Manual No.'19・KX-T-335

updated May 13, 2022

MITSUBISHI HEAVY INDUSTRIES

TECHNICAL MANUAL

EEV-KIT
General information

EEVKIT6-E-M/A, /B (Master)
EEVKIT6-E-C/A, /B (Slave)
EEV6-71-E/A
EEV6-160-E/A
EEV6-280-E/A

In this manual, General information of EEV-KIT is shown.

Regarding the others manual please see below table.

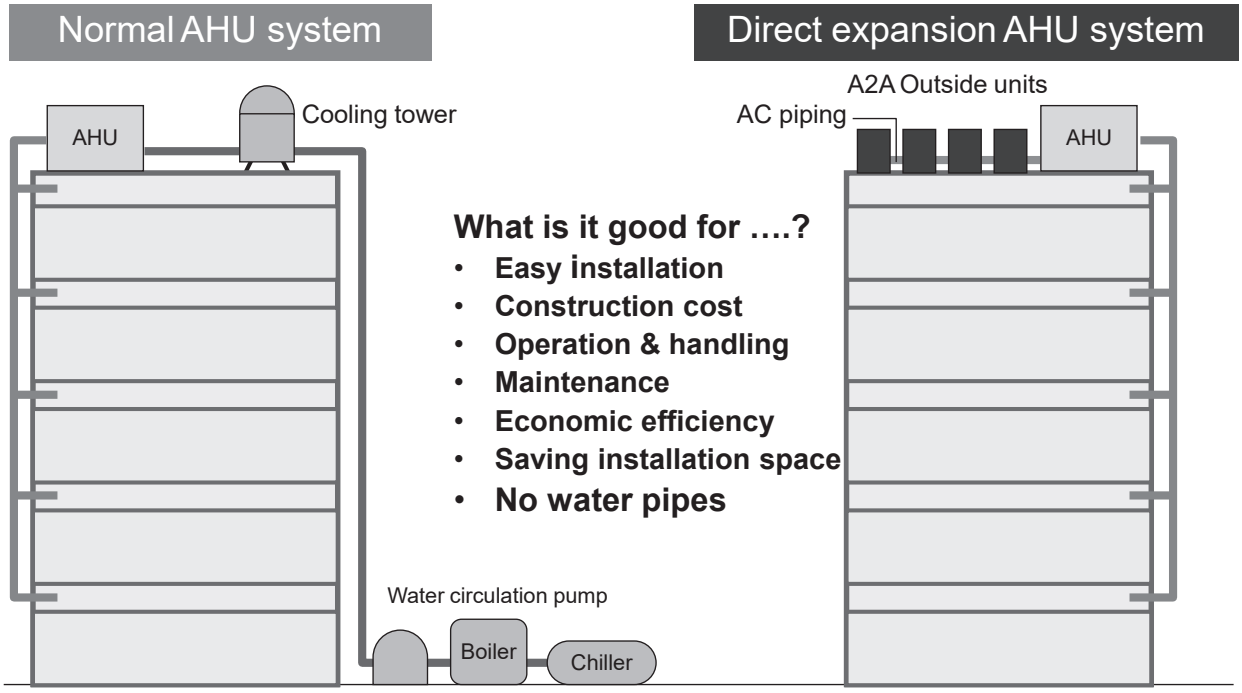
Manual	No.
For single refrigeration system (EEVKIT6-E-C/A, /B)	'19・KX-T-336
For multiple refeigeation system (EEVKIT6-E-M/A, /B, -C/A, /B)	'19・KX-T-337

Preliminary information, all of contents are subject to final confirmation by MHI.

MITSUBISHI HEAVY INDUSTRIES THERMAL SYSTEMS, LTD.

