DAIKIN

Si30-408

Service Manual

VRV®

Basic Training Manual

PREFACE

The latest technological innovations of air conditioners make remarkable progress. We are not able to perform our duty without mastering the proper basic theory and knowledge in service skills and techniques.
The field of VRV system particularly
shows such a rising tendency. The techniques on trouble shooting and trouble removing corresponding to the computerized and systematized products are required. Based on these requests, therefore, we have prepared this manual, emphasizing the understanding on VRV system.
We wish that you would use this manual as a guidebook for the service of VRV system or as a reference book for education of service personnel, which leads to the development of skills in whole service group of Daikin.

DEC.2004

DAIKIN INDUSTRIES, LTD.

After Sales Service Division

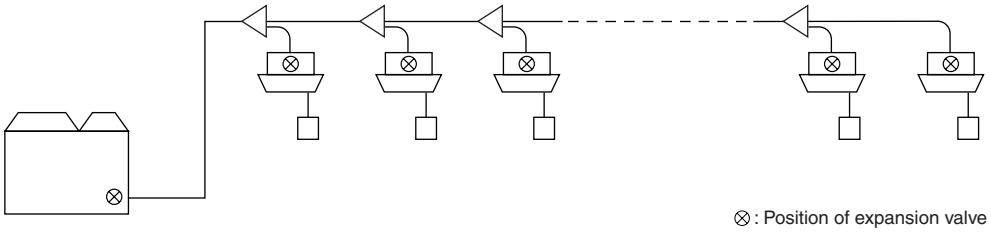
General Contents

A. Introduction

1. What is a VRV System?

VRV System

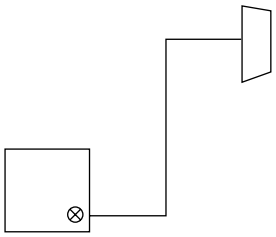
- Thirty or more indoor units can be connected to single system.
- There are "cooling / heating selection -standard- type" and "individual operating system of cooling and heating" according to type of the system.
- One of the biggest characteristics is mounting of expansion valves ⊗ to the indoor unit as well as to the outdoor unit.



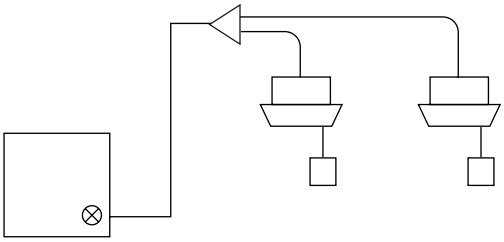
⊗ : Position of expansion valve

SkyAir, Residential Air Conditioner

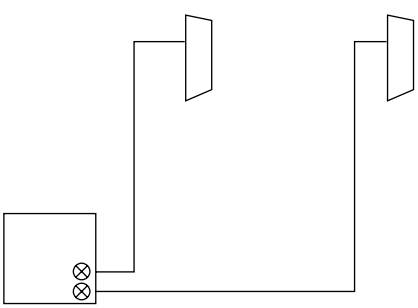
- **Pair Type**
  Single indoor unit is connected to single outdoor unit.
  (The expansion valve is mounted to the outdoor unit only.)



- **SKY AIR System for Simultaneous Operation (Twin, Triple, and Double-Twin)**
  These series are included in SkyAir. These types can be connected to two to four indoor units to single system. However, the individual operation is not available, only the simultaneous operation.
  (The expansion valve is mounted to the outdoor unit only.)



- **Multi System for Individual Operation**
  Each indoor unit can be operated individually.
  However, refrigerant piping is connected to each indoor unit using separate connecting piping, not using halfway branch piping.
  (The expansion valve is mounted to outdoor unit by each indoor unit.)



2. List of VRV Unit Models

2.1 List of Outdoor Unit Models

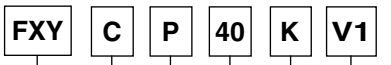
Type	R22 C to H series			R22 K series						
Standarad Comp. Type	VRV Standard C series			VRV for High outdoor temp (with unloader comp.)						
	Model	Type	Service manual	Model					Type	Service manual
	— RSC10,15C	— Cooling only	— (ES20-2)	RSNY8KTAL					Heat-pump	Si-06
	VRV Standard D series									
	Model	Type	Service manual							
	RSCY10,15D —	Heat-pump —	Si-46A —							
	VRV Standard G series									
	Model	Type	Service manual							
	RSCY5,10G RSC5,10G	Heat-pump Cooling only	Si-45F Si-45F							
	VRV Standard F series									
	Model	Type	Service manual							
	RSCY10,15F RSC10,15F	Heat-pump Cooling only	Si-46A Si-46A							
Small Capacity Inverter Type	VRV Inverter G series			VRV Inverter K series						
	Model	Type	Service manual	Model					Type	Service manual
	RSXY5-10G(J) RSX8,10G(J) RSEY8,10G(J)	Heat-pump Cooling only Heat recovery	Si-45F Si-45F Si-45F	RSXY5-10K RSX5-10K RSEY8,10K					Heat-pump Cooling only Heat recovery	Si-05C Si-05C —
	VRV Inverter H series			VRV Inverter KU series						
	Model	Type	Service manual	Model					Type	Service manual
	RSXY5-10H(J) RSX5-10H(J)	Heat-pump Cooling only	Si-46C Si-46C	RSX5-10KU					Cooling only	Si-91
				VRV Inverter KA series						
				Model					Type	Service manual
				RSX5-10KA					Cooling only	Si-92
				VRV Inverter K series (H/R with Scroll Comp.)						
				Model					Type	Service manual
				RSEY8-10KLY1					Heat recovery	Si-95
High COP Inverter Type										
Large Capacity Inverter Type				VRV Plus series						
				Model	Function unit	Inverter	Cnstant Speed		Type	Service manual
				RXY16-30K RX16-30K REY16-30K	BL2 or 3K BC2 or 3K BR2 or 3K	RXY8 or 10K RX8 or 10K RXY8 or 10K	RNY8 or 10K RN8 or 10K RNY8 or 10K		Heat-pump Cooling only Heat recovery	Si-05C Si-05C Si-11
				VRV Plus series for High outdoor temp						
				Model	Function unit	Inverter	Cnstant Speed	Condenser	Type	Service manual
				RXY16-30K-K RX16-30K-K	BL2 or 3K BC2 or 3K	RXY8 or 10K RX8 or 10K	RNY8 or 10K RN8 or 10K	RXE2 or 3K RXE2 or 3K	Heat-pump Cooling only	Si-94 Si-94
				VRV R22 Plus series						
				Model	Main unit	Sub unit			Type	Service manual
				RSXY16-30KA	RXY8 or 10KA	RXE8 or 10KA			Heat-pump	Si33-101
				VRV II series						
				Model	Module				Type	Service manual
				RXY5-48M RX5-48M	RXY8-16M RX8-16M				Heat-pump Cooling only	Si38-304 Si38-304

<table>
<tr><td>Type</td><td colspan="5">R-407C</td><td>R410A</td></tr>
<tr><td rowspan="4">Standarad Comp. Type</td><td colspan="5"></td><td></td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td rowspan="6">Small Capacity Inverter Type</td><td colspan="5">VRV Inverter K series</td><td rowspan="2"></td></tr>
<tr><td>Model</td><td></td><td></td><td>Type</td><td>Service manual</td></tr>
<tr><td>RSXYP5-10KJY1
RSXP5-10KY1</td><td></td><td></td><td>Heat-pump
Cooling only</td><td>Si-90A
Si33-106</td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td colspan="5">VRV Inverter K series (H/R with Scroll Comp.)</td><td rowspan="3"></td></tr>
<tr><td>Model</td><td></td><td></td><td>Type</td><td>Service manual</td></tr>
<tr><td>RSEYP8, 10KJY1</td><td></td><td></td><td>Heat-Recovery</td><td>Si-96</td></tr>
<tr><td>High COP Inverter Type</td><td colspan="5">VRV High COP type L series</td><td rowspan="3"></td></tr>
<tr><td>Model</td><td></td><td></td><td>Type</td><td>Service manual</td></tr>
<tr><td>RSXYP5-10L</td><td></td><td></td><td>Heat-pump</td><td>Si33-201</td></tr>
<tr><td rowspan="6">Large Capacity Inverter Type</td><td colspan="5"></td><td></td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td colspan="5">VRV Plus series</td><td rowspan="2"></td></tr>
<tr><td>Model</td><td>Main unit</td><td>Sub unit</td><td>Type</td><td>Service manual</td></tr>
<tr><td>RSXYP16-30KJ
RSXP16-30K
RSEYP16-30KJ</td><td>RXYP8 or 10KJ
RXP8 to 20K
REYP8 or 20KJ</td><td>RXEP8 or 10KJ
RXEP8 to 10K
RXEP8 or 10KJ</td><td>Heat-pump
Cooling only
Heat recovery</td><td>Si33-002
Si33-103
Si33-105</td><td></td></tr>
<tr><td colspan="5"></td><td>VRV II series
Model | Module | Type | Service manual
RXYQ5-48M | RXYQ5-16M | Heat-pump | Si39-302 Si39-404
REYQ5-48M | REYQ5-16M | Heat recovery | Si39-306</td></tr>
</table>

2.2 Nomenclature

2.2.1 Nomenclature (Previous indication)

Indoor Unit



Power supply symbol
V1 : Single phase 220 to 240V, 50Hz
VE : Single phase 220 to 240V, 50Hz : 220V, 60Hz
VAL : Single phase 220V, 60Hz

Indicates major design category
KA : Models for ceiling mounted low silhouette duct type
Models for ceiling suspended type
KB : Models for super cassette
KJ : Models applied for EC regulation
KF : Outdoor air processing unit

Capacity Indication
Conversion to horsepower:

20 : 0.8 HP	50 : 2.0 HP	125 : 5 HP
25 : 1 HP	63 : 2.5 HP	200 : 8 HP
32 : 1.25 HP	80 : 3.2 HP	250 : 10 HP
40 : 1.6 HP	100 : 4 HP	

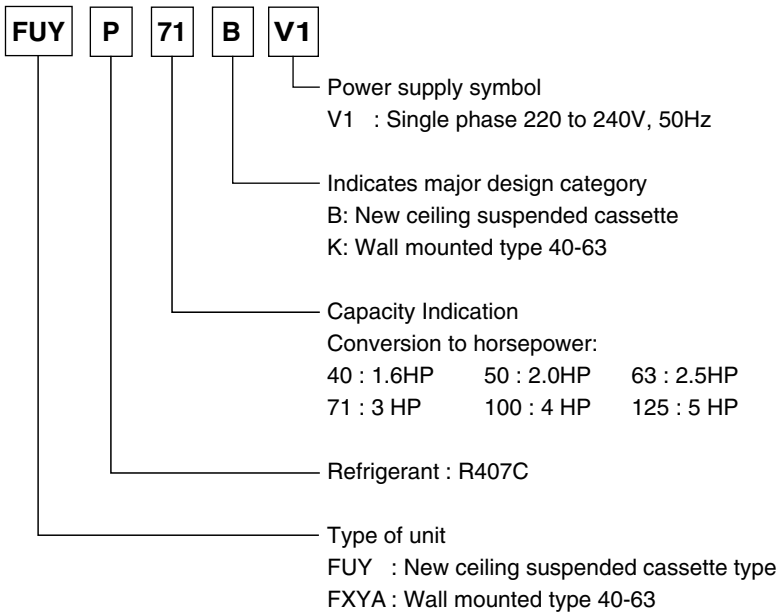
Refrigerant type
No indication : R22
P : R407C

Type of unit
C : Ceiling mounted cassette type (Double flow)
F : Ceiling mounted cassette type (Multi flow) – Super cassette –
K : Ceiling mounted cassette corner type
D : Ceiling mounted low silhouette duct type (Low static pressure)
S : Ceiling mounted built-in type
B : Ceiling mounted built-in (Rear suction)
M : Ceiling mounted duct type or outdoor air processing unit
H : Ceiling suspended type
A : Wall mounted type
L : Floor standing type
LM : Concealed floor standing type
N : Concealed floor standing type

Indicates that this is a INVERTER SERIES indoor unit.
FX : Cooling Only
FXY : Heat Pump

(V1217)

Indoor Unit



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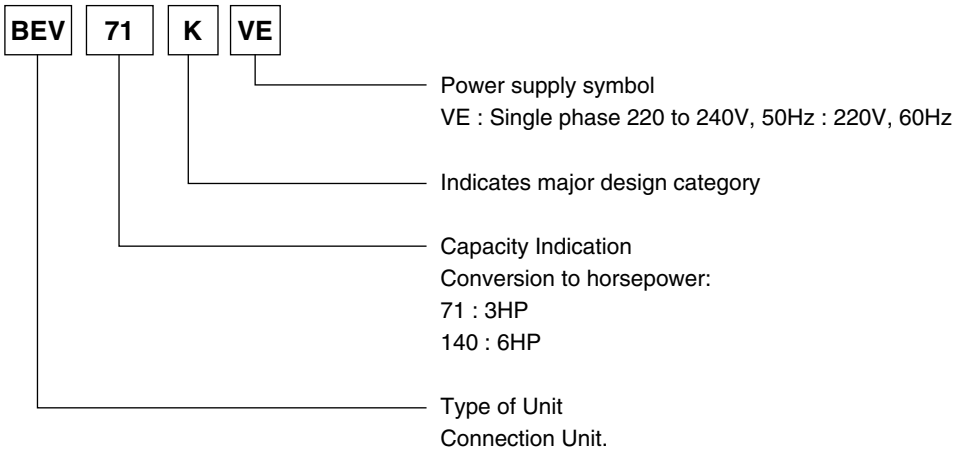
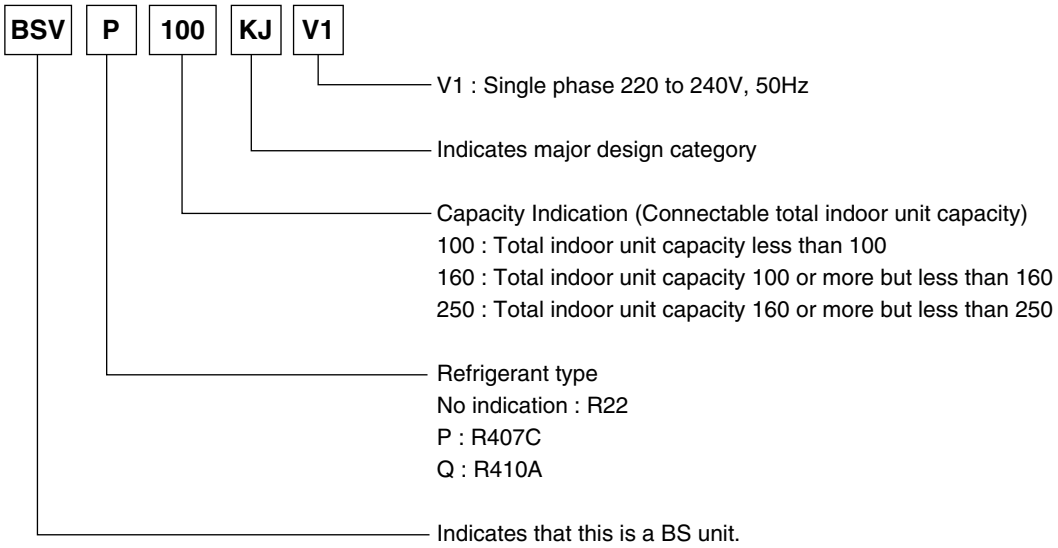
Connection Unit (Only Necessary for FUYP Indoor Units)



(V2864)

BS Unit (Only Necessary for Heat Recovery System)



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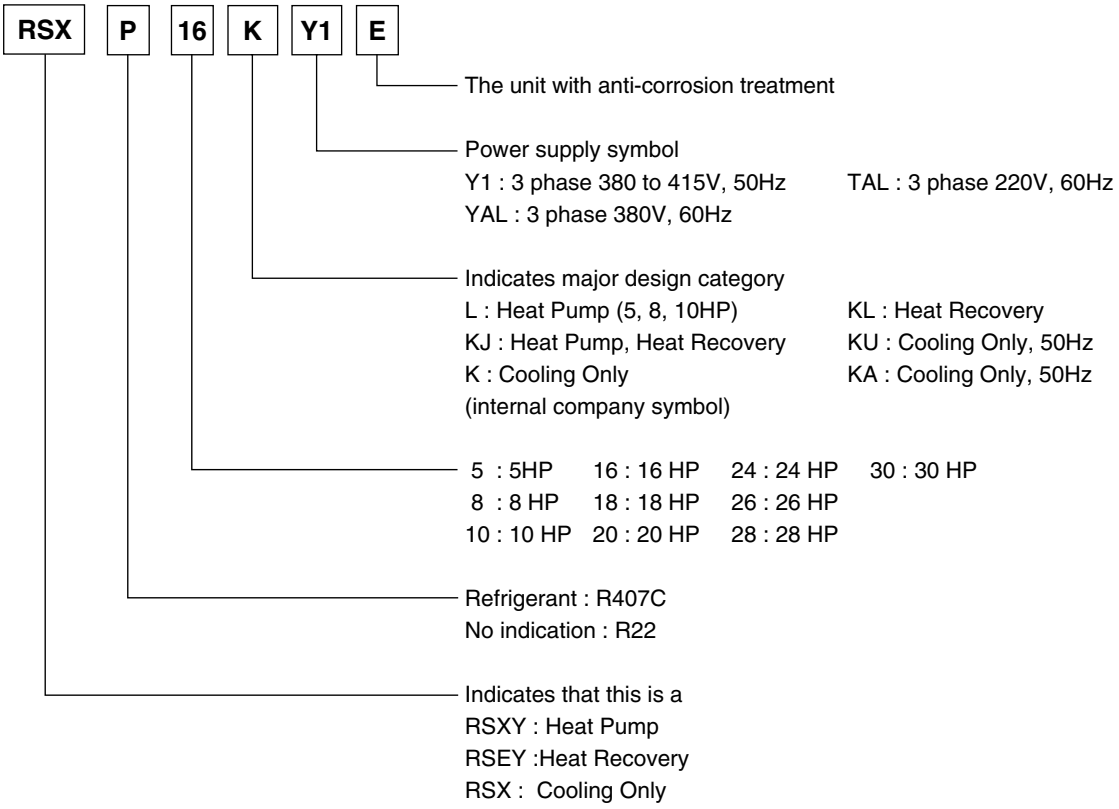
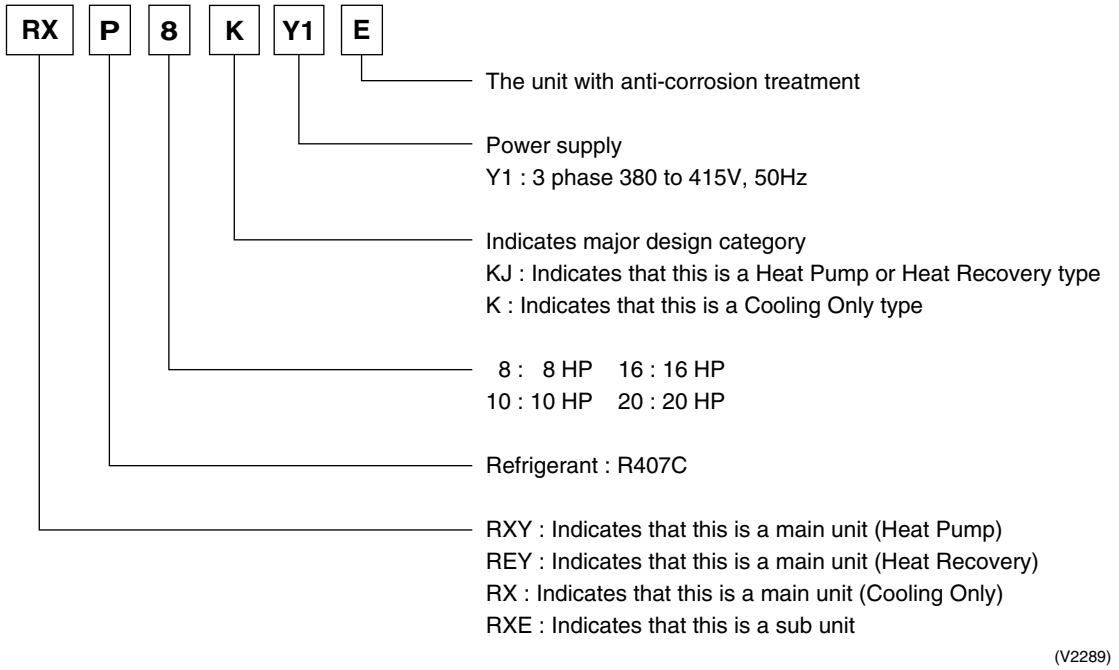
Outdoor Unit (Combination Model Name)



(V2288)

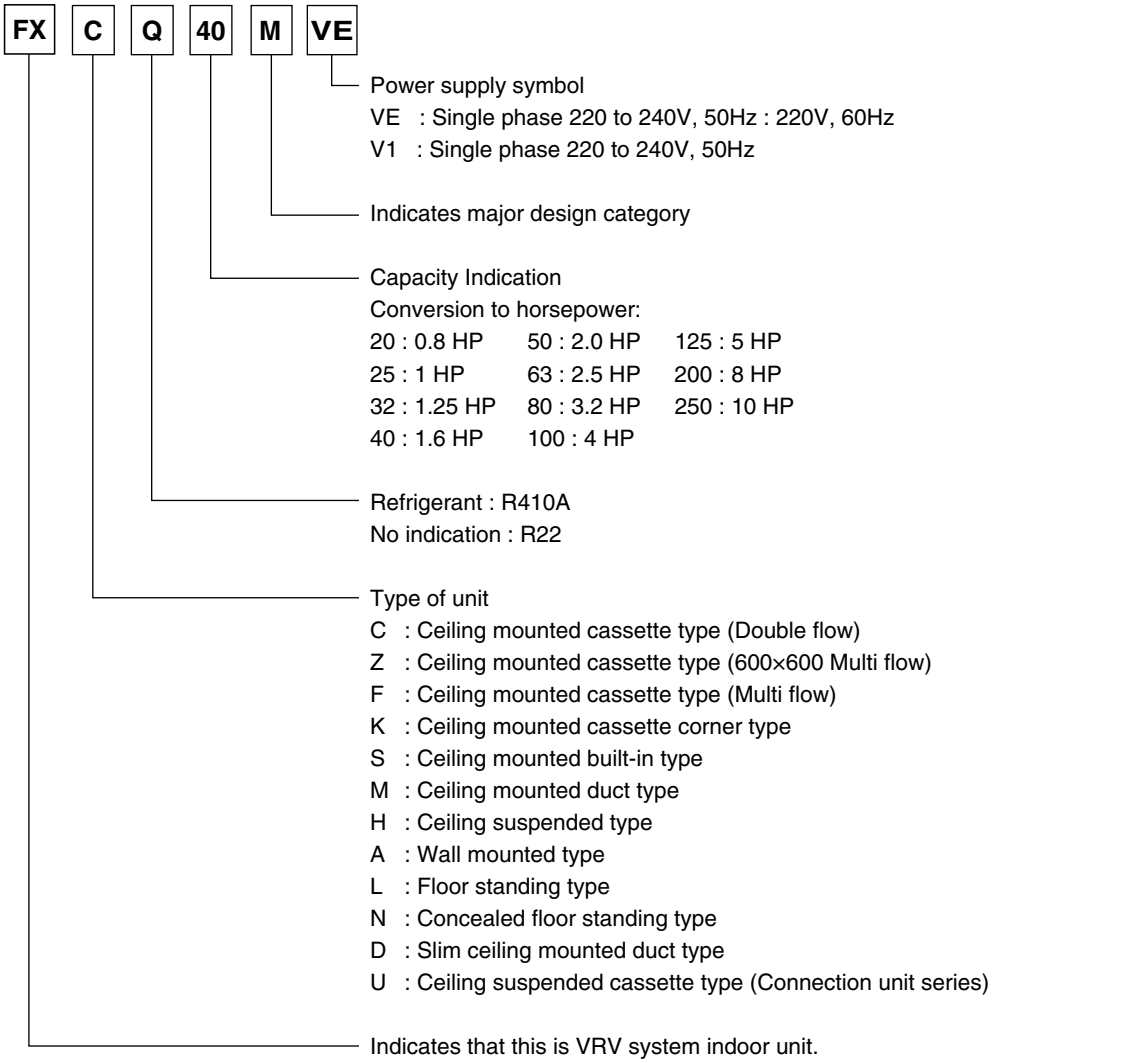
Outdoor Unit (Modular Model Name)



(V2289)

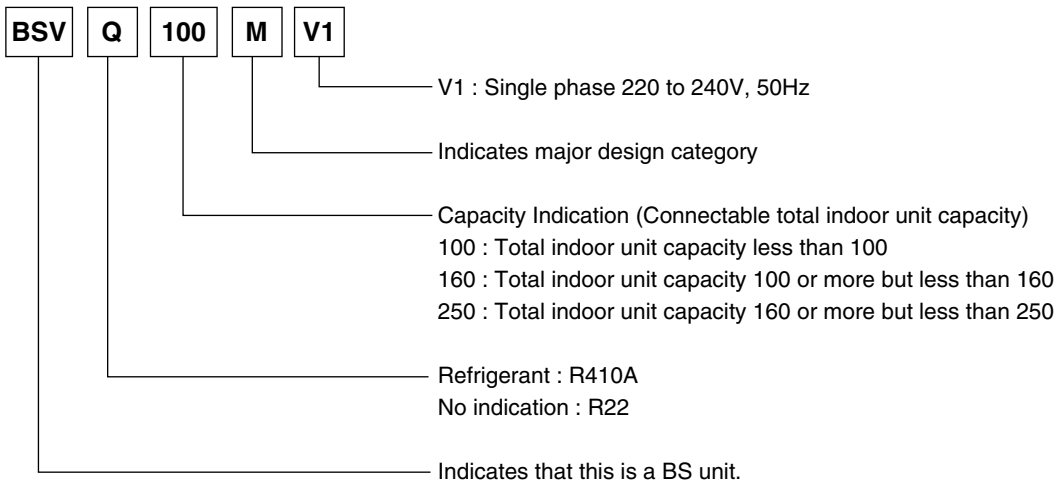
2.2.2 Nomenclature (New indication)

Indoor Unit



(V2286)

BS Unit (Only Necessary for Heat Recovery System)



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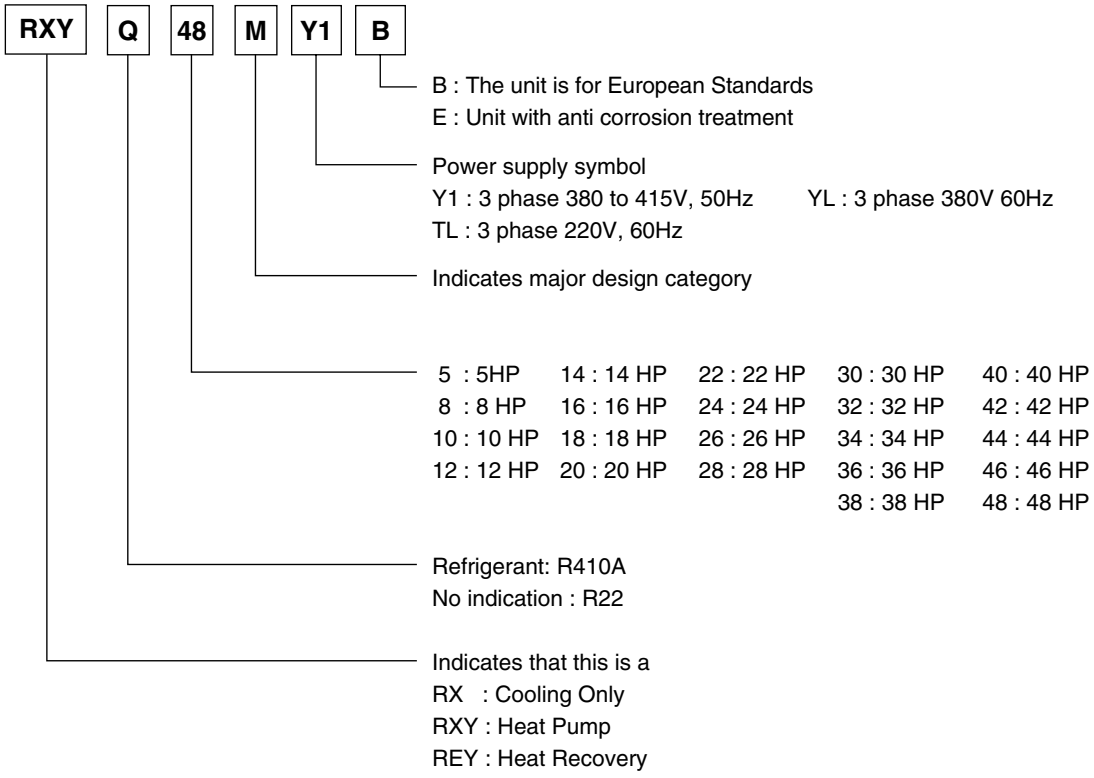
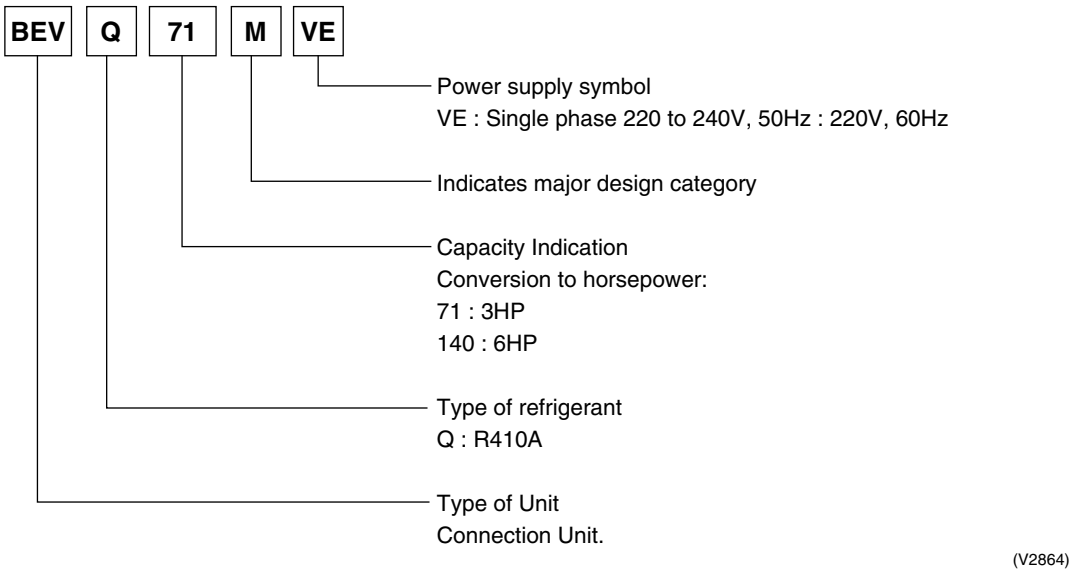
Outdoor Unit



(V2288)

Connection Unit (Only Necessary for FXUQ Indoor Units)



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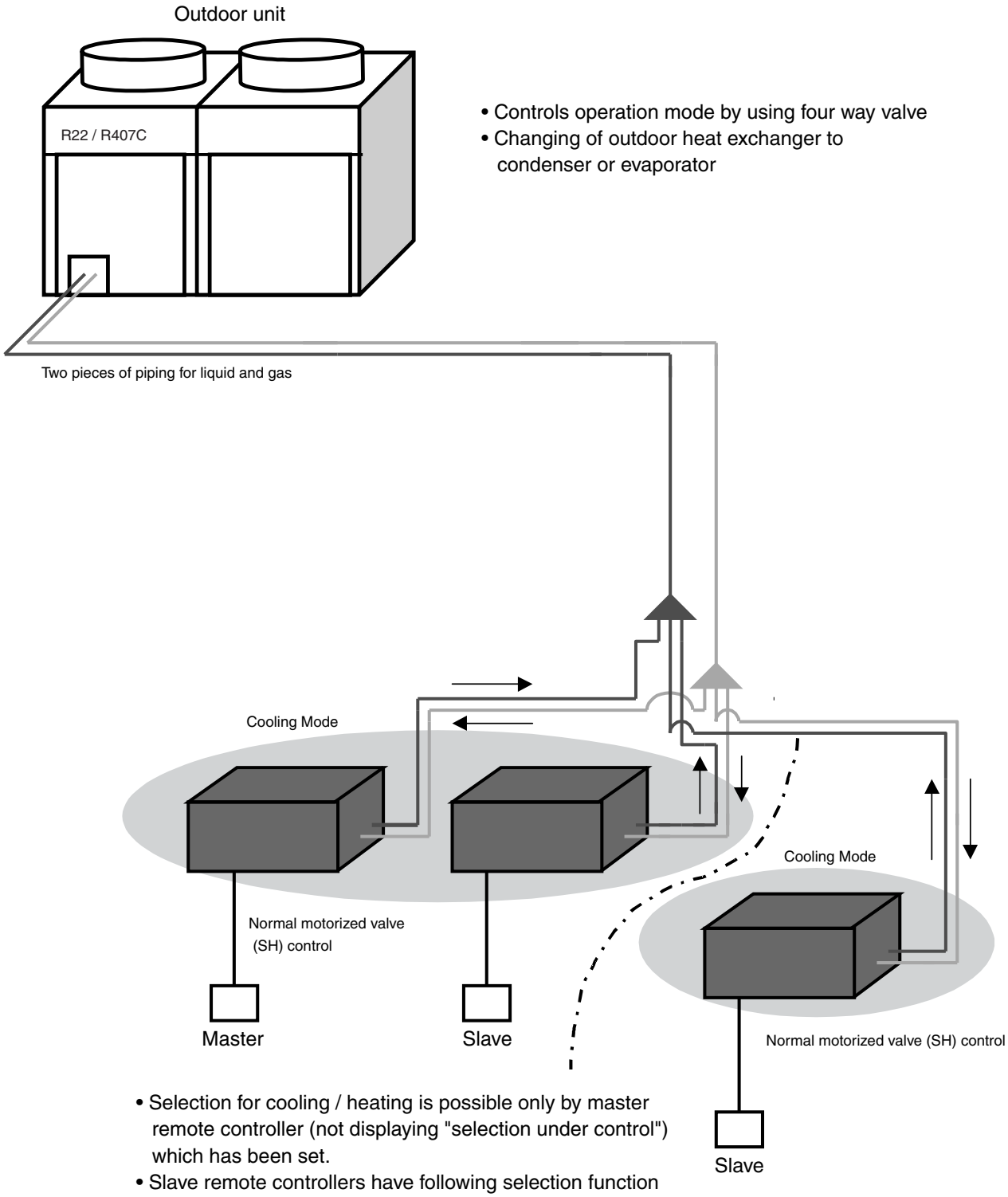
3. System Basic Configuration

3.1 Cooling / Heating Selection -Standard- System

3.1.1 Type A

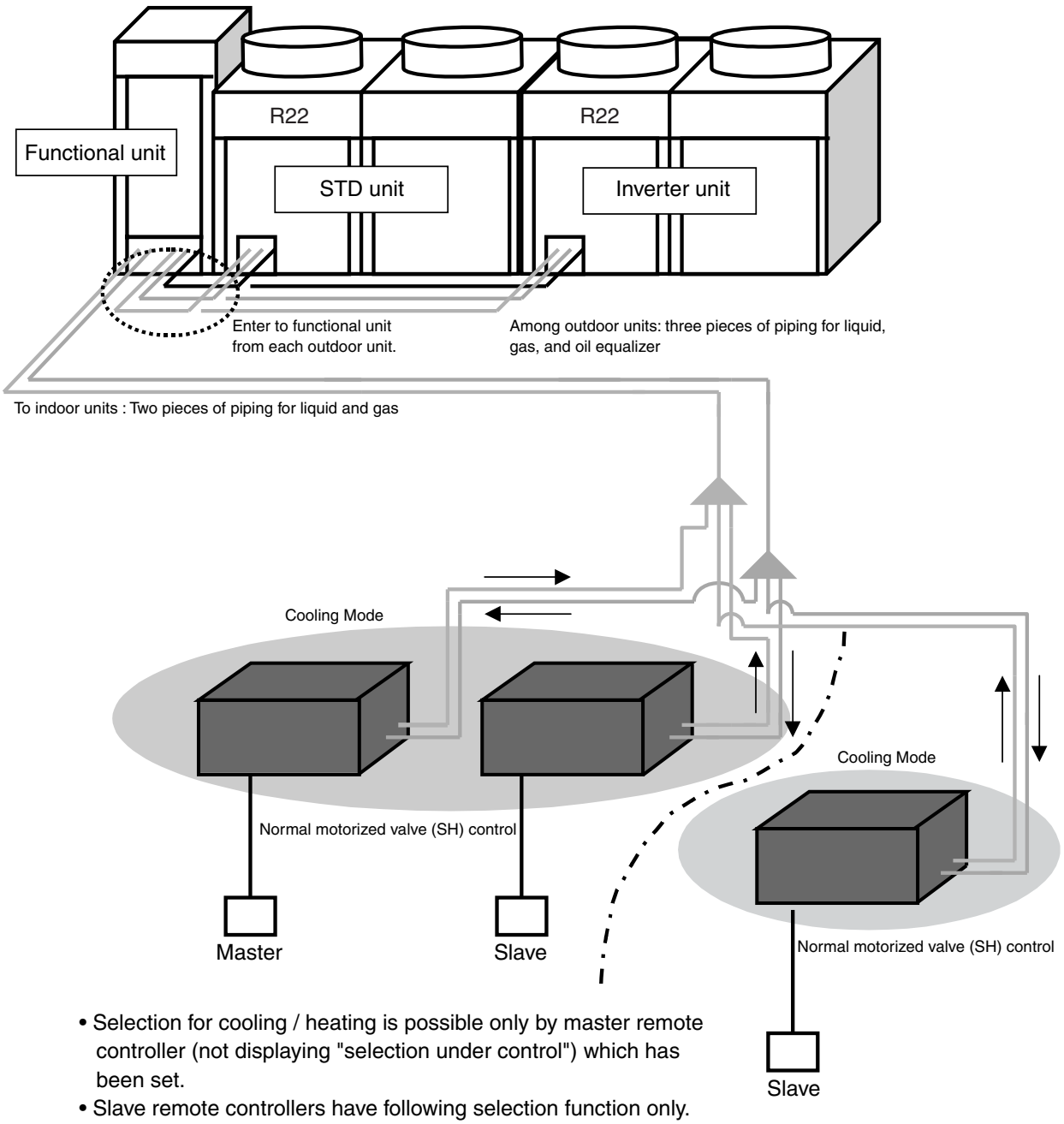
- **R(S)XY(P) ~**



• Selection for cooling / heating is possible only by master remote controller (not displaying "selection under control") which has been set.
• Slave remote controllers have following selection function only.
(1) Cooling, dry and fan only at Master unit cooling
(2) Heating and fan only at Master unit heating

3.1.2 Type B

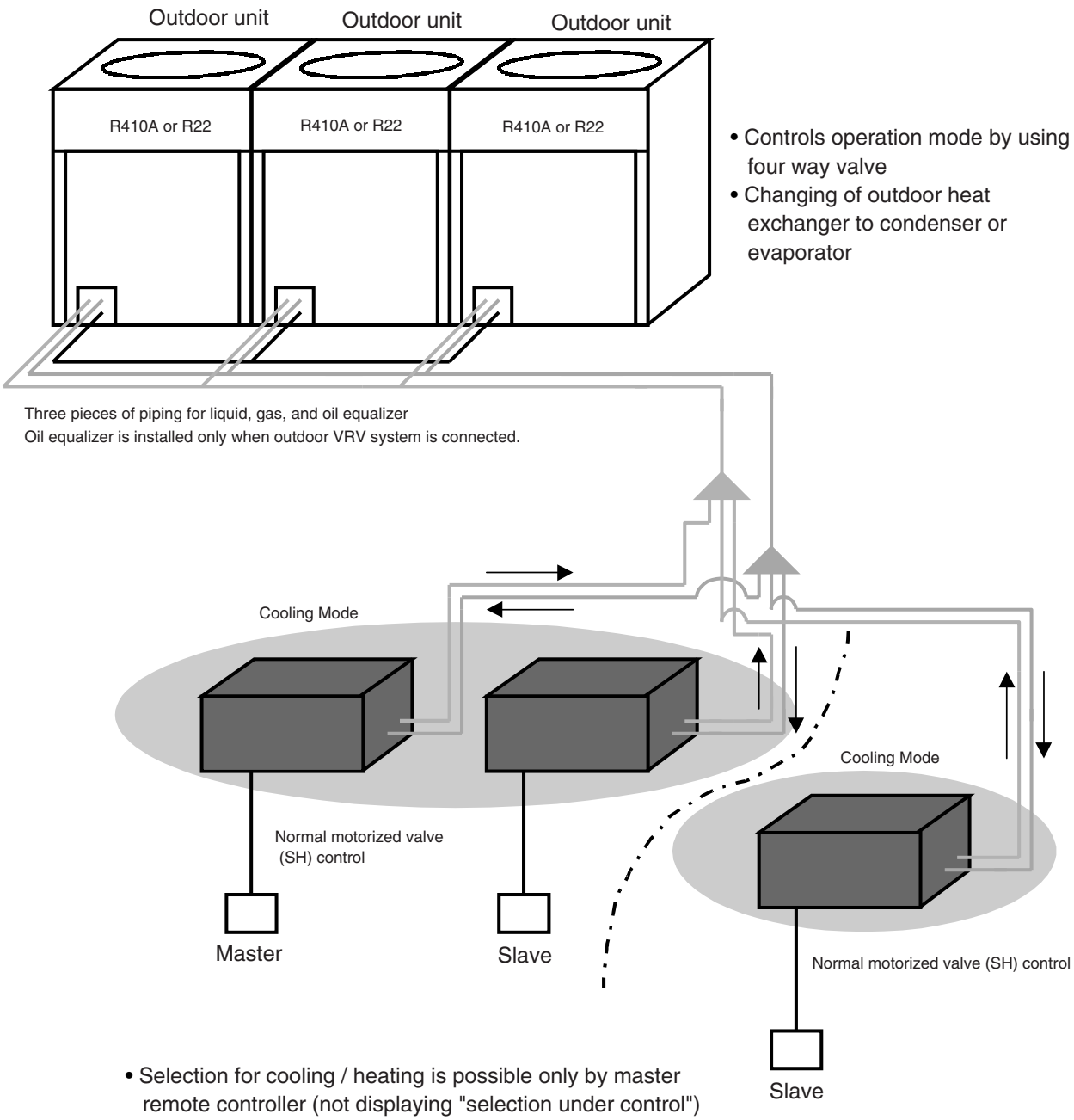
- **BL 2 ~ 3K (A) : Functional unit**
  RXY ~ K (A) : Inverter unit
  RNY ~ K (A) : STD unit



- Selection for cooling / heating is possible only by master remote controller (not displaying "selection under control") which has been set.
- Slave remote controllers have following selection function only.
  (1) Cooling, dry and fan only at Master unit cooling
  (2) Heating and fan only at Master unit heating

3.1.3 Type C

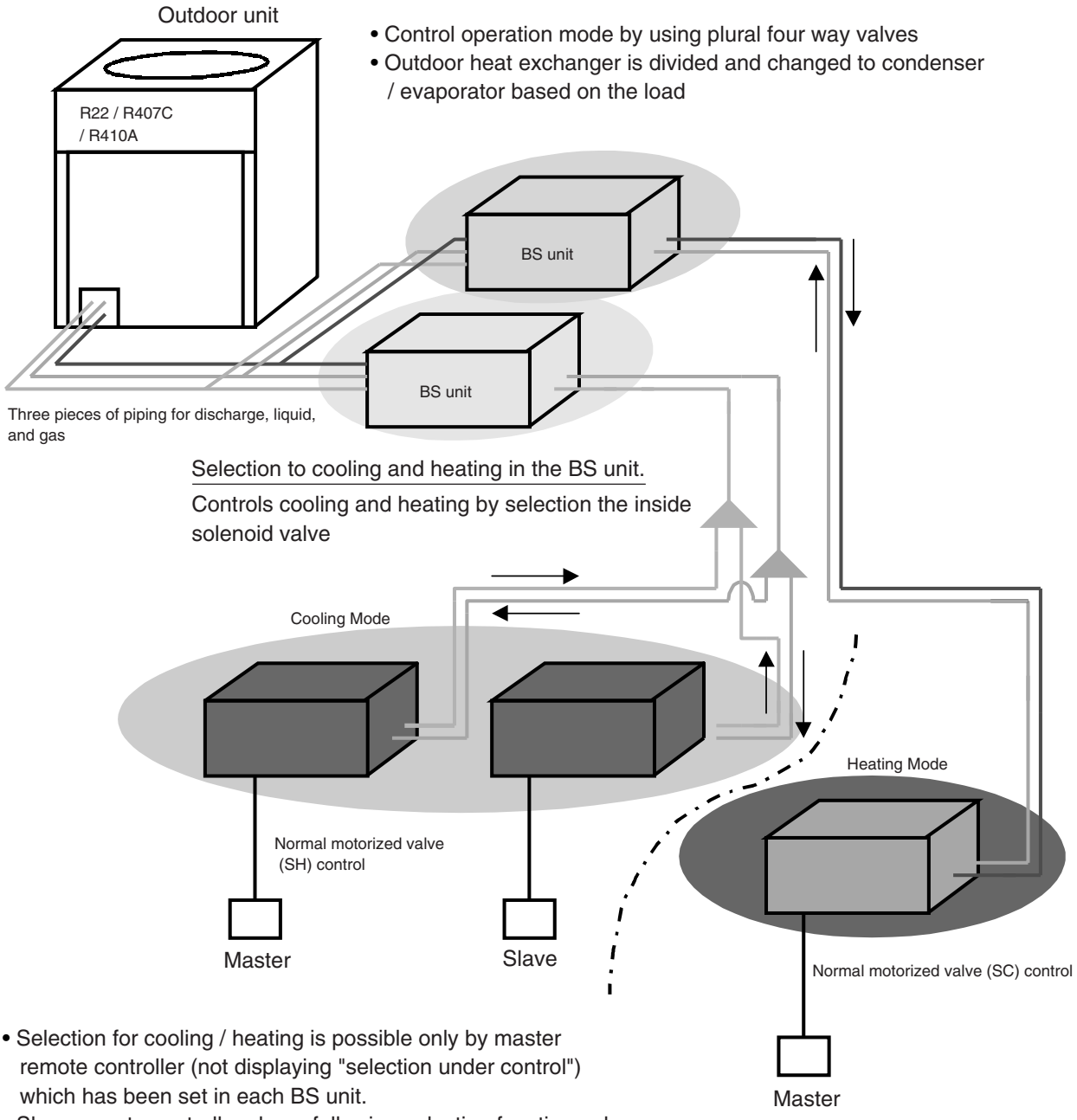
- **RX(Y)(Q) ~ M**



• Selection for cooling / heating is possible only by master remote controller (not displaying "selection under control") which has been set.
• Slave remote controllers have following selection function only.
(1) Cooling, dry and fan only at Master unit cooling
(2) Heating and fan only at Master unit heating

3.2 Heat Recovery (Cooling / Heating Individual Operating) System

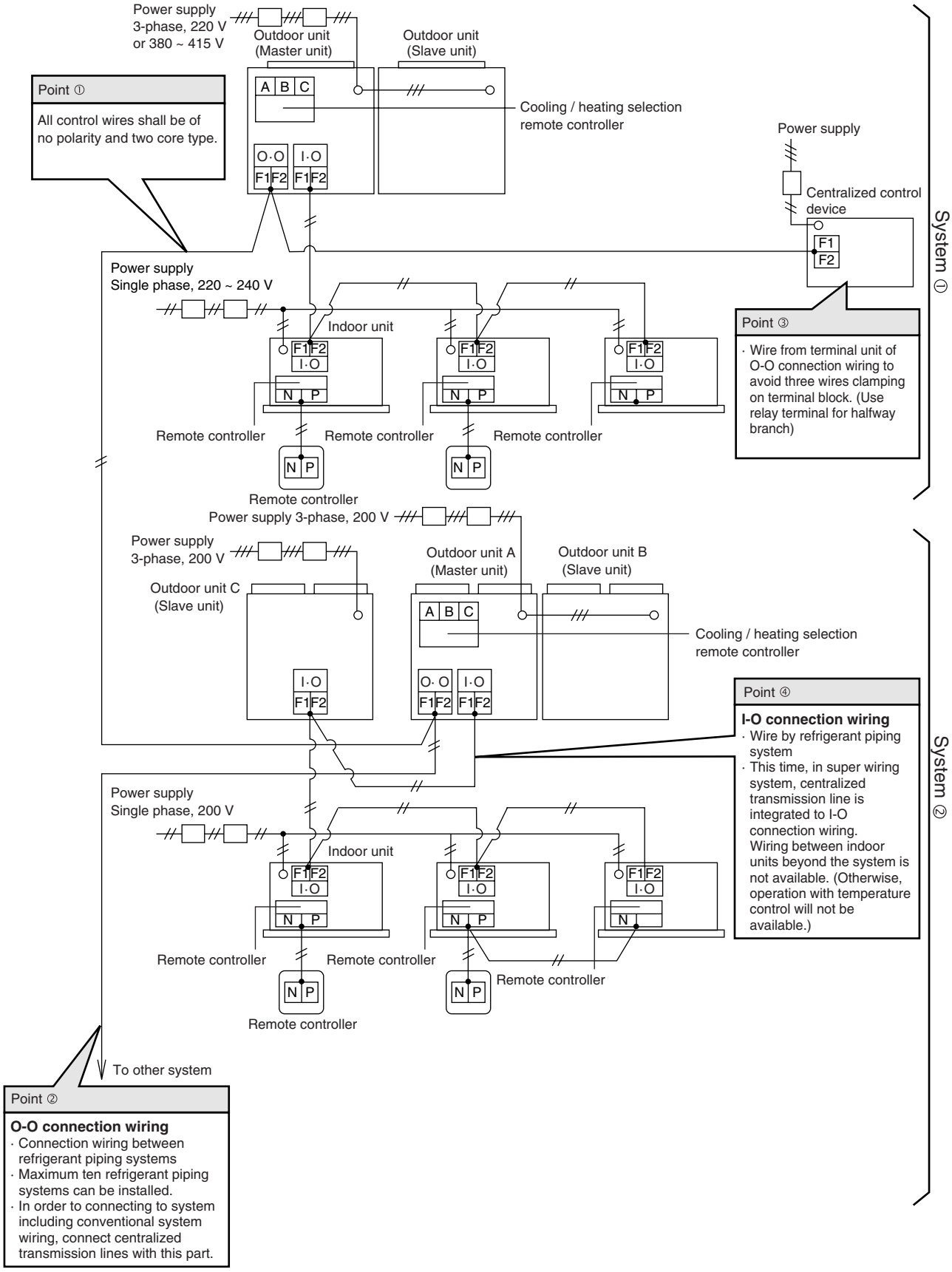
- **R(S)EYP(Q) ~**



- Selection for cooling / heating is possible only by master remote controller (not displaying "selection under control") which has been set in each BS unit.
- Slave remote controllers have following selection function only.
  (1) Cooling, dry and fan only at Master unit cooling
  (2) Heating and fan only at Master unit heating

4. Super Wiring System

4.1 Points of Super Wiring System



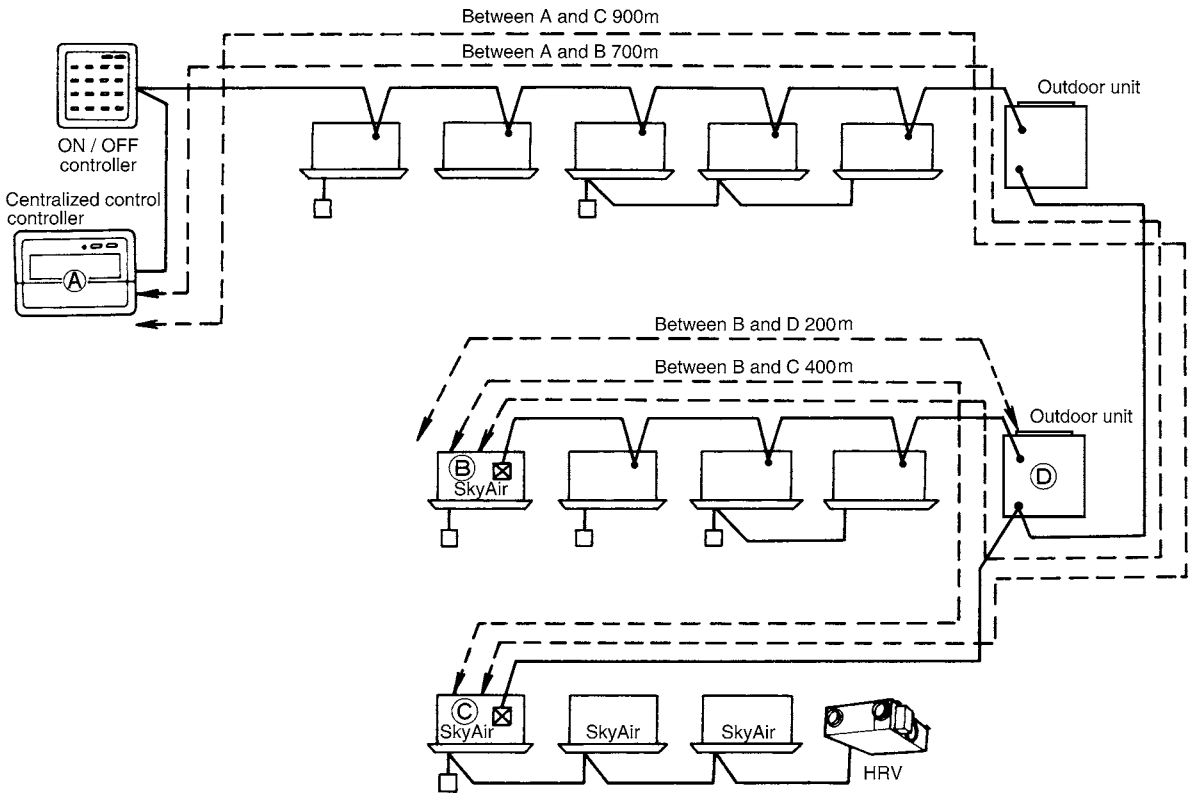
4.2 Wiring Length

- In super wiring system, limit the wire length within the following number except the wiring of remote controller, due to standardization of wiring for connection between outdoor and indoor unit and centralized transmission lines.

The farthest length: 1000m or less,
the total wiring length: 2000m or less

(When using sheathed wire, the total wiring length can be 1500m or less)

Example of System



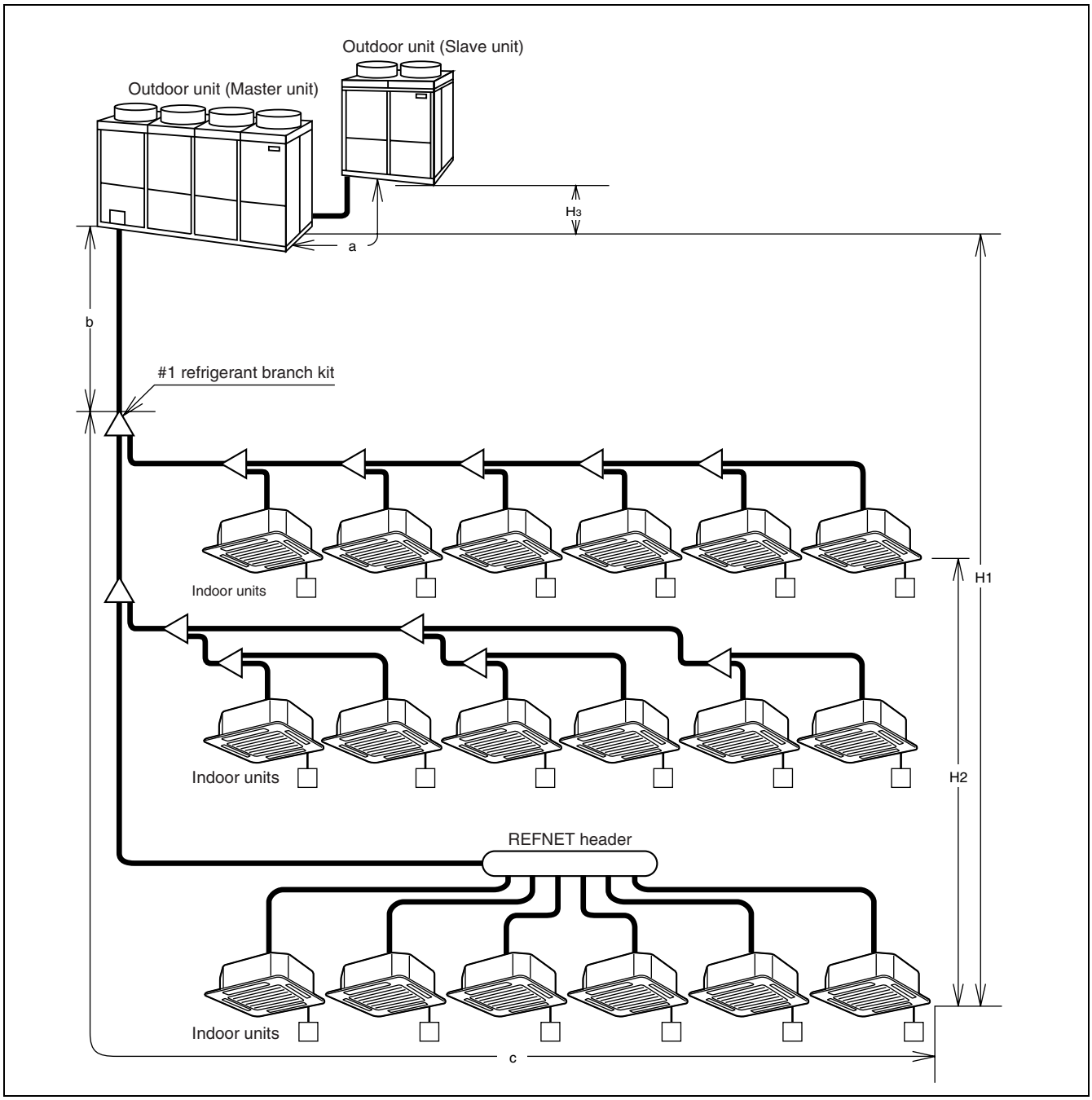
- In the above system, the farthest connecting distance is 900m between (A) and (C), conforming the condition of the farthest length of 1000m or less, and the total wiring length is 1100m, the sum of 900m between (A) and (C) plus 200m between (B) and (D), also conforming the condition of 2000m or less.
  Thus, as long as both the farthest length and the total wiring length stay within the limits, the system operates without any trouble.

Note: Be sure to check the farthest length and the total wiring length in designing.
If the sum of lengths exceeds the restricted limits, divide the system, or install more DIII-NET expander adapters as countermeasures.

5. REFNET Piping

5.1 Allowable Length of Refrigerant Piping

5.1.1 For RSXY(P) ~ KA(L)



■ **Allowable Length of Refrigerant Piping (Actual length)**

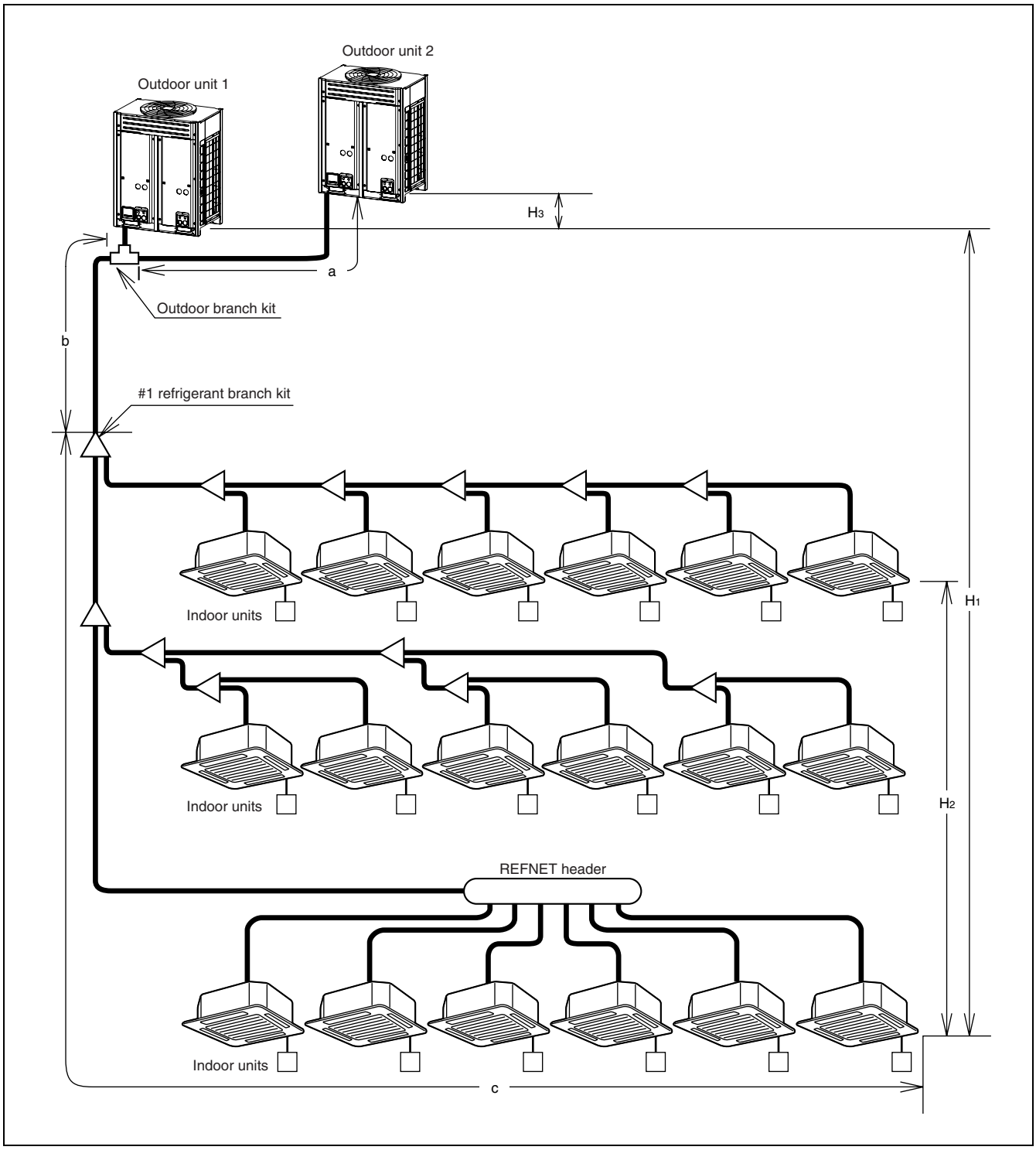
	Outdoor unit (master) to Outdoor unit (slave) [a]	#1 branch kit to Indoor unit [c]	Outdoor unit to Indoor unit (b + c)
Allowable length (m)	5m or less	40m or less	120m or less

■ **Allowable Level Difference**

	Between outdoor unit and indoor unit [H_1]	Between indoor units [H_2]	Between outdoor units (master and slave units) [H_3]
Allowable level difference (m)	50m or less If outdoor unit is located lower than indoor unit: 40m or less	15m or less	5m or less

Notes:
1. Be sure to use REFNET piping materials for piping branch part.
2. Do not make branch part after branching with REFNET header.

5.1.2 For RX(Y)(Q) ~ M



■ **Allowable Length of Refrigerant Piping (Actual Length)**

	Outdoor branch to Outdoor unit [a]	#1 branch kit to idoor unit [c]	Outdoor branch to Indoor unit [b + c]
Allowable length (m)	10m or less	40m or less	150m or less

■ **Allowable Level Difference**

	Between outdoor unit and indoor unit [H_1]	Between indoor units [H_2]	Between outdoor units [H_3]
Allowable level difference (m)	50m or less If outdoor unit is located lower than indoor unit: 40m or less	15m or less	5m or less

Notes:
1. Be sure to use REFNET piping materials for piping branch part.
2. Do not make branch part after branching with REFNET header.

5.2 For Refrigerant Piping

■ Guideline for Tightening Flare Nut (When No Torque Wrench is Available.)

Piping size	Tightening angle (guideline)	Recommended arm length of tool
ϕ6.4	60° ~ 90°	Approximately 150mm
ϕ9.5	60° ~ 90°	Approximately 200mm
ϕ12.7	30° ~ 60°	Approximately 250mm
ϕ15.9	30° ~ 60°	Approximately 300mm
ϕ19.1	20° ~ 35°	Approximately 450mm

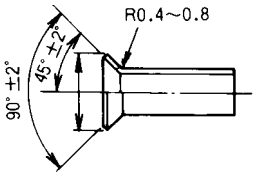
Notes:

1. When pipe jointing with flare nut, use both open-ended spanner and a torque wrench.
2. If no torque wrench is available, refer to the following item 3 as a guide.
3. In the work of tightening flare nut, there should be a spot where the tightening torque suddenly increases. Thereafter, tighten further with tightening angle shown in above list.

■ Bending Radius in Pipe and Flare Tightening Torque

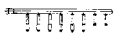
Piping size	Bending radius	Tightening torque (N·cm)
ϕ6.4	30 to 40 mm	1420 ~ 1720
ϕ9.5	30 to 40 mm	3270 ~ 3990
ϕ12.7	40 to 60 mm	4950 ~ 6030
ϕ15.9	40 to 60 mm	6180 ~ 7540
ϕ19.1	—	9720 ~ 11860

■ Processing Dimension for Flare Section

Piping size	Dimension-A		Flared shape
	R22, R407C	For R410A	
ϕ6.4	8.6 ~ 9.0	8.7 ~ 9.1	
ϕ9.5	12.6 ~ 13.0	12.8 ~ 13.2	
ϕ12.7	15.8 ~ 16.2	16.2 ~ 16.6	
ϕ15.9	19.0 ~ 19.4	19.3 ~ 19.7	
ϕ19.1	23.3 ~ 23.7	(24)	

■ Calculation List on Equivalent Length of Joint (For Reference)

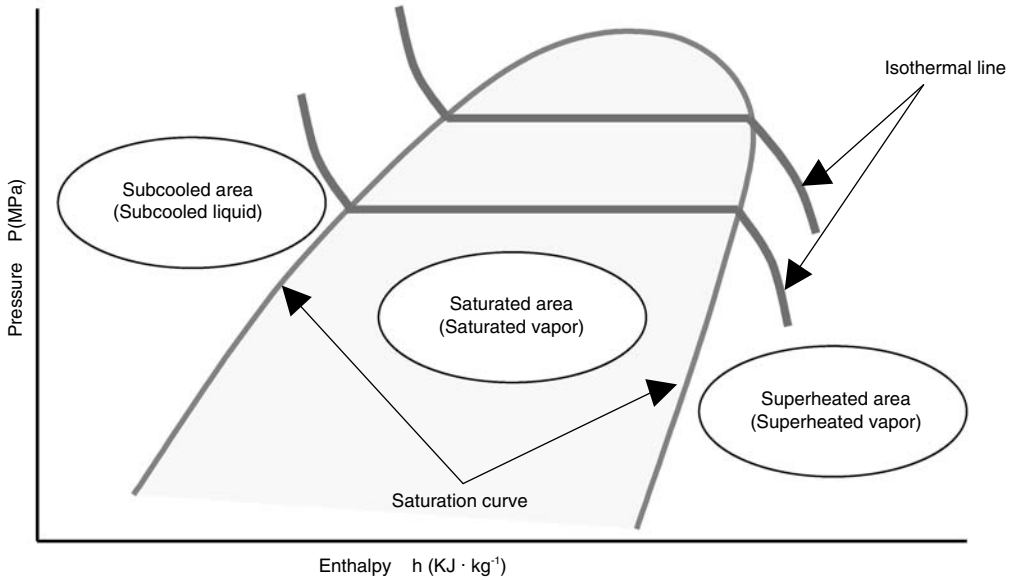
Unit: m

Type \ Pipe diameter	ϕ6.4	ϕ9.5	ϕ12.7	ϕ15.9	ϕ19.1	ϕ25.4	ϕ31.8
L joint 	0.16	0.18	0.20	0.25	0.35	0.45	0.55
Trap bend 	1.4	1.3	1.5	2.0	2.4	3.4	4.0
REFNET joint 	0.5						
REFNET header 	1.0						

B. Basic Information

1. Explanations on P-H Diagram (Refrigerant Characteristics Table)

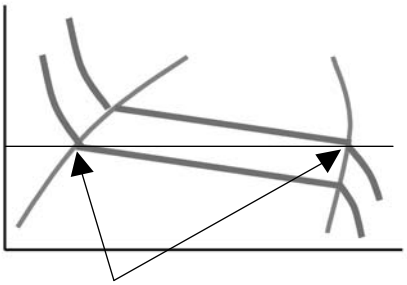
P-H diagram shows characteristics of various refrigerants with pressure on vertical axis and enthalpy on horizontal axis.



- Change of state change from gas to liquid is said condensation and that from liquid to gas said evaporation. The boundary state of each change is said saturation, and the temperature generating saturation is said saturation temperature.
- Saturation temperature depends on kinds of refrigerant and pressure. The characteristics of saturation temperature are shown on P-H diagrams of various refrigerants, which is called saturation curve.
- The characteristics of temperature gradients for pressure and enthalpy are shown on P-H diagrams, which is called "isothermal lines". By knowing the zone divided with saturation curve in which the intersection point of pressure and isothermal line is included, the information on the state of refrigerant can be provided. The intersection above can be obtained by measuring pressure and temperature of refrigerant at a certain point.
- As to single refrigerants (R22, R134A etc.), isothermal line has no gradient in the saturated area ,that is, the saturation temperature under certain pressure is same at both liquid side and gas side. As to mixed refrigerants (R407C, R410A etc.), in which plural refrigerants with different boiling points are mixed, their isothermal lines have gradients in the saturated area, so the saturation temperatures under certain pressure are different at liquid side and gas side. They are called zeotropic refrigerants, with the exception that R410A is called false azeotropic refrigerant.

States of refrigerants are classified following 3 categories.

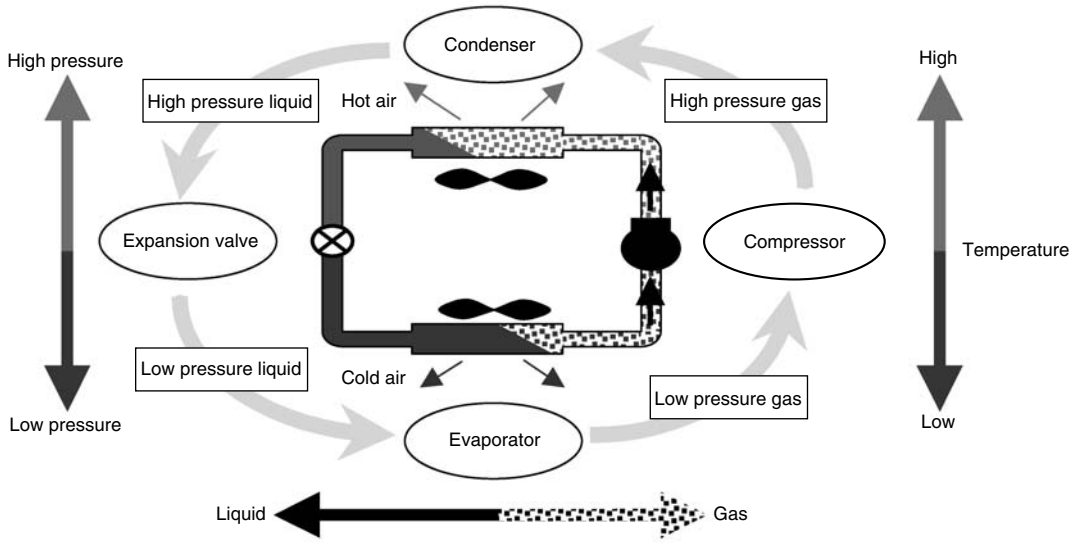
- Superheated vapor: state that refrigerant is existing as gas
- Saturated vapor: state that is mixture of liquid and gas (this is also called wet vapor)
- Subcooled liquid: state that refrigerant is existing as liquid

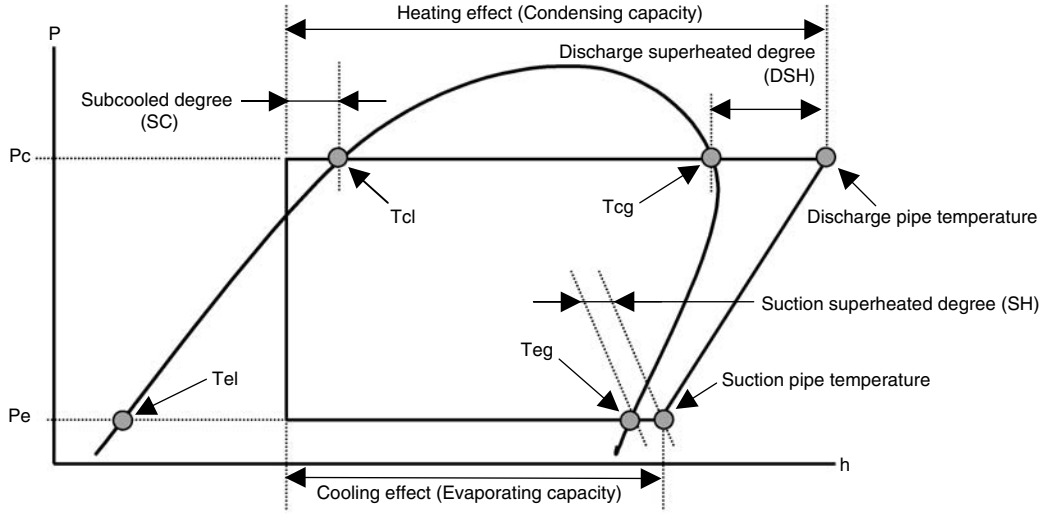


Zeotropic refrigerant R407C has different saturation points at liquid side and gas side. (gas side is higher than liquid side)

2. Concept of Basic Refrigeration Cycle

The refrigeration cycle is composed of repetition of the following process.
"Compression → Condensation → Expansion → Evaporation"
The refrigerating machine conducts above cycle with compressor, condenser, expansion valve and evaporator.





Theoretic refrigeration cycle neglecting pressure loss, etc. drawn on P-H diagram is shown as above.
The difference between "temperature" and "pressure equivalent saturation temperature" is called superheated degree.

- The difference between discharging pipe temperature and condensation temperature is called discharging superheated degree(DSH).
- The difference between suction pipe temperature and evaporating temperature is called suction superheated degree (SH).
  (Generally, superheated degree means suction superheated degree)

The difference between "temperature" and "pressure equivalent saturation temperature" in subcooled liquid is called subcooled degree (SC).

In order to prevent wet operation (*), the superheated degree is made at evaporator outlet and refrigerant flow rate into evaporator is regulated with expansion valve, so that the superheated vapor can be sucked by compressor.

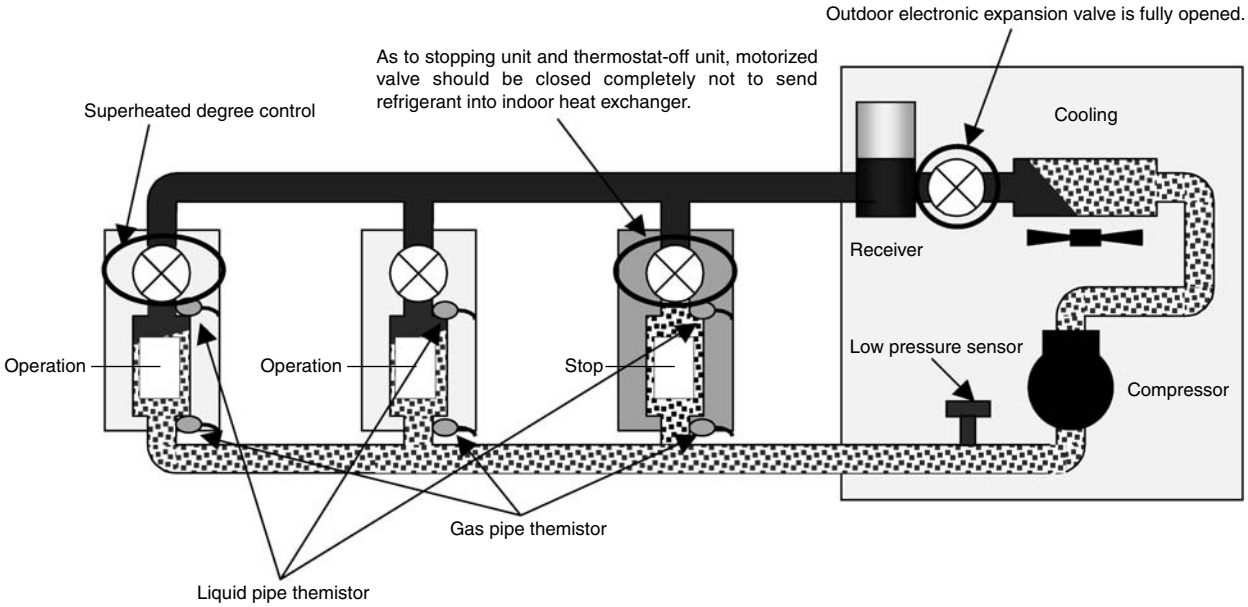
* Wet operation is a state of operation, where wet vapor due to the vapor not completely vaporized in the evaporator, wet vapor is sucked by compressor.
(Wet operation may cause damage of compressor due to liquid compression, dilution of refrigeration oil, etc..)

3. Points of Refrigerant Control of VRV System

3.1 Cooling Operation

Subject to change of the number of operation (thermostat-on) units, capacity, air flow rate, suction temperature, humidity change of indoor units

- Load on total system changes.
- Loads on every indoor machine are different.



Compressor Capacity Control

In order to maintain the cooling capacity corresponding to the capacity of evaporator and load fluctuation, based on the pressure detected by low pressure sensor of outdoor unit (Pe), the compressor capacity is so controlled to put the low pressure equivalent saturation temperatures (evaporation temperature = Te) close to target value.

Superheated Degree Control of Indoor Electronic Expansion Valve

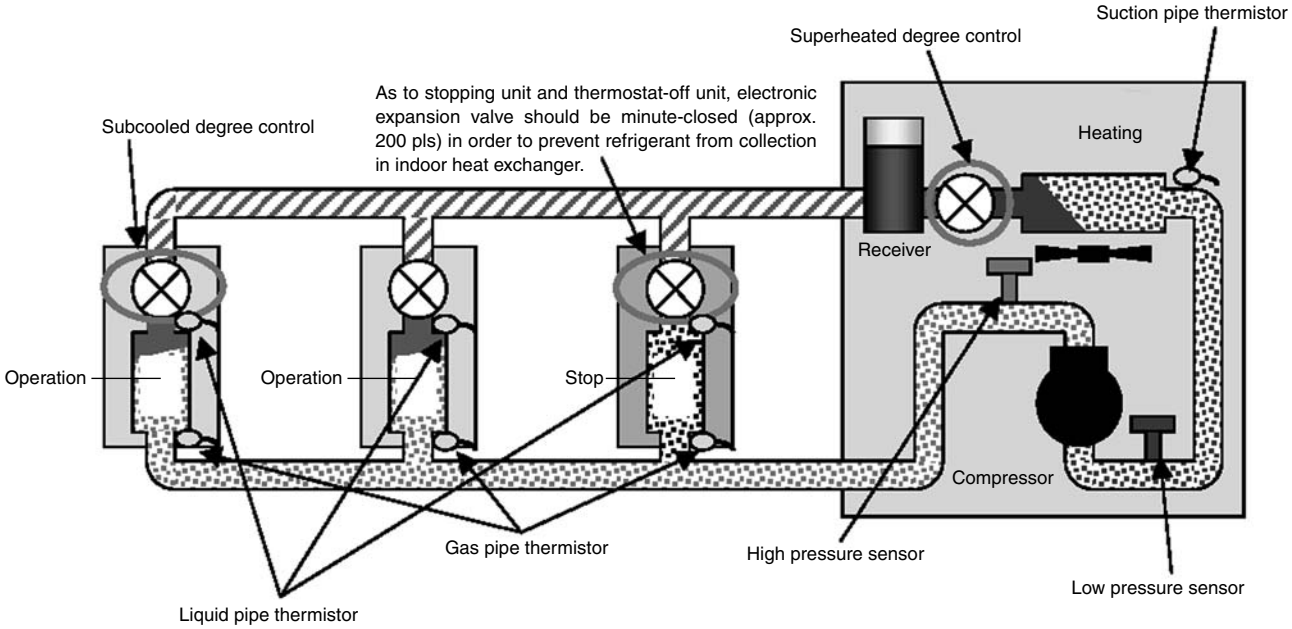
In order to maintain the superheated degree in evaporator and to distribute proper refrigerant flow rate in spite of different loads on every indoor unit, based on the temperature detected by thermistors of liquid pipes and gas pipes, indoor electronic expansion valve is so regulated as to put superheated degree at evaporator outlet close to target value.

- Superheated degree SH = (indoor gas pipe temperature – indoor liquid pipe temperature)

3.2 Heating Operation

Subject to change of the number of operation (thermostat-on) units, capacity, air flow rate, suction temperature, of indoor units

- Load on total system changes.
- Loads on every indoor unit are different.



Compressor Capacity Control

In order to maintain the heating capacity against condenser capacity and load fluctuation, based on the pressure detected by high-pressure sensor control (Pc), compressor capacity is so controlled to put the high pressure equivalent saturation temperature (condensing temperature = Tc) close to target value.

Superheated Degree Control of Outdoor Electronic Expansion Valve

In order to maintain the superheated degree in evaporator, based on the pressure detected by the low pressure sensor (Te) and the temperature detected by the thermistor of suction pipe, outdoor electronic expansion valve is so controlled as to put superheated degree at evaporator outlet close to target value.

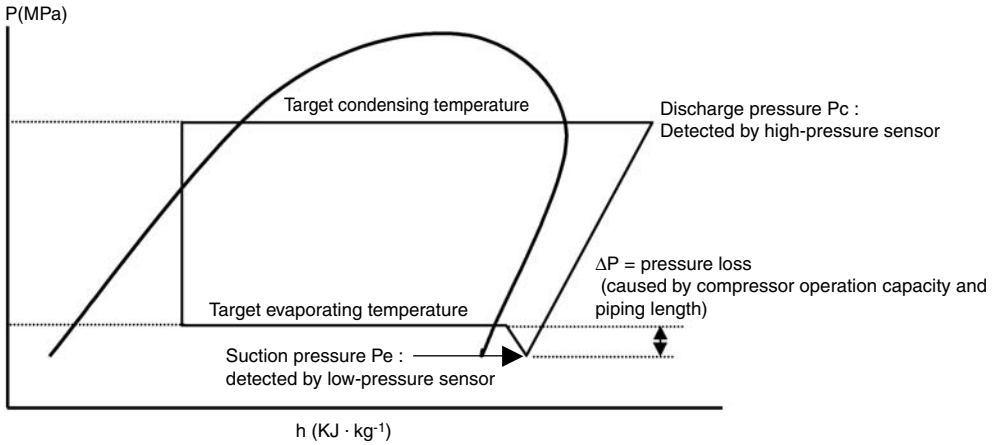
- Superheated degree SH = (outdoor suction pipe temperature – outdoor evaporating temperature)

Subcooled Degree Control of Indoor Electronic Expansion Valve

In order to distribute proper refrigerant flow rate in spite of different loads on every indoor unit, based on the pressure detected by the high pressure sensor of outdoor unit (Tc) and the temperature detected by the thermistor of indoor liquid pipes, indoor electronic expansion valve is so controlled as to put subcooled degree at condenser outlet close to target value.

- Subcooled degree SC = (outdoor condensing temperature – indoor liquid pipe temperature)

3.3 Compressor Capacity Control



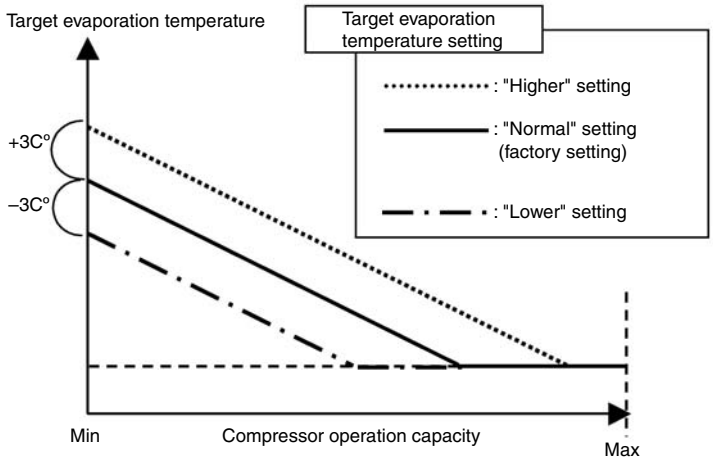
In the compressor capacity controller of VRV system, the pressure detected (Pe or Pc) by pressure sensor installed in outdoor unit is converted into equivalent saturation temperature, and the evaporation temperature (Te) while cooling or the condensation temperature (Tc) while heating are so controlled with PI control as to put them close to the target value in order to maintain stable capacity in spite of incessantly varying load. (Refer target value below table.)

	Target condensation temperature / High pressure		Target evaporation temperature / Low pressure	
R22	46°C	1.8MPa	5.5°C	0.59MPa
R407C	48°C	1.9MPa	7.5°C	0.58MPa
R410A	46°C	2.8MPa	6.0°C	0.96MPa

*Above all target temperatures mean saturation temperatures on gas sides.

The pressure loss in piping increases depending on connecting piping length and operation capacity of compressor. In order to compensate capacity lowering caused by the pressure loss in piping, the following correction are made.

Correction of Target Evaporation Temperature by ΔP.



◆ Target value adjustment can be made through field setting.
Long connection piping at the installation site may increase pressure loss in piping and an inverse installation (outdoor unit is placed lower than indoor unit) may increase liquid pipe inside resistance. In such case, "lower" setting of target evaporation temperature by using field setting will give stable operation.
On the other hand for short connection piping, higher setting will make stable operation easy.

In addition, samplings of evaporation temperature and condensation temperature are so made that pressure detected by every pressure sensors of high/low pressure are read every 20 seconds and calculated. And every time the compressor capacity (INV frequency or STD ON/ OFF) is controlled to eliminate deviation from target value.

3.4 Control of Electronic Expansion Valve

Electronic Expansion Valve of Outdoor Unit

■ **In Cooling Operation**

In cooling operation, outdoor electronic expansion valve should basically be fully open.
Note: In some models of type L or newer, the valve can be fully closed with a bridge circuit.

■ **In Heating Operation = Superheated Degree Control**

Superheated degree [SH] is calculated from the low pressure equivalent saturation temperature (Te) converted from the pressure detected by the low pressure sensor of outdoor unit (Pe) and temperature detected by suction pipe thermistor (Te). Electronic expansion valve opening degree is so regulated that the superheated degree [SH] becomes close to targeted superheated degree [SHS].

When SH > SHS, adjust to make opening degree wider than present one.
When SH < SHS, adjust to make opening degree narrower than present one.
SH : Superheated degree (Ts – Te)
SHS : Target superheated degree (Normally 5°C)

Electronic Expansion Valve of Indoor Unit

■ **In Cooling Operation = Superheated Degree Control**

Superheated degree [SH] is calculated from temperature detected by the gas pipe thermistor of indoor machine (Tg) and the temperature detected by liquid pipe thermistor (Tl). Electronic expansion valve opening degree is so controlled that the superheated degree [SH] becomes close to targeted superheated degree [SHS].
The compensation is made based on the temperature difference between setting temperature and suction air thermistor temperature (ΔT).

When SH > SHS, adjust to make opening degree wider than the present one.
When SH < SHS, adjust to make opening degree narrower than the present one.
SH : Superheated degree (Tg – Tl)
SHS : Target superheated degree
[Normally 5°C, however, when the temperature difference (ΔT) decreases, SHS increases. (even when SH is large, the opening degree becomes small.)]
ΔT : Remote controller setting temperature - suction air thermistor detection value

■ **Subcooled Degree Control in Heating Operation**

Subcooled degree [SC] is calculated from the high pressure equivalent saturation temperature (Tc) converted from the pressure detected by high pressure sensor of outdoor unit and the temperature detected by liquid pipe thermistor of indoor unit (Tl). Electronic expansion valve opening degree is so regulated that the subcooled degree [SC] is close to target subcooled degree [SCS].
The compensation is made based on the temperature difference between setting temperature and suction air thermistor temperature (ΔT).

