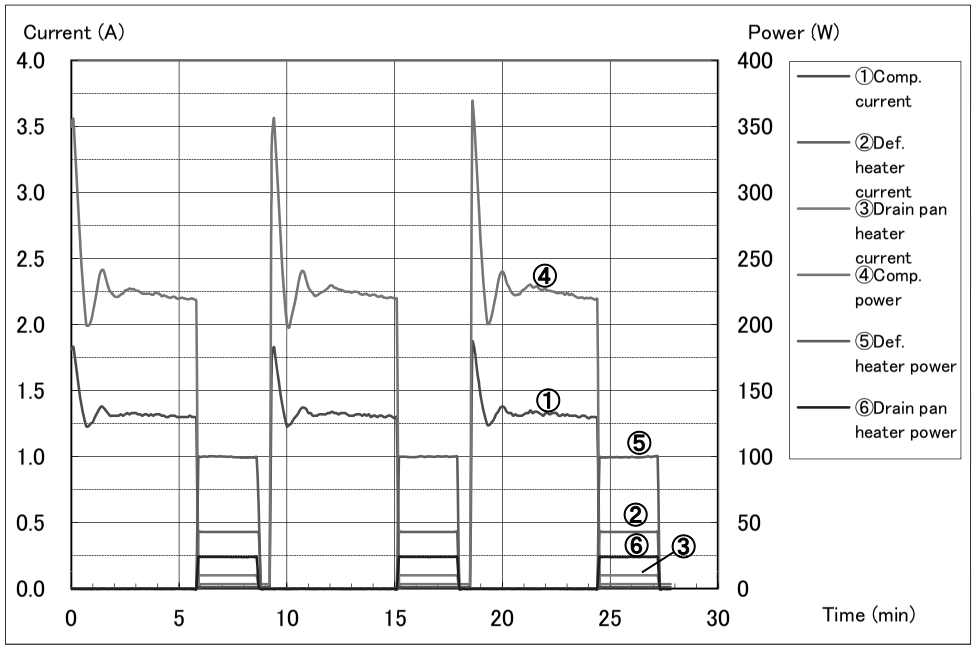


KM-RS34A1E : AT30℃ 230V50Hz SV 5℃

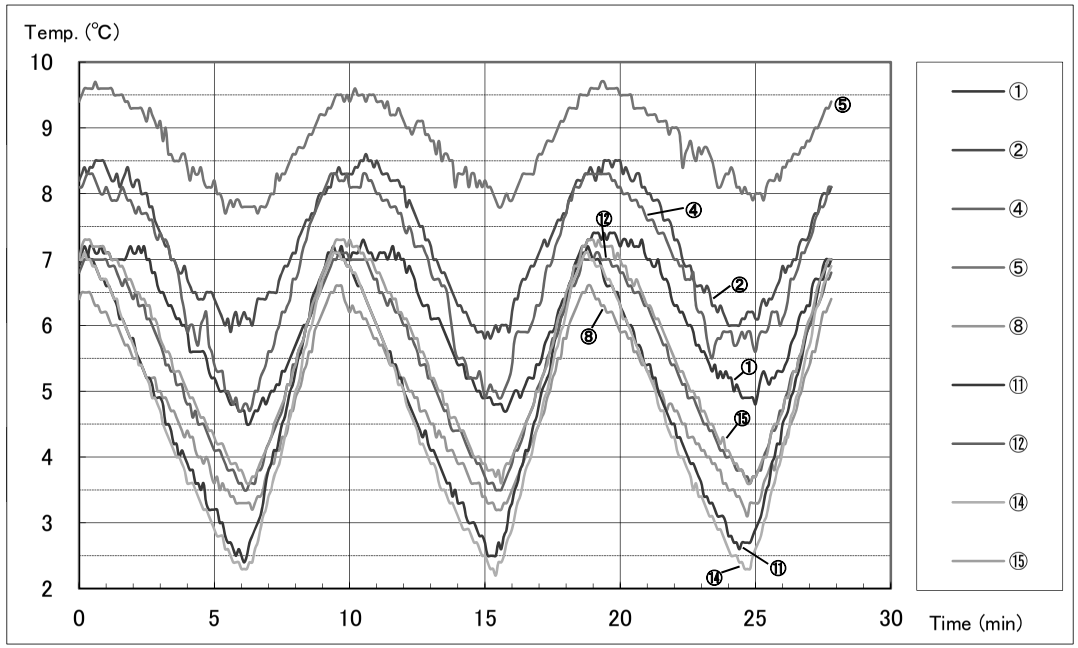
Unit area temp. and ambient temp.



Current and input

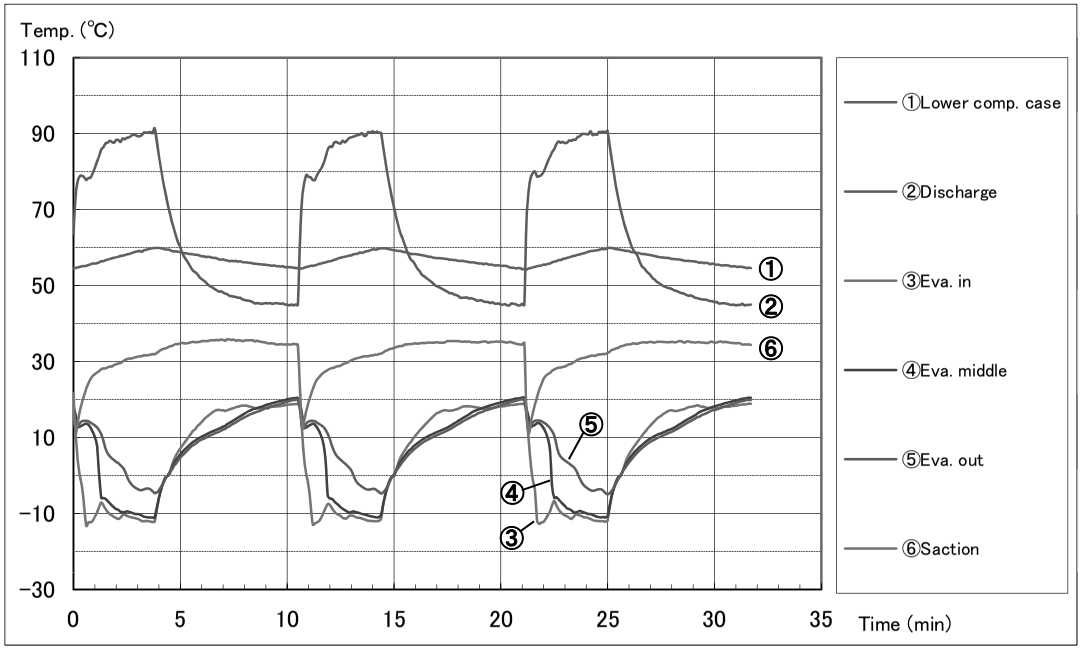


Chamber temp. (thermocouple)

