شرکت آژندسرویس تقدیم می کند

آموزش نصب دستگاهها کولر گازی

Installation of Airconditioner

System Appliance Division KEEN Electric



01

Load Calculation

Thermal Sources



Heat Loss & Load (by Building Type)



Heat Loss & Load (by Activity)





Heat Loss & Load (by Number of human)



Heat Loss & Load (by Appliance)



Heat Loss & Load (by Site of Building)



Main Factor

: Room Space (Square × Height).

Sub Factor

- Direction and size of window
- Human, Home & Office Appliance
- Ventilation, Material of Building

Total Load (cal) = Main factor + Sub factors

Simple Load Calculator Method

- Step 1 : Check environment of installing place. Ex) Maximum Temp of China : 40°C Calculator 80~100 Btu/m³
- Step 2 : Select a capacity by the Room space Ex) Square × Height = 10m*6m*3m = 180 m³ (This size is proper space for 5 person)
- Step 3 : Sub Loss factors
- Ex) Normal Situation = 0, Special Situation = Add

If School Class = 15 students,

10persons*120Kcal/h*3.968Btu/Kcal = 4,762 Btu/h

Step 4 : Confirm capacity by the room space and load Ex) 90Btu/hm³ * 180m³ + 4,762Btu/h = 21,000Btu/h Select 24,000 Btu/h Airconditioner

02

Split A/C Installation



Installation Work Flow – Split Type



Place Selection (1)

Indoor Unit

Less Distance between In / Out door unit, More Performance

✓ Good Air flowing Area for Maintaining Temperature Distribution
(Height is more than 2.5m)

✓ No obstacle around Suction & Discharge

✓ Horizontally...

✓ Avoid Doors

Avoid Direct Rays of the Sun

Good ventilation



Place Selection (2)

Outdoor Unit

- Avoid direct sunlight
- Easy maintenance
- Easy connection with Cables, Power source & Pipes
- The support for weight, noise & vibration Firm and Flat
- ✓ Avoid Oil Existing Place (Including Oil for Mechanic)
- Avoid Discomfort to Neighbors with Noise and Hot Air
- ✓ Avoid Strong Wind to the Air Discharge Part
- ✓ Don't Install at the Outside Wall (Dropping)

Performance – Length & Height



н

* The designs of the unit and Connectionvalue are subject to Change according to the model.

Performance – Distance Diagram



Affluence of outdoor temperature (Cooling)



Assumption : ambient temperature around indoor unit = 27 °C

Good ventilation



the Housetop

Diameter : 65 mm

- ✓ Get Approval from Owner and Customer
- ✓ Avoid Damage of Water Pipes and Electric Wires in Building
- Inclined Toward Outside



For Good Drain

- Slope toward the outside
- Open the end of hose
- Avoid twist and wave
- Far from floor or ground
- ✓ Far from the Ditch











A right angle(90°) between Cutter & pipe Remove burrs and a rough face by reamer

✓ Tilt Pipe for preventing insert powder



Flaring the pipe

[mm]





₽	Diameter	А
ļ -	Ф 6.35	1.3
	Ф 9.52	1.8
	Ф12.70	2.0

Caution



Inclined







Bending Pipes





 After Discovering Water Leakage Or Modifying Pipe



Taping after cover Insulation tube



May cause another water leakage



Attach insulation tube twice.

Don't cover both pipes of Gas & Liquid by insulation tube



Drain hose must be on the lowest position



Good Installation









Sunscreen for outdoor unit

Avoid the direct ray of sunlight.



Connecting Pipes

Be Careful





Diameter (outer)[mm]	Torque [kg.cm]
Ф 6.35	160
Ф 9.52	300
Ф12.70	500
Ф15.88	700



Air Purge – Vacuuming and Checking Leakage



- Vacuum at least 30 minutes.
- Close the gas hose of manifold gage, then power off vacuum pump.
- Confirm the pressure after 10 minutes later, if the pressure rise, there is gas leakage

Vacuum (Removing Moisture)



Air including moisture

It need vacuum power under -750mmHg



Moisture is attached inner Pipe



Dried Pipe

Self Purge



1. Connect each assembly pipe to valve on outdoor unit, open the valve of the low pressure, after 10 seconds close the valve.