When SC > SCS, adjust so to make opening degree wider than present one.
When SC < SCS, adjust so to make opening degree narrower than present one.
SC : Superheated degree (Tc – Tl)
SCS : Target subcooled degree.
[Normally 5°C, however, when the temperature difference (ΔT) decreases, SCS increases. (even when SC is large, the opening degree becomes small.)]
ΔT : Remote controller setting temperature - suction air thermistor detection value

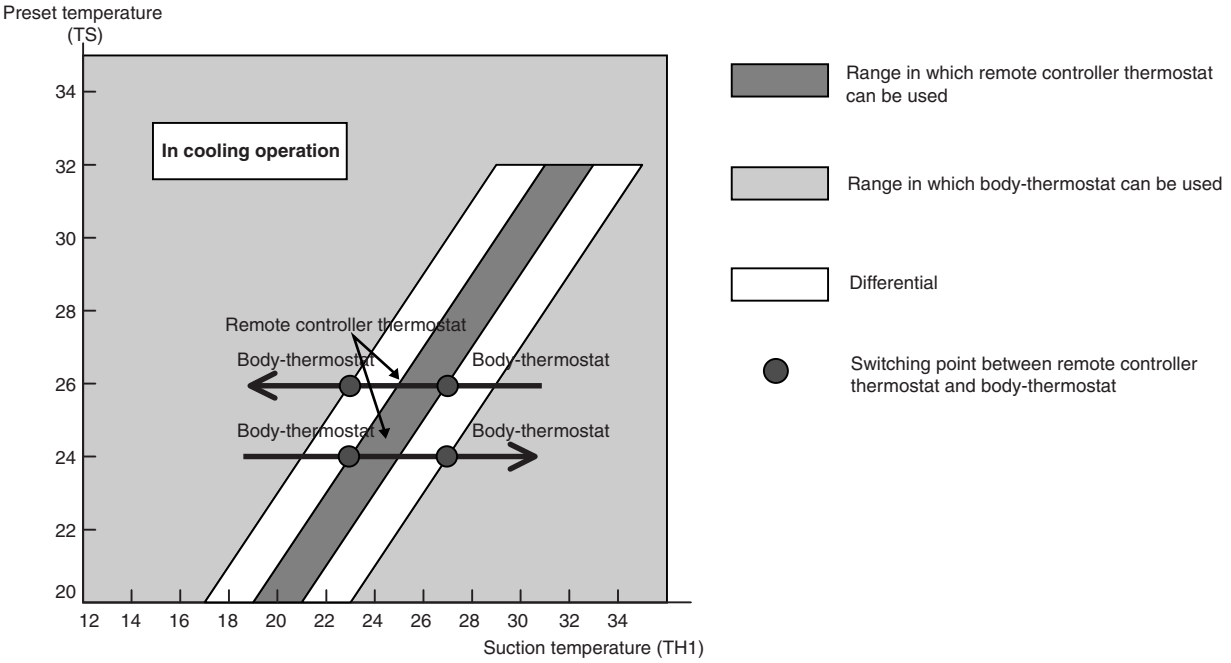
(Reference) Control range of outdoor electronic expansion valve
- R22 unit ... 0 to 2000pls
- R407C unit ...
  ① Ve-up standard (RSXYP 5 to 10L): 0 to 480 pls
  ② Others: 0 to 2000 pls
- R410 A unit ... 0 to 1400 pls

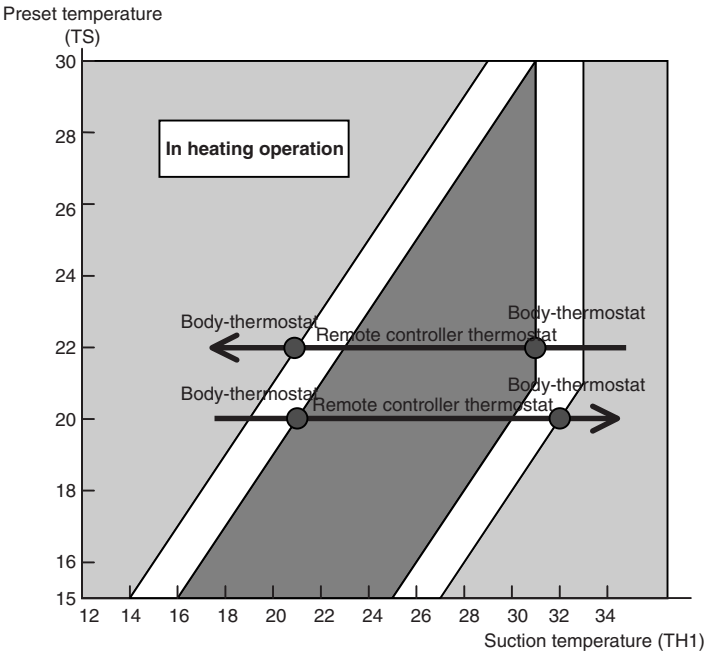
4. Control of Indoor Unit

4.1 Thermostat-control

4.1.1 Operation Range of Remote Controller Thermostat

Room temperature is controlled by remote controller thermostat side and suction thermostat (body-thermostat) on indoor unit side.
(However, when remote controller thermostat is set to "Not used " with field setting, the unit can be controlled only by body-thermostat.)

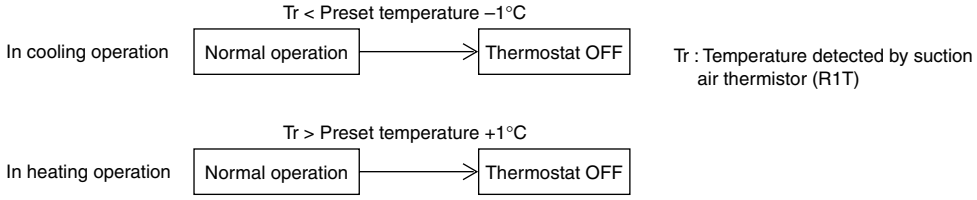




Note: When the outdoor air (OA) mixed with indoor air is sucked, the room temperature may happen to be out of the set temperature because the air temperature is out of the area of "operation range of remote controller thermostat ". In such a case, install the remote controller thermostat in the room where there is no influence of outdoor air.

4.1.2 Thermostat-control in Normal Operation

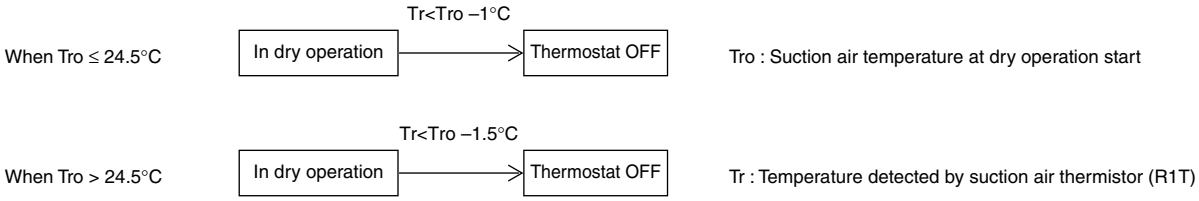
As to VRV system, remote controller thermostat is set to use when shipped from factory. Normally thermostat differential is set to setting temperature –1°C at cooling, while set to setting temperature +1°C in heating when shipped from factory.



However, the unit can be controlled only by body-thermostat when using 1 group remote controller. For cassette type indoor unit, the unit is controlled with compensation value of –2°C against body-thermostat detection value in heating operation. (Thermostat - differential can be changed from 1°C to 0.5°C with field setting. Refer to page 43 and page 44 for changing.)

4.1.3 Thermostat - control in Dry Operation

In dry operation, control is made based on suction temperature at the time of operation start.

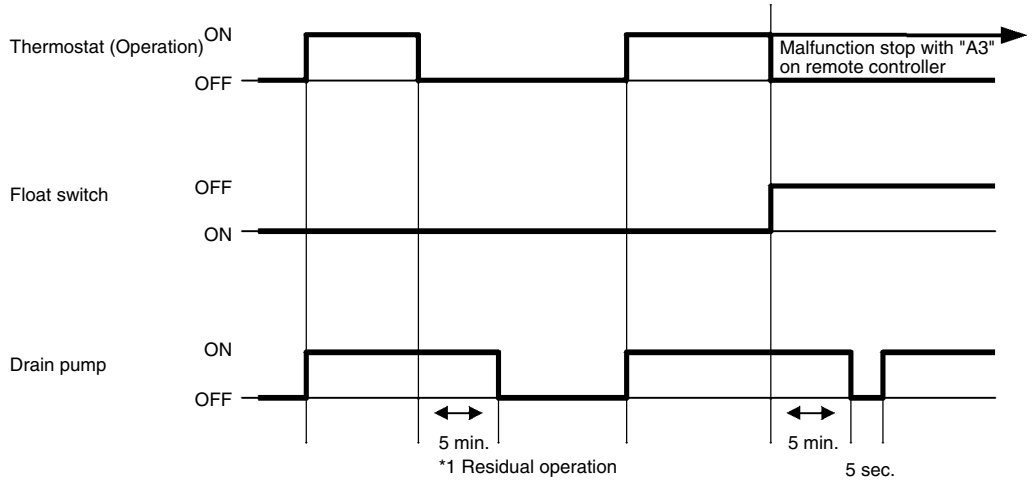


Fan is driven with L flow rate during dry operation, and turned off for a period of 6 minutes during thermostat-off, and then with L flow rate. (In order to prevent humidity from rising in the room during thermostat-off.)

4.2 Drain Pump Control

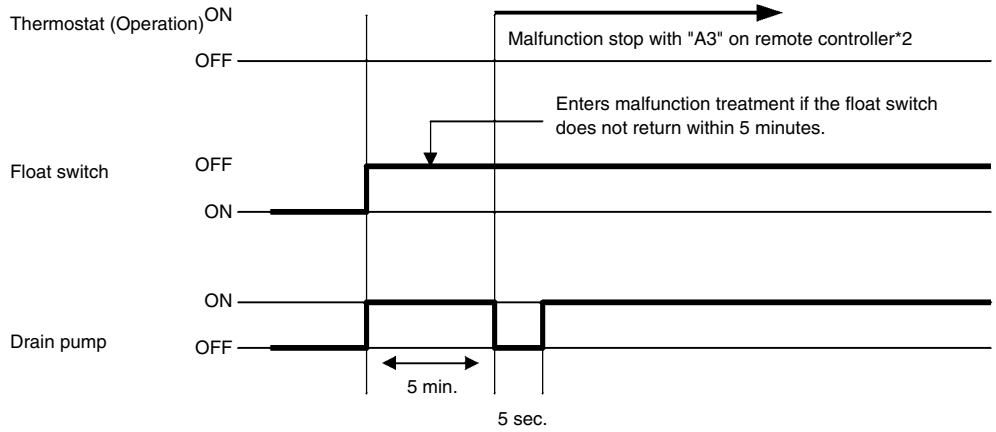
4.2.1 Drain Pump Control

(1) When the float switch is actuated during the cooling thermostat ON.

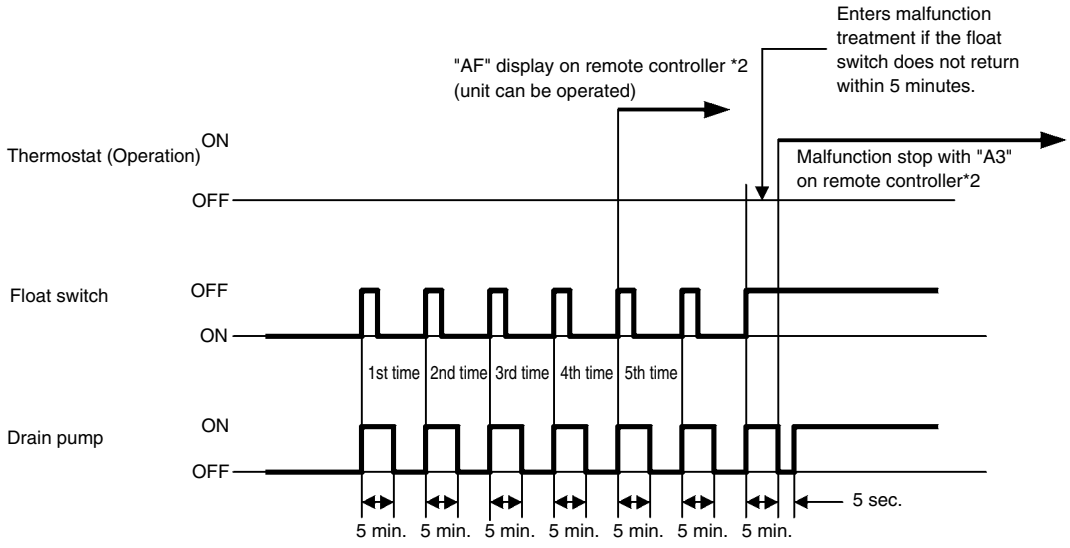


*1: The purpose of residual operation is to completely drain any moisture adhering to the fin of the indoor heat exchanger during the thermostat off.

(2) When the float switch is actuated during thermostat OFF:

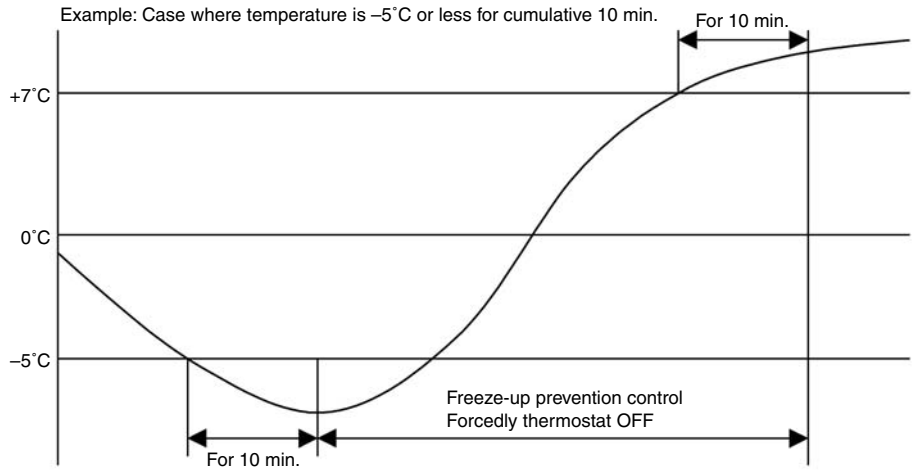


*2: When operation stopped, no malfunction will be displayed, however, when operation started next time, it will be displayed.



4.3 Freeze-up Prevention Control

Freeze-up prevention by off-cycle (The control be carried out with individual indoor unit.)
When the temperature detected by liquid pipe temperature thermistor (Th2) of the indoor heat exchanger lowers, and the following ON condition is fulfilled, the unit enters freeze-up prevention operation (forcedly thermostat off).
In freeze-up prevention operation, fan-tap is fixed at the flow rate of L. The operation will be stopped with the OFF condition below.
ON condition: The temperature (Th2) is –1°C or less for cumulative 40 min., or –5°C or less for cumulative 10 min.
OFF condition: The temperature (Th2) is +7°C or more for successive 10 min.



Conception of Freeze-up Prevention Control

- To make freezing uneasy
  - Aiming to limit the frequency of thermostat on / off and keep comfortableness.
    → Wide range of continuous operation can be kept
  - Aiming to maintain reliability of compressor
    → The frequency of compressor on/off is limited (Capacity control of indoor electronic expansion valve).
- To make sure to remove the frozen matter, once enter into frozen mode.
  - Aiming to make sure to prevent water from leakage
    → The condition to remove the frozen matter completely is adopted.

Note: When multi-flow cassette (super cassette) of indoor unit is set as two-way or three-way discharge, on condition is changed as below:

1°C or below continues for cumulative 15 minutes, or
0°C or below continues for continuous one minute

When freeze-up prevention is actuated, fan-tap is fixed at the flow rate of LL.
(Off condition is similar to the standard)

4.4 Heater Control

4.4.1 Heater Control of VRV System

Optional heater (wiring modification adapter is required) is made on/off under the conditions below.

On Condition (All Conditions should be Satisfied)

- Heating mode & thermostat-on
- Not under hot-starting
- Not under preparation of oil-return or defrosting
- Not under pressure equalizing
- Tc (High pressure equivalent saturation temperature transmitted from outdoor) < 50°C
- Th2 (Indoor liquid pipe thermistor) < 43°C

Off Condition (Any One of the Conditions below should be Satisfied.)

- Becomes any mode except heating
- Thermostat-off
- Under hot-starting
- Under preparation of oil-return or defrosting
- Under pressure equalizing
- Tc > 60°C
- Th2 > 47°C

4.4.2 Fan Residual Operation

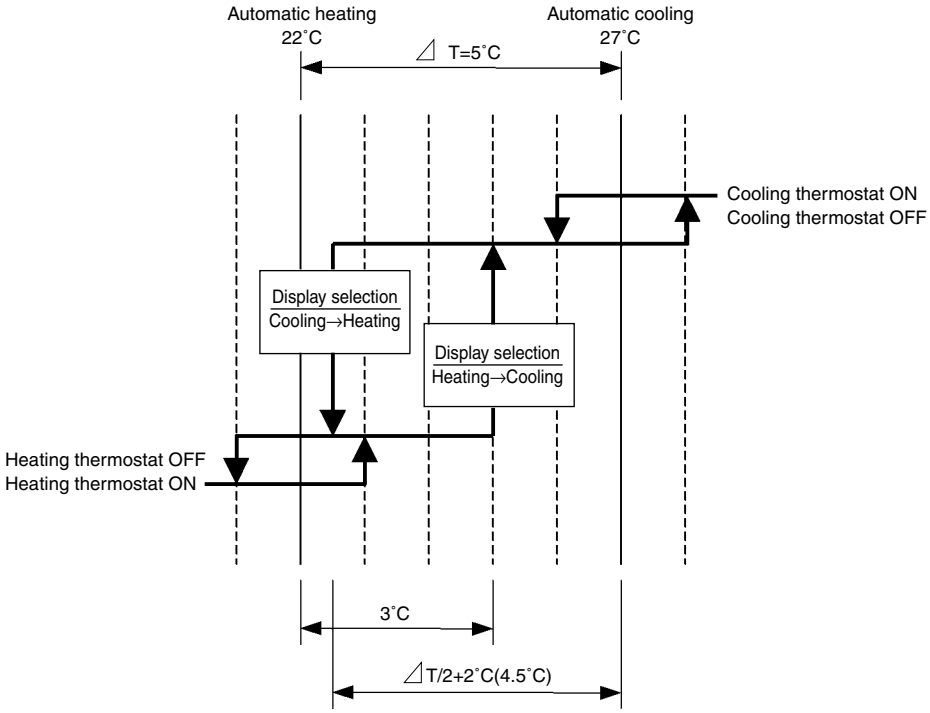
In order to prevent the thermal protector from actuation during heater is off, the fan will be operated with residual operation for the certain period of time after heater is off. (This operation shall be carried out regardless of heater)

Residual operation time = Ceiling suspended type: 100 seconds, others: 60 seconds

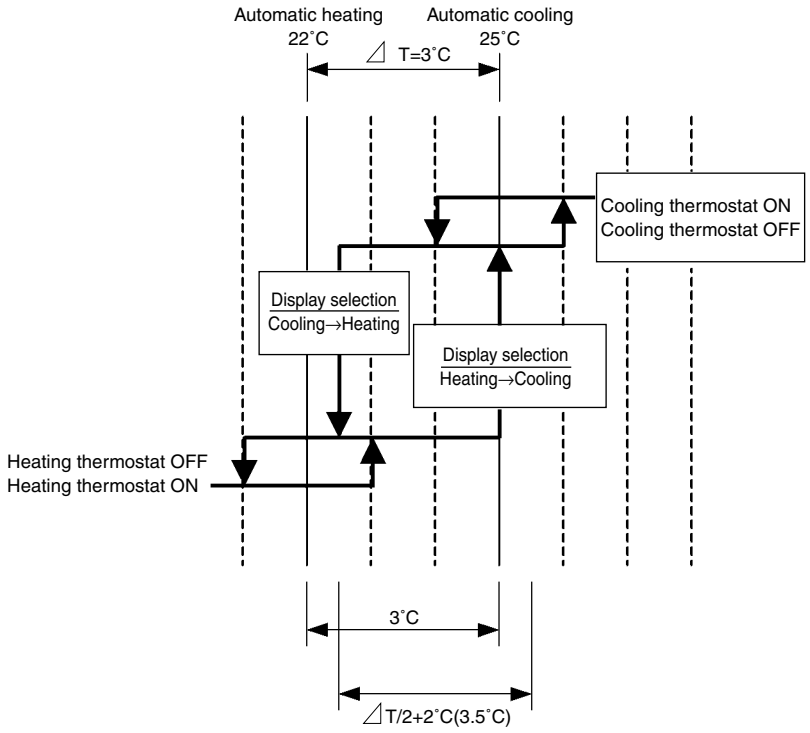
4.5 Thermostat Control in Cooling / Heating Automatic Operation

In cooling / heating automatic operation, the unit is controlled as shown below based on set "differential value". Factory setting of differential valve is 5°C. As to charging method of setting value, refer to page 43 and page 44.

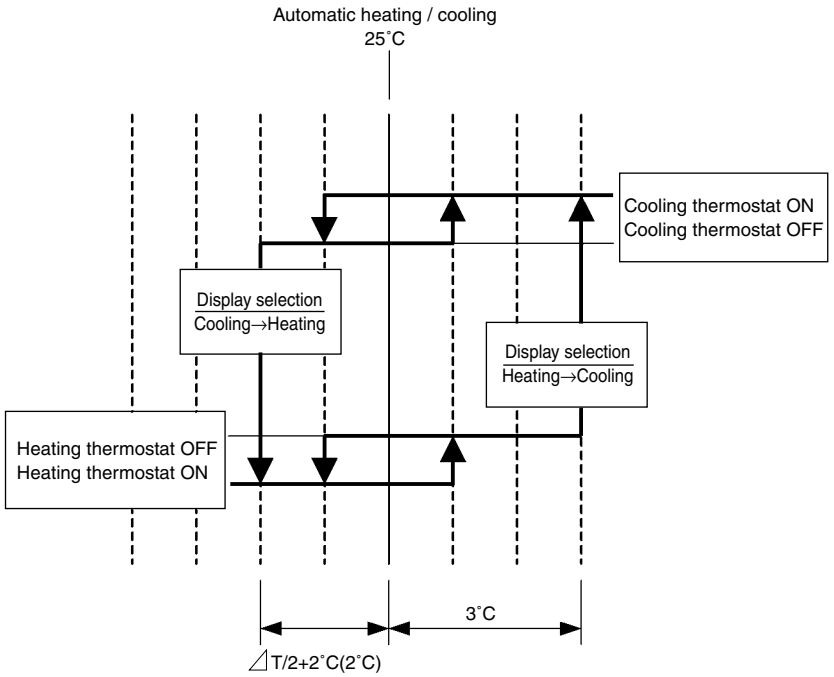
Cooling/Heating Differential: at 5°C



Cooling/Heating Differential: at 3°C



Cooling/Heating Differential: at 0°C



In order to prevent hunting in cooling / heating:

- After cooling operation thermostat turns off, if the temperature does not reach setting temperature –2°C, heating operation should not be on.
- After heating operation thermostat turns off, if the temperature does not reach setting temperature +3°C, cooling operation should not be on.

5. Other Functional Operations

5.1 Explanations on Main Functional Control

5.1.1 Cooling Operation

Compressor capacity control	Constant evaporation temperature (Te) control (Basic target value: R22 = 5.5°C, R407C = 7.5°C, R410A = 6°C *Compensation is applied)
Indoor electronic expansion valve control	Constant superheated degree (SH = Tg – Tl) control (Basically compensation of 5°C is required. As to R407C unit, temperature gradient compensation is applied.)
High pressure stepping down control	As rising of the high pressure, decreased the compressor capacity.
High pressure protection control	Forcedly thermostat-off with limitation on retrying
Low pressure stepping down control	Low pressure stepping down control is not made. (Capacity is decreased by normal control of compressor.)
Low pressure protection control	Hot gas bypass is on. → Forcedly thermostat-off with limitation on retrying
Low outdoor temperature cooling control	As lowering of the high pressure, outdoor fan is controlled. (fan-tap drops).
Cooling overload control	Instruction of forcedly opening degree is given to indoor electronic expansion valve. (Disregard of superheated degree control, even opening degree)
Discharge pipe temperature control	Based on discharging pipe temperature Td and discharging superheated degree DSH = Td – Tc, Injection is on. → Compressor capacity is lowered.→ Forcedly thermostat off with limitation on retrying
Oil return control	Based on cumulative operation time, oil return operation should be carried out periodically. (According to the state of operation, cumulative operation time may be compensated.)

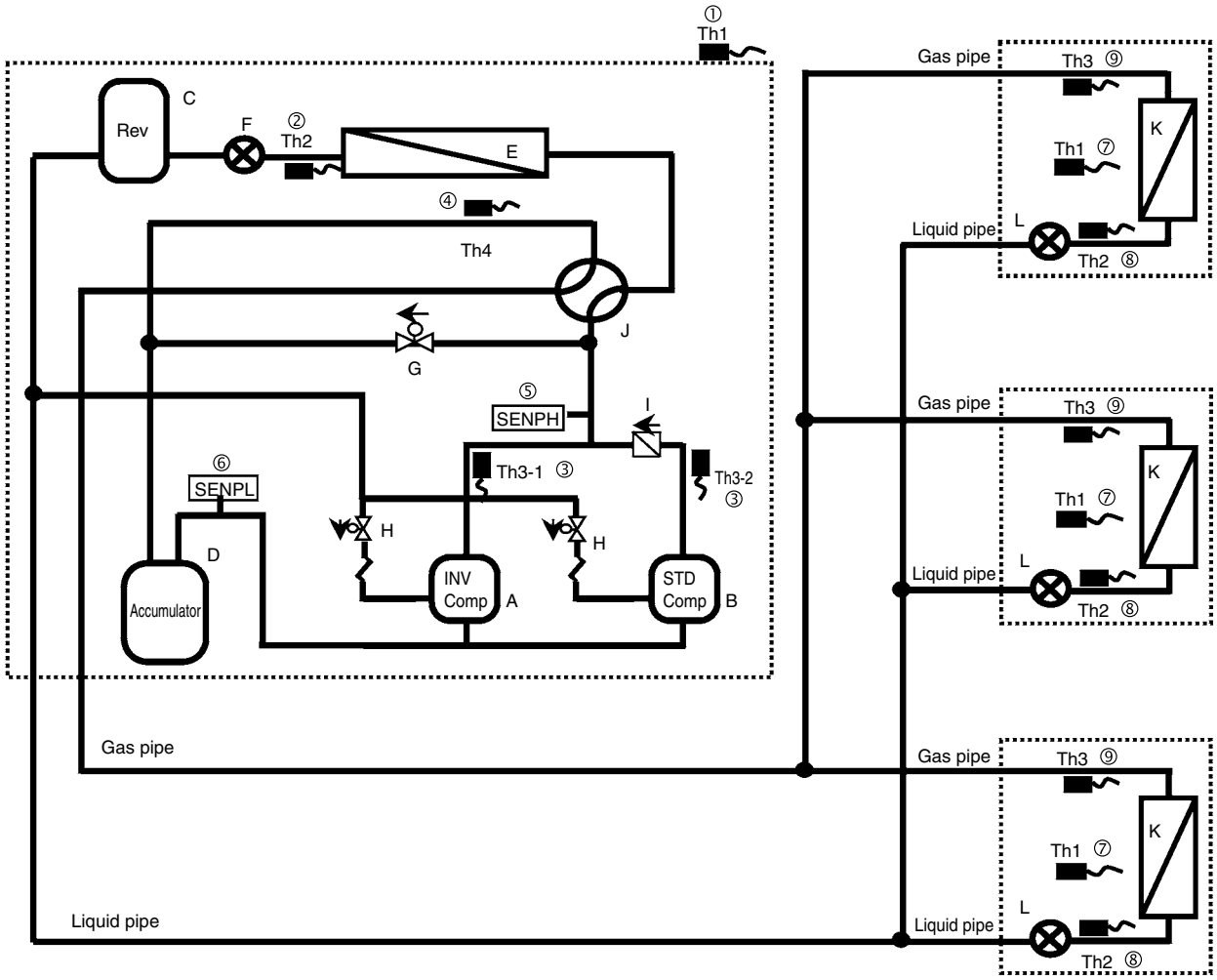
5.1.2 Heating Operation

Compressor capacity control	Constant condensing temperature (Tc) control (Basic target value: R22 = 46°C, R407C = 48°C, R410A = 46°C *Compensation is applied)
Outdoor motorized valve control	Constant superheated degree (SH = Ts – Te) control (Basic 5 deg. compensation is applied.)
Indoor motorized valve control	Constant subcooled degree (SC = Tc – Tl) control (Basic compensation of 5 deg is applied.)
High pressure stepping down control	(= Heating overload control) Compressor capacity control → Outdoor electronic expansion valve control (Disregard of superheated degree control) and Outdoor fan control (Fan tap is lowered.)
High pressure protection control	Forcedly thermostat-off with limitation on retrying
Low pressure stepping down control	As lowering of the low pressure decreases the compressor capacity.
Low pressure protection control	Hot gas bypass is on. → Forcedly thermostat-off with limitation on retrying
Defrost control	Based on lowered Tb, defrosting operation is carried out. (Compensation based on Ta).
Discharge pipe temperature control	Based on discharging pipe temperature Td and discharging superheated degree DSH = Td – Tc, Injection is on. → Compressor capacity is lowered → Forcedly thermostat-off with limitation on retrying
Oil return control	Based on cumulative operation time, oil return operation should be carried out periodically. (According to the state of operation, cumulative operation time may be compensated.)

5.2 Explanations on Electric and Functional Components

5.2.1 For RSXY8, 10K and RSXYP8, 10KJ

■ **Schematic Diagram of Refrigerant**



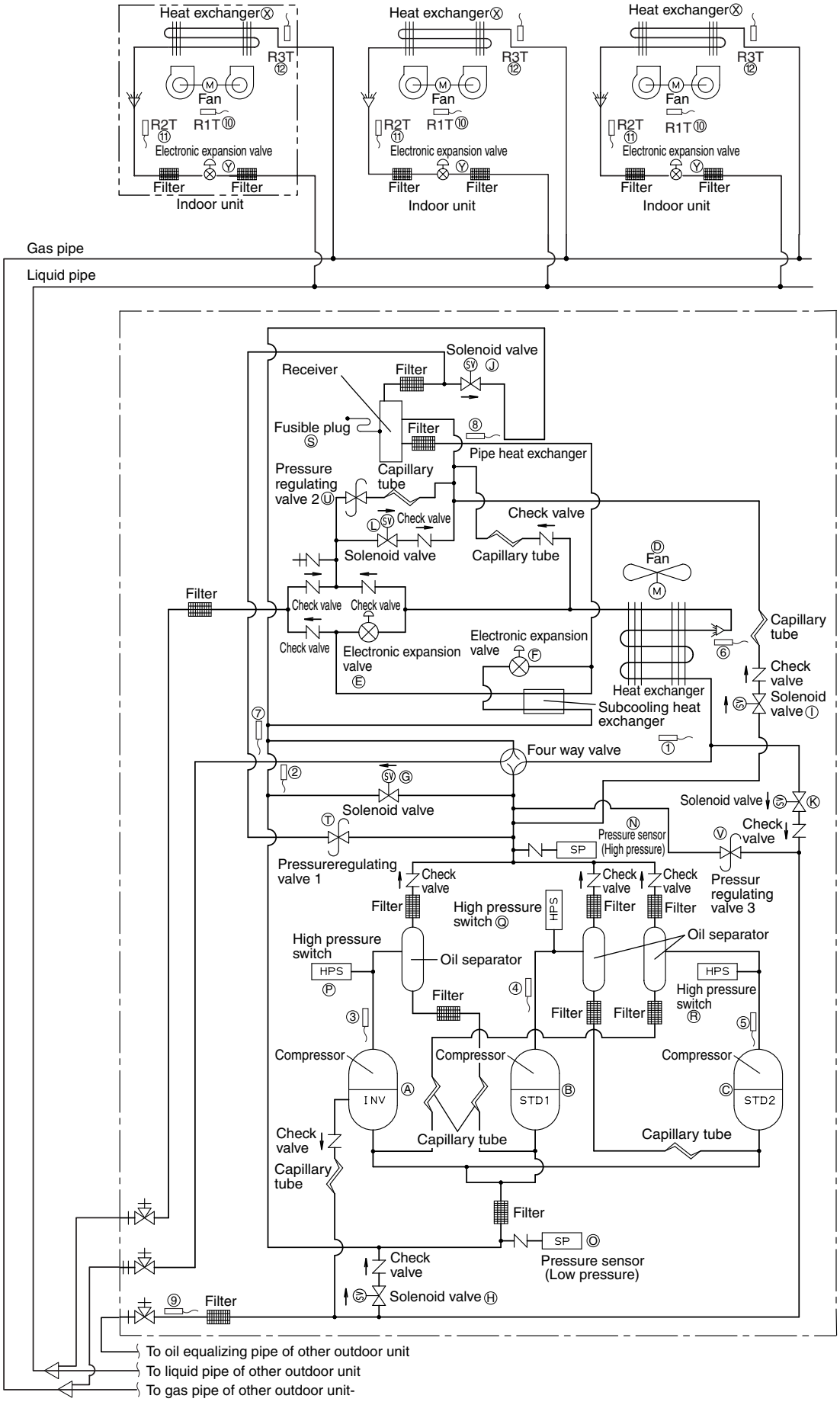
■ Explanation on Component Function

	No.	Parts name	Symbol	(Electric symbol)	Function
Outdoor unit sensor	①	Outdoor thermistor	Ta	R1T (Th1)	In heating operation standby due to outdoor temperature (forcedly thermostat-off at 27°C or higher), influence to defrost condition.
	②	Heat exchanger thermistor	Tb	R2T (Th2)	In heating operation, used for detection of defrosting
	③	Discharge pipe thermistor	Tdi, Tds	R31T (Th3-1) R32T (Th3-2)	Used for protection control of discharge pipe temperature
	④	Suction pipe thermistor	Ts	R4T (Th4)	In heating operation, used for superheated degree (SH = Ts – Te) control of outdoor electronic expansion valve
	⑤	High-pressure sensor	Pc, Tc	(SENPH)	Used for high pressure control and for compressor capacity control in heating operation. Although the pressure (Pc) is detected, controlling should be based on the equivalent saturation temperature (Tc).
	⑥	Low-pressure sensor	Pe, Te	(SENPL)	Used for low pressure control and for compressor capacity control in cooling operation. Although the pressure (Pe) is detected, controlling should be based on the equivalent saturation temperature (Te).
Indoor unit sensor	⑦	Suction air thermistor	Tr	R1T (Th1)	Used for thermostat control and compensation of electronic expansion valve control.
	⑧	Liquid pipe thermistor	Tl	R2T (Th2)	Used for superheated degree (SH = Tg – Tl) control in cooling operation and freeze-up prevention control. Used for subcooled degree (SC = Tc – Tl) control during heating operation and cancellation of hot start (34°C) control.
	⑨	Gas pipe thermistor	Tg	R3T (Th3)	Used for subcooled degree (SH = Tg – Tl) control in cooling operation.
Components of outdoor unit	A	Inverter compressor	INV	(MC1)	Used to conduct the capacity control (constant Te control in cooling, constant Tc control in heating) with inverter.
	B	STD compressor	STD	(MC2)	Used to conduct the capacity control with compressor using commercial power supply and inverter compressor (delayed start).
	C	Receiver	—	—	Making constant supply of liquid refrigerant to liquid receiver and evaporator (expansion valve). Storing excessive refrigerant
	D	Accumulator	—	—	Gas-liquid separator avoiding direct suction of liquid refrigerant to compressor.
	E	Outdoor unit heat exchanger	—	—	Working as condenser in cooling operation and as evaporator in heating operation (air-cooled)
	F	Outdoor unit electronic expansion valve	—	Y1E (20E)	Controlling so as to keep superheated degree (SH = Ts – Te) constant (basically 5°C)
	G	Hot gas bypass solenoid valve	—	Y2S (20RP)	Used for pressure equalizing and low-pressure protection in no operation.
	H	Injection solenoid valve	—	Y3S Y4S (20RT)	Conducts protection control with discharge pipe temperature (Tdi, Tds) and discharge superheated degree (Tdi, Tds – Tc)
	I	Check valve	—	—	Prevents refrigerant from backword flow in operation only with inverter compressor. (Prevention of standard compressor start with deferential pressure)
	J	Four way valve	—	Y1R (20S)	Making selection of cooling / heating cycle (energized coil for heating)
Components of indoor unit	K	Indoor unit heat exchanger	—	—	Heat exchanger works as evaporator in cooling operation and as condenser in heating operation. (Air cooled type)
	L	Indoor unit electronic expansion valve	—	Y1E (20E)	Used for superheated degree (SH = Tg – Tl) control in cooling operation, and for subcooled degree (SC = Tc – Tl) control during heating operation. Avoiding liquid collection, by setting the valve as minute opening (240 pls) in heating thermostat-off (when compressor is on).

* Electric symbols vary depend on the model of unit. For correct symbol, refer to relevant wiring diagram.

5.2.2 For RXY(Q)14, 16M

■ **Schematic Diagram of Refrigerant**



■ Functional Parts

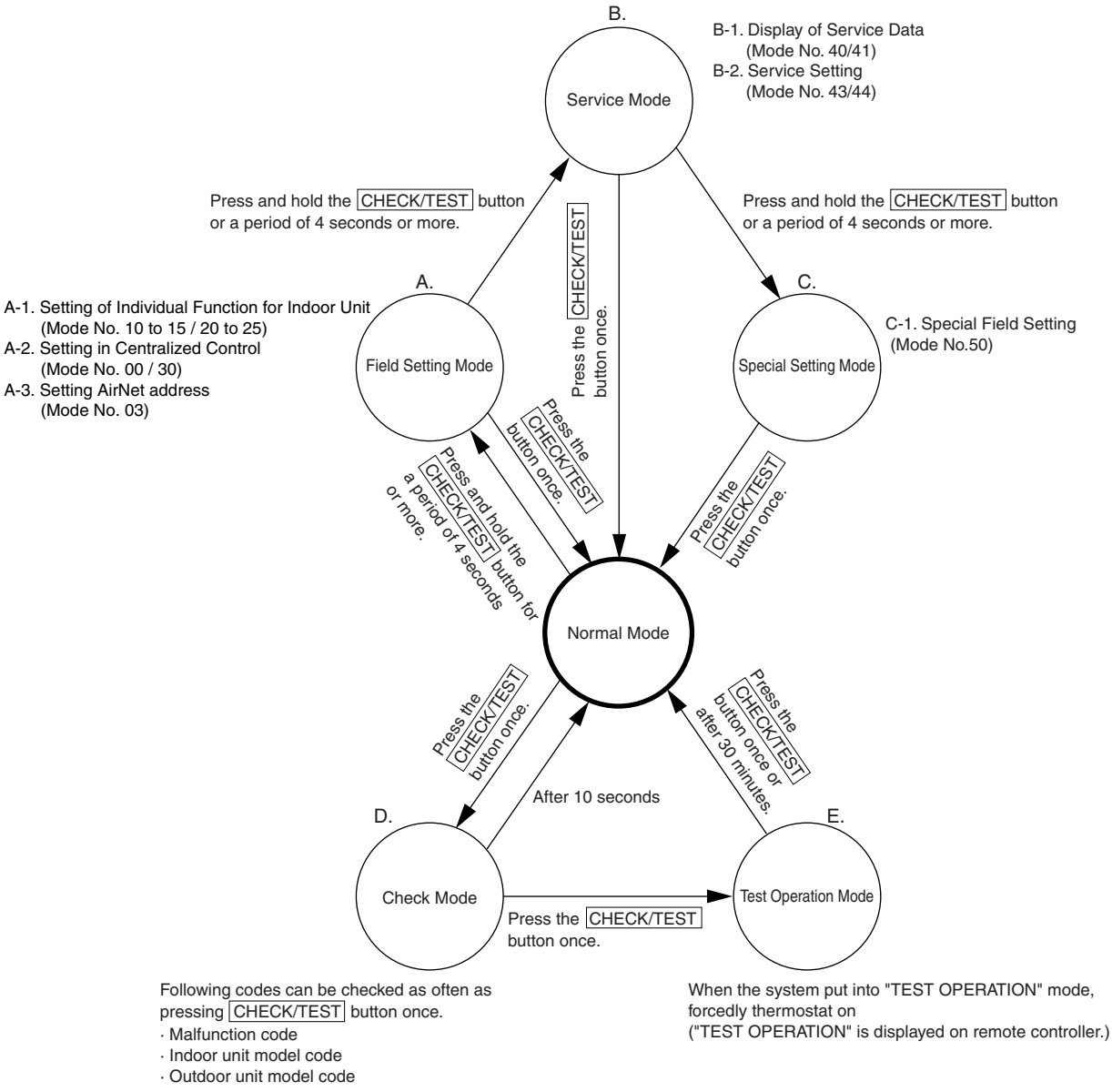
	No.	Part name	Symbol	(Electrical symbol)	Function
Outdoor unit sensor	①	Outdoor thermistor	Ta	(R1T)	Used to detect outdoor temperature, thus compensating discharge pipe temperature and others.
	②	Suction pipe thermistor	Ts	(R2T)	Used to detect suction pipe temperature, thus conducting constant control of the suction superheated degree in heating operation.
	③	Discharge pipe thermistor (INV)	Tdi	(R31T)	Used to detect discharge pipe temperature, thus conducting the protection control of compressor temperature.
	④	Discharge pipe thermistor (STD1)	Tds1	(R32T)	
	⑤	Discharge pipe thermistor (STD2)	Tds2	(R33T)	
	⑥	Heat exchanger deicer thermistor	Tb	(R4T)	Used to detect the liquid pipe temperature of air heat exchanger, thus making judgment of defrosting operation.
	⑦	Subcooling heat exchanger gas pipe thermistor	Tsh	(R5T)	Used to detect gas pipe temperature on the evaporation side of subcooling heat exchanger, thus conducting the constant control of outlet superheated degree of the subcooling heat exchanger.
	⑧	Receiver outlet liquid pipe thermistor	Tl	(R6T)	Used to detect outlet liquid pipe temperature of the receiver, thus conducting the preventive control of drift between outdoor units in heating operation on the multi outdoor unit system.
	⑨	Oil equalizer pipe thermistor	To	(R7T)	Used to detect oil equalizer pipe temperature, thus detecting the opening / closing operation of the stop valve for oil equalizer pipe.
	N	High-pressure thermistor	Pc, Tc	(S1NPH)	Used to detect high pressure.
	O	Low-pressure thermistor	Pe, Te	(S1NPL)	Used to detect low pressure.
Indoor unit sensor	⑩	Discharge air thermistor	Tr	(R1T)	Used for thermostat control and the compensation of electronic expansion valve control.
	⑪	Liquid pipe thermistor	Tl	(R2T)	Used to control superheated degree (SH = Tg – Tl) in cooling operation. • Used to freeze-up prevention control. Used to control subcooled degree (SC = Tc – Tl) in heating operation. • Used for hot start reset (34°C).
	⑫	Gas pipe thermistor	Tg	(R3T)	Used to control superheated degree (SH = Tg – Tl) in cooling operation.
Components of outdoor unit	A	INV compressor	INV	(M1C)	Inverter compressors are driven by inverter at a frequency in the range of 52 Hz to 210 Hz. STD compressors are only operated with commercial power supply. The following section shows the number of operation steps in combined use of the inverter and STD compressors. RXY(Q)5M : 20 steps RXY(Q)8, 10, 12M : 29 steps RXY(Q)14, 16M : 35 steps
	B	STD compressor 1	STD1	(M2C)	
	C	STD compressor 2	STD2	(M3C)	
	D	INV fan	—	(M1F)	This inverter fan operates at revolution speed in eight steps by inverter drive for heat exchange with the air heat exchanger.
	E	Electronic expansion valve (Main)	EV1	(Y1E)	Used for PI control in heating operation so that the outlet superheated degree of the air heat exchanger will be kept constant.
	F	Electronic expansion valve (Subcooling)	EV2	(Y2E)	Used for PI control so that the outlet superheated degree of the subcooling heat exchanger will be kept constant.
	G	Solenoid valve (Hot gas)	SVP	(Y1S)	Used to prevent the transitional drop of low pressure.
	H	Solenoid valve (Oil equalizer)	SVO	(Y2S)	Used to conduct oil equalization between outdoor units on the outdoor unit multi system.
	I	Solenoid valve (Receiver gas inlet)	SVL	(Y3S)	Used to maintain high pressure in cooling operation with low outdoor temperature. Furthermore, used to prevent the refrigerant from accumulating in outdoor units in stop mode on the multi outdoor unit system.
	J	Solenoid valve (Receiver gas purging)	SVG	(Y4S)	Used to recover the refrigerant into the receiver.

	No.	Part name	Symbol	(Electrical symbol)	Function
Components of outdoor unit	K	Solenoid valve (Non-operating unit gas discharging)	SVSG	(Y5S)	On the outdoor unit multi system, used to prevent the refrigerant from accumulating in outdoor units in stop mode.
	L	Solenoid valve (Non-operating unit liquid pipe closing)	SVSL	(Y6S)	On the outdoor unit multi system, used to prevent the refrigerant from accumulating in outdoor units in stop mode.
	M	Four way valve	—	(Y7S)	Used to switch the unit to cooling operation or heating operation.
	P	High-pressure switch (For INV compressor)	—	(S1PH)	In order to avoid the increase in high pressure while in malfunction, these switches are actuated at a pressure of 3.8MPa or more to stop the unit. (2.7 MPa for R22 unit)
	Q	High-pressure switch (For STD compressor 1)	—	(S2PH)	
	R	High-pressure switch (For STD compressor 2)	—	(S3PH)	
	S	Fusible plug	—	—	In order to avoid increase in pressure at abnormal hating due to fire, the fusible part melts at a temperature of 70 to 75°C, thus relieving pressure into atmosphere.
	T	Pressure regulating valve 1 (Receiver to Discharge pipe)	—	—	In order to prevent damage to functional parts due to increase in pressure in transport or storage, these valves open at pressure of 2 to 2.7MPa, thus avoiding the increase in pressure. (1.5 ~ 2.0 MPa for R22 unit)
	U	Pressure regulating valve 2 (Liquid pipe to Receiver)	—	—	
	V	Pressure regulating valve 3 (Oil equalizer pipe to Discharge pipe)	—	—	
Components of indoor unit	X	Indoor unit heat exchanger	—	—	This heat exchanger serves as an evaporator while in cooling operation or a condenser while in heating operation (air cooling).
	Y	Indoor unit electronic expansion valve	—	(Y1E)	Used to control the superheated degree (SH = Tg – TI) in cooling operation or subcooled degree (SC = Tc – TI) in heating operation. This valve slightly opens (i.e., 240 pls) with thermostat OFF (compressor ON) in heating operation, thus preventing the accumulation of oil.

C. Field Settings from Remote Controller

1. Field Settings from Remote Controller

The following modes can be selected by using the CHECK/TEST button on the remote controller.



1.1 Field Setting Mode

1.1.1 Settings of Individual Functions for Indoor Unit

Individual functions of indoor unit can be changed from the remote controller. At the time of installation or after service inspection/repair, make field settings in accordance with the following descriptions.
Be noted that wrong settings may result in malfunctions.
(If any optional accessory is mounted to the indoor unit, changes in settings may be needed. For details, refer to information in the manual for optional accessories.)

Procedure

① Turn on the power supply.
Turn on the power supply of indoor unit. (Setting is available only with turning on the power supply.)
Check installation and electric wiring again before turning on the power supply.
(After all LCDs are displayed for turning the power supply, operation is occasionally not accepted, displaying "88" for a period of about one minute.)

② Put the system into field setting mode.
While in normal mode, press and hold the TEST button for a period of four seconds or more to put the system into "Field Setting Mode".

③ Select mode No.
Select a desired "mode No." using the button.

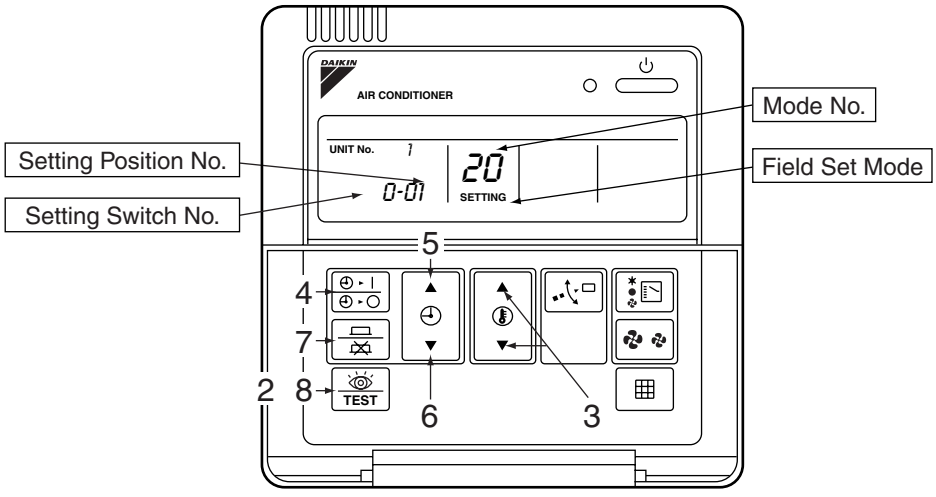
④ Select indoor unit No.
While in group control, to make field settings for individual indoor unit (i.e., if mode No. 20, 21, 22, 23 or 25 is selected), press the button and select the "indoor unit No." to be set. (Be noted that this operation is not required for the group batch control.)

⑤ Select setting switch No.
Press the upper button of and select the "set switch No.".

⑥ Select setting position No.
Press the lower button of and select the "set position No.".

⑦ Determine the content of settings.
Press the button once and "determine" the content, the setting of which has been changed.

⑧ Return to the normal mode.
Press the button to return the system to "normal mode".
(Example) To set the filter sign time to "Filter Contamination-Heavy" while in group batch setting mode, set the Mode No. to "10", the Set Switch No. to "0", and the Setting Position No. to "02".



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■ List of Setting Item

: Factory setting

	Mode No. Note 1)	Setting Switch No.	Setting Contents	Setting Position No. Note 2) 01	02	03	04
VRV system multi indoor unit settings	10(20)	0	Filter contamination-Heavy/ Light (Setting of time intervals to display filter sign) (Use this setting to reduce the time intervals to a half to display filter sign if the filter is easily contaminated.)	Super long life filter: Light: Approx. 10,000 hours	Heavy: Approx. 5000 hours	—	—
				Long life filter: Light: Approx. 2500 hours	Heavy: Approx. 1250 hours		
				Standard filter: Light: Approx. 200 hours	Heavy: Approx. 100 hours		
		1	Types of long-life filters (Setting of time intervals to display filter sign)	Normal (long life filter)	Super long life filter	—	—
		2	Remote controller thermostat	Use	Not use	—	—
		3	Computation of interval time to display filter sign (Make this setting not to display the filter sign.)	Display	No display	—	—
	12(22)	0	Selection of optional accessories output (Field selection of output for adapter for wiring change)	Indoor unit thermostat ON	—	Operation output	Abnormal output
		1	External ON-OFF input (Make this setting to conduct ON-OFF operation from outside.)	Forcedly OFF	ON-OFF operation	When external protection device is connected	—
		2	Thermostat selection (Make this setting to use the remote sensor.)	1°C	0.5°C	—	—
		3	Air flow rate with thermostat OFF (Support for increased capacity of air cleaning unit.)	LL	Set airflow rate	—	—
		4	Automatic mode differential (Setting of temperature differential for automatic mode on cool/heat simultaneous operation type of unit)	01 : 0 / 02 : 1	03 : 2 / 04 : 3	05 : 4 / 06 : 5	07 : 6 / 08 : 7
		5	Automatic restart function after automatic resetting from power failure (Return to the conditions before power failure)	Not equipped	Equipped	—	—
	13(23)	0	Adaptable to high ceiling (Make this setting to install unit to ceiling of approx. 2.7 m or more in height.)	Standard N	High ceiling 1 H	High ceiling 2 S	—
		1	Selection of airflow direction (Make this setting when blocking pad kit is mounted.)	4 directions F	3 directions T	2 directions W	—
		3	Airflow direction adjustment (Make this setting when outlet decorative plate is mounted.)	Equipped	Not equipped	—	—
		4	Setting of air flow direction adjustment range	Upward side	Standard	Downward side	—
		5	Field selection of air flow rate (Air flow rate control through air outlet for phase control)	Standard	Option 1	Option 2	—
	15(25)	0	—	—	—	—	—
		1	Humidification with heating thermostat OFF	Not equipped	Equipped	—	—
		2	Direct duct connection (Make this setting when the unit is connected via ducting directly with outdoor air processing unit.)	Not equipped	Equipped	—	—
		3	Interlocking of drain pump and humidifier	Not equipped	Equipped	—	—
		5	Field selection to make individual setting of ventilation under remote and centralized control	Not equipped	Equipped	—	—
		6	Field selection to make individual setting of cleaning under remote and centralized control	Not equipped	Equipped	—	—

Notes:

1. The settings are made by group in a batch. Through the selection of mode No. in the ( ), individual settings can be made by each indoor unit as well. Checking of setting changes, however, can only be enabled in individual mode in the ( ). (In the case of group batch control, even with settings changed, "01" will be displayed at all times.)
2. Make no settings of any item not listed above. Furthermore, if indoor units have no corresponding functions, nothing will be displayed.
3. To return to normal mode, "88" may be displayed to initialize the remote controller.

1.1.2 Settings of Group No. for Centralized Control System

In order to control with central controller or ON/OFF controller, settings of group No. to each group using remote controller are necessary.
(Connect remote controller to indoor unit, which does not need remote controller, then remove the remote controller after setting.)

Procedure

① Turn on the power supply.
Turn on the power supply of indoor unit (+ System of rate control). (Setting is available only with turning on the power supply.)
Check installation and electric wiring again before turning on the power supply.
(After all are displayed for turning the power, operation is occasionally not accepted, displaying "88" for a period of about one minute.)

② Put the system into setting mode.
While in normal mode, press and hold the TEST button for a period of four seconds or more to put the system into "Field Setting Mode".

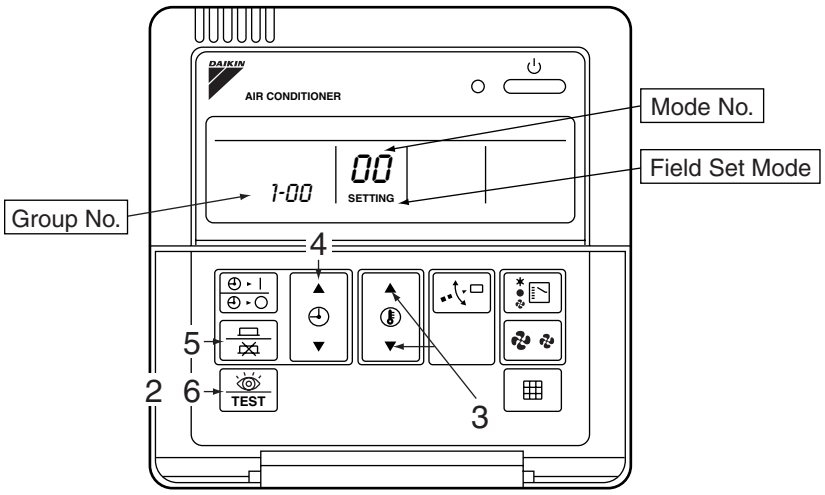
③ Select mode No.
Select mode No. 00 using button.

④ Select group No.
Select group No. using the upper and lower button of .
(Group No. increases such as 1-00, 1-01 to 1-15, 2-00, to 4-15)

⑤ Determine group No.
Determine the content using button.

⑥ Return to normal mode.
Press TEST button.

Note: Refer to installation manual for using simple remote controller.
Refer to each attached instruction manual for the settings of group No. of HRV or various kinds of adapters (general purpose adapters)



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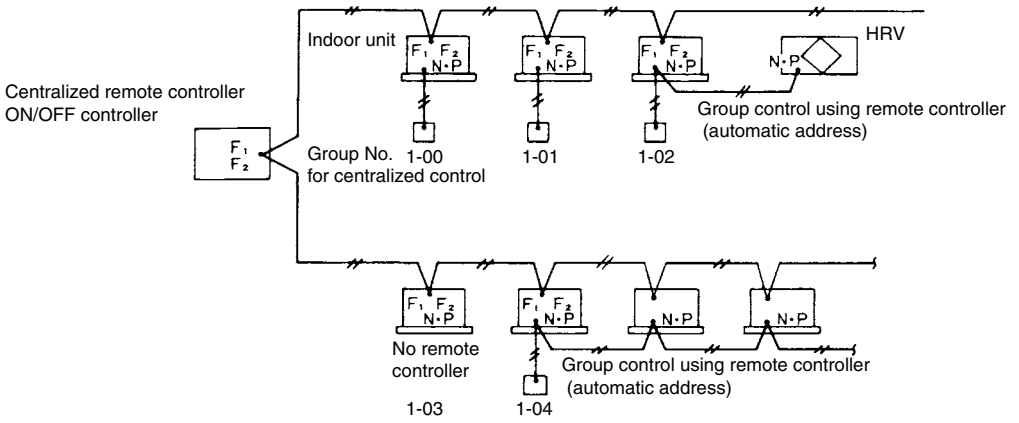
Make the settings of group No. while the "group" in LCD is blinking. When no blinking, press the button.

■ **Examples of Settings of Group No.**



Method for Address Setting for Individual Units

When setting the address in indoor units unit such as adjustment of charges, select mode No. 30. Then, make settings as the following procedure.

Procedure

① Turn on the power supply.
Turn on the power supply of indoor unit (+ Rate control unit). (Setting is available only with turning on the power supply.)
Check installation and electric wiring again before turning on the power.
(In turning on the power supply after all LCDs are displayed, the operation is occasionally not accepted displaying "88" for a period of about one minute.)

② Put the system into setting mode.
While in normal mode, press and hold the TEST button for a period of four seconds or more to put the system into "Field Setting Mode".

③ Select mode No.
Select mode No. 30 using button.

④ Select unit No.
Select unit No. using button.

⑤ Select group No.
Select group No. using the upper and lower button of .
(Group No. increases such as 1-00, 1-01 to 1-15, 2-00, to 4-15)

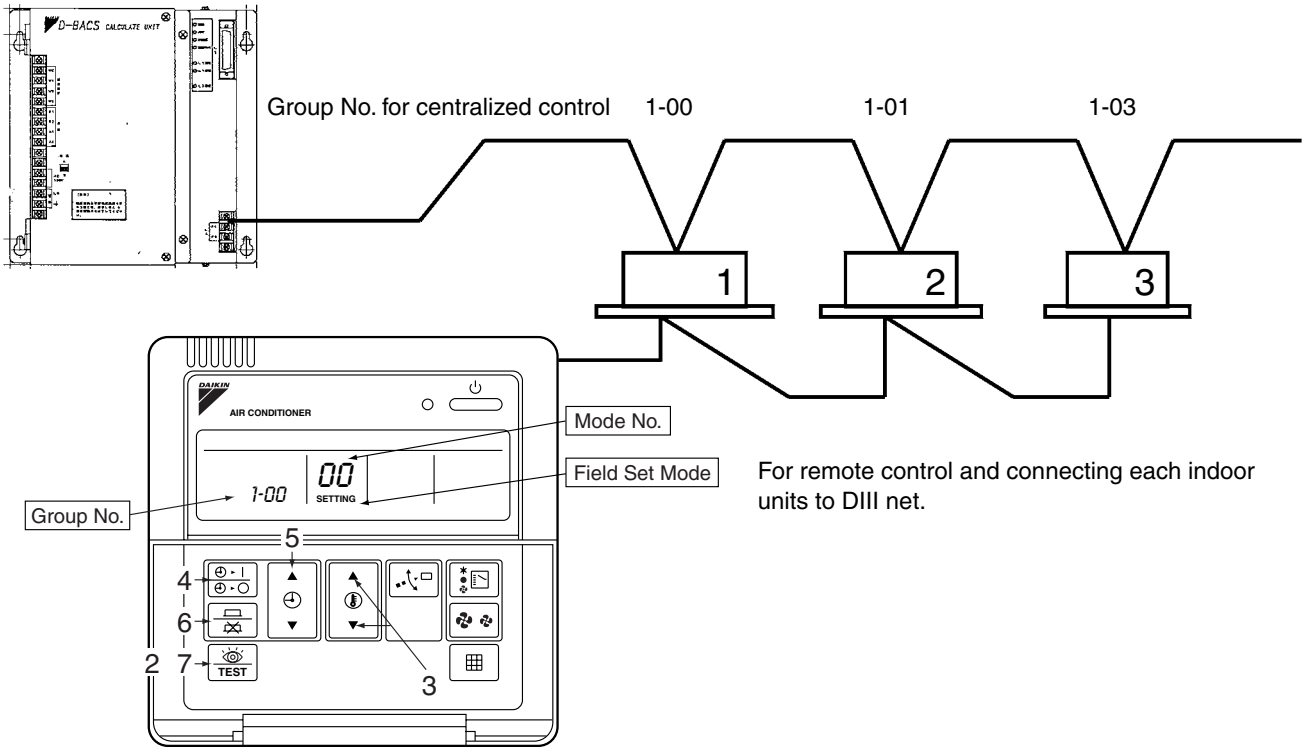
⑥ Determine group No.
Determine the content using button.

⑦ Return to normal mode.
Press TEST button.

Note: Refer to installation manual for using simple remote controller.
Refer to attached information for the settings of group No. of HRV or various kinds of adapters.

When setting the address in indoor units unit such as adjustment of charges, select mode No. 30. Then make settings as the following procedure.

■ Examples of Address Settings



For remote control and connecting each indoor units to DIII net.

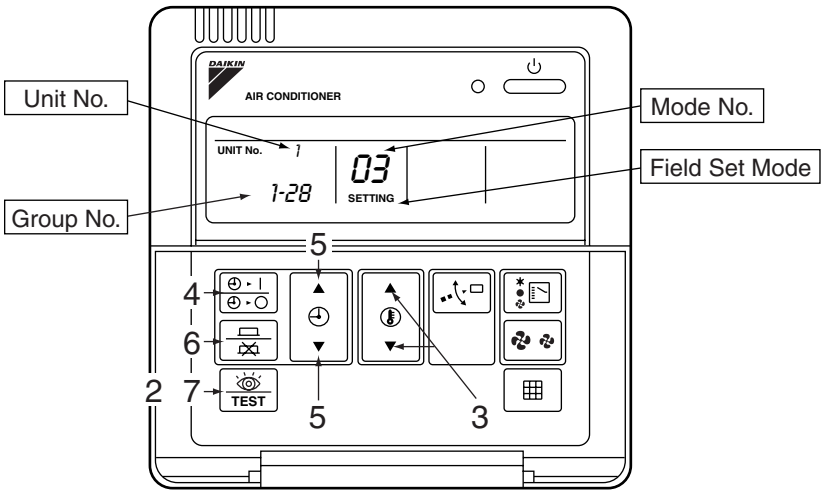
1.1.3 Settings of AirNet Address

For the setting of AirNet address of indoor unit, select mode No. using remote control and follow the procedure below.
(Make settings by changing unit No. with no remote control equipped.)
The settings of AirNet address make it easy to check indoor unit by using service checker.

Note: Do not change the settings at AirNet maintenance clients due to pre-setting.

Procedure

1. Turn on the power supply.
   Turn on the power supply of indoor unit (+ unit of rate control or checker). (Setting is available only with turning on the power supply.)
   Check installation and electric wiring again before turning on the power supply.
   (In turning on the power supply after all LCDs are displayed, the operation is occasionally not accepted displaying "88" for a period of about one minute.)
2. Put the system into setting mode.
   While in normal mode, press and hold the TEST button for a period of four seconds or more to put the system into "Field Setting Mode".
3. Select mode No.
   Select mode No. 03 using button.
4. Select unit No.
   Select unit No. using button. (Unit No. 1-16)
5. Set AirNet address.
   Select AirNet address using the upper and lower button of . (Settings with number in the range from 1 to 128 is available.)
6. Determine group No.
   Determine the content using button.
7. Return to normal mode.
   Press TEST button.



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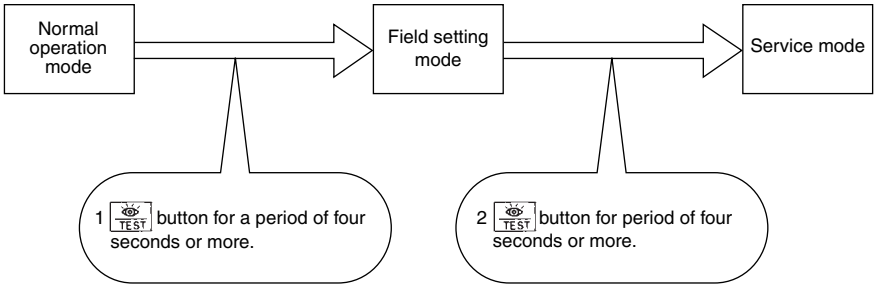
1.2 Service Mode

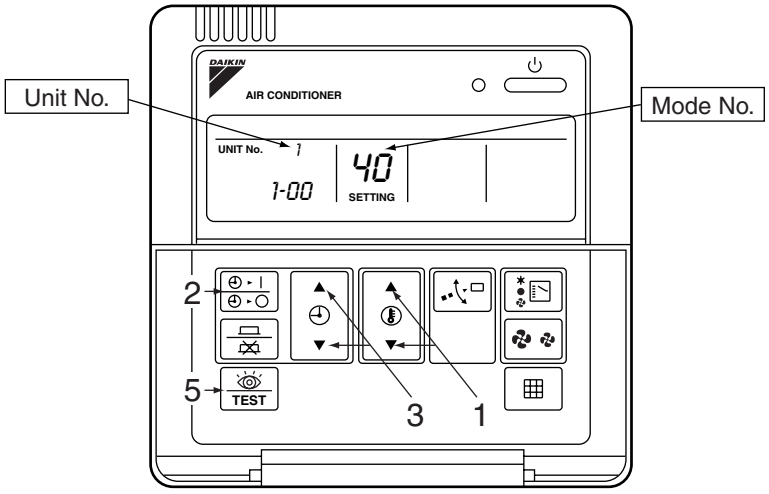
The operation of TEST button of remote controller enables "service data" gain and "service settings" with service mode.

■ **How to Enter the Service Mode**



1.2.1 Check on Service Data

① Select mode No.
Select a desired mode No. 40 or 41 using button.
② Select unit No. (For group control only)
Select indoor unit No. to be set using button.
③ Select malfunction history No. or sensor data No.
Select a desired malfunction history No. or sensor data No. by using button.
④ Each data will be displayed. (Refer to table next page.)
⑤ Return to normal operation mode.
Press TEST button once.

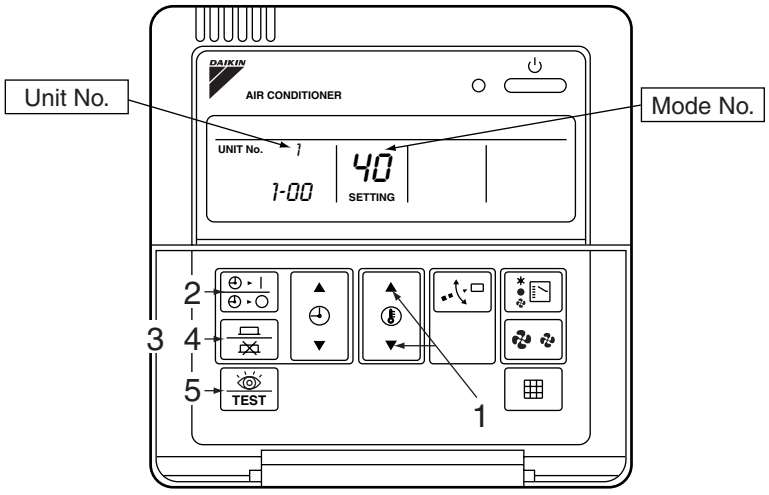


(VL042)

Mode No.	Function	Contents and setting methods	Example of display on remote controller
40	Display of malfunction code history	Displays malfunction history. The history No. can be changed with the button.	Unit 1 Malfunction code 2-U4 40 History No: 1-9 1: Latest Malfunction code
41	Display of sensor data and display of address data	Displays various types of data. Select the data to be displayed with the button. Sensor data 0: Remote controller thermostat 1: Suction 2: Liquid pipe 3: Gas pipe Address data 4: Indoor unit address 5: Outdoor unit address 6: BS unit address 7: Zone control address 8: Cooling/heating batch address 9: Demand/low noise address	Example of sensor data display Unit No. Type of sensor 11 27 41 Temperature ˚C Example of address display Unit No. Type of address 18 1 41 Address

1.2.2 Service Settings

① Select mode No.
Select a desired mode No. by using button.
(While in wireless remote controller, setting of "43" forcedly fan ON is only available.)
② Select unit No. (For group control only)
Select indoor unit No. to be set by using .
(While in wireless remote controller, select the upper ▲ and lower ▼ button.)
③ Make required settings in each mode.
In mode 44 and 45, press the button before setting so that the setting change can be made. (The "code" in LCD blinks.)
Refer to table next page.
④ Determine the set content. (Mode 44, 45)
Press the button to determine.
(After determination, the "code" in LCD changes from blinking to lightening.)
⑤ Return the system to normal operation mode.
Press the button once.



(VL042)

Mode No.	Function	Contents and setting method	Example of display on remote controller
43	Forcedly fan ON	Forcedly fan ON By selecting the unit No. with the button, the fan of each indoor unit will be forcedly turned on (forcedly ON) individually.	Unit 1 43
44	Individual setting	Select the unit by using button. Set the air flow rate with the button. Set the air flow direction with the button.	Unit 1 Code 1 3 44 Air flow rate 1: Low 3: High Air flow direction P0 ~ P4
45	Unit No. transfer	Transfer unit No. Select the unit No. with the button, Select the unit no. after transfer with the .	Present unit No. Unit 1 Code 02 45 Unit No. after transfer

Method to Specify the Indoor Unit No.

In indoor units where group control is made, mode No. 43 (turn on the forcedly fan) is used to specify the location of installation of the indoor unit with a certain No.
(When the malfunction occurs within remote control group, above method can also be utilized to specify the indoor unit which has the trouble.)

Procedure

Turn on the power supply.

① Turn on the power supply of indoor unit (+ rate control unit).
(No settings can be made without turning on the power supply.)
Check the installation and electric wirings once again before turning on the power supply.
(When the power supply is turned on, there may be cases where any operation cannot be accepted with "88" displayed once.)

② Put the system into setting mode
Press the TEST button for a period of 4 seconds or more, and put the system into "Field Setting Mode".

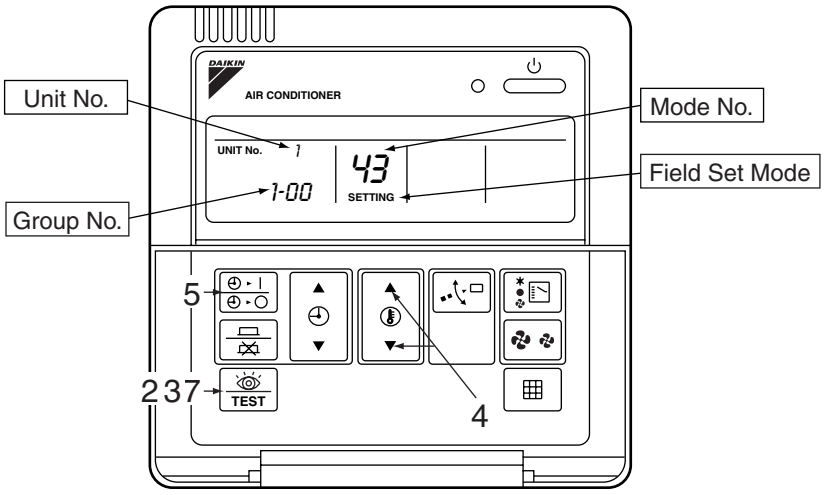
③ Put the system into service mode.
Press the TEST button for a period of 4 seconds or more once again.

④ Select the mode No.
Select the mode No. 43 using the button. (Unit No. 1-16)

⑤ Select the unit No.
Select the unit No. using the button. (Unit No. 1-16)

⑥ The fan in relevant indoor units starts to operate.

⑦ Turn the system into the normal mode.
Press the TEST button.



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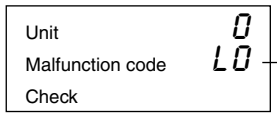
1.3 Check Mode

Check of malfunction code, indoor model code and outdoor model code is available using check mode by operating the TEST button on remote controller.

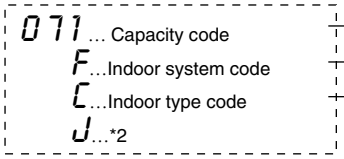
1.3.1 Check on Malfunction Code and Model Code

1. Press the TEST button once. (*1) → Malfunction code is displayed



→ Refer to "a list on malfunction code" (P.104) on the contents of malfunctions code.

2. Press the TEST button once again. (*1) → Indoor model code is displayed.



*2: The symbols have no connections with the field service.

→ Example of capacity code display

Example of model	Display
FXYCP28M	028
FXYFP80M	080

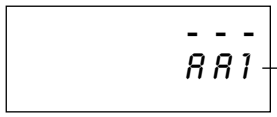
→ Example of indoor system code

Display	Classification of product	Classification of system
1	VRV system	(VAV indoor)
2	VRV system	Outdoor air processing unit
F	VRV system	Standard indoor
U H	VRV system/ For equipment	Particular application

→ Example of indoor type code

Display	Type	Model
A	Wall mounted	FXA(Q)
C	Double flow	FXC(Q)
E	Corner	FXK(Q)
F	Multi flow	FXF(Q)
H	Ceiling suspended	FXH(Q)
J	Built-in	FXS(Q)
L	Floor standing	FXL(Q)
P	Concealed ceiling duct	FXM(Q)
L	Concealed floor standing type	FXN(Q)
6	Multi flow 600×600	FXZ(Q)
3	Slim Ceilling mounted duct	FXD(Q)
5	New ceilling suspended cassette	FXU(Q)

3. Press the TEST button one more time. (*1) → Outdoor model code is displayed.



→ Example of indoor unit model code Display

Display	Type	Model
A A 1	VRV System Inverter K Series	RSXY(P)
A A 3	R407C VRV PLUS Series	RXY(P)
A 9 2	VRV Heat Recovery Series	RSEY(P)
A A 5	High COP type R407C L Series	RSXYP-L
A A A	VRV II	RX(Y)(Q)-M

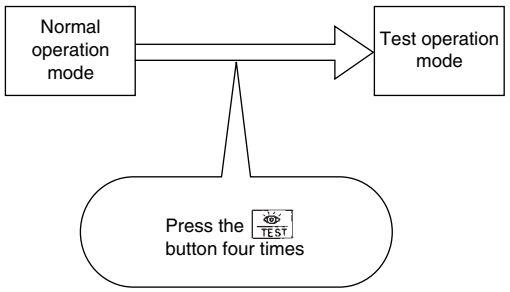
*1: When the operation by buttons is not performed for a period of 10 seconds, the display automatically shows normal mode.

1.4 Test Operation Mode

Putting the system into test operation mode is available by operating the TEST button of remote controller.

1.4.1 Setting of Test Operation Mode

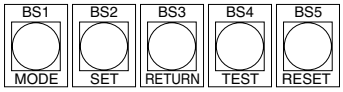
Test operation mode setting is available by operating as follows.



After setting of test operation mode, pressing the ON/OFF button starts to operate test operation.
("TEST OPERATION" is displayed on the remote controller.)

2. Field Setting on Outdoor Unit

Using pushbutton switches on the PC board enables a variety of settings.
However, setting items and setting No. etc. are different according to the model.
The following explanation was made based on the representative models of RX(Y)(Q) ~ M. For further details, refer to each service manual of applicable model of the target machine.



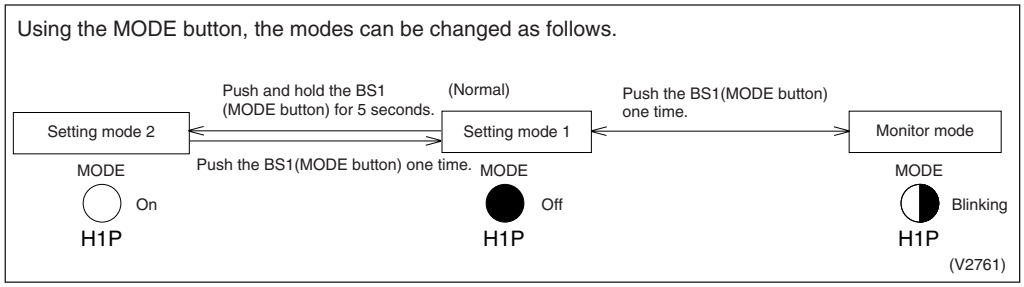
(V2760)

* For the multi-outdoor system, make setting using the master unit.
(Setting using the slave unit is not valid.)

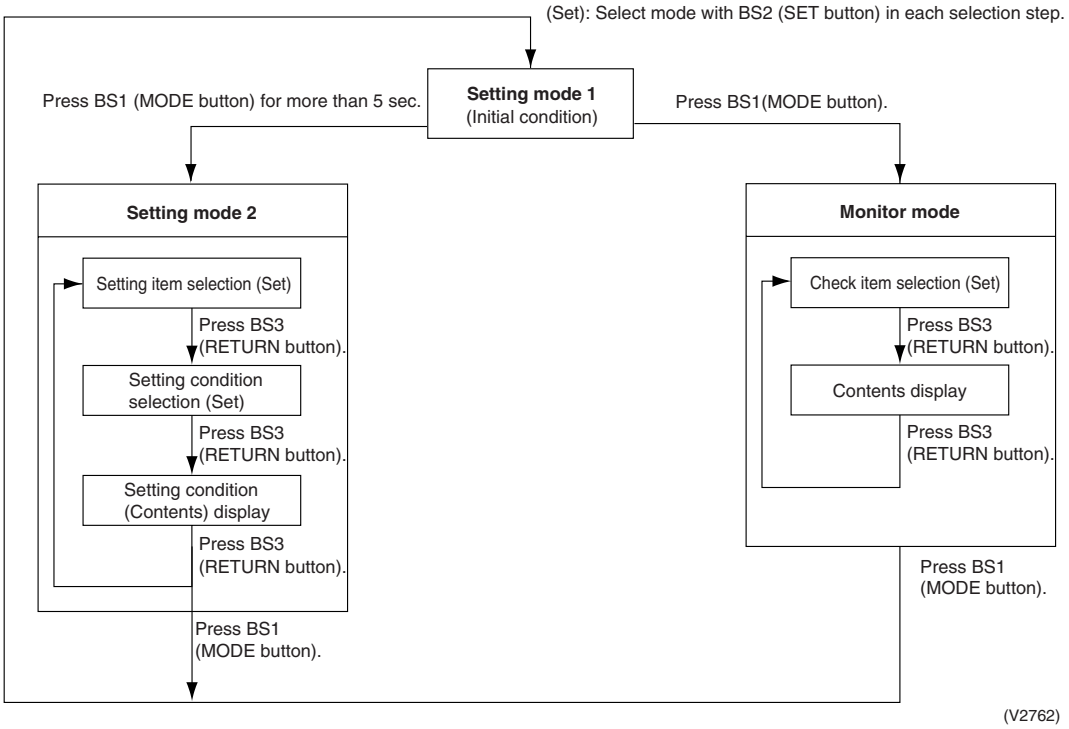
The following 3 setting modes are available.

1. **Setting mode 1 (H1P: OFF)**
   Initial state (while in normal operation): Used to make setting of the method of "Cool/Heat selection".
   This mode is displayed while in "malfunction", "low noise control", and "demand control" as well.
2. **Setting mode 2 (H1P: ON)**
   This mode is used to make changes of operating conditions or settings of a variety of addresses, mainly for service work.
3. **Monitor mode (H1P: Blinking)**
   This mode is used to check the contents set in Setting mode 2.

■ Procedure for Changing Mode



Steps to Change Mode



2.1 Explanation of Basic Mode

2.1.1 Setting Mode 1

Normally, the system is set to "Setting Mode 1". In other condition, press the MODE button(BS1) once to put the system into "Setting mode 1".

<Selection of Setting Item>

Press the SET button (BS2) to set LED display for setting item.

- Setting items No.1,5 and 6 display the present status only. Refer to the sheet in the lower right on the contents of display.
- Setting items No. 2,3 and 4 can select the cooling / heating selection method.
  → After setting, press the RETURN button (BS3) to determine the content.

Pressing the RETURN button (BS3) puts the system into the initial setting.

No.	Setting (Display) items	Example of LED display						
		H1P	H2P	H3P	H4P	H5P	H6P	H7P
1	Display of Malfunction / In preparation / Test operation*	●	●	○	●	●	●	●
2	Select cooling / heating (Individual)	●	●	○	●	●	●	●
3	Select cooling / heating (Batch master)	●	●	●	○	●	●	●
4	Select cooling / heating (Batch slave)	●	●	●	●	○	●	●
5	Low noise operation	●	●	○	●	●	●	●
6	Demand operation	●	●	○	●	●	●	●

* Setting No. 1, 5 and 6 are to display only current condition.

Display contents of Malfunction / In preparation / Test operation

Normal	●	●	○	●	●	●	●
Malfunction	●	●	○	●	●	●	●
In preparation / Test - RUN	●	◑	○	●	●	●	●

Display contents in low noise operation

Normal	●	●	○	●	●	●	●
In low noise operation	●	●	○	●	●	○	●

* Displays are changed by setting No. 2, 3 and 4.

Display contents in demand operation

Normal	●	●	○	●	●	●	●
In demand operation	●	●	○	●	●	●	○

* Displays are changed by setting No. 2, 3 and 4.

○ : ON
● : OFF
◑ : Blink

2.1.2 Setting Mode 2

Press and hold the MODE button (BS1) for a period of five seconds or more to put the system into "Setting mode 2".

<Selection of Setting Items>

Press the SET button (BS2) and set the LED display to setting items shown on the right.

Press the RETURN button (BS3) to finalize the setting items. (The current setting conditions are displayed while blinking.)

<Selection of setting conditions>

Press the SET button (BS2) and set the LED display to conditions to be set.

Press the RETURN button (BS3) to finalize the check items.

Press the RETURN button (BS3) and put the system into the initial state of "Setting mode 2".

* If you become confused about the setting halfway through it, press the MODE button (BS1). Thus, the system will return to Setting mode 1.

No.	Setting item	Set Content
0	Emergency operation (INV compressor operation inhibit)	In defect of the INV compressor, operation is made only using the STD compressor. The operation is for temporary use until replacing of the compressor. The comfort declines excessively. Therefore, replace the compressor without delay. (However, for RX(Y)(Q)5M, this setting is not available.)
1	Address in batch cooling/ heating	Sets the address in unified cooling/heating operation.
2	Low noise · Demand address	Address in low noise and demand operation
5	Indoor unit forcedly fan H	The indoor fan in the stop condition is forcedly to operate. (H tap)
6	Indoor unit forcedly operation	Indoor unit is forcedly to operate.
8	Te setting	Target evaporation temperature in cooling
9	Tc setting	Target condensing temperature in heating
10	Setting of defrost selection	Changes temperature conditions for defrosting. Setting is available to defrost quick or slow.
11	Starting in sequence setting	Sets when starting in sequence. (ON is factory setting.)
12	External low noise · Demand setting	Receives the low noise or the demand signal from outside.
13	AirNet address	Sets the AirNet address.
18	High static pressure setting	Set when mounting air discharge duct and operating in high static pressure
19	Emergency operation (STD compressor operation inhibit)	In defect of the STD compressor, operation is made only using the INV compressor. The operation is for temporary use until replacing of the compressor. The comfort declines excessively. Therefore, replace the compressor without delay. (However, for RX(Y)(Q)5M, this setting is not available.)
20	Setting of refrigerant re-filling operation	Makes refrigerant re-filling operation.
21	Setting of refrigerant recovery vacuuming mode	Sets to refrigerant collection mode.
22	Setting of nighttime low noise level	Enables to set the simplified operation of automatic night low noise. Time is subject to "starting set" and "ending set".
25	Setting of external low noise level	Sets the low noise level when the low noise signal is input from outside.
26	Starting time of nighttime low noise operation	Sets the starting time of the nighttime low noise. ("Setting of the nighttime low noise" is required.)
27	Closing time of the night low noise operation	Sets the closing time of the nighttime low noise. ("Setting of the nighttime low noise" is required.)
28	Setting of power transistor checks mode	Uses for the troubleshooting of the DC compressor. The inverter waveform is output without wiring to the compressor. Therefore, the mode is convenient to identify if the defect part is the compressor or the PC board.
29	Setting of capacity priority	When the low noise operation or the nighttime low noise operation was performed, this setting enables to release the low noise operation automatically if the capacity is required.
30	Setting of demand 1 level	Change the target value of power consumption when the demand 1 is input.
32	Setting of constant demand	The demand 1 is always performed by making this setting without input from outside. (It is effective against such a problem that the capacity in the breaker is small and the breaker trips when the load is growing.)
38	Emergency operation (Master unit with multi-outdoor-unit system is inhibited to operate.)	Prohibits operating the corresponding outdoor unit tentatively for the parts of outdoor-multi malfunction. The comfort declines excessively. Therefore, replace the parts without delay.
39	Emergency operation (Slave unit 1 with multi-outdoor-unit system is inhibited to operate.)	
40	Emergency operation (Slave unit 2 with multi-outdoor-unit system is inhibited to operate.)	

↑

The numbers in the "No." column show the number of times to press the SET button (BS2).

No.	Used Example	LED Display							Setting condition display	*Factory setting
		Page H1P	Under prepa-ration, Malfun ction H2P	Cooling/Heating selection: Indivi-dual H3P	Batch master H4P	Batch slave H5P	Low noise H6P	Dema nd H7P		
0	For emergency measures by inverter in individual installation machine. The unit will stop when this setting made with multi system unit.	○	●	●	●	●	●	●	Normal operation Emergency operation (INV compressor is inhibited to operate.)	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
1		○	●	●	●	●	●	○	Address 0 Binary number 1 (6 digits) 31	○ ● ● ● ● ● ● * ○ ● ● ● ● ● ○ ○ ● ○ ○̃ ○ ○ ○
2	Setting for mounting of external control adapter	○	●	●	●	●	○	●	Address 0 Binary number 1 (6 digits) 31	○ ● ● ● ● ● ● * ○ ● ● ● ● ● ○ ○ ● ○ ○̃ ○ ○ ○
5	Used for deciding the system either indoor or outdoor.	○	●	●	●	○	●	○	Normal operation Indoor forcedly fan H	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
6	Forcedly puts the indoor unit into the test operation mode. [UNDER CENTRALIZED CONTROL] is displayed in indoor remote controller.	○	●	●	●	○	○	●	Normal operation Indoor forcedly operation	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
8	Correction of the pressure loss in piping Select according to the piping length and scale of the pressure loss.	○	●	●	○	●	●	●	High Normal Low	○ ● ● ● ○ ● ● ○ ● ● ● ● ○ ● * ○ ● ● ● ● ● ○
9	Correction of the pressure loss in piping Select according to the piping length and scale of the pressure loss.	○	●	●	○	●	●	○	High Normal Low	○ ● ● ● ○ ● ● ○ ● ● ● ● ○ ● * ○ ● ● ● ● ● ○
10	Changing of the time for entering in defrost.	○	●	●	○	●	○	●	Quick Normal Slow	○ ● ● ● ○ ● ● ○ ● ● ● ● ○ ● * ○ ● ● ● ● ● ○
11		○	●	●	○	●	○	○	Equipped Not equipped	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
12	Setting when mounting of external control adapter. Can be used together with No. 30.	○	●	●	○	○	●	●	External low noise · Demand: No External low noise · Demand: YES	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
13	Convenient to check the checker type 3 system	○	●	●	○	○	●	○	Address 0 Binary number 1 (6 digits) 63	○ ● ● ● ● ● ● * ○ ● ● ● ● ● ○ ○ ● ○ ○̃ ○ ○ ○
18		○	●	○	●	●	○	●	High static pressure setting OFF High static pressure setting ON	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
19	For emergency measures of individual installation unit when the defect of STD.	○	●	○	●	●	○	○	OFF STD 1, 2 operation: Inhibited STD 2 operation: Inhibited	○ ● ● ● ● ● ● * ○ ● ● ● ● ● ○ ○ ● ● ● ● ○ ●
20	Setting for refrigerant charging	○	●	○	●	○	●	●	Refrigerant charging: OFF Refrigerant charging: ON	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
21	Fully opens motorized valve forcedly in indoor or outdoor unit	○	●	○	●	○	●	○	Refrigerant recovery: OFF Refrigerant recovery: ON	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
22		○	●	○	●	○	○	●	OFF Level 1 (Outdoor fan with 6 step or lower) Level 2 (Outdoor fan with 5 step or lower) Level 3 (Outdoor fan with 4 step or lower)	○ ● ● ● ● ● ● * ○ ● ● ● ● ● ○ ○ ● ● ● ● ○ ● ○ ● ● ● ● ○ ○

No.	Used Example	LED Display							Setting condition display	
		Page H1P	Under prepa-ration, Malfun ction H2P	Cooling/Heating selection: Indivi-dual H3P	Cooling/Heating selection: Batch master H4P	Cooling/Heating selection: Batch slave H5P	Low noise H6P	Dema nd H7P		*Factory setting
25		○	●	○	○	●	●	○	Level 1 (Outdoor fan with 6 step or lower) Level 2 (Outdoor fan with 5 step or lower) Level 3 (Outdoor fan with 4 step or lower)	○ ● ● ● ● ● ○ ○ ● ● ● ● ○ ● * ○ ● ● ● ○ ● ●
26		○	●	○	○	●	○	●	About 20:00 About 22:00 About 24:00	○ ● ● ● ● ● ○ ○ ● ● ● ● ○ ● * ○ ● ● ● ○ ● ●
27		○	●	○	○	●	○	○	About 6:00 About 7:00 About 8:00	○ ● ● ● ● ● ○ ○ ● ● ● ● ○ ● ○ ● ● ● ○ ● ● *
28	For checking the quality of the INV compressor. Only applicable to DC inverter compressor.	○	●	○	○	○	●	●	OFF ON	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
29		○	●	○	○	○	●	○	OFF ON	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
30		○	●	○	○	○	○	●	60 % demand 70 % demand 80 % demand	○ ● ● ● ● ● ○ ○ ● ● ● ● ○ ● * ○ ● ● ● ○ ● ●
32		○	○	●	●	●	●	●	OFF ON	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
38	For emergency measures of the outdoor-multi system installation (For the series of VRV II)	○	○	●	●	○	○	●	OFF Master unit operation: Inhibited	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
39		○	○	●	●	○	○	○	OFF Slave unit 1 operation: Inhibited	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●
40		○	○	●	○	●	●	●	OFF Slave unit 2 operation: Inhibited	○ ● ● ● ● ● ○ * ○ ● ● ● ● ○ ●

2.1.3 Monitor Mode

Pressing the MODE button (BS1) while in "Setting mode 1" will enter "Monitor mode".

<Selection of Setting Item>

Press the SET button (BS2) and set the LED display to setting items.

<Check the set contents>

Pressing the RETURN button (BS3) will display respective data by LED.

Pressing the RETURN button (BS3) will put the system into the initial state of "Monitor mode".

* Pressing the MODE button (BS1) will return the system to "Setting mode 1".