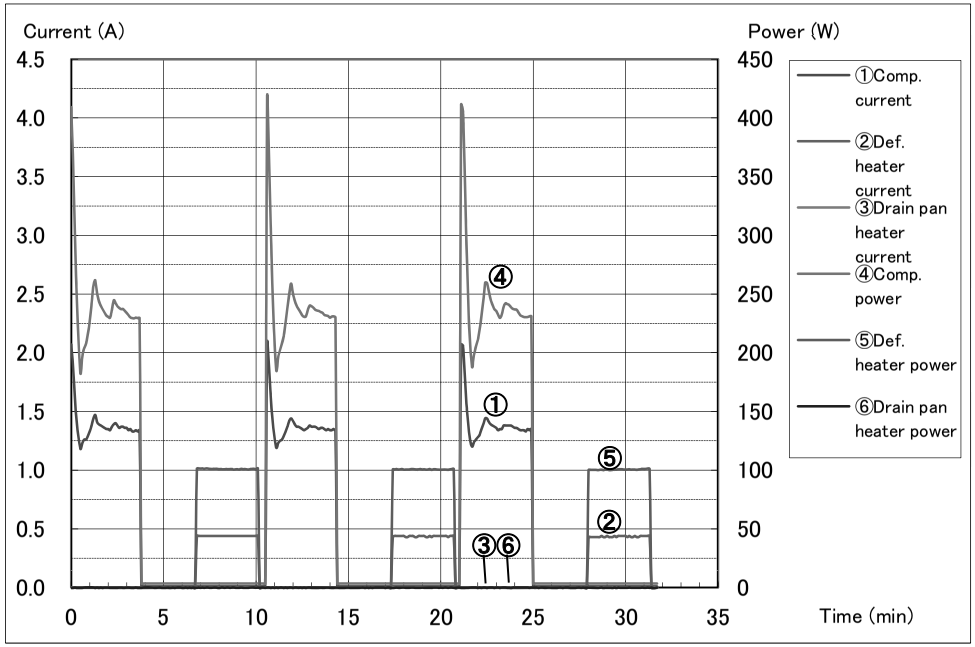


KM-RS34A1E : AT30℃ 230V50Hz SV14℃

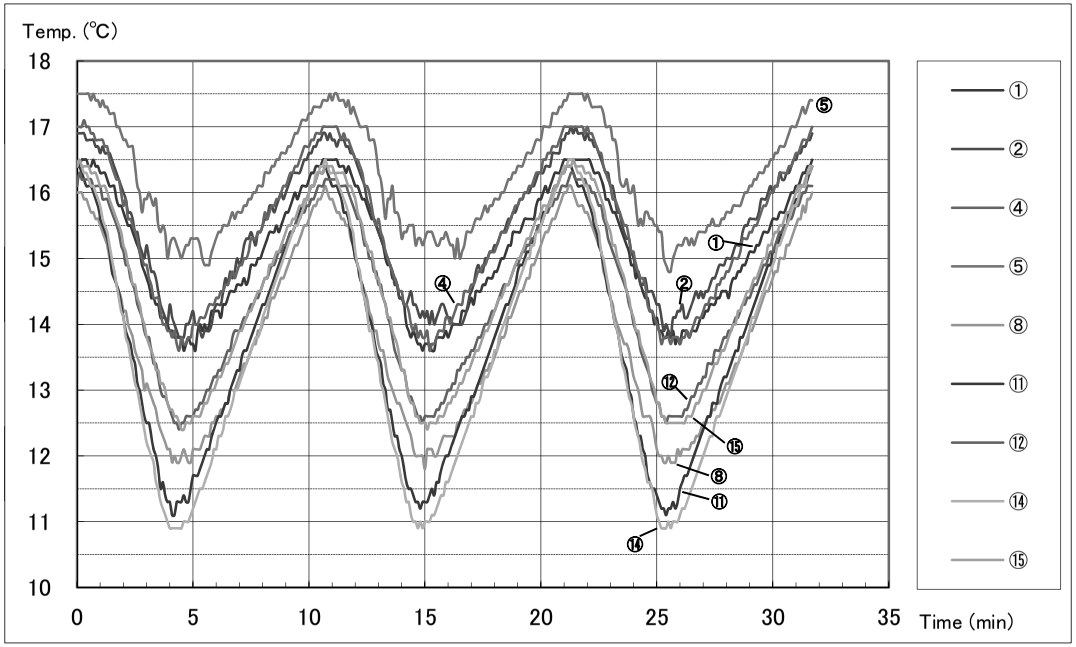
Unit area temp. and ambient temp.



Current and input



Chamber temp. (thermocouple)



Instruction manual

・This section is extracted and printed from Instruction Manual.

・If you find out “Refer to page ●●” in them, this page means not page in Service manual but page in the lower corner of each page in the extract from Instruction Manual.
This page number is not corresponded with serial number in Service manual.

・**Please note the extracted Instruction Manual which corresponds to the initial unit production, so the contents may be revised in future.**

Panasonic

Operating Instructions

Pharmaceutical Refrigerator

KM-RS16A1

KM-RS34A1

KM-RS16A1
KM-RS34A1 Series

KM-RS16A1

Please read these instructions carefully before using this product, and save this operating instructions for future use.

See page 38 for all model numbers.

CONTENTS

INTRODUCTION

■ Read this operating instructions carefully before using the appliance and follow the instructions for safety operation.

■ Our company never guarantee any safety if the appliance is used for any objects other than intended use or used by any procedures other than those mentioned in this operating instructions.

■ Keep this operating instructions in an adequate place to refer to it as necessary.

■ The contents of the operating instructions will be subjected to change without notice due to the improvement of performance or functions.

■ Contact our sales representative or agent if any page of the operating instructions is lost or page order is incorrect.

■ Contact our sales representative or agent if any point in this operating instructions is unclear or if there are any inaccuracies.

⚠CAUTION

Our company guarantees the product under certain warranty conditions. Our company in no way shall be responsible for any loss of content or damage of content.

PRECAUTIONS FOR SAFE OPERATION

It is imperative that the user complies with this operating instructions as it contains important safety advice.

Items and procedures are described so that you can use this unit correctly and safely. If the precautions advised are followed, this will prevent possible injury to the user and any other person.

Precautions are illustrated in the following way:

⚠WARNING

Failure to observe WARNING signs could result in a hazard to personnel possibly resulting in serious injury or death.

⚠CAUTION

Failure to observe CAUTION signs could result in injury to personnel and damage to the unit and associated property.

Symbol shows;

△ this symbol means caution.

⃠ this symbol means an action is prohibited.

● this symbol means an instruction must be followed.

Be sure to keep this operating instructions in a place accessible to users of this unit.

< Label on the unit >

This mark is labeled on the cover in which the electrical components of high voltage are enclosed to prevent the electric shock.
The cover should be removed by a qualified engineer or a service personnel only.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.

Only qualified engineers or service personnel should install the unit. The installation by unqualified personnel may cause electric shock or fire.

Install the unit on a sturdy floor and take an adequate precaution to prevent the unit from turning over. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.

Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

Never install the unit in a flammable or volatile location. This may cause explosion or fire.

Never install the unit where acid or corrosive gases are present as current leakage or electric shock may result due to corrosion.

Always ground (earth) the unit to prevent electric shock. If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod. Such grounding may cause electric shock in the case of an incomplete circuit.

Connect the unit to a power source as indicated on the rating label attached to the unit. Use of any other voltage or frequency other than that on the rating label may cause fire or electric shock.

Never store volatile or flammable substances in this unit if the container cannot be sealed. These may cause explosion or fire.

Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet on the unit. This may cause electric shock or injury by accidental contact with moving parts.

Use this unit in safe area when treating the poison, harmful or radiate articles. Improper use may cause bad effect on your health or environment.

Turn off the power switch (if provided) and disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Do not touch any electrical parts (such as power supply plug) or operate switches with a wet hand. This may cause electric shock.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Never splash water directly onto the unit as this may cause electric shock or short circuit.

Never put containers with liquid on the unit as this may cause electric shock or short circuit when the liquid is spilled.

Never bind, process, or step on the power supply cord, or never damage or break the power supply plug. A broken supply cord or plug may cause fire or electric shock.

Do not use the supply cord if its plug is loose. Such supply cord may cause fire or electric shock.

Never disassemble, repair, or modify the unit yourself. Any such work carried out by an unauthorized person may result in fire, or electric shock or injury due to a malfunction.

Disconnect the power supply plug if there is something wrong with the unit. Continued abnormal operation may cause electric shock or fire.

When removing the plug from the power supply outlet, grip the power supply plug, not the cord. Pulling the cord may result in electric shock or fire by short circuit.

Disconnect the power supply plug before moving the unit. Take care not to damage the power cord. A damaged cord may cause electric shock or fire.

Disconnect the power plug when the unit is not used for long periods. Keeping the connection may cause electric shock, current leakage, or fire due to the deterioration of insulation.

If the unit is to be stored unused in an unsupervised area for an extended period, **ensure that children do not have access and that doors are locked completely with a key.**

The disposal of the unit should be accomplished by appropriate personnel. Remove doors to prevent accidents such as suffocation.

Do not put the packing plastic bag within reach of children as suffocation may result.

PRECAUTIONS FOR SAFE OPERATION

⚠CAUTION

Use a dedicated power source as indicated on the rating label attached to the unit. A multiple-tap may cause fire resulting from abnormal heating.

Connect the power supply plug to the power source firmly after removing the dust on the plug. A dusty plug or improper insertion may cause a heat or ignition.

Never store corrosive substances such as acid or alkali in this unit if the container cannot be sealed. These may cause corrosion of inner components or electric parts.

Check the setting when starting up of operation after power failure or turning off of power switch. The stored items may be damaged due to the change of setting.

Be careful not to tip over the unit during movement to prevent damage or injury.

Prepare a safety check sheet (copy the last page) when you request any repair or maintenance for the safety of service personnel.

ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe at least under the following conditions (based on the IEC 61010-1):

■ Indoor use;

■ Altitude up to 2000 m;

■ Temperature 5 ^{o}C to 40 ^{o}C

■ Maximum relative humidity 80% for temperature up to 31 ^{o}C decreasing linearly to 50% relative humidity at 40 ^{o}C;

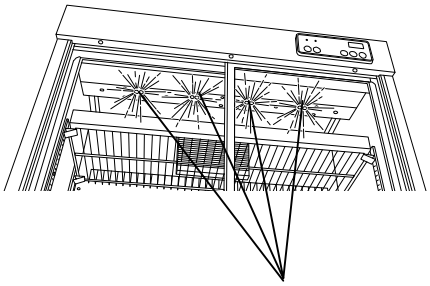
■ Mains supply voltage fluctuations up to ±10% of the nominal voltage;

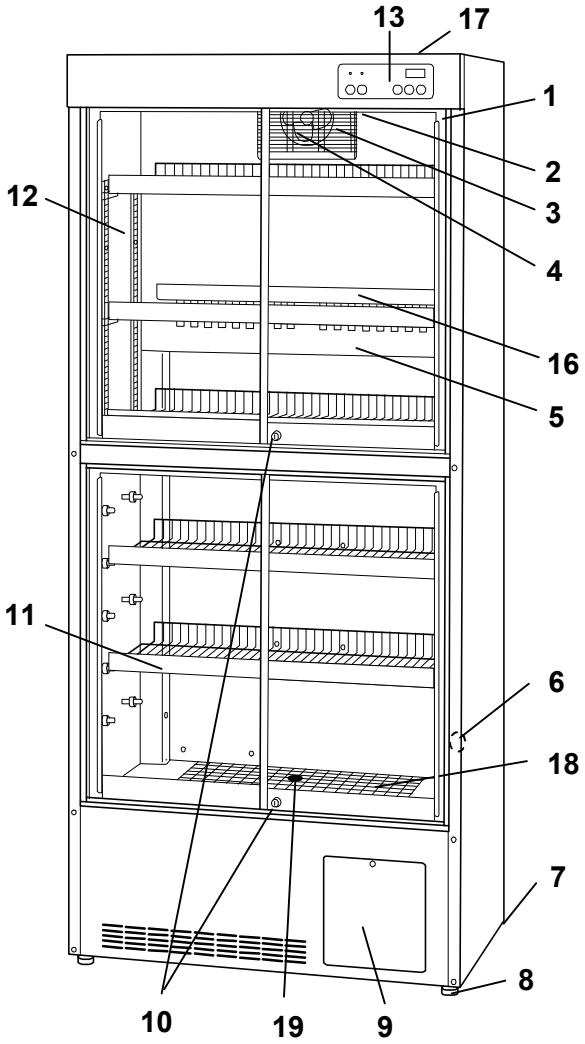
■ Transient overvoltages up to the levels of OVERVOLTAGE CATEGORY Ⅱ;