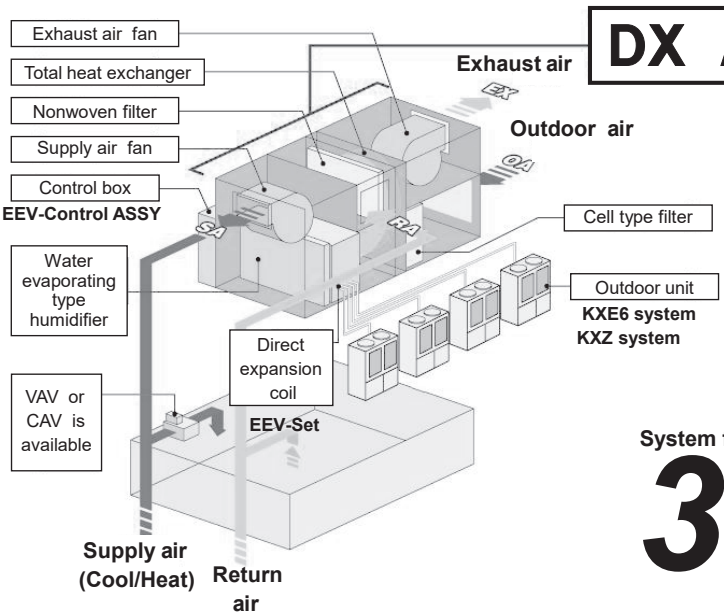
Contents

1. What is a DX AHU



AHU：Air handling unit

DX AHU : Air handling unit equipped with the direct expansion coil



DX AHU

System feature 1
Applied air cooled type heat pump outdoor unit for heat source

System feature 2
Applied direct expansion coils for heat exchanger in the AHU

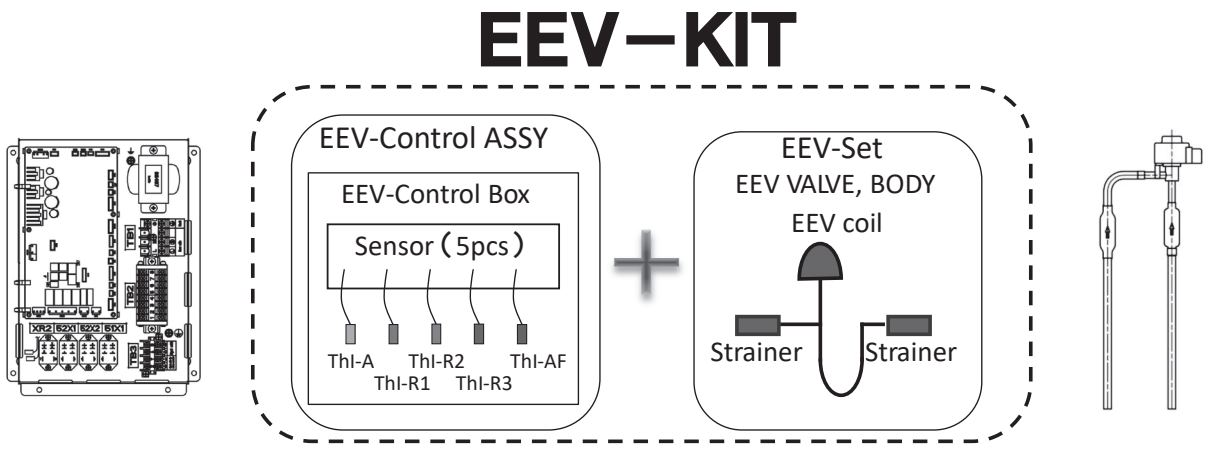
System feature 3
Available to connect KXE6 or KXZ systems(Max. 8 systems) to one air handling unit

Max. capacity 896kW（I/U:28kW×32)：cooling capacity
(Master PCB can control 32 slave PCB's)

#

2. What is an EEV-KIT

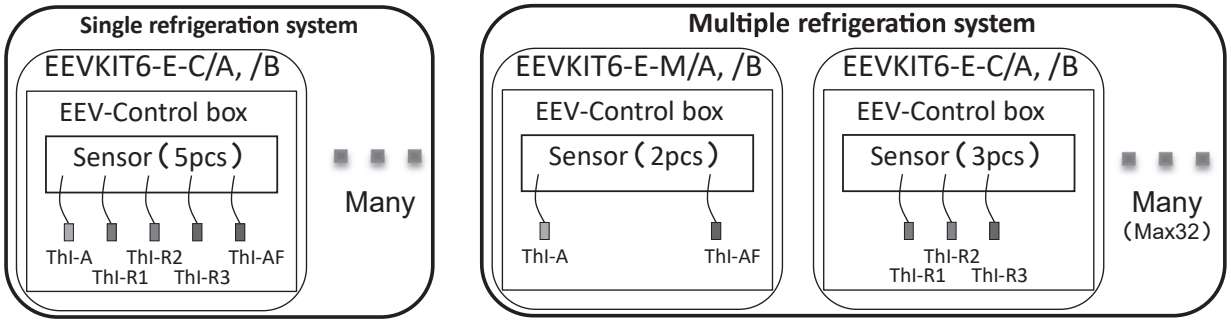
- EEV-KIT is the control kit for operating the locally provided air handling unit and/or fan coil unit fitted with direct expansion heat exchanger coils in connection with the KXE6 or KXZ system.
- EEV-KIT is composed of an EEV-Control ASSY and an EEV-Set.



The Control box is NOT waterproof. When installing outdoors, install it in a waterproof box.

The EEV-Control ASSY has 2 type.

