Service Manual

Split Wall-Mounted Type
Room Air Conditioner
(ALLEGRO PLUS SERIES)

Model applied:
42HQE009QC/38YE009QC
42HQE012QC/38YE012QC

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1.6 Outdoor unit overload current protection.
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1.10 Quickly connected piping and cable

2. Specification

Model			42HQE009QC/38YE009QC	42HQE012QC/38YE012QC
Power supply		Ph-V-Hz	1, 220-240V~, 50Hz	1, 220-240V~, 50Hz
Cooling	Capacity	w	2500	3500
	Rated Input	W	890	1250
	Rated current	A	4.2	5.5
	EER	W/W	2.81	2.81
Heating	Capacity	w	2900	4000
	Rated Input	W	900	1250
	Rated current	A	4.2	5.4
	COP	W/W	3.21	3.21
Moisture Removal		L/h	1.0	1.2
Max. input consumption		W	1200	1500
Max. current		A	6	8
Starting current		A	21.7	33
Compressor	Model		PA108X1C-4DZDE	PA145X2C-4FT
	Type		Rotary	Rotary
	Brand		TOSHIBA	TOSHIBA
	Capacity	Btu/h	8820	12045
	Input	W	900	1225
	Rated current(RLA)	A	4.1	5.5
	Thermal protector		B160-135-241E/MRA 13430-9087	UP3RE0591-T56 （INTERNAL：IOL）
	Capacitor	uF	25	35
	Refrigerant oil	ml	350	480
Indoor fan motor	Model		RPG13H	RPG20D
	Brand		Welling	Welling
	Input	W	36.5	44
	Capacitor	uF	1.2	1.5
	Speed(hi/mi/lo)	r/min	1150/1050/950	1180/900/750
Indoor coil	a.Number of rows		2	2
	b.Tube pitch(a)xrow pitch(b)	mm	21x13.37	21x13.37
	c.Fin spacing	mm	1.3	1.3
	d.Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium
	e.Tube outside dia.and type	mm	φ7, innergroove tube	φ7, innergroove tube
	f.Coil length x height x width	mm	578X252X26.74	655×315×26.74
	g.Number of circuits		2	2
Indoor fan	Type	mm	Crossflow	Crossflow
Indoor air flow (Hi/Mi/Lo)		m3/h	450/400/350	642/470/380
Indoor Sound pressure (Hi/Mi/Lo) (LPA) @cooling		dB(A)	38/36/33	41/36/30
Indoor unit	Dimension (W*H*D)	mm	750x250x188	815X280X195
	Packing (W*H*D)	mm	830x336x280	915X360X275

	Net/Gross weight	Kg	12.5/15	14/19.5
Outdoor fan motor	Model		YDK24-6T	YDK24-6F
	Brand		Welling	WELLING
	Input	W	56	56
	Capacitor	uF	3	2.5
	Speed	r/min	840	800
Outdoor coil	a.Number of rows		1	1.6
	b.Tube pitch(a)xrow pitch(b)	mm	25.4x22	21x13.37
	c.Fin spacing	mm	1.4	1.5
	d.Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium
	e.Tube outside dia.and type	mm	φ9.53 innegroove tube	φ7, innergroove tube
	f.Coil length x height x width	mm	684x508x22	775x504x26.74
	g.Number of circuits		2	4
Outdoor fan	Type	mm	Propeller	Propeller
Outdoor air flow		m3/h	1800	2000
Outdoor Sound pressure (LPA) @cooling		dB(A)	53	54
Outdoor unit	Dimension(W*H*D)	mm	700X540X225	780X540X245
	Packing (W*H*D)	mm	815X580X325	910X575X335
	Net/Gross weight	Kg	27/30	34.5/36.5
Refrigerant type R410A		g	850	1000
Design pressure		MPa	4.2	4.2
Refrigerant piping	Liquid side/ Gas side		Quick Connection(4m)	Quick Connection(4m)
Expansion device (Capillary)	Main	mm	Φ2.5*1.3*700	Φ3.2*1.7*1100
	Sub	mm	Φ2.5*1.3*950	Φ2.5*1.5*1100
Operation temp		℃	17-30	17-30
Ambient temp		℃	-7-43	-7-43
Application area		m2	14-21	18-26

Remarks:

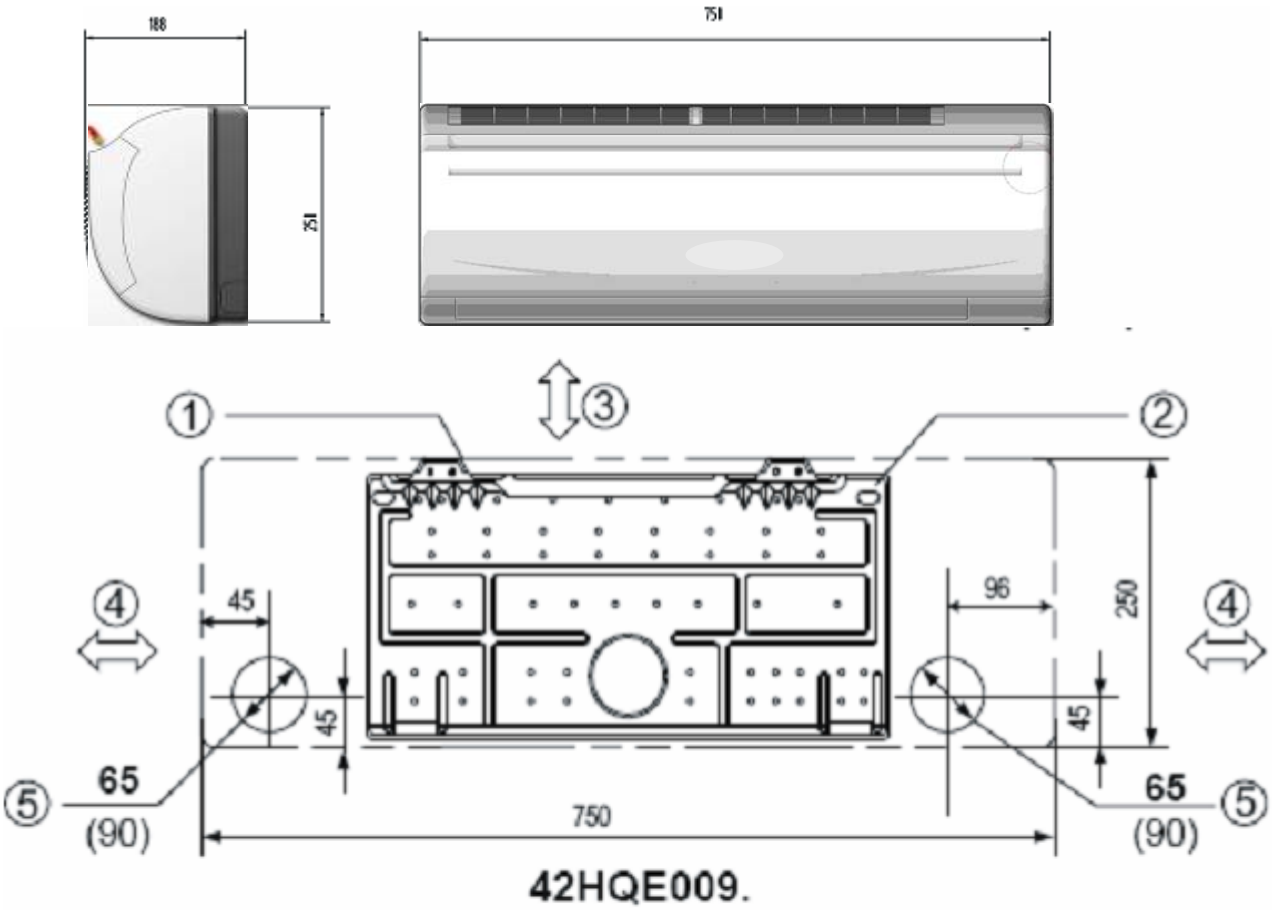
1.Cooling capacities are based on indoor air temp. 27℃ DB, 19℃ WB and outdoor air temp. 35℃ DB, and 24℃ WB. Heating capacities are based on indoor air temp. 20℃ DB, 15℃ WB and outdoor air temp. 7℃ DB, and 6℃ WB.

2. Indoor Sound Pressure level is measured in free field (JIS 9612 std) at 1m distance.

Outdoor Sound Pressure level is measured in hemispherical field, at 4m distance from the unit. these values are normally somewhat different as a result of ambient condition.

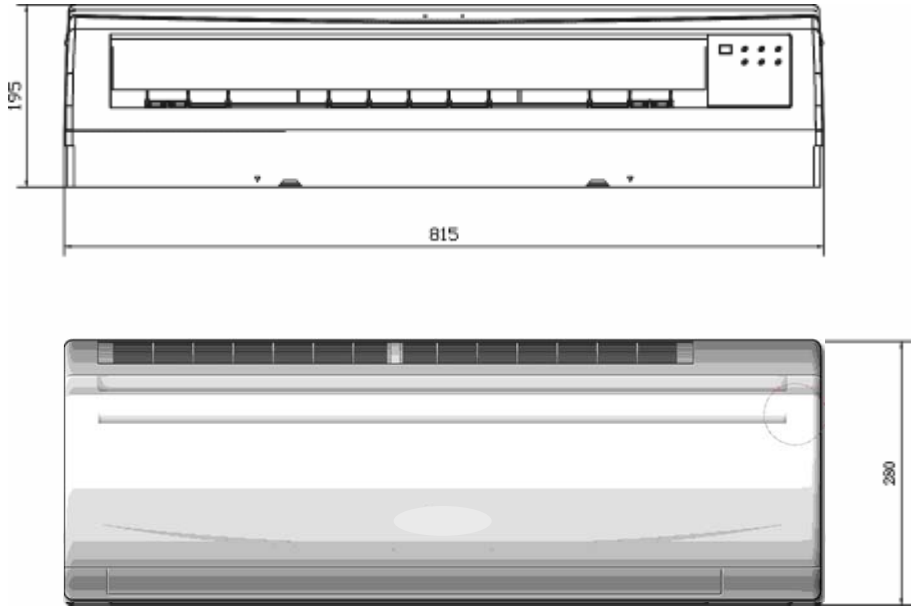
3. Dimensions

3.1 Indoor unit 42HQE009QC



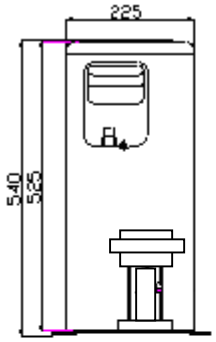
① Indoor unit outline
② Installation plate
③ 150 mm or more to ceiling
④ 120 mm or more to wall
⑤ Left refrigerant pipe hole