■ Temporary OVERVOLTAGES occurring on the mains supply;

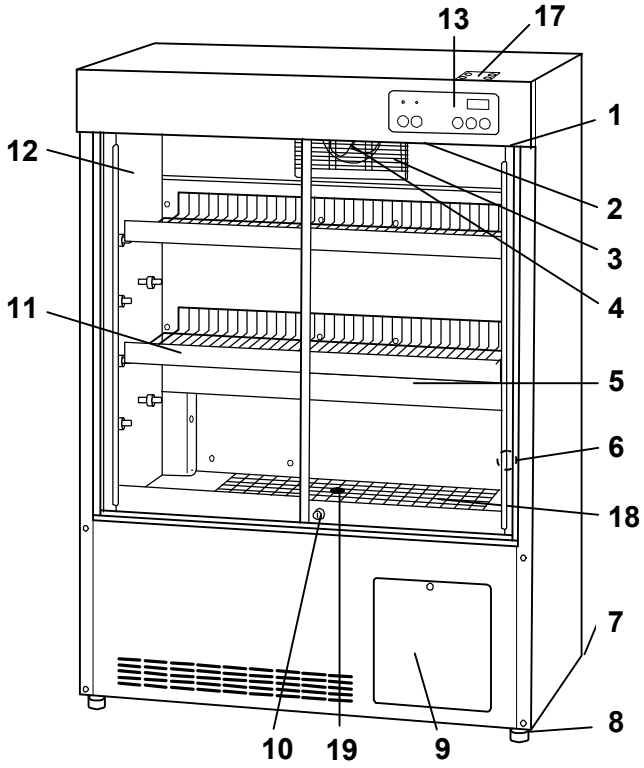
■ Applicable pollution degree of the intended environment (POLLUTION DEGREE 2 in most cases);

REFRIGERATOR COMPONENTS

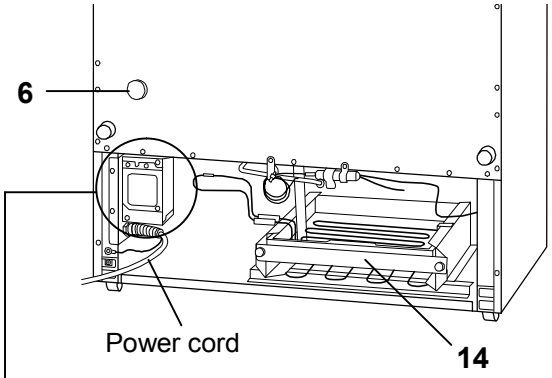




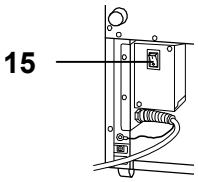
KM-RS34A1



KM-RS16A1



Rear side for KM-RS16A1



Only for Europe products

REFRIGERATOR COMPONENTS

1. Door switch

2. LED light: White LED light.

3. Air intake vent: Be careful not to block off. If air intake vent is blocked, the chamber temperature becomes unstable. Also be careful not to insert the finger or enter the foreign materials

4. Air circulating fan: Circulate the cooled air in the chamber.

5. Air exhaust vent: Be careful not to block off.

6. Access port: This port allows cables to be passed into the chamber.
Note: If an instrument requiring a power source is to be placed inside the chamber, the cable can be led through the access port. After installation, a rubber cap should be used to seal the access port. Failure to do this can affect the temperature uniformity inside the chamber and lead to condensation on the outside of the access port.

7. Caster: Mounted on the back side. When moving the unit, tilt the unit backward a little for easy carrying.

8. Leveling foot: Adjust the height by screw bolt to install the unit in level.

9. Space for a temperature recorder: Location for an optional temperature recorder. (page 32)

10. Key lock: Insert the key and turn to the clockwise 180^{o} with pressing into the head of lock when lock the doors.

11. Shelf

12. Door: Consists of double pair glass with heat ray reflection film. Be careful not to break the glass.

13. Control panel: Displays operating condition of the unit and used to set chamber temperature etc. (page 11)

14. Evaporating tray: Places in rear bottom of the frame. Pull out forward for removing. (page 25)

15. Power switch (KM-RS16A1E and KM-RS34A1E only): This is for turning ON/OFF the power to the unit.

16. Exhaust vent cover (KM-RS34A1 only): Always install the exhaust vent cover on the back of the shelf when the shelf is located at the front of the exhaust vent.

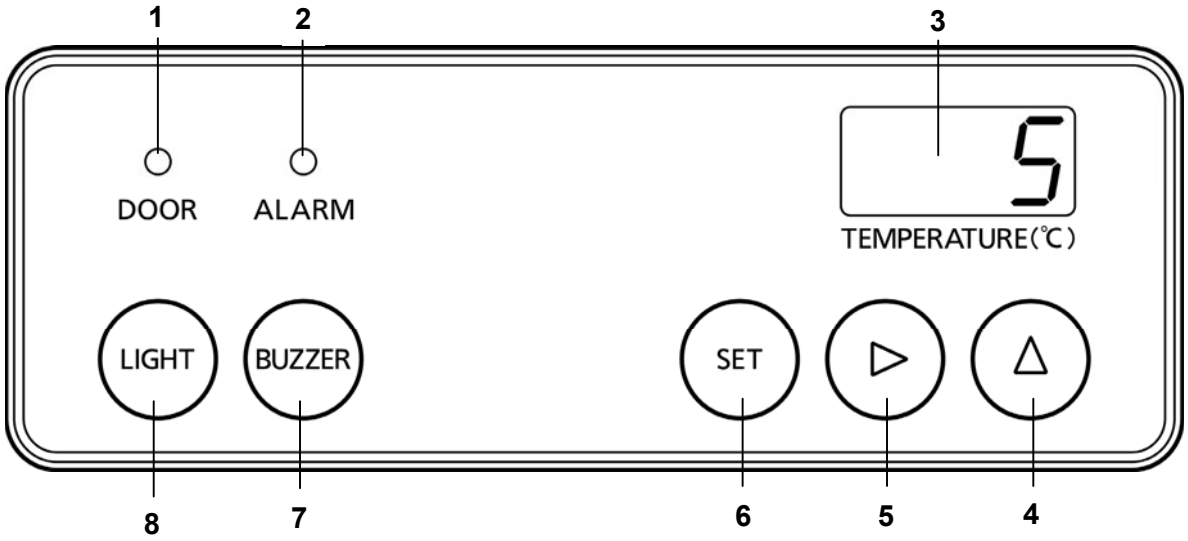
17. Space for battery mounting box: A battery mounting box can be attached here. Switch on the battery switch of the battery mounting box. (page 22)

18. Drain board: The things can be placed on a drainboard.

19. Drain cap: The drain can be used to collect the defrosted water.

REFRIGERATOR COMPONENTS

Control panel components



1. Door check indicator (DOOR): The red LED lamp is lit when the door is opened.
(2 minutes after the door check indicator is lit; the alarm buzzer is activated to notice the door opening.)

2. Alarm indicator (ALARM): The red LED lamp blinks during an alarm status. (page 23, 24)

3. Temperature display: Normally this shows the chamber temperature and during an alarm status, this shows a blinking chamber temperature. And an error code and a chamber temperature is displayed alternately when the self diagnostic function detects any abnormality. (page 24)

4. Numerical value shift key (▲): Pressing this key for 5 seconds at temperature display mode causes the setting mode. Pressing this key at setting mode makes the figure on the temperature display to change.

5. Digit shift key (▶): Pressing this key at setting mode makes the digit to be inputted on the temperature display to change. Pressing this key for 5 seconds at temperature display mode causes the setting mode for key lock.

6. Set key (SET): Pressing this key at temperature display mode enables the temperature setting. (page 15) Pressing this is at the end of setting mode memorizes the setting.

7. Alarm buzzer stop key (BUZZER): Pressing this key silences the alarm buzzer when the alarm buzzer sounds. But the remote alarm is not canceled. (This is after the installation of battery mounting box, an optional component (KM-RPP01BB1W)).

8. LED light key (LIGHT)

Turn on the LED light pressing this key. To turn off the LED light press this key again.
If it is turned by LED light key, it will be turned off automatically after 10 minutes.
LED light turns off when it open and close the door.

■"temperature display mode": the status which the temperature display shows the current chamber temperature

■"setting mode"; the status which the temperature display is ready to be entered after pressing numerical value shift key for about 5 seconds.

INSTALLATION SITE

To operate this unit properly and to obtain maximum performance, install the unit in a location with the following conditions:

■ A location not subjected to direct sunlight

Do not install the unit under direct sunlight. Installation in a location subjected to direct sunlight cannot obtain the intended performance.

■ A location with adequate ventilation

Leave at least 10 cm around the unit for ventilation. Poor ventilation will result in a reduction of the performance and consequently the failure.

■ A location away from heat generating sources

Avoid installing the unit near heat-emitting appliances such as a heater or a boiler etc. Heat can decrease the intended performance of the unit.

■ A location with little temperature change

Install the unit under stable ambient temperature. The allowable ambient temperature is between -5 ^{o}C and 35 ^{o}C.

■ A location with a sturdy and level floor

Always install the unit on a sturdy and level floor. The uneven floor or tilted installation may cause failure or injury. Install the unit in stable condition to avoid the vibration or noise. Unstable condition may cause vibration or noise.

⚠ WARNING

Install the unit on a sturdy floor. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.

Select a level and sturdy floor for installation. This precaution will prevent the unit from tipping. Improper installation may result in water spillage or injury from the unit tipping over.

■ A location not prone to high humidity

Install the unit in the ambient of 80% R.H. or less humidity. Installation under high humidity may cause current leakage or electric shock.

⚠ WARNING

Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.

Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

■ A location without flammable or corrosive gas

Never install the unit in a flammable or volatile location. This may cause explosion or fire or may result in the current leakage or electric shock by the corrosion of the electrical components.