No.	Setting items		LED display H1P	H2P	H3P	H4P	H5P	H6P	H7P	Data display
0	Various settings		◑	●	●	●	●	●	●	Refer to below
1	Address in batch cooling / heating		◑	●	●	●	●	●	○	Lower six digits
2	Low noise · Demand address		◑	●	●	●	●	○	●	
4	AirNet address (*1)		◑	●	●	●	○	●	●	
5	The number of connected indoor units (*2)		◑	●	●	●	○	●	○	
7	The number of connected zone units (Outdoor, except BS)		◑	●	●	●	○	○	○	
8	The number of outdoor units		◑	●	●	○	●	●	●	
11	The number of zone units (Outdoor, except BS)		◑	●	●	○	●	○	○	Lower six digits
12	The number of terminals		◑	●	●	○	○	●	●	Lower four digits (upper)
13	The number of terminals		◑	●	●	○	○	●	○	Lower four digits (lower)
14	Content of malfunction (latest)	(*3)	○	●	●	○	○	○	●	Refer to page 104, Malfunction code list in the chapter of trouble-shooting.
15	Content of malfunction (one cycle before)		○	●	●	○	○	○	○	
16	Content of malfunction (two cycles before)		○	●	○	●	●	●	●	
20	Content of retry (latest)	(*4)	○	●	○	●	○	●	●	
21	Content of retry (one cycle before)		○	●	○	●	○	●	○	
22	Content of retry (two cycles before)		○	●	○	●	○	○	●	

↑

The numbers in the "No." column show the number of times to press the SET button (BS2).

Display contents of setting item No.0 "Various settings"

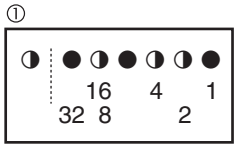
Setting of EMG operation/ backup operation (*5)	ON	◑	●	●	○	●	●	●
	OFF	◑	●	●	●	●	●	●
Setting of defrost selection	Short time	◑	●	●	●	○	●	●
	Middle time	◑	●	●	●	◑	●	●
	Long time	◑	●	●	●	●	●	●
Te setting	H	◑	●	●	●	●	○	●
	M	◑	●	●	●	●	◑	●
	L	◑	●	●	●	●	●	●
Tc setting	H	◑	●	●	●	●	●	○
	M	◑	●	●	●	●	●	◑
	L	◑	●	●	●	●	●	●

Explanation of Used Examples

* 1: Use when checking the checker system.
* 2: Check the numbers to connected indoor units for transmission malfunction, etc.
* 3: Check the malfunction code.
* 4: Check the Retry contents.
* 5: Check when the operation pattern of outdoor unit is unusual.

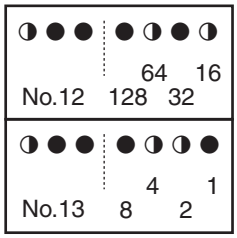
While pressing the SET button, press the RETURN button when No. 1 to No. 15 LED meets the target, thus making it possible to check respective data.

①



Data expresses addresses or the number of units in binary numbers and has two expression methods.
For example, the cool/heat unified address of No. 1 LED is expressed in binary number of lower six digits. (0 to 63)
In the case of ①, the address becomes 010110 (in binary number), which translates to 16 + 4 + 2 = 22 (in decimal number). As a result, the address becomes 22.

②



For example, the number of terminal units for Nos. 12 and 13 is expressed in eight-digit binary number, which are the combination of four upper and four lower digits for Nos. 12 and 13 respectively. (0 to 128)
In the case of ②, the addresses for No. 12 and No. 13 become 0101 and 0110 respectively and the combination of the two addresses becomes 01010110 (in binary number), which translates to 64 + 16 + 4 + 2 = 86 (in decimal number). As a result, the number of terminal units becomes 86.

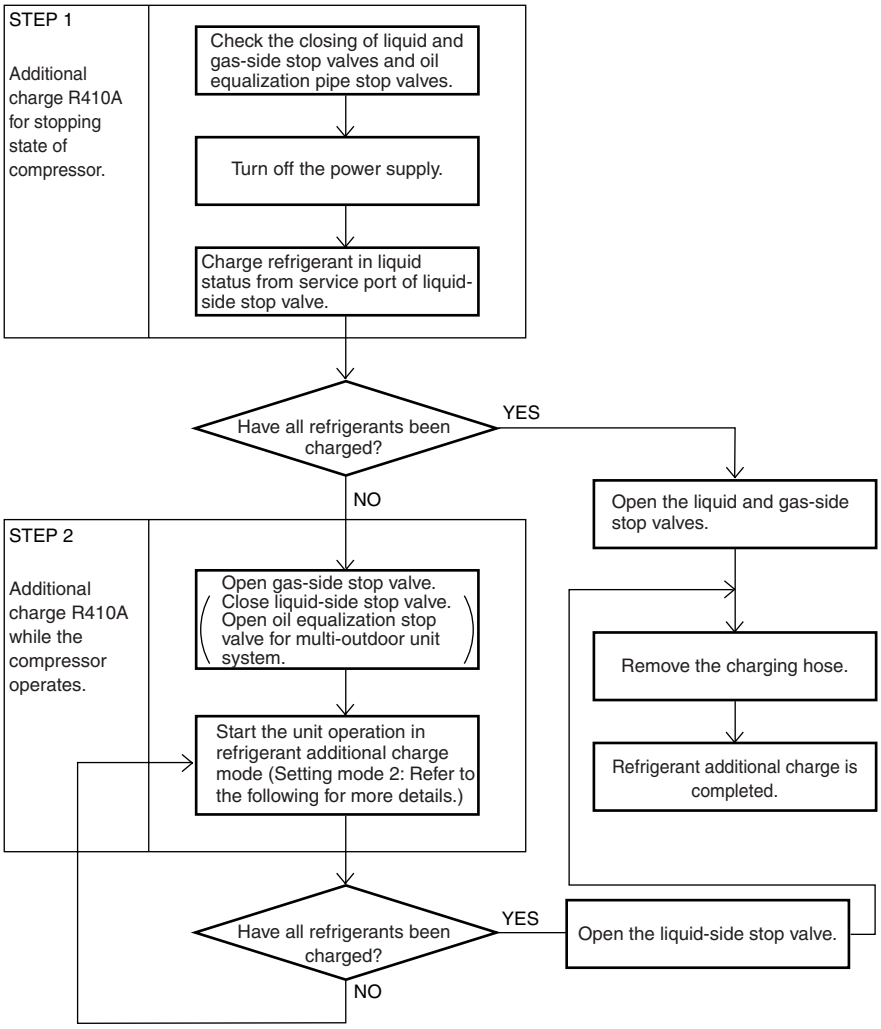
For data name and others of No. 1 to No. 22, refer to information listed in table on the preceding page.

2.2 Use of Each Setting Mode

2.2.1 Setting of Operation of Refrigerant Additional Charge

When all refrigerants cannot be charged while the outdoor unit operation stops, operate the outdoor unit, then charge refrigerants from the service port of liquid pipe stop valve. Use pushbutton switch on the printed circuit board in outdoor unit to start the refrigerant additional charge operation.

Total Process of Refrigerant Additional Charge



Operation Procedure

1. Turn off the main switch and charge refrigerant. Then, turn on the power supply of indoor and outdoor units.
   [Be sure to turn off the main switch and charge refrigerant in the stop state of outdoor unit. Then, charge the lacking refrigerant according to this operation procedure. Operation other than this procedure causes malfunction.]
2. Be sure to open gas-side stop valves and oil equalization stop valve fully for multi-outdoor unit system and to close liquid-side stop valve completely. (With opening status, the refrigerant cannot be charged.)
3. Set (A) additional refrigerant charge operation ON in stop state by using the Setting Mode 2 (H1P: Light). The operation starts.
   (H2P displays the test operation (blinking), then [Test Operation] and [Under centralized control] are displayed on remote controller.)

4. Press the RETURN button (BS3) if the refrigerant is charged to the specified capacity. The operation stops.
   [The operation stops automatically in maximum approximately 30 minutes.
   If the additional refrigerant charge is not completed within 30 minutes, set the (A) additional refrigerant charge operation again and start to operate.
   If the compressor stops soon after re-operating, the refrigerant could be over charged. The refrigerant charging is no more available.]
5. Remove the refrigerant charge hose. Then, be sure to open liquid-side stop valve fully immediately.(Otherwise, the piping could burst due to liquid seal.)

Operating Condition

- Frequency of compressor: 210Hz
- Solenoid valve: Open (Y1S, Y2S, Y3S produced before December 2003, Y1S, Y2S produced after January 2004)
- The outdoor fan: High pressure control
- The indoor expansion valve (all the rooms): 1024 pls
- The indoor fan: H tap

Operating Procedures

1. Charge the refrigerant normal way first.
   Charge from the service port of liquid-side stop valve in stop state of outdoor unit.
   (Close fully the liquid and gas side stop valves.)

   * Be sure to operate as the following only if all the refrigerant cannot be charged after trying the charge in stop state of outdoor unit.
   (Otherwise this causes malfunction.)

2. Turn on the power supply of indoor and outdoor units and open the gas side stop valve fully.
   (Be sure to close fully the liquid-side stop valve.)
3. Setting of service mode

Press and hold the MODE button for a period of five seconds while in "Setting mode 1" to put the system into "Setting mode 2".		○ ● ● ● ● ● ●
Press the SET button and set the LED display to the refrigerant re-filling operation.		○ ● ○ ● ○ ● ●
Press the RETURN button.		○ ● ● ● ● ● ◑
Press the SET button and set the LED display as shown in the right figure.		○ ● ● ● ● ◑ ●
Press the RETURN button and the setting is completed.		○ ● ● ● ● ○ ●
The operation starts when the RETURN button is pressed again.		○ ◑ ● ● ● ● ●
During operation, the system displays the pressure level of low pressure.	0.34MPa	○ ○ ● ○ ○ ○ ○
	0.34MPa	○ ○ ● ● ○ ○ ○
	0.25MPa	○ ○ ● ● ● ○ ○
	0.15MPa	○ ○ ● ● ● ● ○
When operation is completed. (The system operation stops within 30 minutes.) (The display of the immediately previous pressure level blinks.)		○ ○ ● ● ● ◑ ◑ This pattern shows that the unit stopped at pressure level the pressure level of [0.25MPa or less]

4. It is completed if the refrigerant is charged to the specified capacity. If the charge is not completed within 30 minutes, make the setting again and operate
   (Pressing the check button in refrigerant additional charging operation stops the operation.)
5. Remove the refrigerant charge hose and open the liquid-side stop valve fully.

2.2.2 Setting of Refrigerant Recovery Mode

When the refrigerant is recovered in the field, open the expansion valves in indoor and outdoor units fully.
Prohibit the operation of both indoor and outdoor units.

Operation Procedures

1. Make the setting of (B) Refrigerant recovery / evacuation mode ON using the Setting Mode 2 in stop state.
   The expansion valves of indoor and outdoor units open fully and some of solenoid valves energized. (H2P displays the test operation (blinking), then “Test Operation” and “In Centralized Control” are displayed in remote controller and the operation is prohibited. After setting, do not cancel the Setting Mode 2 until the refrigerant recovery is completed.)
2. Recover the refrigerant by using the refrigerant recovery machine. (For further details, refer to the manual attached to the refrigerant recovery machine.)
3. Press the MODE (BS1) button and release the Setting Mode 2 .

* Fix the electronic expansion valves of indoor and outdoor units with full opening status for the operation of refrigerant recovery.

Operating Procedures

1. Stop the operation.
2. Make the setting of service mode.

Press and hold the MODE button for a period of 5 seconds while in Setting mode 1 to put the system into Setting mode 2.	○ ● ● ● ● ● ●
Press the SET button to set the LED display to the refrigerant recovery mode.	○ ● ○ ● ○ ● ○
Press the RETURN button.	○ ● ● ● ● ● ◑
Press the SET button to set the LED display as shown in the right figure.	○ ● ● ● ● ◑ ●
Press the RETURN button and the setting is completed.	○ ● ● ● ● ○ ●
Press the RETURN button again and put the system into the initial state.	○ ● ● ● ● ● ●

3. Turn off the power supply of indoor and outdoor units.
   (Turn off the power supply of either one unit of indoor and outdoor, then turn off the power supply of another unit within 10 minutes.)
4. Conduct the refrigerant recovery.

* The setting can be canceled using the setting mode or the setting mode can be released by resetting the power supply of outdoor unit.

2.2.3 Setting of Evacuation Mode

When the refrigerant is recovered in the field, open the expansion valves in indoor and outdoor units fully and energize some solenoid valves.

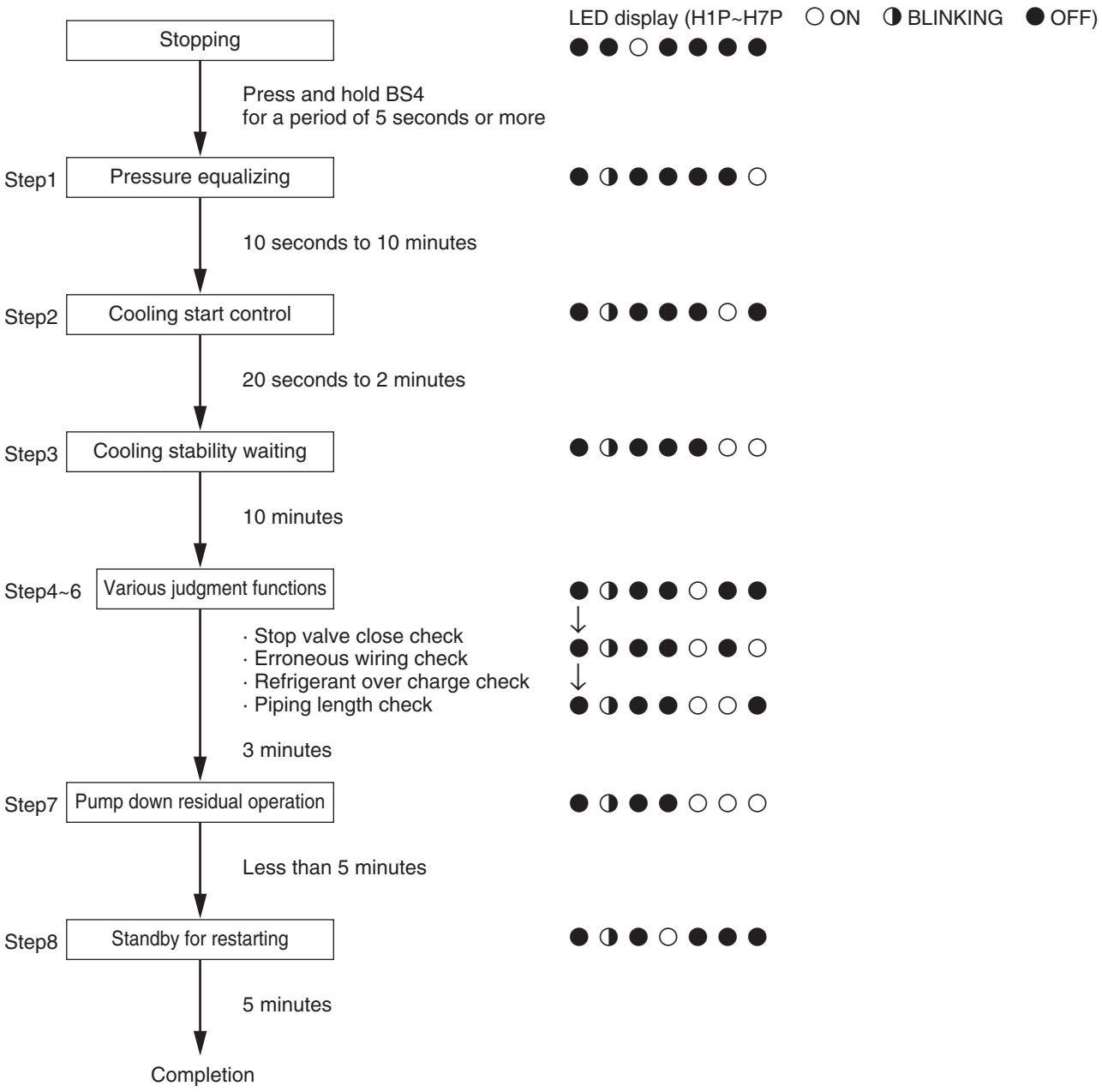
Operation Procedures

1. Make the setting of (B) Refrigerant recovery / evacuation mode ON by using the Setting Mode 2 in stop state.
   The expansion valves of indoor and outdoor units open fully and some solenoid valves are energized. (H2P displays the test operation (blinking), then “Test Operation” and “In Centralized Control” are displayed on remote controller and the operation is prohibited. After setting, do not cancel the Setting Mode 2 until the evacuation is completed.)
2. Operate the evacuation by using the vacuum pump.
3. Press the MODE (BS1) button and cancel the Setting Mode 2 .

2.2.4 Working in the Check Operation

Provide the test operation mode and study the following items in order to prevent the malfunction in the field installation: the check for erroneous wiring, the check the stop valve, judging the piping length, judging the refrigerant over-charging, the check for missing thermistor (or reverse connection) in discharging pipe and the minimum opening degree at start of the motorized valve.

Check operation function



D. Troubleshooting

1. For Troubleshooting

Every service engineer shall have consciousness, confidence, responsibility, and pride as a service person of manufacturer.

According to action patterns shown below, take prompt and on-target measures against defects or failures pointed out by customers.

1. **Thoroughly listen to complaints or requests from customers.**
   Hearing of complaints or requests from customers
   Under what circumstances the customers will have complaints or be satisfied?
   - On what equipment, in which rooms or locations?
   - When? (→ In the evening, at the startup in the morning, while all units are in operation, while a small number of units are in operation, or else)
   - Under what circumstances? (→ The system does not cool, water leakage or malfunction occurs, or else)

2. **Assume according to the contents of the hearing from customers and reproduce circumstances (or approximate circumstances) under which defects are caused to check the operating conditions. Furthermore, check the operating conditions under any other circumstances.**
   Check the contents described in the attached check items on the operating conditions, and then record them in the operating condition check sheet (p.108).

3. **Referring to the book of case examples, check to be sure whether applicable information is described.**

4. **Using the FTA technique, probe the causes of defects and narrow down the causes by a process of elimination.**
   Referring to attached analysis on causes by FTA and samples, probe the causes of defects.

5. **Take measures and check to be sure the conditions after the measures in the same manner as that under 2., above.**
   - Failures or defects in products → Rectify them by repair or adjustment.
   - Defects in construction area or facility design → Contact the request party. (Prompt contact with the distribution channel.)

6. **Explain customers about overview, contents of checks, results of checks, contents of measures, results of measures, and observations in plain expressions, have the customers accept the explanation, and then leave the site.**

There are differences among individuals in product knowledge, know-how, and likes and dislikes. In order to enlist cooperation from other service engineers or sections, however, pin down and recap at least 1. to 3. out of items aforementioned. After that, with service engineer's own observations added, the service engineer shall approach the customer.
(Be sure to try to rectify the failure or defect himself.)

2. Check Items before Troubleshooting

2.1 Check Items on Operation Condition (Essential Items as a Minimum)

Check Items for Outdoor Unit

- Model name of outdoor unit
- Outdoor temperature / Suction temperature of the outdoor unit
- High pressure
- Low pressure
- Liquid pressure (Measurement is required)
- Compressor discharge pipe temperature
- Compressor suction pipe temperature (at the place near the low pressure sensor)
- Compressor capacity (* Hz + ON / OFF)
- Total capacity with indoor unit operation (with thermostat-ON)

Check Items for Each Indoor Unit

- Model name of indoor unit
- Suction temperature (No. 41 on remote controller)
- Discharge temperature (Measure with thermometer)
- Set flow rate (Check with remote controller)
- Liquid pipe temperature (No. 41 on remote controller)
- Gas pipe temperature (No. 41 on remote controller)
- Opening degree of electronic expansion valve

Other Check Items

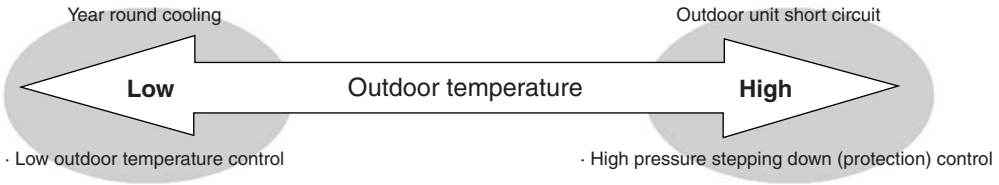
- Number of indoor unit connected (Total capacity / Capacity ratio of indoor unit to outdoor unit)
- Approximate piping length, Additional refrigerant charged amount
- Frequency of occurrence of abnormality or malfunction
- Timing of occurrence of abnormality or malfunction (Time band, etc.)
- Operating condition of the room (Number of units in operation or thermostat-ON)

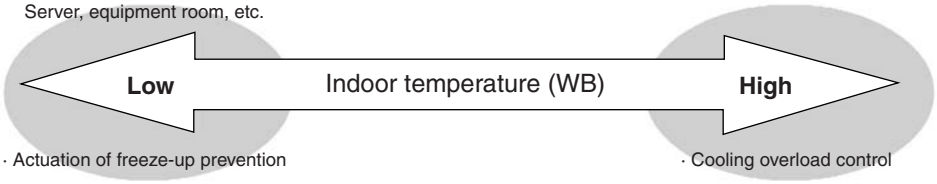
Check the condition by preparing a state that resembles the state which has appeared at the time of malfunction.
For the troubles occur occasionally or appear when the specified unit is operated, check the above items in each case of specified unit individual operation, other unit individual operation and all units operation.

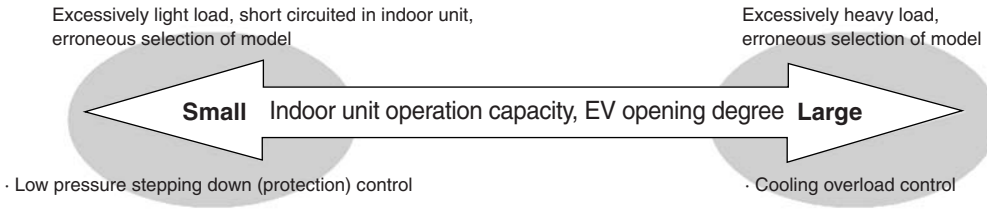
* Check by using the "Operation condition check sheet" (P.108) for eliminating leakage of check item

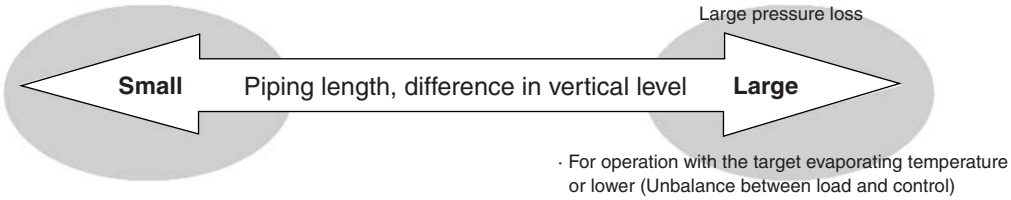
2.2 Check for Malfunction in Cooling Operation

When cooling malfunctions, check on the following factors to specify the state of malfunction (peculiar on site). (In order to avoid an insufficient investigation at the initial check)







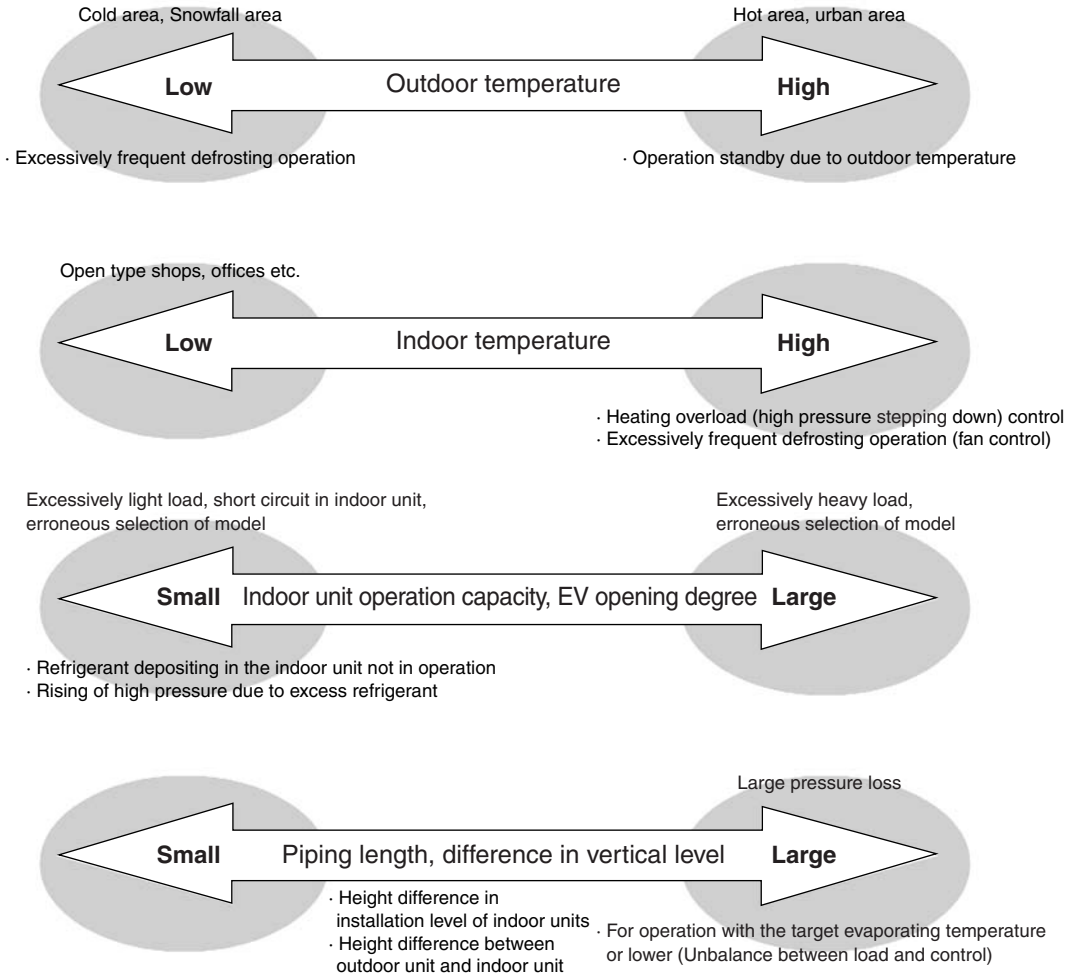


<At the time of ordinal operation, starting-up, oil return operation>
Make sure that the timing of cooling malfunction generation.

If EV opening of all indoor units are the same degree, the instruction (control) for valve opening degree is sent from the outdoor unit.
Make sure to grasp the state by using the checker.

2.3 Check for Malfunction in Heating Operation

When heating malfunctions, check on the following factors to specify the state of malfunction (peculiar on site). (In order to avoid an insufficient investigation at the initial check)



<At the time of normal operation, starting-up, before and after oil return operation, before and after defrosting>

Make sure that the timing of heating malfunction generation.

If EV opening of all indoor units are the same degree, the instruction (control) for valve opening degree is sent from the outdoor unit.
Make sure to grasp the state by using the checker.

3. Method of Troubleshooting

3.1 Excessive / Insufficient Charging of Refrigerant

For VRV system, troubleshooting can be executed only with the operating conditions of air conditioner relating to pressure control and electronic expansion valve control, and the methods of judgment are shown below.

1. For excessive charging

(The operating capacity of compressor has a tendency to increase in cooling while decrease in heating.)

1. Operate with light load by using capacity control of compressor due to increasing of high pressure (condensing temperature).
   (Compressor capacity cannot be controlled to obtain the target pressure.)
   As a result, circulation volume of refrigerant decreases, and cooling and heating will malfunction.
2. In heating operation, since a large amount of liquid refrigerant is stagnant between the outlet of condenser and the liquid line, the cooling temperature of refrigerant become large and discharge air temperature lowers even when the target pressure (see below) is maintained in heating operation. Moreover, the detecting temperature of liquid pipe thermistor in indoor unit may be kept at approx. 40°C or higher normally, while in this case, the temperature may lower to approx. 35°C or lower due to a stagnancy of refrigerant. Accordingly, the discharge temperature may become approx. 30°C.
3. In heating operation, the control is executed during closing operation of EV opening degree.
   Since the liquid pressure rises with the rising high pressure, even if the EV is throttled to the minimum opening degree (200 pls), refrigerant cannot be super heated at the outlet of heat exchanger and liquid refrigerant which does not evaporate returns to compressor, resulting an operation so called "wet operation".
   - Superheated degree = 0 → The discharge pipe temperature lowers.
     (Condensing temperature + 20°C or less)

2. For insufficient charging

(The operating capacity of compressor has a tendency to decrease in cooling while increase in heating.)

1. The discharge pipe temperature of compressor rises. (Suction SH increases, and discharge pipe temperature also increases.)
2. Refrigerant at the outlet of evaporator is superheated. (Electronic expansion valve will be opened fully.)
   In this case, for the suction superheat degree of compressor is increased, alarm display of insufficient gas (U0) is displayed.
3. In cooling operation, when the operation capacity of compressor is small, since the low pressure (evaporating pressure) is low against refrigerant load, the unit cannot be operated with required capacity due to decreasing of refrigerant circulation volume. In heating operation, it is required to check that the difference between high pressure and liquid pressure is 0.3 to 0.4 MPa.
   Due to the characteristic of expansion valve, refrigerant cannot flow easily when the pressure difference between inlet and outlet of the valve is 0.2 MPa or more, therefore, liquid refrigerant will be stagnant between indoor heat exchanger and liquid piping.
   Large pressure difference → Shortage of refrigerant
   Small pressure difference → Excessive charge of refrigerant

Target Pressure and Temperature

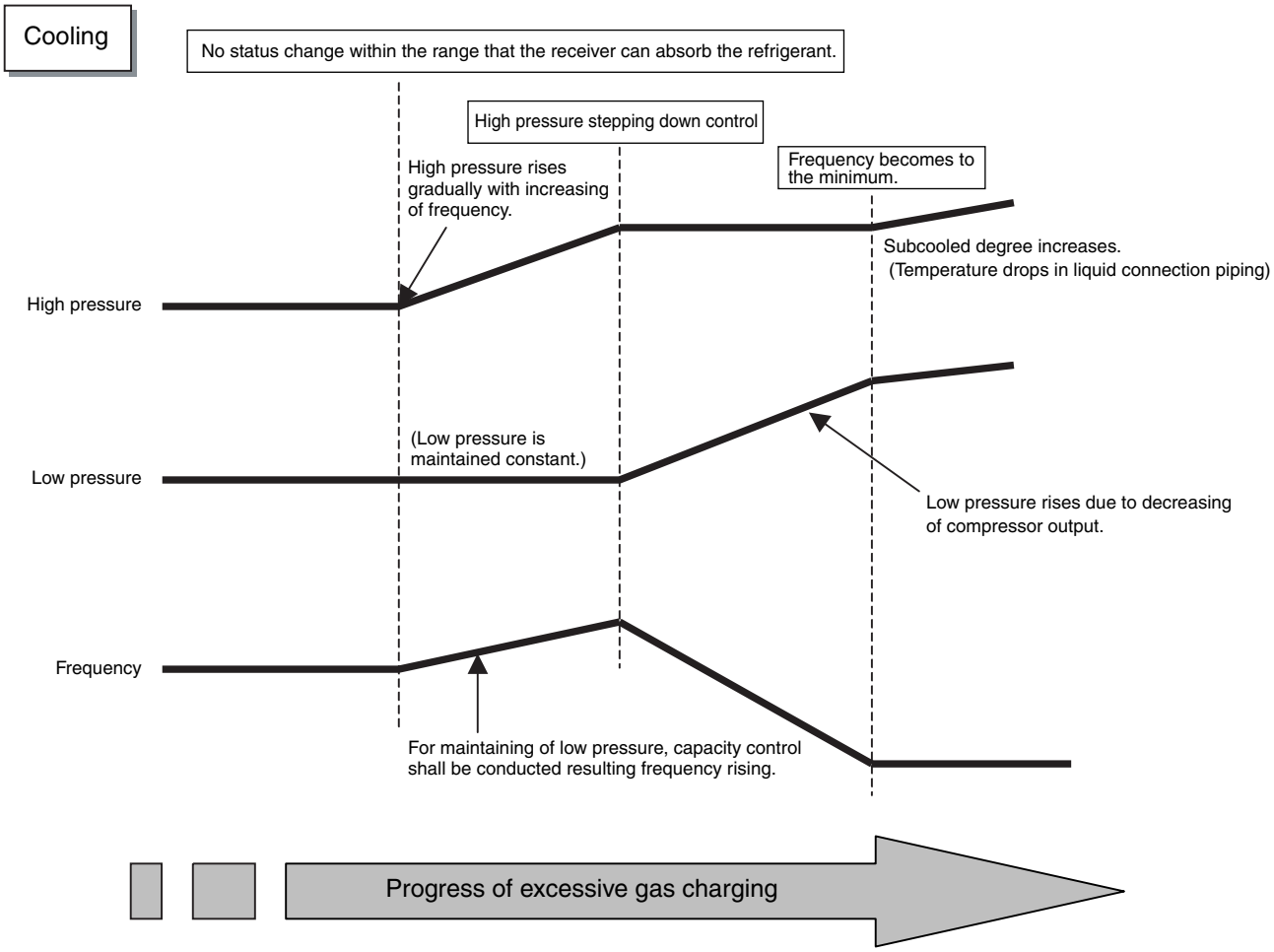
	Target condensing temperature / High pressure		Target evaporating temperature / Low pressure	
R22	46°C	1.8MPa	5.5°C	0.59MPa
R407C	48°C	1.9MPa	7.5°C	0.58MPa
R410A	46°C	2.8MPa	6.0°C	0.96MPa

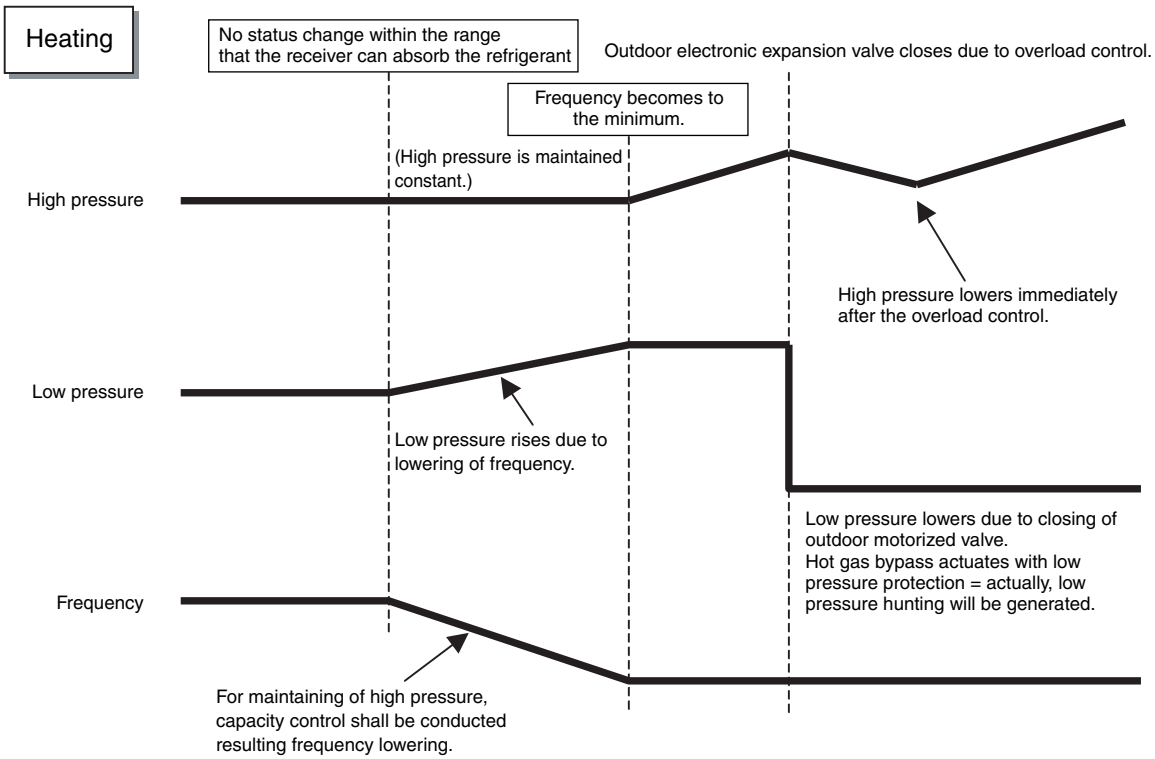
* Above target temperature stands for the saturation temperature at gas side.

3.1.1 Change of High / Low Pressure and Frequency with Excessive / Insufficient Refrigerant Gas Charge (Presentation with Image)

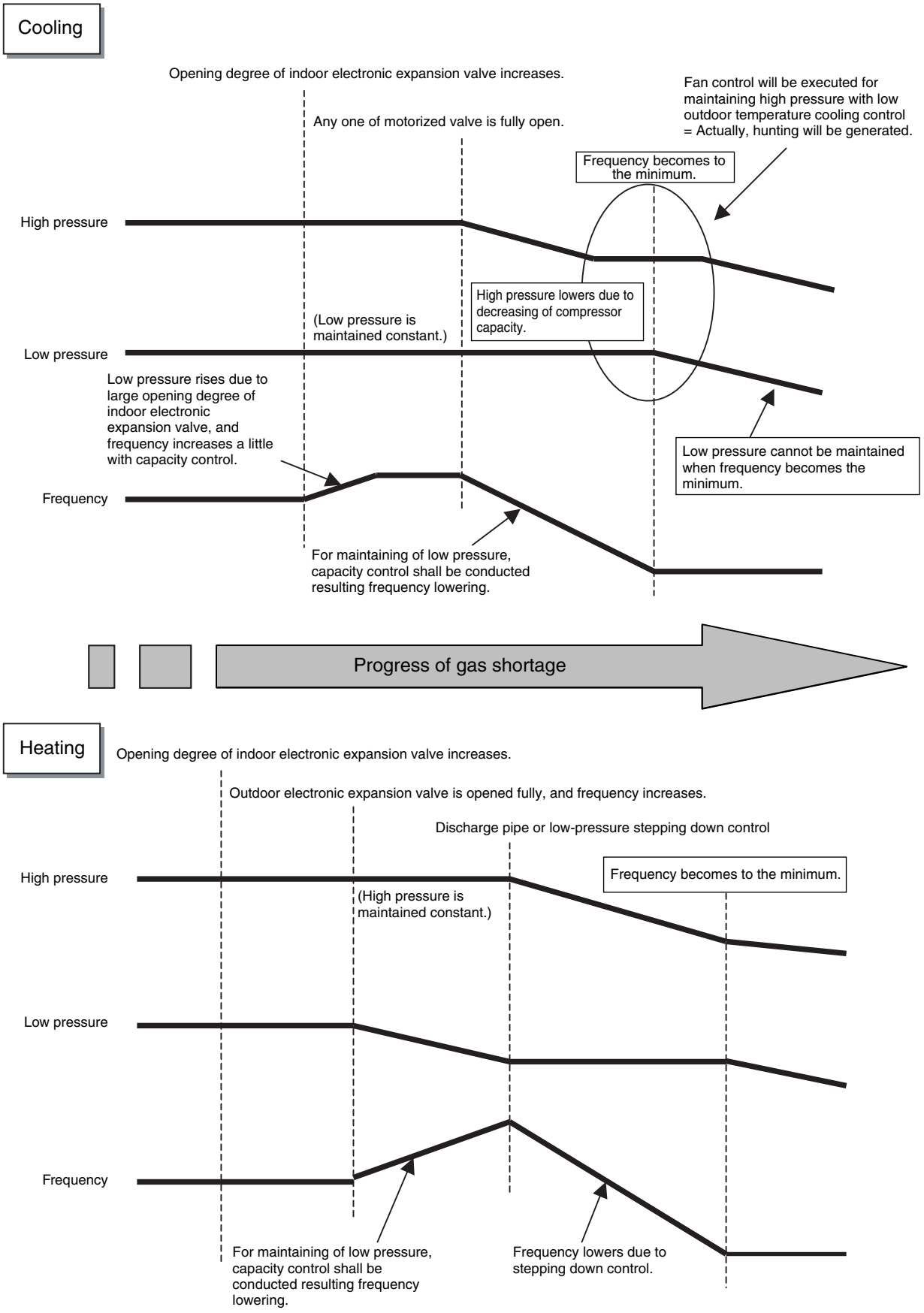
[For operation with all units connected (100 %)]

1. Excessively Charged Refrigerant Gas





2. Insufficient Refrigerant Gas



3.2 Abnormal Judgment for Various Sensors

When pressure sensor, thermistor or current sensor detects an abnormal value (upper limit value or more, or lower limit value or less), the unit will be halted with display of "Abnormal cord". [Abnormal stop]

Outdoor Unit

Sensor name	R22 model			R407C model			R410A model			Malfunction code
	Electronic symbol	Upper limit value	Lower limit value	Electronic symbol	Upper limit value	Lower limit value	Electronic symbol	Upper limit value	Lower limit value	
High-pressure sensor	SENPH	71.4°C	–40.5°C	SENPH	74.4°C	–35.7°C	SINPH	43 kg/cm^2	0.1 kg/cm^2	JA
Low-pressure sensor	SENPL	26.8°C	–53.5°C	SENPL	32.7°C	–39.6°C	SINPL	18 kg/cm^2	–0.1 kg/cm^2	JC
Outdoor air thermistor	Th1	90.0°C	–43.7°C	R1T	90.0°C	–43.6°C	R1T	90.0°C	–43.6°C	H9
Heat exchanger thermistor	Th2	90.0°C	–43.7°C	R2T	90.0°C	–43.6°C	R4T	90.0°C	–43.6°C	J6
Discharge pipe thermistor (For INV)	Th3-1	196.0°C	–10.2°C	R3-1T	165.0°C	–20.0°C	R31T	165.0°C	–20.0°C	J3
Discharge pipe thermistor (For STD)	Th3-2	196.0°C	–10.2°C	R3-2T	165.0°C	–20.0°C	R32T	165.0°C	–20.0°C	J3
Suction pipe thermistor	Th4	90.0°C	–10.2°C	R6T	90.0°C	–43.6°C	R2T	90.0°C	–43.6°C	J5
Oil temperature thermistor (For INV)	Th5-1	90.0°C	–10.2°C	—	—	—	—	—	—	JH
Oil temperature thermistor (For STD)	Th5-2	90.0°C	–10.2°C	—	—	—	—	—	—	JH
Header thermistor	Th6	90.0°C	–10.2°C	R4T	90.0°C	–43.6°C		90.0°C	–43.6°C	J7
Current sensor	—	—	—	T1A	40A	5A	T1A	40A	5A	J2
Applicable models	RXY ~ K(A) RNY ~ K(A)			RXYP ~ K RSXYP ~ L			RXY(Q) ~ M			—

Indoor Unit

Sensor name	R22 model			R407C model			R410A model			Malfunction code
	Electronic symbol	Upper limit value	Lower limit value	Electronic symbol	Upper limit value	Lower limit value	Electronic symbol	Upper limit value	Lower limit value	
Heat exchanger liquid pipe thermistor	Th2	120°C	–50°C	Th2	120°C	–50°C	R2T	120°C	–50°C	C4
Heat exchanger gas pipe thermistor	Th3	120°C	–50°C	Th3	120°C	–50°C	R3T	120°C	–50°C	C5
Suction air thermistor	Th1	130°C	–40°C	Th1	130°C	–40°C	R1T	130°C	–40°C	C9
Discharge air thermistor	Th4	130°C	–40°C	Th4	130°C	–40°C	R4T	130°C	–40°C	CA
Remote controller thermistor for suction air	Th	130°C	–40°C	Th	130°C	–40°C	R1T	130°C	–40°C	CJ
Applicable models	G ~ KA type			P ~ K type			Q ~ M type			—

3.2.1 Thermistor

1. Symptoms with Thermistor Resistance Deviation

In Cooling with Superheat Degree Control

• Indoor unit liquid pipe thermistor

· When the resistance deviates to smaller value. (Higher temperature detected)

Superheat degree (SH) = Tg-Tl
↓
Tg-Tl decreases.
↓
Indoor electronic EV closes.
↓
Superheat operation, cooling capacity lowering (Freeze-up protection cannot be detected.)

· When the resistance deviates to larger value. (Lower temperature detected)

Superheated degree (SH) = Tg-Tl
↓
Tg-Tl increases.
↓
Indoor electronic EV opens.
↓
Wet operation (Freeze-up protection can be applied easily.)

• Indoor gas pipe thermistor

· When the resistance deviates to smaller value. (Higher temperature detected)

Superheated degree (SH) = Tg-Tl
↓
Tg-Tl increases.
↓
Indoor electronic EV opens.
↓
Wet operation

· When the resistance deviates to larger value. (Lower temperature detected)

Superheat degree (SH) = Tg-Tl
↓
Tg-Tl decreases.
↓
Indoor electronic EV closes.
↓
Superheat operation, cooling capacity lowering

Code of Thermistors Detecting Various Temperatures

	Units using R22, R407C	Units using R410A
Tl (indoor liquid pipe temperature)	Th2	R2T
Tg (indoor gas pipe temperature)	Th3	R3T

In Heating with Subcooled Degree Control

• **Indoor unit liquid pipe thermistor**

· When the resistance deviates to smaller value. (Higher temperature detected)

Subcooled degree (SC) = Tc-TI

↓

Tc-TI decreases. (Subcooling does not work.)

↓

Indoor electronic extension valve closes.

↓

Liquid refrigerant is stagnant in indoor heat exchanger. (High pressure rises due to heating overload.)

· When the resistance deviates to larger value. (Lower temperature detected)

Subcooled degree (SC) = Tc-TI

↓

Tc-TI increases. (Subcooling works excessively.)

↓

Indoor electronic extension valve opens.

↓

Refrigerant delivery among indoor units cannot be balanced.

In ON / OFF Judgment for Heating Hot Start

• **Indoor unit liquid pipe thermistor**

· When the resistance deviates to larger value. (Lower temperature detected)

Condition for canceling hot start
TI ≥ 35˚C or 3 minutes elapse from thermostat ON.

↓

TI ≤ 35˚C is detected.

↓

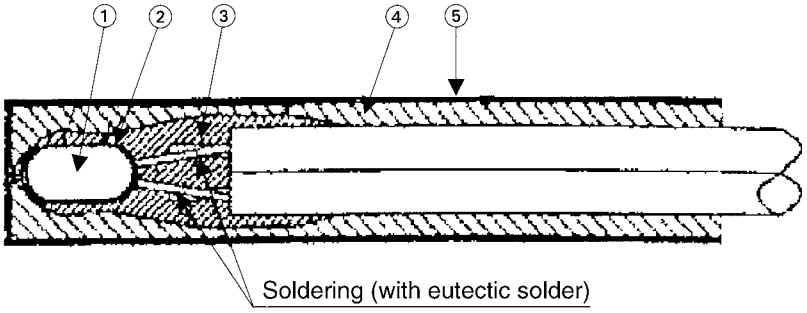
Hot start cancellation delays. (For 3 minutes or less)

↓

Insufficient capacity for start-up

Tc: Equivalent saturation temperature of detected value of outdoor high pressure sensor (Pc)
TI: Detected temperature of indoor liquid pipe thermistor
(Th2 for units using R22 or R407C, R2T for units using R410A)

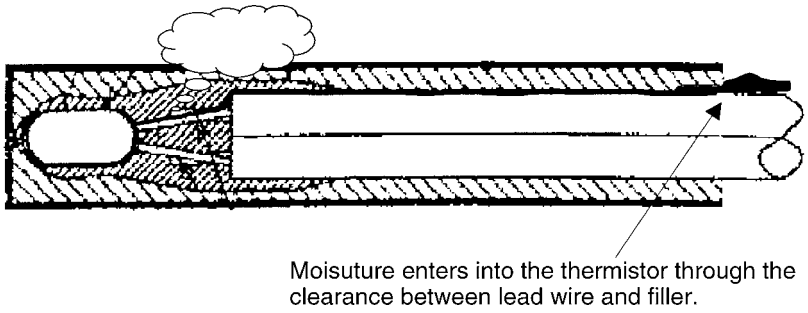
2. Construction of Thermistor



No.	Name	Material
1	Thermistor	Metallic oxide Glass Dumet wire
2	Coat agent 1	Silicon resin
3	Coat agent 2	Epoxy resin
4	Filling agent	Epoxy resin
5	Protective pipe	Phosphor deoxidized copper

For Thermistor Malfunction

Electrolytic corrosion (transfer of cuprous oxide) generated.



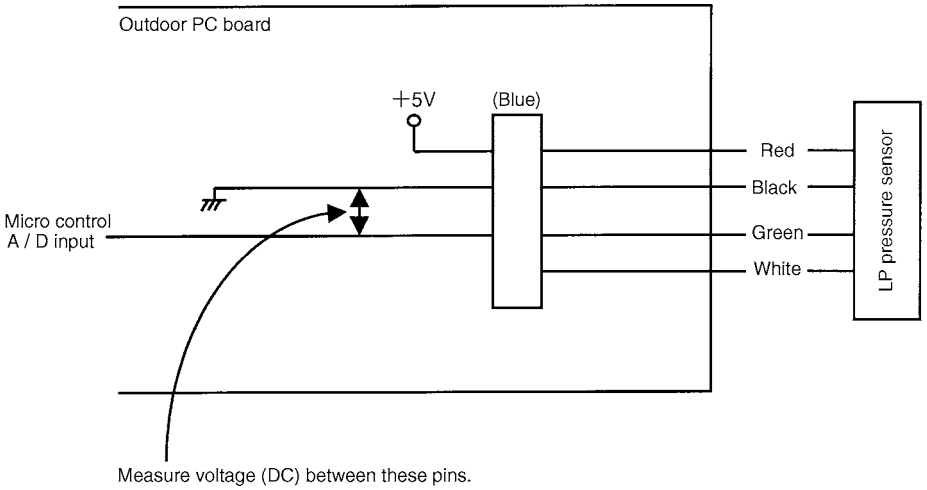
3. Thermistor Temperature · Resistance Characteristic

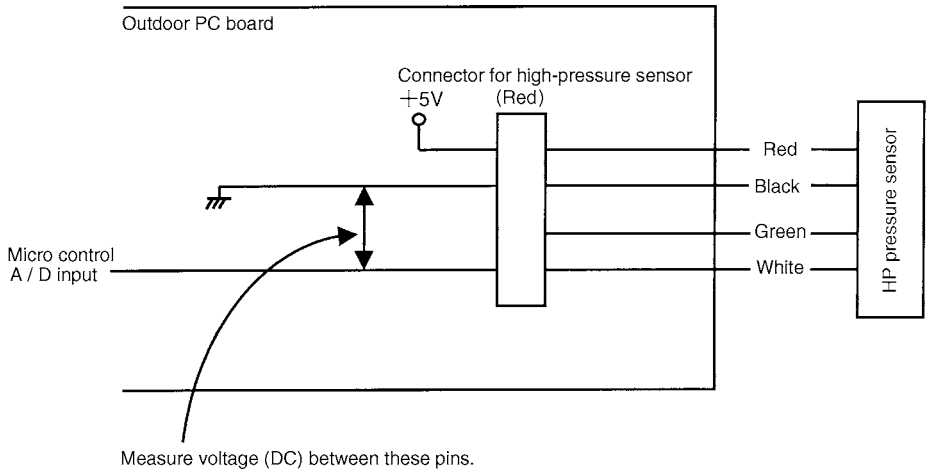
Unit: kΩ

Thermisitor Temperature °C	A	B	C	D
–10	112.0	—	—	48.48
–8	100.4	—	—	43.92
–6	90.2	88.0	866.8	39.84
–4	81.1	79.1	782.7	36.19
–2	73.0	71.1	707.6	32.93
0	65.8	64.1	640.4	30.00
2	59.4	57.8	580.0	27.37
4	53.7	52.3	525.6	25.00
6	48.6	47.3	477.0	22.87
8	44.1	42.9	433.4	20.94
10	40.0	38.9	394.2	19.20
12	36.3	35.3	358.9	17.63
14	33.0	32.1	327.1	16.21
16	30.1	29.2	298.5	14.91
18	27.4	26.6	272.6	13.74
20	25.0	24.3	249.0	12.67
22	22.9	22.2	228.1	11.70
24	20.9	20.3	208.9	10.82
26	19.1	18.5	191.5	10.01
28	17.5	17.0	175.8	9.27
30	16.1	15.6	161.5	8.60
32	14.8	14.2	148.4	7.98
34	13.6	13.1	136.6	7.41
36	12.5	12.0	125.8	6.89
38	11.5	11.1	116.0	6.42
40	10.6	10.3	107.0	5.98
42	9.8	9.5	98.8	5.57
44	9.1	8.8	91.3	5.20
46	8.4	8.2	84.4	4.86
48	7.8	7.6	78.1	4.54
50	7.2	7.0	72.3	4.25
52	6.7	6.7	67.1	3.98
54	6.7	6.0	62.2	3.73
56	6.2	5.5	57.8	3.50
58	5.7	5.2	53.7	3.28
60	4.96	—	50.0	3.08
62	4.62	—	46.5	2.90
64	4.30	—	43.3	2.73
66	4.01	—	40.4	2.57
68	3.75	—	37.6	2.42
70	3.50	—	35.1	2.28
72	3.27	—	32.8	—
74	3.06	—	30.6	—
76	2.86	—	28.6	—
78	2.68	—	26.8	—
80	2.51	—	25.1	—
82	—	—	23.5	—
84	—	—	22.0	—
86	—	—	20.6	—
88	—	—	19.4	—
90	—	—	18.2	—
92	—	—	17.1	—
94	—	—	16.0	—
96	—	—	15.1	—
98	—	—	14.2	—
Application	• Heat exchanger (Indoor / Outdoor) • Suction air • Air in remote controller • Outdoor air	• Radiator fin	• Discharge pipe	• For water temperature

3.2.2 Pressure Sensor

1. Voltage Measuring Point





When the color of harness is not as mentioned above, find the measuring point by following procedure.

1. Black is GND.
2. Find DC5V line.
3. The remained wire is the sensing section.
   (For the same pressure, higher output voltage can be detected with low-pressure sensor, while lower output voltage detected with high pressure sensor.)

2. Voltage Characteristic of Pressure Sensor (R22, R407C)

High pressure $P_H = (V_H - 0.5) \times 0.98$

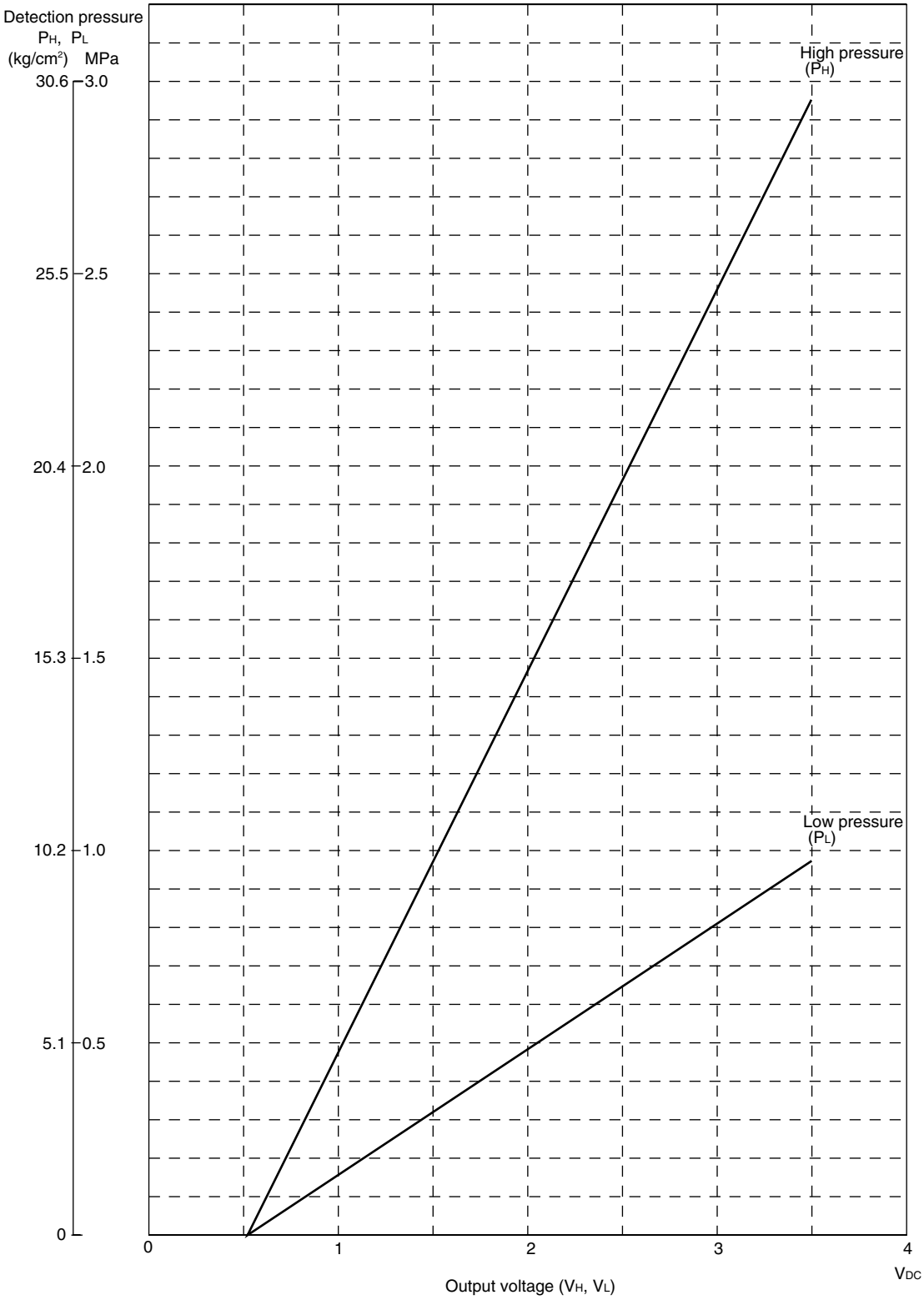
Low pressure $P_L = (V_L - 0.5) \times 0.98 / 3$

P_H : Detection pressure [High pressure side] MPa

P_L : Detection pressure [Low pressure side] MPa

V_H : Output voltage [High pressure side] V_{DC}

V_L : Output voltage [Low pressure side] V_{DC}



3. Voltage Characteristic of Pressure Sensor (R410A)

$P_H = 1.38V - 0.69$

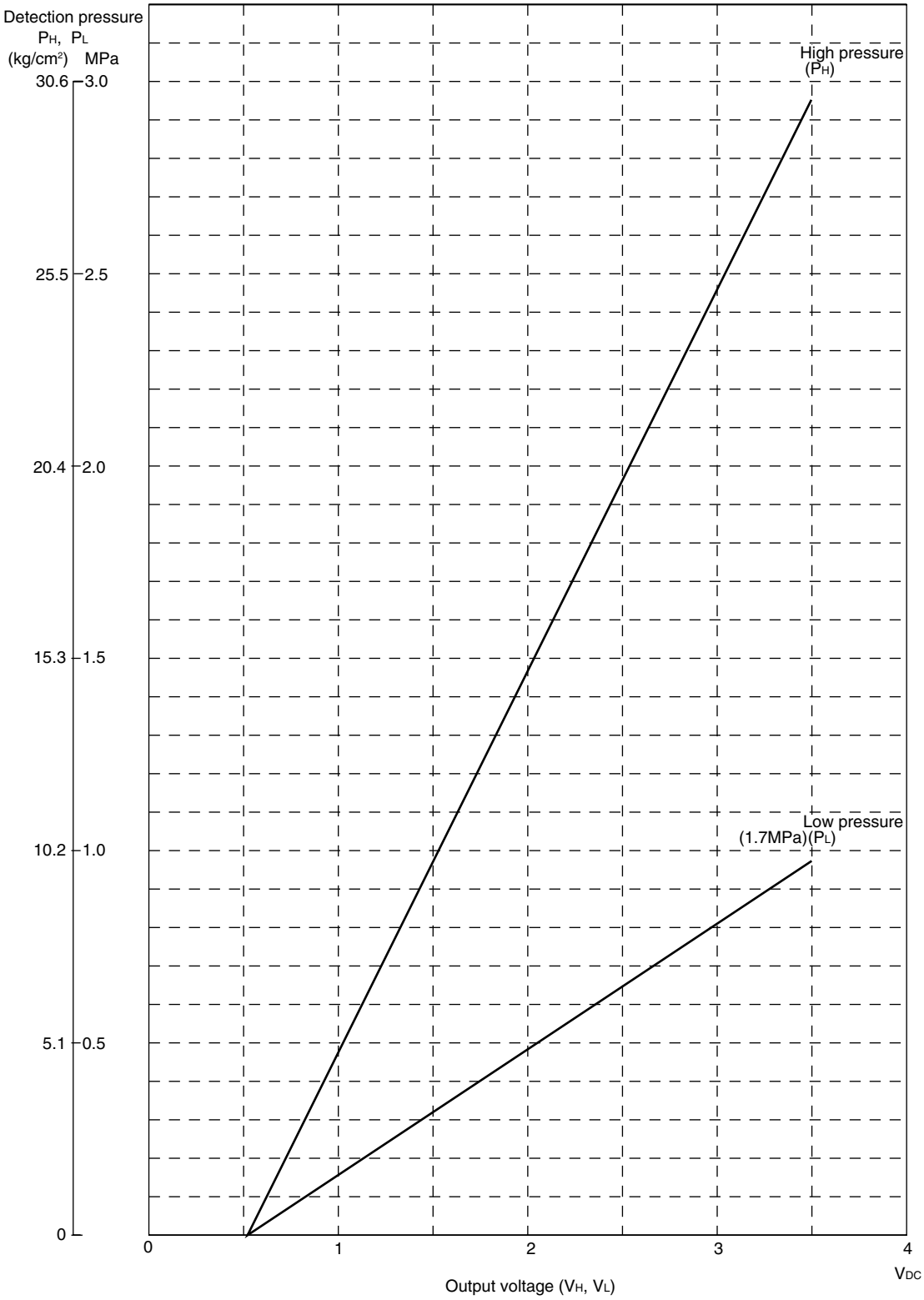
$P_L = 0.57V - 0.28$

P_H : Detection pressure [High pressure side] MPa

P_L : Detection pressure [Low pressure side] MPa

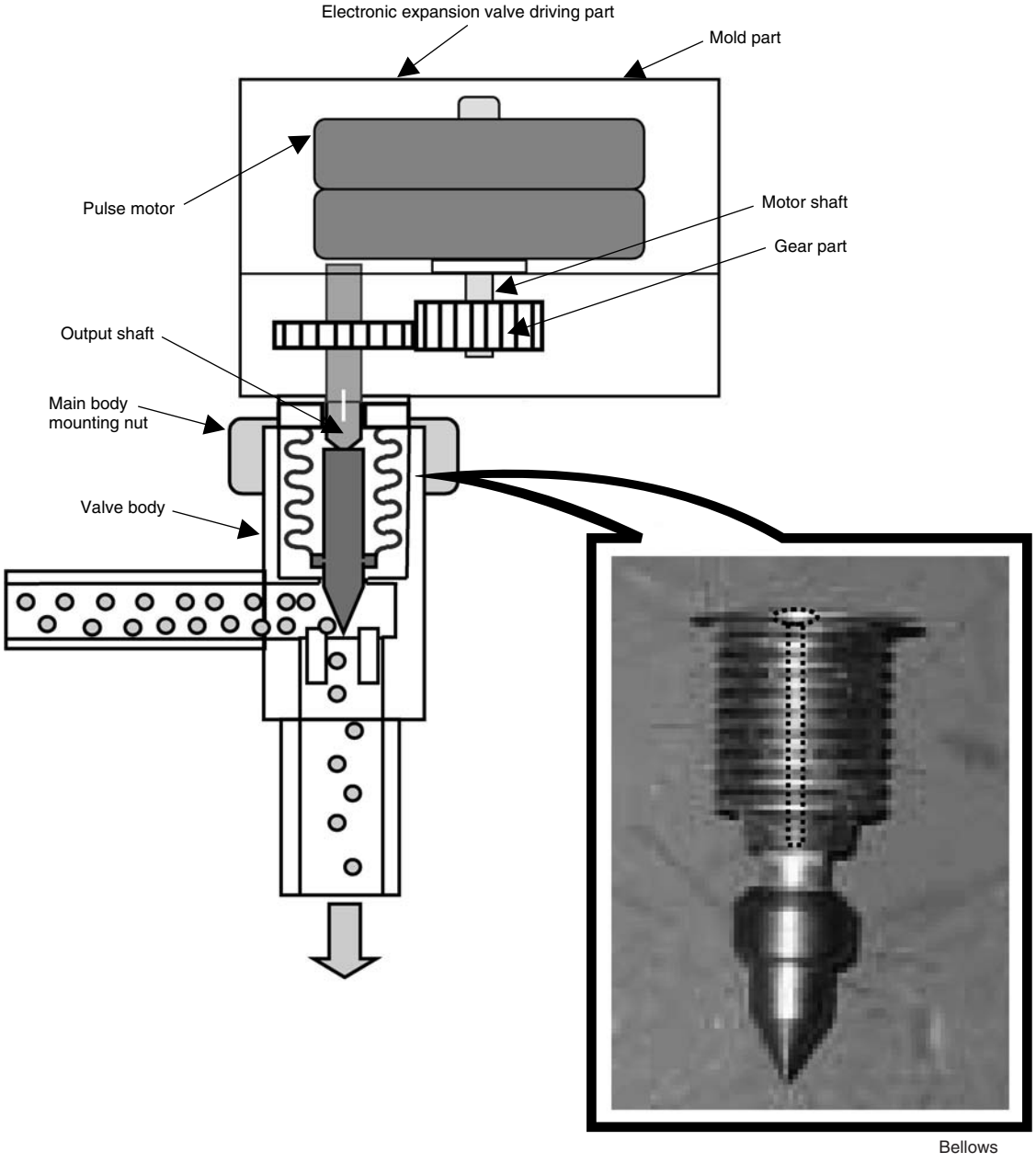
V_H : Output voltage [High pressure side] V_{DC}

V_L : Output voltage [Low pressure side] V_{DC}



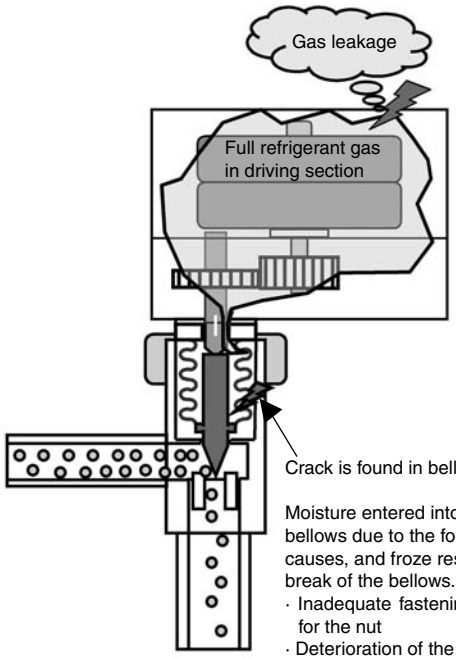
3.3 Structure and Operation of Electronic Expansion Valve

For VRV system, EBM type linear control valve is employed to use as an electronic expansion valve for superheated degree control or subcooled degree control.
In the valve, single-phase excitation drive type pulse motor is employed. On receiving 2000 pls signal, goes to full open. The stroke of gear is 0.7 mm from full open to complete close. The below figure shows the inside structure of driving section, and the gear ratio is 1 / 30.

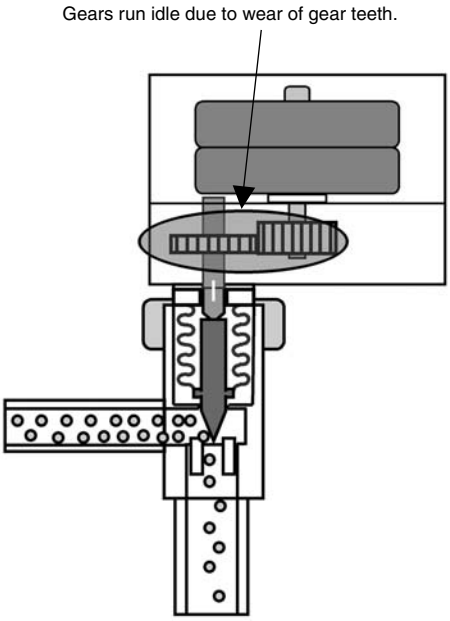


3.3.1 Malfunction Example of Electronic Expansion Valve

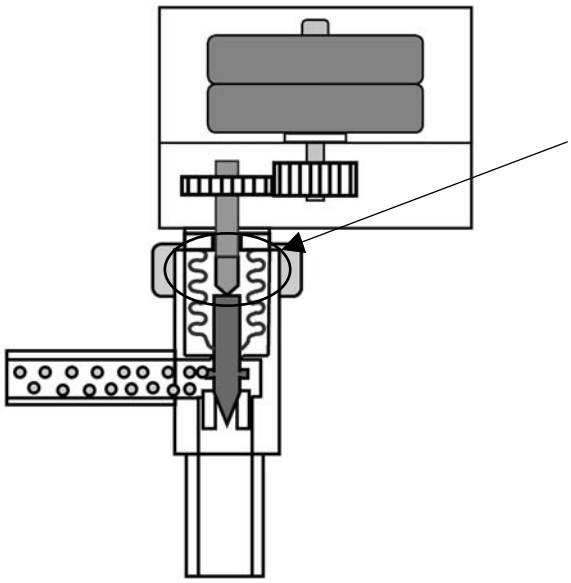
■ Gas Leakage



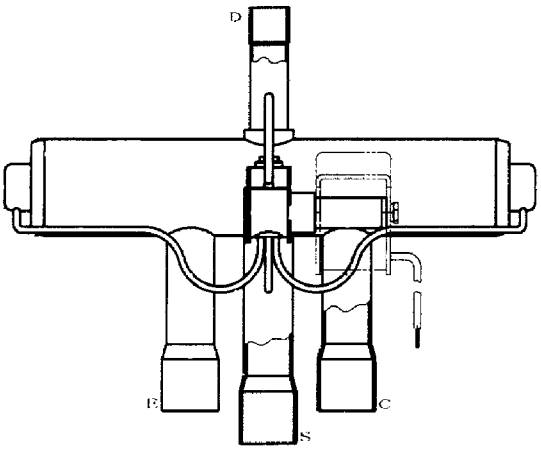
■ Malfunction (Full Open)



■ Malfunction (Complete Close)

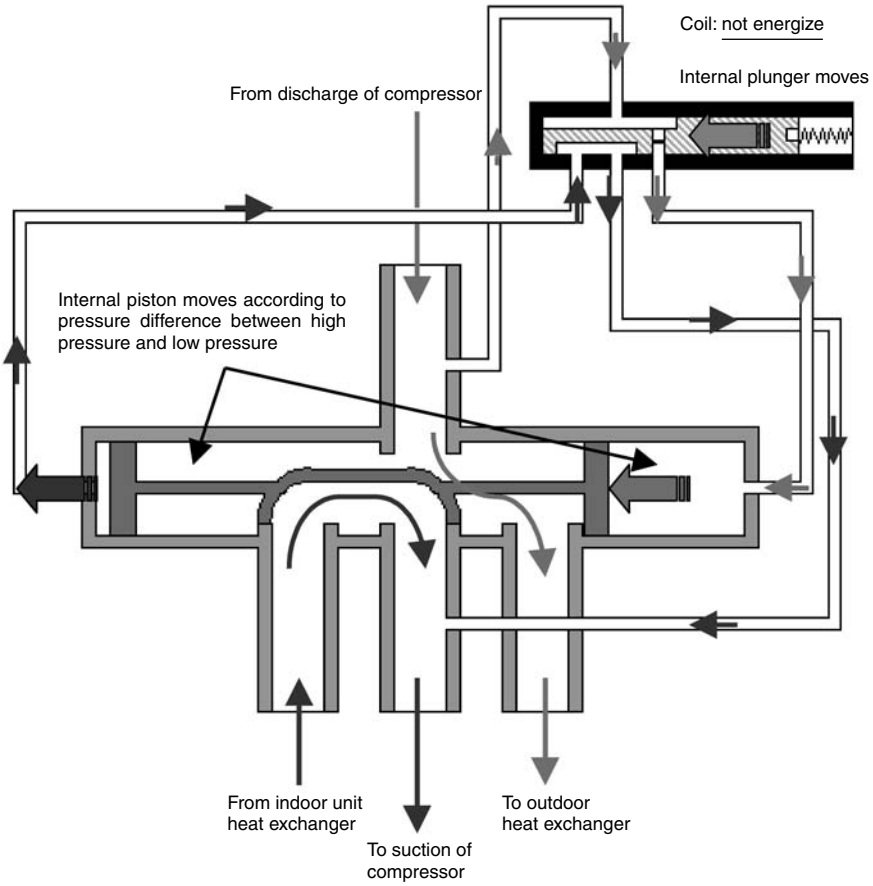


3.4 Structure and Movements of Four-way Valve

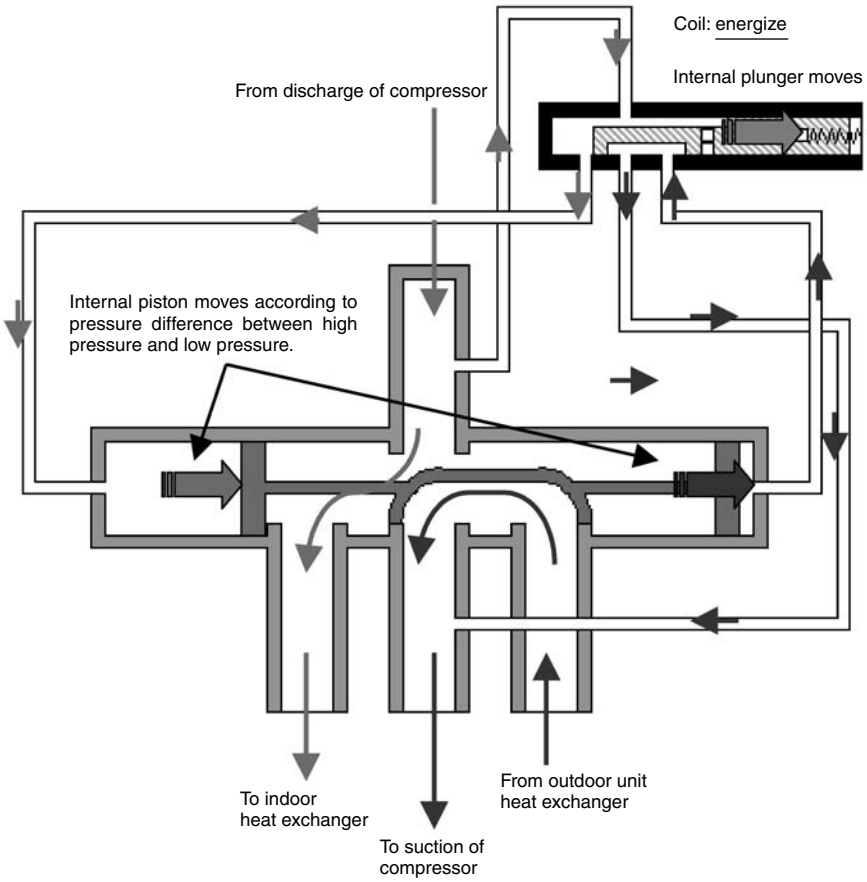


Four way valve is a representative valve which is used for heat pump type air conditioner. This valve functions to selection flow direction of superheated refrigerant discharged from compressor. In heating operation, the valve feeds the refrigerant to indoor heat exchanger. While in cooling and defrosting in heating, the valve feeds to outdoor heat exchanger.
For VRV system standard unit, one four-way valve is installed, however, for some units of other series, plural valves may be installed.
Moreover, there is two-way valve or three way valve operated with the same mechanism.

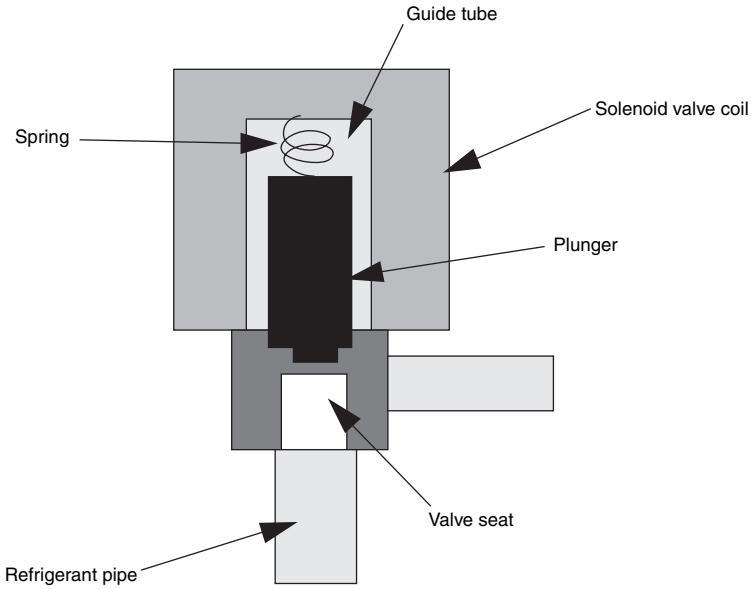
■ **Movement in Cooling**



■ Operation in Heating



3.5 Structure and Operation of Solenoid Valve



Liquid Injection

In order to prevent overheating operation of compressor, refrigerant is injected to compressor suction port from liquid line reducing pressure through capillary tube.
The operation is as follows;
Plunger which is a slide part inside valve body lifts to make a flow of refrigerant when the coil is energized, while when not energized, the plunger lowers to contact with valve seat due to spring force, and shuts the flow of refrigerant.

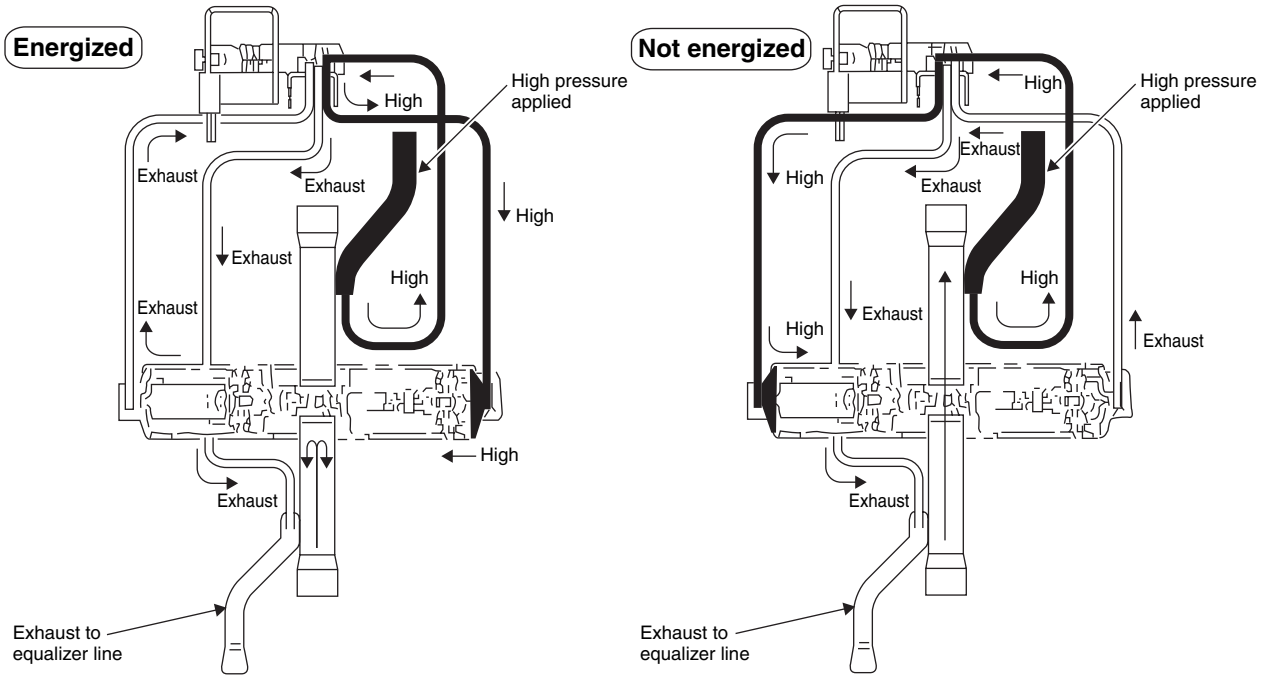
3.6 Structure and Operation of Two-way Solenoid Valve

In heating operation, when each standard speed outdoor unit does not operate, the two-way solenoid valve stops each gas pipe.
This valve is external equalizing type, i.e. pressure difference to move the spool can be made outside of valve.
The valve "closes" when coil is energized, "opens" when not be energized.
The shape of the valve is similar to four-way valve and approx. 0.35MPa is required for operation.

Operation mode	In operation of standard outdoor unit	In no operation of standard outdoor unit
Cooling operation	Valve state: “open: not energized” The line including the valve functions as a low pressure line of each standard speed outdoor unit.	Valve state: “open: not energized” The valve is opened to collect refrigerant in INV unit in order to prevent refrigerant from accumulate in the unit stopping.
Heating operation	Valve state: “close: energized” The line functions as a discharge gas line of each standard speed outdoor unit.	Valve state: “open: not energized” The valve is closed in order to prevent discharge gas from coming into the unit stopping.

Principal of Valve Operation

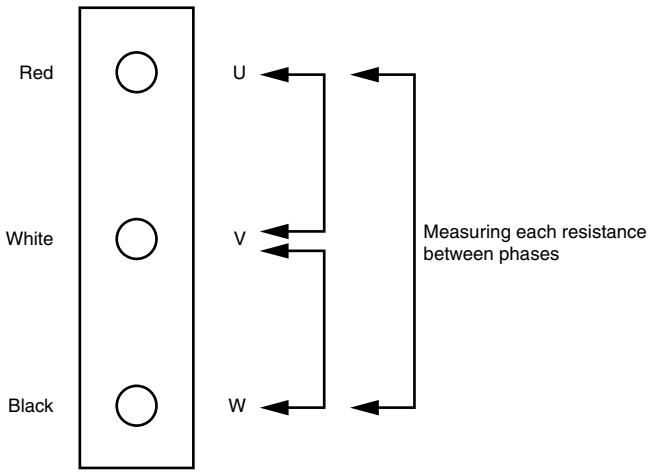
Basically, the principal of valve operation is the same as four-way valve. Below figure shows the operation of valve.



3.7 Check on Outdoor Fan Motor

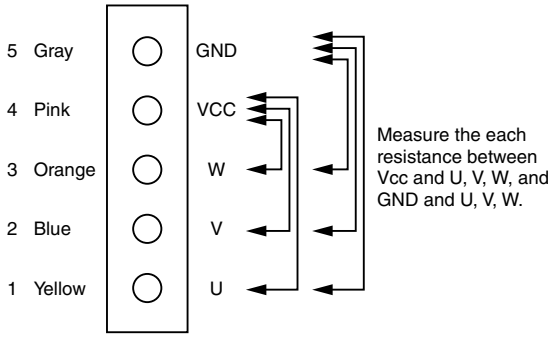
Check 1
Check on connector of fan motor (power supply cable)

(1) Turn OFF the power supply.
Check on resistance balance and short-circuiting between phases by measuring each resistance between phases of U, V, and W with the connector (3-core) at motor side after disconnect the connector or relay connector.



Check 2
Check on connector of fan motor (control cable)

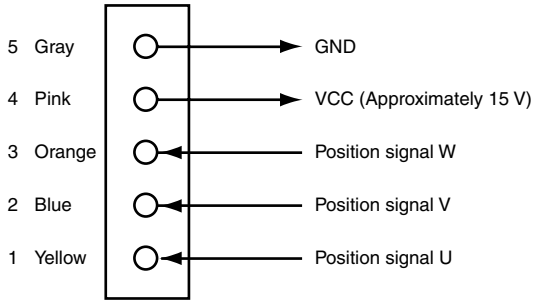
(1) Turn OFF the power supply.
(2) Check on resistance balance between terminals (± 20 % or less) by measuring each resistance between Vcc and U, V, W, and GND and U, V, W with the connector (5-core) at motor side after disconnect the connector or relay connector.



Check 3
Check on pulse input of fan inverter PC board position signal

(1)Disconnect the connector X2A under the conditions of power supply OFF and operation OFF.
(2) Check that approx. 15 V can be read between pin number of 4 and 5 in X2A after turn ON the power supply.
(3) Connect the connector X2A under the conditions of power supply OFF and operation OFF.
(4) Rotate fan motor for one turn manually under the conditions of power supply ON and operation OFF, and check on the following items.
Pulses (approx. 0 V and approx. 5 V) can be output for four times between pin No. 1 and 5 in X2A.
Pulses (approx. 0 V and approx. 5 V) can be output for four times between pin No. 2 and 5 in X2A.
Pulses (approx. 0 V and approx. 5 V) can be output for four times between pin No. 3 and 5 in X2A.

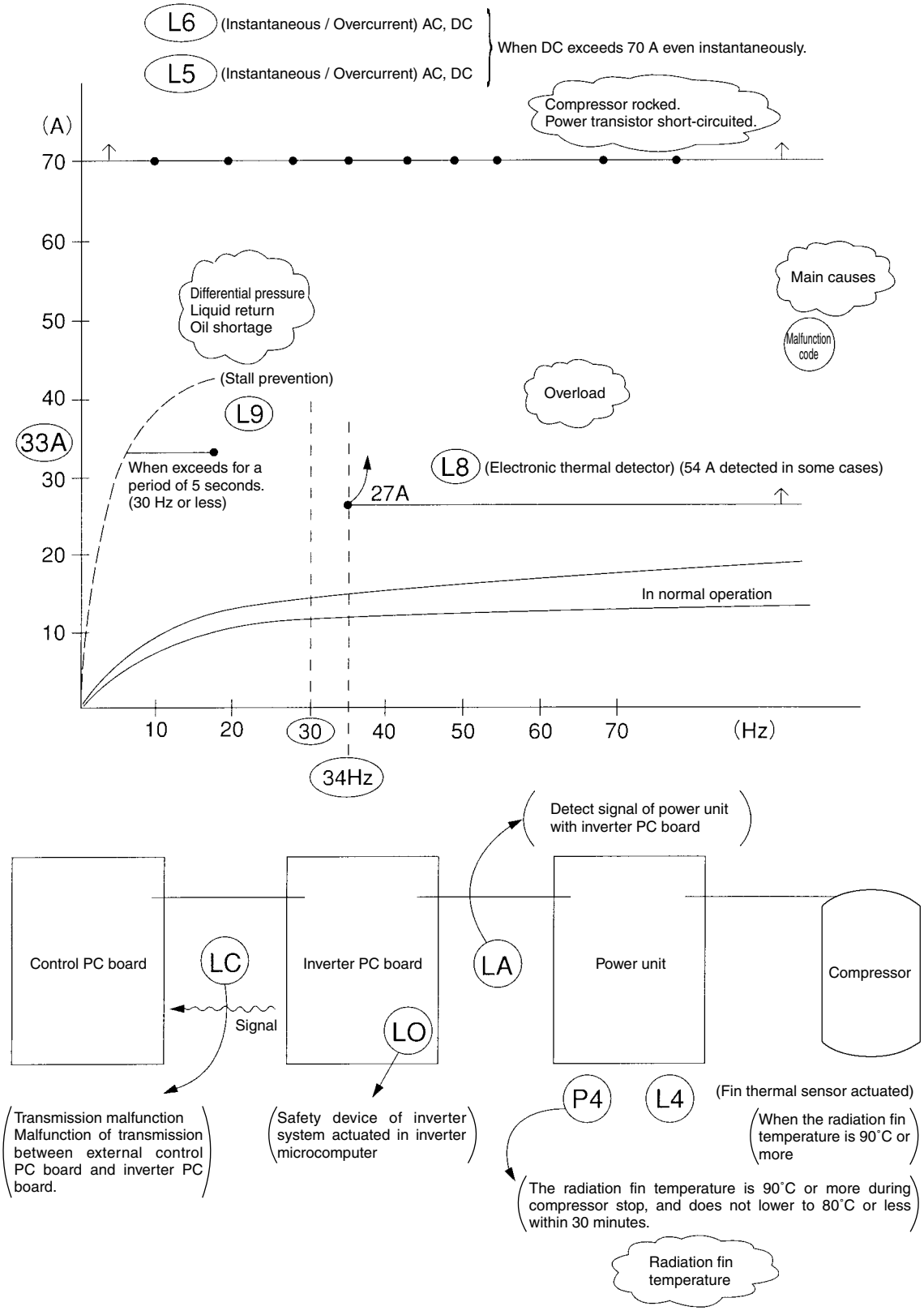
Above item (2) cannot be observed. → Faulty PC board → Replace PC board.
Item (4) cannot be observed. → Faulty hall IC → Replace the outdoor fan motor.