- 2. Chech for gas leakage.
- 3. Push the needle valve for 2~3 seconds sevral times
- 4. Open the low and high pressure valve, and chech for gas leakage.
- 5. Test operation of airconditioner
- 6. Check pressure and refill refrigerant

Bomb Purge



- Connect each assembly pipe to valve on outdoor unit, and connect Manifold guage to high pressure valve.
- 2. open the Flare Nut of low pressure side
- Open handle of low pressure side of Manifold guage for 10 seconds and close for 5 seconds. (repeat 5~8 times)
- 4. After gas leak from Flare Nut, close Flare Nut.
- 5. Chech for gas leakage.
- 6. Open the low and high pressure valve.
- 7. Test operation of airconditioner
- 8. Check pressure and refill refrigerant

Vaccum Purge



- 1. Discharge GAS in indoor unit completely.
- 2. Connect charging hose of middle of manifold guage to vacuum machin.
- 3. Purge the air from the system using vacuum pump for about 30 minutes.
 - (Chech that pressure gauge show –27Lb and less)
- 5. Close the valve of low side of manifold guage
 - and ture off power of vacuum machine.
- 6. After 5 minutes, pressure guage must be stop.
- 7. If it's value is decreased, find leakage point.

because it is gas leakage.
Check the Connection Parts by Foam

- ✓ Indoor Unit & Pipes
- Outdoor Unit & Pipes



Pour Water into Drain Panel & Hose

Charging and Tuning R22

Class	At ins	tallation	At service		
Connection Pipe Length	Air-Purge Method	Refrigerant Adjustment	Air-Purge Method	Refrigerant Quantity	
Standard 5m	Refer to the detailed Air-Purge Procedure	Unnecessary	Purge air using a vacuum pump or an additional	refer to specification sheet	
Max. ~15m (24K : 20m)		Add "A" of refrigerant (R-22) for every 1m.	refrigerant cylinder.	Add "A" of refrigerant (R-22) for every 1m.	



MODEL	"A"	"B"
7K/ 9K	20(g/m)	7
12K/	30(g/m)	7
18K	30(g/m)	8
24K	40(g/m)	8

Tuning with Low Pressure – 12K

✓ Set High speed cooling mode

✓ Check low pressure 10 minutes later after turn on the compressor



Outdoor inlet air D.B. temp ('C)

Low Pressure



Outdoor inlet air D.B. temp(°C)

Pressure of R22 on Operating

Temp of out	low pressure kg/cm(PSIG)	High pressure kg/cm(PSIG)
Less than 20℃	3.3 ~ 4.0(47 ~ 57)	10 ~ 12.5(156 ~ 178)
Less than 24°C	4.4 ~ 4.5(57 ~ 64)	12.5 ~ 14(178 ~ 199)
Less than 28°C	4.5 ~ 5.0(64 ~ 71)	14 ~ 15(199 ~ 213)
Less than 32℃	4.8~5.3(68.3~75.4)	15 ~ 16.5(213 ~ 235)
Less than 36℃	5.0 ~ 5.5(71~78.2)	16.5~18.5(235 ~ 263)
Less than 40°C	5.4 ~ 5.9(76.8~84)	18.5~21(263 ~ 298.6)
Less than 44°C	5.8~6.3(82.5~89.5)	21 ~ 23(298.6 ~ 327)

When COMPRESSOR operate,

If the value of pressure is above range, it is steadystate(normal).

- It is some different according to MODEL.
- On operating, Normal state of pressure of Refrigerant

(Condition : Temp of Indoor:27°C, Temp of outdoor :33°C)

- Low pressure : 4 ~ 6 kg/cm²
- ▶ High pressure :16 ~ 20kg/c㎡

Cycle with P-h Diagram



Enthalpy (kcal/kg)

Temperature and Humidity Ranges

Tropical A/C

The following table indicates the temperature and humidity ranges within which the air conditioner can be used.

If the air conditioner is used at	Then
High temperatures	The automatic protection feature may be triggered and the air conditioner stopped.
Low temperatures	A water leak or some other malfunction may occur if the heat exchanger freezes.
High humidity levels	Water may condense on and drip from the surface of the indoor unit if it is used for long periods.

Mode	Outdoor Temperature	Indoor Temperature	Indoor Humidity
Cooling	21°C to 54°C approx.	18°C to 32°C approx.	80% or less
Drying	18°C to 54°C approx.	18°C to 32°C approx.	-

* If the cooling operation is used at over 33°C(indoor temperature), it does not cool at its full capacity.