■ A location without the possibility of anything fall

Avoid installing the unit in the location where anything can fall down onto the unit. This may cause the breakdown or failure of the unit.

INSTALLATION

1. Removing the packing materials and tapes

Remove all transportation packaging materials and tapes. Open the doors and ventilate the unit. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.) After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the panels with a dry cloth.

Note:

Remove the cable tie banding the power supply cord. Prolonged banding may cause the corrosion of the cord coating.

2. Installing the unit

Extend the leveling feet by rotating them counterclockwise to contact them to the floor. Ensure the unit is level. (Fig. 1)

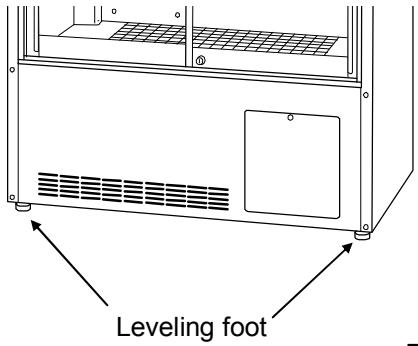


Fig. 1

3. Fixing the unit

Two fixtures are attached to the rear of the frame. Fix the frame to the wall with these fixtures and rope or chain. (Fig. 2)

Note:

Contact our sales representative or agent if the unit should be fixed for earthquake resistant.

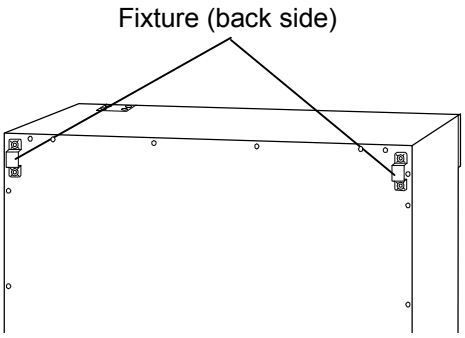


Fig. 2

4. Ground (earth) the unit

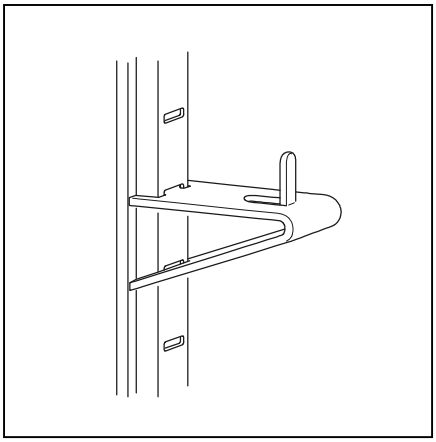
The ground (earth) is for preventing the electric shock in the case of the electrical insulation is somehow degraded. Always ground the unit at the time of installation.

■ A 3-prong plug with grounding pole, there is no need for electric work for grounding.

■ If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.

Installation of shelf

To the size of the storage product Add to inside, can be freely adjusted the height of the shelf. Adjustment of the shelf is set to the desired position of the support (four received one shelf per shelf) received shelf. At this time, adjust shelf so that it is horizontal.



START-UP OF UNIT

To commence the operation (initially or after temporary power off due to the cleaning, maintenance, etc.), follow the procedure below:

■ The operation is resumed automatically at the resume time from power failure with the setting before power failure.

1. Check the power switch is OFF. (KM-RS16A1E and KM-RS34A1E only)

2. Check that the battery switch of battery mounting box for power failure alarm (optional component) is OFF if the battery mounting box for power failure alarm is installed.

3. Connect the power supply cord to the dedicated power source with the chamber empty.

4. Turn on the power switch. (KM-RS16A1E and KM-RS34A1E only)

→ At the power on, the high temp. alarm is activated. The alarm indicator blinks and the blinking chamber temperature is displayed.

■ At the start-up with the factory setting, the high temp. alarm is activated when the chamber temperature is higher than 10 ^{o}C, therefore the high temp. alarm works (High temp. alarm; temperature display blinks, alarm indicator blinks, buzzer sounds after 15 minutes)

5. Set the desired chamber temperature. (page 15)

■ The factory setting of refrigerator temperature is 5 ^{o}C.

<Important>

■ Allow 5 minutes before turn on the power switch or power supply cord when the power supply is off. That is a time for compressor to start-up again.

It takes about 1 hours to reach the set temperature (ambient temp. 30 ^{o}C, no load, without containers)

6. On the temp. display, check the chamber temperature reaches the set temperature.

7. Turn on the power switch of battery mounting kit for power failure alarm (optional component) if the battery mounting kit for power failure alarm is installed.

8. By opening the door, check the LED light is on.

9. Put the material in the chamber gradually.

■ Putting a large amount of material in the chamber at a time causes the temperature rise.

■ Never block the air intake vent or air exhaust vent in the refrigerator.

10. As needed, set the alarm temperature (page 18 to 19), buzzer suspended period (page 21), and the lock of chamber temperature setting (page 16).

<Attention>

■ The condensation may be found on the glass of refrigerator door under high temperature and humidity condition. Wipe off the condensation with a soft dry cloth.

CHAMBER TEMPERATURE SETTING

Set the temperature of chamber according to the usage condition. This unit keeps the storage items for long period with adequate chamber temperature.

	Temperature
Setting range	between 2 °C and 14 °C
Initial setting (at factory)	5 °C

The chamber temperature of 2 °C may cause partial freeze of stored items.

Example: Change the chamber temperature to 4 °C from 5 °C.

Following shows an example. Change the setting as necessary.

	Description Operation	Key operated	Indication after operation
1	Connect the power supply cord to the outlet. (only when start-up of unit)	-----	The current chamber temperature is displayed. 
2	Press set key.	SET	The current setting is displayed and the first digit is blinks. 
3	Set the temperature to 4 with the digit shift key and the numerical value shift key.	▶	When pressed, the settable digit is shifted.
		▲	When pressed, the figure of settable digit changes. 
4	Press set key.	SET	Set temperature is memorized and the current chamber temperature is displayed. 

■ The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

<Important>

■ It is recommended to install a temperature recorder (optional component) to check the highest/lowest chamber temperature when the item which needs severe temperature control is stored.

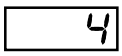
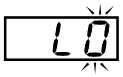
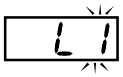
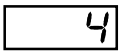
KEY LOCK FUNCTION

The temperature setting of chamber can be locked to avoid accidental change. When the lock is ON, the change of chamber temperature is unable even if the key on the control panel is operated.

■ Initial setting (at factory): Lock is OFF

Display	Mode	Function
L 0	Lock is OFF	Enable to change of temperature setting
L 1	Lock is ON	Disable to change of temperature setting

Example: Changing the lock status to ON from OFF (initial setting).

	Description Operation	Key operated	Indication after operation
1		-----	The current chamber temperature is displayed. 
2	Press digit shift key for about 5 seconds.		The current setting is displayed and the first digit is blinks. 
3	Press numerical value shift key and scroll the figure to 1		When pressed, the figure of settable digit changes. 
4	Press set key	SET	The key lock is set to ON. The current chamber temperature is displayed. 

■ The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

DEFROSTING

The following 2 types of defrosting methods is provided for the refrigerator. Both of them are controlled automatically.

● Cycle defrosting

The chamber temperature is kept stable by ON/OFF operation of the compressor. When the compressor is OFF (stopped), the frost on the evaporator is melted by the heater. This defrosting never influences to the chamber temperature.

● Defrosting by defrost sensor

The cycle defrosting may not be sufficient to remove the frost on the evaporator when the ambient temperature is high, the door is opened frequently, or heavy moist items are stored in the chamber. In this case, the defrosting operation is started automatically when the defrost sensor detects the frost.

During the defrosting, the current chamber temperature and dF is displayed alternately when the temperature display indicator for chamber is lit.

After completion of defrosting, dF display is disappeared and the chamber returns to the normal operation.

<Important>

■ During the defrosting, the chamber temperature reaches around 10 ^{o}C temporary.

■ Too much frost is accumulated on the evaporator when the chamber is running under high temperature and humidity condition. For example, the defrosting operation is started once a week when the chamber is running with 2 ^{o}C setting at 30 ^{o}C, 80% R.H.

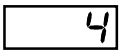
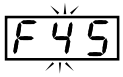
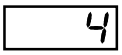
LED LIGHTING TIME SETTING

The light is automatically put out in set-up time after turning on a LED Light. The method of change of lighting time is as follows.

■ Initial setting (at factory): 10 minutes

Example: Changing the LED lighting time to 5 minutes from 10 minutes

Following shows an example. Change the setting as necessary.

	Description Operation	Key operated	Indication after operation
1		-----	The current chamber temperature is displayed. 
2	Press numerical value shift key for about 5 seconds.	▲	F00 is displayed and the first digit is blinks. 
3	Set the figure to F45 with the digit shift key and numerical value shift key.	▶	When pressed, the figure of settable digit changes.
		▲	When pressed, the figure of settable digit changes. 
4	Press set key.	SET	The pressed setting is displayed and the first digit is blinks. 
5	Set the figure to 005 with the digit shift key and numerical value shift key.	▶	When pressed, the figure of settable digit changes.
		▲	When pressed, the figure of settable digit changes. 
6	Press set key.	SET	The setting is memorized and the current chamber temperature is displayed. 

■ The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

■ A LED light can be changed from 0 minute to 15 minutes.

■ 000 (0 minutes) remains off the LED light.

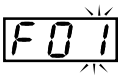
ALARM TEMPERATURE SETTING

Setting of high temperature alarm

The abnormal temperature rise is notified by the blink of alarm indicator and display of chamber temperature, and the alarm buzzer (15 minutes after blink) when the high temperature alarm is set. Always set the high temperature alarm to avoid the damage of storage items due to the temperature rise.