3.8 Diagnosis on Malfunction Code of Inverter System

3.8.1 Understanding of Malfunction Code

■ **In case of 3 phase, 200~220V class model**



3.8.2 Malfunction Code List (3 phase 200~220V class model)

	Code	Name of items	Detecting condition, Location (Model)	Main malfunction point
Items relating with electric current during unit operation	L5	Instantaneous overcurrent	When DC output current exceeds 70 A even instantaneously. (G) shunt, (K) DC·CT (G) 75A (H) 85A (K) 76.5A	Compressor lock Power transistor short circuit (INV_1 unit)
	L6	Instantaneous overcurrent	When AC output current exceeds 70 A even instantaneously. (H) AC·CT	
	L9	Stall prevention	When INV1 compressor is 30 Hz or less, AC 33A or more for a period of 5 seconds (K) DC·CT DC 54A or more for a period of 30 seconds (G) shunt AC 27.5A or more for a period of 3 seconds (H) AC·CT	Differential pressure (faulty equalizing) Liquid return Oil shortage (INV unit)
	L8	Electronic thermal sensor	When INV1 pressure is 34 Hz or more, DC 54A or more (G) shunt DC 27.5A or more (K) DC·CT AC 27.5A or more (H) AC·CT	Overload Compressor INV / PC board
Items other than electric current (control, safety device, signal)	LC	Transmission malfunction between inverter PC board and outdoor unit PC board	On outdoor PC board, signal is detected between outdoor PC board and inverter PC board. (Whether signal returns from inverter PC board or not?)	Disconnection between outdoor PC board and INV PC board (INV PC board) (Outdoor PC board)
	LO	Faulty inverter PC board	The safety device of inverter system activates in microcomputer on inverter. Only for (G)	INV PC board Power transistor Mgsw
	LA	Faulty power transistor	Output signal sent to power transistor is detected in inverter PC board. Only for (G)	Disconnection between INV PC board and compressor Compressor (Power unit)
	L4	Radiation fin temperature rising	When radiation fin temperature reaches 90 °C or more, (H / K) (LO displays for G) P4 also may occur.	Heat radiation of fin Power transistor INV PC board Radiation fin thermistor
	P4	Faulty sensor for radiation fin temperature	Fin temperature of 90°C or more is detected during compressor halts, and does not lower to 80°C or less within 30 minutes. Fin thermistor (H / K) For fin thermal during compressor halts Fin thermal (G)	Radiation fin thermistor

Note; (G): VRV-G type, (H): VRV-H type, (K): VRV-K type
DC·CT: Detected by direct current converter
AC·CT: Detected by alternative current converter
Shunt: Detected by shunt resistance

■ **Example of overseas 400 volts class model**

Current protection set value

	Code	Name of Item	Detection condition	Model		Main mulfunction point
				RX(Y)(Q)-M, REYQ-M	RX(Y)Q-MA	
Item relating with electric current during unit operation	L5	Instantaneuos	Detected by peak current, operation time 10 micro sec (When exceed this value, stop immediately.)	*1 36amps (*2 25amps)	*1 30amps (*2 21amps)	Compressor lock, Compressor motor short, Cable short circuit, Inveter mulfunction
	L8	Electronic thermal detector 2	Detected by secondary current, Malfunction is detected when exceed this current value for period of 5 seconds	*2 16.5amps	*2 17amps	Compressor mulfunction, Compressor overload
		Electronic thermal detector 1	Detected by secondary current, Malfunction is detected when exceed this current value for period of 260 seconds	*2 15amps	*2 17amps	
	L9	Stall prevention	Detected by secondary current, Malfunction is detected when exceed this current value before reaching 20Hz at starting.	*2 15amps	Malfunction is not detected by electrical current	Abnormal differential pressure , Liquid compression, Shortage of rubricating oil, Compressor malfunction

*1 Malfunction detection by direct current inside inverter PCB
*2 Malfunction detection by effective current of compressor part
* Above current detection method--- Shunt resistance

3.8.3 How to Use Monitor on Inverter PC Board

The latest contents of malfunction stop can be obtained by LED display on inverter PC board. Each malfunction stop of inverter has retry function. Within the specified frequency of retry, the unit merely goes into 5 minutes standby mode, and malfunction cannot be determined. When the retry frequency completes within 60 minutes, malfunction is determined and malfunction code will be displayed on indoor remote controller.

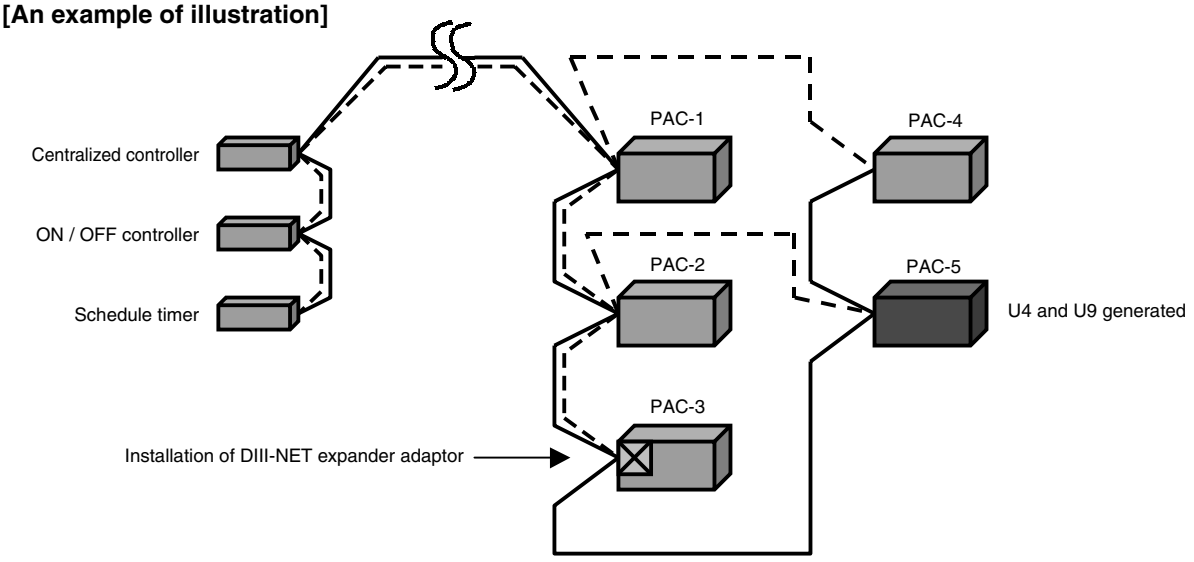
LED A 1 2 3 4	Malfunction contents	Number of retry times
◑ ● ● ● ●	Normal	—
◑ ● ● ● ○	Malfunction of fin thermal	3
◑ ○ ○ ● ●	Malfunction of sensor system	0
◑ ○ ● ● ○	Voltage shortage	3
◑ ● ● ○ ●	Instantaneous overcurrent	3
◑ ● ○ ○ ○	Electronic thermal	3
◑ ○ ○ ○ ○	Stall prevention	3
◑ ● ○ ● ●	Open phase detection	3
● ● ● ● ●	Microcomputer malfunction	Infinite

◑ : BLINK
○ : ON
● : OFF

3.9 Diagnosis on Transmission System Malfunction

3.9.1 Understand Entire System (Make a Simple Illustration of the System.)

[An example of illustration]



In the above figure, each line stands for;
Solid line: connection line of wiring which has been improved finally
Dotted line: Actually wired line (faulty wiring)

- The key point of investigation on transmission malfunction shall be to understand and grasp the system entirely.
  Investigate how the connection wiring among devices has been conducted at site, and make an illustrated drawing.
  Thus, the cause of troubles and countermeasures can be found.
- During test operation, or other step, equipment installation contractor may submit wiring diagrams, etc. In many cases, however, wiring may be substantially changed due to various restrictions of the site. Therefore, the initial wiring drawing shall be considered as a reference. (Particularly, if different contractors for piping and wiring have contracted, such as a large scale project, above problem can generally be caused.)
- Although excessive man-hour for checking will be required, make sure to execute continuity check yourself to grasp the equipment system correctly.
  Grasping the actual system can suggest measures for improving incorrect branch wiring, or for better location of DIII-NET expander adapters.
- It is also valid measure to lay down a temporary wiring for investigation of trouble causes. (Preparing some cables of VCTF 1.2 mm^2 with 100 m in length may be helpful.)
- Make sure to keep the illustrated simple line wiring diagrams which is made at the end of the latest service work showing the actual wiring. And the drawing can reduce man-hour for reinvestigation and make response rapid when service call made in future.
  (For discussion on transmission malfunction, the wiring diagrams can be helpful to shorten the discussion time.)

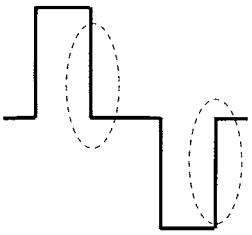
3.9.2 Cautions in Transmitting Waveform Measurement

- Make sure the probe is securely connected to respective terminals (F1 and F2)
- Playing on either of the terminals may deform the waveform, thus resulting in incorrect diagnosis.
- In order to acquire proper diagnosis, be sure to connect a temporary distributing cable to the probe and fix it to the F1 and F2 with screws.
- There are several types of waveforms (for sending and receiving). Therefore, the acquirement of only one waveform remains many things unknown.
- Commit yourself to data reduction. → Record waveforms as soon as acquired so as to recognize at which points the waveforms have been acquired.
- It is useful for measurements to provide a temporary distributing cable.

3.9.3 Measurement Range

- Basically, time axis (lateral axis): 50 μs to 100 μs
  voltage axis (longitudinal axis): 2 V to 5 V
- For oscilloscope, acquire waveforms with the "trigger" set to NORMAL mode for easy reading. (By setting the trigger to AUTO mode, waveforms displayed may immediately disappear.)
- For MEMORY HiCORDER, set all the "filters" to OFF. (Setting the filter to ON may recognize waveforms as noise, thus resulting in no display.)
- In common with the oscilloscope and MEMORY HiCORDER, pay attention to the "POSITION". (Neglecting the position may conceal waveforms to the point of invisibility in upper or lower portion of the screen.)
- It is useful for measurement to provide AC mode for sampling mode. (Waveforms will be displayed in the center of the screen.)

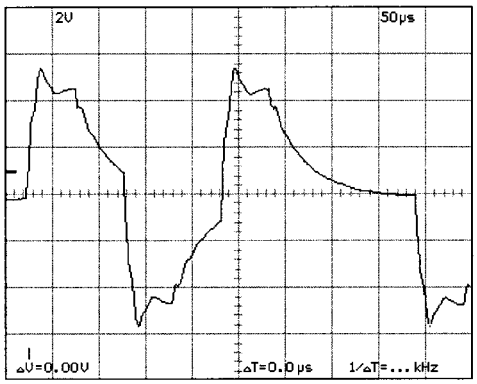
3.9.4 Verification of D-III NET Transmission Waveform



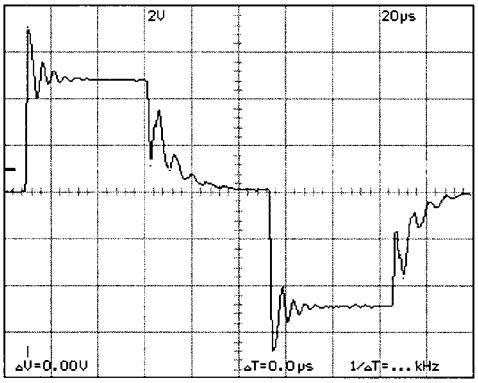
Short pulse with 1V or less or overshoot of waveform at start-up is not problem.

When the waveform as shown below appears in measuring of transmission waveform, transmission malfunction may probably be caused.

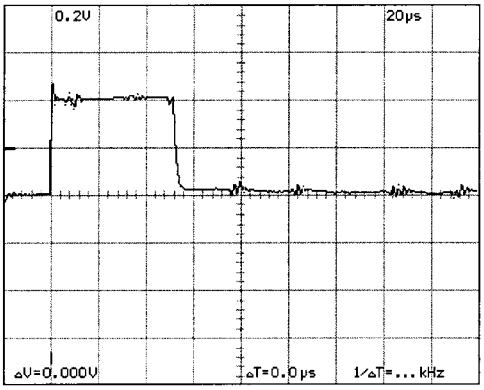
(Round pulse)



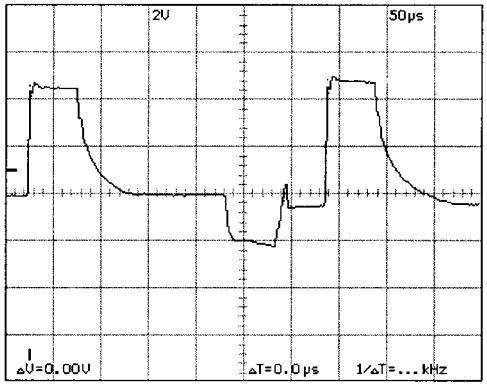
(Ringing)



(Noise)
This waveform causes no malfunctions.



(Faulty waveform)



Above abnormal waveforms are generated due to field factors. Some countermeasures shown in below table can be applied at the equipment side, and conduct proper measure according to the state of waveform.

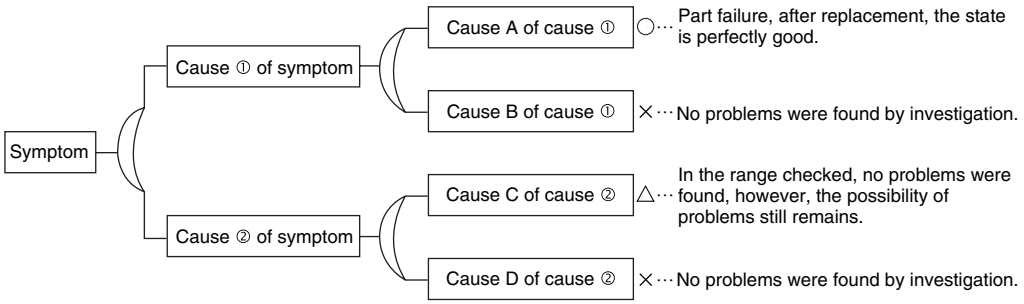
Symptom	Possible Cause	Corresponding example
Round pulse	Too long wiring length, too many units connected, or branches of wiring	Installation of D-III NET expander adapter, Separating the system, (Resistance in the end of line cannot be used.)
Ringing	High voltage cables provided close to the transmitting line, or multi-core cables used	Installation of D-III NET expander adapter, Correction of wiring
Noise	Close to high voltage cable of inverter	Installation of D-III NET expander adapter Correction of wiring
Faulty waveform	Faulty transmitting circuit of PC board	Replacing faulty PC board

4. Malfunction Tree Analysis (FTA)

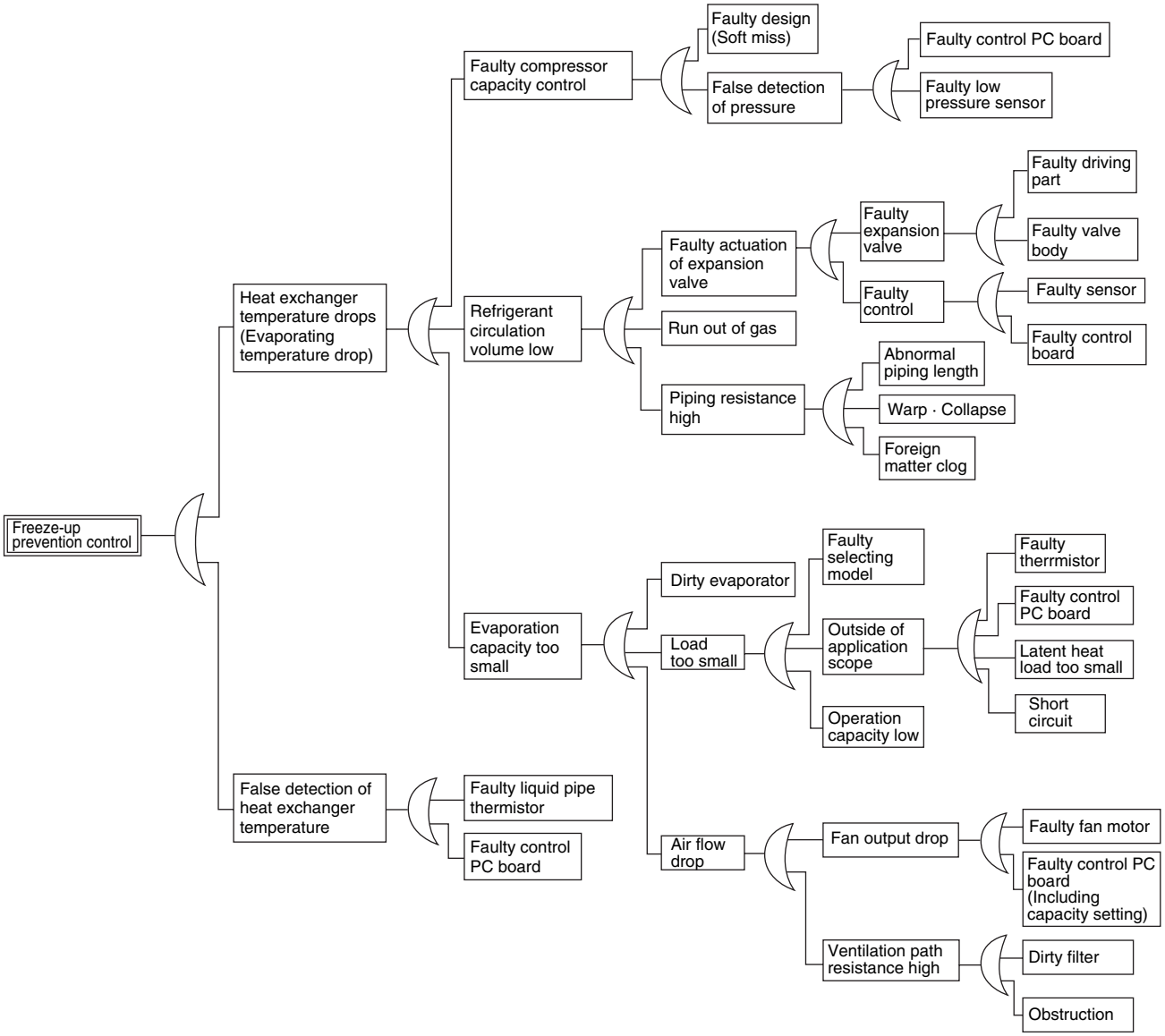
What is FTA? (Fault Tree Analysis)
For analyzing a symptom, put the causes relating to the phenomenon in a dendritic figure.

For project with VRV system, general contractors and subcontractors generally enter in the supply route. As a recent trend, they often request an explanation with FTA method. (i.e., only a reasonable explanation can be accepted.)

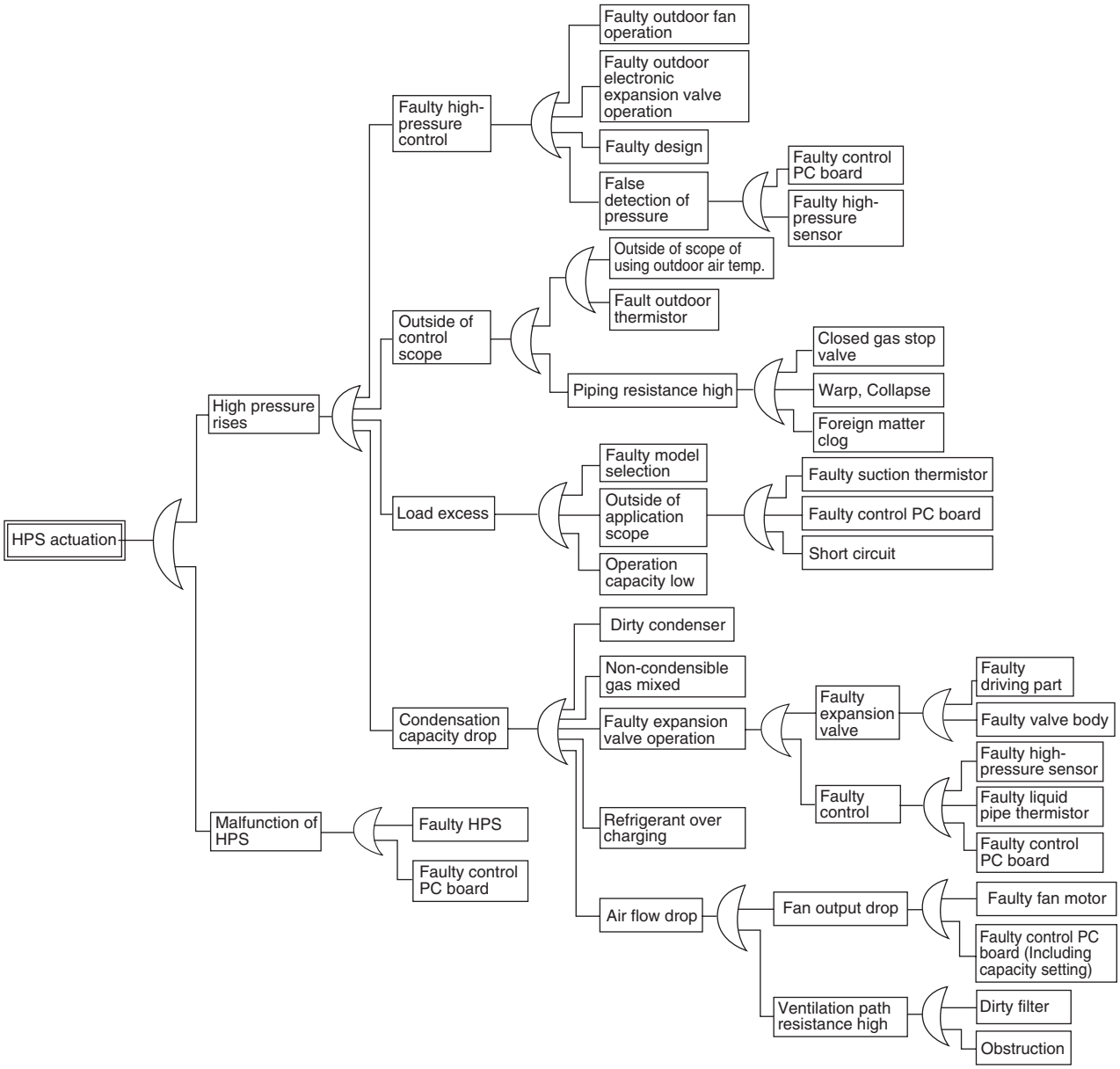
With this method, the causes can be analyzed logically and reasonably, and causes can also be narrowed down by using a process of elimination.
Moreover, in explanation or reporting, this method can make them persuasive.



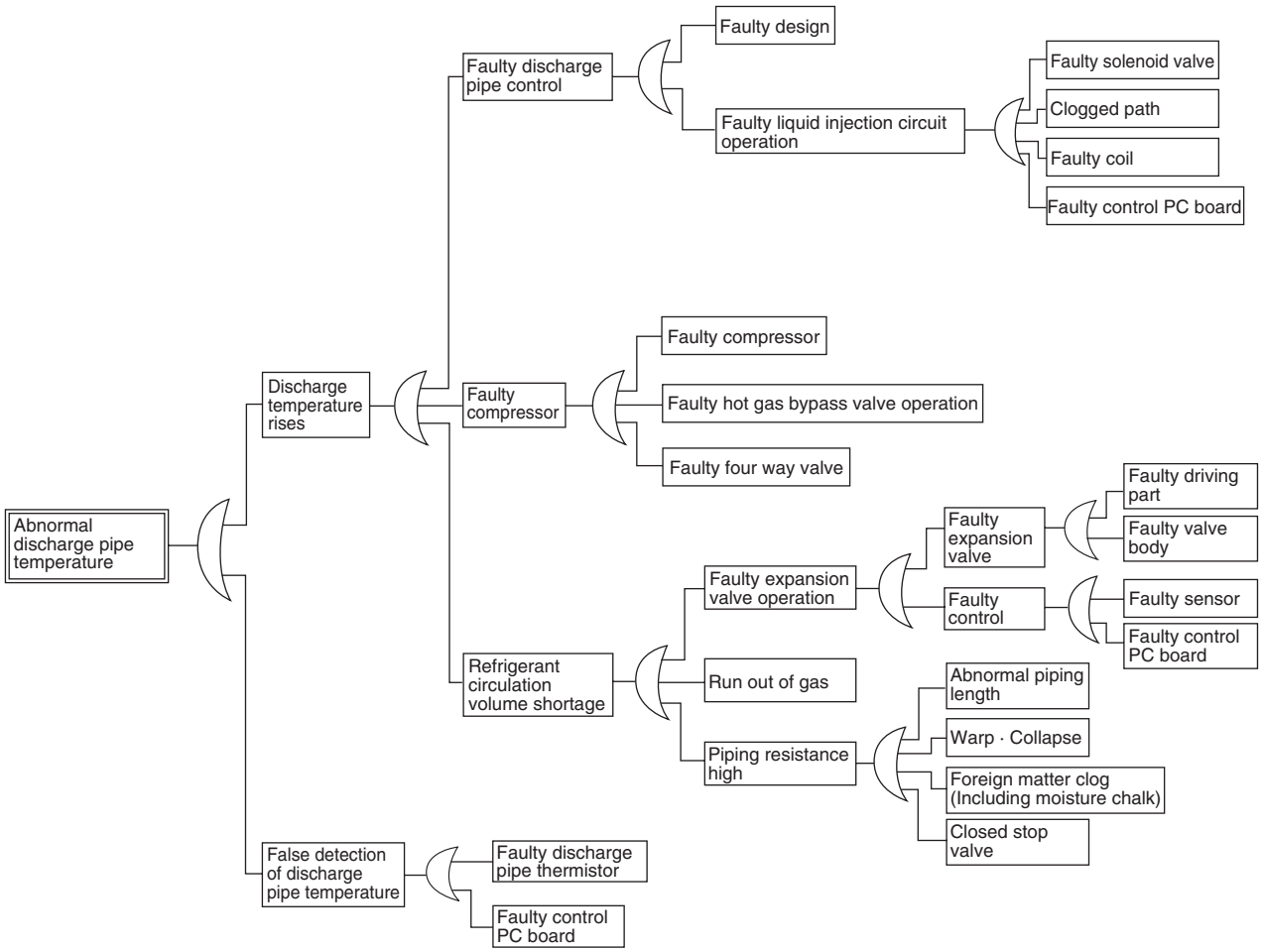
4.1 Actuation of Freeze-up Prevention Control of Indoor Unit



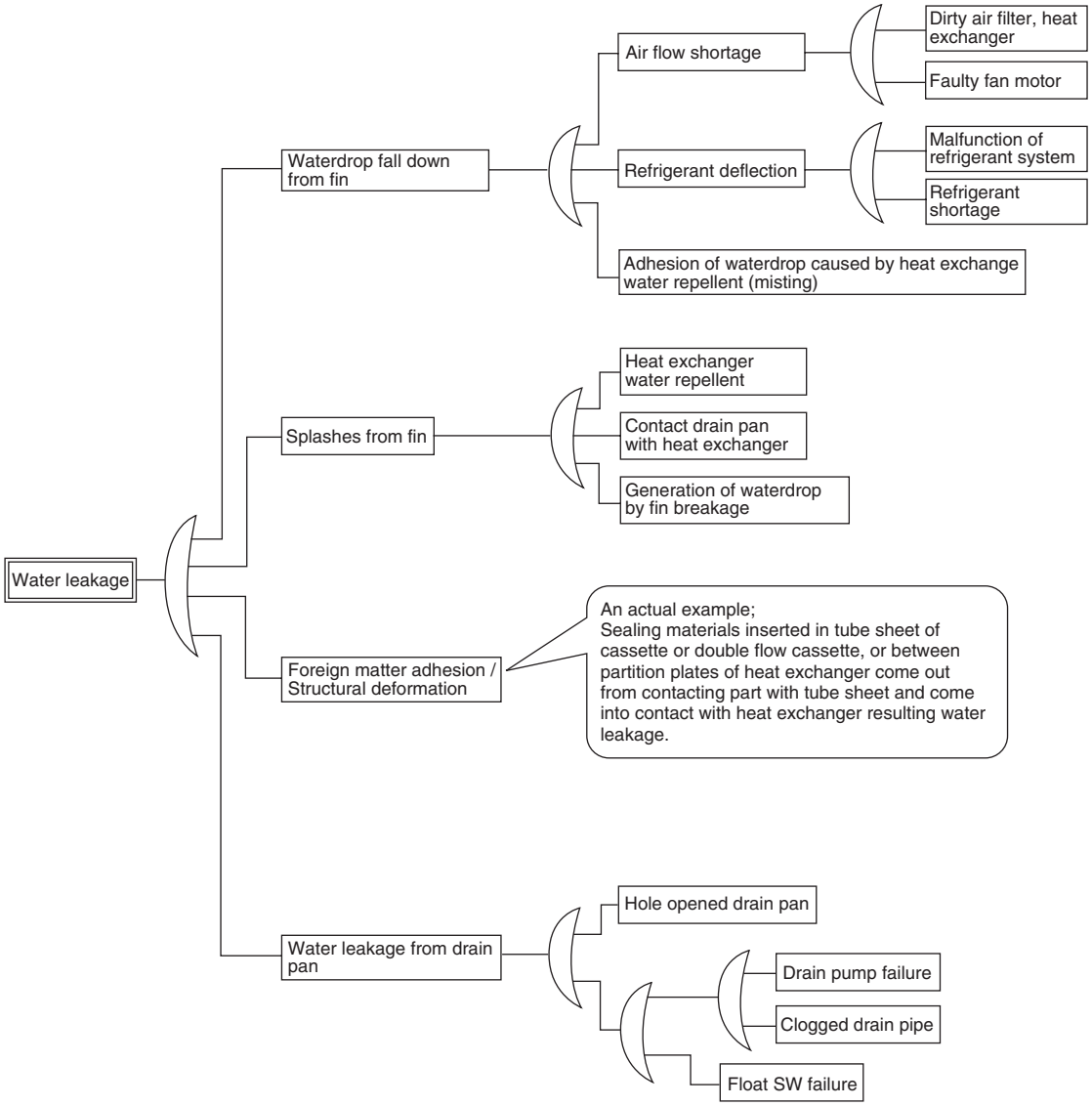
4.2 Actuation of HPS in Heating Operation



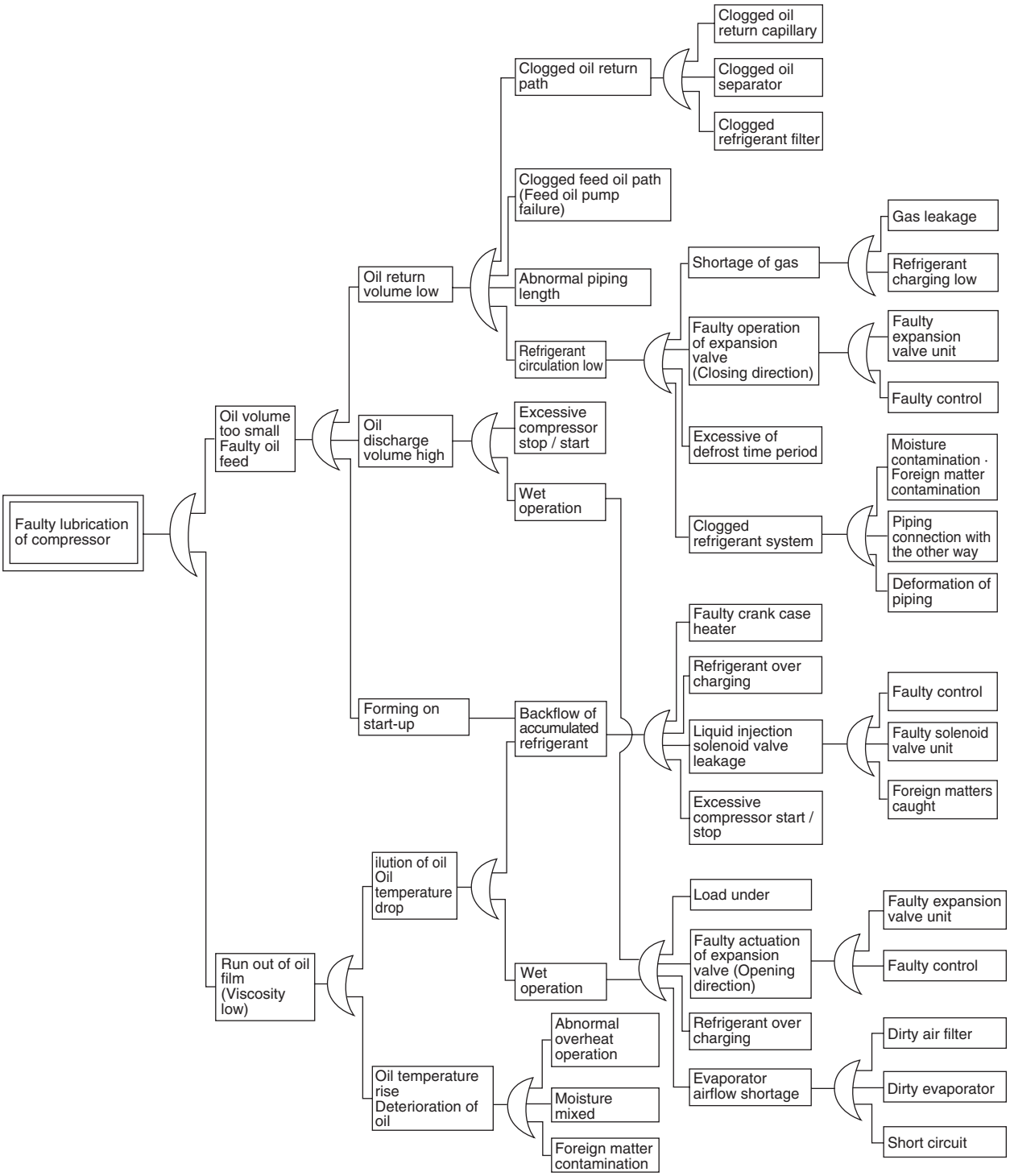
4.3 Abnormal Discharge Pipe Temperature in Cooling Operation



4.4 Water Leakage from Indoor Unit



4.5 Defective Lubrication of Compressor



5. List of Malfunction Code

Content code / Section code		0	1	2	3	4	5	6	7
Indoor	A	Malfunction of external protection device	PC board ass'y Faulty EEPROM setting		Malfunction of drain level control system			Fan motor locked	Malfunction of swing flap motor
	C					Malfunction of thermistor for liquid pipe (Faulty contact · Disconnection · Short circuit	Malfunction of thermistor for gas pipe (Faulty contact · Disconnection · Short circuit		
Outdoor	E	Actuation of protection switch (Batch)	PC board ass'y Faulty EEPROM setting		Actuation of high-pressure switch	Actuation of low-pressure switch	Inverter compressor lock	STD comopressor overcurrent · lock	Fan motor locked
	H				Faulty high-pressure switch	Faulty low-pressure switch			Malfunction of fan motor sensor
	F				Abnormal discharge pipe temperature			Refrigerant over charging	
	J	Malfunction of pressure sensor for discharge pipe	Malfunction of pressure sensor	Malfunction of current sensor for compressor	Malfunction of thermistor for discharge pipe	Faulty thermistor for low-pressure equivalent saturation temperature	Malfunction of thermistor for suction pipe	Malfunction of thermistor for air heat exchanger temperature	Malfunction of thermistor for liquid pipe (Liquid receiver)
	L	Faulty inverter cooling				Faulty inverter cooling	Motor for compressor ground fault. Short circuit. Power unit short circuit	Motor for compressor ground fault. short circuit	
	P		Imbalance in supplied voltage. Open phase		Malfunction of total capacity on indoor unit	Malfunction of power unit temperature sensor			
System	U	Low pressure drop due to refrigerant shortage or faulty electronic expansion valve	Reverse phase. Open phase	Malfunction of power supply voltage Instantaneous power failure Faulty inverter board or faulty contact of main board	Check operation not executed	Malfunction of transmission among indoor unit, BS unit and outdoor unit	Malfunction of transmission between remote controller and indoor unit		Malfunction of transmission between outdoor units
	M		Faulty centralized controller PC board						
Others	6					Malfunction of thermistor for indoor air (HRV)	Malfunction of thermistor for outdoor (HRV)		

8	9	A	H	C	J	E	F
	Malfunction of driving part of electronic expansion valve		Malfunction of dust collecting element		Malfunction of capacity setting		Abnormal drain
	Malfunction of thermistor for suction air (Faulty contact / Disconnection / Short circuit / Failure)	Malfunction of thermistor for discharge air (Faulty contact / Disconnection / Short circuit / Failure)			Malfunction of remote controller sensor		
	Malfunction of driving part of electronic expansion valve						
Malfunction of compressor 1 temperature sensor	Malfunction of thermistor for outdoor air temp.			Malfunction of sensor	Dry alert		
Malfunction of compressor temperature sensor							
Malfunction of thermistor for equalizing oil pipe	Malfunction of outlet thermistor for double pipe heat exchanger	Malfunction of pressure sensor for discharge pipe	Malfunction of oil temperature thermistor system	Malfunction of suction pipe pressure sensor		Malfunction of thermistor for cooling heat exchanger (Secondary side) Malfunction of thermistor for sub tank	Malfunciton of oil temperature thermistor system Malfunction of thermistor for heating heat exchange (Primary side)
Compressor overload · Motor wire cut for compressor	Compressor locked	Malfunction of power unit		Malfunction of transmission between inverter and control units			
Malfunction of transmission between main unit and sub remote controller (Malfunction of sub remote controller)	Malfunction of transmission among indoor unit of other same system, BS unit and outdoor unit	Faulty combination among indoor unit, outdoor unit, BS unit and remote controller Faulty setting	Faulty system	Duplication of centralized address		Malfunciton of transmission between indoor unit and centralized controller	System not set
Malfunction of transmission between centralized controllers		Faulty combination of centralized controller		Faulty central remote controller address setting			
Malfunction of HRV (Dust-collecting element of HRV)		Malfunction of damper system Malfunction of damper system + Malfunction thermistor (HRV)	Faulty door switch or relay connector (Dust collecting of HRV · Humidified unit)				Malfunction of simple remote controller

Malfunction Code Display by Outdoor Unit PC Board

Monitor mode

To enter the monitor mode, press the MODE button (BS1) when in "Setting mode" 1.

<Selection of Setting Item>

Press the SET button (BS2) and set the LED display to the setting item.

<Confirmation of malfunction 1>

Press the RETURN button (BS3) once to display "First digit" of malfunction code in LED.

<Confirmation of malfunction 2>

Press the SET button (BS2) once to display "Second digit" of malfunction code in LED.

<Confirmation of malfunction 3>

Press the SET button (BS2) once to display "master or slave 1 or slave 2" and "malfunction location" in LED.

Press the RETURN button (BS3) and switches to the initial status of "Monitor mode".

* Press the MODE button (BS1) and returns to "Setting mode 1".

Contents of malfunction		Malfunction code
Abnormal discharge pressure	HPS actuation	E3
Abnormal suction pressure	Abnormal Pe	E4
Compressor lock	Detection of INV compressor lock	E5
OC actuation	Detection of STD1 compressor lock	E6
	Detection of STD2 compressor lock	
Outdoor unit fan motor over load · over current · Abnormal lock of outdoor unit fan motor	Instantaneous over current of DC fan motor	E7
	Detection of DC fan motor lock	
Malfunction of electronic expansion valve	EV1	E9
	EV2	
	EV3	
Abnormal position signal of outdoor unit fan motor	Abnormal position signal of DC fan motor	H7
Malfunction sensor for outdoor temperature	Malfunction of Ta sensor	H9
Malfunction of sensor for thermal storage unit		HC
Abnormality in water system of thermal storage unit		HJ
Malfunction of transmission between thermal storage unit and controller		HF
Abnormal discharge pipe temperature	Abnormal Td	F3
Abnormal heat exchanger temperature	Refrigerant over charging	F6
Malfunction of current sensor	Malfunction of CT1 sensor	J2
	Malfunction of CT2 sensor	
Malfunction of sensor for discharge pipe temperature	Malfunction of Tdi sensor	J3
	Malfunction of Tds1 sensor	
	Malfunction of Tds2 sensor	
Malfunction of sensor for heat exchange pipe	Malfunction of Tg1 sensor	J4
	Malfunction of Tg2 sensor	
Malfunction of sensor for suction pipe temperature	Malfunction of Ts sensor	J5
Malfunction of sensor for heat exchange temperature	Malfunction of Tb sensor	J6
Malfunction of sensor for receiver temperature	Malfunction of Tl sensor	J7
Malfunction of sensor for oil pressure equalizing pipe temperature	Malfunction of To sensor	J8
Malfunction of sensor for subcooled heat exchanger temperature	Malfunction of Tsh sensor	J9
Malfunction of sensor for discharge pressure	Malfunction of Pc sensor	JA
Malfunction of sensor for suction pressure	Malfunction of Pe sensor	JC
Inverter radiation fin temperature rise	Over heating of inverter radiation fin temperature	L4
DC output over current	Inverter instantaneous over current	L5
Electronic thermal switch	Electronic thermal switch 1	L8
	Electronic thermal switch 2	
	Out-of-step	
	Speed down after startup	
	Lightening detection	
Stall prevention (Limit time)	Stall prevention (Current increasing)	L9
	Stall prevention (Faulty startup)	
	Abnormal waveform in startup	
	Out-of-step	
Malfunction of transmission between inverter and outdoor unit	Malfunction of inverter transmission	LC

Malfunc-tion code	Check of malfunction 1							Check of malfunction 2							Check of malfunction 3						
	LED1	LED2	LED3	LED4	LED5	LED6	LED7	LED1	LED2	LED3	LED4	LED5	LED6	LED7	LED1	LED2	LED3	LED4	LED5	LED6	LED7
E3	◑			●	●	◑	◑	◑			●	●	◑	◑	◑					●	●
E4								◑			●	◑	●	●	◑					●	●
E5								◑			●	◑	●	◑	◑					●	●
E6								◑			●	◑	◑	●	◑					●	◑
								◑			●	◑	◑	●	◑					◑	●
E7								◑			●	◑	◑	◑	◑					●	◑
E9								◑			◑	●	●	◑	◑					●	◑
															◑					◑	●
															◑					◑	◑
H7	◑			●	◑	●	●	◑			●	◑	◑	◑	◑					●	◑
H9								◑			◑	●	●	◑	◑					●	●
HC								◑			◑	◑	●	●	◑					●	●
HJ								◑			◑	◑	●	◑	◑					●	●
HF								◑			◑	◑	◑	◑	◑					●	●
F3	◑			●	◑	●	◑	◑			●	●	◑	◑	◑					●	●
F6								◑			●	◑	◑	●	◑					●	●
J2	◑			●	◑	◑	●	◑			●	●	◑	●	◑					●	◑
															◑					◑	●
J3								◑			●	●	◑	◑	◑					●	◑
															◑					◑	●
															◑					◑	◑
J4								◑			●	◑	●	●	◑					●	◑
																				◑	●
J5								◑			●	◑	●	◑	◑					●	●
J6								◑			●	◑	◑	●	◑					●	●
J7								◑			●	◑	◑	◑	◑					●	●
J8								◑			◑	●	●	●	◑					●	●
J9								◑			◑	●	●	◑	◑					●	●
JA								◑			◑	●	◑	●	◑					●	●
JC								◑			◑	◑	●	●	◑					●	●
L4	◑			●	◑	◑	◑	◑			●	◑	●	●	◑					●	●
L5								◑			●	◑	●	◑	◑					●	●
L8								◑			◑	●	●	●	◑					●	●
L9								◑			◑	●	●	◑	◑					●	●
LC								◑			◑	◑	●	●	◑					●	●

Contents of malfunction		Malfunction code
Open phase / Power supply imbalance	Imbalance of inverter power supply voltage	P1
Malfunction of temperature sensor inside switch box	Malfunction of thermistor for inverter box	P3
Malfunction of sensor for inverter radiation fin temperature	Malfunction of thermistor for inverter fin	P4
Faulty combination of inverter and fan driver	Incorrect combination of inverter and fan driver	PJ
Shortage of refrigerant	Shortage of refrigerant alert	U0
Reverse phase	Malfunction of reverse phase	U1
Abnormal power supply voltage	Inverter voltage shortage	U2
	Inverter open phase (phase T)	
	Malfunction of charging for capacitor in inverter main circuit	
Check operation not executed		U3
Faulty transmission between indoor units and outdoor units	Malfunction of I / O transmission	U4
Faulty transmission between outdoor units, faulty transmission between thermal storage units, duplication of CT address	Malfunction of O / O transmission	U7
Faulty transmission of other system	Indoor unit system malfunction in other system or other unit of own system	U9
Faulty field setting	Abnormal connection with excessive number of indoor units	UA
	Conflict of refrigerant type in indoor units	
Faulty system function	Incorrect wiring (Auto address malfunction)	UH
Faulty transmission in accessory devices, conflict in wiring and piping, no setting for system	Malfunction of multi level converter, abnormality in conflict check	UJ
		UF

Malfunction code	Check of malfunction 1							Check of malfunction 2							Check of malfunction 3						
	LED1	LED2	LED3	LED4	LED5	LED6	LED7	LED1	LED2	LED3	LED4	LED5	LED6	LED7	LED1	LED2	LED3	LED4	LED5	LED6	LED7
P1	◑			◑	●	●	●	◑			●	●	●	◑	◑					●	●
P3								◑			●	●	◑	◑	◑					●	●
P4								◑			●	◑	●	●	◑					●	●
PJ								◑			◑	◑	●	◑	◑					●	●
U0	◑			◑	●	●	◑	◑			●	●	●	●	◑					●	●
U1								◑			●	●	●	◑	◑					●	●
U2								◑			●	●	◑	●	◑					●	●
U3								◑			●	●	◑	◑	◑					●	●
U4								◑			●	◑	●	●	◑					●	●
U7								◑			●	◑	◑	◑	◑					●	●
U9								◑			◑	●	●	◑	◑					●	●
UA								◑			◑	●	◑	●	◑					●	●
UH								◑			◑	●	◑	◑	◑					●	●
UJ								◑			◑	◑	●	◑	◑					●	●
UF								◑			◑	◑	◑	◑	◑					●	●

☼:ON
◑:BLINK
●:OFF

Malfunction code 1st digit display section

Malfunction code 2nd digit display section

Master	●	●
Slave 1	●	◑
Salve 2	◑	●

Malfunction location

6. Operating Condition Check Sheet

Content of malfunction:

Service shop: Person in charge:

		Model name	Serial No.	System name, Installation site
Outdoor unit				
Indoor unit	No.1			
No. of unit connected unit(s)	No.2			
	No.3			
	No.4			
Capacity %	No.5			
	No.6			
	No.7			
	No.8			

Pipe length / Height difference	m/ m	Frequency of malfunction generated	/ time(s)
Time zone malfunction generated	About o'clock	Malfunction code	

Check item		Inspection method	Standard	Measured value No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	Check
Indoor data	Suction temperature	With remote controller No. 41										
	Discharge temperature	With thermometer										
	Liquid pipe temperature	With remote controller No. 41										
	Gas pipe temperature	With remote controller No. 41										
	Preset flow rate	With remote controller										
	MV opening degree	*										

Inspection item		Inspection method	Reference	Measured value	Check
Outdoor unit operation data	Power supply voltage	Measure voltage between each phase with tester (in operation)	Within ± 10 % of rated voltage No voltage drop	R-S V S-T V T-R V	
	Compressor operation capacity	Measure with clamp meter	—	INV Hz	
				STD1 ON / OFF	
				STD2 ON / OFF	
	High pressure	Measure with pressure gauge, service checker (After 20 minutes or later from operation start)	—	MPa	
	Low pressure	Measure with pressure gauge, service checker (After 20 minutes or later from operation start)	—	MPa	
	Liquid pressure	Measure with pressure gauge (After 20 minutes or later from operation start)	—	MPa	
	Outdoor air temperature	Measure with thermometer (Measure in the place receiving no influence of discharged air from outdoor unit)	In cooling; -5 to 43°C In heating; -15 to 16°C	°C	
	Suction / discharge air temperature	Measure with thermometer (Check on short circuiting) (Measure the maximum different temperature with outdoor.)	—	Suction °C Discharge °C	
	Discharge pipe temperature	Measure with surface thermometer or service checker	(Tc + 20) to 120°C Tc: Saturation temperature equivalent to high pressure	INV °C	
				STD1 °C	
				STD2 °C	
	Suction pipe temperature	Measure with surface thermometer or service checker (Measure in the place receiving no influence of injection)	Te + (2 to 20)°C Te: Saturation temperature equivalent to low pressure	°C	

Others
"Complains or requests from users, Operation conditions at the time of measuring (No. of thermostat ON units, etc.), Past record of malfunction, remedies executed, Comments, etc."

* Check on MV opening degree by using checker or remote controller with special setting.

E. Cases for Examination

1. VRV in General

1.1 Malfunction "E3" is Displayed in Cooling Operation.

Applicable Models

VRV Plus series (L unit)

Condition

Though an malfunction "E3 (abnormal high-pressure)" is sometimes displayed on the VRV Plus series (L unit) system, the same condition is not reproduced at the time of inspection (unintentional operation).

Cause

Electronic expansion valve of the STD outdoor unit 2, which must be opened fully during cooling operation, is malfunctioning. Since the valve is not opened, pressure for high-pressure use has exceeded and accutuated the high-pressure switch.

Measure

Recovers by replacing the electronic expansion valve drive coil of the STD outdoor unit 2.

Point of Diagnosis

When examining multiple outdoor units, do not inspect only the inverter outdoor units but inspect STD outdoor units 1 and 2.

1.2 Malfunction "F6" is Displayed during Check Operation in the Winter Season.

Applicable Models

RX(Y)(Q) ~ M (VRV II series)

Condition

A malfunction "F6" (overcharge of refrigerant) is displayed when a "check operation" is executed as a test operation under the condition of low outdoor temperature in the winter season.

Cause

Due to temporary refrigerant mixing into refrigerating oil, misjudgment is made when a "check operation" is executed under the condition of low outdoor temperature.

Measure

The condition completes by executing the "check operation" again.

Point of Diagnosis

Be sure to execute a "check operation" with the front panel closed. Or, misjudgment is made even if the outdoor temperature is low.

Conditions	Possible misjudgment
Low outdoor temperature	F6
High outdoor humidity	E3, E4. UF

1.3 Trial operation was Initiated but not Started with an Malfunction "LC" Displayed.

Applicable Models

RXYP ~ KJ and RXEP ~ KJ (VRV Plus series)

Condition

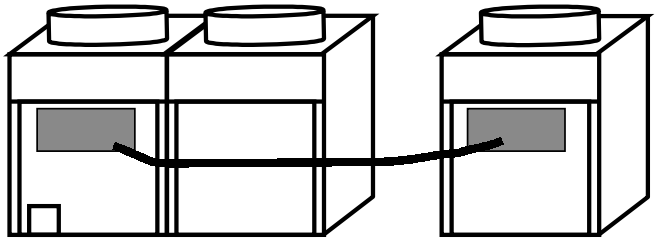
Test operation was initiated but not started with an malfunction "LC (transmission malfunction between the inverter PC board and the control PC board) displayed.

Cause

Accessory wire was not provided between the outdoor unit and the heat exchanger unit.

Measure

Completes by attaching an accessory wire.



Point of Diagnosis

The outdoor unit (master unit) and the heat exchanger (slave unit) must be connected not only with pipes but with wires.

1.4 After Replacement of the Control PC Board, Operation does not Start with an Malfunction "LC" Displayed.

Applicable Models

RXYP ~ KJ and RXEP ~ KJ (VRV Plus series)

Condition

After replacement of the control PC board, operation does not start with an malfunction "LC" displayed.

Cause

Operation was initiated without setting the horsepower.

Measure

Set the horsepower based on the service manual or information of repair of parts.

Point of Diagnosis

Setting the horsepower corresponding to the capacity of the model is needed after replacing the control PC board of VRV.
For setting methods, refer to the page 199 "4. Field settings for replacement of the spare control PC board" of the section "G. Appendix".

1.5 LED Display for Master/slave Judgment Malfunctions at the Time of Test Operation.

Applicable Models

RX(Y)(Q) ~ M (Outdoor unit multi system of VRV II series)

Condition

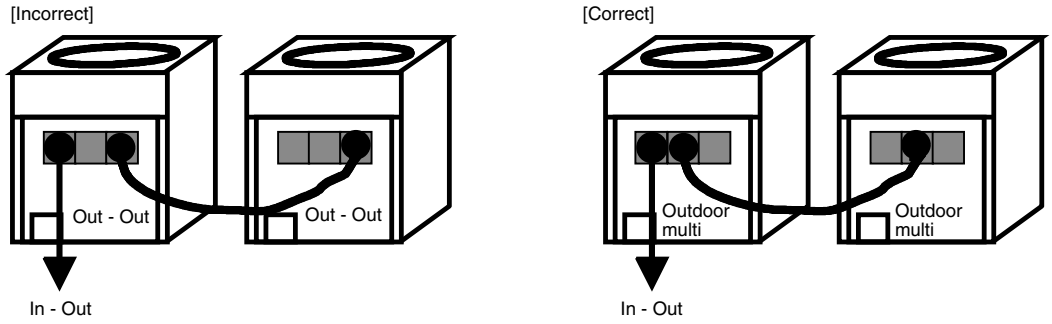
LED display for master/slave judgment remained to be turned off the test operation of the multi system of two VRV II units though the unit being connected to the indoor-to-outdoor unit connection wire should be judged as a master unit normally.
At that time, the same LED for the slave unit of outdoor multi connection was blinking.

Cause

Instead of connection of "outdoor multi terminals (Q1 and Q2)", "outdoor-to-outdoor (F1 and F2)" connection was being applied at the time of multiple operation.

Measure

Recovers by correcting the wire connections between outdoor units to "outdoor multi (Q1 and Q2)".



Point of Diagnosis

Select the method of connection of outdoor units from the following two methods, A and B.

A. Batch connection between outdoor units of different systems →Connect the "Out - Out terminals (F1 and F2)".
B. Multiple connection of the same system → Connect the "outdoor multiple terminals (Q1 and Q2)".

1.6 Cautions for Test Operation

Applicable Models

RX(Y)(Q) ~ M (VRV II series)

Condition

Though a test operation (check operation) in combination with the VRV II series outdoor unit had completed, an malfunction "E4 (abnormal low pressure malfunction)" or an malfunction "F3 (abnormal discharge pipe temperature malfunction)" occurred frequently after that.

Cause

Due to erroneous connection of wires and pipes, electronic expansion valve of the indoor unit does not open when only a single system is operated, which causes a faulty refrigerant circulation and results in a drop of pressure for low-pressure. Normal pressure is obtained by operating two systems simultaneously.

Measure

Issue a slip of request for modification work so that the erroneous connection of wires and pipes is corrected.

Point of Diagnosis

If a test operation (check operation) of multiple units of VRV II series is executed simultaneously, the test operation ends normally even if an erroneous connection exists. Be sure to execute a test operation (check operation) on an individual unit.
Check whether there is an erroneous connection if an malfunction "E4" or an malfunction "F3" generates on the existing equipment.

1.7 Cautions for Demand Control with Externally Controlled Adapter

Applicable Models

RX(Y)(Q) ~ M (VRV II series)

Condition

Demand control with an externally controll adapter attached to the VRV II series outdoor unit is desired.
Thermostat does not turn off though C and 3 were short-circuited i.e., demand level 3, after setting.

* Set items: Demand address 1 (Setting mode 2-2)
Externally controll ADP address 1
Demand setting change to ON from OFF (Setting mode 2-12)

Cause

Demand level setting (setting mode 2-30) remained to be the factory set value i.e., "70%".
It should be changed the setting to "60%" to turn OFF the thermostat by the short circuit between C and 3.

Measure

The thermostat turns OFF by changing the setting mode 2-30 to "60%".

Point of Diagnosis

Change of mode setting is needed in accordance with the purpose of use.
For setting methods, refer to the page 56 "2. Field setting on outdoor unit", of the section "C. Filed Settings from remote controller."

1.8 Malfunction Cooling Operation

Applicable Models

VRV in general (Type K or later models)

Condition

Different systems are used to air-condition the 1st floor and the 2nd floor.
Compared with the 1st floor, 2nd floor is not cooled down well. (Though the system for the 2nd floor operates normally, timing when its thermostat turns OFF is early compared with the one for the 1st floor.)

Cause

Since the remote controller's thermostat has been set to disabled after the setting of remote controller for the 2nd-floor system was changed during past inspection, ON/OFF switching is made according to the body-thermostat.
(It is set to "enabled" at the factory. Change of setting may have been made in the past inspection.)

Measure

Change the setting of remote controller's thermostat to enabled.

Point of Diagnosis

1.9 Malfunction Heating Operation

Applicable Models

VRV in general (Type K or later models)

Condition

If all thermostats are turned ON in heating operation, heating operation by the indoor units on the lowest floor (2nd floor) is not good.

Cause

Due to less pressure loss of pipes, refrigerant tends to circulate in the upper floors and not to flow to lower floors.

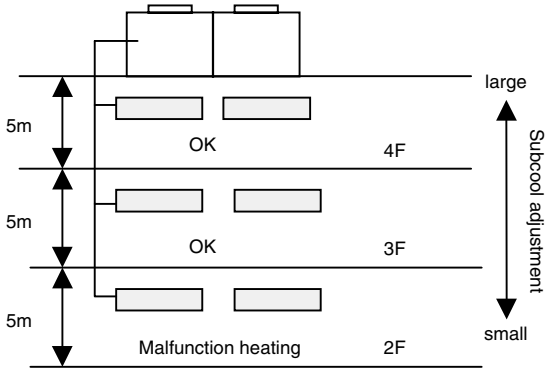
Measure

Make subcool adjustments for upper and lower floors, respectively. (Adjust to closing direction for upper floors and opening direction for lower floors.)
Request to adjust the thermostat setting for the upper floors to the rising direction.

* If needed, set to 0 PLS when the operation is stopped in the upper floors.

Point of Diagnosis

Using long pipes may cause a slight drop of capability due to pressure loss even if the piping length does not exceed the standard.



1.10 Inferior Insulation of the Compressor before Test Operation

Applicable Models	VRV in general
Condition	At the time of test operation, compressor was replaced since the insulation was found insufficient in the insulation measurement with the power not supplied.
Cause	Insulation at the terminal section inside the compressor dropped temporarily due to non-operational condition of liquid refrigerant accumulated inside the compressor.
Measure	Resolved by supplying power to the crank case heater for 6 hours.
Point of Diagnosis	Measure the insulation resistance of the compressor after supplying power to the crank case heater for 6 hours.

1.11 No Heating Operation is Available though Cooling Operation is Possible. (Fan only Operation Continues with no Malfunction Displayed.)

Applicable Models	VRV in general
Condition	Compressor for one of two systems failed three times. Noise is heard on the compressor another system.
Cause	Erroneous connection of wires and pipes.
Measure	Recovers by correcting the connection.
Point of Diagnosis	1. Operate a single indoor unit and check whether cold or hot air is obtained. 2. Operate also an another indoor unit. Then stop the 1st unit and check whether cold or hot blast is obtained. 3. Check the remaining units according to the above steps.

Note: Please note that, if an operation of another unit is initiated after stopping the 1st unit, the outdoor unit does not start for a while due to restart protection control.

1.12 Inverter Compressor Fails Three Times a Month

Applicable Models

VRV in general

Condition

Cause

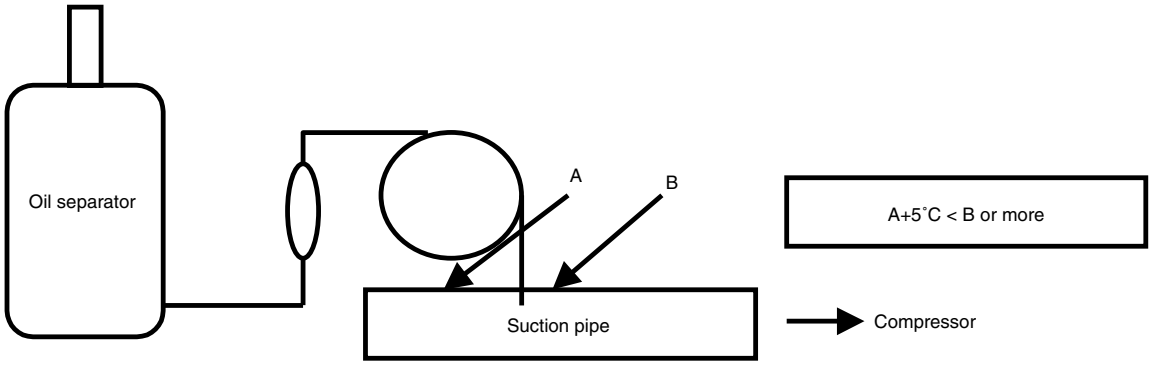
Due to foreign matters clogging between the oil separator and the filter, oil does not return to the compressor.

Measure

Recovers by replacing the refrigerant filter.

Point of Diagnosis

Measure temperature before and after the oil-returning capillary connection of the suction pipe and obtain the temperature difference. Check that the temperature difference is 5 degrees or more when the compressor operating frequency is stabilized.



1.13 Cooling Operation of Specific Indoor Units is not Good.

Applicable Models

VRV in general

Condition

Cooling operation of specific indoor units only is not good though remaining indoor units work well and reach the set temperature.
The pressure of the outdoor units for low-pressure use (evaporating temperature) has reached the target value.
Liquid pipe temperature of the faulty indoor units is 4 to 5°C and gas pipe temperature is 18 to 22°C.

Cause

Liquid pipe at the inlet of indoor unit was bent by hands and broken. It caused lacking in gas supply because essential refrigerant circulation amount was not secured for the indoor units.

Measure

Recovers by correcting the field piping.

Point of Diagnosis

1. Check the following:
   Make sure that the difference between thermistor temperature of indoor unit's gas pipe and thermistor temperature of liquid pipe is applox. 5°C.
   (Thermistor temperature of indoor unit's liquid pipe: 5 to 8°C; Thermistor temperature of gas pipe: 10 to 13°C)
2. Check whether the pressure of outdoor unit for low-pressure (evaporating temperature) is approx. 0.4 MPa.

1.14 Malfunction Heating Due to Overcharge of Refrigerant

Applicable Models

VRV in general

Condition

Inverter compressor only operates at low frequency. Discharge temperature of the indoor units is 25°C or less and thermistor temperature of the liquid pipe is approx. 30°C when it is monitored through the service mode of the indoor remote controller. The low-pressure at that time is around 0.2MPa.

Cause

Overcharged refrigerant.
Due to overcharge, refrigerant accumulates in the indoor unit. Under this condition, temperature of the heat exchanger itself drops though the high-pressure rises. In addition, rise of high-pressure causes rise of liquid pressure that results in minimum opening of the electronic expansion valve of outdoor units leading to the wet operation.
(The low-pressure at that time comes to be 0.2MPa due to minimum EV opening.)

Measure

Recovers by correcting the refrigerant to the specified amount.

Point of Diagnosis

1. Use a manifold gauge to measure the high-pressure side of the outdoor unit and the pressure of service port of the liquid-side stop valve. Then check that the difference between the pressure on the high-pressure side and the pressure of the liquid pipe (intermediate pressure) is approx. 0.2MPa or more.
   (Approx. 0.2-MPa differential pressure is required to secure the flow rate at the electronic expansion valve.)
2. Check whether the subcooling of each indoor unit is normal.
   Difference between the saturation temperature being equivalent to the high-pressure and the thermistor temperature of liquid pipe of each indoor unit is approx. 5 to 8°C
   (Liquid pipe temperature is normally approx. 38°C or higher.)

1.15 Inverter Compressor Fails in a Short Period.

Applicable Models

VRV in general

Condition

Inverter compressor for the specific outdoor unit fails due to faulty insulation.
Since seizure has occurred on the metal sliding section and remaining amount of refrigerant oil is proper, in terms of malfunction mode the failure has occurred by the refrigerant oil that was diluted through wet operation.

Cause

Detecting temperature of the gas pipe thermistor of outside air processing unit was 106°C being different from the specified resistance. It caused to fully open the electronic expansion valve mounted to the indoor unit and resulted in backflow of liquid.
(Indoor units of VRV set to stop operation after completion of the day's work, however, the outside air processing unit set to operate around the clock.)

Measure

Recovers by replacing the EV drive section of the outside air processing unit.

Point of Diagnosis

1. Use a service checker type III and check whether the superheated degree control of the indoor unit is normal.
2. If the above checker is not available, use a remote controller to check.
   (When replacing the compressor, locate the cause of fault of the compressor.)

1.16 Heating Operation of All Indoor Units is Faulty.

Applicable Models

VRV in general

Condition

Heating operation of all indoor units is faulty though the operating capacity of indoor units is small and all units are operating.
However, high-pressure of the outdoor units has reached the target value of 1.7MPa and stabilized.
Temperature of liquid pipe and the one of gas pipe of indoor units are equivalent to indoor temperature.

Cause

High-pressure gas flowed into the receiver due to leakage of the check valve in the receiver gas releasing circuit. It caused the rise of liquid pressure and eliminated the differential pressure from the high-pressure. Consequently the liquid accumulated due to improper amount of circulating refrigerant at the electronic expansion valve of indoor unit and drop in discharge air temperature occurred.

Measure

Recovers by replacing the corresponding check valve.

Point of Diagnosis

1.17 Faulty Heating.

Applicable Models

VRV in general

Condition

During heating operation with the ceiling mounted built-in type indoor units, cold air was blasted sometimes causing draft. High-pressure had reached the target value and was stabilized, the discharge air temperature of indoor unit was approx. 40°C, and same condition was not reproduced during inspection of the unit.

Cause

Drop of temperature in discharge air due to indoor unit's capacity control. (Temperature set by the remote controller was as low as 22°C.)
In order to prevent hunting of indoor temperature due to ON/OFF switching of thermostat, VRV uses an electronic expansion valve mounted to the indoor unit to control the flow rate (capacity control) of refrigerant. In heating operation, if the temperature of suction air of indoor unit closes to the temperature set by the remote controller, capacity (flow rate of refrigerant) is adjusted by closing the opening degree of the electronic expansion valve. Therefore, if the temperature of liquid pipe of indoor unit drops and subcooling degree increases, the temperature of blow-out air drops simultaneously.

Measure

Explain that it results under the normal control.

Point of Diagnosis

1. Check whether the condensation temperature (high-pressure) has reached the value around the target value of 1.7MPa during the heating operation.
2. Check whether the capacity of indoor unit is not being controlled (the difference between the temperature of suction air and set value).

1.18 Outdoor Unit of the Cooling Only Model Operates with Heating Operation Displayed.

Applicable Models

VRV in general

Condition

Outdoor unit started operation when operation is initiated with the heating operation displayed in the local remote controller.
In addition, since the corresponding unit had an optionally installed hot water coil, the coil froze and burst.

Cause

Erroneous connection of cooling / heating select circuit of remote controller (connected between A and C instead of B and C).
The outdoor unit has a single cooling circuit basically. Therefore, even if heating operation is displayed in the remote controller, no switching of the refrigerant circuit is made and the outdoor unit starts cooling cycle with heating operation displayed.
(If a cooling / heating select remote controller is attached, priority is given to the outdoor unit.)
As a result, liquid refrigerant flows into the indoor side and remaining water in the hot water coil freezes with the pump stopped.

Measure

Recovers by correcting the wiring of the cooling / heating select remote controller.
If a heating operation is displayed in the cooling only model, confirm the terminal connection section of the cooling / heating select remote controller of the outdoor unit.

Point of Diagnosis

1.19 High-pressure Shutdown Occurs only When the STD Compressor Starts.

Applicable Models

VRV in general

Condition

High-pressure rises abnormally and the high-pressure shutdown results when the STD compressor starts during cooling operation.
(High-pressure tends to be higher even in the operation of inverter compressor only.)
Temperature of heat exchanger thermistor of outdoor unit was found being equivalent to the outdoor temperature when data was collected by using the service checker type III.

Cause

liquid-side stop valve was not fully open.
(The staff considered it was fully open when inspected.)

Measure

Recovers by fully opening the stop valve.

Point of Diagnosis

Check whether the detecting temperature of heat exchanger thermistor is close to the saturation temperature being equivalent to the high-pressure.
[Be sure to check all basic items like liquid-side stop valve and electronic expansion valve.]

2. Indoor Unit Related Examples

2.1 Temperature is not Displayed on the Central Controller.

Applicable Models	FXMQ125MF + controller
Condition	Though the FXYMP140MF (outside air processing unit) was built in the control range of the centralized controller, no temperature is displayed on the centralized controller. Temperature is displayed on the remote controller.
Cause	Since the outside air processing air conditioner is controlled based on the discharge air, set temperature of the discharge air is displayed on the remote controller. (Type M or later models) Therefore, temperature is not displayed on the centralized controller due to the difference in meaning of set temperature compared with the normal indoor units.
Measure	Explain that the contents of display are normal.
Point of Diagnosis	

2.2 Water Leakage from the Ceiling Duct

Applicable Models

FXYMJ140KC + Optional humidifier (Japanese Domestic case)

Condition

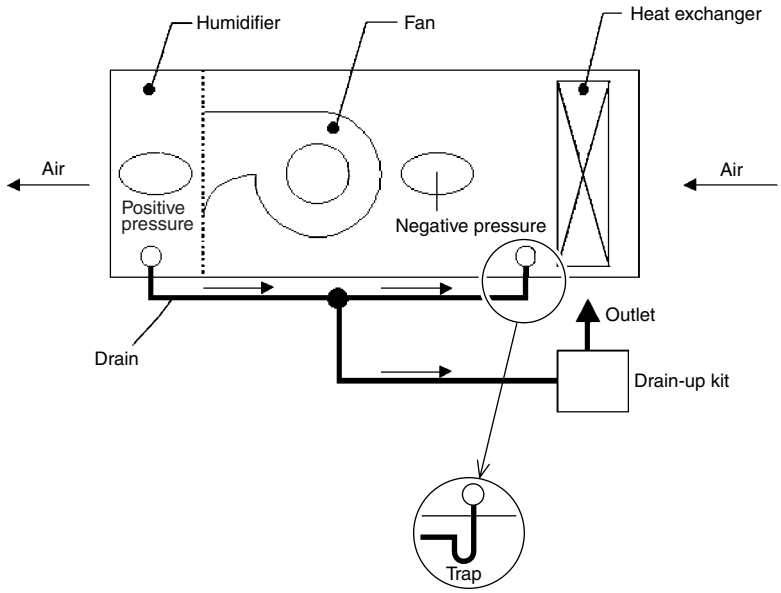
Indoor unit with ceiling duct +Natural evaporation type humidifier + High-lift drain-up kit
Water leakage occurs when the power of (FXYMJ140KC) and (KNMJ30L140) indoor units is shut off.

Cause

Drain from the equipment and the one from the humidifier are designed to flow together to the drain-up kit and the drain-up kit is designed to operate when voltage is applied. However, the drain flows back and is not drained completely during operation due to negative pressure on the equipment side and the drain rushes to the drain-up kit when the operation is stopped. Since the drain-up kit does not operate when the power is shut off, water leakage occurs.

Measure

Install a trap to the drain on the equipment side.



Point of Diagnosis

3. Malfunction of Transmission Examples

3.1 [Malfunction of Transmission Examples] Display of Malfunction of Transmission due to the Elevator's Power Line

Applicable Models	VRV in general
Condition	A malfunction "UE" is issued at random. It continues to be generated maximum 30 seconds. Transmitted waveforms were checked to be distorted for a period of approx. 10 seconds on site.
Cause	Out-Out transmission line had been laid next to the high-voltage line of the elevator.
Measure	Request to correct wiring.
Point of Diagnosis	

3.2 [Malfunction of Transmission Examples] Malfunction of Transmission due to Wiring next to the High-voltage Line for Indoor Unit

Applicable Models	VRV in general
Condition	A malfunction "U4" sometimes occurred on the specific system. Its cause was not located though the transmission waveforms on the outdoor unit side were checked.
Cause	Waveforms on the indoor unit side were checked. The wiring on the indoor unit side had been laid next to the high-voltage line.
Measure	Keep the wiring of indoor unit away from the high voltage line.
Point of Diagnosis	

3.3 [Malfunction of Transmission Examples] Faulty Condition to Multi-core Wire

Applicable Models

VRV in general

Condition

Cause

According to the wiring company, two-core lines were to be used as transmission line. However, multi-core lines are used actually. There was also a case where two cores out of four cores were being used for power supply.

Measure

Request to correct the wiring.

Point of Diagnosis

3.4 [Malfunction of Transmission Examples] Faulty Condition Caused by the Use of Single-core Line

Applicable Models

VRV in general

Condition

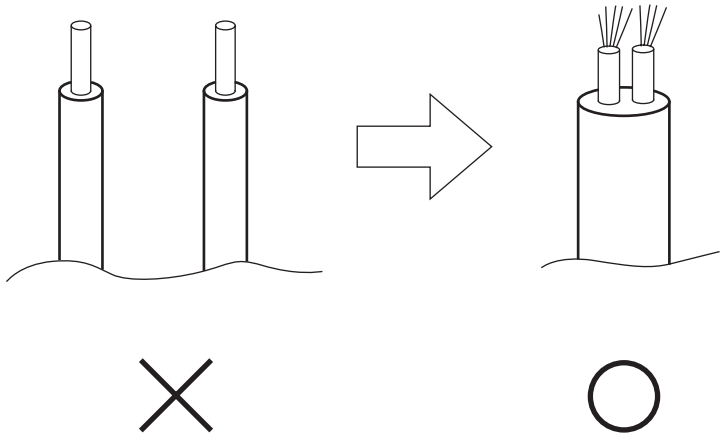
Cause

A malfunction "U4" is issued due to a single-core line used as a transmission line.

Measure

Changed to the VTCF two-core line.

Point of Diagnosis



3.5 [Malfunction of Transmission Examples] "Under Centralized Control" is Displayed on the Individual Remote Controller.

Applicable Models	VRV in general
Condition	"Under central control" is displayed on the individual remote controller and operation by the remote controller is disabled.
Cause	T1 and T2 terminals on the indoor side had been short-circuited by mistake.
Measure	The short circuit line was removed. Before taking measures, check the condition because the forced stop input may have been wired intentionally based on the facility conditions on site.
Point of Diagnosis	

3.6 [Malfunction of Transmission Examples] An Malfunction "U4" is Issued.

Applicable Models	VRV in general
Condition	
Cause	DIII-NET adapter was installed on the indoor-to-outdoor line. An malfunction "U4" is displayed on the individual remote controller though operation through the centralized controller is possible.
Measure	Corrected so that the DIII-NET expander adapters installed on the outdoor-to-outdoor line.
Point of Diagnosis	

3.7 [Malfunction of Transmission Examples] A Malfunction "UE" is Sometimes Issued.

Applicable Models	Heat recovery VRV system
Condition	
Cause	One BS unit in the system was oscillating.
Measure	Completed by mounting a DIII-NET expander adapter.
Point of Diagnosis	

3.8 [Malfunction of Transmission Examples] Faulty Condition Caused by Branch Lines.

Applicable Models	VRV in general
Condition	A transmission malfunction occurred when the centralized controller was added to the existing system.
Cause	Ten of all indoor-to-outdoor lines were branch lines from a single bus cable.
Measure	Corrected IN - OUT wiring to one - after another wiring
Point of Diagnosis	

F. Service Checker Type3 Application Edition

This Edition provides a summary of collecting operation data and further processing and making effective use of excel data after the collection.
For the detailed handling methods such as the operation of SERVICE CHECKER TYPE3, refer to information in the Instruction Manual.

1. List of Applicable Models of TYPE3

1.1 VRV Multi Systems (R410A/R407C/R22)

Connection	D3	D3-NET connection	Soft. Ver.	Support software version (A blank is Ver. 1.03 or before it.)
	PCB	PCB connection		

VRV series-HFC			Connection		Soft. Ver.
Type		Model	D3	PCB	
R410A					
VER II “M” series	Heat Pump	RXYQ5-48M (Y1)	0		1.07
	Heat Recovery	REYQ5-48M (Y1)	0		1.08
R407C					
VRV “K” series	Heat Pump	RSXYP5-10K(JY1)	0	0	
	Heat Recovery	RSEYP8-10K(JY1)	0		1.04a
VRV plus series	Cooling Only	RSXP16-30K(Y1)	0		1.06
	Heat Pump	RSXYP16-30K(JY1)	0		1.05
	Heat Recovery	RSEYP16-30K(JY1)	0		1.06
VRV “L” series	Heat Pump	RSXYP5-10L(JY1, Y1, YL)	0		1.06

VRV series-R22			Connection		Soft. Ver.
Type		Model	D3	PCB	
VRV “G” series	Cooling Only	RSX8G, 10G(Y1, YAL)		0	
	Heat Pump	RSXY5-10G(Y1, YAL)		0	
	Heat Recovery	RSEY8G, 10G(Y1)		0	
VRV “H” series	Cooling Only	RSX5-10H(Y1)		0	
	Heat Pump	RSXY5-10H(Y1, YAL, TAL)		0	
VRV “K” series	Cooling Only	RSX5-10K(Y1, TAL)	0	0	
		RSX5-10K(UY1)	0	0	
	Heat Pump	RSXY5-10K(Y1, YAL, TAL)	0	0	
		RSXY5-10K(7W1)	0	0	
	Heat Recovery	RSEY8-10K(Y1)		0	
		RSEY8-10KL(Y1)	0		1.04a
VRV plus series	Cooling Only	RX16-30K(Y1, YAL) (C unit)	0	0 *1	
	Heat Pump	RXY16-30K(Y1, YAL) (L unit)	0	0 *1	
		RXY16-30KA(Y1, YAL)	0		1.05
	Heat Recovery	REY16-30K(Y1) (R unit)	0	0 *1	
	Condenser Unit	RXE2-3KVAL *2	0		1.04b
VRV II “M” series	Cooling Only	RX5-48M(Y1)	0		1.07
	Heat Pump	RXY5-48M(TL, YL)	0		1.07
VRV system for Hi-outdoor temp. use		RSNY8KTAL	0	0	

*1 Connect to a functional unit.
*2 VRV Plus (Cooling only, Heat pump) for high outdoor temperature use up to 50degC. Condenser Unit.
*3 On VRV II heat recovery series, outdoor unit data is split off into common and individual sections. Consequently, two units of icons are displayed even for a single outdoor unit. If two or more outdoor units are included in the system, icons for s single outdoor unit + Another one unit will be displayed.
*4 Be aware that, on models equipped with D3-NET for the transmission system between indoor and outdoor units, data on indoor units changes at intervals of several minutes.
*5 “E: Resistant to salt damage”, “G: Resistant to serious salt damage”, or “Y: Export voltage”, which is the suffix on a model name, is omitted.
*6 With D3-NET connected, be aware that this Service Checker cannot be used in combination with “Remote control adapter” or “Individual use of schedule timer”.

*7 On indoor units with a PC board replaced by a spare PC board in D3-NET connection, there may be cases where the model name is displayed in “HiVAV System”. Since this is a correct display, however, use these indoor units as it is.
*8 Connect any model of VRV Plus series to applicable function units or cooling plus units.
*9 If the Service Checker is connected to the PC board, information on indoor units will be integrated into a single indoor unit of data. On the Network Map Display window , only a single indoor unit of icon is displayed.

2. What Service Checker Can Do

1. **The Service Checker makes it possible to make the pass/fail judgment on and check the performance of functional parts in the following cases.**
   (Thermistor, pressure sensor, solenoid valve, and four-way valve)
   - You should know temperature (or pressure) detected by the thermistor (or pressure sensor):
   - You should check whether or not there is a difference between the temperatures measured and detected:
   - You should check to be sure instructions to energize the solenoid valve (four-way valve) are provided:
   - You should check to be sure the solenoid valve (four-way valves) operates according to instructions provided from the control unit:

2. **The Service Checker Operations makes it possible to check the operating conditions of each operation control in the following cases.**
   (Operation mode, stepping down/protective control, and retry control)
   - You should know to what operation mode (i.e., cooling or heating mode) the equipment is set:
   - As the compressor operating frequency does not increase, you should check whether any stepping down control is in progress.
   - As the equipment repeats ON-OFF operations, you should check whether any retry control is in progress.

3. **The Service Checker makes it possible to check the conditions of and operate indoor units in the following cases.**
   (The Service Checker Type3 enables the operation equal to that accomplished with centralized controllers: With DIII-NET connected.)
   - You are able to check whether the compressor operating frequency is set to low or the number of indoor units with thermostat turned ON is less than required.
   - Even though you are unable to enter the room due to the customer's convenience, you are able to check the performance data of indoor unit.
   - You should increase the number of indoor units to be operated or the set temperature.

4. **The Service Checker enables the simultaneous collection of data on multiple systems in the following cases: With DIII-NET connected.**
   - You should make a data comparison between defective systems and normal systems.
   - You should collect data in a lump at the time of maintenance.

5. **The Service Checker enables the collection of DIII data (transmission data) in the following cases: With DIII-NET connected.**
   - You are not able to rectify the malfunctions in transmission. Therefore, you should check the transmission data.

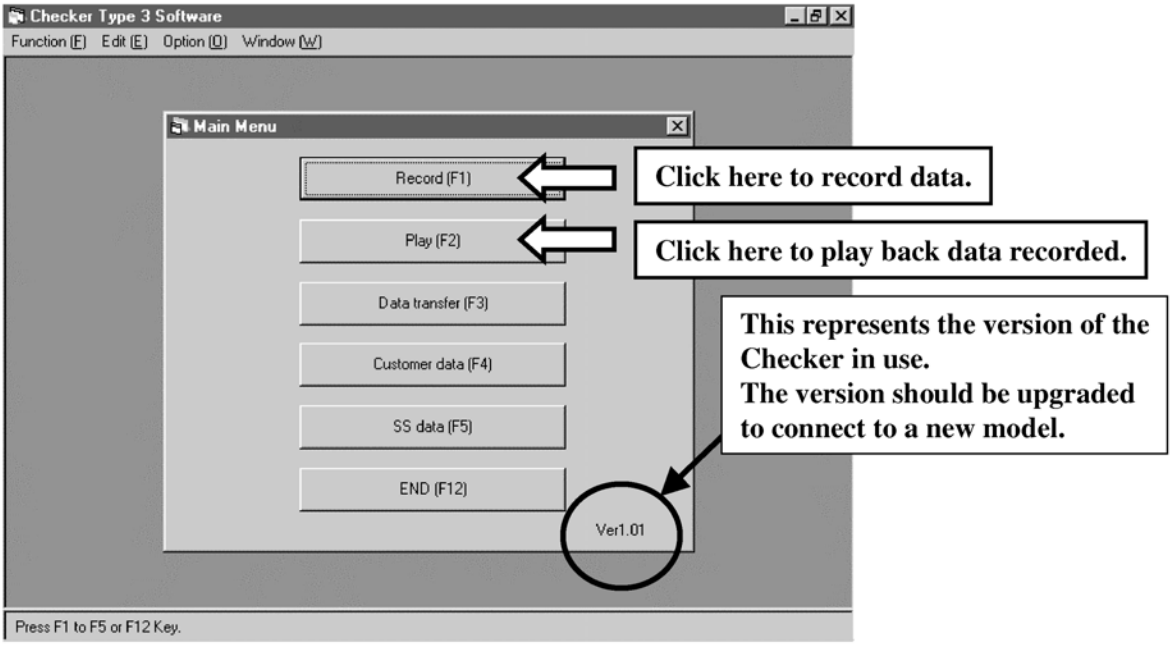
6. **The Service Checker enables troubleshooting in places other than on site through saving and verifying data collected, in the following cases.**
   - As you were able to rectify failures on site, you should check the data when you get back to office.
   - You should present the data as information to be appended to a report for the customer.

To Conduct Analysis

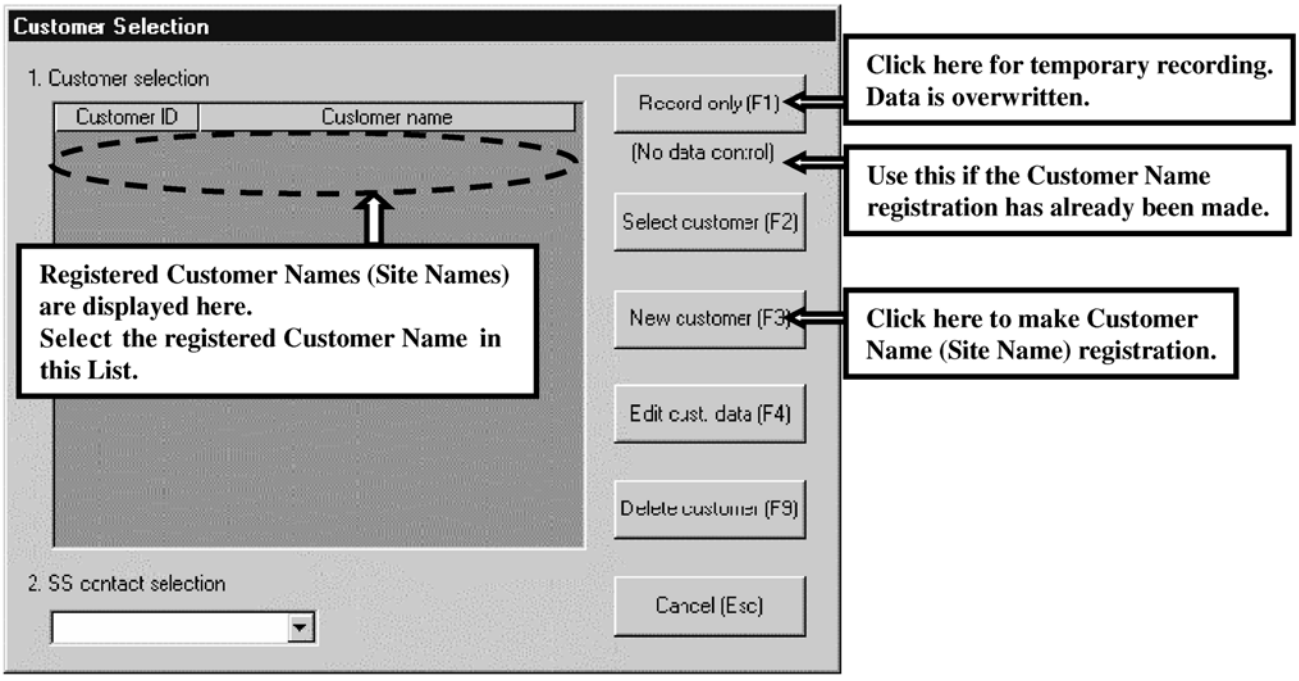
If you collect or analyze data on the Service Checker:

- **First of all, make the pass/fail judgment on functional parts.**
  For accurate data collection, be sure to check the functional parts for any problem.
  Case example: Even though the thermistor showed a normal value at an ambient temperature, the detection data got out of order with increasing temperature.
  (Particularly, in order to collect data on products manufactured in many years ago, give consideration to the case example aforementioned.)
- **Focus much attention on the quotient of "Condensing temperature / Evaporating temperature" rather than that of "High pressure / Low pressure".**
  The Service Checker expresses the quotient of "High pressure / Low pressure" in a value through converting the quotient into the pressure equivalent saturation temperature and uses it as the target value for the capacity control. Therefore, it is immediately obvious whether or not the target temperature is achieved.
- **Check "each stepping down and protective control" for the operating conditions and look at why this control is performed.**
  Each stepping down and protection control is used to ensure reliability, not to protect malfunctions.
  For example, do not determine that "the system does not cool (or heat) due to the activation of the control". Verify why the control is activated, referring to other data.
- **Are "discharge superheated degree and suction superheated degree" kept at proper levels, respectively?**
  Most of malfunctions in compressors result from "wet operation". Referring to the diagnosis procedure on the preceding page, check to be sure the discharge and suction superheated degrees are kept at proper levels.
- **Data on indoor units**
  Data on temperatures and motorized valve opening degrees of indoor units are updated every five minutes. By contrast, data on outdoor units are updated earlier than that. As a result, even though data on outdoor units are able to be collected, the data on indoor unit is not synchronized with that while in malfunction. (Performance data and ON/OFF operation data are updated on an as-needed basis.
  In order to verify the data on indoor units, be sure to give consideration to the said point.

* The time to store data in the Service Checker follows the PC clock.
  Before using the Service Checker, be sure to set the PC clock to the real time.

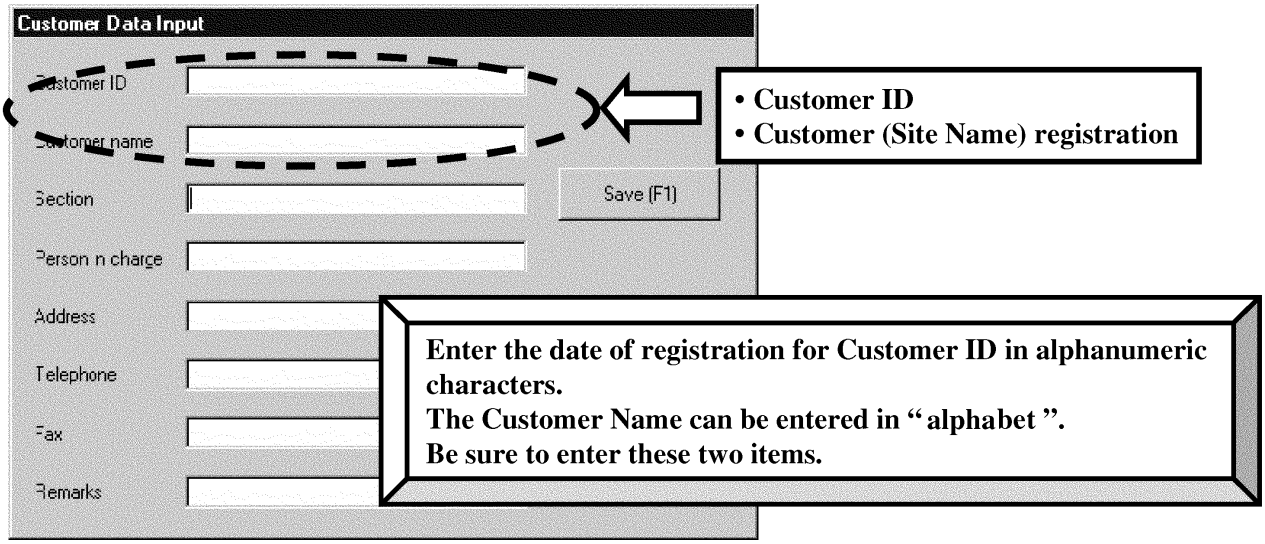


Procedure Select and click an applicable item on the main menu.



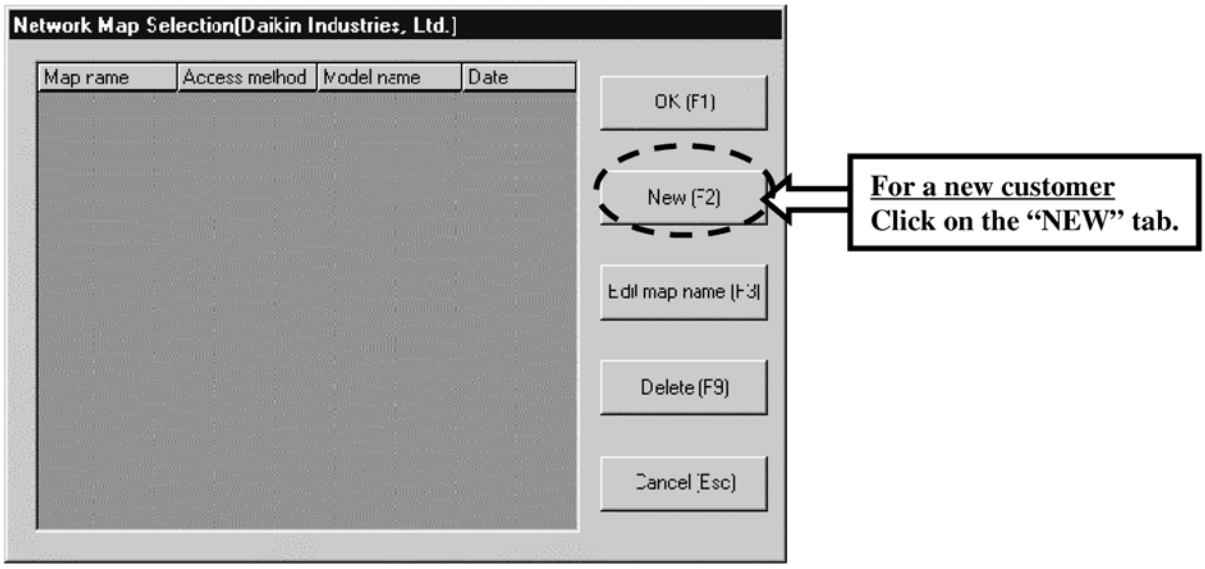
Procedure Click on the Customer Name (Site Name) registration tab.