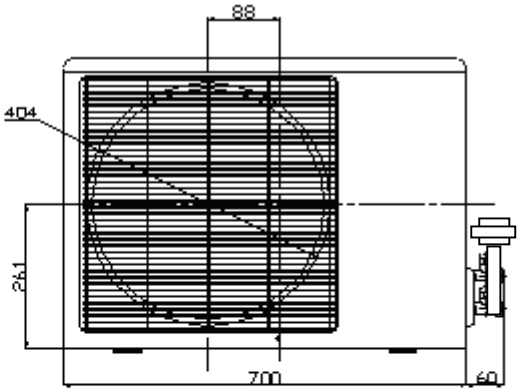
Indoor unit 42HQE012QC

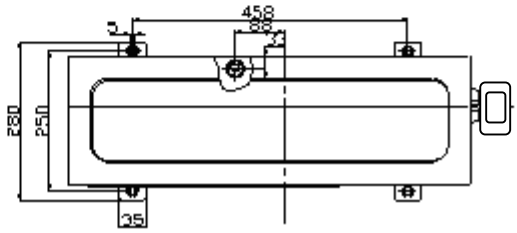


3.2 Outdoor unit

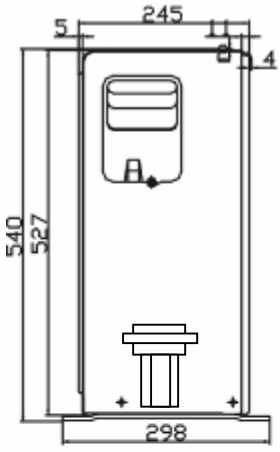
38YE009QC

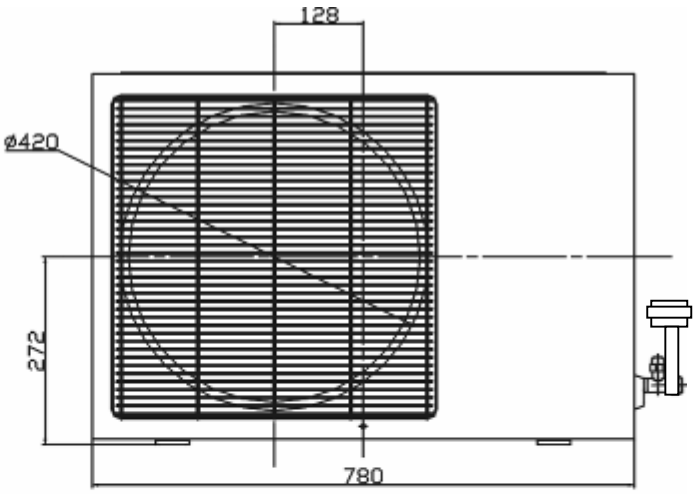


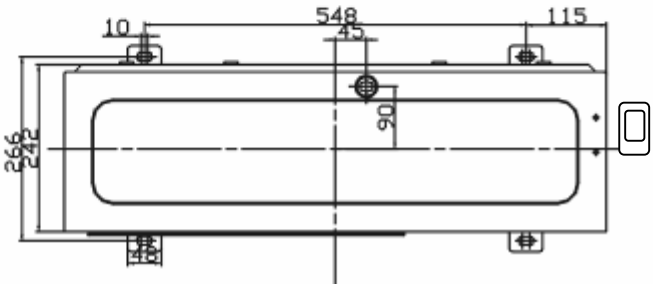




38YE012QC

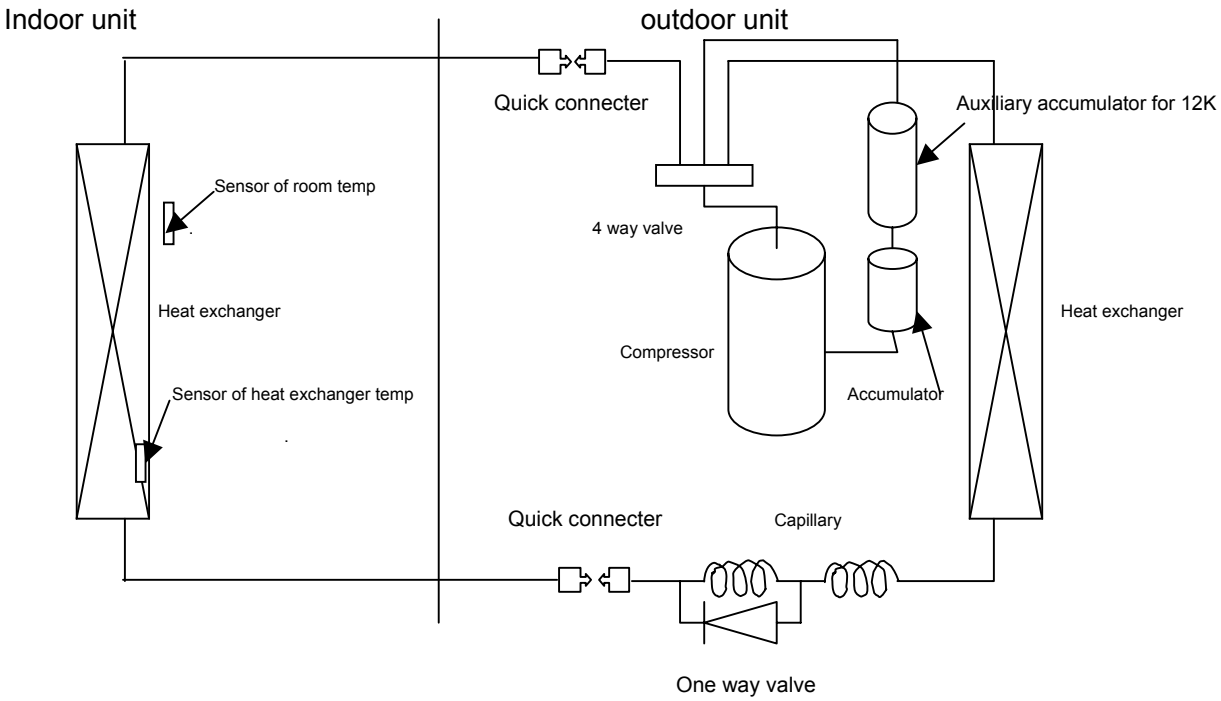






4 Refrigeration cycle diagram

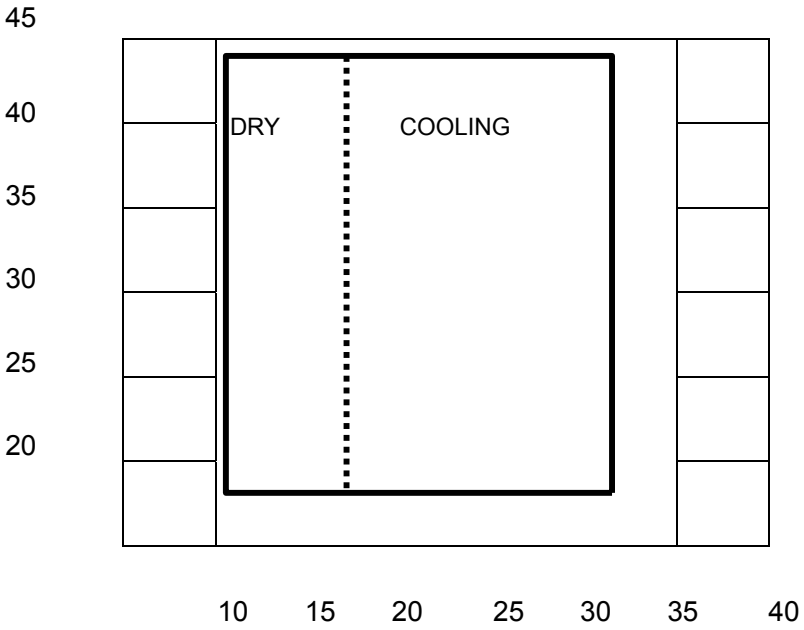
Cooling & heating



5 Operation limits

5.1 Cooling operation

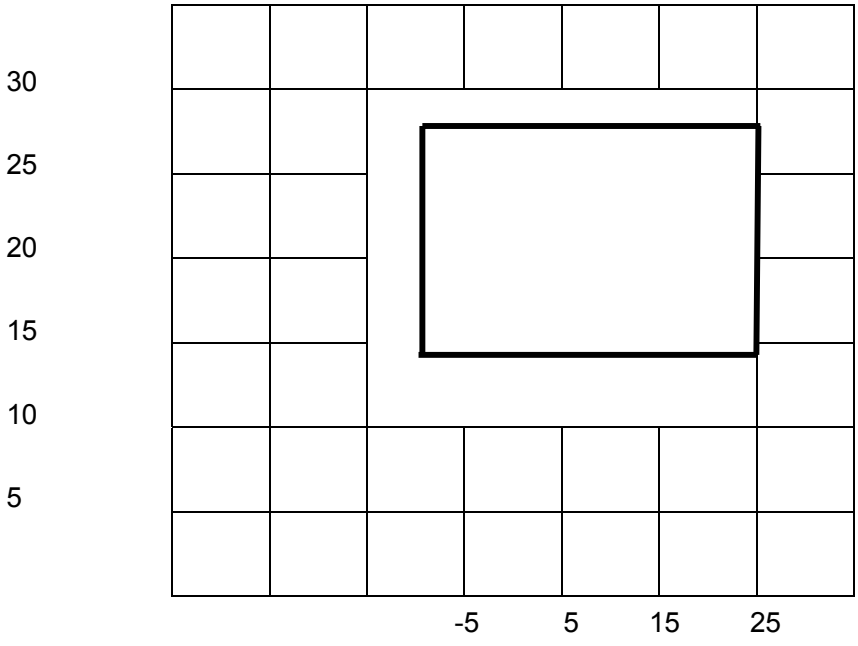
Outdoor air temp. ℃ DB



Note : The chart is the result from the continuous operation under constant air temperature conditions. However, excludes the initial pull-down stage.