- Settable range of high temperature alarm:
  Between the set temperature of chamber plus 2 °C and
  the set temperature of chamber plus 14 °C
- Initial setting (at factory): the set temperature of chamber plus 5 °C

Example: Changing the high temperature alarm to 3 °C from 5 °C plus the set temperature of chamber. Following shows an example. Change the setting as necessary.

	Description Operation	Key operated	Indication after operation
1		-----	The current chamber temperature is displayed. 
2	Press numerical value shift key for about 5 seconds.	▲	F00 is displayed and the first digit is blinks. 
3	Press numerical value shift key and scroll the figure to 1.	▲	When pressed, the figure of settable digit changes. 
4	Press set key.	SET	The current setting is displayed and the first digit is blinks. 
5	Scroll the figure to 003 by using digit shift key and numerical value shift key.	▶	When pressed, the changeable digit is shifted.
		▲	When pressed, the figure of settable digit changes. 
6	Press set key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed. 

■ The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

<Important>

■ The alarm may be activated after defrosting or when too much items are stored in the chamber, depending on the setting of high temperature alarm. This is not a malfunction. The alarm is cancelled automatically when the chamber temperature reaches the set temperature.

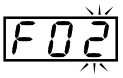
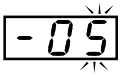
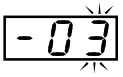
ALARM TEMPERATURE SETTING

Setting of low temperature alarm

The abnormal temperature descent is notified by the blink of alarm indicator and display of chamber temperature, and the alarm buzzer (15 minutes after blink) when the low temperature alarm is set. Always set the low temperature alarm to avoid the damage of storage items due to the temperature descent.

- Settable range of low temperature alarm:
  Between the set temperature of chamber minus 2 °C and
  the set temperature of chamber minus 14 °C
- Initial setting (at factory): the set temperature of chamber minus 5°C

Example: Changing the low temperature alarm to 3 °C from 5 °C minus the set temperature of chamber. Following shows an example. Change the setting as necessary.

	Description Operation	Key operated	Indication after operation
1		-----	The current chamber temperature is displayed. 
2	Press the numerical value shift key for about 5 seconds.	▲	F00 is displayed and the first digit is blinks. 
3	Change 0 to 2 by pressing the numerical value shift key.	▲	When pressed, the figure of settable digit changes. 
4	Press set key.	SET	The current setting is displayed and the first digit is blinks. 
5	Scroll the figure to -03 by using digit shift key and numerical value shift key.	▶	When pressed, the changeable digit is shifted.
		▲	When pressed, the figure of settable digit changes. 
6	Press set key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed. 

■ The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

<Important>

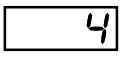
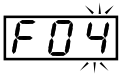
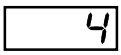
■ The abnormal temperature descent is notified by the blink of alarm indicator and display of chamber temperature, and the alarm buzzer (15 minutes after blink) when the chamber temperature is 0 °C or lower with regardless the setting of low temperature alarm. In this case, the remote alarm terminal is changed to alarm status. This is a precaution against the freezing of storage items.

SETTING OF DELAY OF DOOR ALARM

The door check indicator is light when the door is opened, and the alarm buzzer sounds with some delay to notice the door opening.
The delay time (between lighting of the door check indicator and activation of the alarm buzzer) can be changed. Set an appropriate delay time according to the condition of use to prevent the rise of chamber temperature resulting from inadequate door close.

- Setting range of delay time: 0 and 15 minutes (0 minutes: no delay time)
- Initial setting (factory setting): 2 minutes

Example: Change the delay time to 3 minutes from 2 minutes
Following shows a sample setting. Set the desired delay time according to the condition of use.

	Description of operation	Key operated	Indication after operation
1		-----	The current chamber temperature is displayed. 
2	Press up arrow key for about 5 seconds.	▲	F00 is displayed and the first digit blinks. 
3	Change 0 to 4 by pressing the numerical value shift key.	▲	When pressed, the figure of settable digit changes. 
4	Press set key.	SET	The current setting (002) is displayed and the first digit blinks. 
5	Press up arrow key and scroll the figure to 3.	▲	The display is changed to 003 from 002. 
6	Press set key.	SET	Delay time is memorized and the current chamber temperature is displayed. 

■ The setting mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation (auto-return function). In this case, the setting is not accepted.

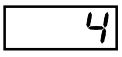
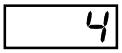
SETTING OF ALARM BUZZER RECOVERY

The alarm buzzer recovers and notifies the abnormality again after preset period (alarm buzzer recovery time) if the same alarm status is continued after the alarm buzzer is stopped by pressing the alarm buzzer stop key (BUZZER). Always set the alarm buzzer recovery time to avoid the false recognition of alarm status.

- Settable range of alarm buzzer recovery time:
  10 minutes interval between 10 and 60 minutes (setting; between 010 and 060) or
  No recovery (setting; 000)
- Initial setting (at factory): 30 minutes

The alarm buzzer never recovers once the alarm buzzer is silenced by pressing the alarm buzzer stop key (BUZZER) if the alarm buzzer recovery time is set to 000 (no recovery). Nevertheless, the alarm buzzer sounds when other alarm status is detected.

Example: Changing the alarm buzzer recovery time to 20 minutes from 30 minutes.
Following shows an example. Change the setting as necessary.

	Description Operation	Key operated	Indication after operation
1		-----	The current chamber temperature is displayed. 
2	Press numerical value shift key for about 5 seconds.	▲	F00 is displayed and the first digit is blinks. 
3	Set the figure to F25 with the digit shift key and numerical value shift key.	▶	When pressed, the figure of settable digit changes.
		▲	When pressed, the figure of settable digit changes. 
4	Press set key.	SET	The current resume time is displayed. The second digit is blinks. 
5	Scroll the figure to 020 with the numerical value shift key.	▲	When pressed, the figure of settable digit changes. 
6	Press set key.	SET	The setting is memorized and the current chamber temperature is displayed. 

- The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.
- Do not set the alarm buzzer resume time during the alarm status.

OPERATION CHECK AFTER RECOVERY

After recovery from a power failure, the unit will resume operation automatically with the setting (chamber temperature, lock of temperature setting, alarm temperature, alarm buzzer recovery time) before power failure. Accordingly, there is no need for re-set however, always check the running status after recovery.

■ The setting is memorized by nonvolatile memory during power failure.

<Attention>

■ After resume time from a power failure, always check the unit starts the operation normally with the setting before power failure.

REMOTE ALARM TERMINAL (OPTION)

There is a remote alarm terminal to battery mounting box (KM-RPP01BB1W) of the optional component.

When using the remote alarm terminal to take out the output from the contact terminal.

The alarm is outputted from this terminal. Contact capacity is DC 30 V, 2 A.

Contact output:

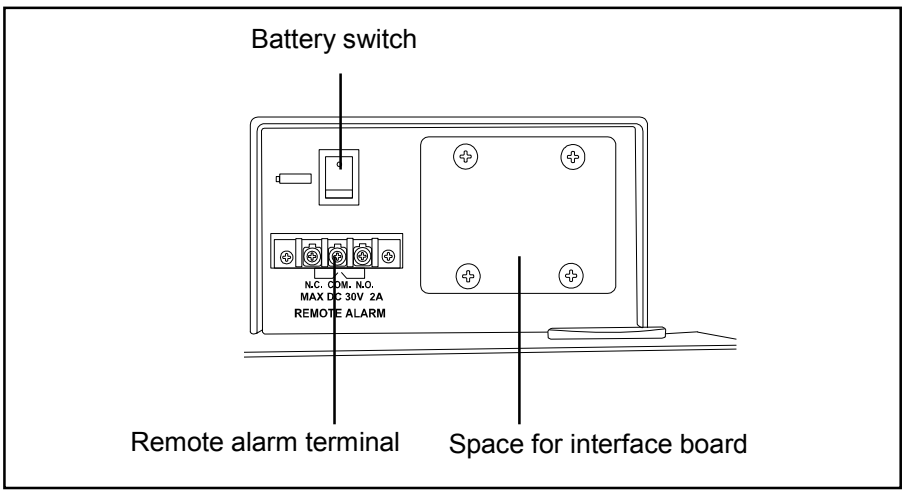
	between COM. and N.O.	between COM. and N.C.
At normal	Open	Close
At abnormal	Close	Open

Note:

■ The buzzer is silenced by pressing alarm buzzer stop key (BUZZER) on the control panel during alarm condition. (A remote alarm is continuing the operation.)

The buzzer will be activated again after certain suspension if the alarm condition is continued.

■ The alarm is actuated when the power supply plug is disconnected from the outlet or the power switch is OFF.



ALARM FUNCTIONS

This unit has the alarm functions shown below.
Contact our sales representative or agent after moving the storage items to other refrigerator if the alarm status continues because there is a possibility of any failure.

Alarms	Situation	Indication	Alarm buzzer	Remote alarm
High temperature alarm	The chamber temperature reaches the setting of high temperature alarm.	Alarm indicator blinks. Displayed temp. blinks.	Intermittent tone with 15 minutes delay	Alarm status with 15 minutes delay. (KM-RPP01BB1W installed)
Low temperature alarm	The chamber temperature reaches the setting of low temperature alarm.	Alarm indicator blinks. Displayed temp. blinks.	Intermittent tone with 15 minutes delay	Alarm status with 15 minutes delay. (KM-RPP01BB1W installed)
0 °C alarm	The chamber temperature reaches 0 °C.	Alarm indicator blinks. Displayed temp. blinks.	Intermittent tone	Alarm status. (KM-RPP01BB1W installed)
Power failure alarm	Power failure. The power supply cord is disconnected. The power switch is off. (KM-RS16A1E/KM-RS34A1E only)	-----	-----	-----
Power failure alarm (KM-RPP01BB1W installed)		Alarm indicator blinks.	Intermittent tone	Alarm status.
Door alarm	The door is open.	Door check indicator lights.	Intermittent tone with 2 minutes delay.	-----

■ The remote alarm terminal is in alarm status in conjunction with the alarm buzzer. However, the alarm status of the remote alarm terminal is not cancelled by pressing the alarm buzzer stop key (BUZZER).