Normal A/C

Mode	Outdoor Temperature	Indoor Temperature	Indoor Humidity	
Heating	0°C to 24°C approx.	27°C or less	-	
Cooling	21°C to 43°C approx	18°C to 32°C approx.	80% or less	
Drying	18°C to 43°C approx.	18°C to 32°C approx.	-	

If the heating operation is used at below 0°C(outdoor temperature) then, does not have a full capacity. If the cooling operation is used at over 33°C(indoor temperature) then, does not have a full capacity.

Gas Tank



By Outdoor Temperature

Cooling Capacity & Air Outlet Temp



Current & Low Pressure



Test Operation Method

- 1. Press the ON/OFF button of the indoor unit for at least 5 seconds.
- 2. Check the operation of the set mainly for the following points.
- 1) OPERATION MODE : COOLING
- 2) FAN SPEED : HIGH
- 3) BLADE-H : SWING
- 4) DISPLAY : OPERATING LED ON
- 5) OUT DOOR LOAD : OUT FAN ON, COMP ON
- 3. Check if the set is in normal operation.
- 4. Press the ON/OFF button again to switch the power off.



Check the Operation Mode

As instruction(Owner's) Book

Check Problems

- ✓ Noise : Compressor, Fan (In&Out), Pipes
- ✓ Vibration : Compressor, Fan (In&Out), Pipes
- Temperature of Air in Outlet
- Remote Controller

And Leakage Test again.

Cleaning

- 🗸 Air Conditioner
- Around working place

Explain to Customer

- Operation
- Maintenance (Cleaning Air Filters by Customer every 2 weeks)
- ✓ Contact point of SVC center
- Caution

EX



Symptoms – Bad Air Purge

Inert Gas (Air) in the Cycle

- Pressure Increase by Inert Gas
- Cylinder Superheating by Condensing Pressure Increasing
- Bad Lubricating by Oil Carbonization & Blazing
- Current Increasing
- Vibration & Noise Increasing

How to Purge

- Using Vacuum Pump
- ✓ Bomb Purge : Using Bomb
- ✓ Self Purge : Using R22 of Outdoor Unit



Symptoms - Bad Vacuum

Discharge Temperature Increasing

- Need More Power by Pressing Ratio Increasing
- Discharge Temperature Increasing
- ✓ Bad Lubricating Lubricating by Oil Carbonization & Blazing
- ✓ Oil Ring on the Piston Wear
- Cooling Performance Decreasing

Condensing Pressure Increasing

Moisture in the Cycle

- Expansion Valve Freezing
- Acid Creating
- Accelerating of Lubricating Oil Blaze



Symptoms - Gas Leakage or Shortage

- Frost on the Entrance of Evaporator
- No Dew on the Exit of Evaporator
- Low Power Consumption (Under 80% of Normal State)
- Small Difference between High and Low Pressure
- Very High Temperature at the Discharge of Compressor
- ✓ No Dew on the Evaporator
- ✓ Warm Suction Pipe



Symptoms – Overcharging Refrigerant

- ✓ Both High and Low V/V Pressure is High
- High Current
- Low Temperature of Evaporator Outlet
- Serious Dew at the Suction Pipe of Compressor
- ✓ OLP is tripped frequently

Blocked Dryer

- ✓ Normal High Pressure, Very Low Low Pressure
- ✓ No Temp. Difference between Inlet and Outlet of Condenser
- ✓ More than 3℃ Difference between In / Out of Dryer

Blocked Capillary Tube

- ✓ Warm Inlet / Cold Outlet
- ✓ Normal Status → Warm
- ✓ No Difference between In / Out of Evaporator

Symptoms - Bad Compressing

Low Difference between High and Low Pressure

- ✓ Very Low Discharging Temperature (Under 50°C)
- Can Touch Discharge Pipe of Compressor with Bare Hands
- ✓ Approximately 50% of Current against Normal State
- ✓ After Pump Down, the Pressure is More than 0
- ※ Must Check if Refrigerant is Remained in the Cycle or not. (Because Symptom is Similar to Refrigerant Leakage)

The Causes of Compressor Failure

- Liquid Refrigerant Inflow to the Compressor
- ✓ Low Input Voltage
- ✓ Instable Voltage
- ✓ Defective Condenser(Electric)
- Overload Protector working
- Defective Thermistor
- ✓ Bad Contact Point of Rotary Switch



✓ Defective Coil in the Compressor (Locked by No Oil or Wearing)