5.2 Heating operation

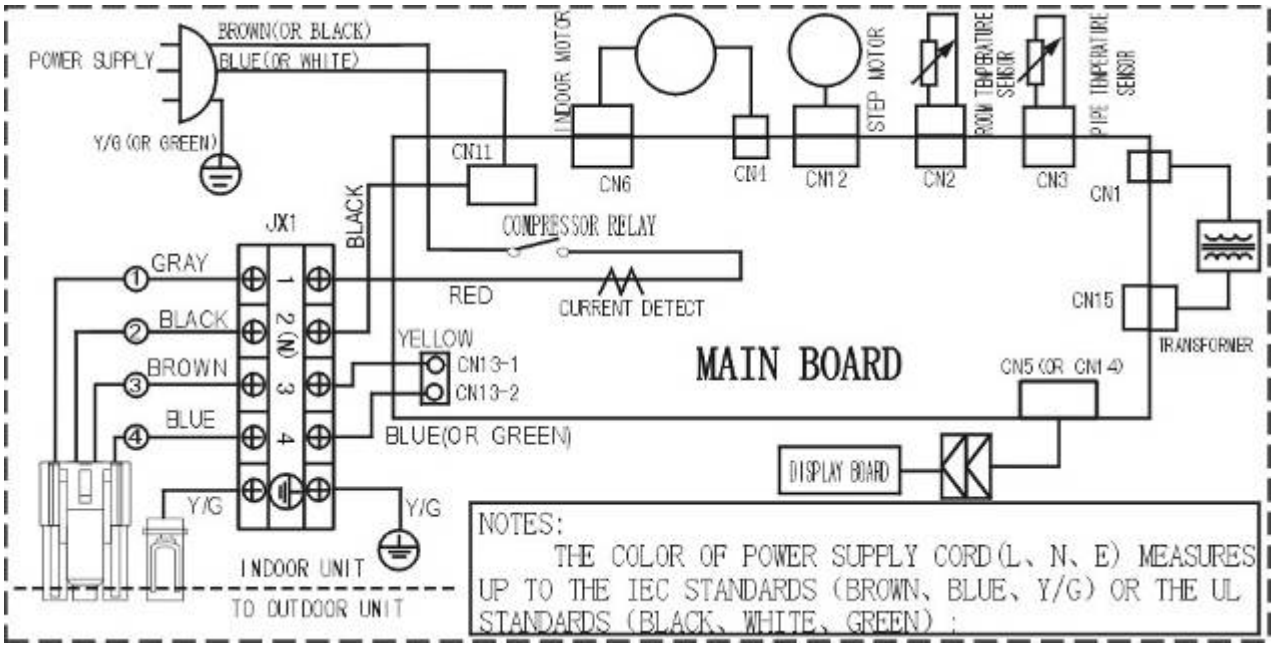
Indoor air temp. ℃ DB



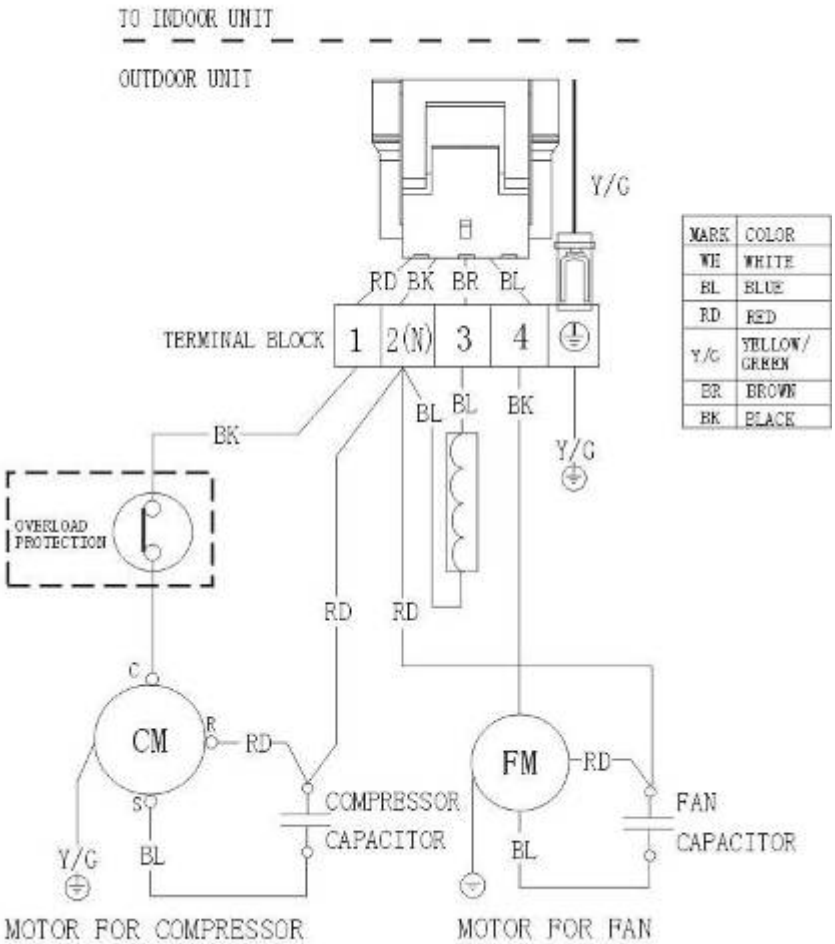
Note : The chart is the result from the continuous operation under constant air temperature conditions. However, excludes the initial pull-down stage.