SAFETY FUNCTIONS

This unit has the safety functions shown below.

Safety	Situation	Indication and alarm buzzer	Safety operation
Over-heat protection	Thermal fuse temperature exceeds 70 °C	-----	The defrost heater is off to avoid the temperature rise.
Over-cool protection	The temperature is lower than about 0 °C.	-----	Compressor is off to avoid the temperature descent.
Auto-return	There is no key pressing for 90 seconds in the setting mode.	-----	The setting mode is returned to the temperature display mode.
Key lock	The key lock is ON (L1).	-----	Change of temperature setting is disable.

SELF DIAGNOSTIC FUNCTIONS

This unit has the self diagnostic functions shown below.
Contact our sales representative or agent if an error code (ex. E01) is displayed resulting from the self diagnostic.

Self diagnostic	Situation	Indication	Alarm buzzer	Remote alarm
Sensor abnormality	The thermal sensor is disconnected.	Alarm indicator blinks. E01 and -50 is displayed alternately.	Intermittent tone	Alarm status (KM-RPP01BB1W installed)
	The thermal sensor is short-circuited.	Alarm indicator blinks. E02 and 50 is displayed alternately.		
	The defrost sensor is disconnected.	Alarm indicator blinks. E03 and chamber temp. are displayed alternately.		
	The defrost sensor is short-circuited.	Alarm indicator blinks. E04 and chamber temp. are displayed alternately.		
Battery switch check (KM-RPP01BB1W installed)	When a battery switch is off and the alarm buzzer stop key (BUZZER) are pressed	Alarm indicator blinks. E09 blinks for about 5 seconds	Intermittent tone (about 5 seconds)	-----
LED light abnormality	LED light circuit is short-circuited.	Alarm indicator blinks. E16 and chamber temp. is displayed alternately.	Intermittent tone	Alarm status (KM-RPP01BB1W installed)
Battery check (KM-RPP01BB1W installed)	About 3 years have passed with the power switch on. (time to replace the battery)	F-1 and chamber temp. is displayed alternately.	-----	-----

■ The remote alarm terminal is in alarm status in conjunction with the alarm buzzer. However, the alarm status of the remote alarm terminal is not cancelled by pressing the alarm buzzer stop key (BUZZER).

ROUTINE MAINTENANCE

⚠ CAUTION

Always disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Cleaning of cabinet

■ Clean the unit once a month. Regular cleaning keeps the unit looking new.

■ Use a dry cloth to wipe off small amounts of dirt on the outside and inside of the unit and all accessories. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. Wipe off the condensation on the glass or exterior of the cabinet with a dry soft cloth. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.)

After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the cabinet or accessories with a dry cloth.

<Important>

■ Never pour water onto or into the unit. This may cause electric shock or failure.

■ **Do not use a brush, an acid, a thinner, a laundry soap, a powder detergent, boiling water for cleaning.** These cause damage of painted surface or failure of plastic and rubber components. Also, do not wipe the plastic and rubber components by a volatile material.

Cleaning of evaporating tray

The evaporating tray is placed in the bottom rear of the unit. Clean the evaporating tray twice or three times a year.

1. Remove the fixing plate by pulling the clip toward front. (Fig.1)

2. Pull out the evaporating tray. (Fig.2)

3. Dispose remaining water in the evaporating tray.

4. Clean the evaporating tray with a dilute neutral dishwashing detergent and then rinse away the detergent with water. Do not use hot water.

5. After the cleaning, replace the fixing plate to its original position, and fix it by the clips.

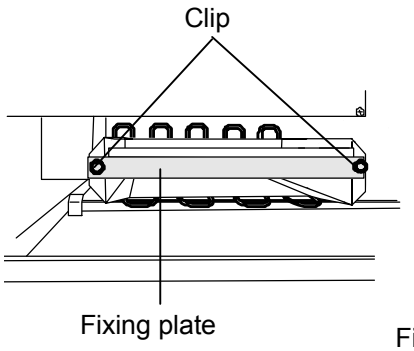


Fig.1

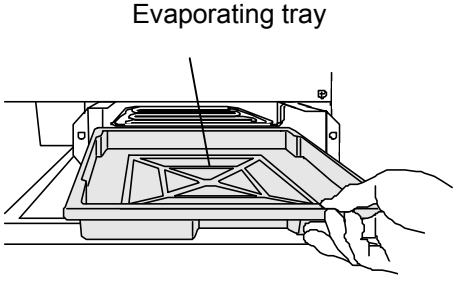


Fig.2

TROUBLESHOOTING

If the unit malfunctions, check out the following before calling for service.

Malfunction	Check/Remedy
If nothing operates even when plugged in	■ The unit is not connected to the power supply properly. ■ The capacity and voltage of power supply is not sufficient. ■ There is a power failure. ■ The circuit breaker on the supply circuit is activated. → A breaker of 15 A or more is recommended.
The alarm is activated at start-up	■ The alarm status is kept until the chamber temperature reaches the set temperature. ■ The alarm buzzer recovers after 30 minutes even if the alarm buzzer is silenced by pressing the alarm buzzer stop key (BUZZER).
The alarm is activated during operation	■ The door was kept opened for a long time. ■ The door is opened. ■ An error code is displayed on the temperature display. (page 24) → Contact our sales representative or agent.
Noisy	■ The floor is not sturdy. ■ The installation site is not level. ■ The unit is tilted. ■ The cabinet contacts the surrounding wall.
When the refrigerator does not get cold enough	■ The door is frequently opened. ■ The unit is in direct sunlight. ■ The ventilation around the unit is blocked. ■ There is a nearby heat source. ■ The ambient temperature is too high. → The allowable ambient temperature is between -5 ^{o}C and 35 ^{o}C. ■ The storage items are too much. ■ The air exhaust vent is blocked up with storage items. ■ The access port is not covered. → The access port should be covered with the insulation and rubber caps when no use.

DISPOSAL OF UNIT

⚠ WARNING

If the unit is to be stored unused in an unsupervised area for an extended period **ensure that children do not have access and doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Always remove doors to prevent accidents such as suffocation.

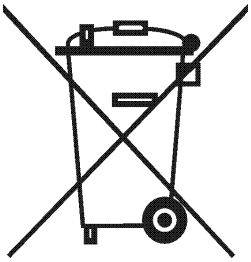
Decontamination of chamber

Before disposing a pharmaceutical refrigerator with biohazardous danger, decontaminate the pharmaceutical refrigerator to the extent possible by the user.

DISPOSAL OF UNIT

Note:
This symbol mark and recycle system are applied only to EU countries and not applied to the countries in the other area of the world.

Waste Electrical and Electronic Equipment (WEEE) Directive-2002/96/EC



(English)
Your Panasonic product is designed and manufactured with high quality materials and components which can be recycled and reused.

This symbol means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from your household waste.

Please dispose of this equipment at your local community waste collection/recycling centre.

In the European Union there are separate collection systems for used electrical and electronic products.

Please help us to conserve the environment we live in!

(German)
Ihr Panasonic Produkt wurde entworfen und hergestellt mit qualitativ hochwertigen Materialien und Komponenten, die recycelt und wiederverwendet werden können.

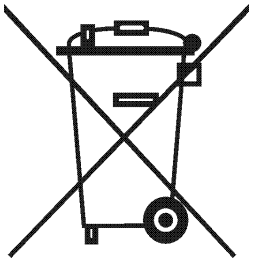
Dieses Symbol bedeutet, daß elektrische und elektronische Geräte am Ende ihrer Nutzungsdauer von Hausmüll getrennt entsorgt werden sollen.

Bitte entsorgen Sie dieses Gerät bei Ihrer örtlichen kommunalen Sammelstelle oder im Recycling Centre.

In der Europäischen Union gibt es unterschiedliche Sammelsysteme für Elektrik- und Elektronikgeräte.

Helfen Sie uns bitte, die Umwelt zu erhalten, in der wir leben!

DISPOSAL OF UNIT



(French)
Votre produit Panasonic est conçu et fabriqué avec des matèriels et des composants de qualité supérieure qui peuvent être recyclés et réutilisés.

Ce symbole signifie que les équipements électriques et électroniques en fin de vie doivent être éliminés séparément des ordures ménagères.

Nous vous prions donc de confier cet équipement à votre centre local de collecte/recyclage.
Dans l'Union Européenne, il existe des systèmes sélectifs de collecte pour les produits électriques et électroniques usagés.

Aidez-nous à conserver l'environnement dans lequel nous vivons !

Les machines ou appareils électriques et électroniques contiennent fréquemment des matières qui, si elles sont traitées ou éliminées de manière inappropriée, peuvent s'avérer potentiellement dangereuses pour la santé humaine et pour l'environnement.
Cependant, ces matières sont nécessaires au bon fonctionnement de votre appareil ou de votre machine. Pour cette raison, il vous est demandé de ne pas vous débarrasser de votre appareil ou machine usagé avec vos ordures ménagères.

(Spanish)
Los productos Panasonic están diseñados y fabricados con materiales y componentes de alta calidad, que pueden ser reciclados y reutilizados.

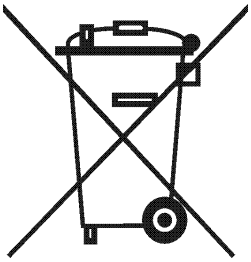
Este símbolo significa que el equipo eléctrico y electrónico, al final de su ciclo de vida, no se debe desechar con el resto de residuos domésticos.

Por favor, deposite su viejo equipo en el punto de recogida de residuos o contacte con su administración local.

En la Unión Europea existen sistemas de recogida específicos para residuos de aparatos eléctricos y electrónicos.

Por favor, ayúdenos a conservar el medio ambiente!