Symptoms Table

		Outdoor pressure		Temperature					
Condition	Current			Comp.	Outdoor		Indoor		Dolto T
		Low	High	Discharge	Liquid	Gas	Liquid	Gas	Deila T.
Blocked air flow (indoor)	down	down	*	down	down	down	down	down	Wide
Bblocked air flow(outdoor)	up	*	up	up	*	*	*	*	Small
Gas leakage	down	down	down	up	down	up	down	up	Small
Overcharge	up	up	up	*	*	*	up	*	Small
Clogged capillary tube	down	down	down	up	down	up	down	up	Small
Compressor valve bad	down	up	down	up	*	up	up	up	Small
Pressed pipe(Gas side)	down	down	down	up	*	down	*	up	Small

* Marks unnecessary items

Self Diagnosis

• S*07AS2/S*09AS2/S*12AS4

LAMP or DISPLAY Monit		
OPERATION	TIMER	TURBO
%	Θ	(jg)
0	•	0
•	•	0
\bullet	0	٠
0	•	
•	•	•
		LAMP or DISPLAY OPERATION TIMER

🔿 : Lamp off 🔹 🕕 : Lamp flickering

•S*07APG/S*09APG/S*12APG

Error Modo	DISPLAY 7	Domark	
Error mode	OPERATION OFF	OPERATION ON	Nelliaik
Indoor unit room temperature sensor error (open or short)	OFF	E1	
Indoor unit heat exchanger temperature sensor error(open or short)	OFF	E2	
Indoor FAN MOTOR error : Keep the RPM value 450 below for 15 seconds	OFF	E3	
EEPROM error	OFF	E6	
Error in option In case of No option set-up In case of option data error	All lamp blinking	All lamp blinking	

ERROR OPERATION	7-SEG LED DISPLAY
ROOM THERMISTOR (OPEN or SHORT)	E1 displayed

Set up the Model Option

Step.1 Preparing the remote control to main PCB option set

- 1) Remove the battery from the remote control
- 2) Press the temperature up/down button simultaneously and insert the battery again
- 3) Make sure the remote control display is shown as 00 00 00

Step.2 Second stage preparation



₩ Note ; In case the wrong letter has been selected, continue to press the button until the correct letter appears.

- 1* If the first stage number * [] " appears on the display, proceed to the second stage.
- 2nd Every time the ① and ⑦ button, "Ⅱ" and "Ⅰ" each continue to appear.
- 3rd Whenever pressing the ②, ③, ④, ⑤, ⑥, ⑧, ③, ⑩, ⑪, ⑫ button, the number increases from 0~9(0123456789) and A, b, C, d, E, F each time.

Example of setting Model Option (1)

Ex) Option No. : 066025 - 172362



Example of setting Model Option (2)

Ex) Option No. : 066025 - 172362



04

Multi A/C



Several Indoor Units

for 1 Outdoor Unit

- Individual Control is Possible

- Saving Space

2. Feature...



- High Quality Product & High Price

2. Feature...



Fixed Capacity Compressor

- Low Price (90% price of 2 Single type product)
- Saving Space for Outdoor Unit
- Easy to Interior by pre-piping
- Easy to install

🕨 Free Joint Multi



Limited only the Maximum Sum of Indoor Unit Capacity

- Energy Saving
- Saving Space for Outdoor Unit
- Various Choice of Indoor Units
- Comfortable Cooling / Heating (Inverter)
- Easy to Interior by pre-Piping
- Easy to Install

2. Feature...

Pack Multi	Free Joint Multi	System Multi
 Fixed or Variable Capacity Fixed Joint Low Class Capacity 	 Variable Capacity (Inverter / BLDC) Increased DOF of Joint Middle Class Capacity Multi-Piping / Single-Piping 	 Variable Capacity (Inverter + Non Inverter) Free of Joint High Class Capacity ; for Building Long Height / Piping Single-Piping Centralized Control Remote Control

X DOF : Degree **O**f **F**reedom

2. Feature...

1:1 Pipe connecting between indoor units and outdoor unit

Multi-Piping type





03

Window A/C Installation

Place Selection (1)



Place Selection (2)

No obstacle at rear of outdoor side

Air pass through well at rear of outdoor side



Bad Installation





EX


Over Piping

- 1. Must be keep "Max Length" & "Max Height"!!!!!
- Please search another way...
 If you install A/C using Over Piping, Air Conditioner will be dead, though you make it with every skills.
- 3. SAMSUNG has not responsible for over-piping. No Guarantee !!! The Installer has responsible all about it.



Piping for Pressure Compensation



Piping for Oil Return



Example of 12K Btu A/C ("H" maximum :7M)