6 Wiring diagram

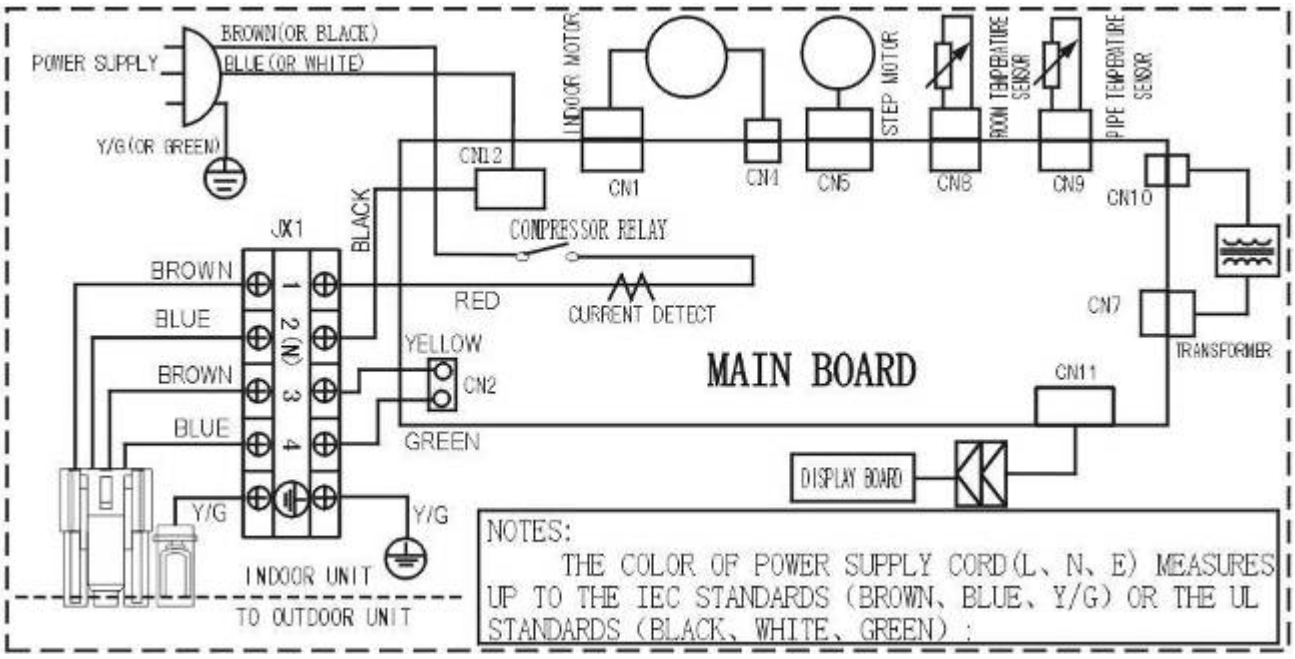
6.1 42HQE009QC / 38YE009QC



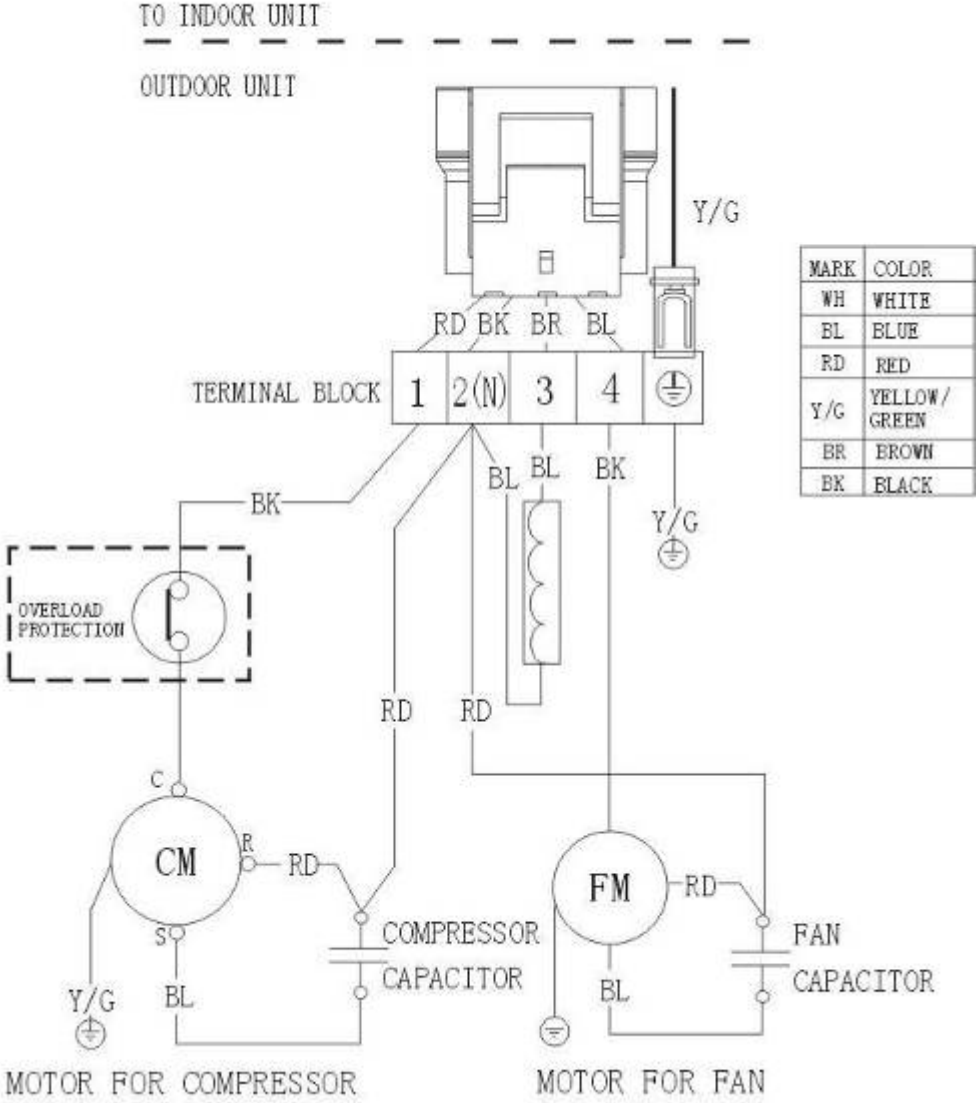
OUTDOOR ELECTRIC WIRING DIAGRAM



6.2 42HQE012QC/ 38YE012QC



OUTDOOR ELECTRIC WIRING DIAGRAM



7 Specification of electrical parts

7.1 Temperature-resistance of room temp. sensor & pipe temp. sensor

Temperature ℃	Resistance KΩ	Temperature ℃	Resistance KΩ	Temperature ℃	Resistance KΩ
-10	62.28	17	14.618	44	4.3874
-9	58.71	18	13.918	45	4.2126
-8	56.37	19	13.263	46	4.0459
-7	52.24	20	12.643	47	3.8867
-6	49.32	21	12.056	48	3.7348
-5	46.57	22	11.5	49	3.5896
-4	44	23	10.973	50	3.451
-3	41.59	24	10.474	51	3.3185
-2	39.82	25	10	52	3.1918
-1	37.2	26	9.5507	53	3.0707
0	35.2	27	9.1245	54	2.959
1	33.33	28	8.7198	55	2.8442
2	31.56	29	8.3357	56	2.7382
3	29.91	30	7.9708	57	2.6368
4	28.35	31	7.6241	58	2.5397
5	26.88	32	7.2946	59	2.4468
6	25.5	33	6.9814	60	2.3577
7	24.19	34	6.6835	61	2.2725
8	22.57	35	6.4002	62	2.1907
9	21.81	36	6.1306	63	2.1124
10	20.72	37	5.8736	64	2.0373
11	19.69	38	5.6296	65	1.9653
12	18.72	39	5.3969	66	1.8963
13	17.8	40	5.1752	67	1.830
14	16.93	41	4.9639	68	1.7665
15	16.12	42	4.7625	69	1.7055
16	15.34	43	4.5705	70	1.6469

7.2 Compressor windings resistance (run & start winding @20℃)

Compressor model	PA108X1C-4DZDE	PA145X2C-4FT
Winding 1 (Main)	3.75±5% Ω	2.35±5% Ω
Winding 2 (Sub)	4.75±5% Ω	3.22±5% Ω

7.3 Indoor fan motor windings resistance (@20℃).

Motor model	RPG13H	RPG20D
Winding 1 (Main)	385±8%	360±8%
Winding 2 (Sub)	400±8%	291±8%