DISPOSAL OF UNIT



(Portuguese)
O seu produto Panasonic foi concebido e produzido com materiais e componentes de alta qualidade que podem ser reciclados e reutilizados.

Este símbolo significa que o equipamento eléctrico e electrónico no final da sua vida útil deverá ser descartado separadamente do seu lixo doméstico.

Por favor, entregue este equipamento no seu ponto local de recolha/reciclagem.

Na União Europeia existem sistemas de recolha separados para produtos eléctricos e electrónicos usados.

Por favor, ajude-nos a conservar o ambiente em que vivemos!

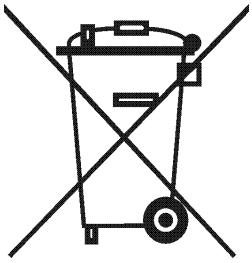
(Italian)
Il vostro prodotto Panasonic è stato costruito da materiali e componenti di alta qualità, che sono riutilizzabili o riciclabili.

Prodotti elettrici ed elettronici portando questo simbolo alla fine dell'uso devono essere smaltiti separatamente dai rifiuti casalinghi.

Vi preghiamo di smaltire questo apparecchio al deposito comunale.
Nell'Unione Europea esistono sistemi di raccolta differenziata per prodotti elettrici ed elettronici.

Aiutateci a conservare l'ambiente in cui viviamo!

DISPOSAL OF UNIT



(Dutch)
Panasonic producten zijn ontwikkeld en gefabriceerd uit eerste kwaliteit materialen, de onderdelen kunnen worden gerecycled en weer worden gebruikt.

Het symbool betekent dat de elektrische en elektronische onderdelen wanneer deze vernietigd gaan worden , dit separaat gebeurt van het normale huisafval.

Zorg ervoor dat het verwijderen van de apparatuur bij de lokaal erkende instanties gaat gebeuren.
In de Europese Unie wordt de gebruikte elektrische en elektronische apparatuur bij de daarvoor wettelijke instanties aangeboden.

Alstublieft help allen mee om het milieu te beschermen.

(Swedish)
Din Panasonic produkt är designad och tillverkad av material och komponenter med hög kvalitet som kan återvinnas och återanvändas.

Denna symbol betyder att elektriska och elektroniska produkter, efter slutanvändande, skall sorteras och lämnas separat från Ditt hushållsavfall.

Vänligen, lämna denna produkt hos Din lokala mottagningstation för avfall/återvinningsstation.

Inom den Europeiska Unionen finns det separata återvinningssystem för begagnade elektriska och elektroniska produkter.

Vänligen, hjälp oss att bevara miljön vi lever i!

TEMPERATURE RECORDER (OPTION)

Installation of temperature recorder (OPTION)

The chamber temperature is recorded and maintained by attaching a temperature recorder available as an optional component. For the attachment, the recorder fixing is necessary. Consult our sales representative or agent for the temperature recorder installation.

Temperature recorder	Recorder fixing
MTR-0621LH-PA or MTR-0621LH-PE	MPR-S30-PW
MTR-G04A-PA or MTR-G04C-PE	MPR-S7-PW

Setting of MTR-0621LH-PA or MTR-0621LH-PE

Pull the knob on the upper part of the recorder forward to change the recording paper or battery.

Setting of recording paper

1. The information on the recording paper is shown in Fig. 1.

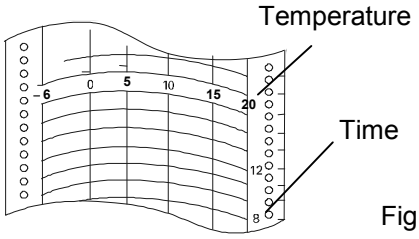


Fig. 1

2. Pull the cartridge up after opening the top lid. The lid can be opened by turning the knob counterclockwise. See Fig. 2.

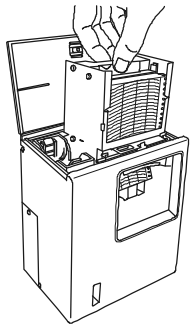


Fig. 2

3. As shown in Fig. 3, insert the recording paper with the "begin" tab placed in the cartridge. Check that the printed side is facing out.

4. Place the recording paper beneath the arm and between the plate spring and guide plate in the direction of the arrow.

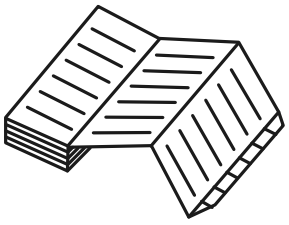


Fig. 3

Note:

- Do not scratch or put pressure on the recording paper.
- Do not bend the recording paper.
- Do not reverse the recording paper manually.

The used recording paper left in the used recording paper compartment can cause a malfunction. Be sure to remove it. See Fig. 4.

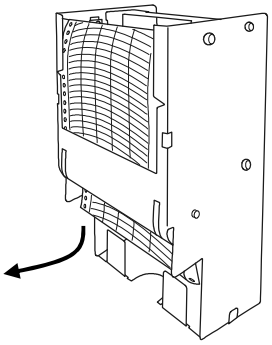


Fig. 4

TEMPERATURE RECORDER (OPTION)

5. Place the recording paper between the guide and the guide plate. Slide the recording paper along the guide plate so that the recording paper will not be forced out of the date/hour slot. See Fig. 5.

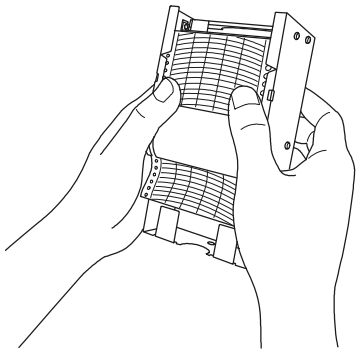


Fig. 5

6. After ascertaining that the holes on the side of the paper are locked into the teeth of the sprocket, turn the gear and send the paper into the used paper compartment.

Setting of time

1. Turn the gear on the date/hour slot to the desired time.

2. After properly folding the recording paper in the used or unused paper compartment, replace the cartridge.

Removing of the used recording paper

After recording, take out the cartridge and remove the recording paper from the recording paper outlet. If not all of the recording paper has been fed into the used recording paper compartment, send all the recording paper in the compartment first turning the gear.

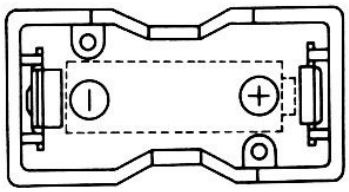


Fig. 6

Battery replacement

To replace the battery, turn the knob counterclockwise to open the lid. Place the battery in the battery case according to the plus-minus indications on the bottom of the battery case. See Fig. 6 At the time of the first use the battery.

Start-up

1. The quartz motor is started by placing a “R14” or size “C” dry cell battery in the battery case.

2. Check the operation of the recorder using the quartz motor rotation check gear.

3. Replace the battery once a year.

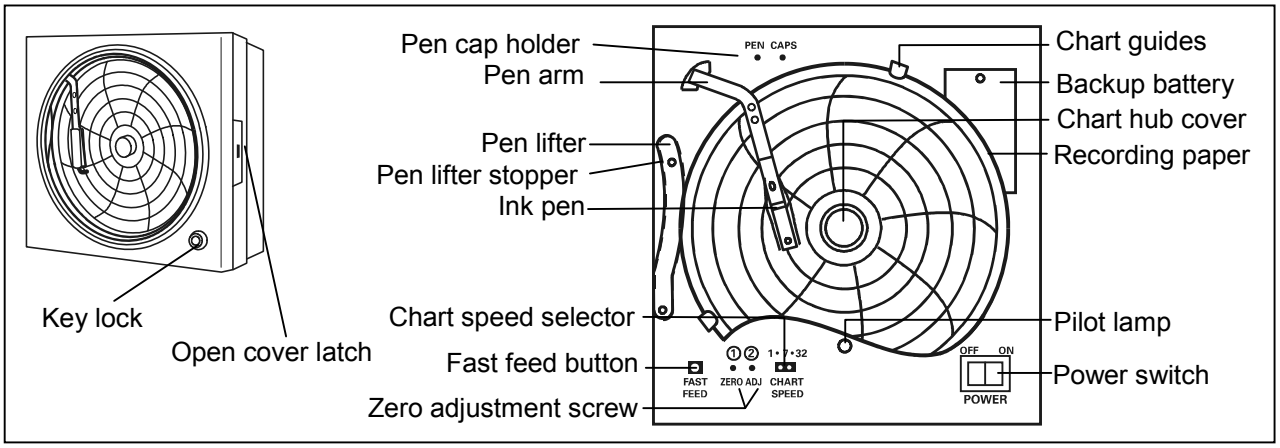
Stopping

The temperature recorder is stopped by taking the battery out of the battery case.

TEMPERATURE RECORDER (OPTION)

Setting of MTR-G04A-PA or MTR-G04C-PE

If the warning is required for the internal temperature record or the interior temperature deviates from the target temperature, an optional temperature recorder (MTR-G04A-PA, MTR-G04C-PE) is available.



Loading the ink pen:

1. Slightly raise the end of the ink pen lifter and remove from the lifter stopper. Then rotate clockwise as shown in Fig. 1.

2. Remove the ink pen from the bag and remove its cap. The cap can be conveniently kept on the cap holder located at the upper left corner.

3. Press both sides of the pen arm as indicated by the arrows to open the head clamp at A and B. (See to Fig. 2 illustration 1)

4. Position the ink pen so that the guide pins fit into the guide holes on the pen arm. (See to Fig. 2 illustration 2)

5. Press the two sides of the head clamp as indicated by the arrows to secure the ink pen. (See to Fig. 2 illustration 3) From the side view, the cartridge should fit perfectly on the arm. Confirm that the pen arm is attached to both sides of the ink pen.

6. After loading the ink pen, return the pen lifter to the original position. Confirm that the pen lifter has securely entered the pen lifter stopper.