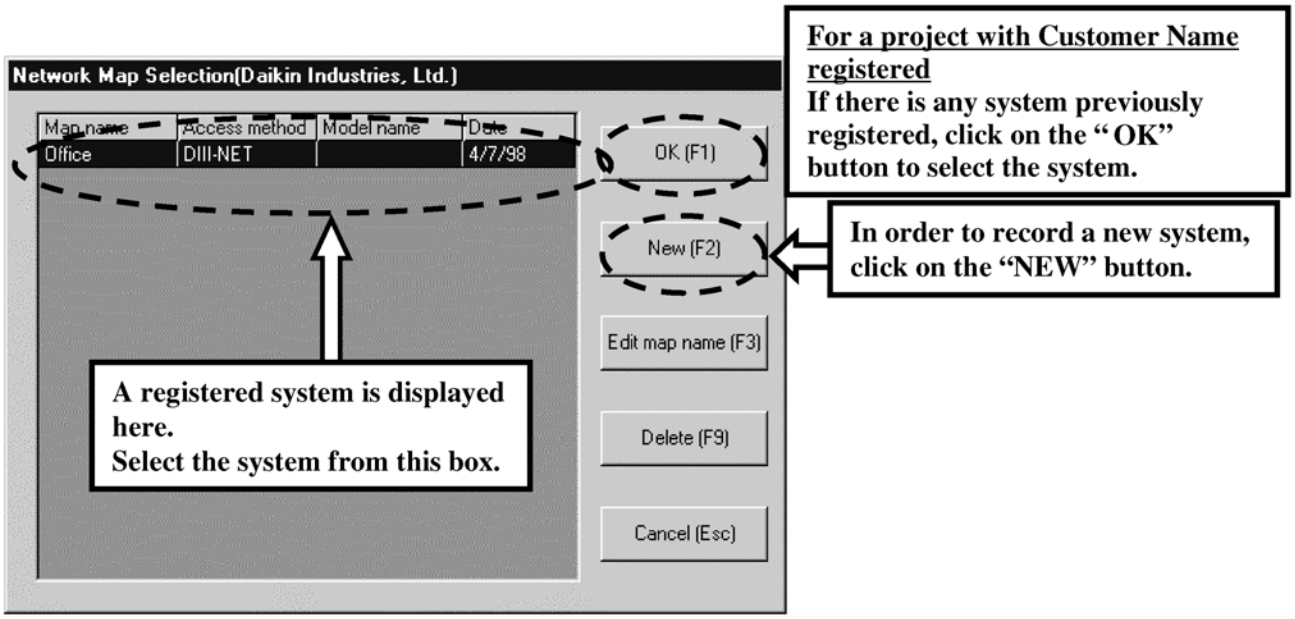
- If the Customer Name registration has been made, click on the "Select customer" and select a Customer Name in the list displayed on the window.



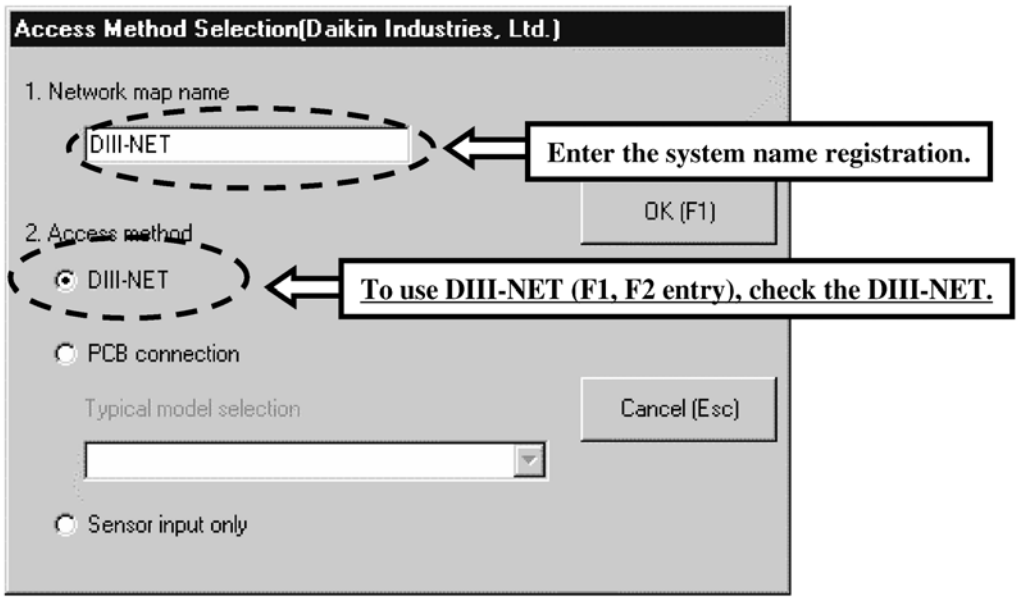
Procedure Register the Customer ID and Customer Name (Site Name).

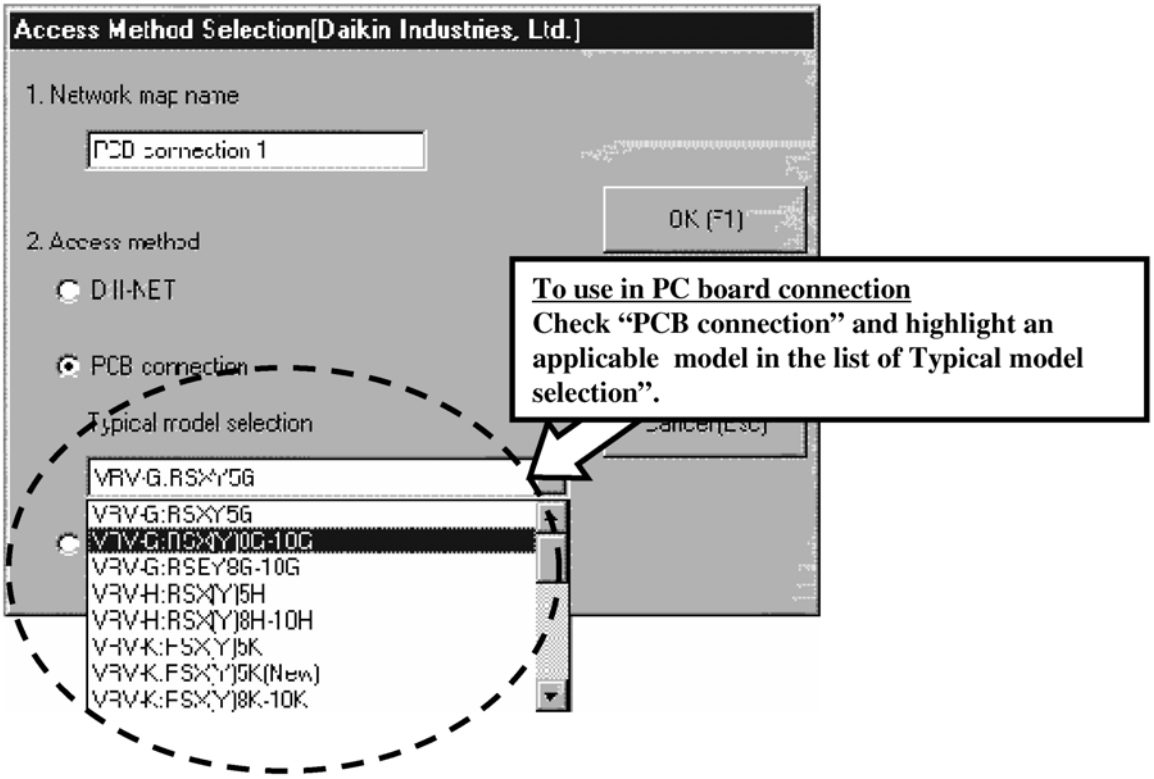
- For the registration, only enter the Customer ID and Customer Name. For any other items, enter them as needed.





Procedure Register the system.
Select menu "For a new customer" or "For a project with Customer Name registered".

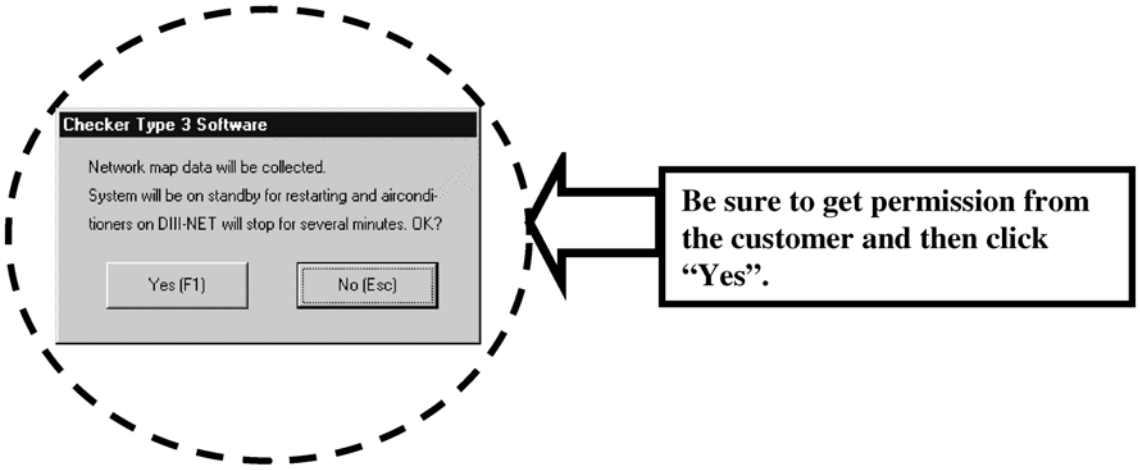




Procedure

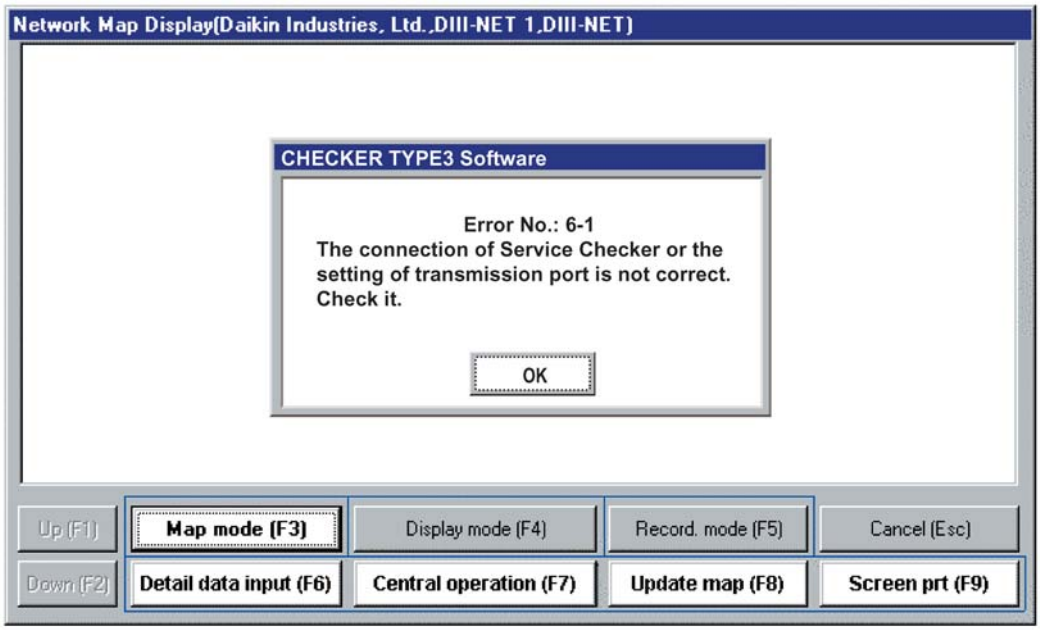
Select the method of registering and connecting systems.
Enter the "System Name" and then select the "Connecting Method".

- For the connecting method, check either "DIII-NET" or "PCB connection".



If you attempt to record data through the use of DIII-NET (F1, F2 connection), the warning above will appear on the window.
In this case, clicking on the "Yes" will stop all systems connected to the DIII-NET for a period of several minutes, which has ever resulted in a claim regarding the server room of hospital.

- If the Checker is connected to any other systems via Outdoor-Outdoor transmission besides the system of outdoor units connected, these other systems will go into "Restart standby (forced thermostat OFF)" mode.
- After the completion of "Restart standby" mode, the systems will be automatically reset, thus returning to operation prior to the standby.
- In the case of PCB connection, the systems will never go into "Restart standby" mode.



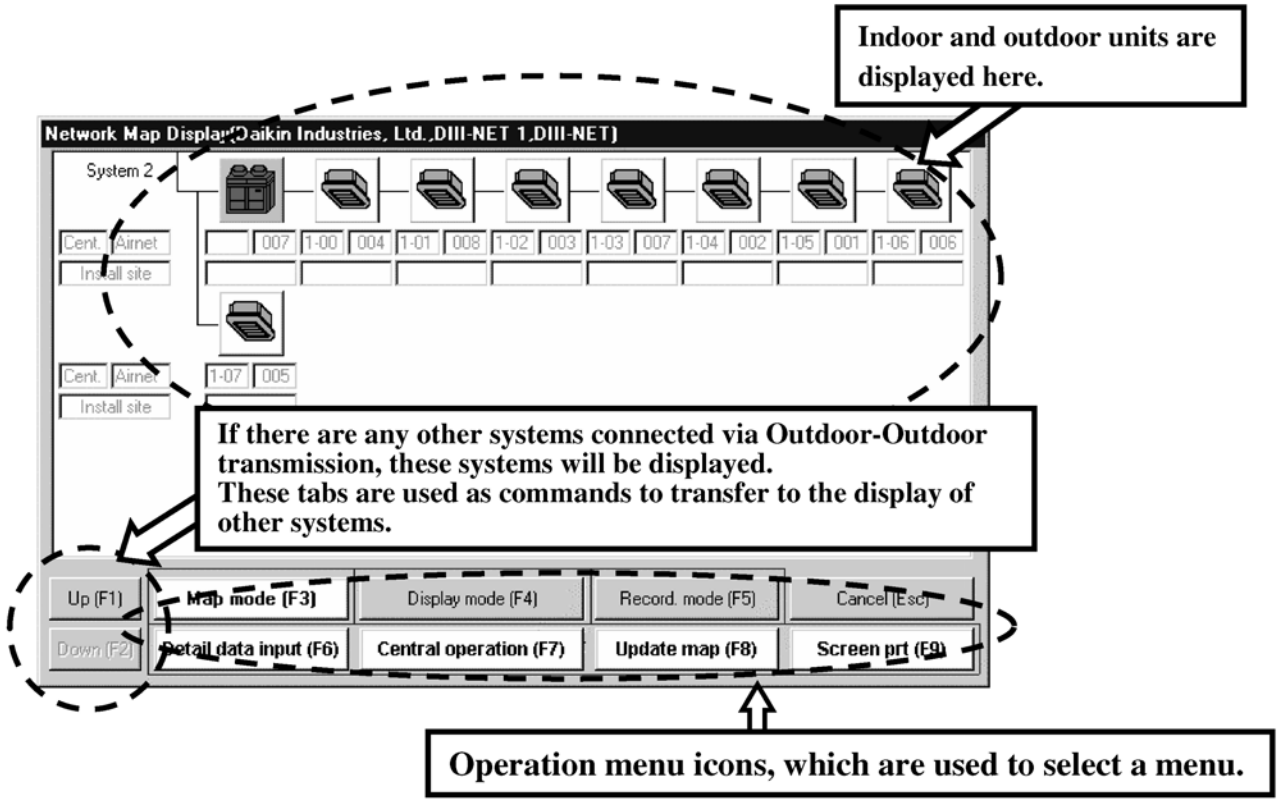
Even tough all settings have been made and the window has been switched, if no data is read and the above error is displayed on the window, the following causes will be supposed.

- "F1 and F2" is not well connected,
- PC board is not properly connected, or
- The Checker is not power ON.

Therefore, check to be sure the above connections or else.

3. Recording and Playback of Operation Data

3.1 Menu Window (Map Mode)

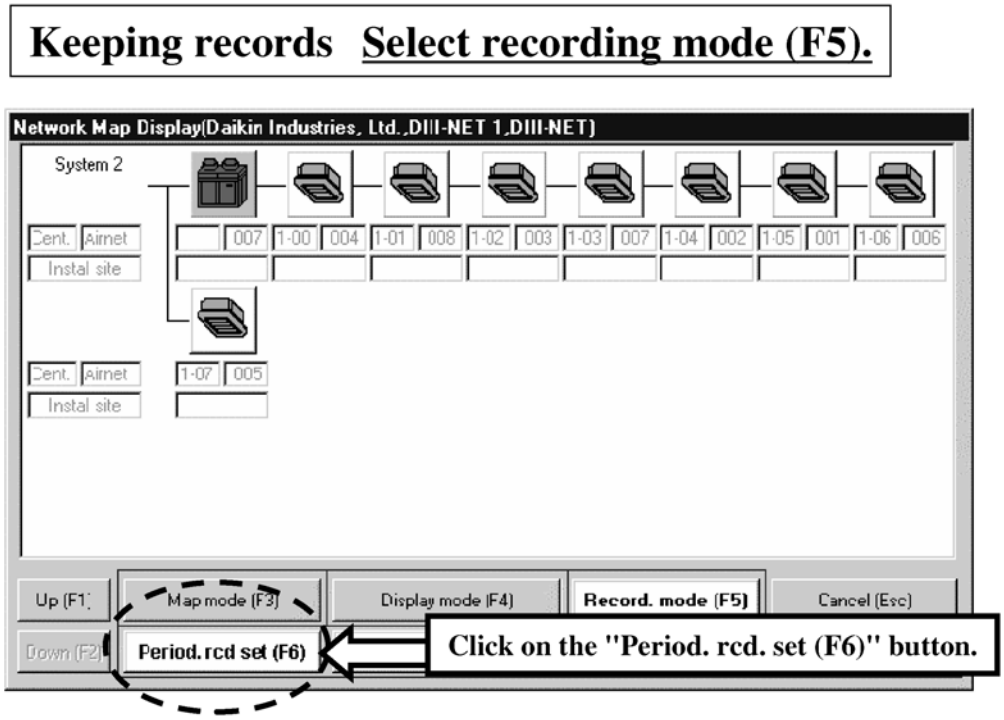


If the units are properly read, the above window will appear.

- If the above window appears, select an operation to be conducted on the menu icons.

Caution

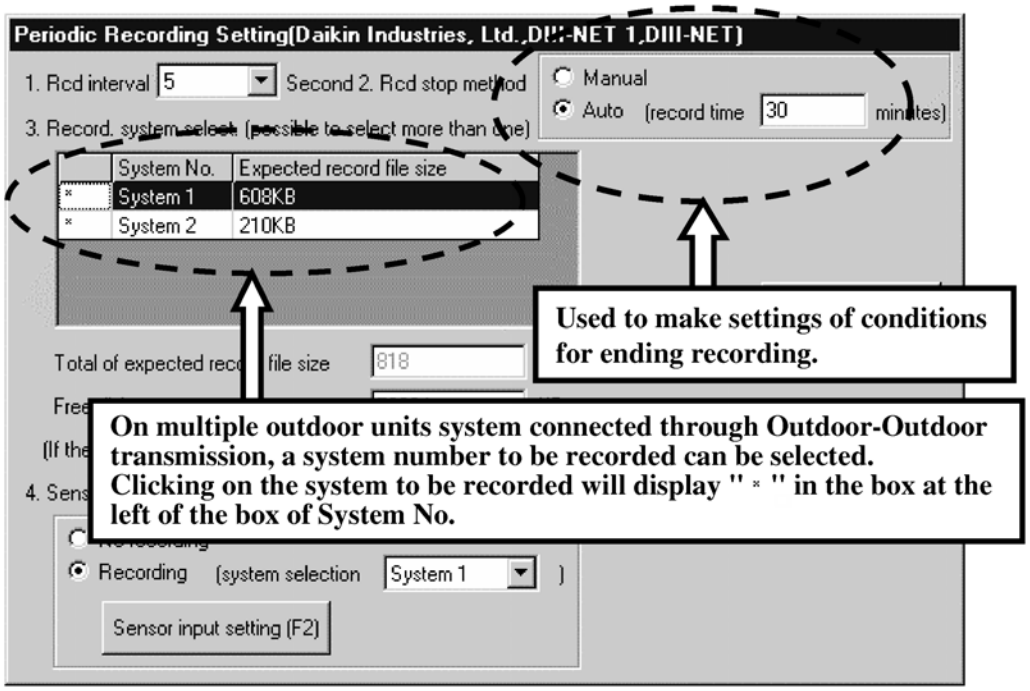
- The number of outdoor units varies with the number of sensors.
- **Color of unit**
  Red - Malfunction
  Purple - Malfunction of transmission
  Green - Operating conditions (Thermostat ON on outdoor unit)
  Gray - Operation stop (Thermostat OFF on outdoor unit)



■ **Selecting recording mode (F5) will display the above window.**

Click on the “Period. rcd. set” button and make setting of periodical recording.

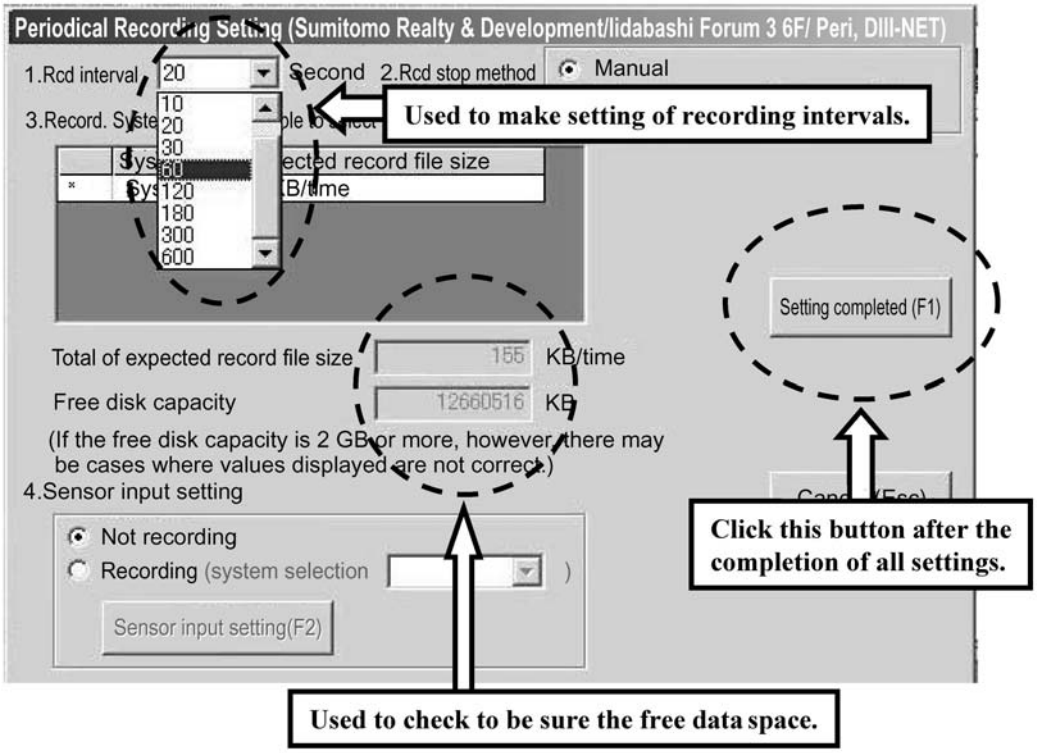
3.2 Periodical Recording Setting Window



■ **Make settings of periodical recording.**

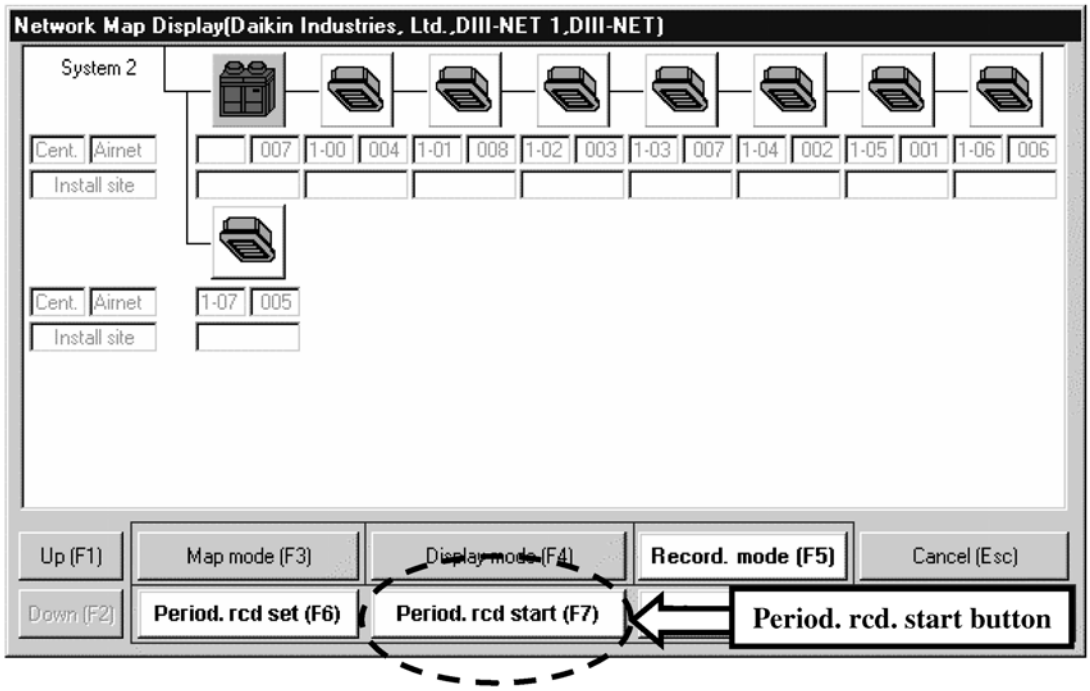
■ Selection of system to be recorded
— Be conscious only to select a system for which data should be collected.
(Otherwise, data memory will run down in a shorter period of time.)

■ Setting of conditions for ending recording
— Normally, make this setting to “Manual”.



■ **Make settings of periodical recording.**

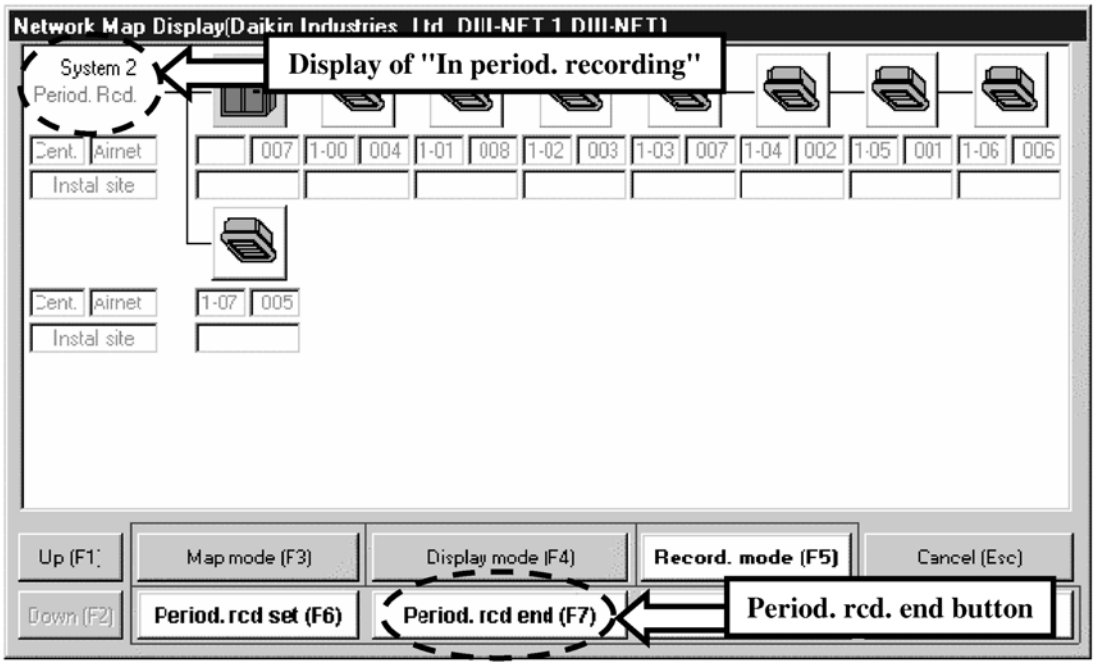
■ Setting of recording intervals
— Set the recording intervals to 60 seconds unless otherwise specified by Quality Control Dept., or else.
■ Be sure to check the free data space.
■ After the completion of all settings, click on the “Setting completed” button.



■ **Make settings of periodical recording.**

Click on the “Period. rcd. Start” button.
— Periodical recording starts —

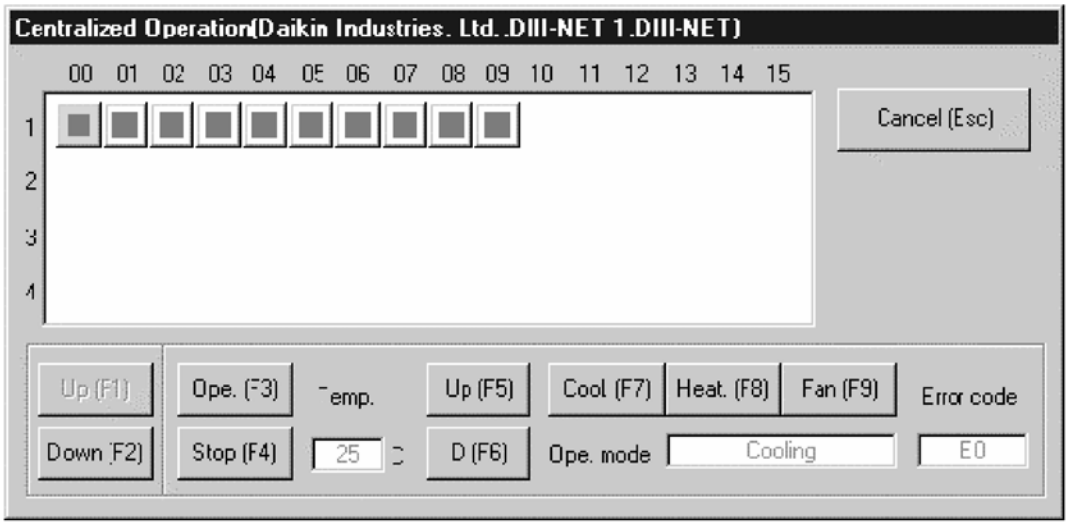
■ Check whether or not the recording process is in progress.
Check to be sure “In period. recording” is displayed.



■ **To end recording**

■ Click on the “Period. rcd. end” button.
Terminate the Checker and then disconnect wirings.

3.3 Centralized Operation (F7)

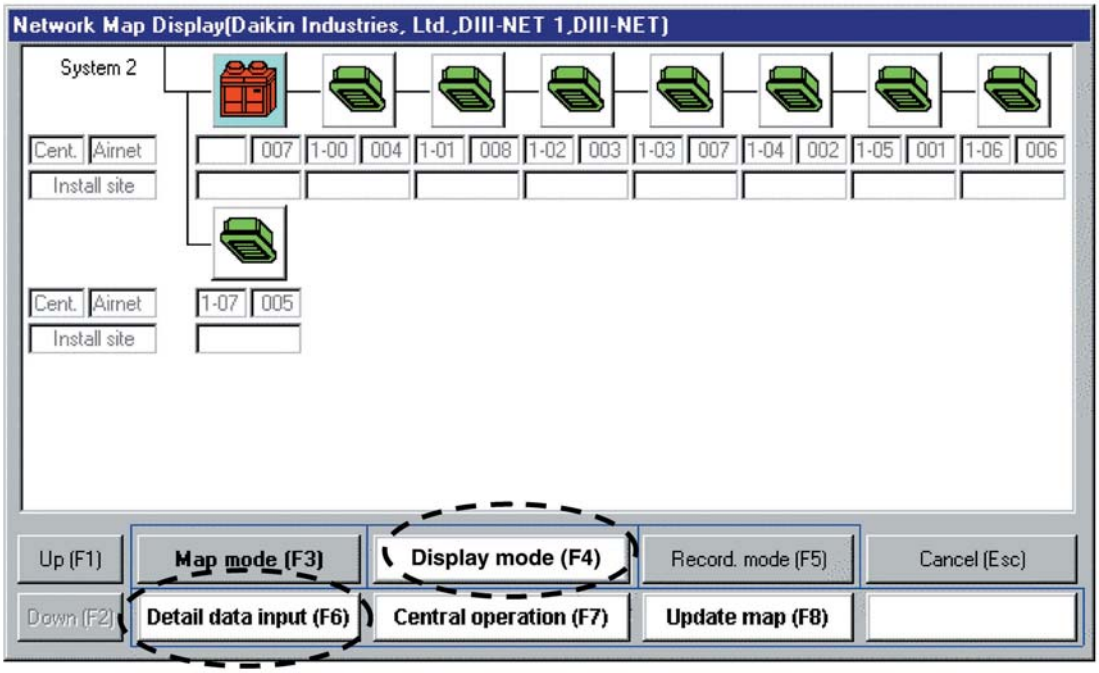


- **Make settings of periodical recording.**

- Click on the "Centralized operation" button on the Menu window.
- The centralized operation is the same as operation on centralized remote controller.

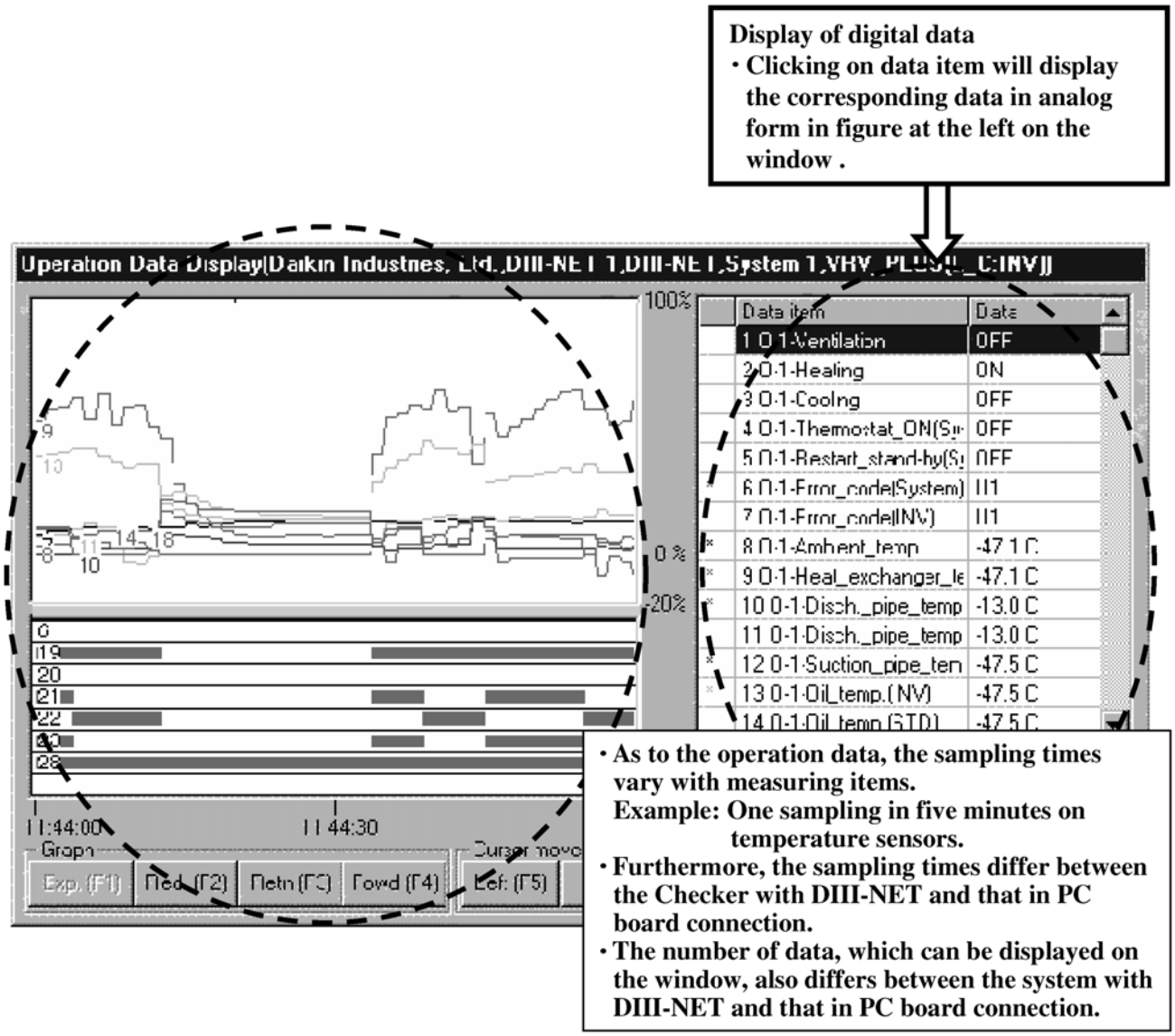
Caution Address settings should be made on the remote controller for indoor units.

3.4 Display of Operation Data



- **Display operation data.**
  (Operation data can be displayed even while in recording mode.)

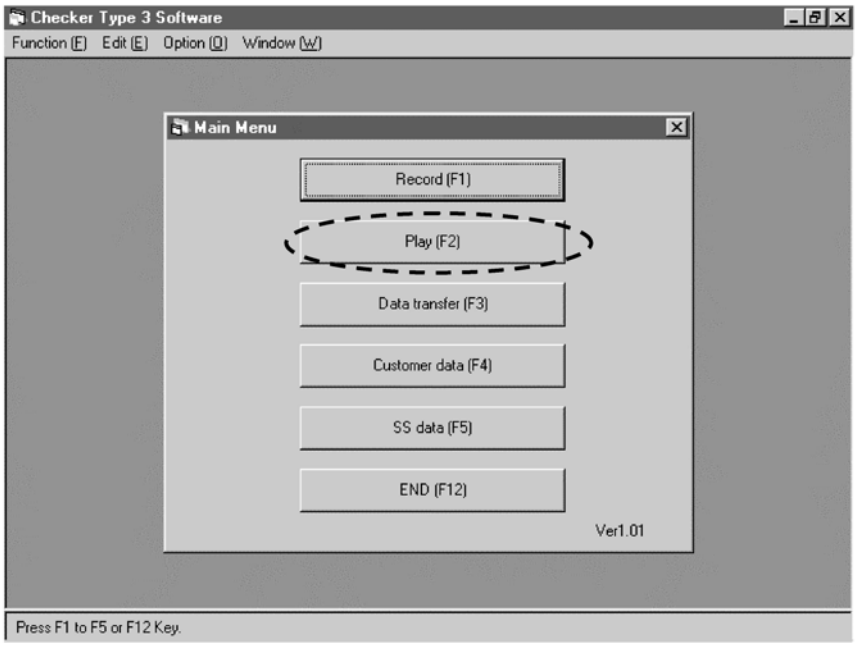
- Click on the “Display mode” button on the Menu window.
  — The above window will be displayed. —



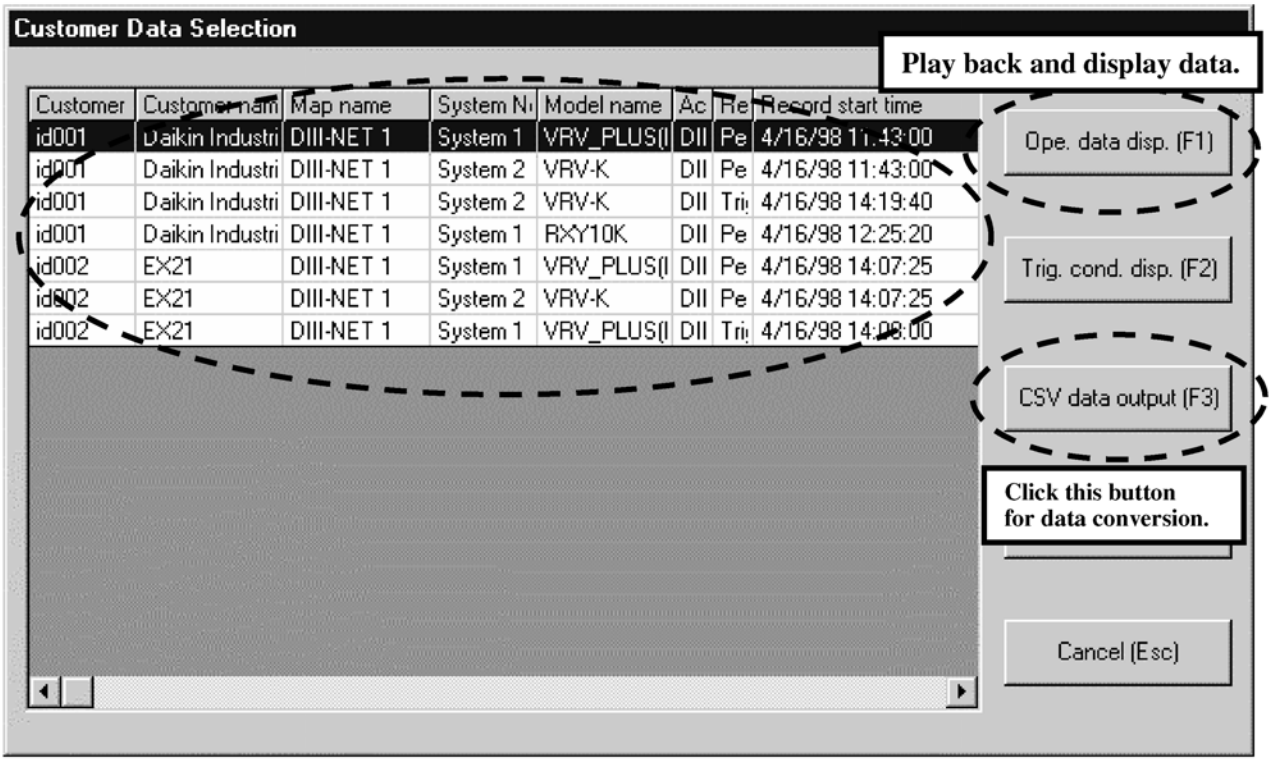
■ **Display of operation data**
(Operation data can be displayed even while in recording mode.)

■ Click on the “Detail data input” button on the Menu window.
— The above window will be displayed. —
■ Digital data will be displayed at the right on the window.
■ Eight data (e.g. sensor or ON/OFF data) selected from the digital data will be displayed in analog form as shown in figure above.

3.5 Playback of Data Recorded

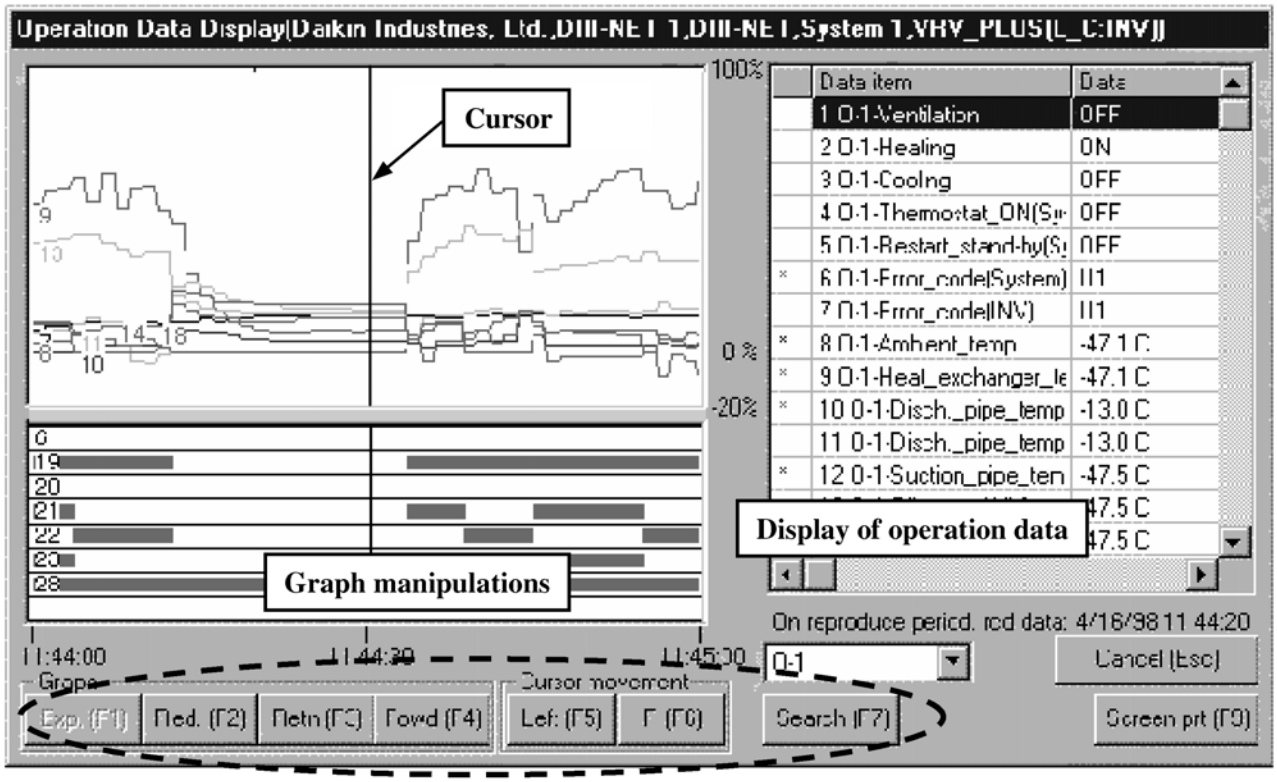


- **Playback of operation data**
- Click on the “Play” button on the Menu window shown above.



Highlight data to be played back on the operation data shown in figure above and then click on the “Ope. data disp. (F1)” button.

- Data conversion (Convert data on the Checker into spreadsheet software(EXCEL).) Select data and then click on the "CSV data output" button.



Buttons	Contents
Enlargement (F1)	Used to display the graph for a period of time shortened.
Reduction (F2)	Used to display the graph for a period of time prolonged.
Backward (F3)	Used to move the graph to the left on the window.
Forward (F4)	Used to move the graph to the right on the window.
Left (F5)	Used to move a cursor on the graph to the left.
Right (F6)	Used to move a cursor on the graph to the right.

4. Collection and Playback of Data on Checker

For collection and playback of data on Checker

Caution

1. Be sure to check the Nos. of system and indoor unit of the system, on which a malfunction occurs.
   - Example of checking method
     If the centralized address is known — Carry out some operation (e.g. ON/OFF or set value changing) from the centralized remote controller and define the unit, which presents changes on the Checker.

     If the centralized address is not known — Carry out operation from the remote controller for indoor unit and define the unit, which presents changes on the Checker.

2. In order to collect data using the DIII-NET, check with the customer that "Forced thermostat OFF" is surely activated once.
   - Provide the customer with an explanation that the system stops for a period of five minutes at maximum and is automatically restart as soon as data is accepted.

3. Check to be sure the display time and settings on a personal computer.
   - Since time displayed on the Checker is corresponding to that displayed on the personal computer, be sure to check and change the time.
   - If settings of screen saver and energy saving are made, there may be cases where the personal computer freezes. Be sure to cancel the settings in advance.

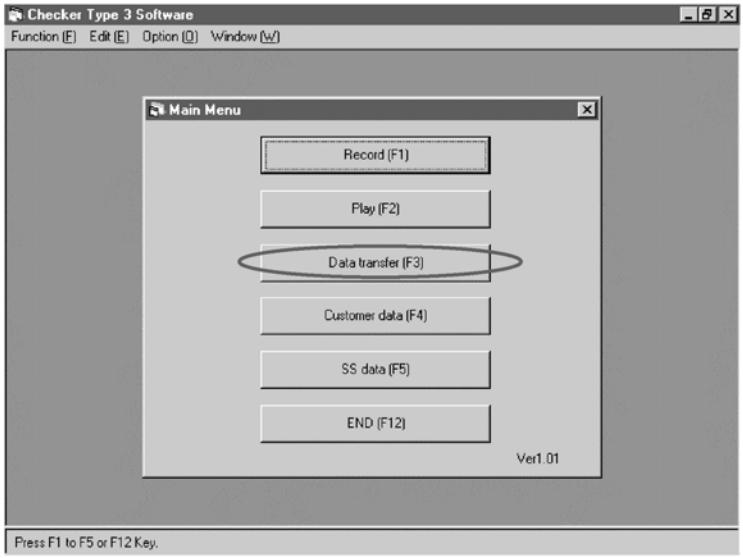
4. Be sure to secure longitudinal data.
   - Be sure to check and take notes of on-site works and the times when malfunctions occur, which will be needed to play back the data. Furthermore, it is advisable to check and take notes of any minimal works or changes.

5. Playback of data
   - Verify collected data by yourself once.
     It is the best to diagnose the data on site where the data was collected, while referring to operation data and refrigerant circuit diagram. Furthermore, since it takes time to verify data at offices, be sure to request for the customer to allow the verification time with an explanation about the reason.
     The nearest way to enable data analysis by yourself is to have your own view on the collected data. If you always consult someone from the beginning, you will not develop the ability to analyze data.

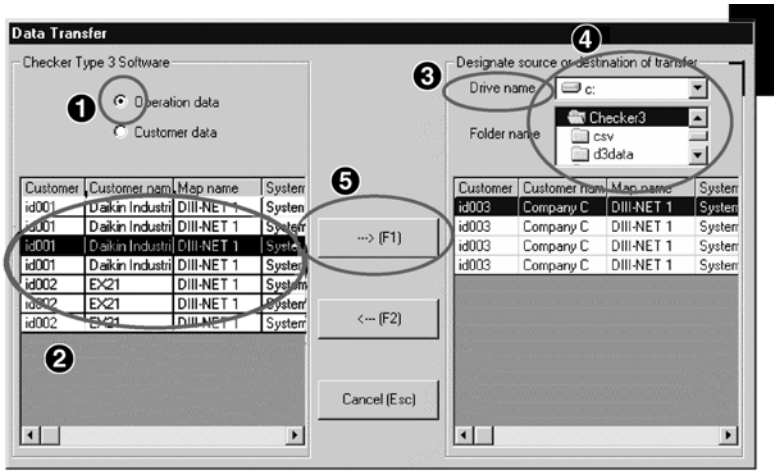
4.1 Retrieval of Raw Data

Retrieve raw (unprocessed) data. → Use this data to e-mail or else.

1. Boot up the Checker software and then click on the “Data transfer” button.



2. Use the following procedure to transfer the data.



1. Check the Operation data (in initial at this position).
2. Highlight data to be retrieved.
3. Highlight a drive to transfer the data.
4. Highlight a folder to transfer the data.
5. Click on the “Transfer (Execute) (F1)” button.

The following files (of two types) are transferred to the folder.
(In the case of a single data transfer)
[Customer data file] File name: “Customer ID.dak”
[Data file] File name: “Alphanumeric character.das”

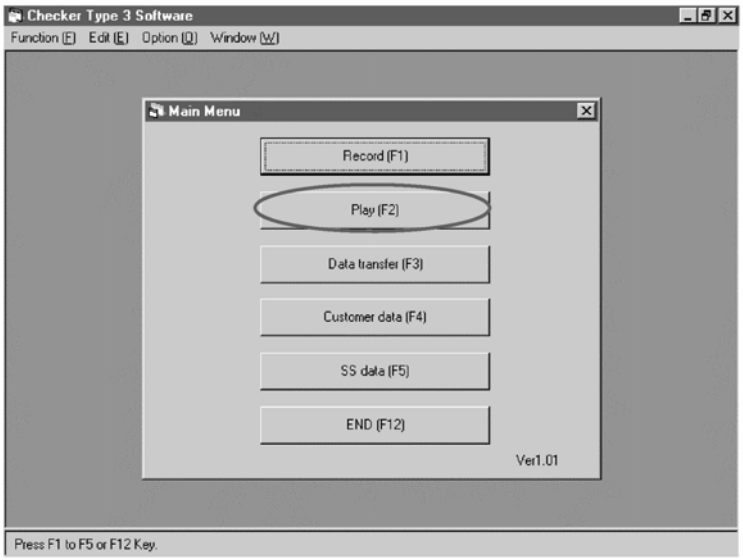
[Customer data file]

[Data file]

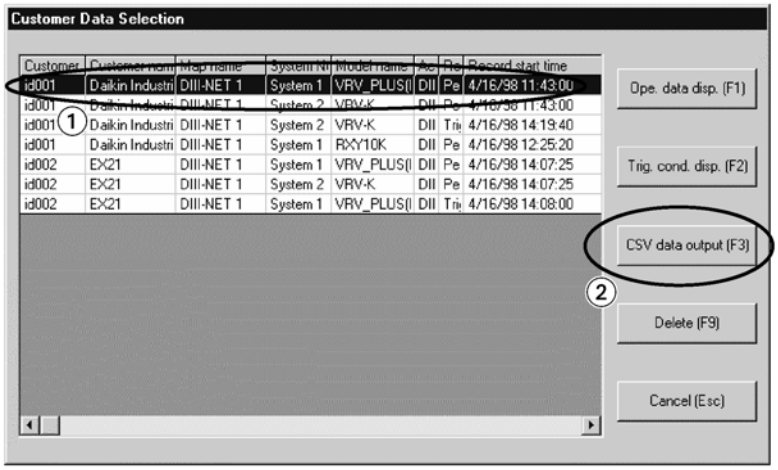
- In order to e-mail data, attach the file (data file) shown above to the e-mail.
- On the contrary, in order to read data transmitted on the Checker, download (transfer) the data to Checker by reversing the procedure 2.

4.2 Retrieval of Processed Data

1. Boot up the Checker software and then click on the "Play" button.

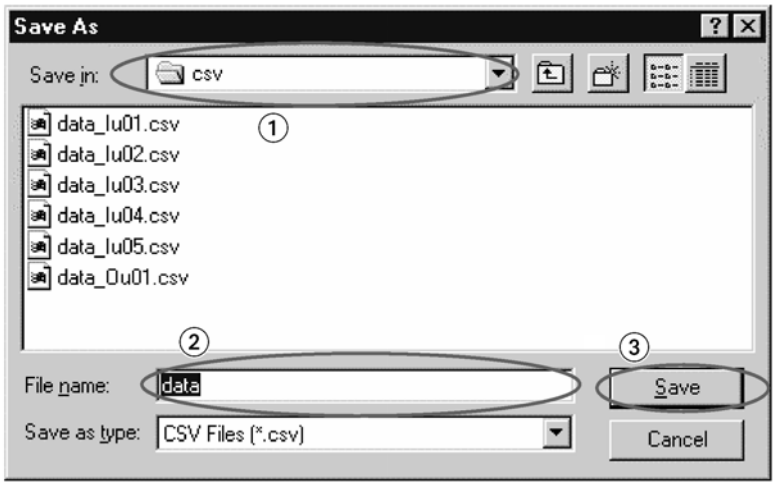


2. Use the following procedure to carry out CSV conversion of data.



1. Highlight operation data to be retrieved.
2. Click on the “CSV data output (F3)” button.

3. Use the following procedure to save converted data.



1. Specify a place to save the data.
2. Enter the data name.
3. Click on the “Save” button.

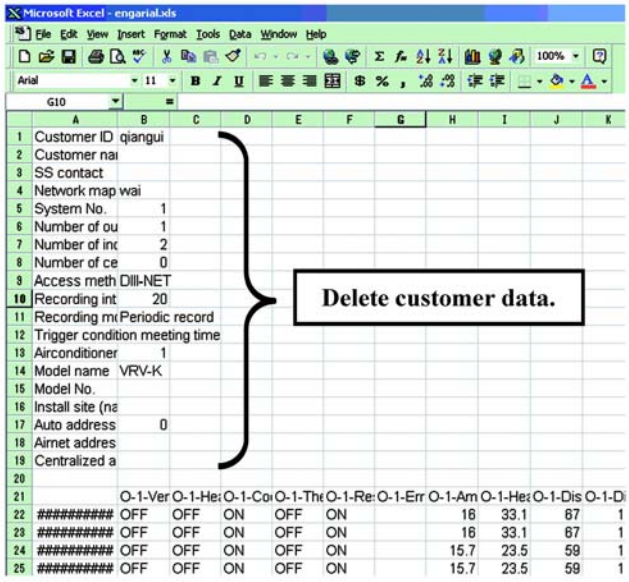
4.3 Data Processing

Process data collected after the CSV conversion.

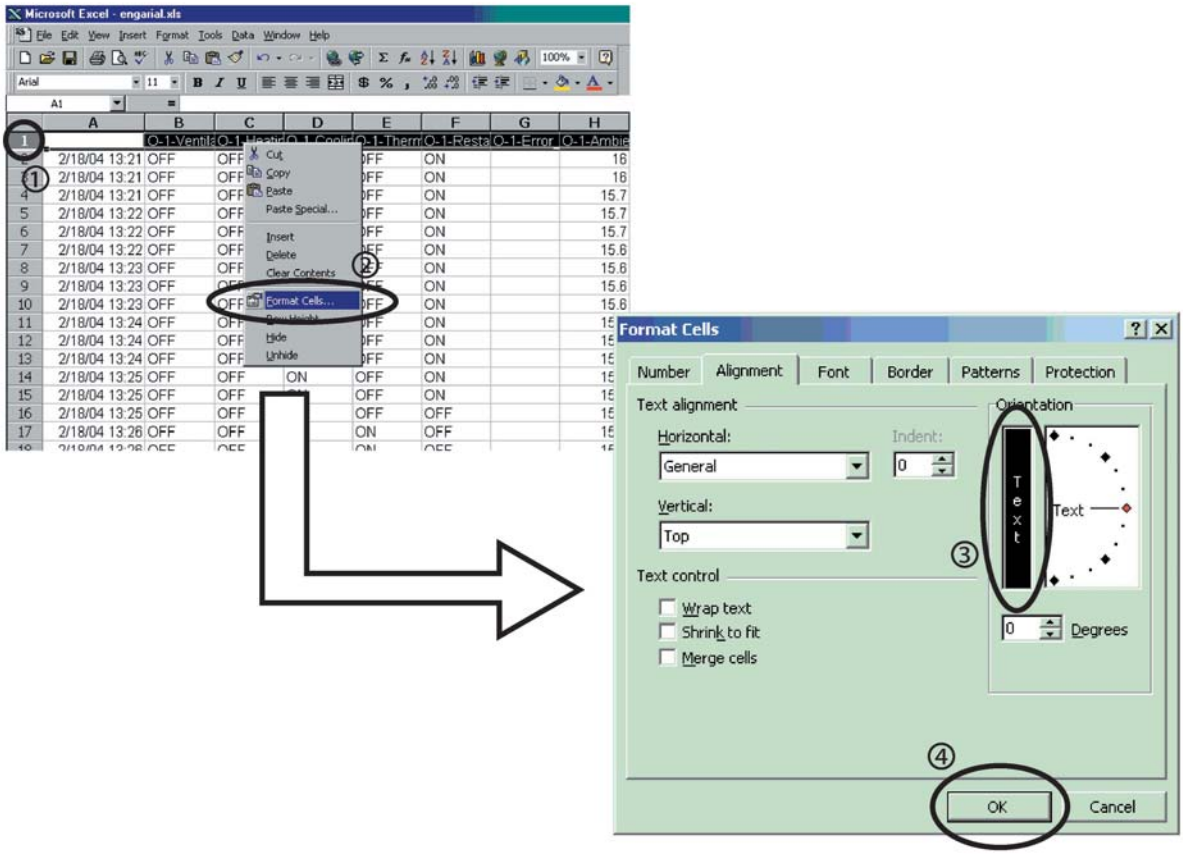
This processing is a method of data analysis on the EXCEL window or in graphical form.

1. Analysis of EXCEL Data

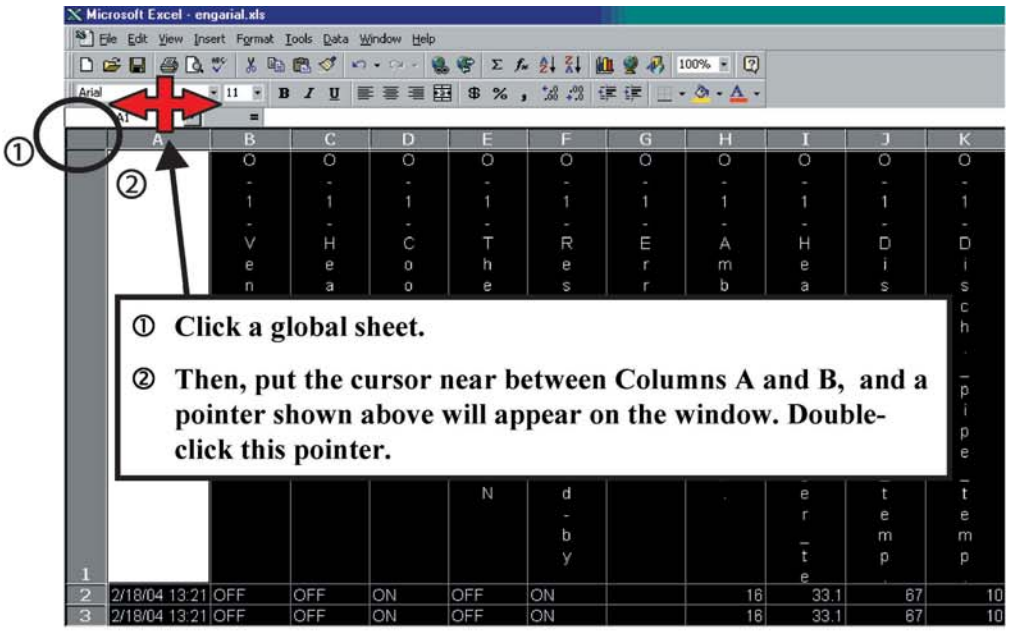
- **Opening data CSV-converted will display the window shown below. On this window, delete "Customer data" on Lines 1 through 19.**

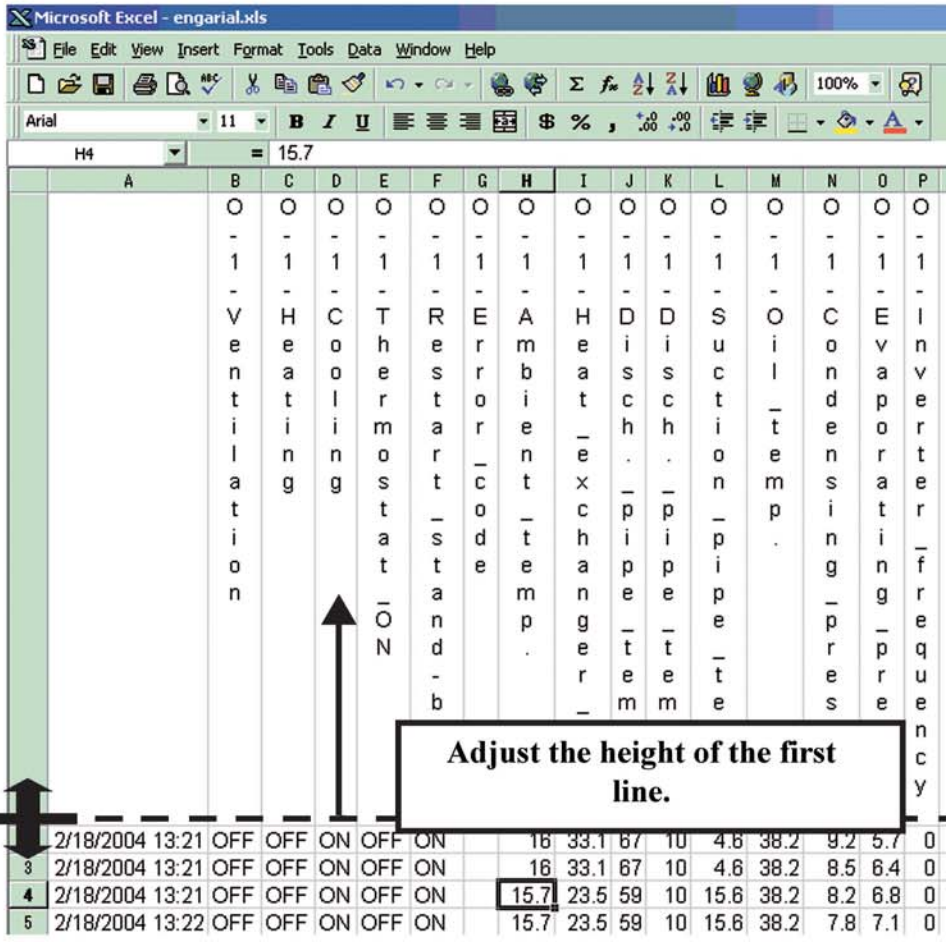


- **Change the formatting on the first line (title of data series).**

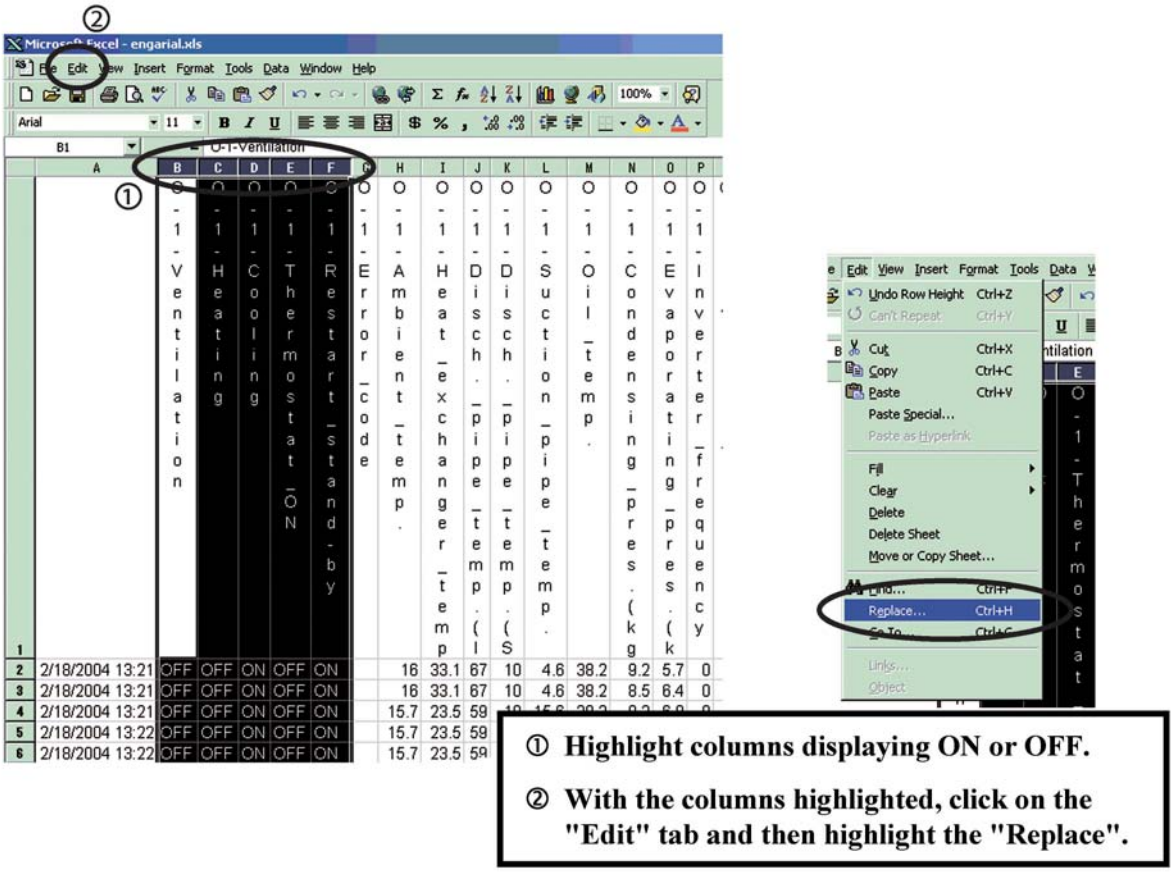


■ **Adjust the width of columns.**

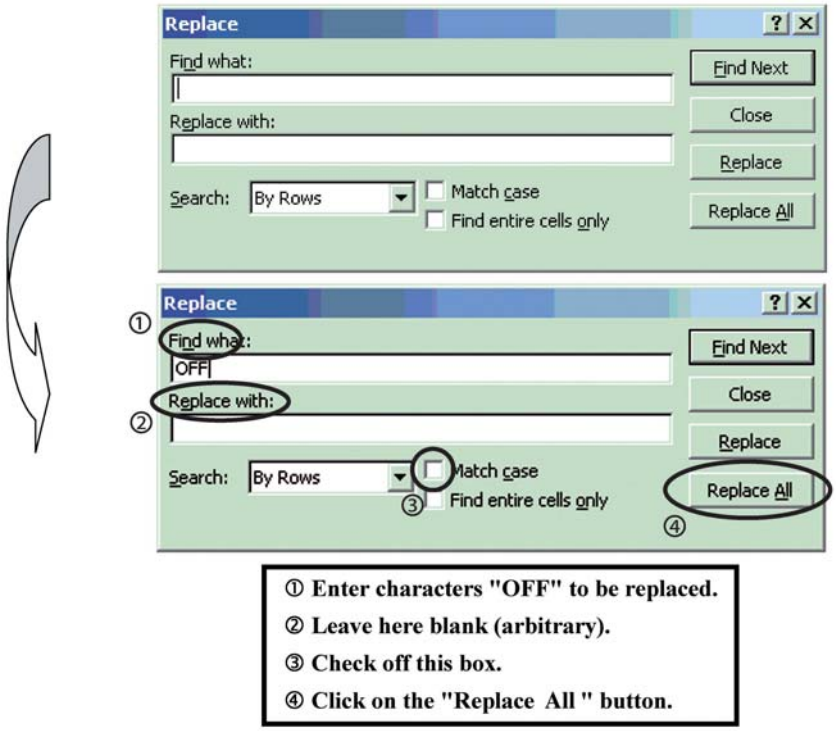




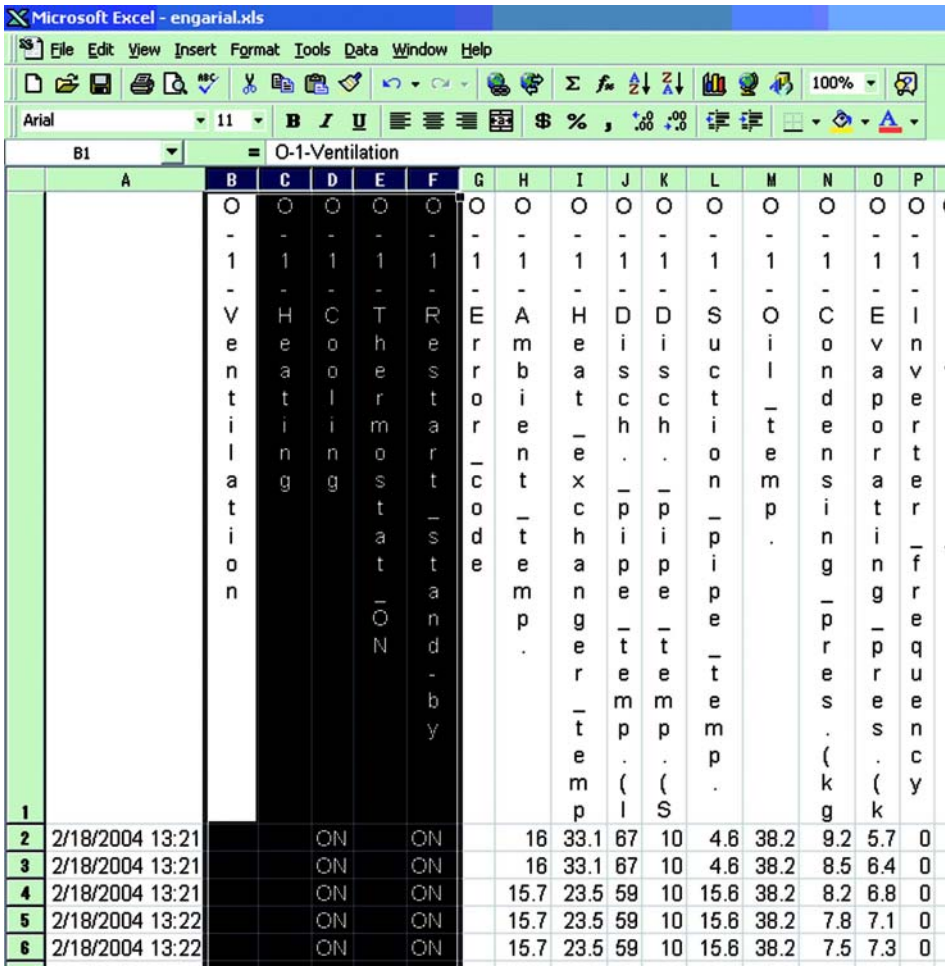
■ **A number of "ON" and "OFF" are mixed on the current setting, thus making the window hard-to-read. Therefore, make settings in accordance with the procedure shown below, in order to facilitate reading.**



The following window will be displayed.



Only “ON”s are displayed, thus facilitating reading the data.
It is effective to replace a variety of functional parts and control (e.g. four-way valves, solenoid valves, or drooping control) as well.



Microsoft Excel - engarial.xls

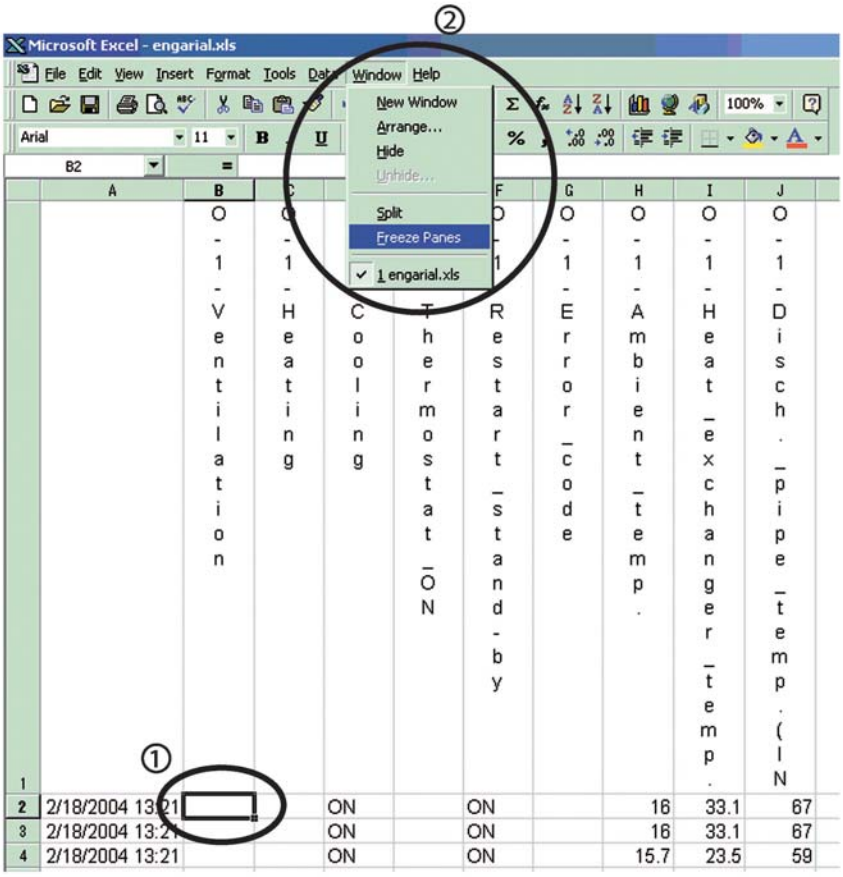
File Edit View Insert Format Tools Data Window Help

Arial 11 100%

B1 = O-1-Ventilation

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1		O-1-Ventilation	O-1-Heating	O-1-Cooling	O-1-Thermostat_ON	O-1-Restart_stand-by	O-1-Error_code	O-1-Ambient_temp.	O-1-Heat_exchanger_temp	O-1-Disch._pipe_temp.(I	O-1-Disch._pipe_temp.(S	O-1-Suction_pipe_temp.	O-1-Oil_temp.	O-1-Condensing_pres.(kg	O-1-Evaporating_pres.(k	O-1-Inverter_frequency
2	2/18/2004 13:21			ON		ON		16	33.1	67	10	4.6	38.2	9.2	5.7	0
3	2/18/2004 13:21			ON		ON		16	33.1	67	10	4.6	38.2	8.5	6.4	0
4	2/18/2004 13:21			ON		ON		15.7	23.5	59	10	15.6	38.2	8.2	6.8	0
5	2/18/2004 13:22			ON		ON		15.7	23.5	59	10	15.6	38.2	7.8	7.1	0
6	2/18/2004 13:22			ON		ON		15.7	23.5	59	10	15.6	38.2	7.5	7.3	0

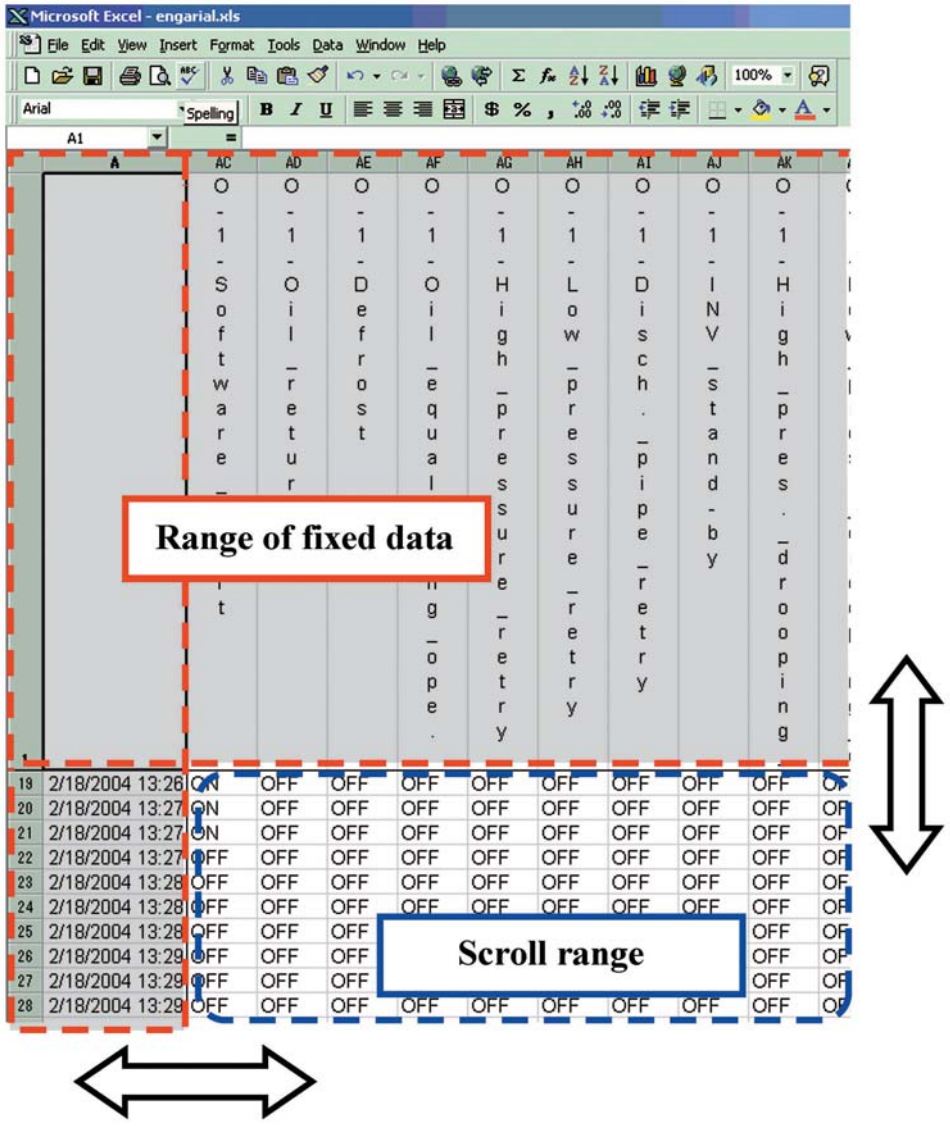
■ **Pane fixing**



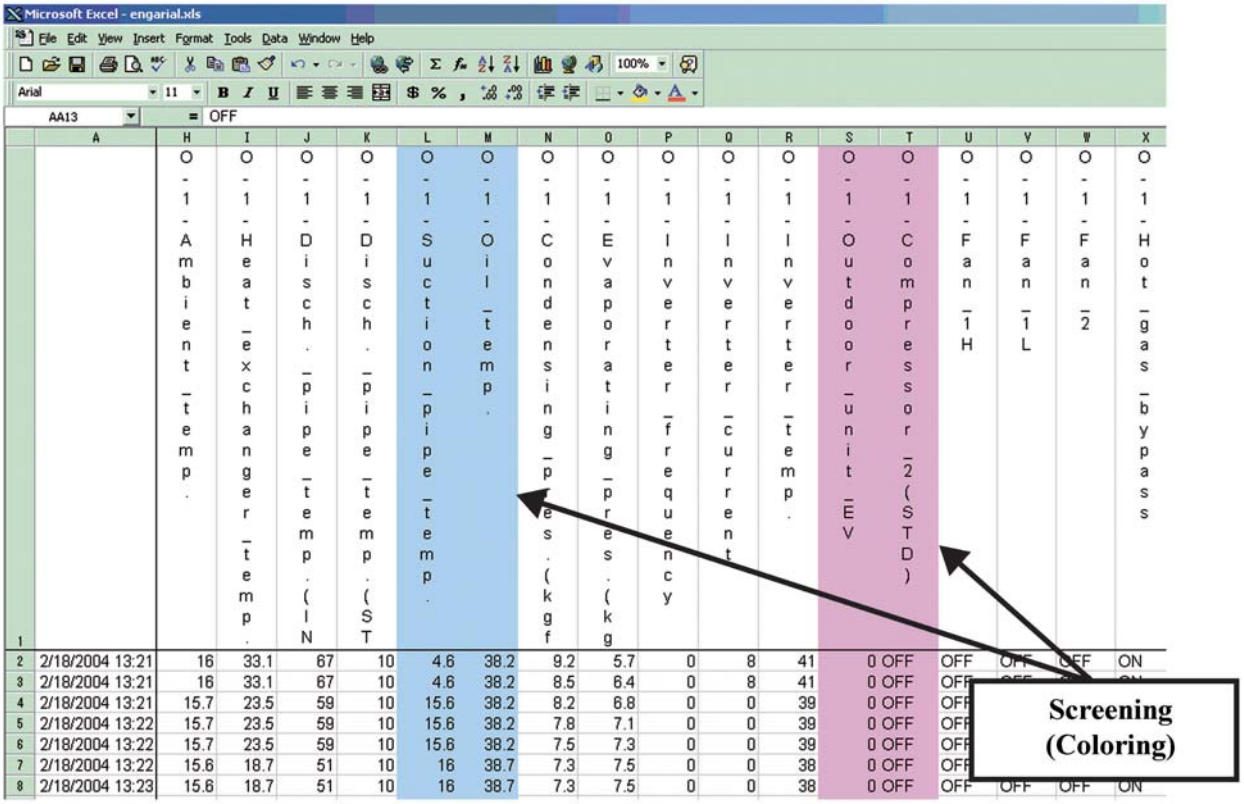
① **Highlight the cell in Column B on the second line.**

② **Click on the "Window" tab and then highlight the "Freeze Panes".**

The title (on the first line) and time (in Column A) of data series is fixed, thus facilitating the Verification of data.



■ **Screening (or coloring) data to be noted facilitates the analysis on the data.**

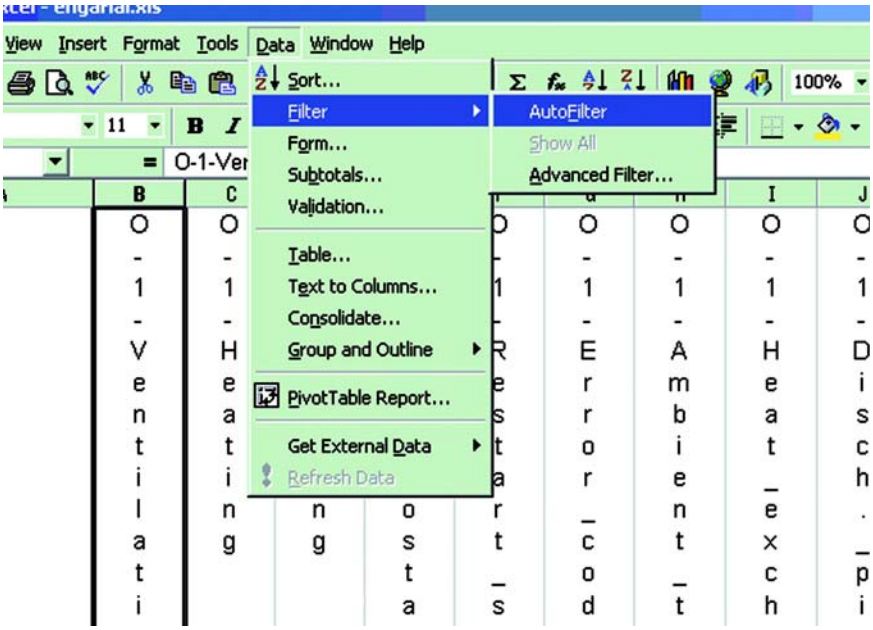


	A	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1		O-1-Ambient_temp.	O-1-Heat_exchanger_temp.	O-1-Discharge_pipe_temp.(IN	O-1-Discharge_pipe_temp.(ST	O-1-Suction_pipe_temp.	O-1-Oil_temp.	O-1-Condensing_pres.(kgf	O-1-Evaporating_pres.(kg	O-1-Inverter_frequency	O-1-Inverter_current	O-1-Inverter_temp.	O-1-Outdoor_unit_EV	O-1-Compressor_2(STD)	O-1-Fan_1H	O-1-Fan_1L	O-1-Fan_2	O-1-Hot_gas_bypass
2	2/18/2004 13:21	16	33.1	67	10	4.6	38.2	9.2	5.7	0	8	41	0	OFF	OFF	OFF	OFF	ON
3	2/18/2004 13:21	16	33.1	67	10	4.6	38.2	8.5	6.4	0	8	41	0	OFF	OFF	OFF	OFF	ON
4	2/18/2004 13:21	15.7	23.5	59	10	15.6	38.2	8.2	6.8	0	0	39	0	OFF	OFF	OFF	OFF	ON
5	2/18/2004 13:22	15.7	23.5	59	10	15.6	38.2	7.8	7.1	0	0	39	0	OFF	OFF	OFF	OFF	ON
6	2/18/2004 13:22	15.7	23.5	59	10	15.6	38.2	7.5	7.3	0	0	39	0	OFF	OFF	OFF	OFF	ON
7	2/18/2004 13:22	15.6	18.7	51	10	16	38.7	7.3	7.5	0	0	38	0	OFF	OFF	OFF	OFF	ON
8	2/18/2004 13:23	15.6	18.7	51	10	16	38.7	7.3	7.5	0	0	38	0	OFF	OFF	OFF	OFF	ON

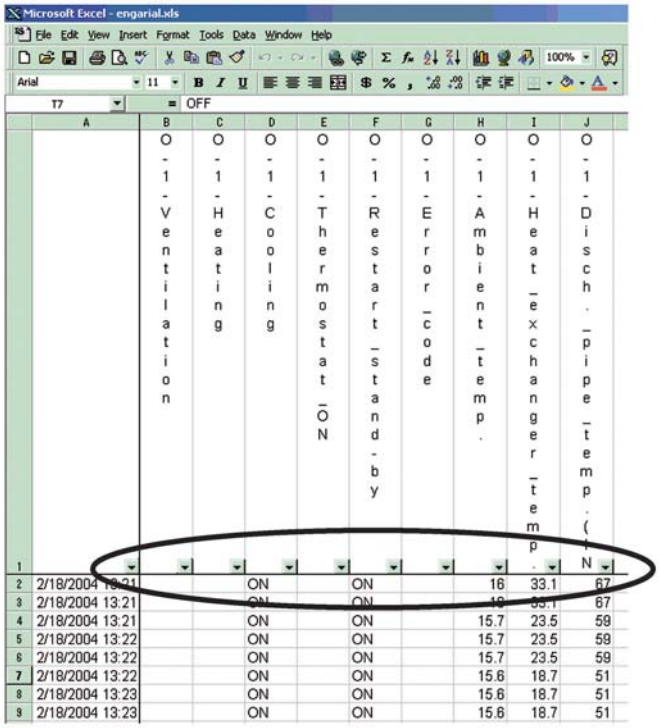
■ **Method of verification using auto filter**

In order to carry out data collection for an extended period of one or two weeks to verify the case of intermittent occurrences of malfunctions, the volume of data will become huge, thus taking time to verify the data.

Using auto filter enables the pinpoint verification of the data, thus achieving the reduction in man-hour spent for the verification.