7.4 Outdoor fan motor windings resistance(@20℃).

Motor model	YDK24-6T	YDK24-6F
Winding 1 (Main)	170±8%	440±8%
Winding 2 (Sub)	195±8%	215±8% Ω

8 Troubleshooting

For all heat pump model

Failure phenomenon	Operation lamp	Timer lamp	Defrosting lamp
Over current protection of the compressor occurs 4 times	☆	X	☆
Indoor fan speed has been out of control for over 1 minute	X	☆	☆
No over-zero signal	☆	☆	☆
Temp. sensor on indoor evaporator is open circuit or short circuit	X	X	☆
Indoor room temp. sensor is open circuit or short circuit	X	☆	X
EEROM error	On	☆	X

✕ Extinguish

☆ Flash at 5Hz

9 Electronic function

9.1 Electric Control working environment

9.1.1 Input voltage: 175~253V

9.1.2 Input power frequency:50Hz

9.1.3 Ambient temperature: -7°C~+43°C

9.1.4 Indoor fan normal working amp is less than 1A,

9.1.5 Outdoor fan. Normal working amp is less than 1.5A

9.1.6 Four-way valve normal working amp is less than 1A.

9.1.7 Swing motor: DC12V.

9.1.8 Compressor: single-phase power supply. Its normal working amp is less than 15A

9.2 Proper symbols and their meanings:

TA: Indoor ambient temperature

TE: Indoor evaporator temperature

TS: Setting temperature through the remote controller

I_{3sec}: Self-protection amp of compressor, continue three seconds until turns off the compressor.

I_{5MIN}: Self-protection amp of compressor, continue five minutes until turns off the compressor.

I_{FAN}: Self-protection amp of outdoor fan/indoor fans when they change from higher wind to lower wind.