Refrigeration system	EEV-Control ASSY	
	EEVKIT6-E-M EEVKIT6-E-M/A, /B	EEVKIT6-E-C EEVKIT6-E-C/A, /B
Single		1 box-Many boxes
Multiple	1 box (for master)	Many boxes (for slave)

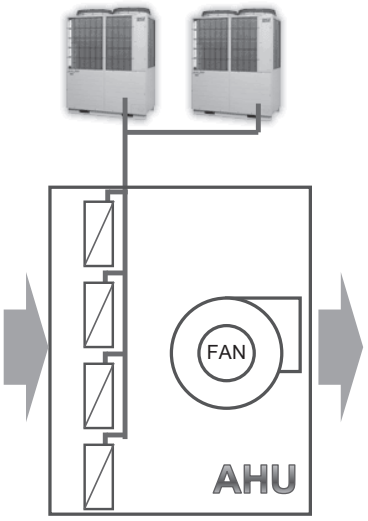


- **Single refrigeration system** EEVKIT6-E-C ･･･many
- **Multiple refrigeration system** EEVKIT6-E-M (1) + EEVKIT6-E-C ･･･many（Max32）
- EEVKIT6-E-C is common for both single and multiple refrigeration systems.
- ThI-A and ThI-AF of the EEVKIT6-E-C are not used in the multiple refrigeration system.

#

Single refrigeration system

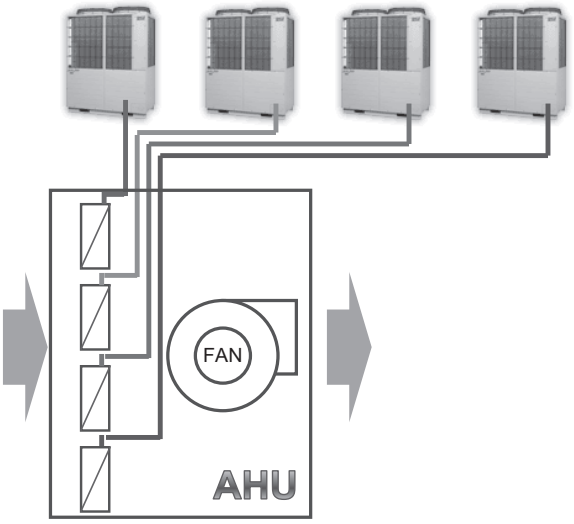
1 refrigerant circuit



Example 4 split DX heat exchanger

Multiple refrigeration system

Example 4 refrigerant circuits



Example 4 split DX heat exchanger

Maximum capacity is different.

Single refrigeration system Up to 48HP （for KXE6）
Up to 60HP （for KXZ）

Multiple refrigeration system Up to 320HP

Possibility of single refrigeration system
over 48HP（for KXE6）or 60HP（for KXZ）

➡ **Depends on the installation conditions**

More than two outdoor units control oil return independently.
Additional limitations must be checked.

Applicable outdoor unit models are shown in the tables below.

KXZE2 series

Model	Compatibility
FDC-LXZE2	○
FDC-KXZXE2	○
FDC-KXZE2M	○
FDC-KXZXE2M	○
FDC(S)-(C)KXZA2	○
FDC(S)-(C)KXZXA2	○
FDC-KXZRE2	−
FDC-KXZRXE2	−

KXZE1 series

Model	Compatibility
FDC-KXZEN1	○
FDC-KXZES1	○
FDC-KXZEN1-W	−
FDC-KXZES1-W	−
FDC-KXZPE1	○
FDC-KXZME1	○
FDC(S)-KXZE1	○
FDCL-KXZE1	○
FDC-KXZXE1	○
FDC-KXZE1M	○
FDCB-KXZE1	○ ∗2
FDC-KXZRE1	−
FDC-KXZRXE1	−
FDC-KXZWE1	−

KXE6 series

Model	Compatibility
FDC(S)-KXEN6	○
FDC(S)-KXES6	○
FDC(S)-KXE6	○
FDC(S)-KXE6M	○
FDC-KXRE6	○ ∗1
FDCB-KXE6	○ ∗2
FDCR-KXE6	−
FDCH-CKXE6G	−
FDCH-KXE6	−

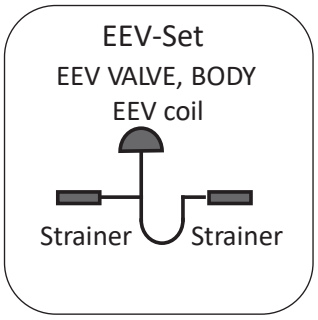
∗1:Not possible to change the evaporating/ condensing temperature
∗2:If air drawing condition of AHU can be regarded as that of FDC-KXZE1, it is applicable.