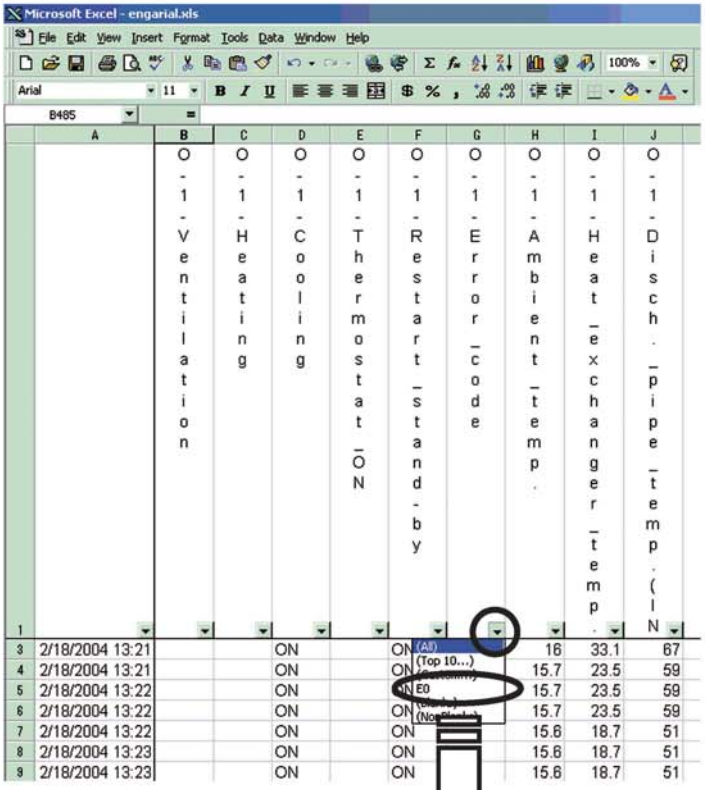


Click on the "Data" tab and then highlight "Filter" and then "Auto filter" on the Menu.



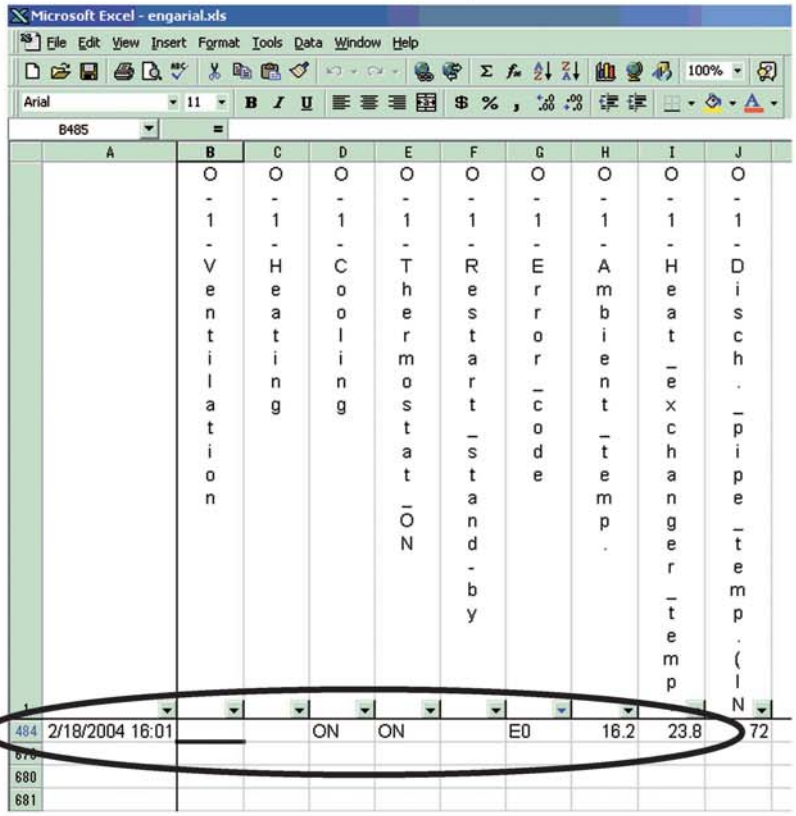
Items on the first line change as shown above.

Pressing the [▽] button corresponding to items to be noted will list and display all elements contained in the column items.



Left figure lists the column items of “Error codes”. “E0” in the list shows that a malfunction has occurred.

Click "E0".

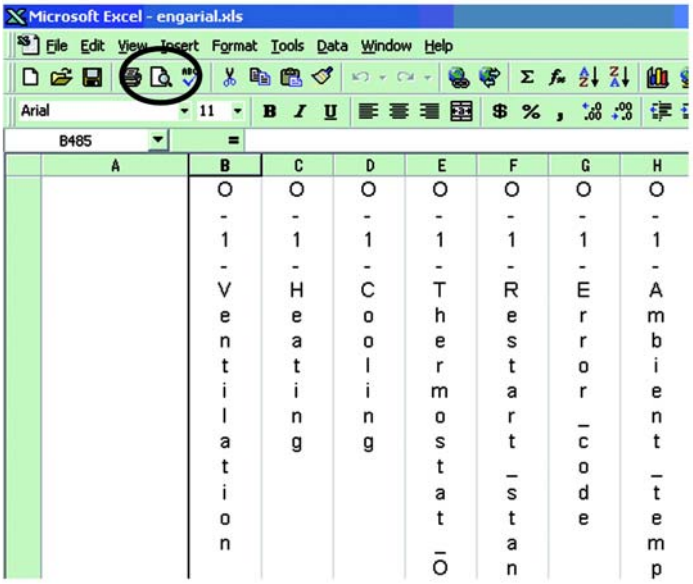


This information shows that “E0” occurred at 16:01 on the 484th line.
In this case, cancel the auto filter and then define the causes of the malfunction according to data prior and subsequent to the time when the malfunction occurred.

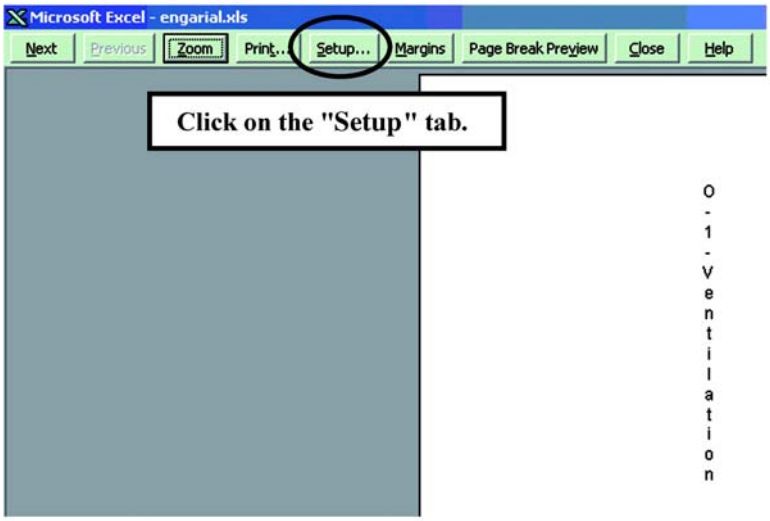
Furthermore, using the auto filter enables the following verification.

- Check each temperature/pressure data for maximum (minimum) value.
- Extract defrosting and oil return operation and then verify the operation data.

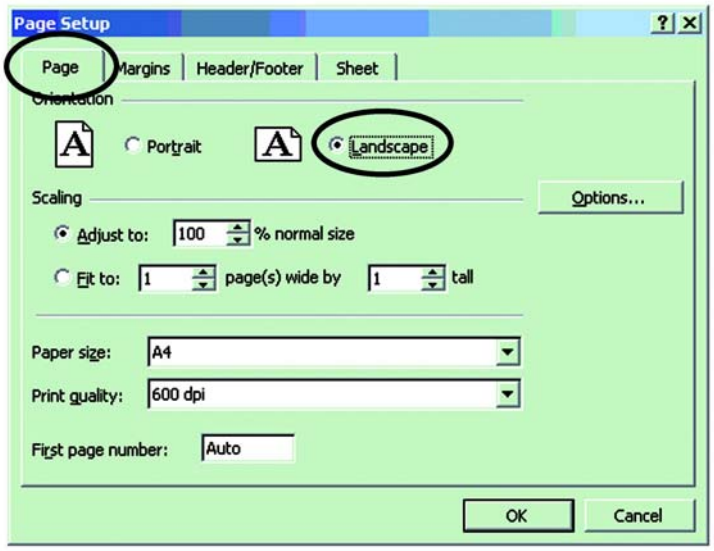
- **Edit and print EXCEL data and then carry out an analysis on the data.**

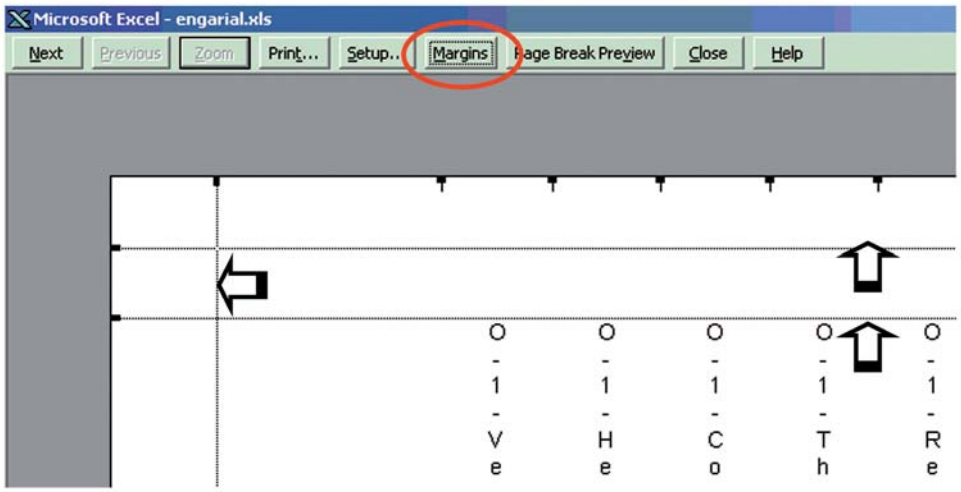


Click on the "Print preview".

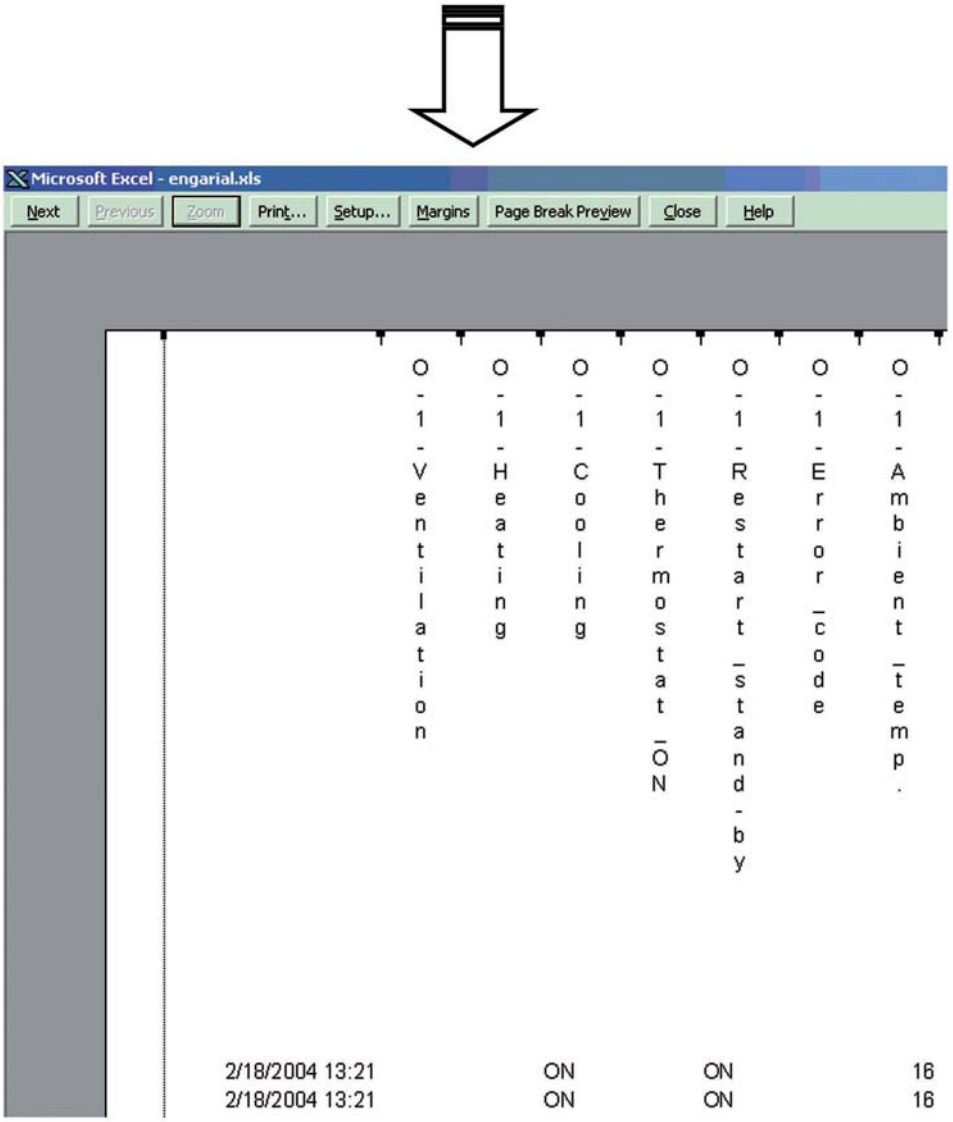


On the “Page Setup” window,
Printing direction → “Landscape”
Paper size → Set to “A4 or A3 (if printable)”.

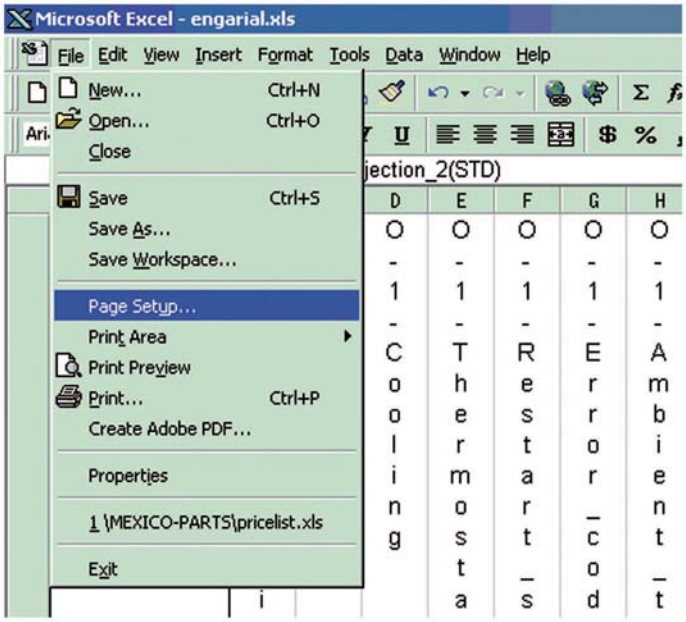


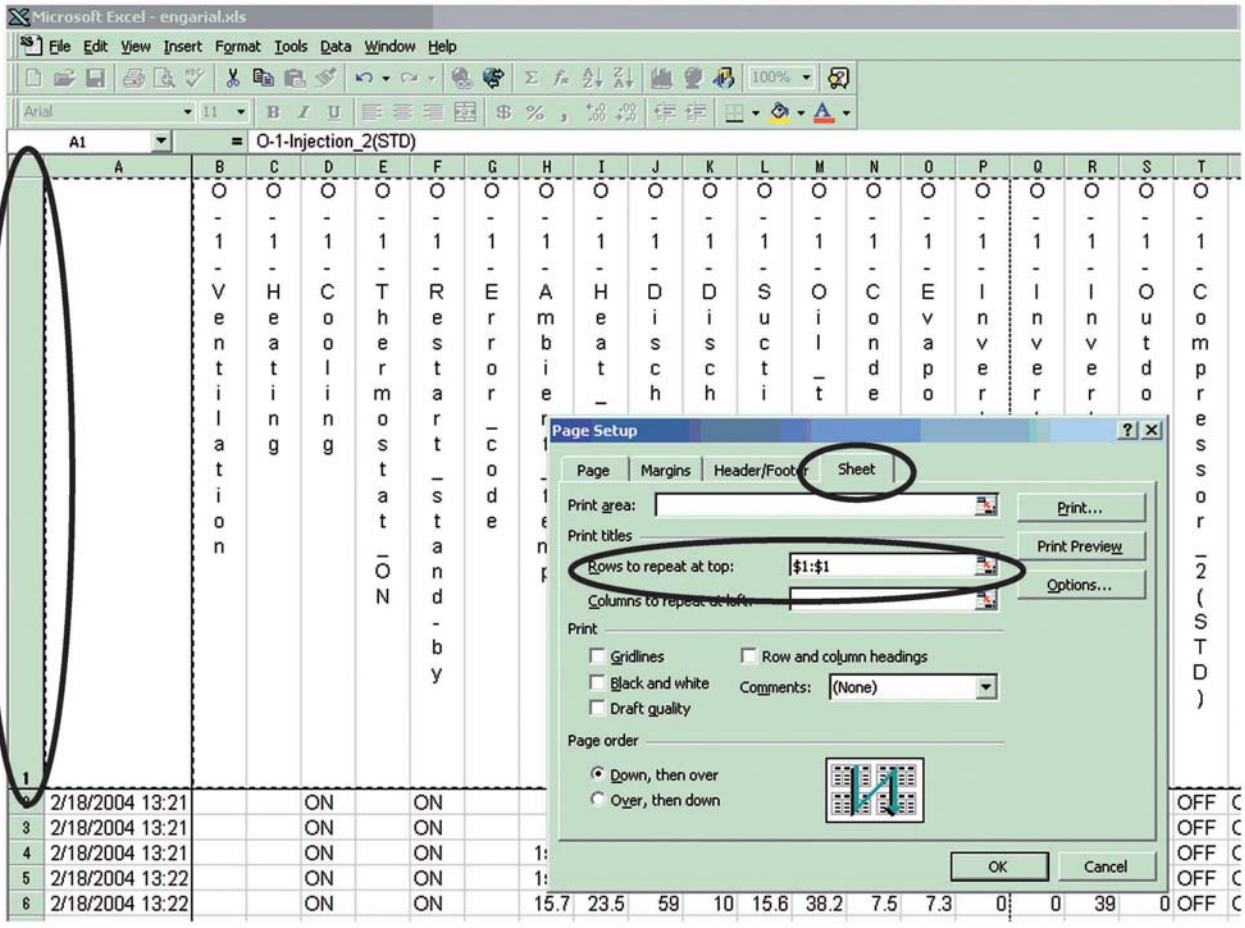


Use the "Margins" tab to adjust the margin so that the global paper will be printed.



Exit the “Print preview”, click on the "File" tab and then highlight the “Page Setup”.

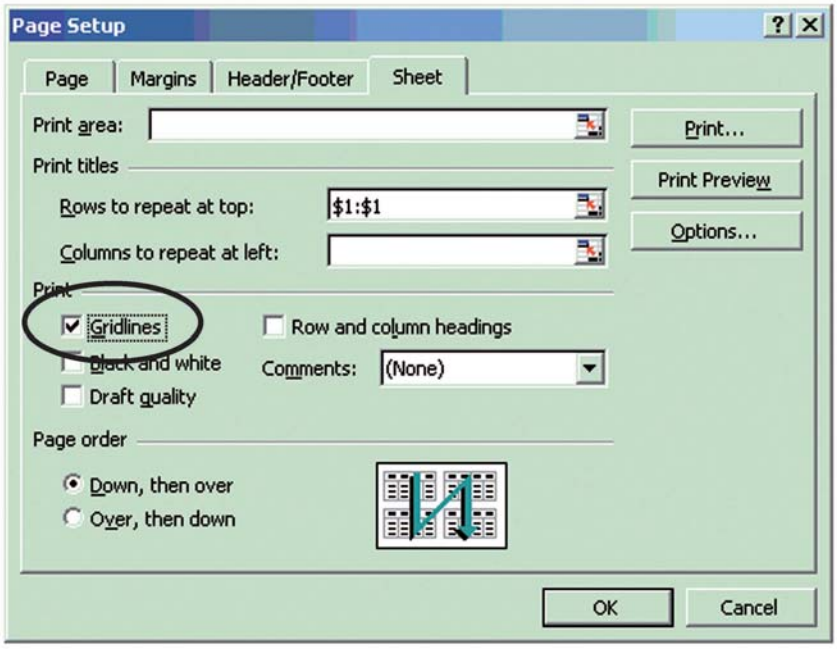




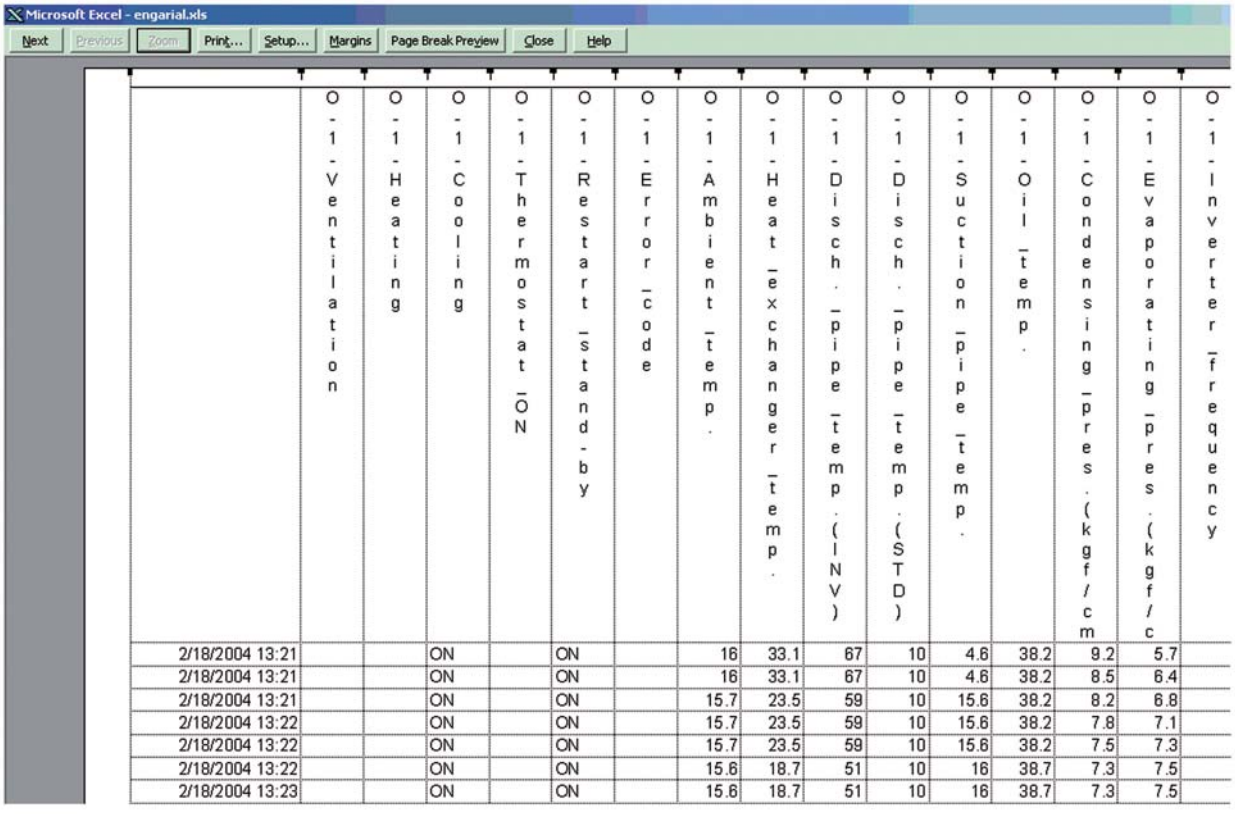
On the “Sheet” menu within the “Page Setup” window, click on the “Print titles” and “Rows to repeat at top” and then click on any place on the first line.

→ “$1 : $1” will be entered.

Printing data according to the process above will print the first line at all times, thus facilitating the analysis on the data.



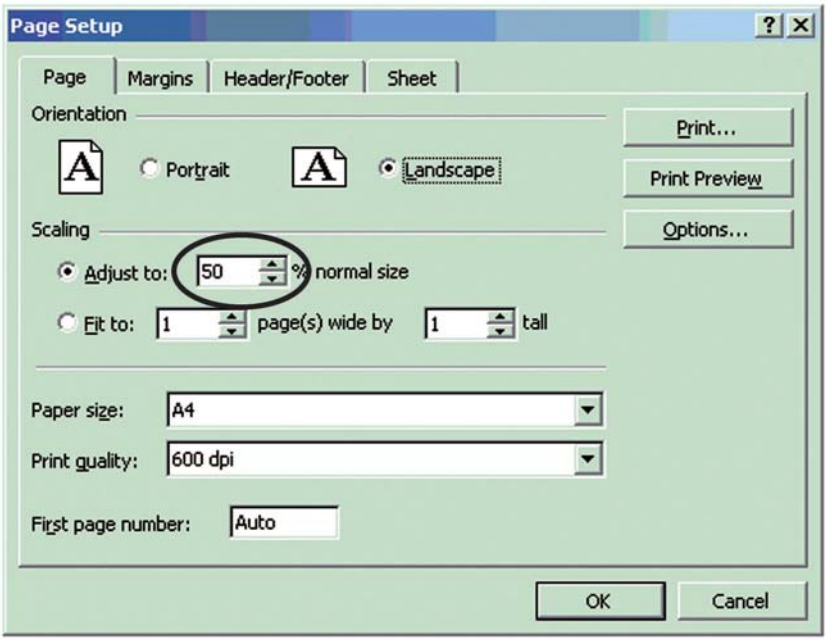
On the “Sheet” menu within the “Page Setup” window, check the “Gridlines” box of the Print section .



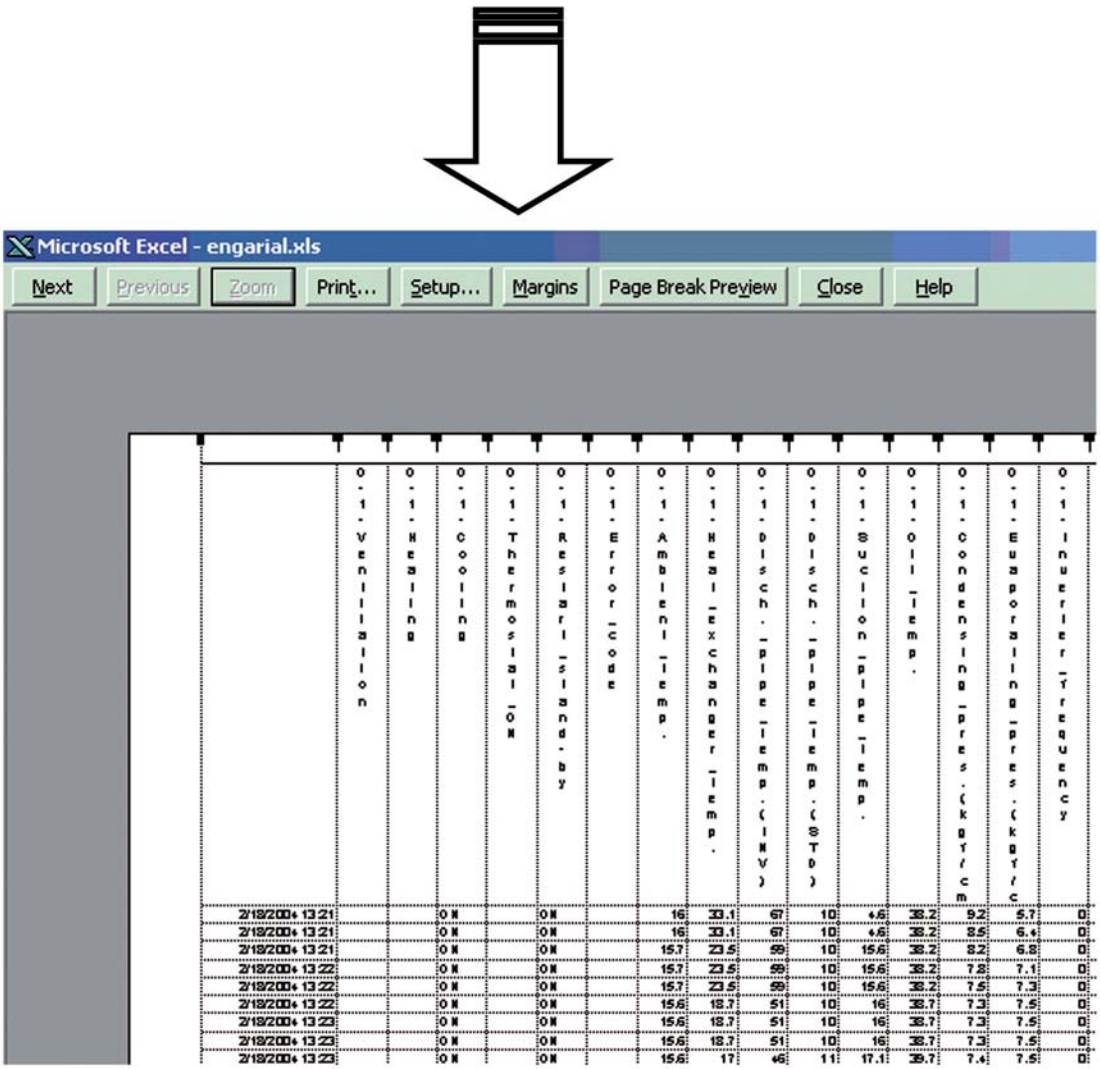
	O-1-Ventilation	O-1-Heating	O-1-Cooling	O-1-Thermostat_ON	O-1-Restart_stand-by	O-1-Error_code	O-1-Ambient_temp.	O-1-Heat_exchanger_temp.	O-1-Disch._pipe_temp.(INV)	O-1-Disch._pipe_temp.(STD)	O-1-Suction_pipe_temp.	O-1-Oil_temp.	O-1-Condensing_pres.(kgf/cm	O-1-Evaporating_pres.(kgf/c	O-1-Inverter_frequency
2/18/2004 13:21			ON		ON		16	33.1	67	10	4.6	38.2	9.2	5.7	
2/18/2004 13:21			ON		ON		16	33.1	67	10	4.6	38.2	8.5	6.4	
2/18/2004 13:21			ON		ON		15.7	23.5	59	10	15.6	38.2	8.2	6.8	
2/18/2004 13:22			ON		ON		15.7	23.5	59	10	15.6	38.2	7.8	7.1	
2/18/2004 13:22			ON		ON		15.7	23.5	59	10	15.6	38.2	7.5	7.3	
2/18/2004 13:22			ON		ON		15.6	18.7	51	10	16	38.7	7.3	7.5	
2/18/2004 13:23			ON		ON		15.6	18.7	51	10	16	38.7	7.3	7.5	

Checking on the “Print preview” window, the closing lines of cells are displayed.

■ **Setting of reduced print**



Setting figures in the "Enlarged/Reduced" box to 50% or so (initial setting to 100%) will make it possible to print all items in a sheet of paper. (Adjust the percent values in accordance with the number of data items to be printed.)



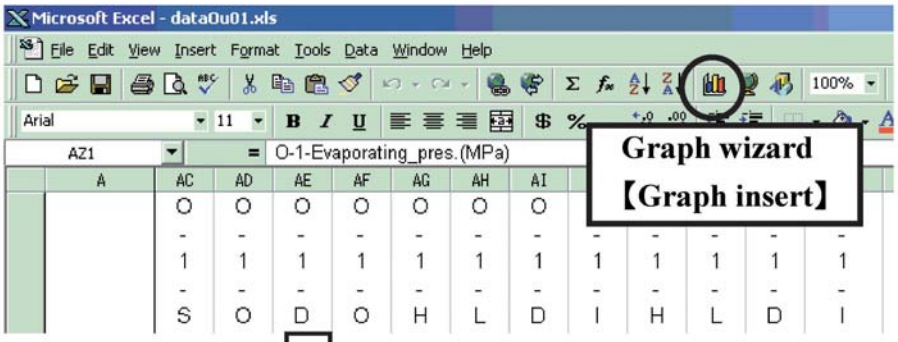
Print the EXCEL data, and check and verify the data.

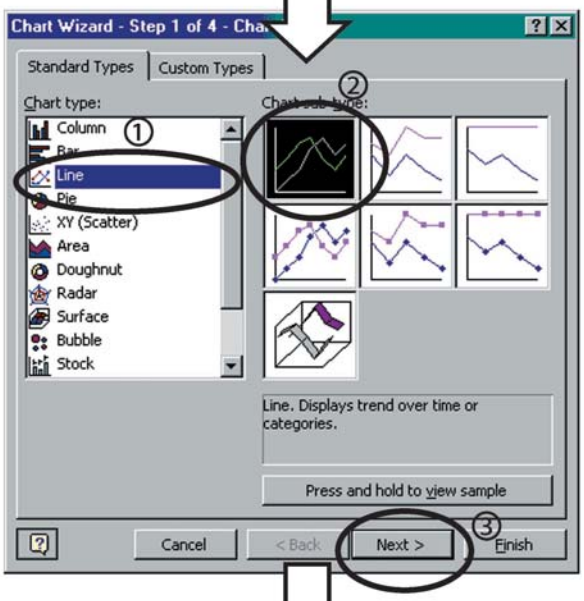
2. Plotting in Graph

There are cases where it is hard to keep track of the overall variations of data on the CSV data. In this case, graphing the data will facilitate the verification of the data.
(The following section shows an example of the graphing procedure.)

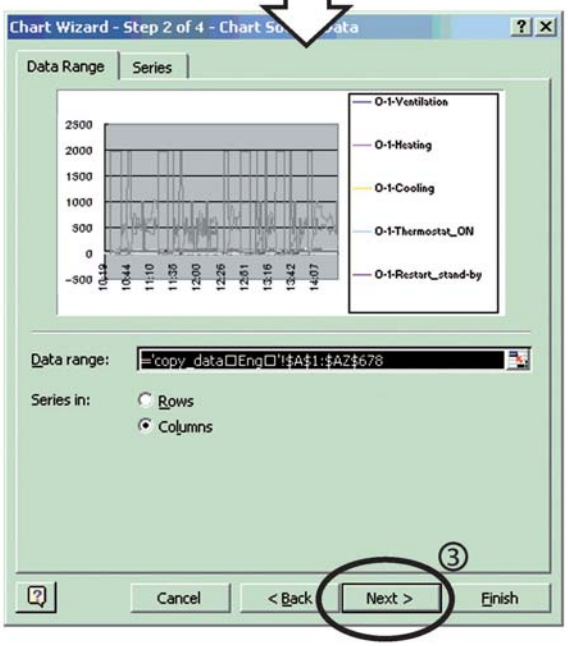
1. Method of graphing and organizing a global sheet.

■ **Run the graph wizard (graph insert).**



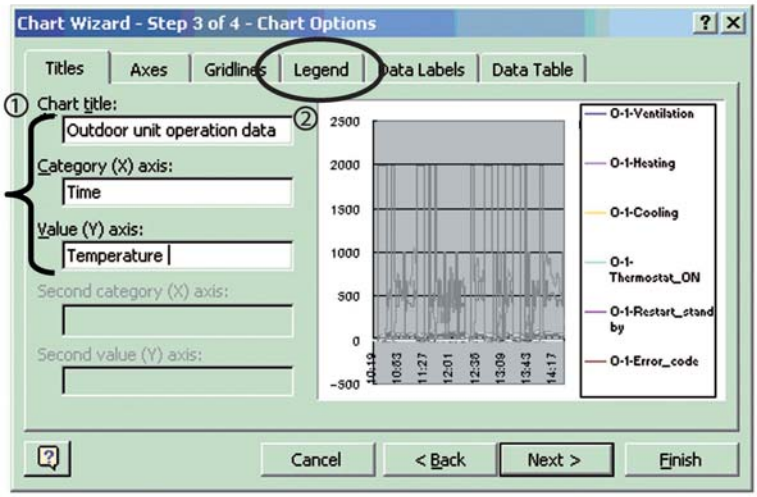


① Type of graph: "Line chart"
② Form: "Shown in left figure"
③ Click on the "Next" button.



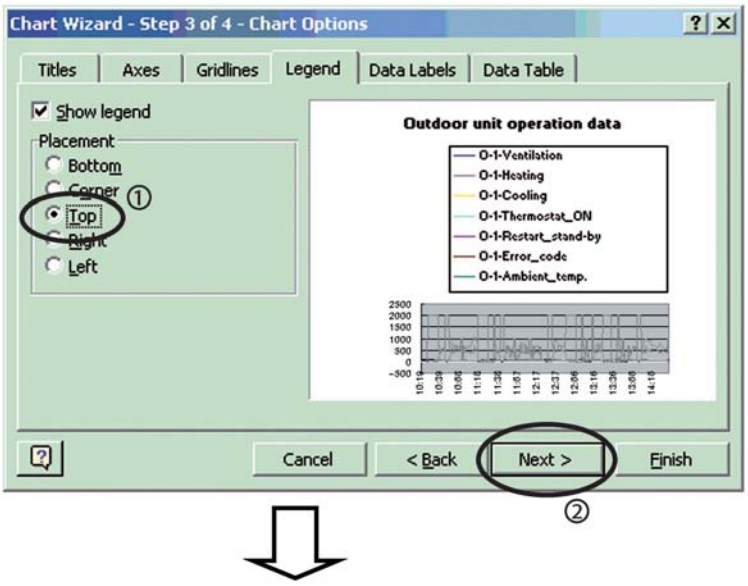
③ Click on the "Next" button.

These items can be entered in later stage.



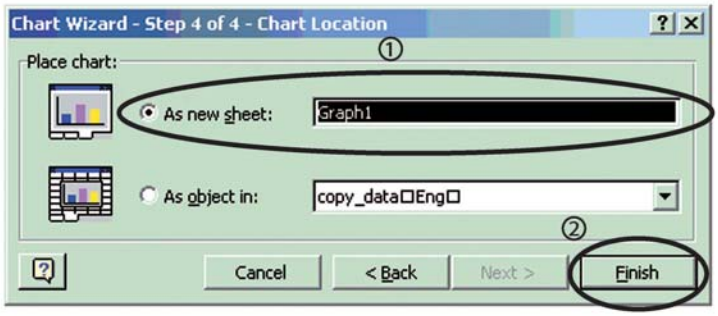
① Enter the title of graph and X- and Y-axis items.

② Click on the "Legend" tab.



① Check the "Top".

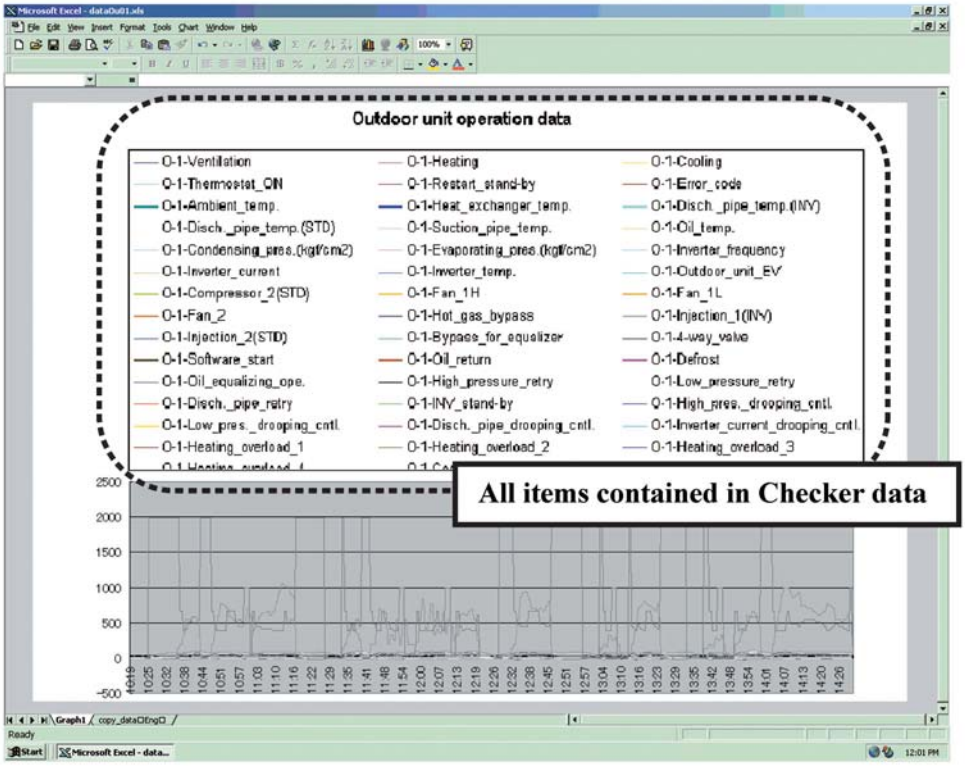
② Click on the "Next" button.



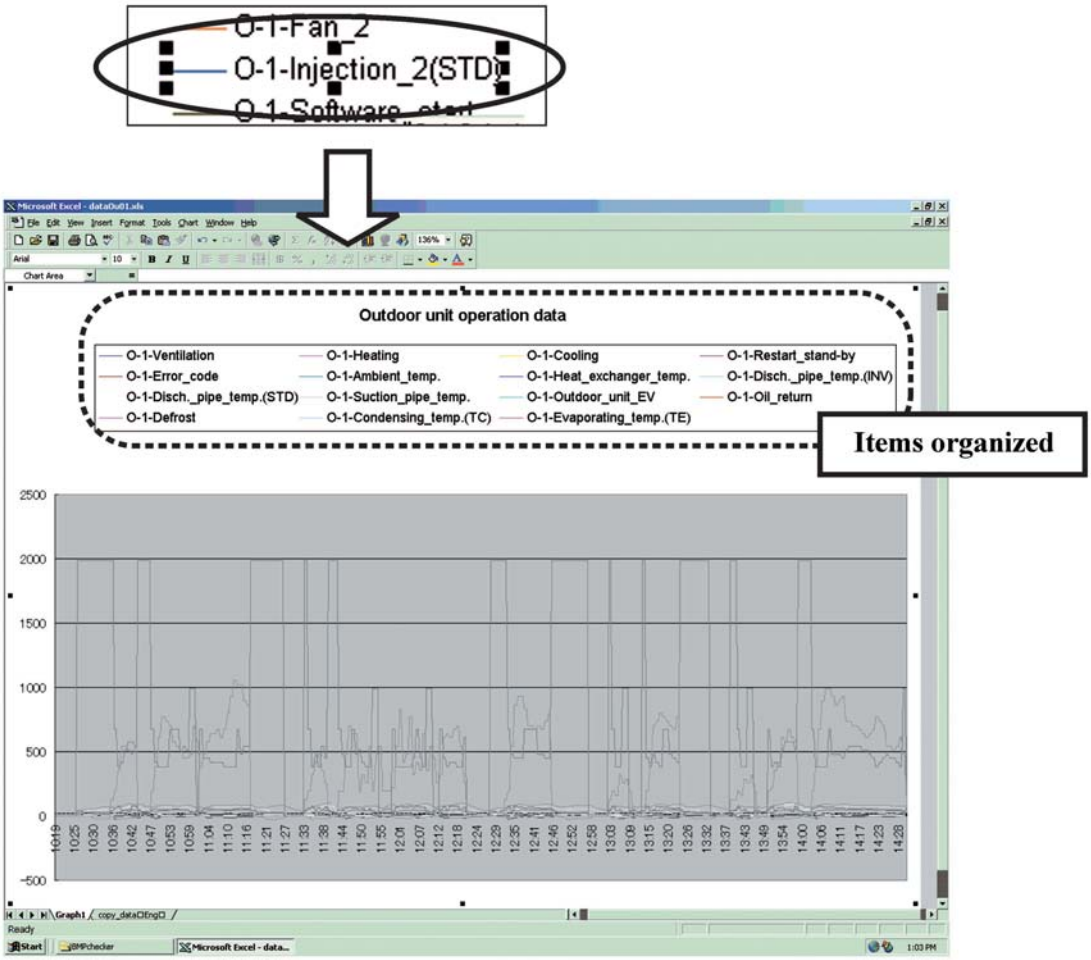
① Check the "As new sheet".

② Click on the "Finish" button.

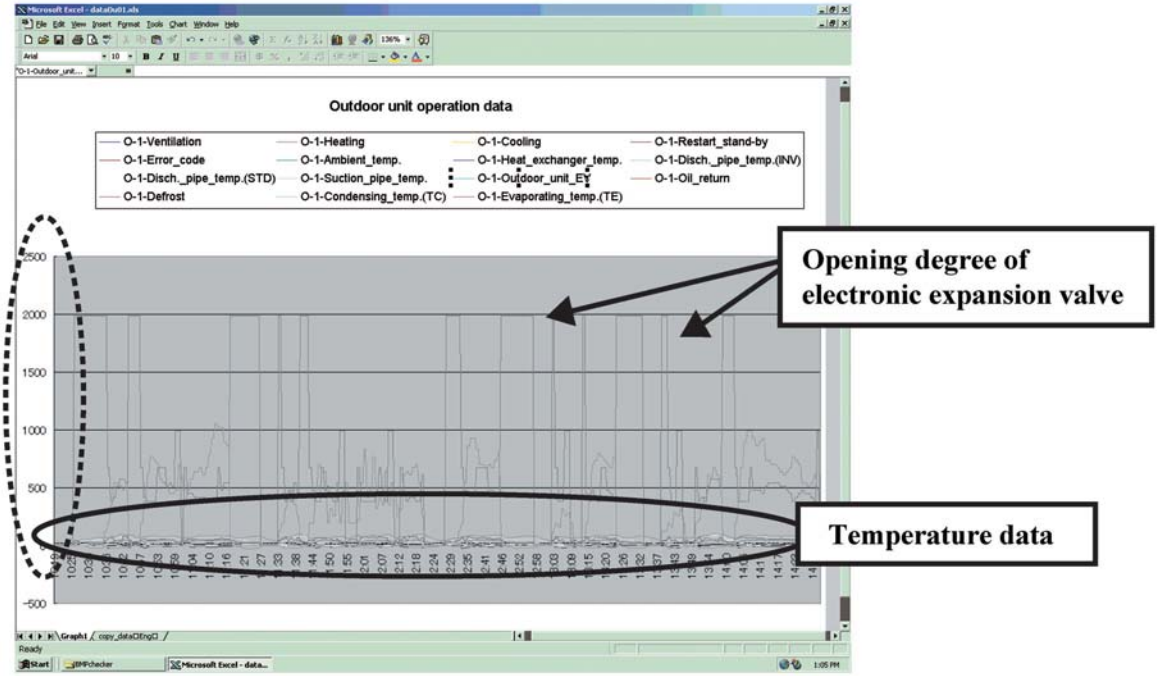
4.4 Organizing Graph



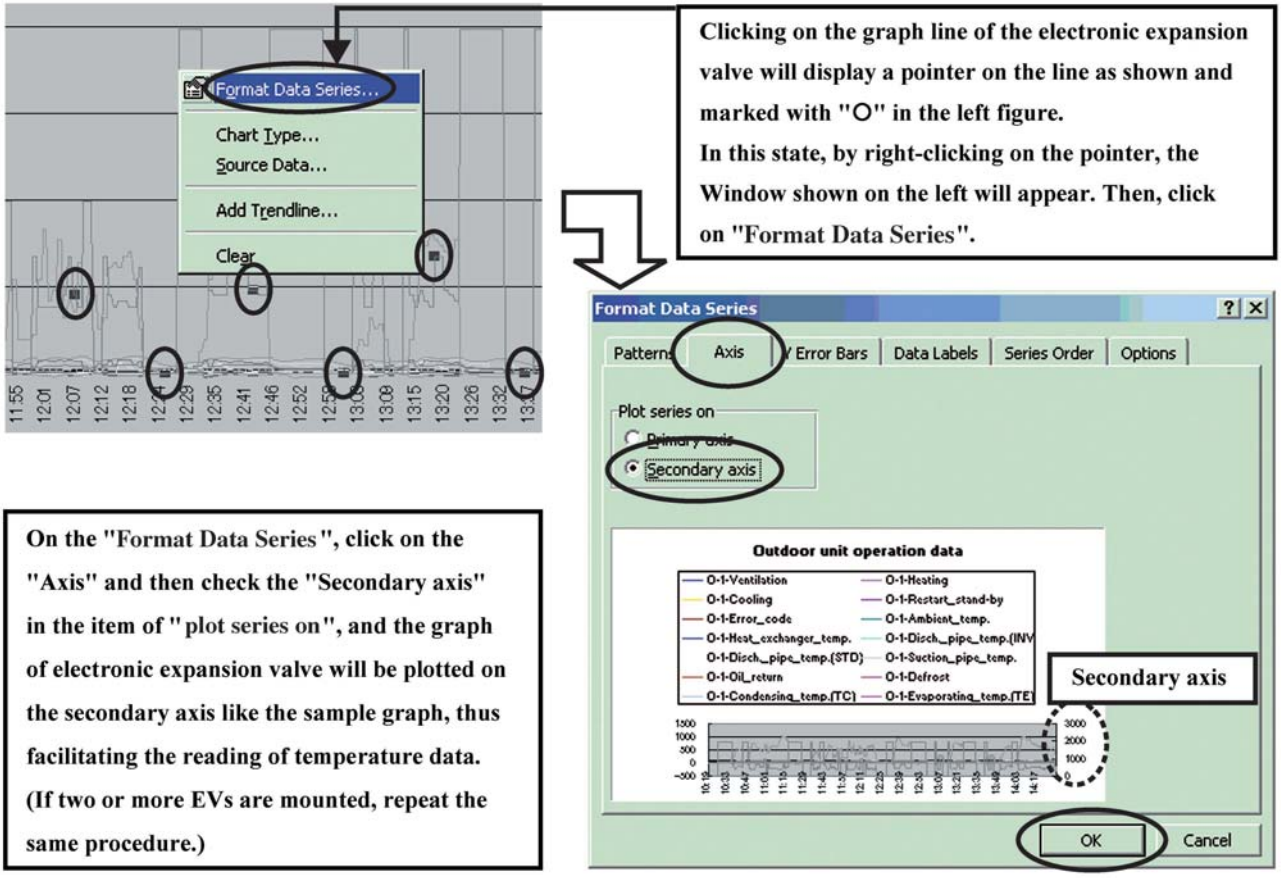
As shown in the window in previous page, all items contained in the Checker data are graphed. Therefore, for unnecessary items, click on the "Legend" (shown in window below) or item lines to delete them.



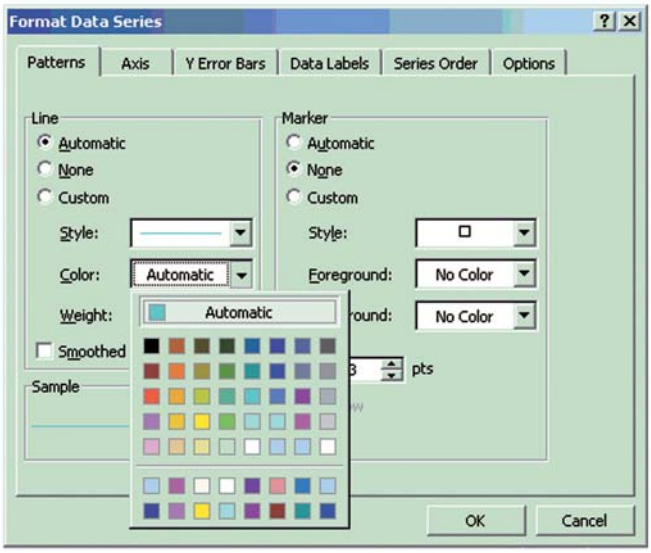
4.5 Using Secondary Axis



If “Opening degree of electronic expansion valve” is selected from the data, due to large amplitude range of 0 to 2000 pulses, the temperature data will be gathered at the bottom of the graph, thus resulting in hard verification of data. Therefore, use the secondary axis to facilitate the reading of the data.



[Reference 1]



"Patterns" menu on the "Format Data Series" enables changes of the "Color/Weight" and others of the graph Lines.

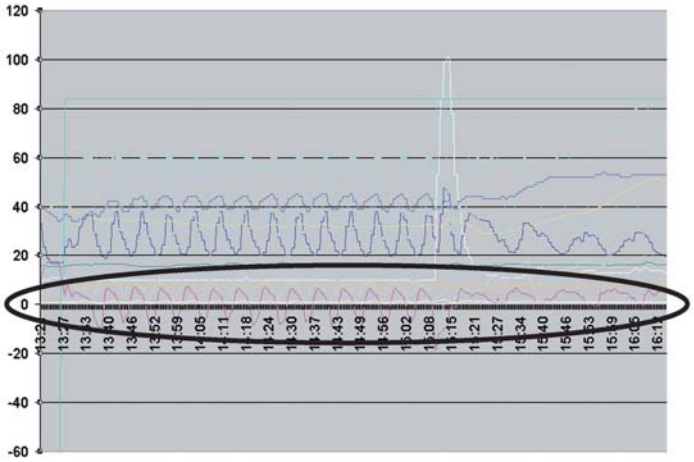
[Reference 2]

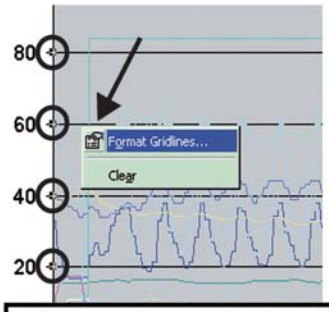
Before the startup of graph wizard, narrow data down to some extent and highlight "Hide". Doing so will require no execution of Section 1-2.

【Highlight columns not to be displayed → Right-click → Highlight "Hide".

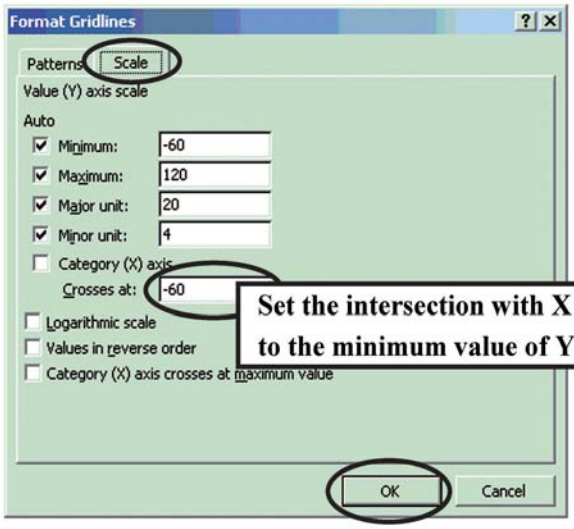
4.6 Traverse of X Axis

Since the intersection of X and Y axes is “0” on the current graph , change this intersection to facilitate the reading of the graph.

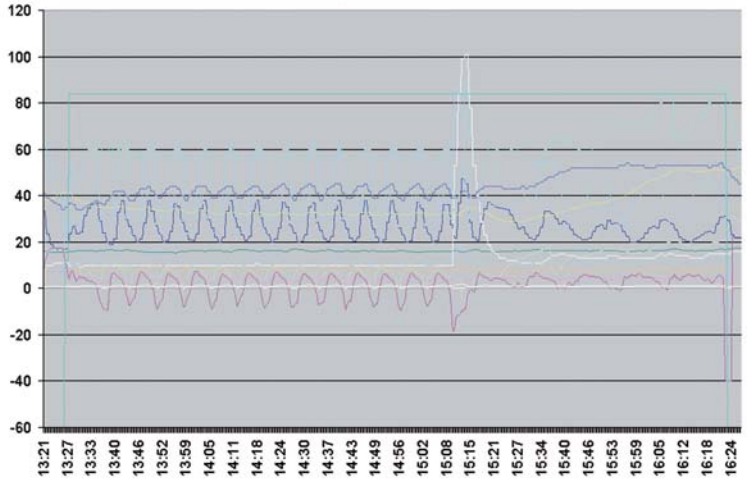




Click on the graduation line of the numerical value axis.
(A pointer will appear on the numerical value axis.)
Right-clicking on the pointer will display the "Format Gridlines" window.



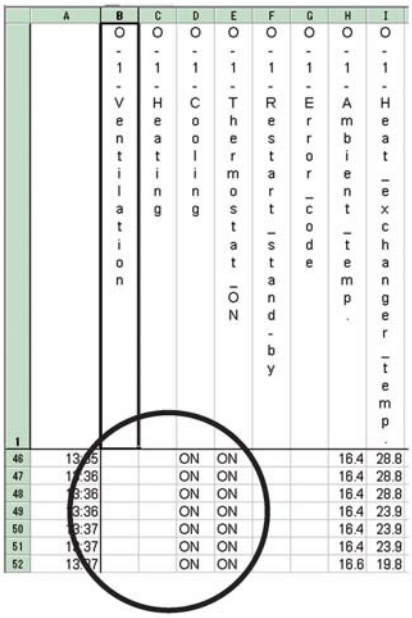
Set the intersection with X axis to the minimum value of Y axis.



The item of X axis traverses to the minimum value of Y axis, thus facilitating the reading of the graph.

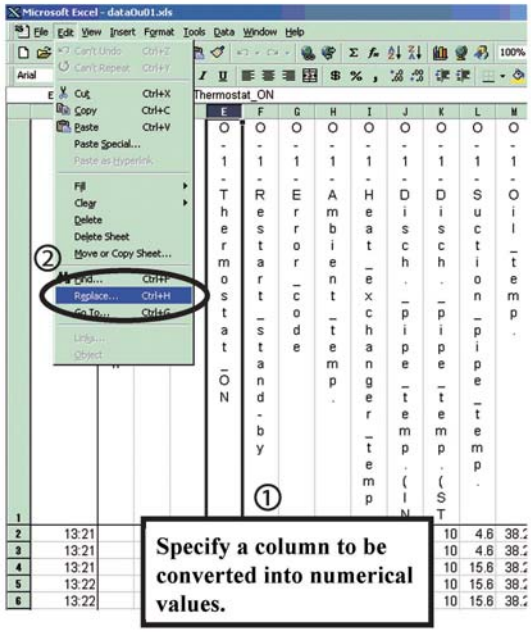
[Reference 3]

■ **Graphing of ON/OFF data on Checker data**



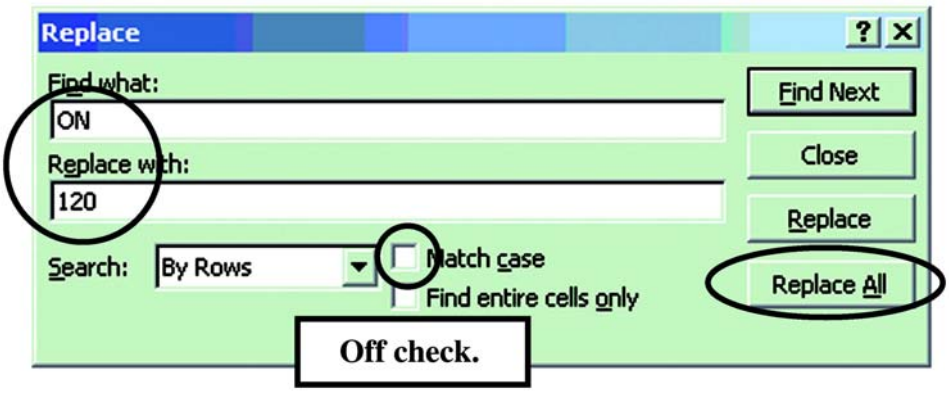
	A	B	C	D	E	F	G	H	I
1		O-1-Ventilation	O-1-Heating	O-1-Cooling	O-1-Thermostat_ON	O-1-Restart_stand-by	O-1-Error_code	O-1-Ambient_temp.	O-1-Heat_exchanger_temp.
46	13:35			ON	ON			16.4	28.8
47	13:36			ON	ON			16.4	28.8
48	13:36			ON	ON			16.4	28.8
49	13:36			ON	ON			16.4	23.9
50	13:37			ON	ON			16.4	23.9
51	13:37			ON	ON			16.4	23.9
52	13:37			ON	ON			16.6	19.8

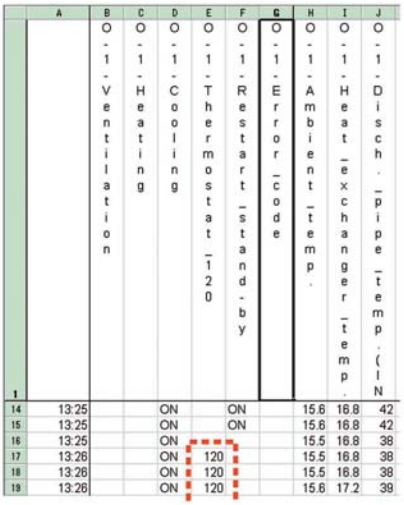
Converting ON/OFF data into numerical values and displaying them within the graph will provide easier understanding of the transition of temperature data with operating conditions.



Highlight a column to be converted into numerical values and then click on the "Replace All" on the "Edit" menu.

■ **Convert "ON" → "120 (Arbitrary)"**



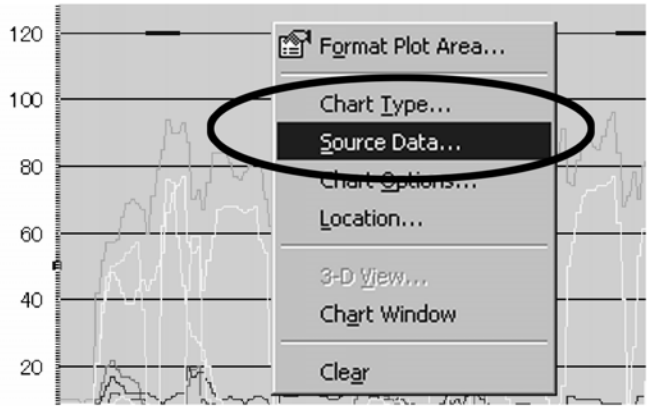


	A	B	C	D	E	F	G	H	I	J
1		O-1-Ventilation	O-1-Heating	O-1-Cooling	O-1-Thermostat_120	O-1-Restart_stand-by	O-1-Error_code	O-1-Ambient_temp.	O-1-Heat_exchanger_temp.	O-1-Disch._pipe_temp.(IN
14	13:25			ON		ON		15.6	16.8	42
15	13:25			ON		ON		15.6	16.8	42
16	13:25			ON				15.5	16.8	38
17	13:26			ON	120			15.5	16.8	38
18	13:26			ON	120			15.5	16.8	38
19	13:26			ON	120			15.6	17.2	39

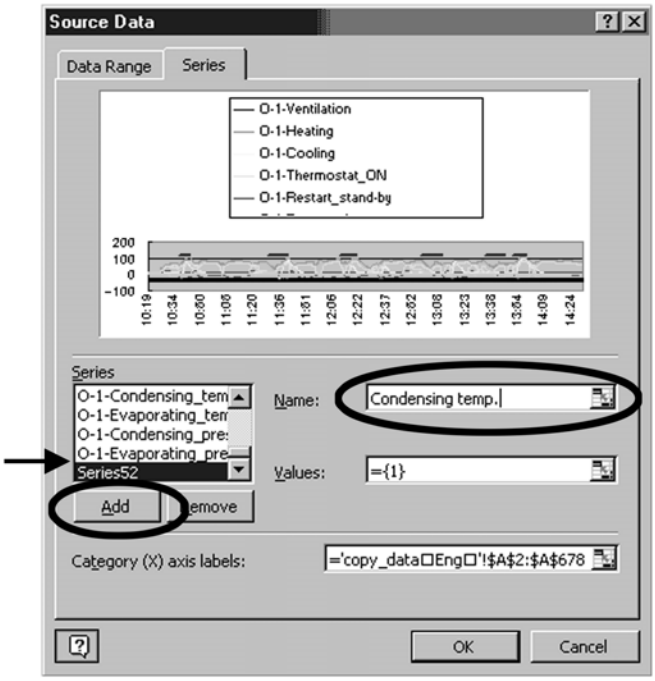
Since "ON" data is converted into a numerical value (120), use the graphing procedure to retrieve the data in the graph.

[Reference 4]

- **Adding data after the graph is plotted.**

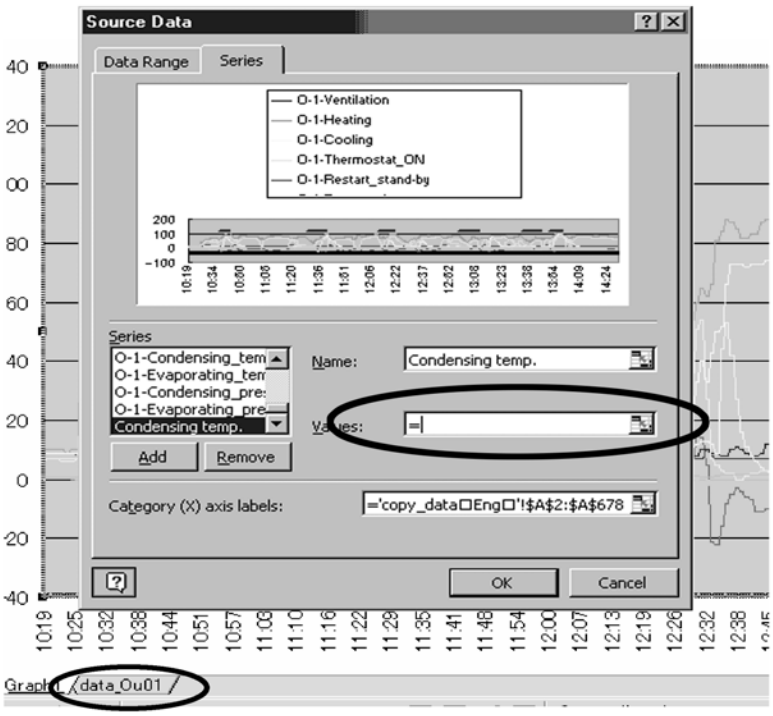


Right-click on the graph plotted and then click on the "Source Data".



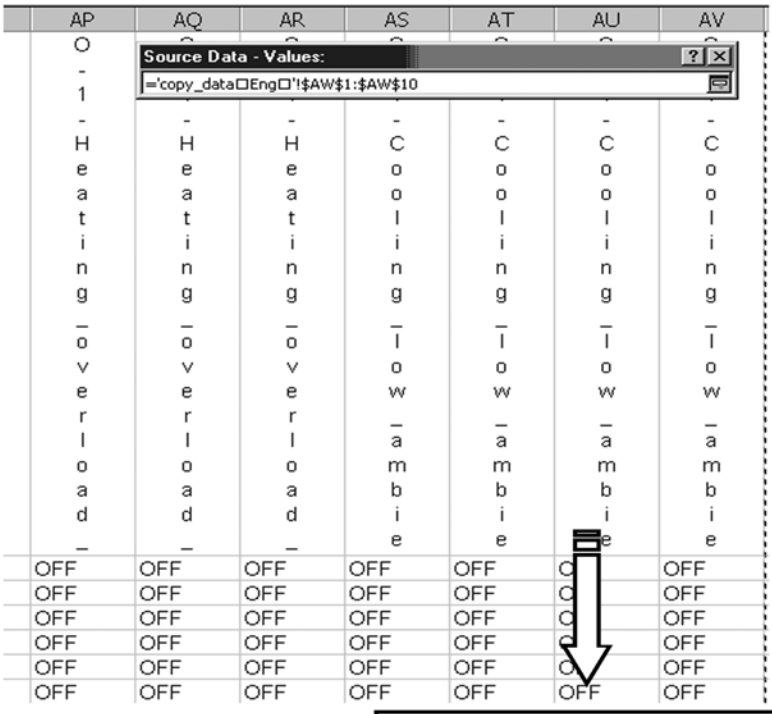
Clicking on the "Add" button will add new series (e.g. Series 52 in figure on the left).

Then, enter an item name to be added.



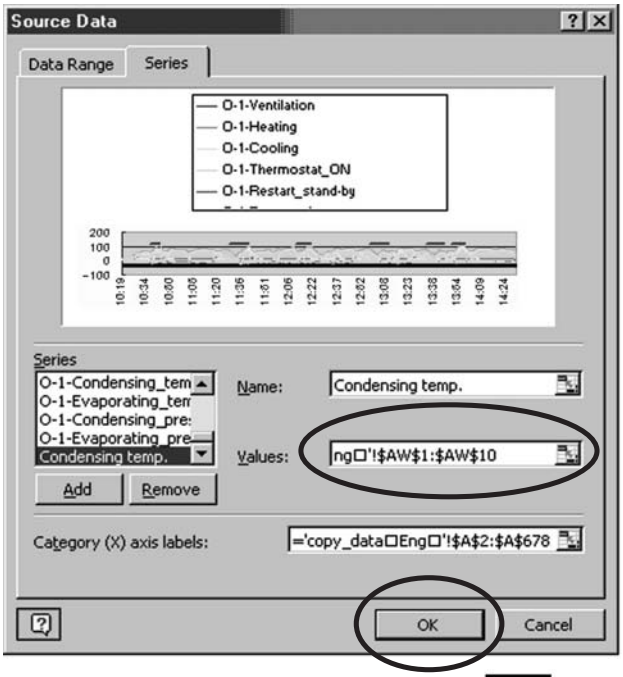
Use the "Values" to determine the range of data.

Return to the original data (data_Ou01) and then highlight the item to be added, thus specifying the range of data.

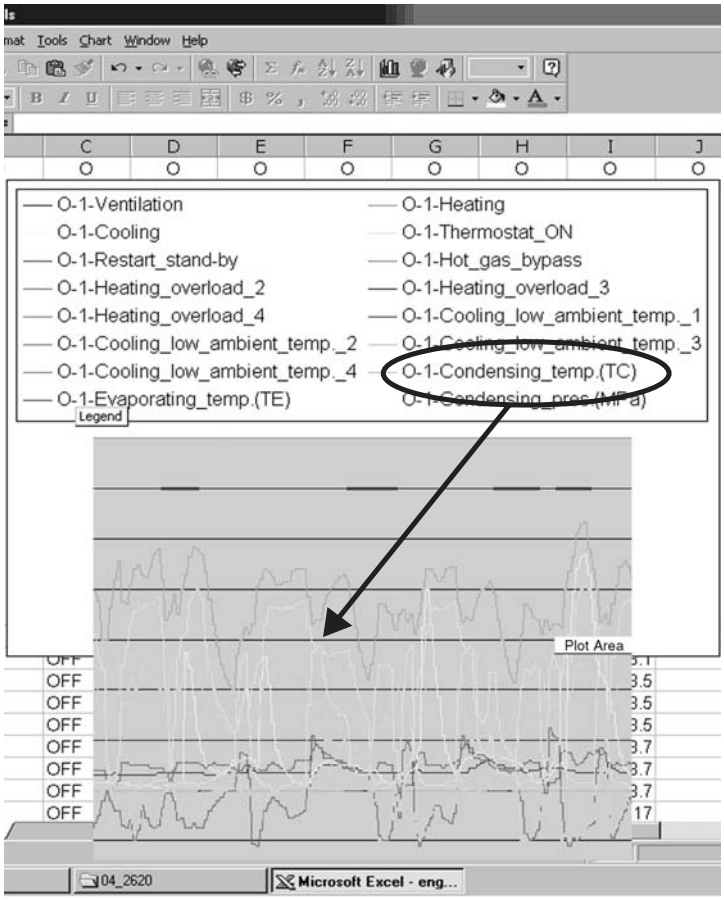


While dragging the mouse, specify the range of data.

(Move the mouse over the range of the original graph.)



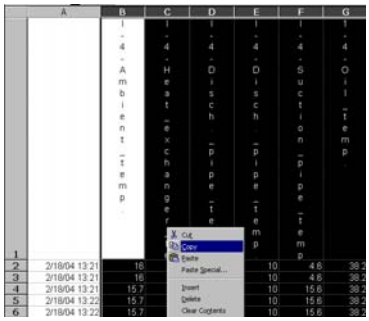
When the range of data to be added is written, click "OK".



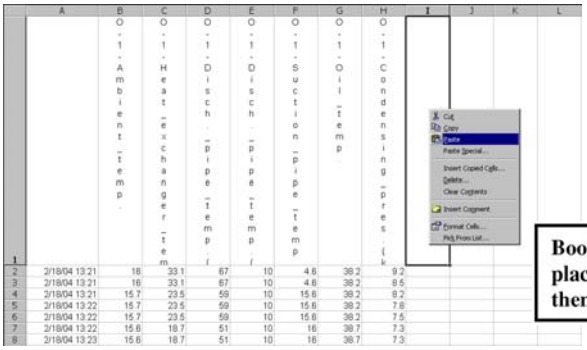
The data series (condensing temperature) is additionally displayed within the graph.

[Reference 5]

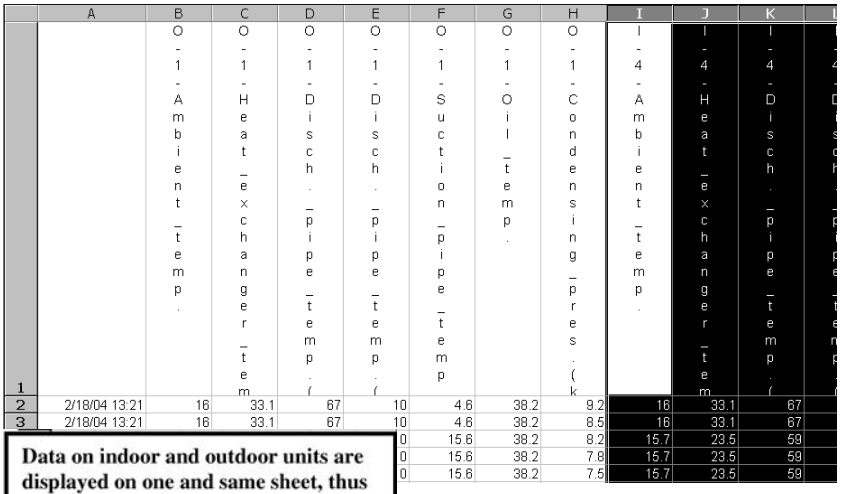
■ **Plotting of data on indoor and outdoor units in one and same graph**



Select data to be plotted in one and same graph from data on indoor units and copy the data by column.



Boot data on outdoor units and click on a place to insert data on indoor units, and then paste the data to this place.



Data on indoor and outdoor units are displayed on one and same sheet, thus making it possible to plot the data in a graph.

Caution The data on indoor units are sampled at 5-minute intervals and, therefore, do not follow the data on outdoor units on an anytime basis.

5. Points of Analysis

5.1 Method of Use by Symptom

In the Case of Faulty Compressor

1. While the compressor is running:
- Compressor oil temp. > Evaporating temp. (Low pressure saturation temp.) + 10°C
- Discharge superheated degree (Discharge pipe temp. – Condensing temp. (High pressure saturation temp.) > 10°C
  (however, 5°C within 12 minutes after startup.)
- Compressor oil temp. < 80°C (If this oil temp. reaches 80°C or more, the oil viscosity will be degraded.)
- Check whether or not suction superheated degree is on a wet trend.
  (Check to be sure the control of outdoor unit EVs while in heating or that of indoor unit EVs while in cooling.) ← (Check whether or not the EVs are throttled.)

2. While the compressor stops running:
- Ambient temp. + 15°C < Oil temp. < 80°C (Pass/Fail judgment of crankcase heater)

In the Case of Malfunction of Cooling

- Check to be sure the temperature detected by pressure sensor has reached and kept constant at target pressure (evaporating temperature).
- Check to be sure the temperature detected by the liquid pipe thermistor of indoor unit reaches about 5 to 7°C, and furthermore the temperature detected by the gas pipe thermistor is about 10°C.
- In addition, check to be sure the opening degrees of indoor unit EVs are about 500 to 1000 pulses, except while in capacity control mode.
  (While in capacity control mode, the EV opening degrees are controlled toward closing side. Thus, the superheated degree will have an increasing tendency.)
- If the indoor unit EVs have uniform and same opening degrees, outdoor units have output control instructions. In this case, check to be sure the data on outdoor units.

In the Case of Malfunction of Heating

- Check to be sure the temperature detected by high pressure sensor has reached and kept constant at target temperature (condensing temperature).
- Check to be sure the temperature detected by the liquid pipe thermistor of indoor units reaches about 38°C.
- Check to be sure the opening degrees of indoor unit EVs are about 500 to 1000 pulses.
  (If the EVs fully open (i.e., the opening degree is 2000 pulses (or approx. 1400 pulses for R410A), refrigerant may be charged excessively or heating load may reach a high level.)
- High pressure – Liquid pressure > 2 kg/cm^2 at service ports on stop valve on the outdoor unit side, which cannot be checked on the Checker.
  (Due to the flow characteristics of EVs, unless the differential pressure between the front and rear of the valve is ▲ 2 kg/cm^2, the liquid is hard to flow.)

5.2 To Conduct Analysis

In order to collect or analyze the Checker data,

First of all, make Pass/Fail judgment on functional parts

For accurate data collection, be sure to check functional parts for any problem.
Example: Even though the thermistor showed a normal value at an ambient temperature, the detection data got out of order with increasing temperature.
(Particularly, to collect data on products manufactured in many years ago, give consideration to the example mentioned above.)

Pay attention to “Condensing temp./Evaporating temp.” rather than to “High pressure/Low pressure”.

High and low pressures detected by each pressure sensor are displayed in values, converted into pressure equivalent saturation temperatures, and used as target values for the capacity control. Therefore, it is immediately obvious whether or not the target temperatures are achieved.

Check each drooping/protection control for operating conditions and think about why this control is performed.

Each stepping down/protection control is used to ensure reliability, not to protect malfunctions. For example, do not consider that “The unit does not cool (or heat) due to control activated”. Verify why the control is activated, in accordance with other data.

Are “discharge superheated degree and suction superheated degree” kept at proper levels, respectively?

Most of malfunctions on compressors result from “wet operation”. Referring to the diagnosis procedure on the preceding page, check to be sure the discharge and suction superheated degrees are kept at proper levels.

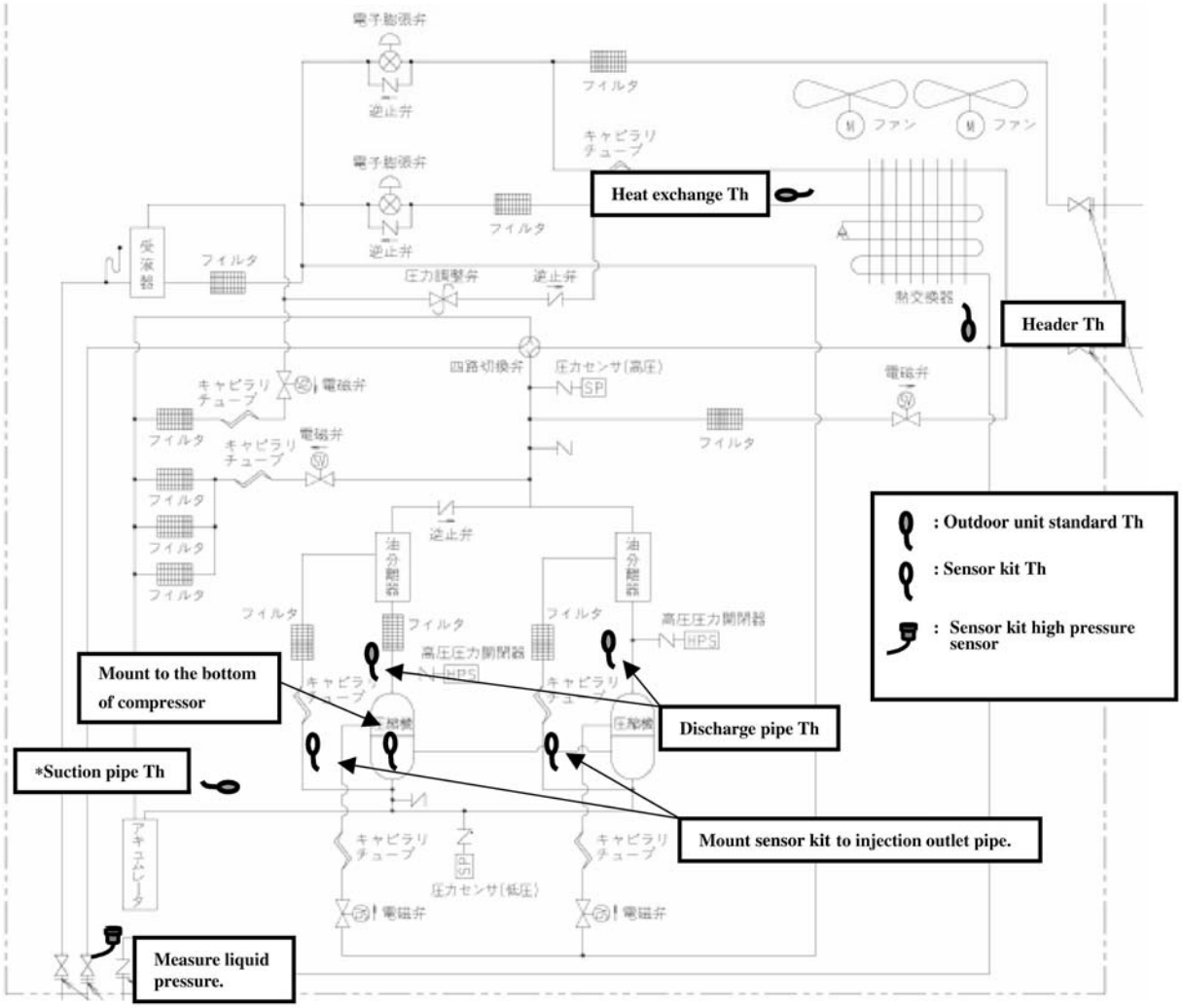
Use data on indoor units as reference values.

Data on temperatures and Evs' opening degrees of indoor units are updated every five minutes. By contrast, data on outdoor units are updated earlier than that. As a result, even though data on outdoor units can be collected, the data is not synchronized with that while in malfunction in most cases. Give consideration to this point in order to verify the data on indoor units.

5.3 Effective Use of Checker

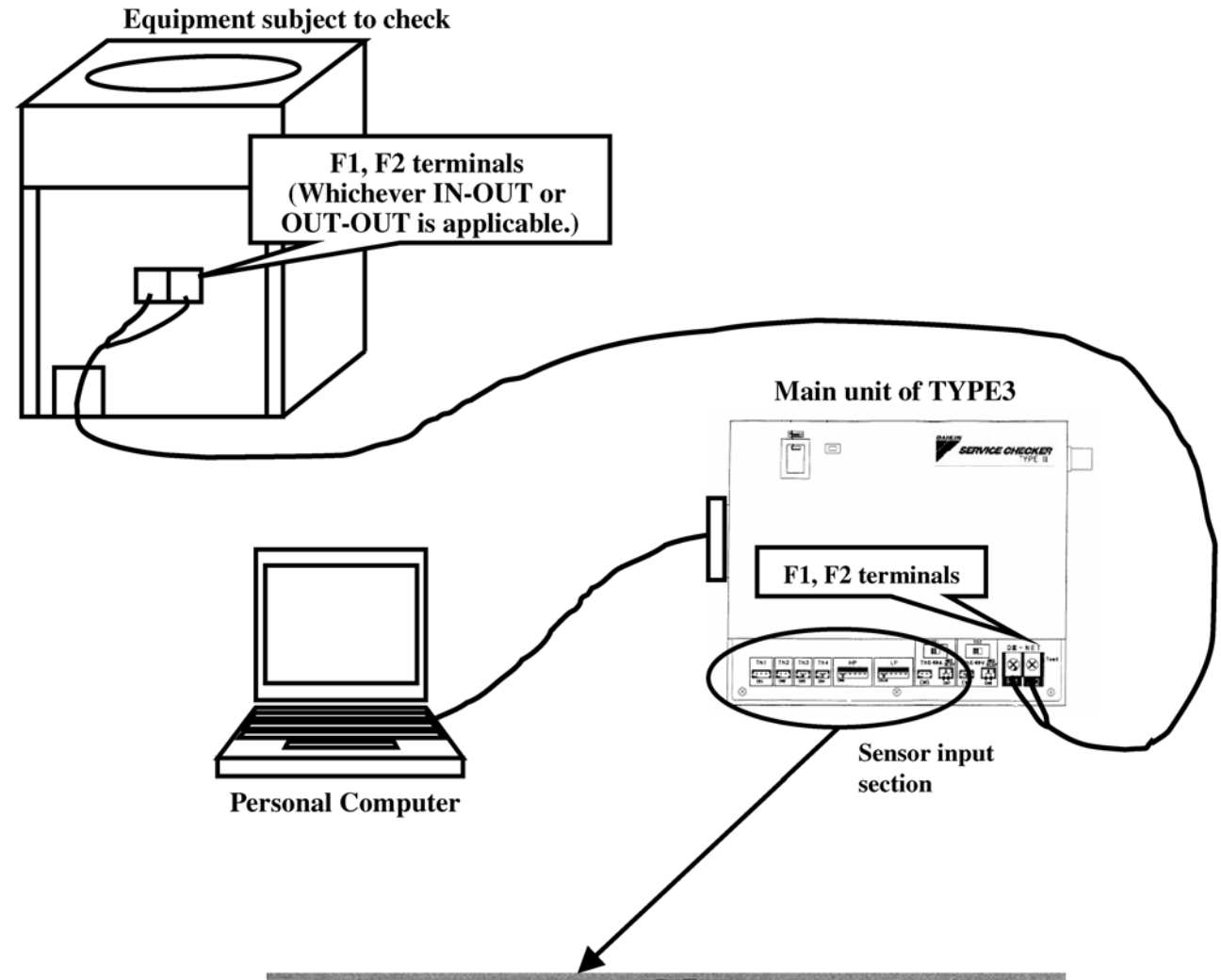
Probe causes of wet operation using the Checker in combination with sensor kits.
Most of current malfunctions on compressors result from seizing of or damage to the compressors due to the dilution of lubricant (refrigerant oil) caused while the compressors are in wet operation.
In order to verify the wet operation using the Checker Type3, using DIII-NET and sensor input in combination enables the collection of effective data.
(If the Checker is connected to PC board, no sensor kits can be used in combination.)

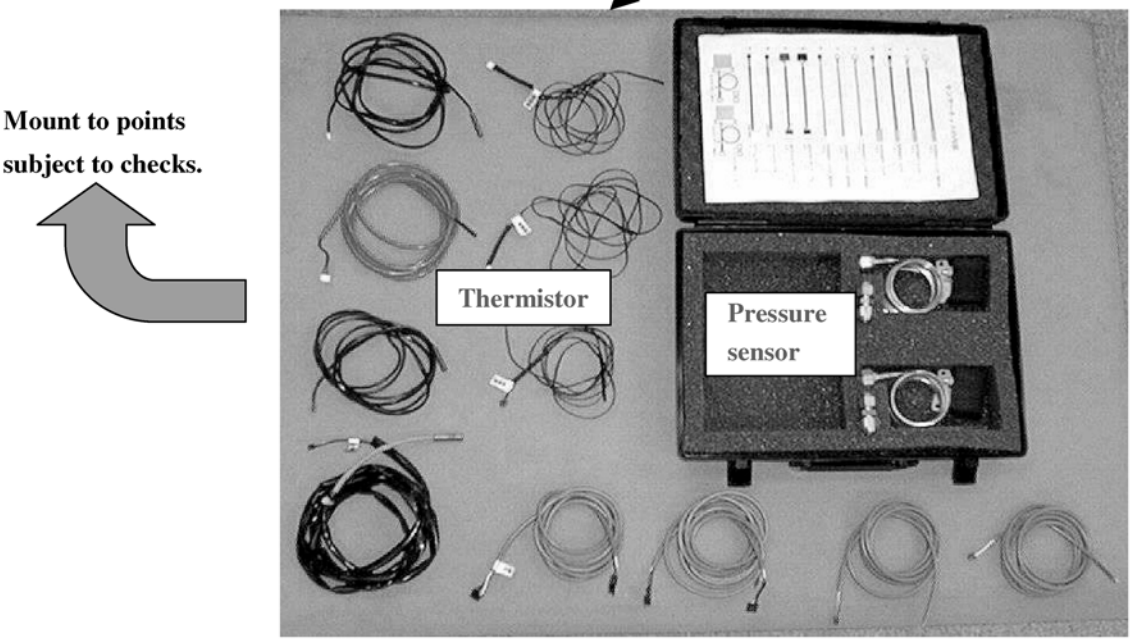
(Example of connection) For RSXYP16KJY1 (Information on slave units is omitted.)



- Through the ON/OFF operation of Injection solenoid valve and the temperature of outlet pipe, determine whether or not oil leaks inside the solenoid valve.
- Measure the melting refrigerant into oil according to the temperature at the bottom of compressor and also wet operation according to compressor operating temperature.
- Since the position of the suction pipe Th varies with models, mount the sensor kit Th in a place where the suction pipe is connected at all times.