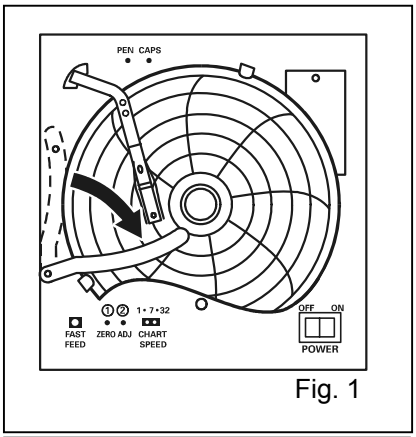


Fig. 1

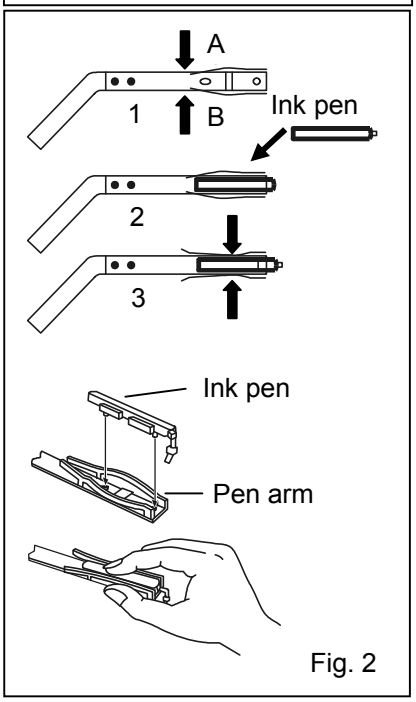


Fig. 2

TEMPERATURE RECORDERS (OPTON)

Starting recording and setting the time:

Turn the power switch ON. The pen will move inward on the circular recording paper and stop temporarily at the 0% position (equivalent to the 40 °C line). Then the ink pen will move to the position which indicates the measured temperature. (Fig.3)

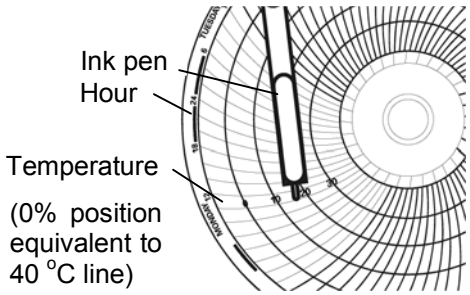


Fig. 3

Time setting Method:

Place the recording paper at a position slightly in front of the desired time (the recording paper is rotated to the left). Set the time by using the fast feed button to quickly rotate the recording paper.

The fast feed button can be used to accurately set the time.

When the recording paper speed is set to 32 days:

The center of the recording paper is divided into 32 equal sections. The lines extending from these lines serve as the 32-day time scale. (Fig.4)

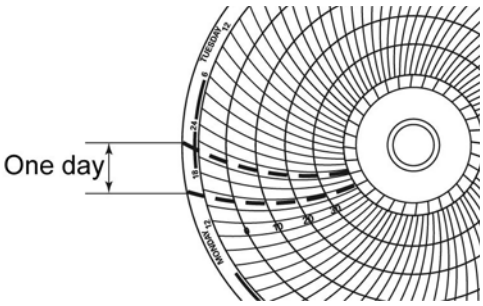


Fig. 4

Stopping recording:

1. Turn OFF the power switch.

2. When recording is stopped for a prescribed period, place the caps back on the ink pen to prevent the ink from evaporating.

Replacing the recording paper:

1. Slightly raise the end of the pen lifter and remove from the pen lifter stopper. Then rotate the pen lifter clockwise until it rests on top of the pen lifter.

2. Remove the recording chart hub cover, and then replace the recording paper.

3. Place the chart hub cover. Remove and dispose of the piece of paper. Confirm that the new recording paper is inside of the chart guides.

4. Set the correct time.

INTERFACE BOARD (OPTION)

The temperature log of our medical equipment can be loaded into a personal computer by using the combination of optional interface board (MTR-480) and data acquisition system (MTR-5000). For the loading, RS-232C is needed to connect our medical equipment with a personal computer.
The combination of optional LAN interface board (MTR-L03) and data acquisition system (MTR-5000) enables the equipment monitoring (such as chamber temperature) by connecting our medical equipment with the data acquisition system (MTR-5000) with LAN.

■ The interface board (MTR-480) and LAN interface board (MTR-L03) cannot used at the same time.
■ Contact our sales representative or agent for the purchase of interface board.

DATA ACQUISITION SYSTEM (OPTION)

By using the optional data acquisition system (MTR-5000), the data from our medical equipment can be acquired and maintained with a personal computer through an optional interface board (MTR-480) or LAN interface board (MTR-L03). The data acquisition system (MTR-5000) is not applicable to some of our medical equipment.
In addition, auto-mailing function sends an e-mail to a specified mail address when any abnormality is detected in the running status of equipment. This reduces the risk of damage of storage items.

■ Contact our sales representative or agent for the purchase of data acquisition system.

SPECIFICATIONS

Product name	Pharmaceutical refrigerator KM-RS16A1	Pharmaceutical refrigerator KM-RS34A1
External dimensions	W800 mm x D465 mm x H1090 mm	W800 mm x D465 mm x H1800 mm
Internal dimensions	W720 mm x D300 mm x H725 mm	W720 mm x D350 mm x H1435 mm
Effective capacity	158 L	340 L
Exterior	Painted steel	
Interior	Stainless steel	
Door	Sliding type, 2-layer pair glass with heat ray reflection film x 2	Sliding type, 2-layer pair glass with heat ray reflection film x 4
Insulation	Rigid polyurethane foamed-in place	
Shelf	Hard steel wire on clear coating x 2, Allowable load; 20 kg/shelf Inner dimensions; W700 mm x D238 mm	Hard steel wire on clear coating x 5, Allowable load; 20 kg/shelf Inner dimensions; W700 mm x D238 mm
Access port	Inner diameter; 30 mm, Rear side	
Cooling method	Forced air circulation, Direct cooling	
Compressor	Hermetic type, Output; 90 W	Hermetic type, Output; 160 W
Evaporator	Fin and tube type	
Condenser	Wire and tube	
Refrigerant	R-407D	
Defrosting	New cycle defrost and forced defrost	
Defrost heater	87 W	91 W (USA only), 101 W (Other area)
Drain-pan heater	25 W	
Temperature controller	Electronic control system	
Temperature display	Digital display (in 1 °C increments)	
Thermal sensor	Thermister sensor	
Alarms	High temp. alarm, Low temp. alarm, 0 °C alarm, Door alarm, Power failure alarm (When it connected option goods KM-RPP01BB1W, a remote alarm is output only.)	
Lamp	LED Light	
Weight	71 kg	100 kg
Accessories	1 set of key	
Optional components	Temperature recorder (MTR-0621LH-PA or MTR-0621LH-PE), Temperature recorder (MTR-G04A-PA or MTR-G04C-PE), Recorder fixing for MTR-0621LH-PA or MTR-0621LH-PE (MPR-S30-PW), Recorder fixing for MTR-G04A-PA or MTR-G04C-PE(MPR-S7-PW) Battery mounting box (KM-RPP01BB1W) Data acquisition system (MTR-5000-PW) Interface board (MTR-480-PW), LAN interface board (MTR-L03-PW)	

■ Design or specifications will be subject to change without notice.

■ Refer to the updated catalog when ordering an optional component.

PERFORMANCE

Product name	Pharmaceutical refrigerator KM-RS16A1	
Model number	KM-RS16A1K KM-RS16A1T KM-RS16A1R	KM-RS16A1E
Temperature control range	Between 2 °C and 14 °C (ambient temp.; -5 °C to 35 °C, no load)	
Noise level	35 dB (A scale)	
Maximum pressure	1800 kPa	
Rated voltage	AC 220 V	AC 220 V/230 V/240 V
Rated frequency	60 Hz	50 Hz
Power consumption	140 W	130 W
Usable condition	-5 °C to 35 °C, 80%R.H. or less	

Product name	Pharmaceutical refrigerator KM-RS34A1		
Model number	KM-RS34A1A	KM-RS34A1K KM-RS34A1T KM-RS34A1R	KM-RS34A1E
Temperature control range	Between 2 °C and 14 °C (ambient temp.; -5 °C to 35 °C, no load)		
Noise level	40 dB (A scale)		
Maximum pressure	2000 kPa		
Rated voltage	AC 110 V/115 V	AC 220 V	AC 230 V/240 V
Rated frequency	60 Hz	50 Hz/60 Hz	50 Hz
Power consumption	200 W	185 W/195 W	185 W
Usable condition	-5 °C to 35 °C, 80%R.H. or less		

- The above data is measured based on our internal basis.
- Design or specifications will be subject to change without notice.
- The unit with CE mark complies with EC directives.

⚠ CAUTION

Please fill in this form before servicing.
Hand over this form to the service engineer to keep for his and your safety.

Safety check sheet

1. Refrigerator contents : ☐Yes ☐No
   Risk of infection: ☐Yes ☐No
   Risk of toxicity: ☐Yes ☐No
   Risk from radioactive sources: ☐Yes ☐No

   (List all potentially hazardous materials that have been stored in this unit.)
   Notes :

2. Contamination of the unit
   Unit interior ☐Yes ☐No
   No contamination ☐Yes ☐No
   Decontaminated ☐Yes ☐No
   Contaminated ☐Yes ☐No
   Others:

3. Instructions for safe repair/maintenance of the unit
   a) The unit is safe to work on ☐Yes ☐No
   b) There is some danger (see below) ☐Yes ☐No
   Procedure to be adhered to in order to reduce safety risk indicated in b) below.

Date :
Signature :
Address, Division :
Telephone :

Product name : Pharmaceutical Refrigerator	Model : KM-	Serial number :	Date of Installation :

Please decontaminate the unit yourself before calling the service engineer.