$I_{RESTORE}$: Amp self-protection return value

$TH_{DEFROST}$: High wind, defrosting temperature difference

$TM_{DEFROST}$: Middle wind, defrosting temperature difference

$TL_{DEFROST}$: Low wind, defrosting temperature difference

TE1: Anti-cold air, from Fan Off to Breeze temperature

TE2: Anti-cold air, from Breeze to Setting Fan Speed temperature

TE3: Anti-cold air, from Setting Fan Speed to Breeze temperature

TE4: Anti-cold air, from Breeze to Fan Off temperature

TE5: Evaporator low temperature protection entering temperature
TE6: Evaporator low temperature protection restoring temperature
TE7: Evaporator high temperature protection, compressor off temperature
TE8: Evaporator high temperature protection, fan off temperature
TE9: Evaporator high temperature protection, restoring temperature

9.3 Systematic functions

Remote receiving
Testing and forced run
Position set for indoor unit wind vane
LED displaying and alarm
On or off Timer
Protection for the compressor
Current protection
High temperature protection of indoor heat exchanger at heating mode
Auto defrosting and heating recovery at heating mode
Anti cold air at heating mode
Anti frozen at heating mode

9.4 Protection

The compressor functions protection with a delay of three minutes.
Sensor protection at open circuit and breaking disconnection

9.4.1 Temperature Fuse break protection

9.4.2 Fan Speed is out of control. When Indoor Fan Speed is too high(higher than High Fan+300RPM)or too low(lower than 400RPM), the unit stops and LED displays failure information and can't returns to normal operation automatically.

9.4.3 Cross Zero signal error warning. If there is no Cross Zero signals in 4 minutes, the unit stops and LED displays failure information and can't returns to normal operation automatically.

9.4.4 The current protection of the compressor

	Condition	Indoor fan	Compressor	Outdoor fan	Remark
Current up	$I < I_{RESTORE}$	On	On	On	
	$I_{RESTORE} < I < I_{FAN}$	On	On	Off	Heating mode
		Low speed	On	On	Cooling mode
	$I_{FAN} < I < I_{5MIN}$		Off	Off	After 5 Minutes
	$I_{5MIN} < I < I_{3SEC}$		Off	Off	After 3 Seconds
Current down	$I_{5MIN} < I < I_{3SEC}$		Off	Off	After 3 Seconds
	$I_{FAN} < I < I_{5MIN}$		Off	Off	After 5 Minutes
	$I_{RESTORE} < I < I_{FAN}$	On	On	Off	Heating mode
		Low speed	On	On	Cooling mode
	$I < I_{RESTORE}$	On	On	On	

If compressor turns off for continuously 4 times due to current protection in 5 minutes since Compressor On, the unit stops and LED displays failure information and can't returns to normal operation automatically.

9.5 Fan-only mode

Fan speed is high/mid/low/ Auto

9.6 Cooling mode

The 4-way valve is closed at cooling mode.

The action of the compressor and the outdoor fan:

	Condition	Compressor	Outdoor fan
Temp. up	T>Ts+1	On	On
	T<Ts+1	Off	Off
Temp. down	T>Ts	On	On
	T<Ts	Off	Off

Auto fan at cooling mode:

	Condition T=Indoor Temp.-Setting Temp.	Indoor fan speed
Temp. up	T<3□	Low
	3□<T<5□	Mid.
	T>5□	High
Temp. down	T>3□	High
	1□<T<3□	Mid.
	T<1□	Low

Anti-freezing control to indoor evaporator at cooling mode(T: evaporator temp.)

	Condition		Compressor	Outdoor fan
	Temp.	Time		
Temp. up	T> TE6		On	On
	T< TE6	>5 Minutes	Off	Off
Temp. down	T> TE5		On	On
	T< TE5	>5 Minutes	Off	Off

9.7 Dehumidifying mode

9.7.1 The 4-way valve is off in dehumidifying mode

9.7.2 Compressor and Indoor Fan actions in dehumidifying mode

NO	Conditions	Indoor Fan	Compressor and Outdoor Fan
1	TA ≥TS+2	LOW BREEZE	ON 6minutes OFF 4minutes
2	TS ≤TA＜TS+2	LOW BREEZE	ON 5minutes OFF 5minutes
3	TA ＜ TS	LOW BREEZE	ON 4minutes OFF 6minutes

Repeat on and off cycle.

9.7.3 Low room temperature protection:

When room temperature decreases to below 10℃, compressor and outdoor fan will stop(indoor fan is Breeze). Dehumidifying operation will be resumed when room temperature restores to over 13℃.

9.7.4 At dehumidifying mode, the anti-freezing function of the indoor heat exchanger is the same as that of cooling mode.

9.7.5 At dehumidifying mode, the action of indoor fan is the same as that of air-only mode.

9.8 Heating mode

9.8.1 Generally, the 4-way valve is open in heating mode, but it is closed in defrosting mode. 4-way valve must delay 2 minutes compared with compressor if the compressor changed into non-heating mode or turned off. 4-way valve doesn't delay in dehumidifying mode.

9.8.2 Generally, the outdoor fan is turned off with the on-off action of compressor in heating mode, except for the defrosting mode or the end of defrost.

9.8.3 Action of compressor and outdoor fan motor at heating mode: compressor must run for 7 minutes after starting and then judge temperature. Meanwhile other protections are still valid.

	Condition	Compressor	Outdoor fan
Room temp. up	T> Ts+3	Off	Off
	T<Ts+3	On	On
Room temp. down	T< Ts+2	On	On
	T>Ts+2	Off	Off

9.8.4 Indoor Fan actions at heating mode

Indoor Fan can be set at HIGH/MID/LOW/AUTO by using a remote controller, but Anti-cold wind function prevails.

Anti-cold wind control function at heating mode

	Condition T= Indoor exchanger temp.	Indoor fan speed
Indoor exchanger temp. up	T<TE1	Off
	TE1<T<TE2	Breeze
	T>TE2	Setting fan speed
Indoor exchanger temp. down	T> TE3	Setting fan speed
	TE3<T<TE4	Breeze
	T<TE4	Off

9.8.5 Auto wind at heating mode

	Condition T=Indoor Temp.-Setting Temp.	Indoor fan speed
Room temp. up	T<2□	High
	T>2□	Mid.
Room temp. down	T>0□	Mid.
	T<0□	High

9.8.6 Indoor evaporator high-temperature protection at heating mode

	Condition T= Indoor exchanger temp.	Compressor	Outdoor fan
Indoor exchanger temp. up	T<TE8	On	On
	TE8<T<TE7	On	Off
	T>TE7	Off	Off
Indoor exchanger temp. down	T>TE9	Off	Off
	T<TE9	On	On

9.8.7 The louver opens to Standard Angle ANGLHEAT when power is on for the first time

9.9 Defrosting operation (Available for heating only).

9.9.1 Defrosting condition: Defrosting starts when either of the following ①&②:

① A and B are satisfied:

A: The compressor keeps running for 40 minutes or more.