5.4 Example of Checker Connection



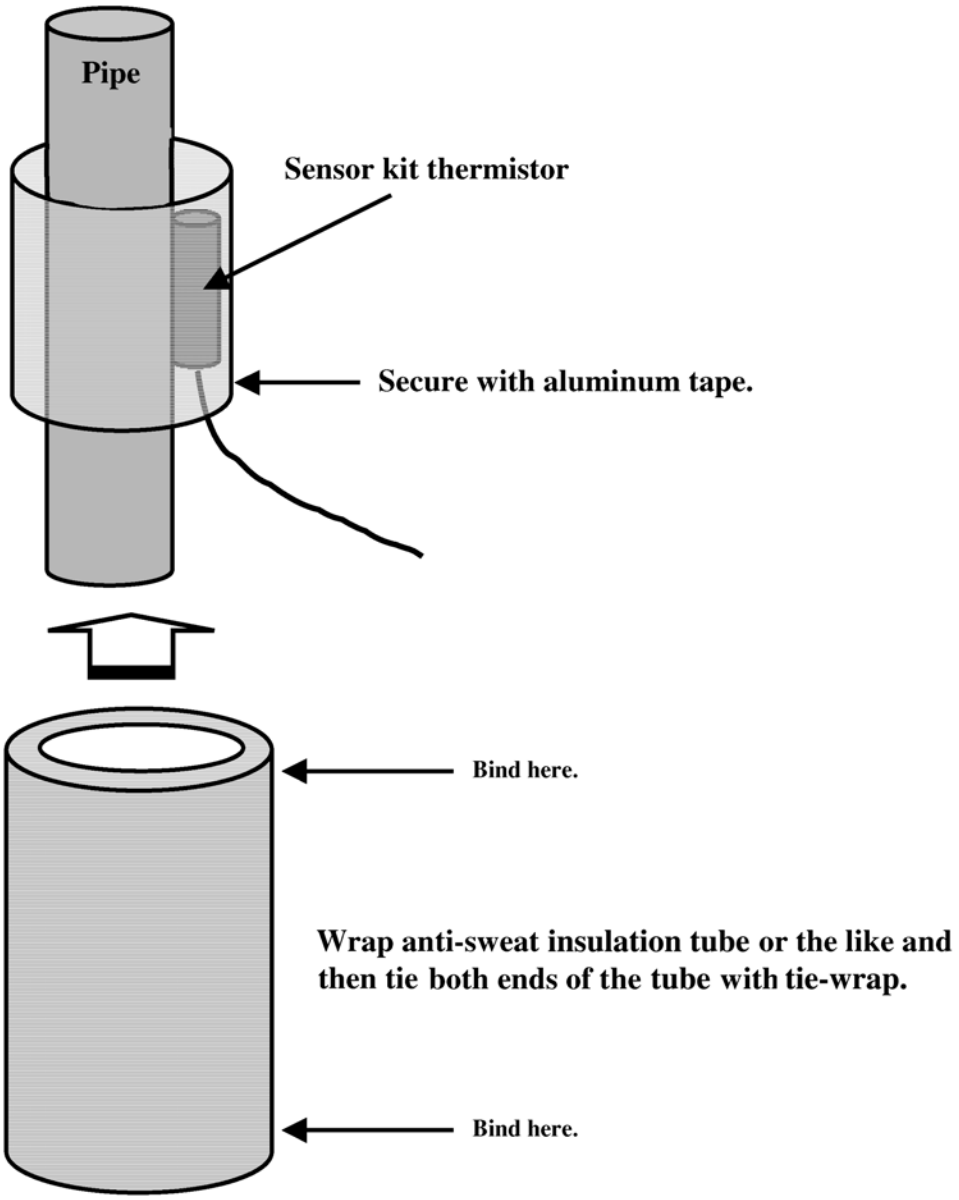


Sensor kit

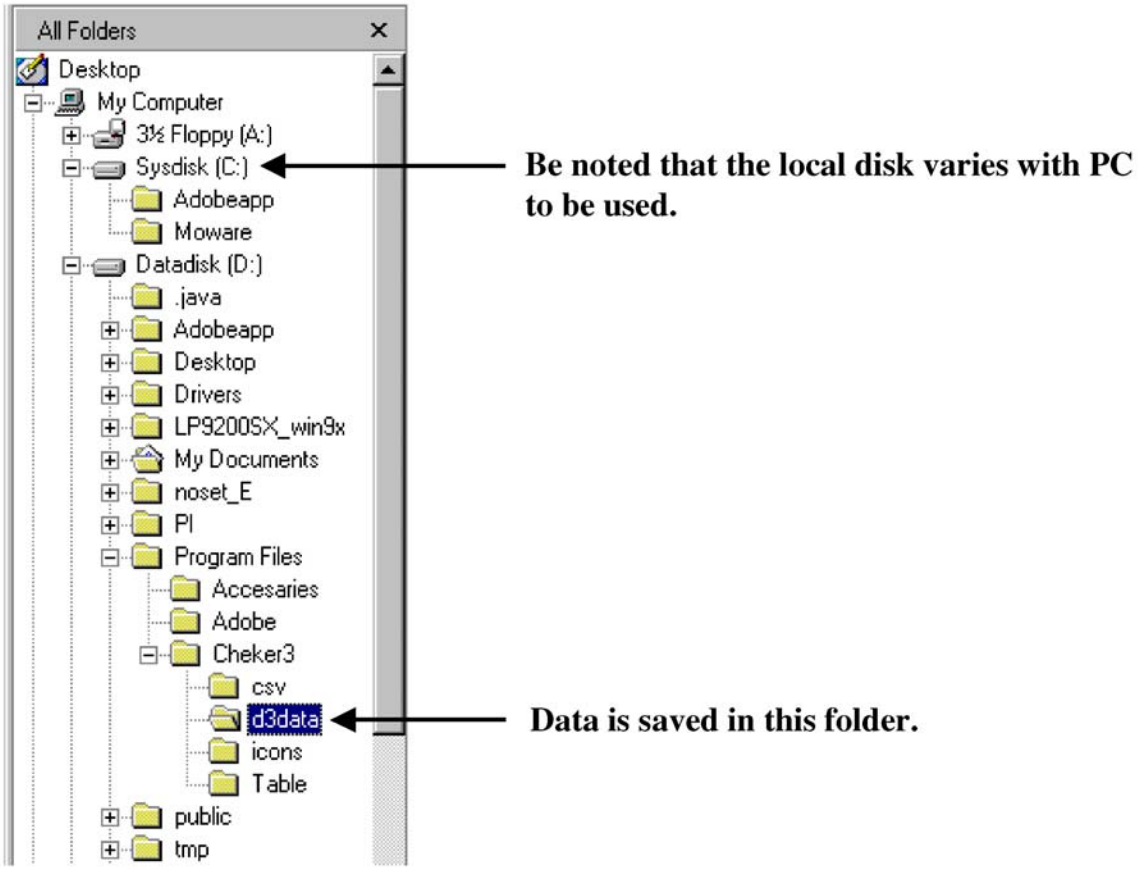
5.5 Method of Mounting Sensor Kit

Caution

1. Determine the position to mount thermistor.
2. Clean the pipe. (Wipe condensate or dirt off the pipe, if any.)
   Be sure to stop equipment before mounting the thermistor to a low temperature pipe.
   (If the pipe is condensed or frozen, no accurate measurements are enabled.)
3. Bring the thermistor into close contact with the pipe in parallel and tightly wind aluminum tape around them.
4. Wrap anti-sweat insulation tube or the like around pipe and thermistor (in order to make them insensitive to ambient temperature.
5. Tie both ends of the anti-sweat vessel.



5.6 Place to Save Data



The DIII data is used to save transmission data on air conditioners.
However, this data cannot be analyzed with the Service Checker.
(If Quality Control Department from factory gives an instruction, collect and transmit the data.)

(Case Example) EXIII: Abnormal discharge pipe temperature

Unit supplied: RSXYJ140KC (Japanese domestic model) equivalent to RSXY5K.
Malfunction conditions:

The compressor stops due to the abnormal high temperature of discharge pipe (F3) approximately once a week.

Discharge pipe temperature control

- When the compressor reaches the discharge pipe temp. of Td – Tc > 35°C, the liquid injection will turn ON. When the discharge pipe temp. becomes Td – Tc < 15°C, the liquid injection will turn OFF. However,for a period of five minutes after the completion of compressor startup, oil return operation, or defrost operation, liquid injection is conducted on all compressors which have started.
  (Td: Discharge pipe temp., Tc: High pressure equivalent saturation temperature)

Referring to the Checker data (graph shown below)

- Even though the compressor reaches the discharge pipe temp. of Td – Tc > 35°C, liquid injection is not activated. (This time, no data on compressor stop due to malfunction could be collected.)

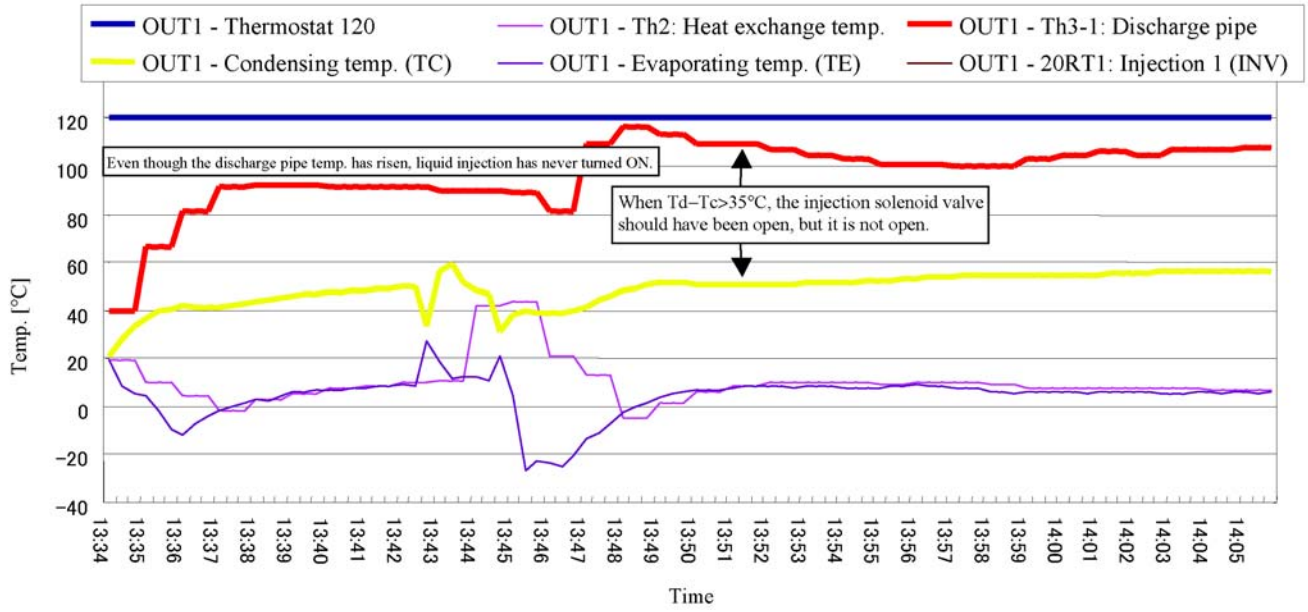
Cause of malfunction

- Since the compressor was shipped with a ROM for test unit use installed at the factory, even though the compressor reached the discharge pipe temp. of Td – Tc > 35°C, liquid injection was not activated. It is supposed that the discharge pipe temperature rose due to the long-term operation of the compressor, thus resulting in the compressor stop due to F3 Malfunction (Abnormally high temperature of discharge pipe).

Countermeasure

- The compressor returned to the normal operation by rewriting the ROM data.

Liquid injection does not turn ON.



(Case Example) VRV II Heat recovery type: Malfunction of heating

Unit supplied: REYQ16M (Heat recovery type)

Malfunction conditions:

Indoor units produce abnormal sounds sometimes and do not heat up.

Referring to Checker data on occurrence of malfunction while in all-unit heating operation (graph shown on the following page)

- The suction pipe temperature has risen up to approximately 70°C.
- Low pressure has reached approximately 1.5 MPa.
- Discharge pipe stepping down control has been activated.
- High pressure has not been stabilized.

* According to the data above, it can be judged that high pressure gas may be bypassed to low pressure side somewhere. Furthermore, since a temperature at the stop valve area of suction gas pipe provided on site was measured and found to be approximately 50°C, it can be judged that the gas is bypassed on the indoor unit side.(The suction gas pipe is only used in cooling operation. Furthermore, this pipe is directly connected to the compressor, thus causing no flow of high pressure gas.)

Referring to verification data on indoor units

Procedure for indoor unit operation

- Among five indoor units connected, stop four indoor units in cooling mode (in order to set the opening degree of the indoor unit expansion valve to 0 pls).
- Operate the remaining one indoor unit in heating test operation mode. (The reason is that if there is no indoor unit with thermostat ON while in heating mode, no high pressure gas will flow in the discharge gas pipe.)Making measurement of indoor unit operation data according to the aforementioned procedure will have an indoor unit which has an increased gas pipe temperature even though no refrigerant flow at 0-pls opening degree of the electronic expansion valve and the liquid and suction pipes are only connected. As a result, it can be judged that the indoor unit with the increased gas pipe temperature has discharge and suction pipes connected other way round.

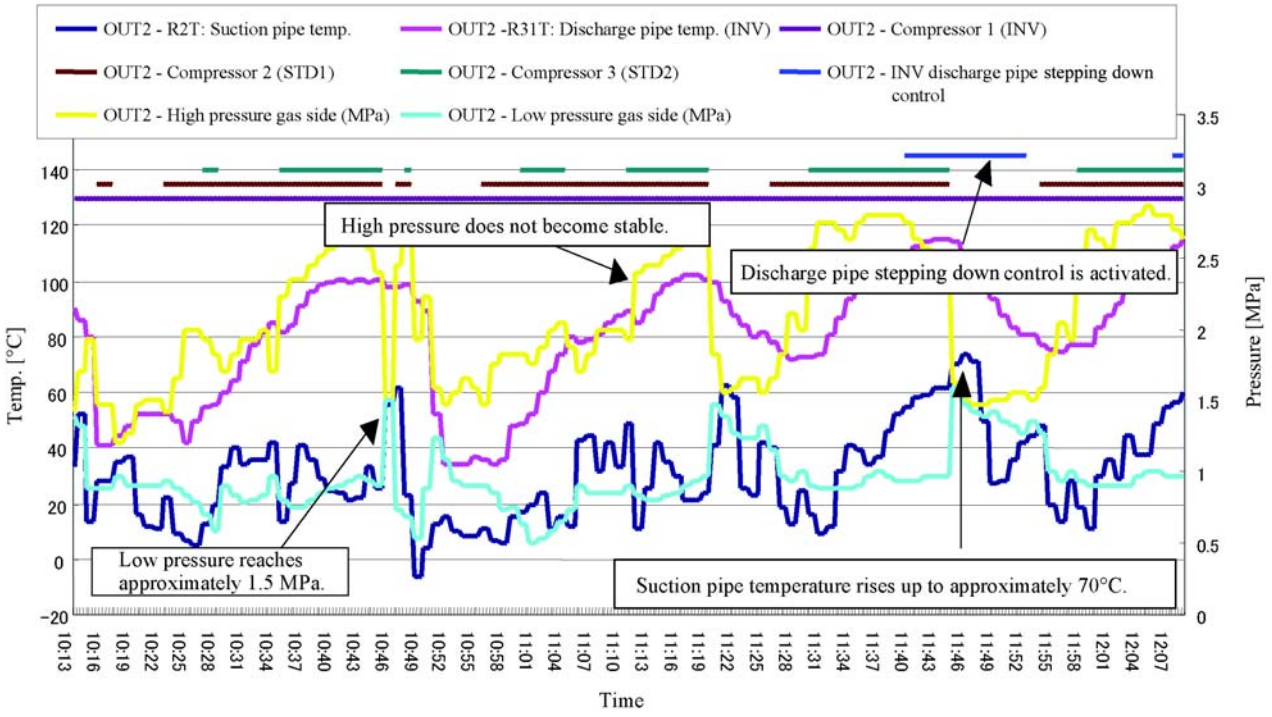
Cause of malfunction

- On the outdoor unit side, discharge gas was bypassed to the suction pipe. As a result, the suction pipe temperature rose following with a rise of discharge pipe temperature and the activation of discharge pipe temperature control, which disabled the continuous operation of the compressor leading to the unstable state of high pressure. Furthermore, on the indoor unit side, due to no discharge gas flow, no indoor units heated up and back pressure was applied to the check valve, thus resulting in the occurrence of abnormal sounds.

Countermeasure

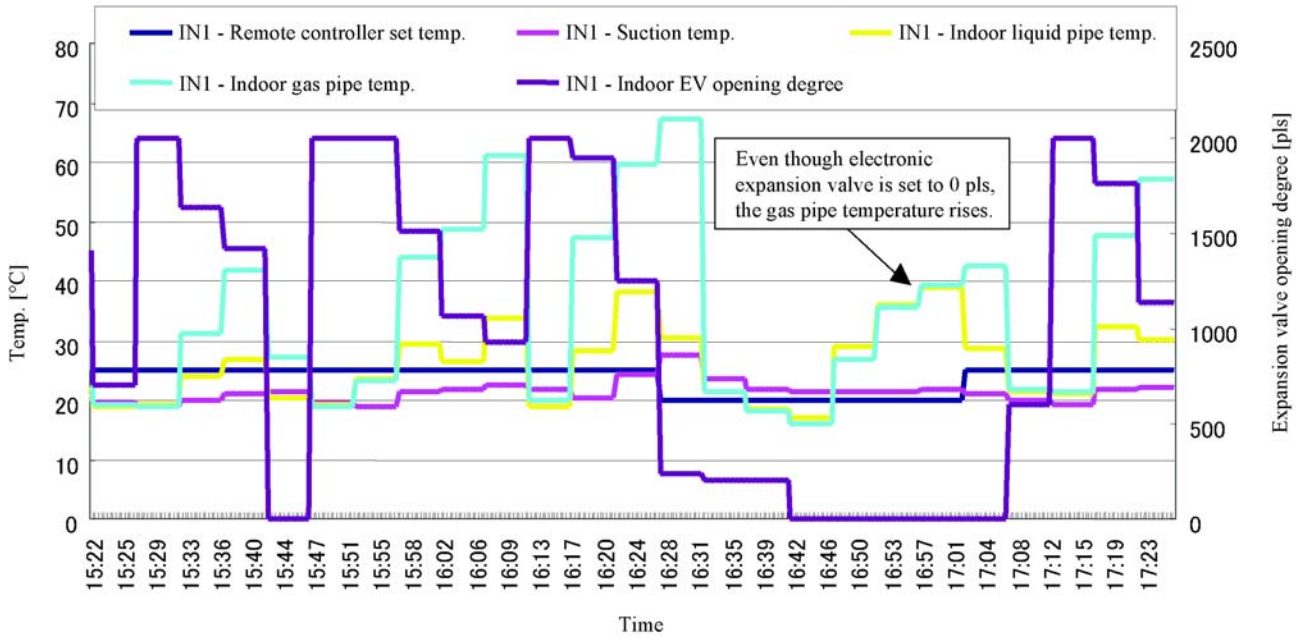
- Pipes of indoor units (1), (3), and (4) provided on site were rectified.

Data on occurrence of malfunction while in all-unit heating operation



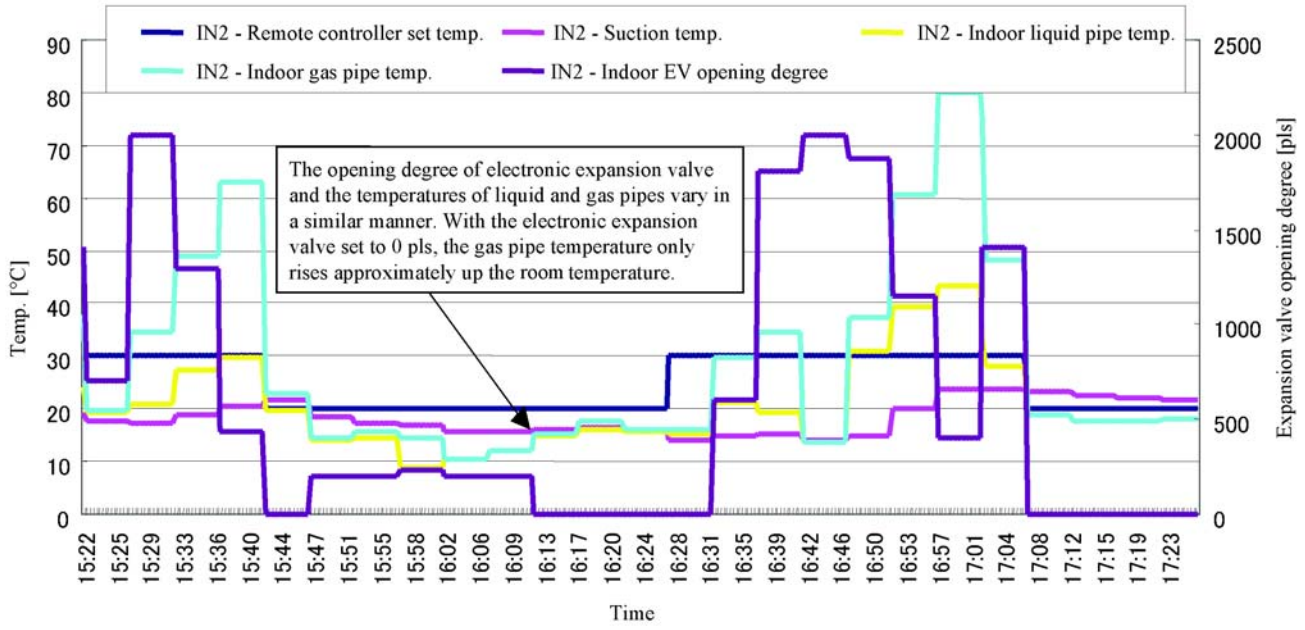
Graph of indoor unit (1)

Indoor unit (1)



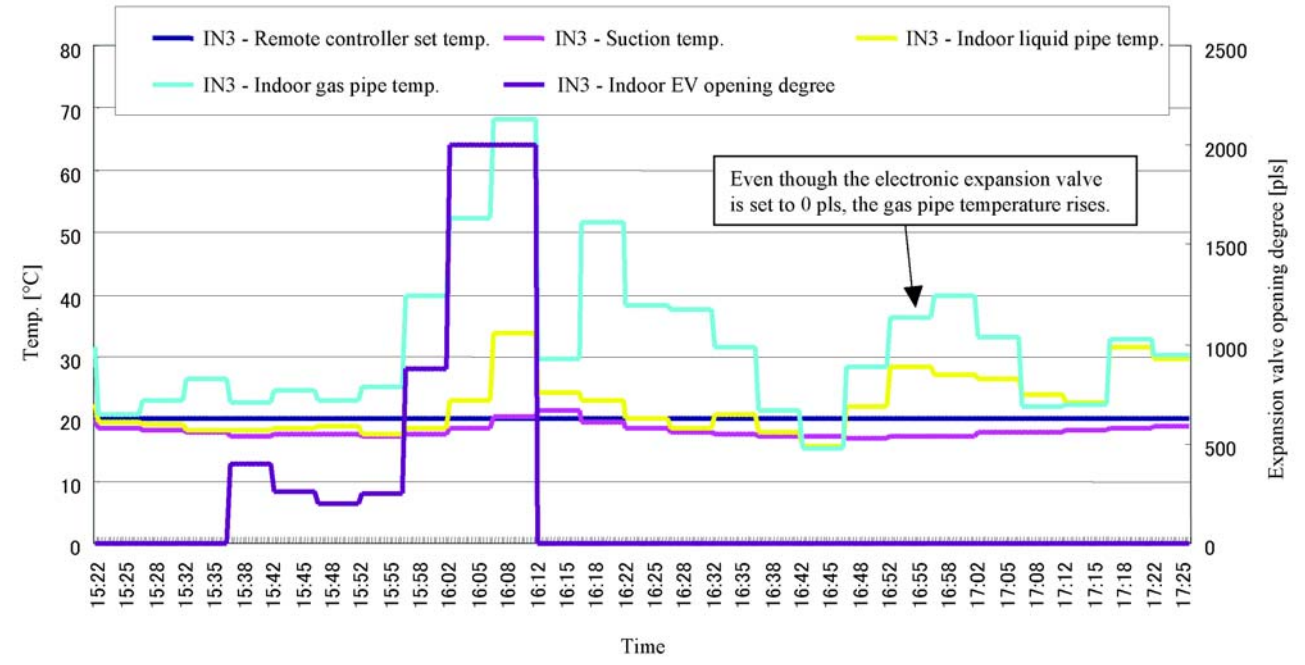
Graph of indoor unit (2)

Indoor unit (2)



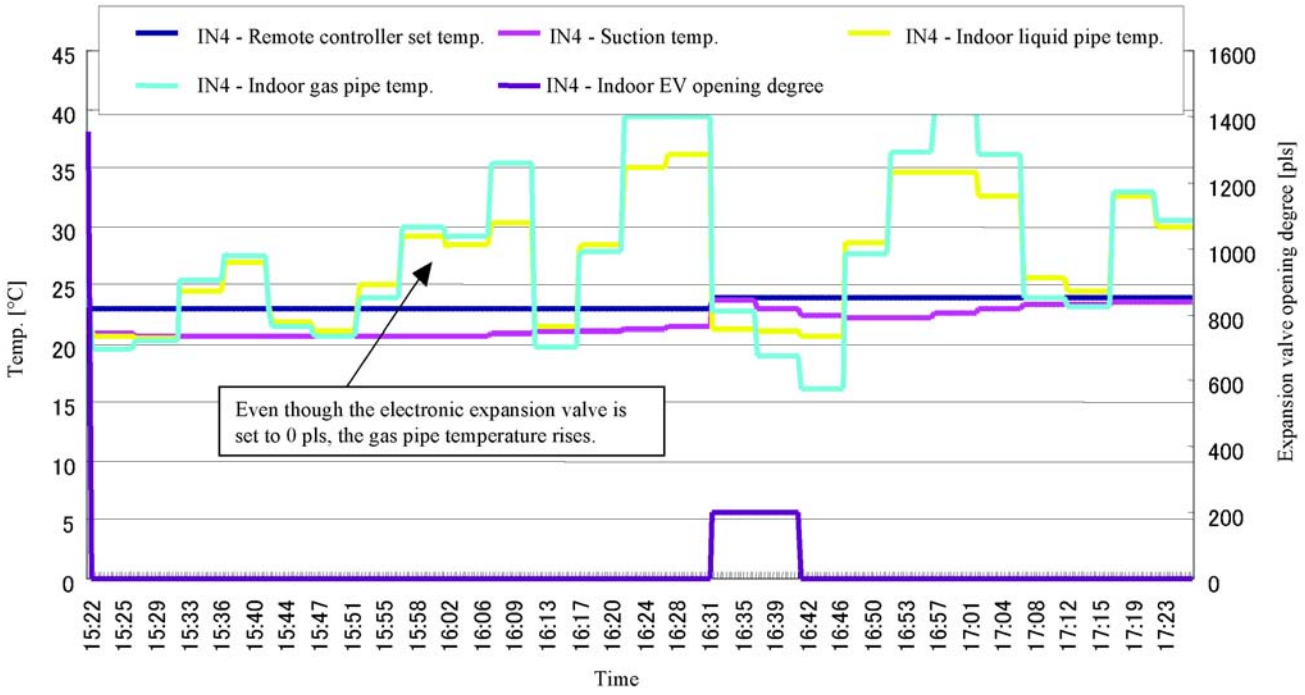
Graph of indoor unit (3)

Indoor unit (3)



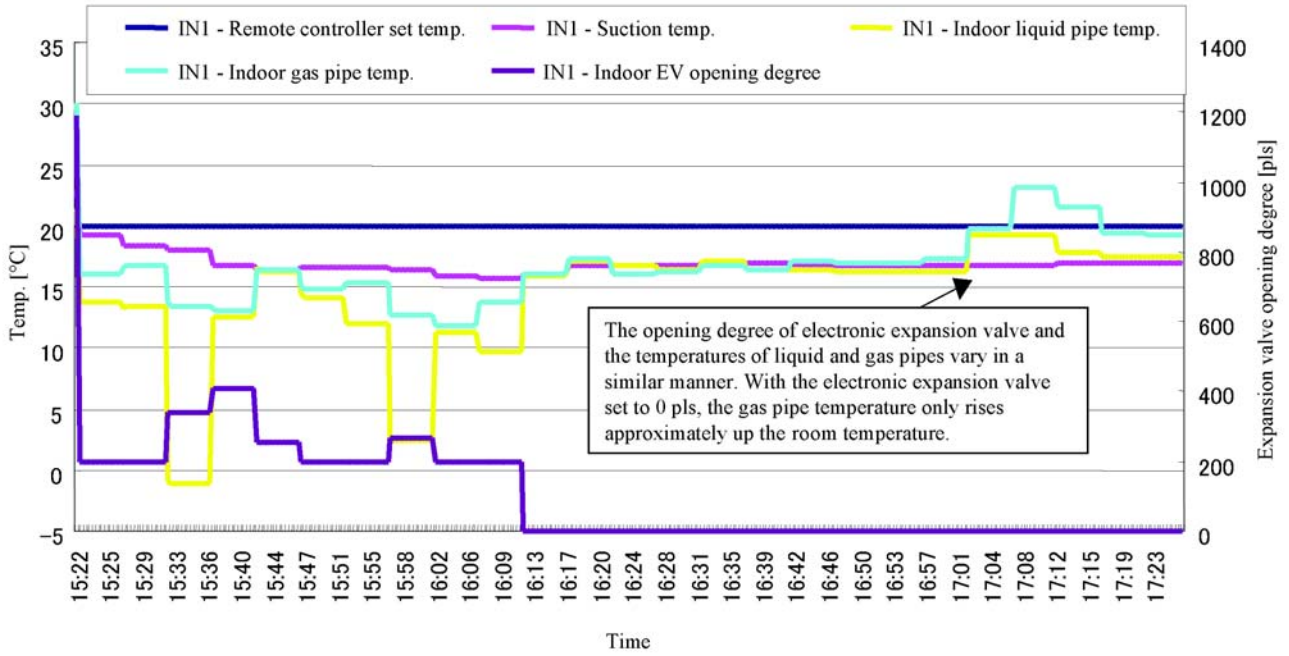
Graph of indoor unit (4)

Indoor unit (4)



Graph of indoor unit (5)

Indoor unit (5)



(Case Example) Ve-up STD RSXYP 5-10L:Malfunction of heating (Indoor units are all in fan operation mode.)

◆ **Features of data**

- The system is under heating overload (high pressure stepping down) control.
- The condensing temperature (high pressure) has reached the target value.
- The operating frequency of INV compressor does not increase. (STD compressor stops running.)
- The opening degree of outdoor unit EV is small.

↓

◆ **Diagnosis**

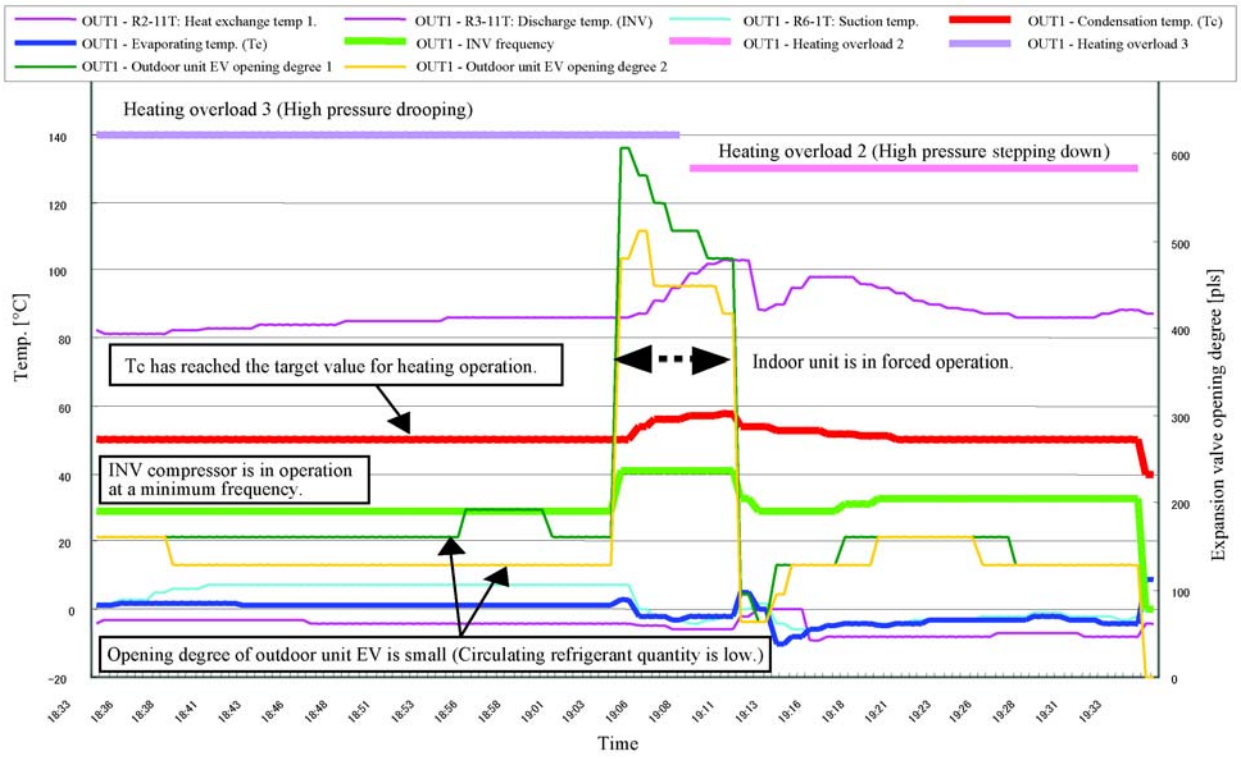
The compressor is low in capacity but reaches the target value of Tc and also under heating overload control. Consequently, the compressor load does not increase even if an increase of the capacity is demanded by the indoor unit.

◆ **Cause**

Non-condensable gas may have mixed in the refrigerant system.

◆ **Countermeasure**

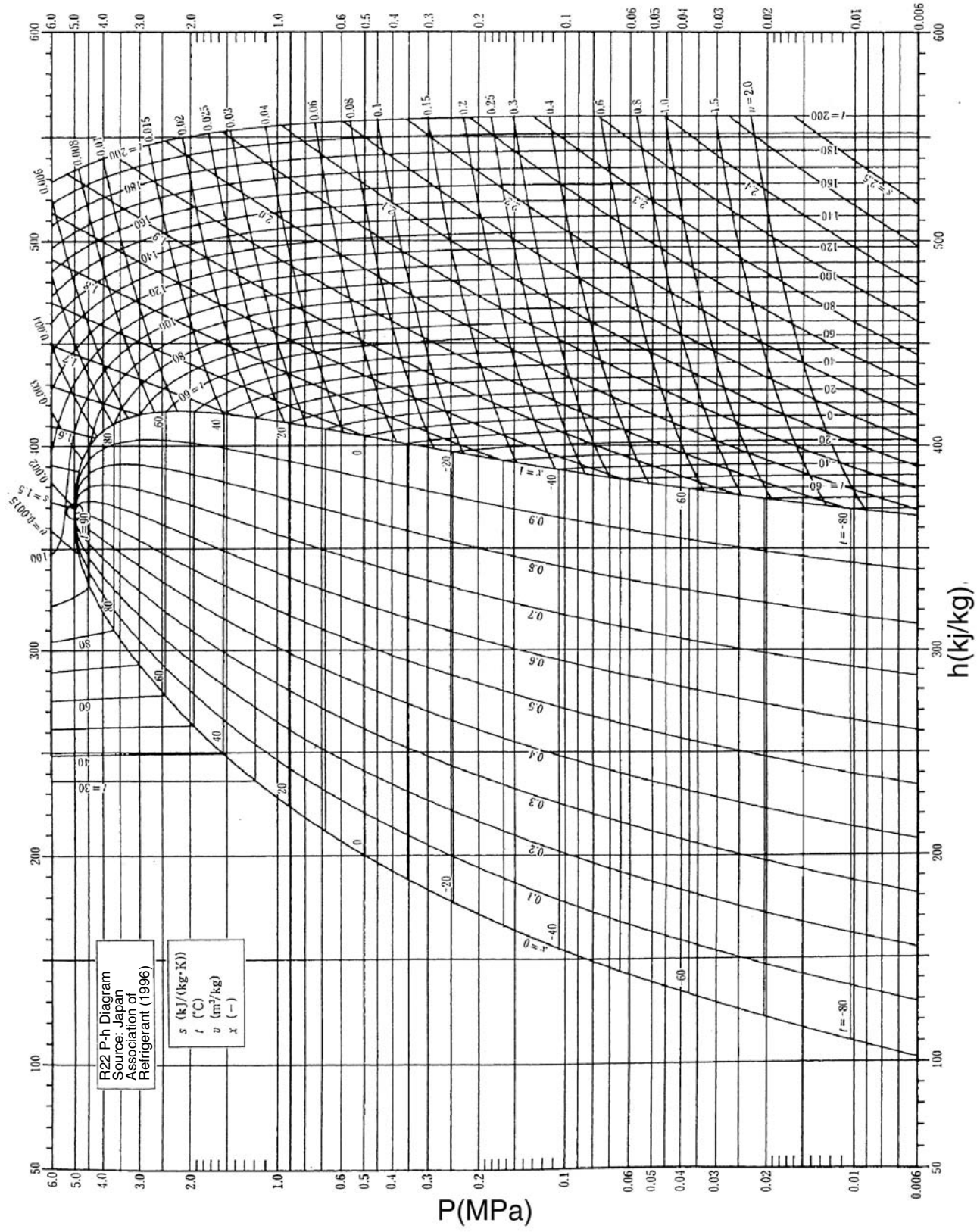
The system returned to good running conditions by the replacement of refrigerant.(Abnormal rise in high pressure occurred on the recovery unit while in refrigerant recovery operation. ← Non-condensable gas)



G. Appendix

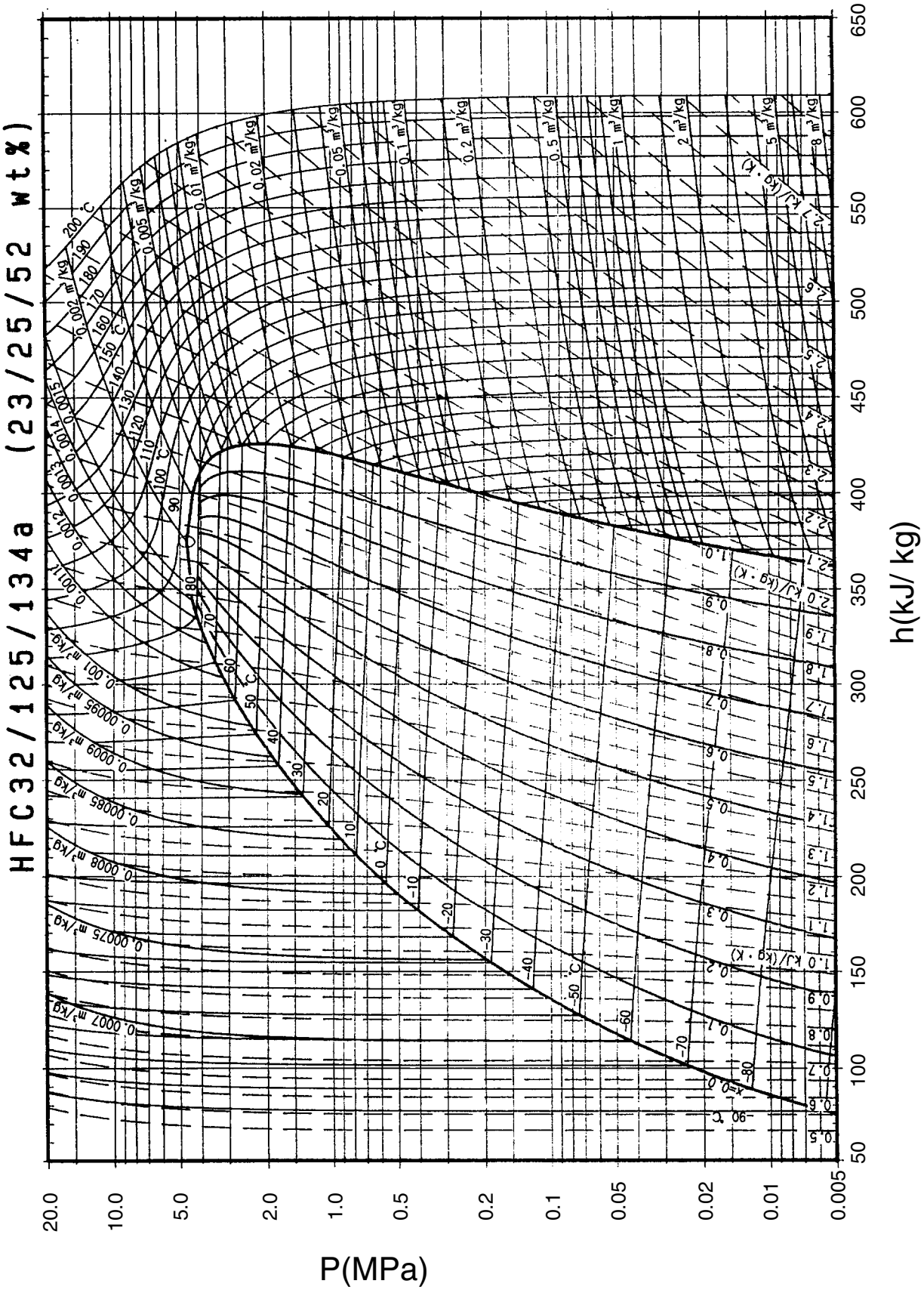
1. Characteristics of Refrigerant

1.1 R22



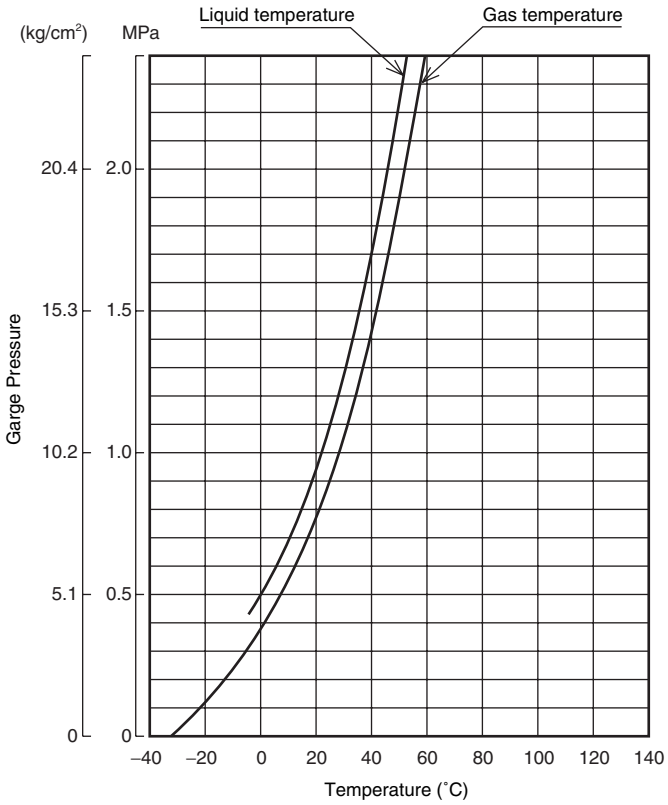
* The pressure values in the diagram show absolute pressure.
Deduct 0.1MPa to obtain gauge pressure.

1.2 R407C



* The pressure values in the diagram show absolute pressure.
Deduct 0.1MPa to obtain gauge pressure.

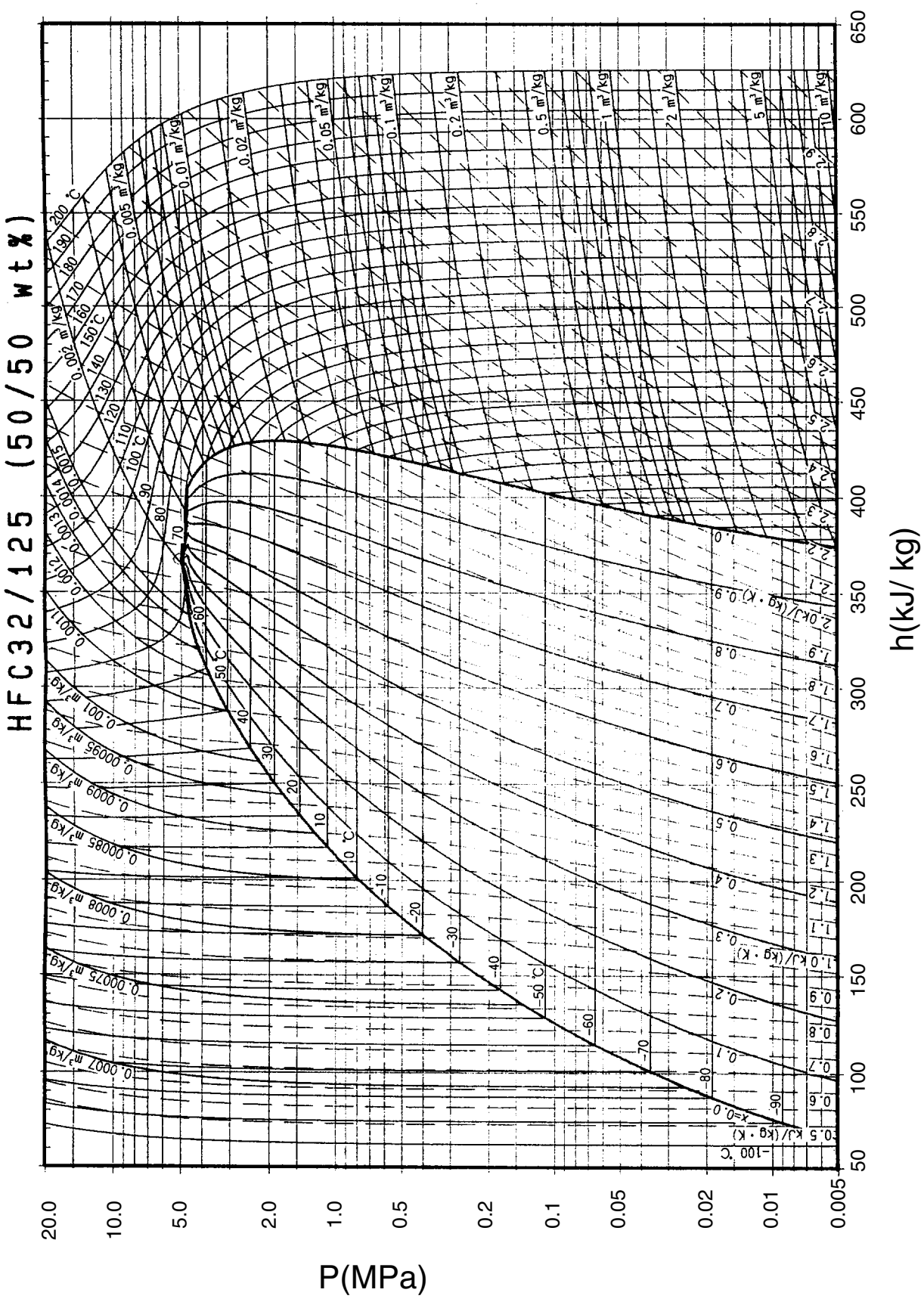
(R407C)



(R407C)

Pressure MPa	Temperature		Pressure MPa	Temperature		Pressure MPa	Temperature	
	Liquid side °C	Gas side °C		Liquid side °C	Gas side °C		Liquid side °C	Gas side °C
0.00	—	–37.0	1.00	21.7	27.5	2.00	46.9	51.9
0.05	—	–28.9	1.05	23.2	29.0	2.05	47.9	52.8
0.10	—	–21.4	1.10	24.7	30.5	2.10	48.9	53.7
0.15	—	–16.3	1.15	26.3	32.0	2.15	49.8	54.6
0.20	—	–11.5	1.20	27.8	33.5	2.20	50.8	55.6
0.25	—	–7.6	1.25	29.3	34.9	2.25	51.8	56.5
0.30	—	–3.7	1.30	30.9	36.4	2.30	52.7	57.4
0.35	—	–0.6	1.35	32.0	37.6	2.35	53.7	58.3
0.40	—	2.5	1.40	33.2	38.7	2.40	54.7	59.2
0.45	–1.1	5.4	1.45	34.4	39.9	2.45	55.6	60.2
0.50	1.4	7.9	1.50	35.6	41.1	2.50	56.6	61.1
0.55	3.9	10.3	1.55	36.8	42.2	2.60	58.4	62.8
0.60	6.4	12.7	1.60	38.1	43.4	2.70	60.0	64.3
0.65	8.7	14.9	1.65	39.3	44.6	2.80	61.6	65.9
0.70	10.6	16.8	1.70	40.5	45.7	2.90	63.2	67.4
0.75	12.6	18.7	1.75	41.7	46.9	3.00	64.9	68.9
0.80	14.5	20.6	1.80	42.9	48.1	3.10	66.5	70.5
0.85	16.5	22.5	1.85	44.1	49.2	3.20	68.1	72.0
0.90	18.4	24.4	1.90	45.0	50.0	3.30	69.8	73.5
0.95	20.2	26.1	1.95	46.0	50.9	3.40	71.4	75.1

1.3 R410A



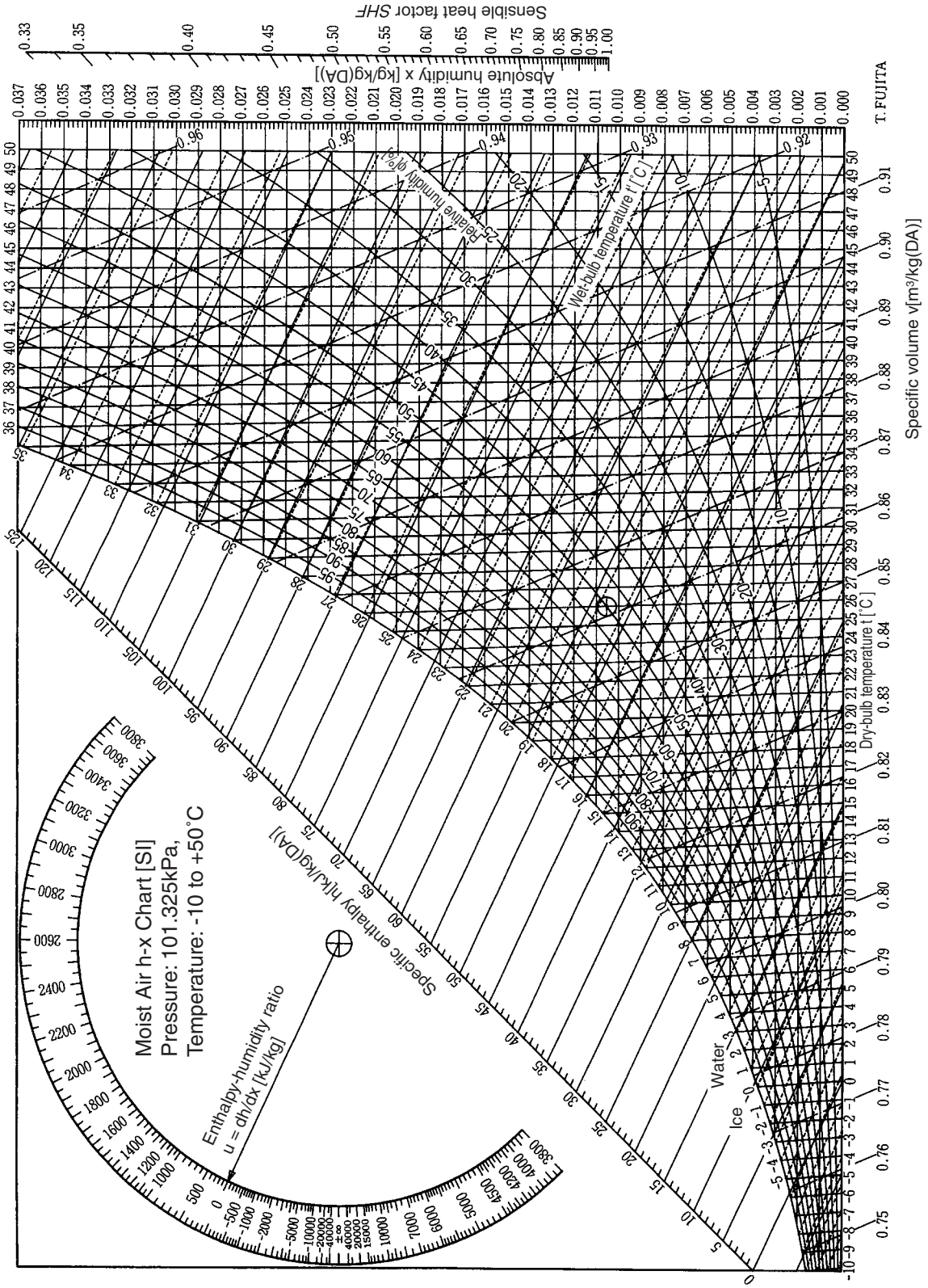
* The pressure values in the diagram show absolute pressure.
Deduct 0.1MPa to obtain gauge pressure.

(R410A Thermodynamical Characteristics)

DAIREP ver2.0

Temperature (°C)	Vapor pressure (kPa)		Density (kg/m^3)		Specific heat at constant pressure (kJ/kgK)		Specific enthalpy (kJ/kg)		Specific entropy (kJ/kgK)	
	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
–70	36.13	36.11	1410.7	1.582	1.372	0.695	100.8	390.6	0.649	2.074
–68	40.83	40.80	1404.7	1.774	1.374	0.700	103.6	391.8	0.663	2.066
–66	46.02	45.98	1398.6	1.984	1.375	0.705	106.3	393.0	0.676	2.058
–64	51.73	51.68	1392.5	2.213	1.377	0.710	109.1	394.1	0.689	2.051
–62	58.00	57.94	1386.4	2.463	1.378	0.715	111.9	395.3	0.702	2.044
–60	64.87	64.80	1380.2	2.734	1.379	0.720	114.6	396.4	0.715	2.037
–58	72.38	72.29	1374.0	3.030	1.380	0.726	117.4	397.6	0.728	2.030
–56	80.57	80.46	1367.8	3.350	1.382	0.732	120.1	398.7	0.741	2.023
–54	89.49	89.36	1361.6	3.696	1.384	0.737	122.9	399.8	0.754	2.017
–52	99.18	99.03	1355.3	4.071	1.386	0.744	125.7	400.9	0.766	2.010
–51.58	101.32	101.17	1354.0	4.153	1.386	0.745	126.3	401.1	0.769	2.009
–50	109.69	109.51	1349.0	4.474	1.388	0.750	128.5	402.0	0.779	2.004
–48	121.07	120.85	1342.7	4.909	1.391	0.756	131.2	403.1	0.791	1.998
–46	133.36	133.11	1336.3	5.377	1.394	0.763	134.0	404.1	0.803	1.992
–44	146.61	146.32	1330.0	5.880	1.397	0.770	136.8	405.2	0.816	1.987
–42	160.89	160.55	1323.5	6.419	1.401	0.777	139.6	406.2	0.828	1.981
–40	176.24	175.85	1317.0	6.996	1.405	0.785	142.4	407.3	0.840	1.976
–38	192.71	192.27	1310.5	7.614	1.409	0.792	145.3	408.3	0.852	1.970
–36	210.37	209.86	1304.0	8.275	1.414	0.800	148.1	409.3	0.864	1.965
–34	229.26	228.69	1297.3	8.980	1.419	0.809	150.9	410.2	0.875	1.960
–32	249.46	248.81	1290.6	9.732	1.424	0.817	153.8	411.2	0.887	1.955
–30	271.01	270.28	1283.9	10.53	1.430	0.826	156.6	412.1	0.899	1.950
–28	293.99	293.16	1277.1	11.39	1.436	0.835	159.5	413.1	0.911	1.946
–26	318.44	317.52	1270.2	12.29	1.442	0.844	162.4	414.0	0.922	1.941
–24	344.44	343.41	1263.3	13.26	1.448	0.854	165.3	414.9	0.934	1.936
–22	372.05	370.90	1256.3	14.28	1.455	0.864	168.2	415.7	0.945	1.932
–20	401.34	400.06	1249.2	15.37	1.461	0.875	171.1	416.6	0.957	1.927
–18	432.36	430.95	1242.0	16.52	1.468	0.886	174.1	417.4	0.968	1.923
–16	465.20	463.64	1234.8	17.74	1.476	0.897	177.0	418.2	0.980	1.919
–14	499.91	498.20	1227.5	19.04	1.483	0.909	180.0	419.0	0.991	1.914
–12	536.58	534.69	1220.0	20.41	1.491	0.921	182.9	419.8	1.003	1.910
–10	575.26	573.20	1212.5	21.86	1.499	0.933	185.9	420.5	1.041	1.906
–8	616.03	613.78	1204.9	23.39	1.507	0.947	189.0	421.2	1.025	1.902
–6	658.97	656.52	1197.2	25.01	1.516	0.960	192.0	421.9	1.036	1.898
–4	704.15	701.49	1189.4	26.72	1.524	0.975	195.0	422.6	1.048	1.894
–2	751.64	748.76	1181.4	28.53	1.533	0.990	198.1	423.2	1.059	1.890
0	801.52	798.41	1173.4	30.44	1.543	1.005	201.2	423.8	1.070	1.886
2	853.87	850.52	1165.3	32.46	1.552	1.022	204.3	424.4	1.081	1.882
4	908.77	905.16	1157.0	34.59	1.563	1.039	207.4	424.9	1.092	1.878
6	966.29	962.42	1148.6	36.83	1.573	1.057	210.5	425.5	1.103	1.874
8	1026.5	1022.4	1140.0	39.21	1.584	1.076	213.7	425.9	1.114	1.870
10	1089.5	1085.1	1131.3	41.71	1.596	1.096	216.8	426.4	1.125	1.866
12	1155.4	1150.7	1122.5	44.35	1.608	1.117	220.0	426.8	1.136	1.862
14	1224.3	1219.2	1113.5	47.14	1.621	1.139	223.2	427.2	1.147	1.859
16	1296.2	1290.8	1104.4	50.09	1.635	1.163	226.5	427.5	1.158	1.855
18	1371.2	1365.5	1095.1	53.20	1.650	1.188	229.7	427.8	1.169	1.851
20	1449.4	1443.4	1085.6	56.48	1.666	1.215	233.0	428.1	1.180	1.847
22	1530.9	1524.6	1075.9	59.96	1.683	1.243	236.4	428.3	1.191	1.843
24	1615.8	1609.2	1066.0	63.63	1.701	1.273	239.7	428.4	1.202	1.839
26	1704.2	1697.2	1055.9	67.51	1.721	1.306	243.1	428.6	1.214	1.834
28	1796.2	1788.9	1045.5	71.62	1.743	1.341	246.5	428.6	1.225	1.830
30	1891.9	1884.2	1034.9	75.97	1.767	1.379	249.9	428.6	1.236	1.826
32	1991.3	1983.2	1024.1	80.58	1.793	1.420	253.4	428.6	1.247	1.822
34	2094.5	2086.2	1012.9	85.48	1.822	1.465	256.9	428.4	1.258	1.817
36	2201.7	2193.1	1001.4	90.68	1.855	1.514	260.5	428.3	1.269	1.813
38	2313.0	2304.0	989.5	96.22	1.891	1.569	264.1	428.0	1.281	1.808
40	2428.4	2419.2	977.3	102.1	1.932	1.629	267.8	427.7	1.292	1.803
42	2548.1	2538.6	964.6	108.4	1.979	1.696	271.5	427.2	1.303	1.798
44	2672.2	2662.4	951.4	115.2	2.033	1.771	275.3	426.7	1.315	1.793
46	2800.7	2790.7	937.7	122.4	2.095	1.857	279.2	426.1	1.327	1.788
48	2933.7	2923.6	923.3	130.2	2.168	1.955	283.2	425.4	1.339	1.782
50	3071.5	3061.2	908.2	138.6	2.256	2.069	287.3	424.5	1.351	1.776
52	3214.0	3203.6	892.2	147.7	2.362	2.203	291.5	423.5	1.363	1.770
54	3361.4	3351.0	875.1	157.6	2.493	2.363	295.8	422.4	1.376	1.764
56	3513.8	3503.5	856.8	168.4	2.661	2.557	300.3	421.0	1.389	1.757
58	3671.3	3661.2	836.9	180.4	2.883	2.799	305.0	419.4	1.403	1.749
60	3834.1	3824.2	814.9	193.7	3.191	3.106	310.0	417.6	1.417	1.741
62	4002.1	3992.7	790.1	208.6	3.650	3.511	315.3	415.5	1.433	1.732
64	4175.7	4166.8	761.0	225.6	4.415	4.064	321.2	413.0	1.450	1.722

2. Psychrometric Chart



3. How to Calculate Cooling / Heating Capacity

Measure the temperatures of suction air and discharge air of indoor unit. Then, calculate the capacity by using the psychrometric chart.

How to calculate the cooling capacity

$$\underset{\text{(kW)}}{\text{Cooling capacity}} = (\underset{\text{(kJ/kg)}}{\text{Enthalpy of suction air}} - \underset{\text{(kJ/kg)}}{\text{Enthalpy of discharge air}}) \times \frac{1}{\underset{\text{(kg/m}^3\text{)}}{\text{Specific volume of discharge air}}} \times \underset{\text{(m}^3\text{/h)}}{\text{Air flow rate}} \times \frac{1}{3600}$$

Example for cooling capacity calculation
- Suction air. . . . . Dry-bulb temperature: 30°C Wet-bulb temperature: 24°C
- Discharge air. . . . Dry-bulb temperature: 20°C Wet-bulb temperature: 18.5°C
- Air flow rate. . . . . 800 m^3/h

According to the psychrometric chart, following values are obtained.
- Enthalpy of suction air: 72.7 kJ/kg
- Enthalpy of discharge air: 52.9 kJ/kg
- Specific volume of discharge air: 0.85 m^3/kg
- Cooling capacity is obtained by substituting those values to the above calculation formula.

$$\text{Cooling capacity} = (72.7 - 52.9) \times \frac{1}{0.85} \times 800 \times \frac{1}{3600} \fallingdotseq 5.18\text{kW}$$

How to calculate the heating capacity

$$\underset{\text{(kW)}}{\text{Heating capacity}} = 1.00 \times \underset{\text{(kJ/kg} \cdot \text{k)}}{\text{Discharge air temperature}} - \underset{\text{(˚C)}}{\text{Suction air temperature}} \times \underset{\text{(m}^3\text{/h)}}{\text{Air flow rate}} \times \frac{1}{\underset{\text{(kg/m}^3\text{)}}{\text{Specific volume}}} \times \frac{1}{3600}$$

Example for heating capacity calculation
- Suction air temperature . . . . . 15°C
- Discharge air temperature . . . 45°C
- Air flow rate. . . . . 800 m^3/h

According to the psychrometric chart, following value is obtained.
- Specific volume … 0.91 m^3/kg
- Heating capacity is obtained by substituting those values to the above calculation formula.

$$\text{Heating capacity} = 1.00 \times (45 - 15) \times 800 \times \frac{1}{0.91} \times \frac{1}{3600} = 7.33\text{kW}$$

4. Field Settings for the Replacement of the Spare Control PC Board

Horsepower should be set by using the switch on the PC board when the control PC board is replaced.

1. Check the model name of the outdoor unit whose control PC board is replaced.
2. After checking the model name, make settings according to the following table.

1.RXY5 ~ 48M, RX5 ~ 48M, RXYQ5 ~ 48M, REYQ8 ~ 48M

In order to replace by the space PC board, change the setting of DIP switch (DS2) on the PC board as shown below.

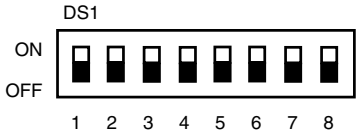
Default condition of DIP switch

	5HP	8HP	10HP	12HP	14HP	16HP
DS2-2	OFF	OFF	ON	OFF	ON	OFF
DS2-3	OFF	ON	ON	OFF	OFF	ON
DS2-4	OFF	OFF	OFF	ON	ON	ON

2. RSXYP5, 8, 10L

In order to replace by the space PC board, change the setting of DIP switch (DS1) on the PC board as shown below.

Default condition of DIP switch



	5L	8L	10L
DS1-7	ON	OFF	ON
DS1-8	OFF	ON	ON

3. RSXP16 ~ 30K, RSXYP16 ~ 30KJ, RSEYP16 ~ 30KJ

In order to replace by the space PC board,, change the setting of DIP switches (SS2 to SS5) on the PC board as shown below.

	SS2		SS3		SS4		SS5	
	A	B	C	D	E	F	G	H
RSXYP16KJ RSXP16K, RSEYP16KJ		■		■	■			■
RSXYP18KJ RSXP18K, RSEYP18KJ		■	■			■		■
RSXYP20KJ RSXP20K, RSEYP20KJ		■	■			■		■
RSXYP24KJ RSXP24K, RSEYP24KJ	■		■		■		■	
RSXYP26KJ RSXP26K, RSEYP26KJ	■		■		■		■	
RSXYP28KJ RSXP28K, RSEYP28KJ	■			■		■	■	
RSXYP30KJ RSXP30K, RSEYP30KJ	■			■		■	■	

Capacity setting table

Note: Resetting of power supply switch is neccessary after capacity setting.

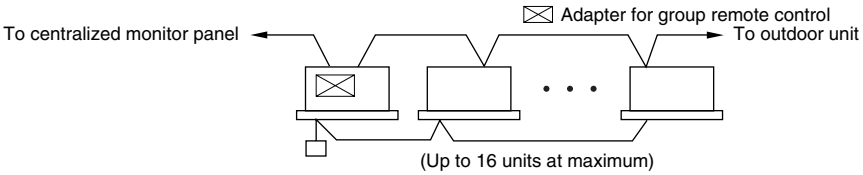
5. Adaptors for Connection of Air Conditioners

5.1 Wiring Adaptor for Electrical Appendices (2) <KRP4A51, 52, 53, 54>

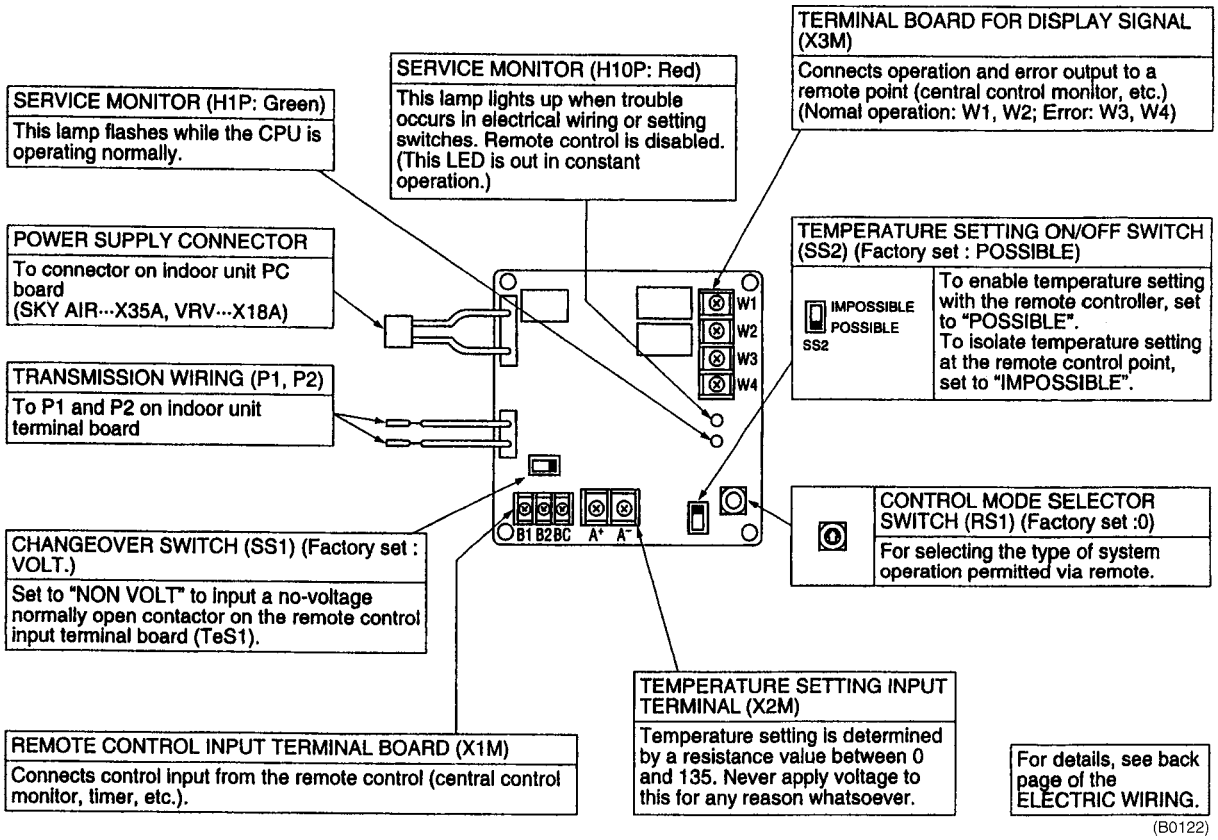
<Application / Intended use>

This adapter enables remote operation control, remote temperature setting, operation display, fetch of malfunction display, and others, but cannot be used in combination with other centralized controllers. A single unit of this adapter performs a batch control of a group connected through the remote controller transmission line (P1 / P2).

Note: No systems without remote controller are available. A single unit of remote controller is absolutely needed.
Furthermore, for two-remote-controller system, this adapter is not usable.



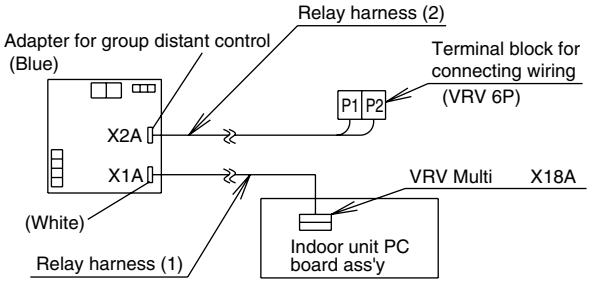
5.1.1 Part Names and Functions



5.1.2 Wiring

1. For a start, make wire connections between the indoor and outdoor units, between respective power supplied, and between the indoor unit and remote controller, and then check whether or not the units normally operate. (Particularly, in order to use the adapter in combination with the group control of the remote controller, check to be sure the jumper wiring.)
   For details, refer to information in the Installation Manual of indoor unit and outdoor unit.
2. Lastly, make wire connections to external equipment such as the centralized control monitor and other settings.
   For details, refer to information in “Wiring to external controller (e.g. centralized control monitor)”.

Connection to indoor unit



Use the relay harnesses (1) and (2) provided to connect wires as shown in figure above.

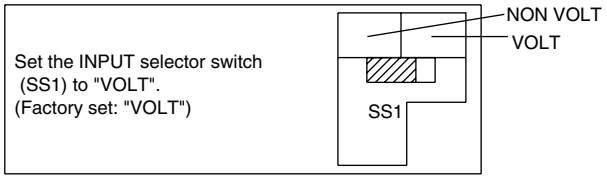
- Connect the relay harness (1) to the connector on the indoor unit PC board ass'y (i.e., X18A on VRV).
- The relay harness (2) has no polarities. Connect wires to terminals P1 and P2 on the connecting wiring terminal block provided in the indoor unit switch box.

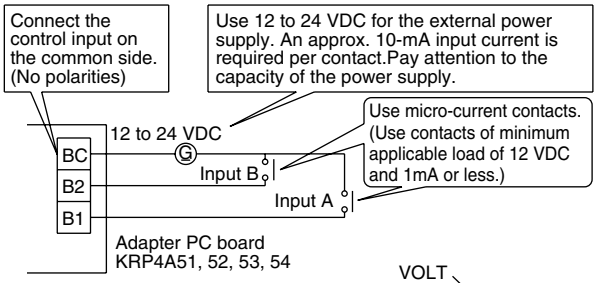
Wiring to external controller (e.g. centralized control monitor)

1. Input for distant control (operation)

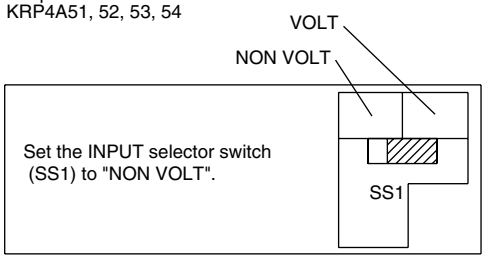
Depending on whether the INPUT selector switch is set to the “VOLT" or "NON VOLT”, connect wires according to the procedure shown below.

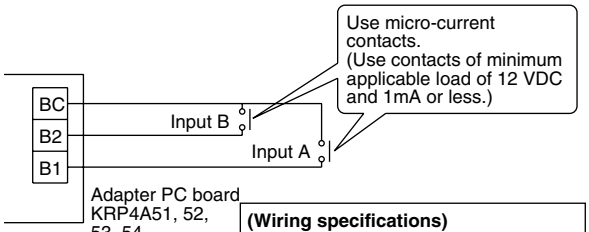
For input in "VOLT" mode:





For input in "NON VOLT" input



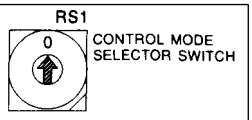


(Wiring specifications)
Types of wires…Sheathed vinyl cords or cables
Size of wire…0.18 to 1.25 mm^2
Total length of wiring…150 m at maximum

<Caution>
In order to prevent malfunctions, keep distance this wiring from the power lines.

2. Setting of CONTROL MODE selector switch (RS1)

Use the CONTROL MODE selector switch (RS1) to make selection and setting of control mode through input A or B.



(Factory set)
"0" position

① To use the system only for display function only in individual display mode

Position	Function
0	Individual display (with input ignored)

② To operate the system using constant input to the input A

Position	Function	Contents with input A tuned ON	Contents with input A turned OFF
1	Remote controller inhibited	Operation (The remote controller is inhibited at all times.)	Stop + Remote controller inhibited
2	Centralized priority	Operation + Remote controller permitted	
3	Remote controller stop permitted	Operation + Only remote controller stop permitted (Operation from remote controller is disabled.)	
4	Remote controller permitted / stop	Remote controller permitted (Operation from remote controller is impossible.)	

Caution The input B is used for forcedly OFF. If this input B is turned ON, the system will be put into "Stop + Remote controller inhibited", thus disregarding the input A. Even if the input A is turned ON with the input B in an OFF state, the content with the input A turned ON will not be provided. In this case, the input A should be turned ON again.

③ To operate the system using instantaneous input to the input A
(Use instantaneous input with ON time of 200 msec or more for the input A.)

Position	Function	Contents of input A	Function of input B
5	Remote controller inhibited	Stops if the input A is turned ON while in operation. Operates if the input A is tuned ON while in stop.	The input B will be put into forcedly OFF function mode. (If the input B is turned ON, the system will be put into "Stop + Remote controller inhibited, Input A disregarded".)
6	Last-pressing priority	Stops if the input A is turned ON while in operation. Operates if the input A is tuned ON while in stop. (The remote controller is permitted at all times.)	

◆ To conduct demand control using input B

Position	Functions & contents with input A turned ON	Functions with input B turned ON
C	Remote controller inhibited (Same as Position 5)	Forcedly thermostat OFF command
D		Energy saving operation command (*)
E	Last-pressing priority (Same as Position 6)	Forcedly thermostat OFF command
F		Energy saving operation command (*)

- Forcedly thermostat OFF command
  This command is used to operate the indoor unit only in forcedly fan mode.
- Energy saving operation command (*)
  This command is used to operate the system with set temperature increased by 2°C in cooling operation or decreased by 2°C in heating operation.

Caution
- In this case, even though the input A is turned ON, the system will make a stop, thus stopping all units in one and the same group.

* On the SkyAir series, even though Position D or F is selected, the forcedly thermostat OFF command will be issued.

④ To operate the system on two input contacts using instantaneous input for the input A and input B

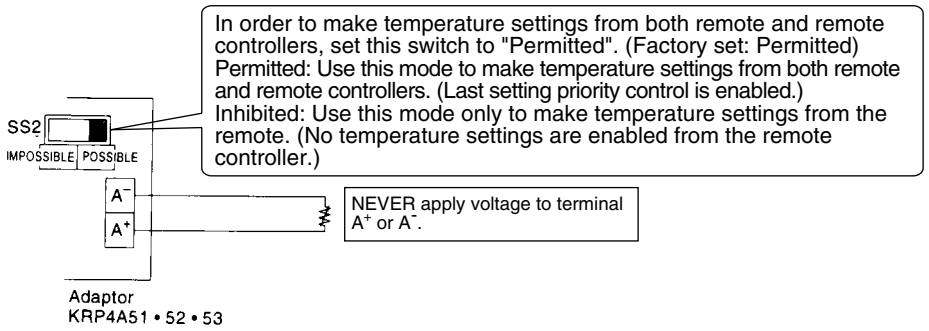
(Use instantaneous input with ON time of 200 msec or more for the input A.)

Position	Function	Contents of input A	Contents of input B
7	Remote controller inhibited	Operation (The remote controller is inhibited at all times.)	Stop + Remote controller inhibited
8	Centralized priority	Operation + Remote controller permitted	
9	Remote controller stop permitted	Operation + Only remote controller stop permitted (Operation from remote controller is impossible.)	
A	Remote controller permitted / stop	Only remote controller permitted (Operation from remote control is impossible.)	
B	Last pressing priority	Operation (The remote controller is permitted at all times.)	Stop (The remote controller is permitted at all timed.)

Cautions

- Using normal input for the input B in Positions 7 to A will put the system into forcedly stop function (with input A disregarded).
- In Position B, the normal input cannot be used for the input B.

3. Input of temperature settings



Temperature settings corresponding to resistance values in the range of 0 to 135Ω can be made.

Set temp. (°C)	16	17	18	19	20	21	22	23	24
Resistance value (Ω)	0.0~3.4	5.0~ 11.6	13.8~ 20.0	22.4~ 28.4	31.0~ 36.4	39.4~ 44.8	48.2~ 52.8	56.6~ 61.2	65.2~ 69.4

Set temp. (°C)	25	26	27	28	29	30	31	32
Resistance value (Ω)	73.8~ 77.8	82.4~ 85.8	91.0~ 94.0	99.4~ 102.2	108.6~ 110.4	117.2~ 119.2	125.8~ 127.4	134.2~ 140.0

Caution The resistance values are counted in wiring resistance.

(Wiring specifications)
Types of wires ... Sheathed vinyl cords
Size of wire ... 1.25 to 2.00 mm^2
Total length of wiring ... 70 m at maximum

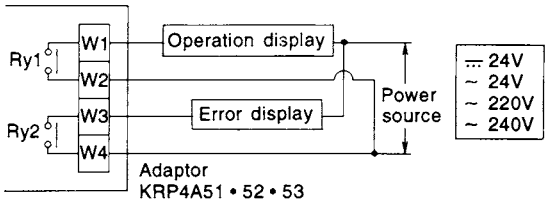
(Caution)
In order to prevent malfunctions, isolate this wiring from the power lines.

4. Fetch of display signals

Normal operation output terminals (W1 and W2) and malfunction output terminals (W3 and W4) are used for no-voltage normal contact output.
(Allowable current is 10mA to 3A per contact.)

Normal operation output (Ry1)
ON when the indoor unit is operating normally.

Error output (Ry2)
ON when the indoor unit stops because of malfunction or when a transmission error occurs between the adaptor and the indoor unit.



Caution In order to use power supply of 220 ~ 240 VAC, keep the power supply cable away from input wirings.

The following table shows the display of output.

Output	Both Ry1 & Ry2 are turned OFF.	RY1 is only turned ON.	Ry2 is only turned ON.
Display	Stop	Normal operation	This system stops due to malfunction or transmission error between the adapter PC board and indoor unit.

5.1.3 Settings of Remote Control Mode Selector Switch (RS1)

Position	Function	Contents of operations in input mode A or B	
		Input A (Between B1 and Bc)	Input B (Between B2 and Bc)
0	Disregard for input	—	—
1	Remote controller inhibited	ON to operate, OFF to stop the system	ON to stop the system (Remote controller inhibited) OFF to permit input A
2	Centralized priority	ON to operate (Remote controller permitted), OFF to stop the system (Remote controller inhibited))	
3	Remote controller permitted / inhibited	Same as Position 1 (Only Remote controller stop is permitted at all times.)	
4	Remote controller permitted / inhibited & OFF	ON to permit the remote controller, OFF to inhibit the remote controller and stop.	
5	Remote controller inhibited	Operate / Stop (Cyclic) (Instantaneous input)	
6	Last pressing priority	Same as Position 5 (Only Remote controller is permitted at all times.)	
7	Remote controller inhibited	ON to operate the system (Instantaneous input)	ON to stop the system (Instantaneous input)
8	Centralized priority	ON to operate the system (Remote controller permitted) (Instantaneous input)	ON to stop (Remote controller inhibited) (Instantaneous input)
9	Remote controller stop permitted	Same as Position 7 (Only Remote controller stop is permitted at all times.)	Same as Position 7
A	Remote controller permitted / inhibited & OFF	ON to operate the system (Remote controller permitted) (Instantaneous input)	ON to stop the system (Remote controller inhibited) (Instantaneous input)
B	Last pressing priority	Same as Position 7 (Only Remote controller is permitted at all times.)	Same as Position 7
C	Position 5 + Energy saving control	Same as Position 5	ON to put the system into forcedly thermostat OFF
D	Position 5 + Room temperature setting shift		ON to operate the system in room temperature setting shift mode*
E	Position 6 + Energy saving control	Same as Position 6	ON to put the system into forcedly thermostat OFF
F	Position 6 + Room temperature setting shift		ON to operate the system in room temperature setting shift mode*

Notes:

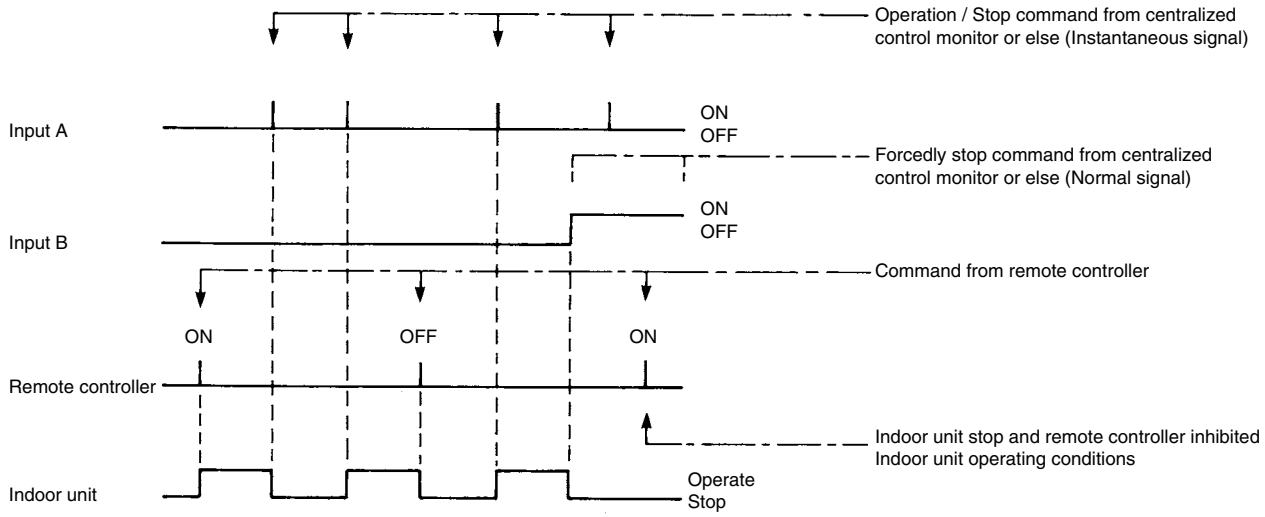
1. In Positions 7 to A while in input B, using constant input will put the system into forcedly stop (disregard for input A). Furthermore, in Position B while in input B, the constant input will be disabled.
2. For the overview of “Function” listed in table above, refer to information in the following section.
3. For instantaneous input, set ON time to 200 msec or more

5.1.4 Function (Overview)

1. ON / OFF control impossible by remote controller
   Used to operate or stop the system only on the group remote control adapter side. (Operation / Stop from the remote controller is disabled.)
2. OFF control possible by remote controller
   Used to start operation on the group remote control adapter side and stop the operation on the remote controller side.
3. Centralized
   Used to start operation on the group remote control adapter side and infinitely operate or stop the system on the remote controller side during an operative period of time set by the timer.
4. Individual (Last pressing priority)
   Used to operate or stop from both the group remote control adapter side and the remote controller side.

<Example of application with remote control mode selector switch (RS1) set to Position No. 6>

The following diagram shows the time chart of remote controller commands and indoor unit against input signals.

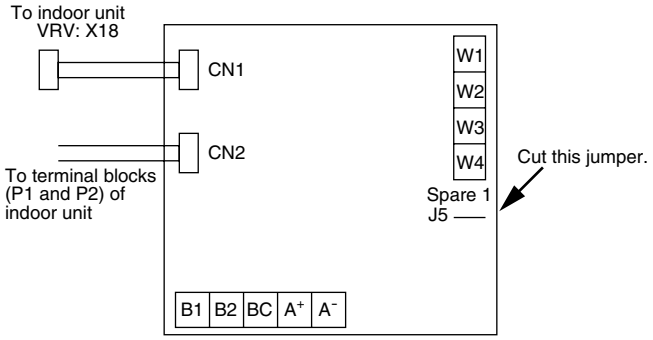


5.1.5 Combined use with Centralized Controllers

The combined use of the wiring adaptor for electrical appendices (2) and the centralized controllers is enabled by the setting method shown below under the limited conditions.

Setting method

Cut the spare jumper (J5) connected to wiring adaptor for electrical appendices (2). (If the use conditions shown below are not satisfied, however, the adapter may not normally function.)



KRP4A51~54

Use conditions

1. If the wiring adaptor for electrical appendices (2) is used by following methods, the combined use will be enabled.
   - Operation and malfunction with the wiring adaptor for electrical appendices (2)
   - Forcedly thermostat OFF control with the wiring adaptor for electrical appendices (2) (For mode settings, only use the input B in Positions C and E.)
   - Temperature setting shift control with the wiring adaptor for electrical appendices (2) (For mode settings, only use the input B in Positions D and F. This control, however, is disabled in combined use with the temperature setting unit (DPF201A53).)
   - The operation mode of the centralized controllers is set to "Individual (last pressing priority)" and the control mode of the wiring adaptor for electrical appendices (2) is also set to "Individual (last pressing priority)".
2. If the system is adaptable to telecommunication with the use of the wiring adaptor for electrical appendices (2) and further the centralized remote controllers are used by the methods listed in table below.

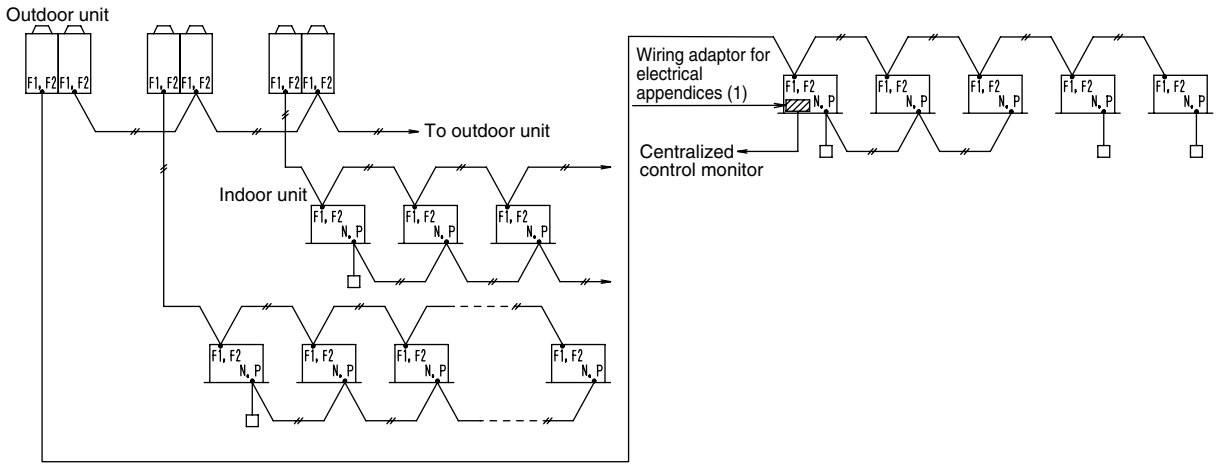
Model	Conditions
Central remote controller (DCS302C61)	No forcedly stop input is used and further this controller is used in any of operation mode 6, 7, 16, and 17.
Unified ON / OFF controller (DCS301B61)	No forcedly stop input is used and further this controller is used in the operation mode set to “last pressing priority”.
Schedule timer (DST301B61)	This timer used in operation code set to “last pressing priority”.
Unified adaptor for computerized control (DCS302A52)	This adapter is used in input mode set to Position 3.
Parallel interface Basic unit (DPF201A51)	No forcedly stop input is used and further this interface is used in operation mode set to Position 1.
Data station (DDS501A51)	No forcedly stop input is used and further no system forcedly stop command or remote controller inhibited command is used.

5.2 Wiring Adaptor for Electrical Appendices (1) (KRP2A61, 62)

Application / Intended use

This adapter enables remote operation control, remote temperature setting, operation display, fetch of malfunction display, and others, but cannot be used in combination with other centralized controllers.
Since this adapter is connected to the centralized control line, “air conditioners, which are connected to the centralized control lines (F1 / F2), are all operated under unified control.”

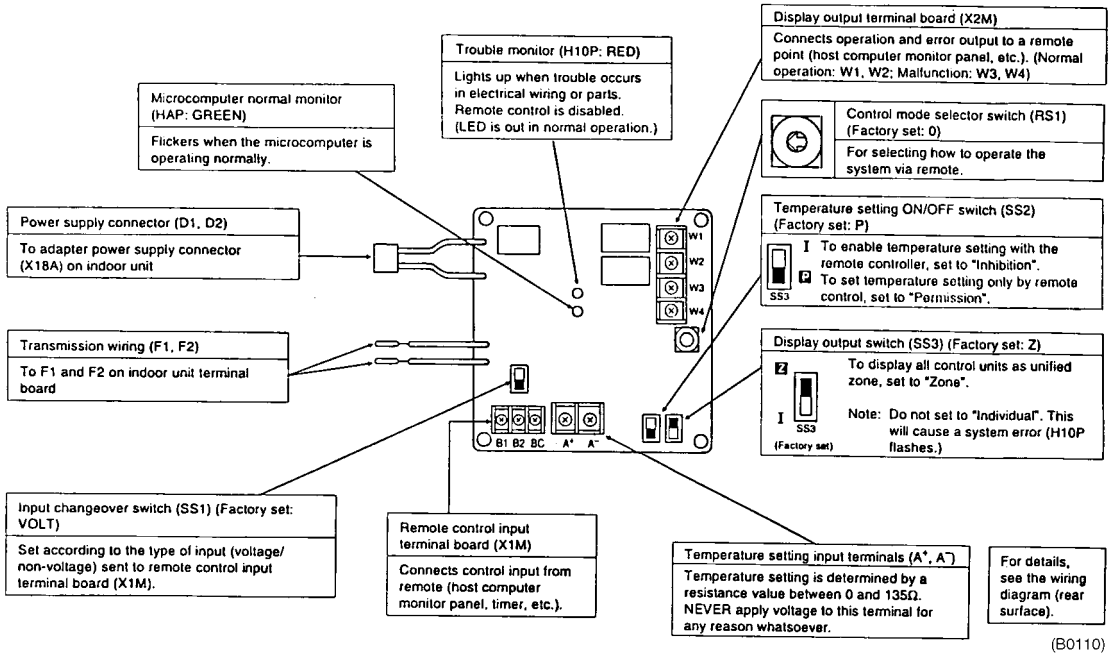
Overview of system



Notes

1. Shaded area: Represents the wiring adaptor for electrical appendices (1).
2. The wiring adaptor for electrical appendices (1) is used to "operate all indoor units connected to the centralized control lines (i.e., terminals F1 and F2) under unified control". In other words, the said indoor units are all operated under one and the same control via the wiring adaptor for electrical appendices (1) from the centralized control monitor.
3. In order to operate the said indoor units under individual group control, use the wiring adaptor for electrical appendices (2) (KRP4A51, 52, 53, 54). The wiring adaptor for electrical appendices (1) is not available for this control.

5.2.1 Part Names and Functions



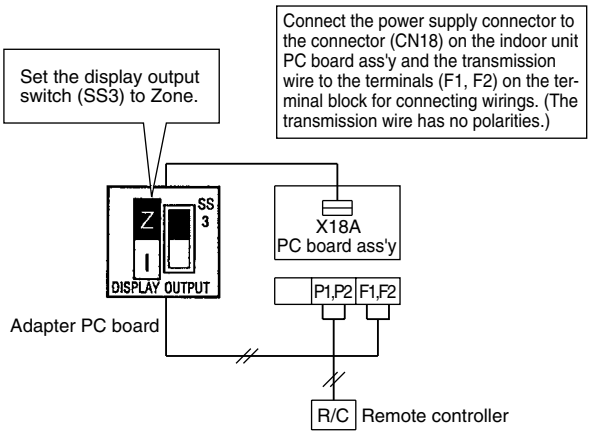
5.2.2 Wiring

1. For a start, make wire connections between the indoor and outdoor units, between respective power supplied, and between the indoor unit and remote controller, and then check whether nor not the units normally operate. (Particularly, in order to use this adapter in combination with the group control of the remote controller, check to be sure the jumper wiring.)
   For details, refer to information in the Installation Manual of indoor unit and outdoor unit.
2. Then, according to the system, connect the adapter PC board for remote control to the main body of indoor unit, and then make setting of the display output switch (SS3) and connect a jumper wire.
   For details, refer to information in “Connection to indoor unit”.
3. Lastly, make wire connections to external equipment such as the centralized control monitor and other settings.
   For details, refer to information in “Wiring to external controller (e.g. centralized control monitor)”.

Note No address No. settings for centralized control are required. (Automatic setting)

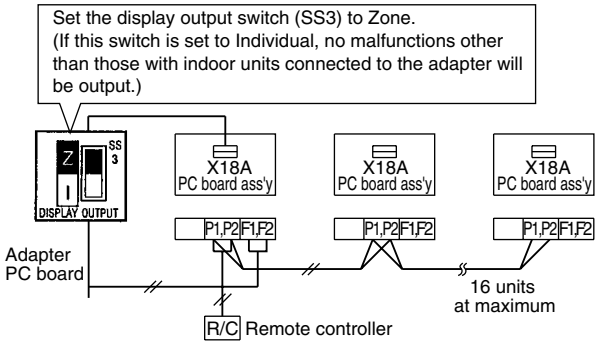
Connection to Indoor Unit

1. For Individual control



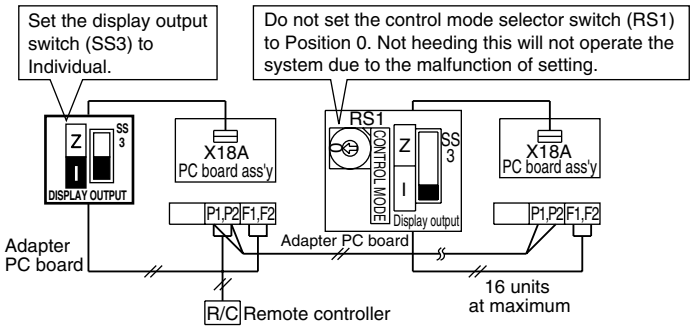
2. For group unified control

■ For group unified display: The wiring procedure is the same as that for the individual control.



Note The remote controller can be installed on indoor units to which the adapter PC board is not directly connected.

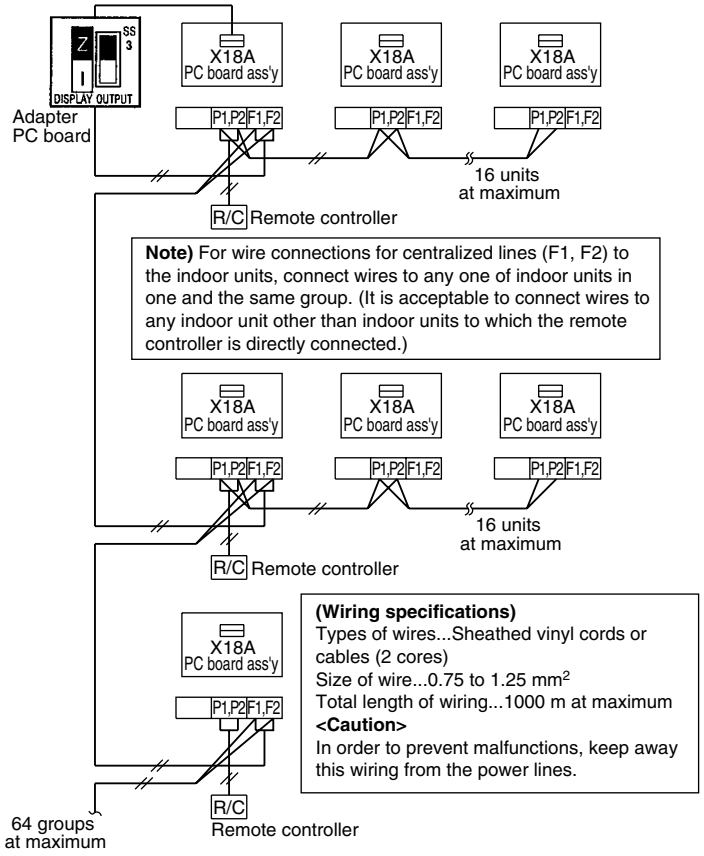
■ For individual display: The wiring procedure is the same as that for the individual control.



Note The remote controller can be installed on indoor units to which the adapter PC board is not directly connected.

3. For zone unified control: The wiring procedure is the same as that for the individual control.

Be sure to set the display output switch (SS3) to Zone.

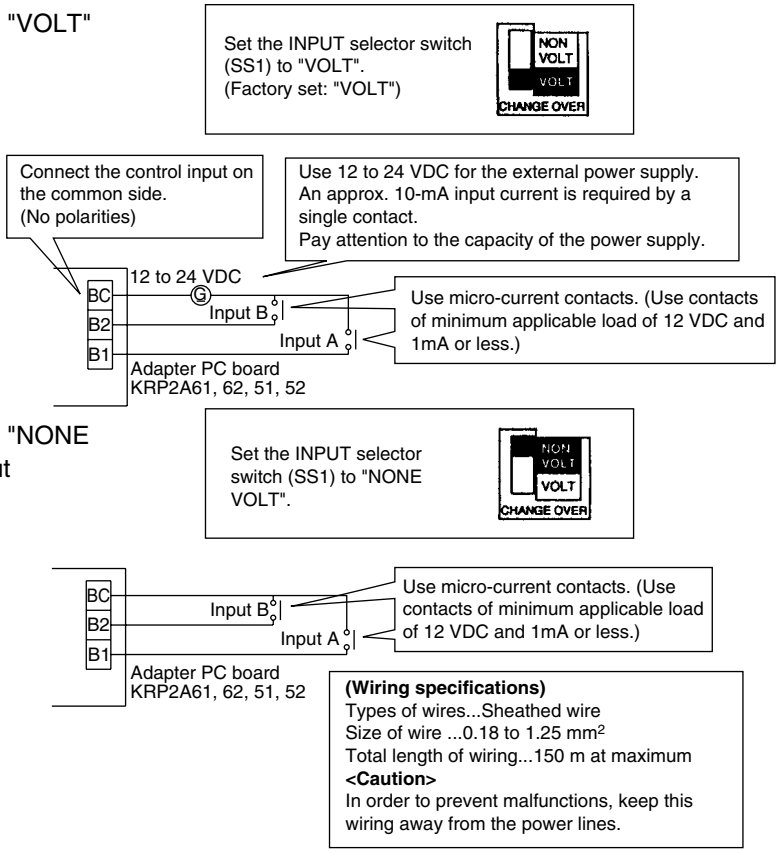


Wiring to External Controller (e.g. Centralized Control Monitor)

1. Input for distant control (operation)

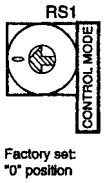
Depending on whether the INPUT selector switch is set to the “Voltage” or “No-voltage”, connect wires according to the procedure shown below.

For input in "VOLT" mode:



2. Setting of CONTROL MODE selector switch (RS1)

Use the CONTROL MODE selector switch (RS1) on the adapter PC board to make selection and setting of control mode through input A or B.



① To use the system only for display function only in individual display mode:

Position	Function
0	Individual display (with input disregarded)

② To operate the system using normal input to the input A

Position	Function	Contents with input A tuned ON	Contents with input A turned OFF
1	Remote controller inhibited	Operation (The remote controller is inhibited at all times.)	Stop + Remote controller inhibited
2	Centralized priority	Operation + Remote controller permitted	
3	Remote controller stop permitted	Operation + Only remote controller stop permitted (Operation from remote controller is impossible.)	
4	Remote controller permitted / stop	Only remote controller permitted (Operation from remote is impossible.)	

Caution

- The input B is used for forcedly OFF. If this input B is turned ON, the system will be put into "Stop + Remote controller inhibited", thus disregarding the input A. Even if the input A is turned ON with the input B in an OFF state, the content with the input A turned ON will not be provided. In this case, the input A should be turned ON again.

③ To operate the system using instantaneous input to the input A

◆ Use instantaneous input with ON time of 200 msec or more for the input A.

Position	Function	Contents of input A	Function of input B
5	Remote controller inhibited	Stops if the input A is turned ON while in operation. Operates if the input A is tuned ON while in stop.	The input B will be put into forcedly OFF function mode. (If the input B is turned ON, the system will be put into "Stop + Remote controller inhibited, Input A disregarded".)
6	Last-pressing priority	Stops if the input A is turned ON while in operation. Operates if the input A is tuned ON while in stop. (The remote controller is permitted at all times.)	

- To conduct demand control using input B

Position	Functions & contents with input A turned ON	Functions with input B turned ON
C	Remote controller inhibited (Same as Position 5)	Forcedly thermostat OFF command
D		Energy saving operation command
E	Last-pressing priority (Same as Position 6)	Forcedly thermostat OFF command
F		Energy saving operation command

- **Forcedly thermostat OFF command**
  This command is to operate the indoor unit only in forcedly fan mode.
- **Energy saving operation command**
  This command is to operate the system with set temperature increased by 2°C in cooling operation or decreased by 2°C in heating operation.

Cautions

- While in zone unified control mode, even if a single indoor unit is in operation, the operation display will be actuated. Consequently, while in last pressing priority mode, some unit stops operation during the operation display is output.
- In this case, even though the input A is turned ON, the system will stop, thus making all units stop.

④ To operate the system on two input contacts using instantaneous input for the input A and input B

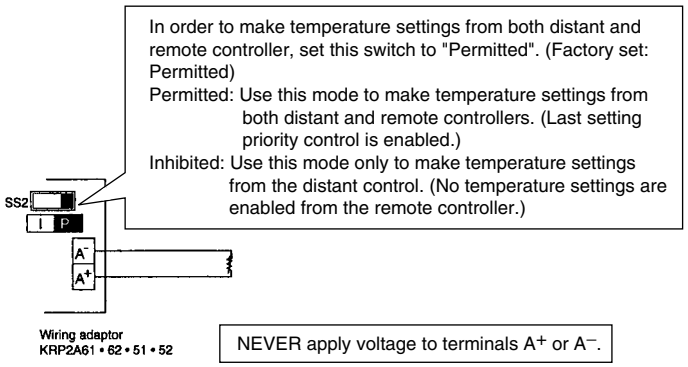
(Use instantaneous input with ON time of 200 msec or more for the input A.)

Position	Function	Contents of input A	Contents of input B
7	Remote controller inhibited	Operation (The remote controller is inhibited at all the time.)	Stop + Remote controller inhibited
8	Centralized priority	Operation + Remote controller permitted	
9	Remote controller stop permitted	Operation + Only remote controller stop permitted (Operation from remote controller is impossible.)	
A	Remote controller permitted / stop	Only remote controller permitted (Operation from remote control is impossible.)	
B	Last pressing priority	Operation (The remote controller is permitted at all the time.)	Stop (The remote controller is permitted at all the time.)

Cautions

- Using normal input for the input B in Positions 7 to A will put the system into forcedly stop function (with input A disregarded).
- In Position B, the constant input cannot be used for the input B.

3. Input of temperature settings



Temperature settings corresponding to resistance values in the range of 0 to 135Ω can be made.

Set temp. (°C)	16	17	18	19	20	21	22	23	24
Resistance value (Ω)	0.0~3.4	5.0~ 11.6	13.8~ 20.0	22.4~ 28.4	31.0~ 36.4	39.4~ 44.8	48.2~ 52.8	56.6~ 61.2	65.2~ 69.4

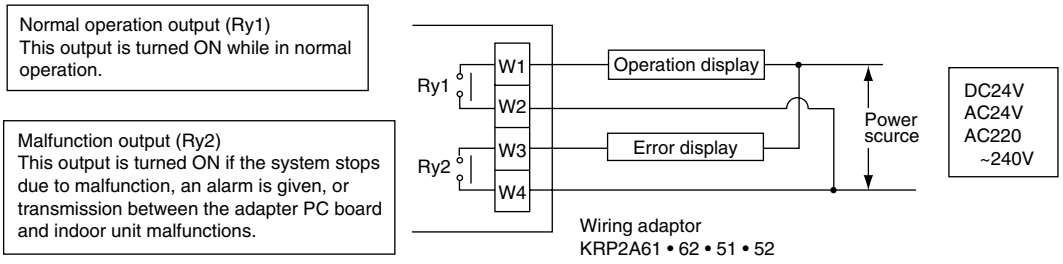
Set temp. (°C)	25	26	27	28	29	30	31	32
Resistance value (Ω)	73.8~ 77.8	82.4~ 85.8	91.0~ 94.0	99.4~ 102.2	108.6~ 110.4	117.2~ 119.2	125.8~ 127.4	134.2~ 140.0

Caution The resistance values are counted in wiring resistance.

(Wiring specifications)
Types of wires...Sheathed vinyl cords or cables
Size of wire...1.25 to 2.00 mm^2
Total length of wiring...70 m at maximum
(Caution) In order to prevent malfunctions, isolate this wiring from the power lines.

4. Fetch of display signals

Normal operation output terminals (W1 and W2) and malfunction output terminals (W3 and W4) are used for no-voltage normal contact output.
(Allowable current is 10mA to 3A per contact.)



Caution In order to use power supply of AC220 ~ 240V, keep the power supply cable away from input wirings.

The following table shows the output by system.

Output / System	Both Ry1 & Ry2 are turned OFF.	Only RY1 is turned ON.	Only Ry2 is turned ON.
Individual control or individual display	Stop	Normal operation	The system stops due to malfunction or malfunction of transmission between the adapter PC board and indoor unit .
Group unified control	Stop	All units are in normal operation.	Even a single unit stops due to malfunction or malfunction of transmission between the adapter PC board and indoor unit.
Zone control	All zones OFF	At least one unit running normally, no malfunction.	Even a single unit stops due to malfunction or malfunction of transmission between the adapter PC board and indoor unit.

Caution If the wirings (F1, F2) are changed after the system operates once, apply power for a period of five minutes or more and then reset the power supply. No heeding so may disable the control from the wiring adaptor for electrical appendices (1).

5.3 External Control Adaptor of Outdoor Unit <DTA104A53, 61, 62>

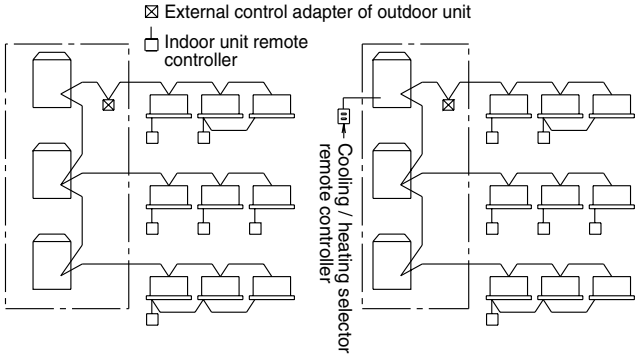
Application / Intended Use

This adapter is built in the indoor unit or BS unit connected through DIII-NET to select the operation mode (Cooling / Heating / Fan operation) in a batch on multiple outdoor units.

Overview of System

1. Batch selection of operation mode (Cooling / Heating / Fan operation)

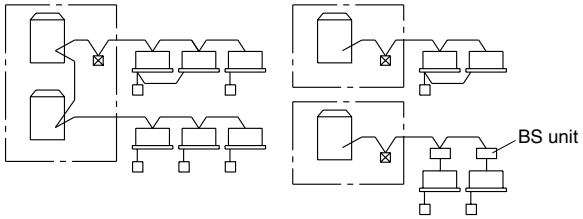
■ For selection of operation mode, using the indoor unit remote controller or cooling / heating selector remote controller
(Possible only if outdoor units is RSX(Y) - KY1 • YAL • TAL type.)



This mode enables a batch selection of operation mode of outdoor units enclosed with [- -].

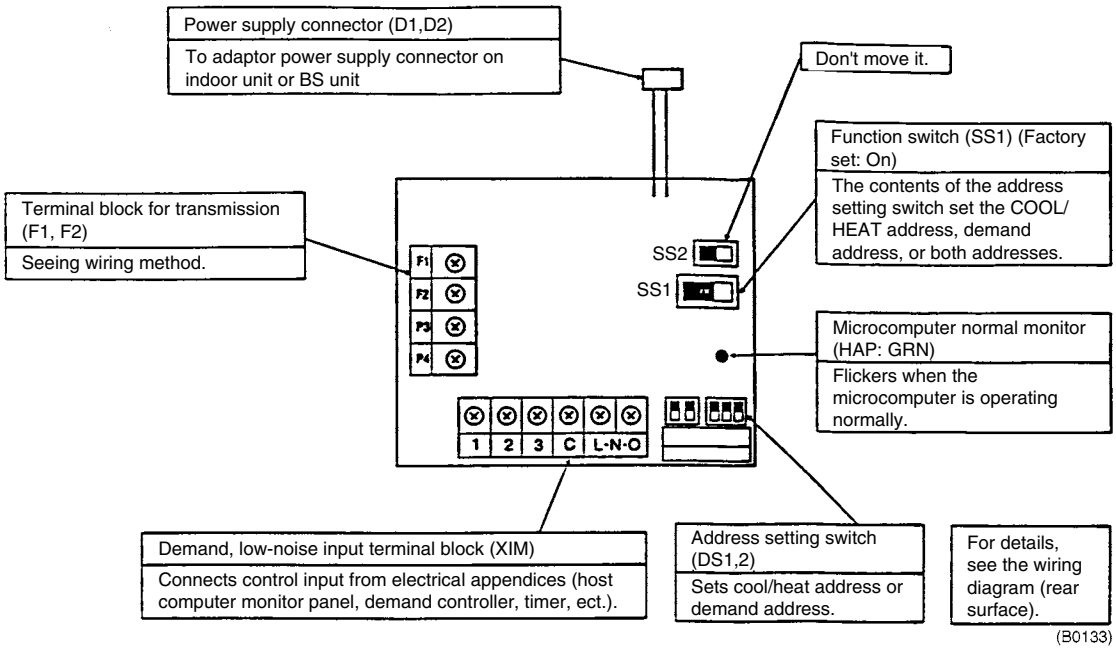
2. Demand control / Low noise control

(Possible only if outdoor units is RSX(Y) - KY1 • YAL • TAL type.)



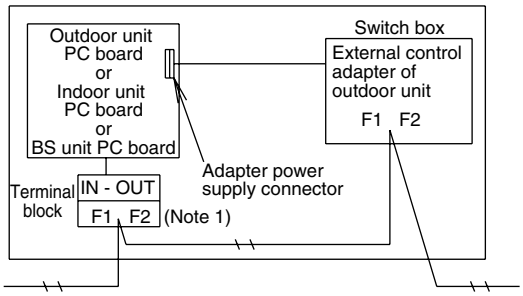
This mode enables a batch of the demand control and the low noise control of outdoor units enclosed with [- -].

5.3.1 Part Names and Functions



5.3.2 Wiring

1. Connect the power supply cable coming from this adapter to the adapter power supply connector on the PC board of the outdoor unit, indoor unit, or BS unit.
2. Connect the connecting wires to each terminal block, and terminals F1 and F2 on the PC board as shown in figure below. (Use 2-core wires. No polarities.)
3. For the connecting wires, use wiring ties provided and tie them to low voltage wires or else in the switch box.

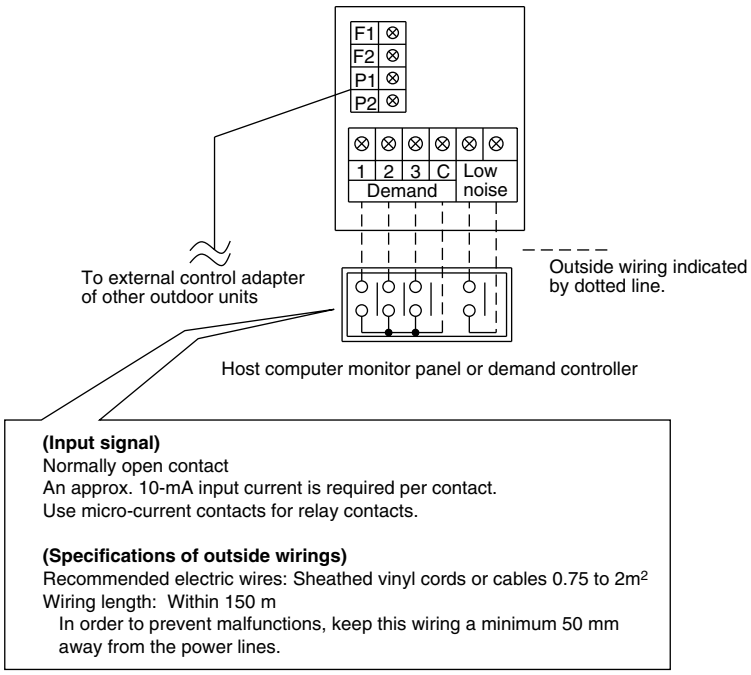


Notes:
- In order to built this adapter in the BS unit, connect wires between the “F1 and F2 on the indoor unit side” of the BS unit and the “F1 and F2” of the adapter.
- Tie the lead wires and connecting wires of this adapter so that these wires will not come into contact with the lid of the switch box.

Cautions

- **Specifications of connecting wires**
  Sheathed wire (2 wire) of 0.75 to 1.25 mm^2 in size
- **Length of connecting wirings**
  Be sure to observe the following limits. Not heeding so may result in the malfunction of transmission.
  Total wiring length: 2000 m or less
  Maximum numbers of branches: 16 branches

4. In order to perform input for the demand/low noise control, connect to the terminal block of this adapter.



■ **Demand input terminals**

Short circuit between (Demand 1) and (C)...Reducing power consumption to approx. 70% as a guide
Short circuit between (Demand 2) and (C)...Reducing power consumption to approx. 40% as a guide.
Short circuit between (Demand 3) and (C)...Forced thermostat OFF

■ **Low noise input terminals**

Short-circuiting between terminals saves capacity control (i.e., control of outdoor unit fan low-speed rotation or operating frequency of compressor) in cooling operation.
Use these terminals only with a low level of load at nighttime.

Notes:

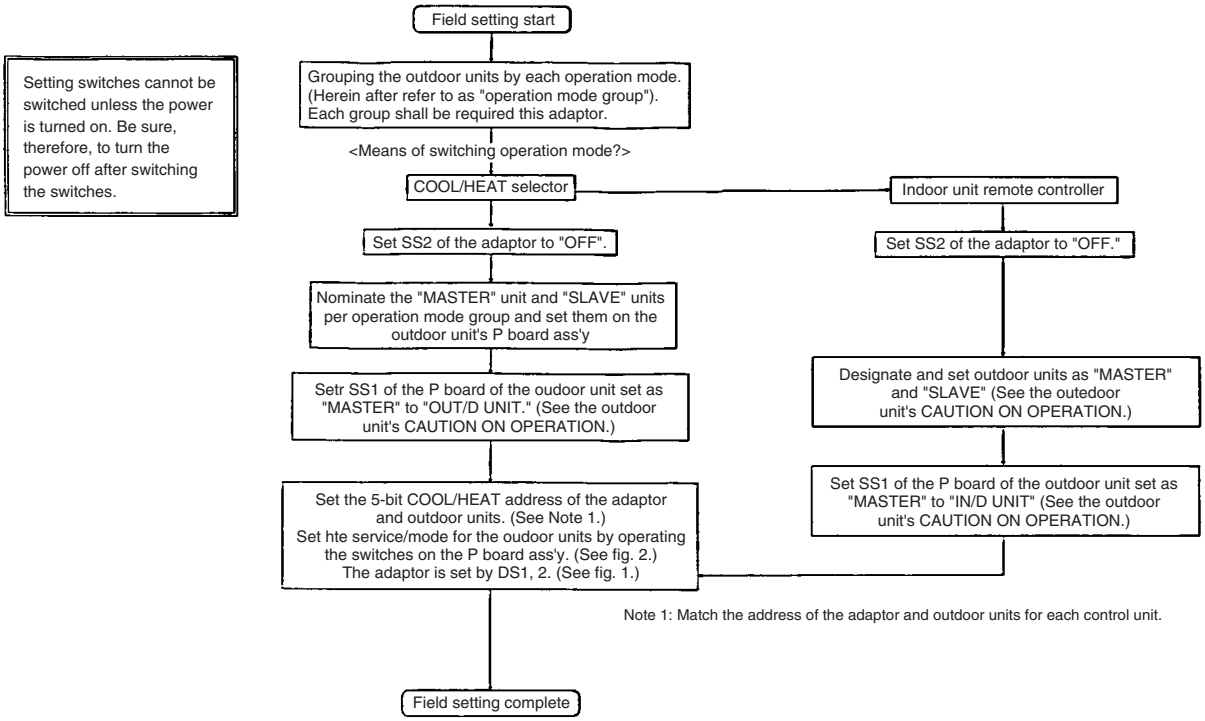
■ In order to input the demand/low noise control, use the switch on the outdoor unit PC board to set mode to low noise control “YES”.

How to set demand control in the field

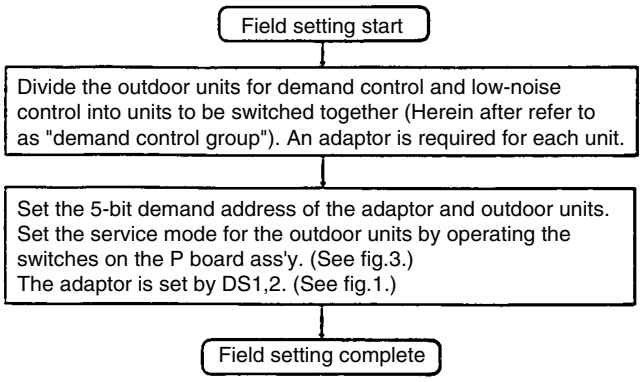
1. Outdoor unit field setting
   - Setting mode 1...Turn ON low noise control as explained in the outdoor unit’s service manual.
   - Setting mode 2...Match low noise and demand addresses to the external control adapter address.
2. External control adapter settings
   - Function switch (SS1)
     Set SS1 to either “BOTH“ or “DE“.
   - Address setting switch (DS1, DS2)
     Match DS1 and DS2 to the low noise and demand addresses of outdoor unit.

5.3.3 Field Settings

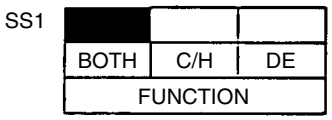
1. The contents of the various settings for unified switching of the operation mode (cool, heat, fan) are as follows.



2. The contents of the various settings for unified switching of demand and low noise operation are as follows.

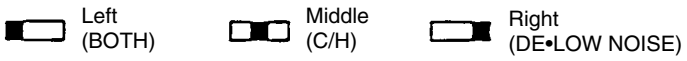


3. To carry out operation mode switching and demand control simultaneously
You can carry out operation mode switching and demand control simultaneously by setting function switch SS1 on the adaptor to "BOTH." Only one address, however, can be set on the adaptor, so the "operation mode switch unit" and "demand control unit" are the same.

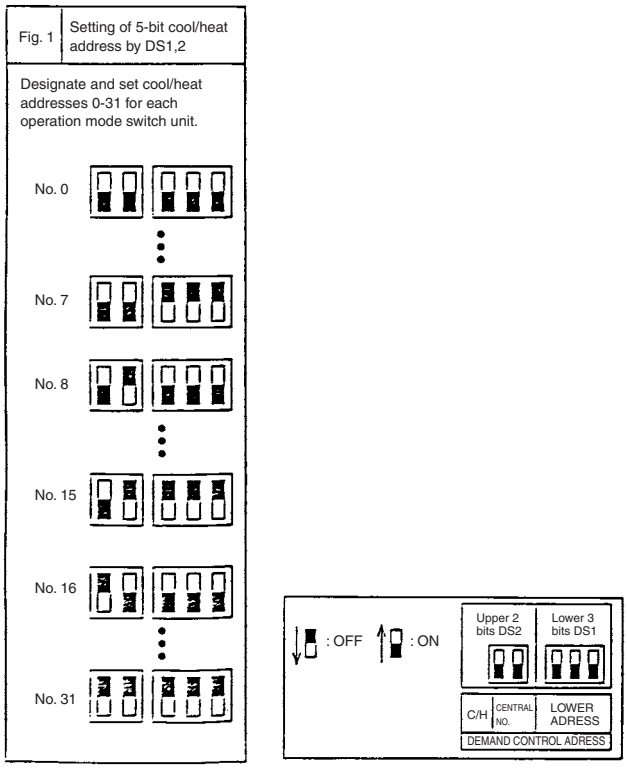


Factory set to "BOTH".

Set the COOL/HEAT address, demand address and low noise address, or both as needed.



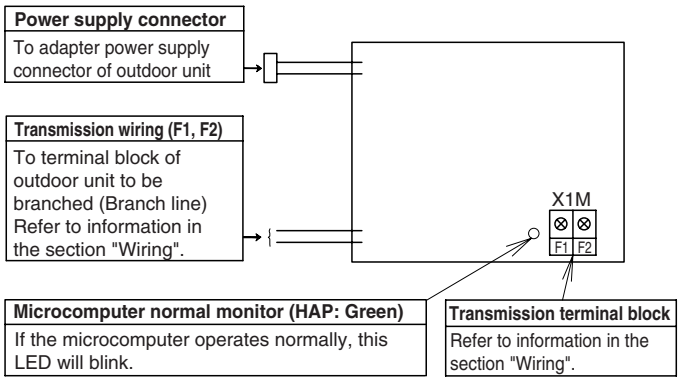
Note 2: The outdoor unit can have an independent "COOL/HEAT address" and "demand address". You can therefore set the "operation mode group" and "demand control group" to different ranges.



5.4 DIII-NET Expander Adaptor <DTA109A51>

Even though the present D-BACS controls 64 groups and 128 indoor units at maximum of VRV system by a single centralized controller, a combined use with the DIII-NET enables the control of 64 groups and 1024 indoor units at maximum.

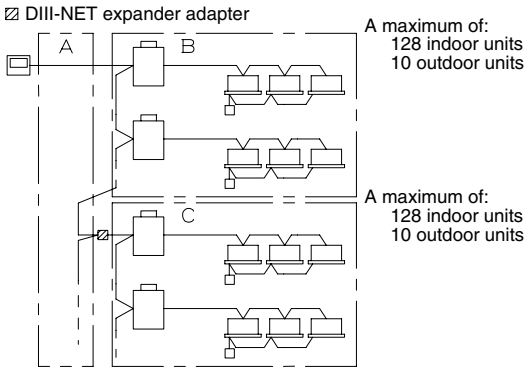
5.4.1 Part Names, Functions and Advantages



- Extending the number of centralized controllable indoor units for VRV system to 64 groups and 1024 units at maximum
- Facilitating response to requirements for wiring in longer length due to large-scale systems and extending flexibility in system design.
- Enabling the protection of control lines by the DIII-NET expander adapter unit, which achieves system design to diversify the risk of centralized control.
- The DIII-NET expander adapter enables the connection of eight units at maximum in one and the same control line.
- A single unit of the DIII-NET expander adapter enables the connection of 10 outdoor unit and 128 indoor units at maximum.

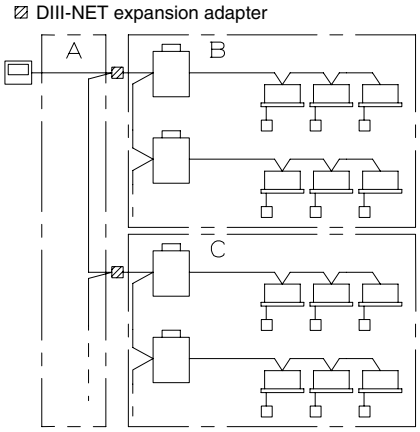
5.4.2 System Configuration

1. The number of units for centralized control can be extended up to 64 groups and 1024 units. (Using two centralized controllers extends the number up to 128 groups and 1024 units.) A limit for the number of connectable units with the DIII-NET comes to constitute that for the expander adapter units.



In the ranges of B and C, a maximum of 128 indoor units and 10 outdoor units are connectable, respectively.

2. The limits for wiring (i.e., Maximum distance: 1000 m, Total wiring length: 2000 m, and Maximum number of branches: 16) should be applied to each adapter unit.

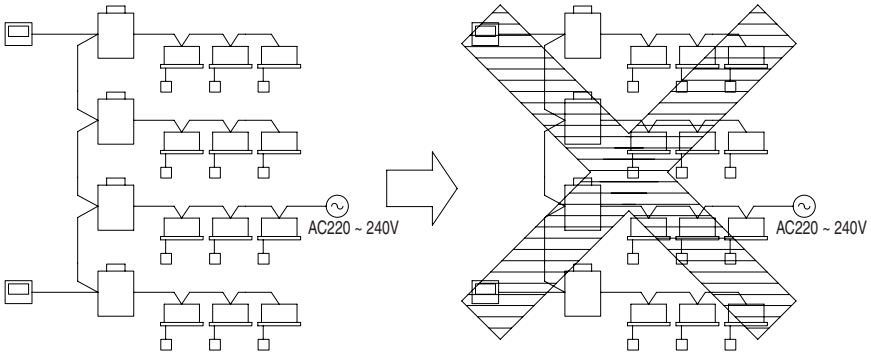


In the ranges of A, B, and C, wirings of 1000-m maximum distance, 2000-m total wiring length, and 16 maximum branches are enabled, respectively.

3. System design to diversify the risk of centralized control is enabled.

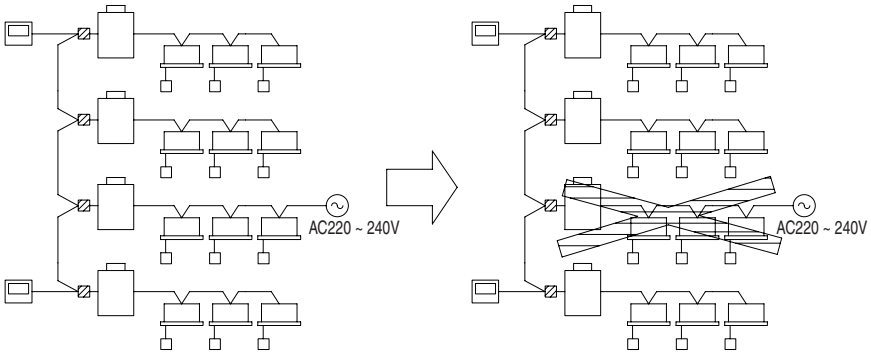
■ **Conventional system**

Faulty wirings, such as the application of 220-240V, may cause the system down.



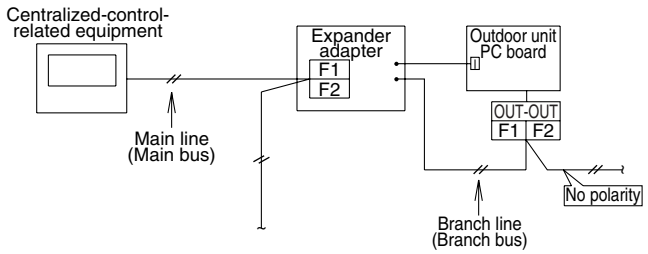
■ **If the expander adapter is used**

Even though only the system goes down at the adapter downward, influence on the entire system can be avoided.



5.4.3 Wiring

1. Connect the power supply cable coming from this adapter to the adapter power supply connector on the outdoor unit PC board.
   (For details on connector No., refer to information in wiring diagrams of outdoor unit and functional unit.)
2. Connect the transmission wiring to the OUT-OUT terminal block of the outdoor unit.
3. Connect the connection wiring to the terminal block as shown in figure below.



Cautions **(Specifications of connection wirings)**

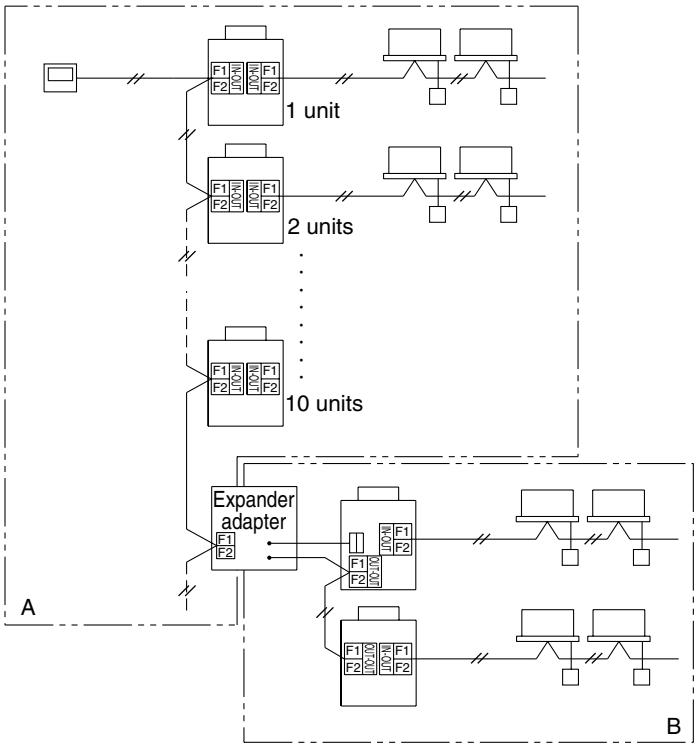
- Sheathed wire of 0.75 ~ 1.25 mm^2 in diameter (2 wire)

(Length of connection wiring)

- Since there are cases where exceeding the following limits by extended adapter unit may cause a malfunction of transmission, be sure to observe these limits.
  Total wiring length: 2000m
  Maximum distance: 1000m
  Maximum number of branches: 16)
- A minimum of one or more indoor units or master centralized controller is required for main bus and branch bus, respectively.
- A maximum of eight extended adapters are connectable.
- Do not install any expander adapter downstream from the expander adapter (i.e., to the branch bus).
- In the case of individual use of the wiring adaptor for electrical appendices (KRP2A) or the schedule timer (DST301B51), no combined use with the expander adapter is enabled.
- The external control adapter for the outdoor unit provides the batch cooling/heating control, demand control, and others by expander adapter unit.
  (No control is available beyond the expander adapter.)
- ON/OFF operations at short intervals from centralized controller may cause temporary faulty display. Therefore, do not attempt these ON/OFF operations.
- The sequential startup is conducted by each expander adapter unit.

Example of Wiring

Wiring for system with 10 or more outdoor units



Caution Each range of A and B is individually subject to restrictions on the connection wiring length. (Refer to information in section “Wiring”.)

5.5 Versatile Usage

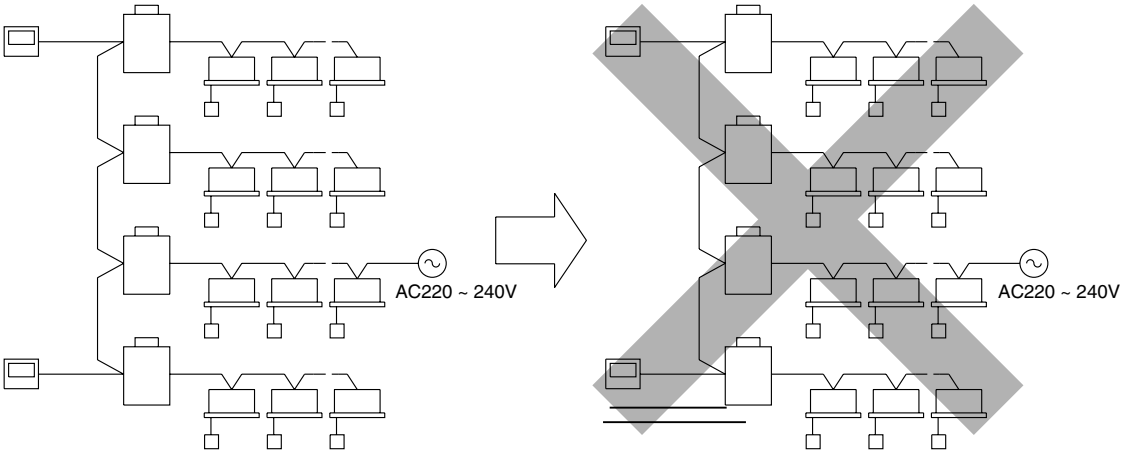
Versatile Usage

1. Diversification of risk of centralized control system

The DIII-NET extended adapter is originally designed to extend the system. In this connection, according to the usage shown in figure below, it is possible to design the centralized control system so that the system risk will be diversified.

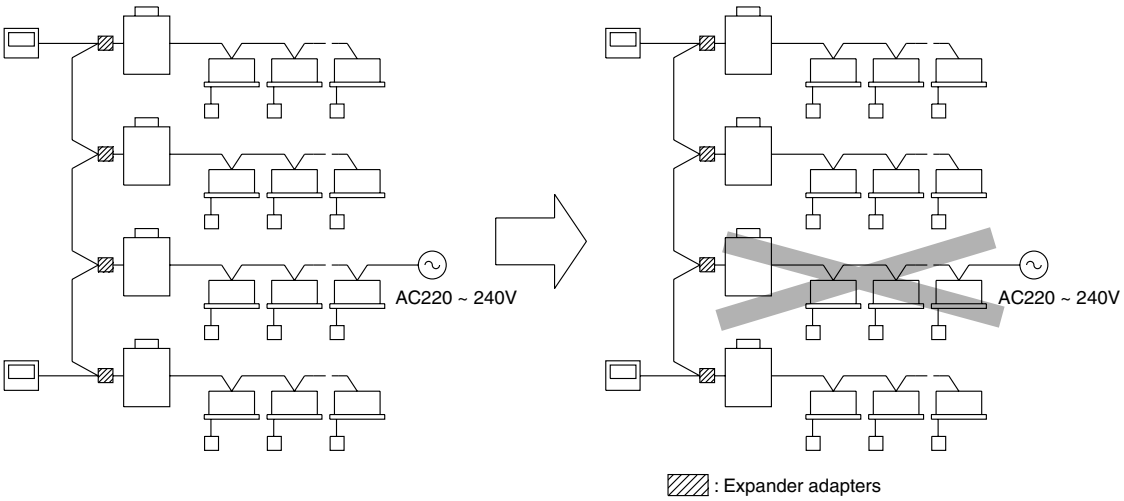
■ **Conventional system**

Faulty wirings, such as the application of 200V, may cause the system down.



■ **If the extended adapter is used**

Even though only the system goes down at the adapter downward, influence on the entire system can be avoided.

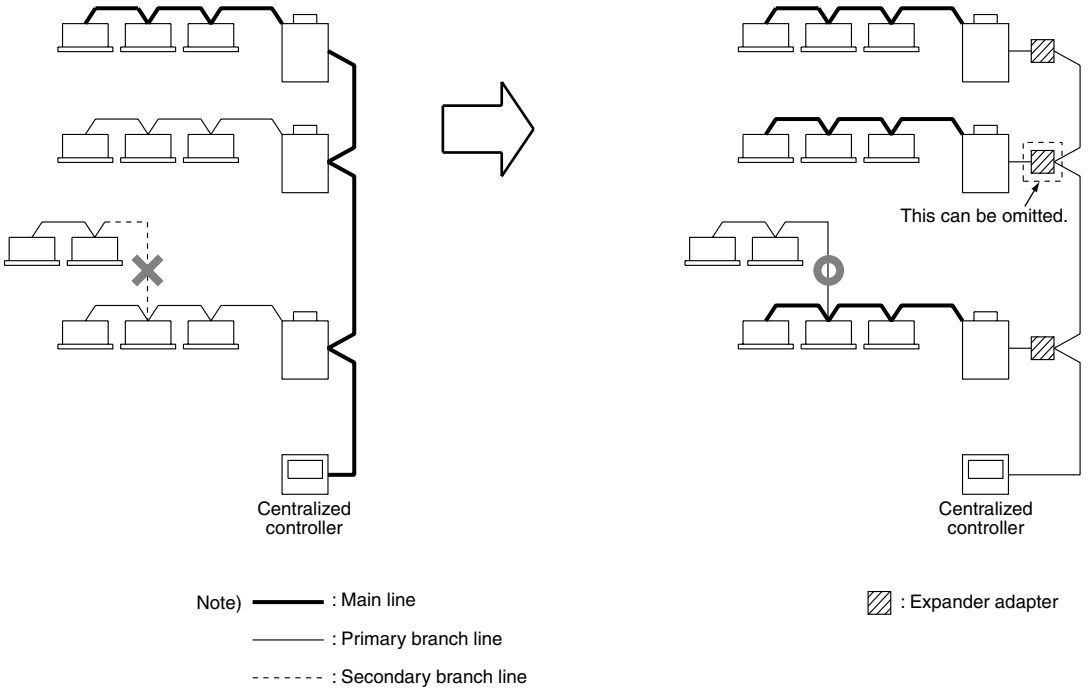


2. Relaxation of restrictions on branching DIII-NET

With the DIII-NET adapter, no secondary branching is enabled. Using expander adapters, however, enables branching shown in figure below. (Direct branching from the main line is referred to as the primary branching, and further branching from the primary branching is referred to as the secondary branching.)

■ **Conventional system**

■ **If the expander adapter is used**

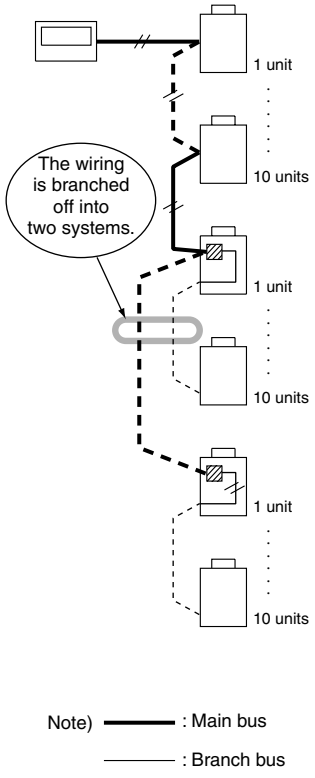


3. Method of extending system

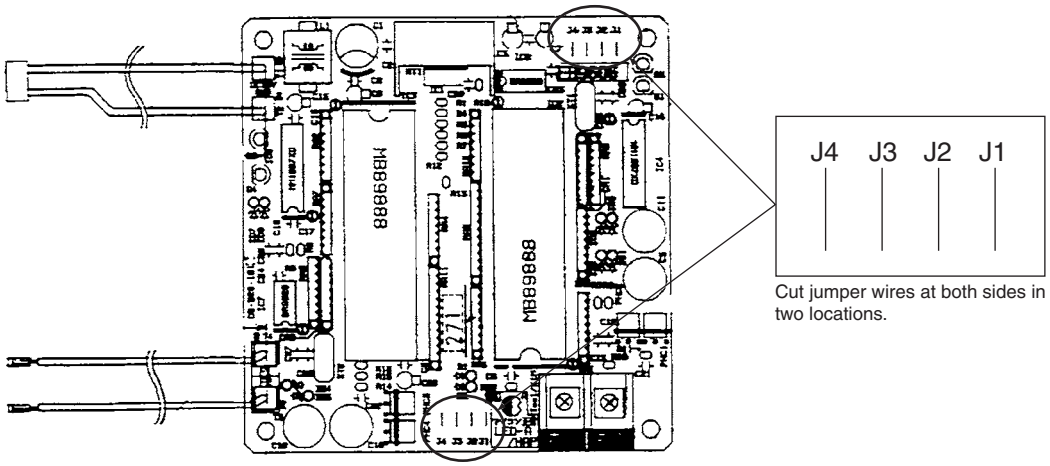
Using two units of expander adapters enables the connection of a maximum of 30 outdoor units (of 300 HP or less). An example of connection is shown in figure below.

Note: If additional extended adapters should be installed due to expansion or else after wires are connected as shown below, a significant change of the wiring within the system will be needed. Therefore, if any expansion is scheduled, follow an example of basic wiring shown in figure below.

■ **Example of basic wiring**



Even though there are several restrictions on the use of expander adapters, these restrictions can be relaxed by cutting jumper wires.



Cut the jumper wire “J2”. → The use of expander adapter in combination with thermal storage controller will be enabled.
Cut the jumper wire “J3”. → The use of expander adapter in combination with external control adapter for outdoor unit will be enabled.

6. How to replace the Compressor

For RSXYP to M:

(1) Collect the refrigerant by using refrigerant recovery unit.
(Since the setting on outdoor unit PCB is required for refrigerant recovery, refer to the warning plate "Precautions in service work" attached on the switch box cover.)
(2) Remove the sound insulator mat covering the faulty compressor, and disconnect the power cable from terminal board of the compressor.
(3) Disconnect the brazing sections of suction pipe and discharge pipe by using brazing torch after the refrigerant has been collected completely.
(4) Pinch the oil pressure equalizing pipe of the faulty compressor at the lower part of the brazed joint as shown in figure 1, and cut it between the pinched section and brazed joint in order to prevent residual oil from discharging.
(5) Remove three bolts at cushion rubber section to take out the faulty compressor outside the unit.
(6) Check that no oil remains in the oil pressure equalizing pipe as shown in figure 2, then remove the cut pipe from the brazed joint with brazing torch.
(7) Install the new compressor in the unit.
(Be sure to insert the cushion rubbers before tightening the fixing bolts of compressor.)
(8) Remove the rubber caps put on the suction and discharge pipe of the new compressor to release the sealing nitrogen gas.
(Take note that oil may spout due to the pipe inside pressure if the plug put on the equalizing seat is removed before removing of rubber cap.)
(9) Remove the plug put on the equalizing seat of the new compressor.
(10) Install the outlet pipe on the equalizing seat of the new compressor.
(11) Braze the equalizing seat outlet pipe to the oil pressure equalizing pipe with brazing torch.
* Since an O-ring is put in the equalizing seat, be sure to maintain the parts around O-ring in cool.
(12) Braze the suction and discharge pipe with brazing torch to the compressor.
(13) Conduct air tight test to check the piping system is free from leakage.
(14) Connect power cable to the terminal board of compressor and cover the compressor with sound insulator mat.

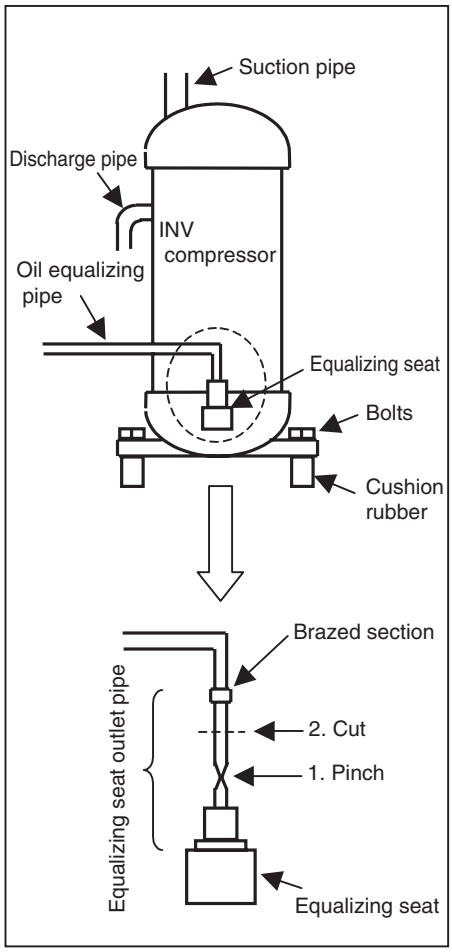


Fig. 1

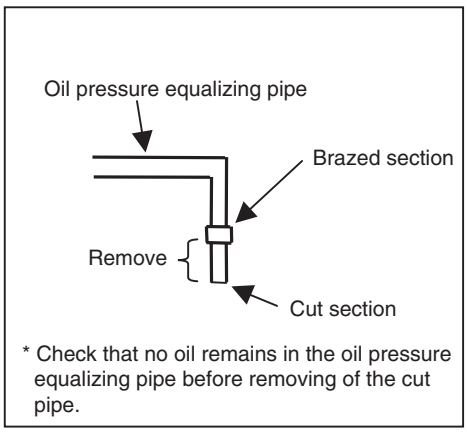


Fig. 2

(15) Conduct vacuum drying.
(Since the setting on outdoor unit PCB is required for vacuum drying, refer to the warning plate “Precautions in service work” attached on the switch box cover.)
(16) Charge refrigerant after the completion of vacuum drying, and check the function of compressor with cooling or heating operation.

7. HRV-Related

7.1 Group Interlock Control

7.1.1 Single-group Interlocked Operation (Basic Pattern)

Purposes and Functions

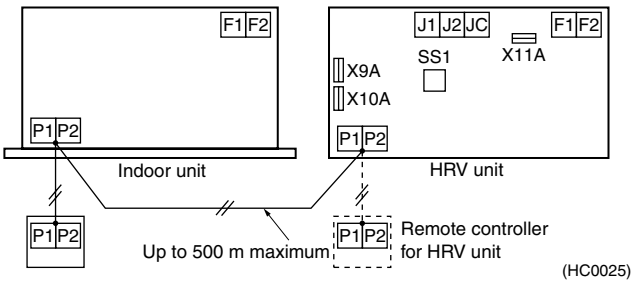
- The remote controller for indoor unit can control the interlocked operation with the HRV unit, and it can make an initial setting of the ventilation flow rate, the ventilation mode changeover and fresh-up operation. The HRV unit can independently be operated, even if the indoor unit is not in operation.

Note:

1. The remote controller should be connected to the terminal no. P1 and P2, the same as the group control wiring of indoor units.
2. Since this is two remote controller system (for Indoor unit and HRV unit), the Master / Slave setting is required.

Remote controller for	Setting
Indoor unit	Slave
HRV unit	Master

Example of Control Wiring



Switch Setting for HRV Unit

- No change is required. (as per factory setting)

Optional Accessories Required

- None

7.1.2 Single-group Interlocked Operation (Direct Duct Connection)

Purposes and Functions

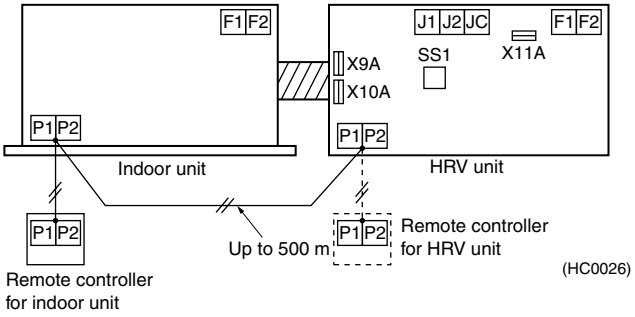
- The operation of HRV unit is interlocked to the indoor unit connected by the duct, which has a fresh air intake.
- It can reduce the number of outlets for supply air.
- The HRV unit cannot be operated independently to prevent a reverse stream of fresh air to the suction side of the indoor unit, unless the fan of indoor is in operation.

Note:

1. The amount of fresh air to the indoor unit should be less than 20% of the total air volume of the indoor unit. (If the amount of fresh air is too much, the capacity of the indoor unit may reduce and the operating sound might be higher.)
2. The HRV unit can be operated independently, if the fan of indoor unit is in operation.
3. Since this is two remote controller system (for Indoor unit and HRV unit), the Master / Slave setting is required.

Remote controller for	Setting
Indoor unit	Slave
HRV unit	Master

Example of Control Wiring



Switch Setting for HRV Unit

- The initial setting by the remote controller for indoor unit
- Direct duct setting ....."ON" [17(27)·5·02]

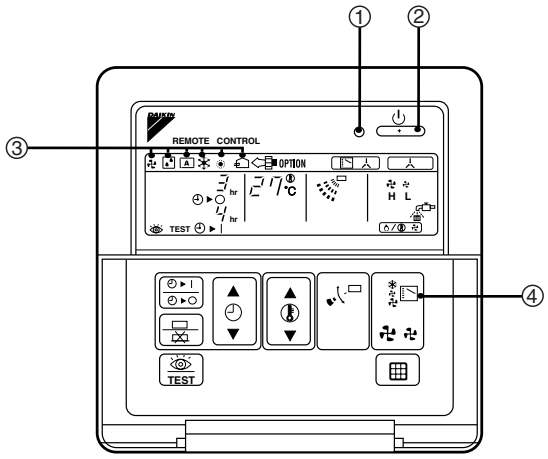
Optional Accessories Required

- None

7.1.3 Operating the HRV Unit Using the Remote Controller of the VRV-system Air Conditioner

When the VRV-system air conditioner is connected with the HRV unit with a direct duct, the remote controller of the air conditioner cannot be used to select the VENTILATION mode. To use the HRV unit without operating the air conditioner, set the air conditioner in the FAN VENTILATION mode and select the low fan speed.

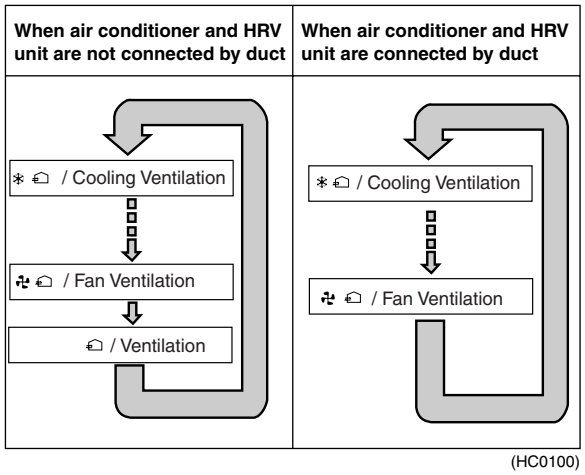
① Operation lamp
② Operation / stop button
③ Operation mode display
④ Operation mode selector



Remote controller for VRV
BRC1A51·52 / 61·62 (HC0099)

- Every time the operation mode selector is pressed, the operation mode display changes as shown below.

Example

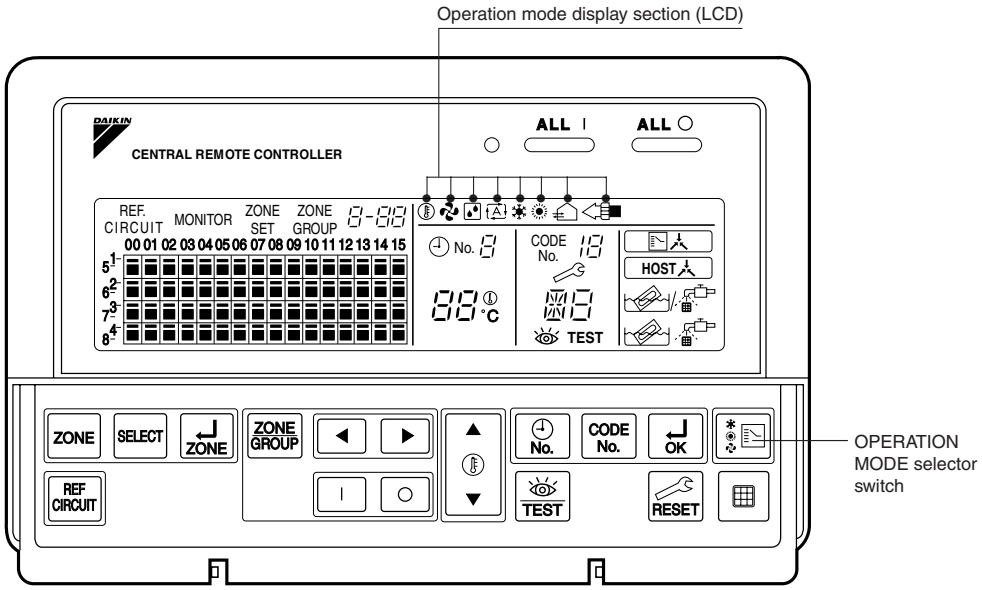


(HC0100)

- When the ▦ "FILTER" indication appears on the display, clean the filter of the HRV unit.

7.1.4 Independent Operation of the HRV Unit Using the Centralized Controller (DCS302B61)

- After selecting the zone where the only the HRV unit operation is desired, press the operation mode selector and select " " VENTILATION. The HRV unit can then be operated independently from the air conditioner.
- When the "FILTER" indication appears on the display, clean the filter of the HRV unit.



(HC0147)

7.1.5 Interlocked Operation with 2 or More Group of VRV System

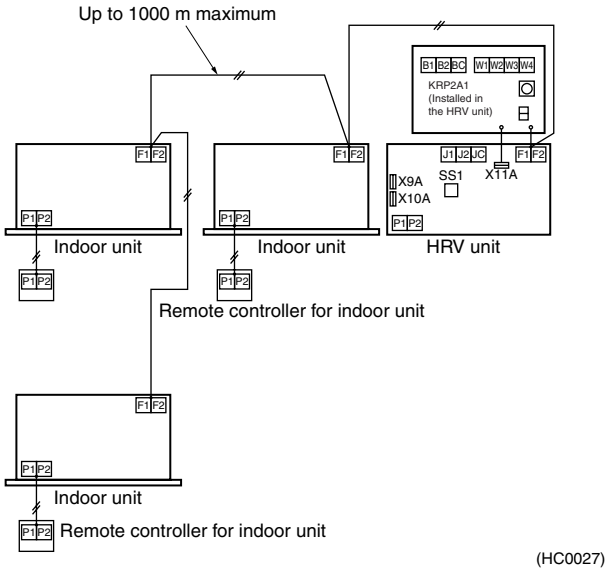
Purposes and Functions

- When the HRV unit is interlocked to 2 or more group of indoor units, the HRV unit operates, if one of indoor unit in groups is in operation. The HRV unit can also be operated independently by remote controller for indoor unit, even if the indoor unit is not in operation.

Cautions:

1. It is not necessary to set the group number for central control.
2. One adapter PCB for remote control should be installed in the one of the unit connected to the central transmission line.
   (When you install an adapter PCB for remote control in the indoor unit, select the applicable model number of Adapter PCB to be installed.)

Example of Control Wiring



(HC0027)

Note: The central transmission line can be extended up to 1000 m maximum.

Switch Setting for HRV Unit

The initial setting by the remote controller for indoor unit or HRV unit.

Optional Accessories Required

- Adapter PCB for remote control: KRP2A61

7.2 Centralized Control System

7.2.1 Collective / Individual Control [Unified On / Off Controller DCS301B61]

Purposes and Functions

- One controller can control the operation of "ON / OFF" of 16 groups of the units collectively or individually.
  Also up to 4 controllers can be installed in one centralized transmission line (in one system), which enable to control up to 64 groups. (16 groups × 4 = 64 groups)
- The ventilation mode will be selected automatically.

Cautions:

1. It is necessary to assign a central group number to each indoor unit and HRV unit.
2. The operation of HRV unit is not interlocked with the operation of indoor unit under this control system. If you like to have an interlocked operation, please consider other control system.

Switch Setting for HRV Unit

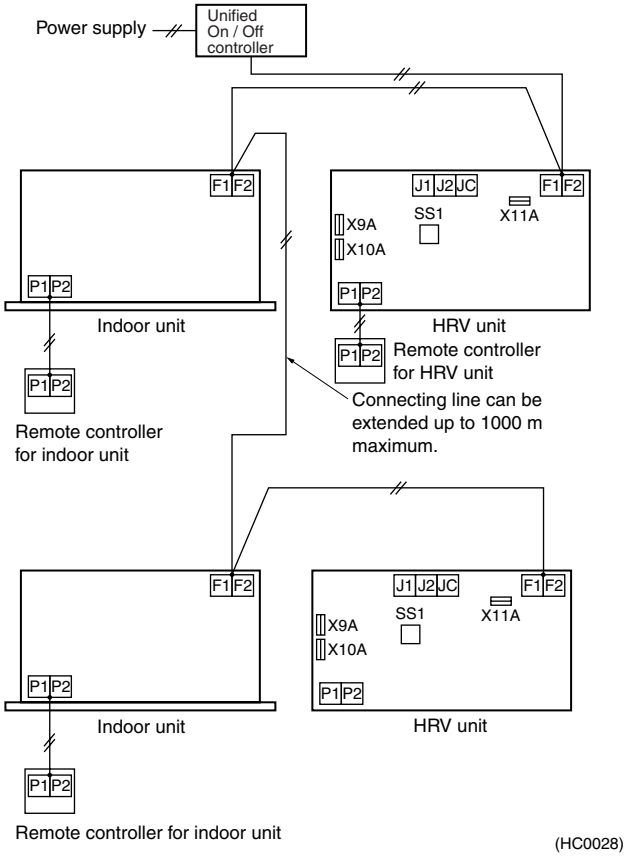
The initial setting is required by the remote controller for indoor unit or HRV unit.

- No change is required. (as per factory setting)

Optional Accessories Required

- Remote controller (Only when you use) BRC301B61

Example of Control Wiring



7.2.2 Zone Control System (Central Remote Controller DCS302B61)

Purposes and Functions

- A maximum of 64 groups can be controlled On / Off individually by one controller. And also the central remote controller can control the On / Off operation of the units in each zone collectively. (It also can control the interlocked operation as well as the independent operation within the same zone.)
- If the zone setting is not required, or if you like to operate the HRV unit whenever one of indoor unit of any group connected to the central transmission line is in operation, refer to the applied system.

Cautions:

1. It is necessary to assign a central control group number.
2. If you operate the HRV unit interlocked to the operation of indoor unit, please set the same zone number. At that time, it is necessary to set the zone operation on the HRV unit.
3. It is not possible to operate On / Off from the remote controller for the HRV unit in zone 1.
4. It is not necessary to set the zone operation mode in zone 2, which is already set at the factory.

Switch Setting for HRV Unit

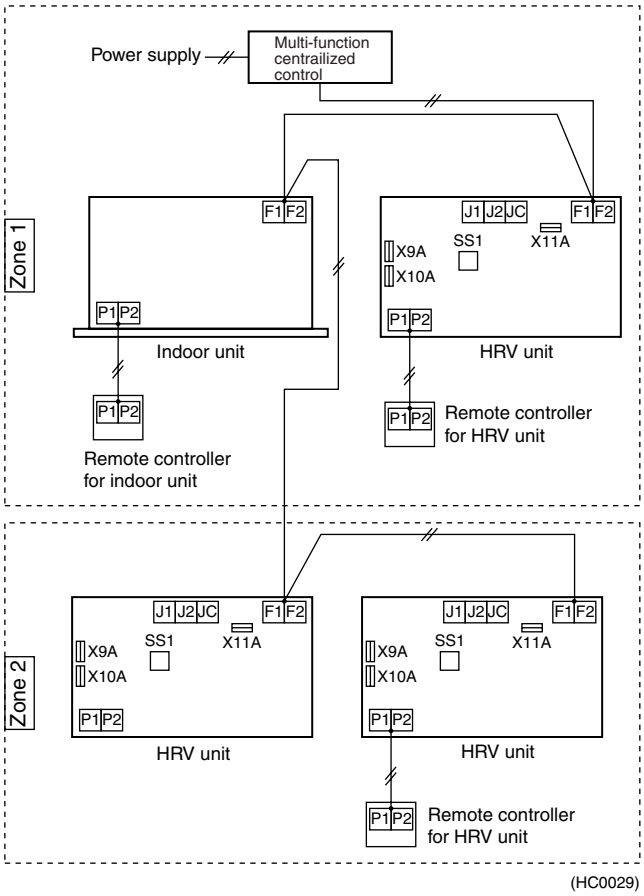
The initial setting is required by the remote controller for indoor unit or HRV unit.

- For zone 1 ....."ON" [17(27)·8·02]
- For zone 2 .....Factory set (No change is required)

Optional Accessories Required

- Remote controller (Only when you use) BRC301B61

Example of Control Wiring



(HC0029)

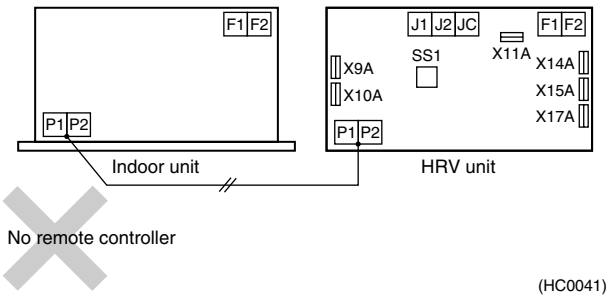
7.3 Examples of Mistakes in Wiring and System Designing

7.3.1 It is Necessary to Install the Remote Controller for the Transmission Line.

<Part 1>

- When you connect the transmission line for the remote controller, the remote controller should be installed on the transmission line.

Example of Control Wiring



Reason

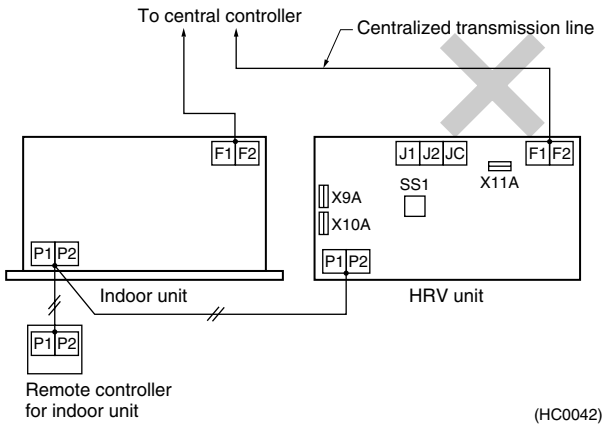
Because the signal through the transmission line is originated from the remote controller, there is no transmission signal to operate the units, if the remote controller is not installed.

7.3.2 The Centralized Transmission Line should be Connected to the Indoor Unit.

<Part 2>

- If the HRV unit is interlocked to the centralized controller, the central transmission line should be connected to the terminal no. F1 and F2 of indoor unit.

Example of Control Wiring



Reason

The information from the indoor unit cannot be transmitted to the central controller through the HRV unit. And also the information from the central controller cannot be transmitted to the indoor unit through the HRV unit.

7.4 Additional Functions

7.4.1 Operation by Power Supply [HRV Unit]

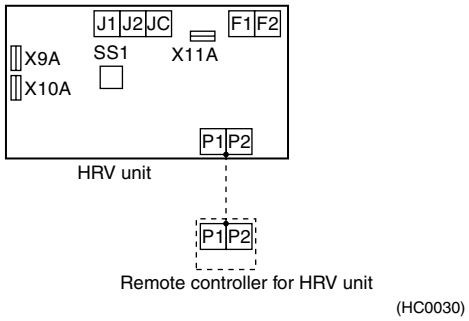
Purposes and Functions

- The HRV unit is operated by "On / Off" of the main power breaker. This is possible only for the independent operation system. (When the main power is disconnected, the transmission error will be displayed if the HRV unit is interlocked to the indoor unit or controlled by the centralized controller.)

Cautions:

1. Install insect control wire net on the air intake and exhaust openings. (If the power is disconnected when the damper is open, the damper remains open and the insects may get into the room.)
2. When you install the remote controller, it is possible to have normal operation after the electric power is supplied.

Example of Control Wiring



(HC0030)

Switch Setting for HRV Unit

The initial setting is required by the remote control for indoor unit. Power-on setting..... "ON" [18(28)·1·02]

Install the remote controller for indoor unit for the initial setting. After completion of the initial setting, remove the remote controller.

Optional Accessories Required

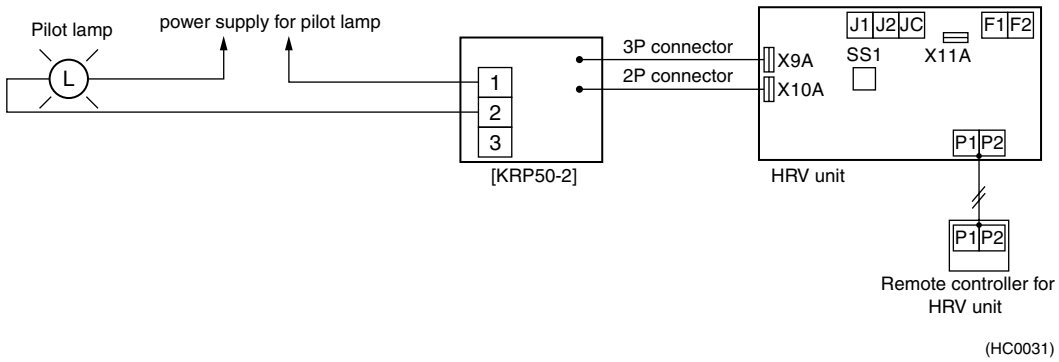
- None

7.4.2 Monitor of Operation (KRP50-2) [HRV Unit → Operating Pilot Lamp (Local Supply)]

Purposes and Functions

To monitor the operation of one HRV unit.

Example of Control Wiring



(HC0031)

Switch Setting for HRV Unit

- No change is required. (as per factory setting)

Optional Accessories Required

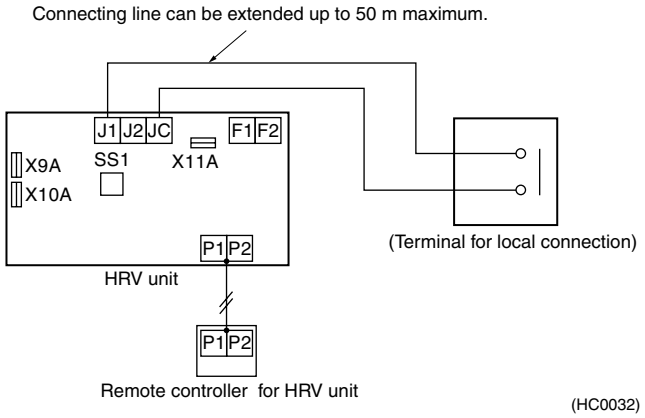
- Adapter PCB: KRP50-2

7.4.3 Fresh-up Operation by External Input [HRV Unit]

Purposes and Functions

When the operation is interlocked with the local ventilating fan (such as the one for toilet or kitchen), the HRV unit performs the over-supply operation to prevent the reverse flow of the odor.
The flow rate of supply air becomes higher than that of exhaust air.

Example of Control Wiring



■ Local wiring

Operation of HRV unit	Terminal for local connection	Capacity of connecting terminal
Fresh-up	Short-circuit	No-voltage normally open contact for micro-current 16 V, 10 mA
Normal	Open circuit	

Notes: The connecting wiring between HRV unit and the terminal for local connection can be extended up to 50 m maximum.

Switch Setting of HRV Unit

■ No change is required. (factory setting)

Optional Accessories Required

■ None

7.4.4 Precool / Preheat Operation

Purposes and Functions

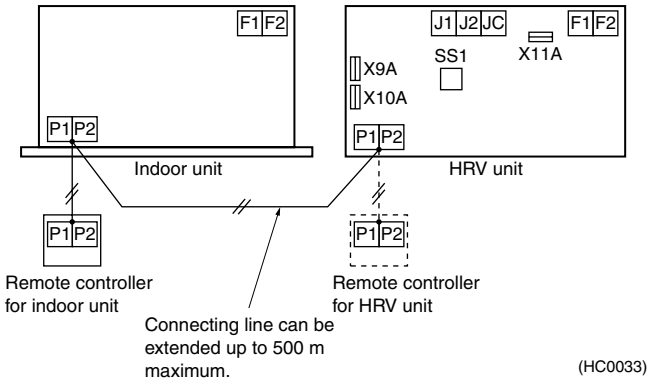
- The operation of HRV unit is delayed when the air conditioner begins operation.

Cautions:

1. The precool / preheat function is possible only when the operation of HRV unit is interlocked to one-group or two-group of indoor unit.
   (It will not function when the HRV unit is in independent operation.)
2. You can select the preset time of 30 / 45 / 60 minutes for delayed operation at the time of initial setting.
   If this preset time is not sufficient, you can extend the preset time for further 30 / 60 / 90 minutes only the preheating function.
3. Since this is two remote controller system (for Indoor unit and HRV unit), the Master / Slave setting is required.

Remote controller for	Setting
Indoor unit	Slave
HRV unit	Master

Example of Control Wiring



Switch Setting of the HRV Unit

The initial setting by the remote controller for the indoor unit.

- Precool / preheat On / Off setting. . . . . "ON" [17(27)·2·02]
- Precool / preheat time setting . . . . . "Time" [17(27)·3·*1]
- Preheat extra time setting . . . . . "Time" [17(27)·9·*2]

*1 setting. . . . . 01 for 30, 02 for 45 and 03 for 60 minutes.
*2 setting. . . . . 01 for 0 (factory set), 02 for 30, 03 for 60 and 04 for 90 minutes.

Optional Accessories Required

- None

7.4.5 Remote Control Operation by Input from Outside

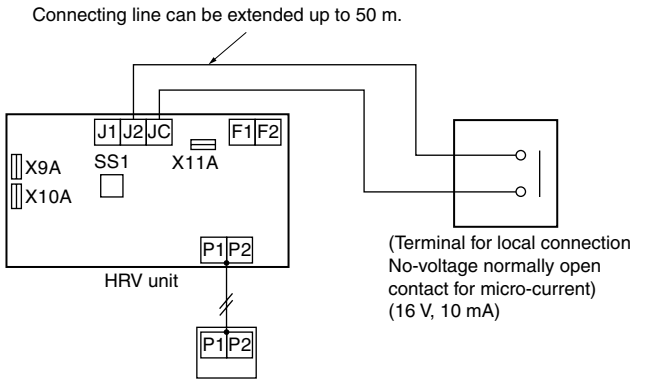
Purposes and Functions

- The HRV unit can be controlled the operation of "On / Off" remotely by the signal from no-voltage normally open contact.

Cautions:

1. When the system is under group control, the input from outside controls the operation of "ON / OFF" collectively, if it is installed in the one of the unit.

Example of Control Wiring



Switch Setting of HRV Unit

- No change is required.

Optional Accessories Required

- None

7.5 Central Control System (DCS302B61)

7.5.1 Collective / Individual Operation (Central Remote Controller)

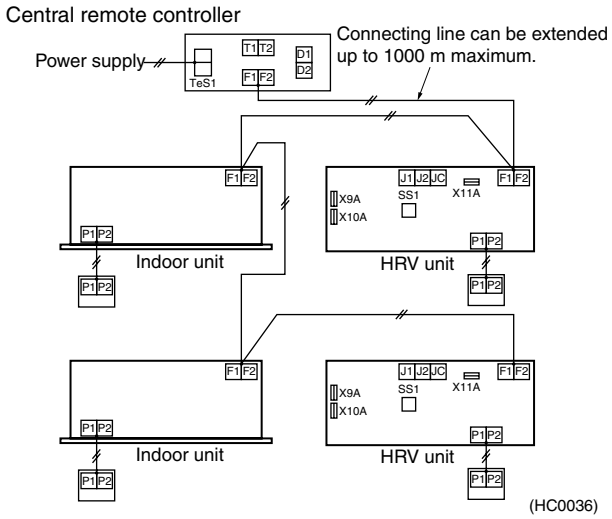
Purposes and Functions

It is possible to have collective On / Off or individual On / Off without zone control (while setting the 64 zones).
It is also possible to connect the unified On / Off controller and etc.

Cautions:

1. It is required the local setting of the group number for central control.
2. The HRV unit judges the ventilation mode individually.

Example of Control Wiring



Switch Setting of the HRV Unit

The initial setting is required by the remote controller for indoor unit.

- Collective zone interlock setting. . . . . "OFF" (as per factory set)

Optional Accessories Required

- Central remote controller DCS302B61

7.5.2 Collective Operation (Schedule Timer DST301B61)

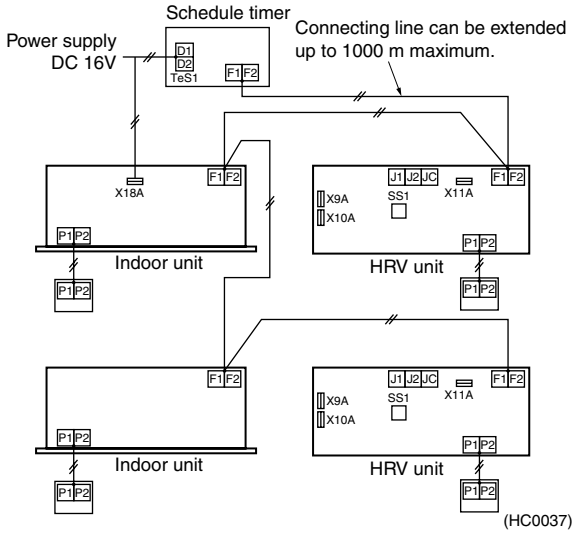
Purposes and Functions

- A maximum of 128 units can be controlled the collective operation / stop by weekly schedule.

Cautions:

1. The setting of group number for central control is not required.
2. The HRV unit judges the ventilation mode individually.
3. The power supply for the schedule timer can be supplied from the PCB of the unit. (X18A for the indoor unit and X11A for the HRV unit)

Example of Control Wiring



Switch Setting of the HRV Unit

The initial setting is required by the remote controller for the indoor unit.

- Collective zone interlock setting. . . . . "OFF" (Factory setting)

Optional Accessories Required

- Schedule timer DST301B61

7.5.3 Collective Operation [Adapter PCB for Remote Control KRP2A Series]

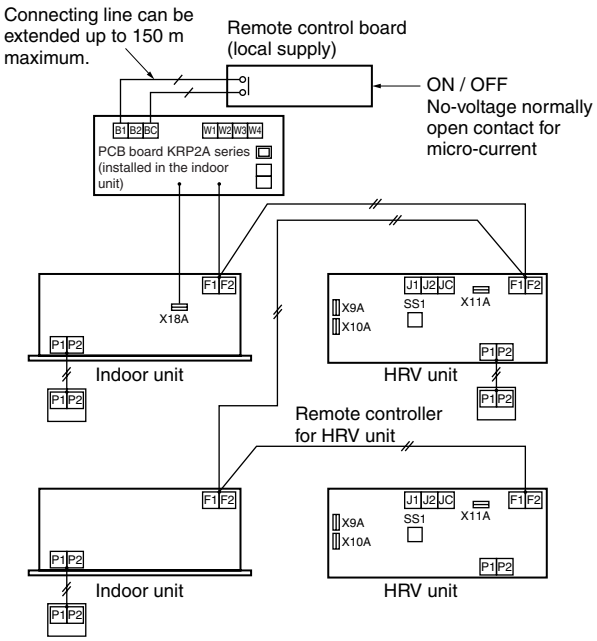
Purposes and Functions

A maximum of 64 groups can be controlled the operation of "ON / OFF" collectively. (For the individual control, use the central remote controller or the unified On / Off controller.)

Cautions:

1. Adapter PCB can be installed in any unit connected to the central transmission line.
2. It cannot be used with other central controller.
3. The setting of group number is not required.
4. The HRV unit judges the ventilation mode individually.

Example Control Wiring



Switch Setting of the HRV Unit

The initial setting is required by the remote controller for the indoor unit or HRV unit.

- Collective zone interlock setting. . . . . "OFF" (as per factory setting)
- The setting of switch on the PCB
- Voltage / no-voltage changeover switch(SS1) . . . . . "no-voltage"

* Remote control mode changeover switch (RS1) should be selected.

Optional Accessories Required

Adapter PCB for remote control KRP2A61

7.5.4 Multi Function Central Controller + Unified On / Off Controller

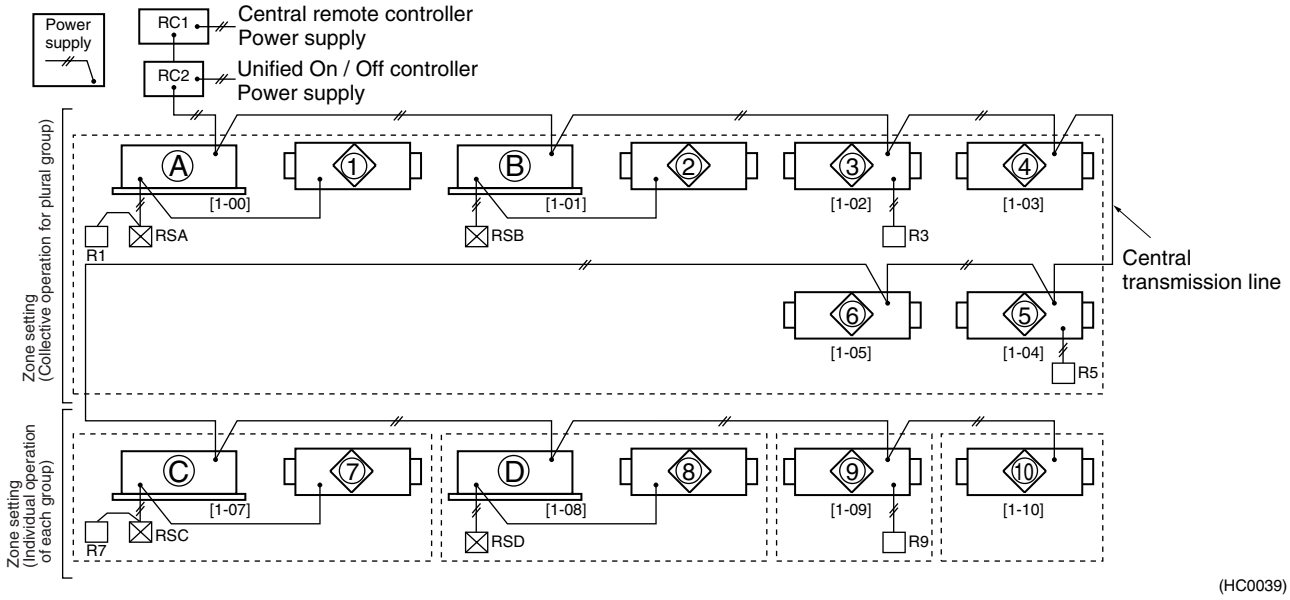
Proper controller should be selected according to the functions required.

* It is possible to combine the schedule timer.

System Overview

RC1 . . . . . Central remote controller
RC2 . . . . . Unified On / Off controller
RSA – D. . . . . Remote controller for the Indoor unit
R1 – 9 . . . . . Remote controller for the HRV unit

System Description



(HC0039)

Unit No.	Setting					Operation display functions (○means possible)															Choise condition	
	Zone setting		Interlocked zone contol		Group number setting for central control	Operation / stop				Independent ventilation Operation/stop				Ventilation air flow Ventilation mode Fresh-up				Filter-sign Malfunction code				HRV unit side	
	Collective	Individual	On	Off	Required (●) Not Required	RC1	RC2	RSA – D	R1 – 9	RC1	RC2	RSA – D	R1 – 9	RC1	RC2	RSA – D	R1 – 9	RC1	RC2	RSA – D	R1 – 9	Interlocked operation with Energy saving	*4 Total evaluation
①	●	–	–	●	Not required (Setting required only for ⒶⒷ)	Collective by zone	Linked to A / B	○	–	–	Linked to A / B	○	–	–	–	–	○	–	–	–	○	○	AA
②	●	–	–	●				○	–	–		○	–	–	–	*2	–	*3	–	*3	–	○	AA
③	●	–	●	–	●		–	○	–	*1	–	○	–	–	–	–	○	○	–	–	○	○	AA
④	●	–	●	–	(Connection required,) ● when setting		–	○	–		–	○	–	–	–	–	–	○	–	–	–	○	BB
⑤	●	–	–	●	●		○	–	○		○	–	○	–	–	–	○	○	–	–	○	–	CC
⑥	●	–	–	●	(Connection required,) ● when setting		○	–	–		○	–	–	–	–	–	–	○	–	–	–	–	DD
⑦	–	●	–	●	Not required (Setting required only for ⒸⒹ)		Linked to C / D	○	–		Linked to C / D	○	–	–	–	–	○	–	–	–	○	○	AA
⑧	–	●	–	●				○	–	–		○	–	–	–	*2	–	*3	–	*3	–	○	AA
⑨	–	●	–	●	●	○	○	–	○	○	○	–	○	–	–	–	○	○	–	–	○	–	*5 CC
⑩	–	●	–	●	(Connection required,) ● when setting	○	○	–	–	○	○	–	–	–	–	–	–	○	–	–	–	–	*5 DD

*1. Independent operation for ventilation is possible, if collective zone interlock setting is "ON" with the indoor unit in the same zone.
*2. It is possible by the initial setting.
*3. Display of malfunction code only.
*4. The meaning of total evaluation

AA: Interlocked operation with energy saving and changeable of Ventilation mode / Air flow rate
BB: Interlocked operation with energy saving and no changeable of Ventilation mode / Air flow rate
CC: No interlocked operation with energy saving and changeable of Ventilation mode / Air flow rate
DD: No interlocked operation with energy saving and no changeable of Ventilation mode / Air flow rate

*5. Interlocked operation setting must not be done for individual zone. (Because there is no unit to combine in zone except 1 unit.)

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The air conditioners manufactured by Daikin Industries have received **ISO 9000 series** certification for quality assurance.

Certificate Number.
(ISO9001) **JMI-0107** (ISO9002) **JQA-1452**
JQA-0495

All Daikin Industries locations and subsidiaries in Japan have received environmental management system standard **ISO 14001** certification.

Daikin Industries, Ltd.
Domestic Group
Certificate Number. EC99J2044

About ISO 14001

ISO 14001 is the standard defined by the International Organization for Standardization (ISO) relating to environmental management systems. Our group has been acknowledged by an internationally accredited compliance organisation as having an appropriate programme of environmental protection procedures and activities to meet the requirements of ISO 14001.

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