B: The temperature difference of evaporator and room temperature meets one of the following:

℃	Temp. of evaporator－room temp.
Fan speed is high	$\leqslant TH_{DEFROST}$
Fan speed is mid	$\leqslant TM_{DEFROST}$
Fan speed is low	$\leqslant TL_{DEFROST}$
Breeze	Meet only if it is Breeze

② Calculate from the end of latest defrost, evaporator high temp. protection only closes outdoor fan with the compressor still running. Add up to 90 minutes.

9.9.2 Defrosting time

If the temp. difference condition ① is satisfied for less than 40 minutes, this can be regarded as severe frosting. The defrosting time is 10 minutes.

If the temp. difference condition ② is satisfied for more than 40 minutes, the defrosting time is 6 minutes.

If the temp. difference condition ① is satisfied out of 40 minutes, generally the defrosting time is 6 minutes, after three continuous 6-minute defrost, the fourth should be 10 minutes defrost. The circulation is as following:

→6-minute defrost → 6-minute defrost→6-minute defrost→10-minute defrost→

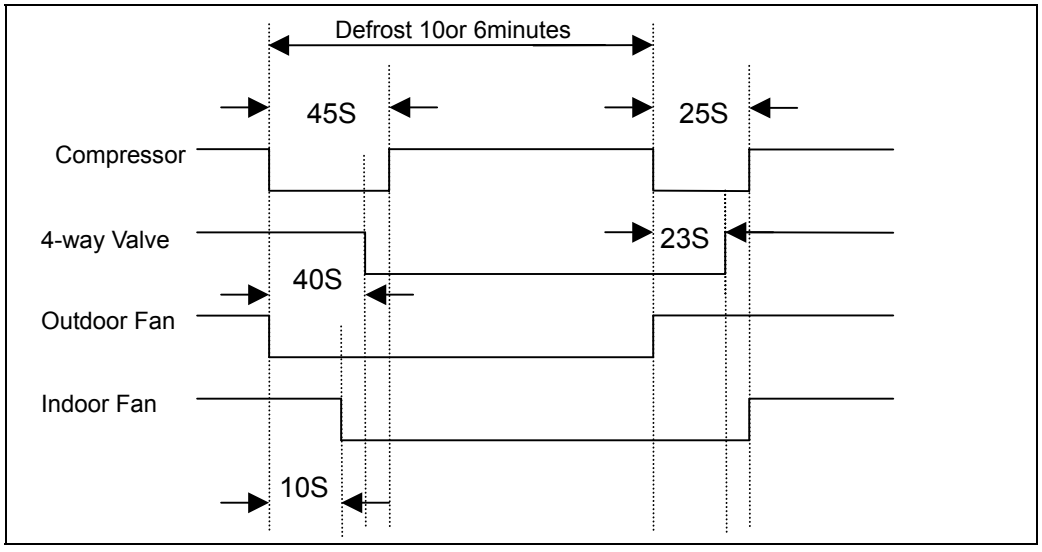
9.9.3 Ending condition of defrosting

If one of following conditions is satisfied, end the defrost and turn into heating mode:

A. The defrost time has reached to 6 or 10 minutes.

B. The compressor current has reached to $\mathbf{I_{DEFROST}}$ or above, $\mathbf{I_{DEROST}}$ differs in different models.

9.9.4 Defrosting Actions:



9.10 Automatic operation mode

9.10.1 The air conditioner automatically selects one of the following operation modes: cooling, heating or fan only according to the temp. difference between room temp. (TA) and set temp. (TS).

TA—TS	Operation mode
TA—TS>2℃	Cooling
-1℃≤TA—TS≤+2℃	Fan-only
TA—TS<-1℃	Heating (Fan-only for cooling only type)

9.10.2 The indoor fan blows automatically in corresponding selected mode.

9.10.3 The motion of indoor fan's blade should accord with the selected operation mode.

9.10.4 One mode should be carried out for at least 15 minutes once selected. If the compressor cannot start for 15 minutes, reselect the operation mode according to the room temp. and set temp., or reselect when the set temp. varies.

9.11 Forced cooling function

9.11.1 Select forced cooling function with the forced cooling button or the switch.

9.11.2 The compressor is unconditionally turned on, after 30 minutes cooling operation whose fan mode is set as low, the A/C operates at the DRY mode with a set temp. of 24℃.

9.11.3 All protections of remote control cooling are available at forced cooling operation.

9.12 Forced Auto function

Select forced auto function with the forced auto button or the switch.

In forced auto status the A/C operates like auto mode with a set temp. of 24℃.

9.13 Timer Function

9.14 Economic Running

9.14.1 The economic running function is available at cooling, heating or auto mode.

Cooling:

The set temperature rise 1℃ per hour. Two hours later, the set temperature will maintain as a constant and the fan speed is kept at low speed.

Heating:

The set temperature decrease 1℃ per hour. Two hours later, the set temperature will maintain as a constant and the air circulation is kept at low speed (Anti-cold air function takes precedence over all).

Auto:

The economic running function operates in accordance with selected running mode by auto mode.

9.15 Auto restart function

In case of a sudden power failure, this function automatically sets the unit to previous settings before the power failure when power returns.

9.16 Models and Parameters

Model	42HQE009QC 38YE009QC	42HQE012QC 38YE012QC
I3SEC	10A	12A
I5MIN	8A	8.5A
IFAN	6.5A	7.5A
IRESTORE	4.5A	6.5A
IDEFROST	3.5A	5.0A
TE1	28	34
TE2	32	37
TE3	30	33
TE4	26	22
TE5	4	2
TE6	10	7
TE7	60	62
TE8	53	53
TE9	50	52
$TH_{DEFROST}$	15	15
$TM_{DEFROST}$	16	16
$TL_{DEFROST}$	17	17