#

EEV-Set

Select from following 3 types according to the coil capacity

Type	EEV6-71-E EEV6-71-E/A, /B	EEV6-160-E EEV6-160-E/A, /B	EEV6-280-E EEV6-280-E/A, /B
Capacity	22 - 71	90 - 160	224 - 280



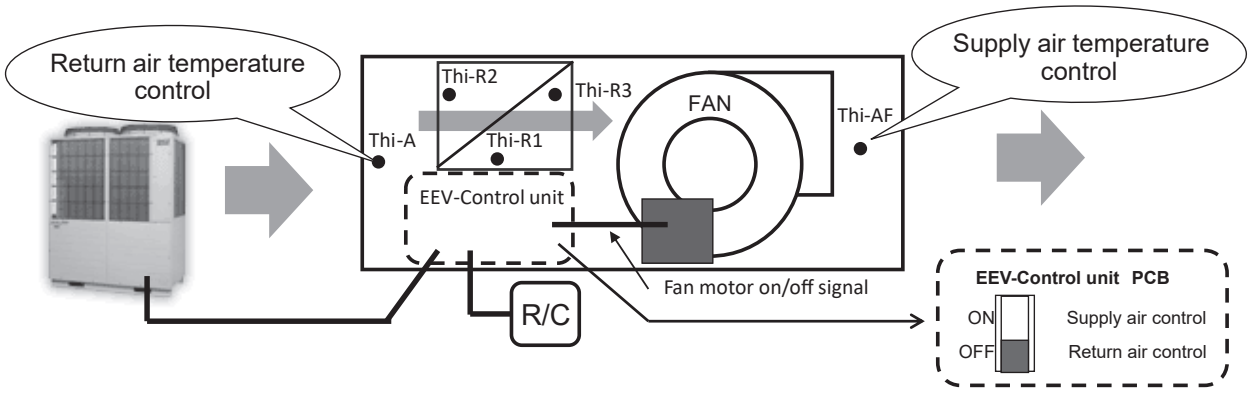
Parts of the EEV-Set

Part name	Part No.	Model name		
		EEV6-71-E EEV6-71-E/A	EEV6-160-E EEV6-160-E/A	EEV6-280-E EEV6-280-E/A
VALVE, BODY (EXP)	SSA387F047A	1		
VALVE, BODY (EXP)	SSA387F045		1	
VALVE, BODY (EXP)	SSA387F049A			1
STRAINER	SSA357A005B	1	1	1
STRAINER	SSA357A005T		1	1
STRAINER	SSA357A005AC	1		
COIL, SOLENOID	PCH387F002	1		
COIL, SOLENOID	PCH387F002A		1	1

Parts are the same as for the KXE6 systems.

3. Features of the EEV-KIT

- The EEV-KIT uses the control technology of KXE6 or KXZ.
- It is able to connect to the Superlink system.
- Remote controls (R/C) for KXE6 or KXZ can be used.
- Operation command to the indoor fan motor is transmitted from the EEV-Control unit.
- Switching between return air temperature control and supply air temperature control is available.



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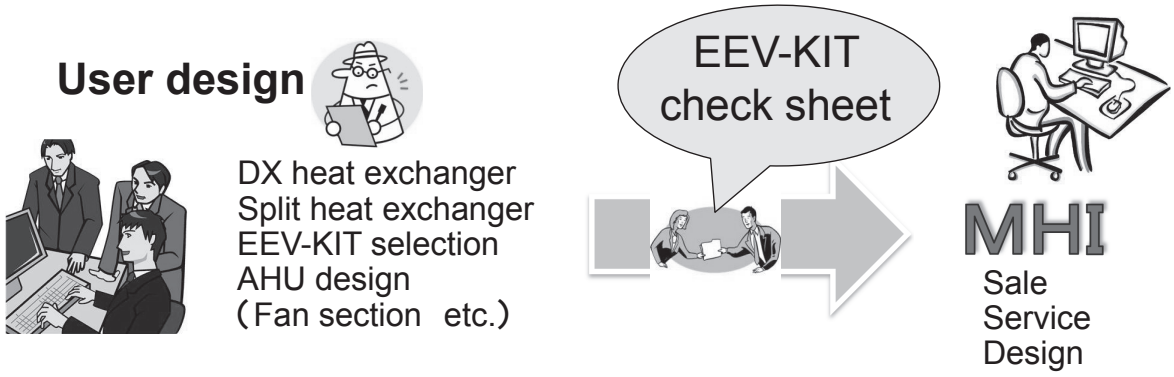
4. User design ⇒ Submit to MHI

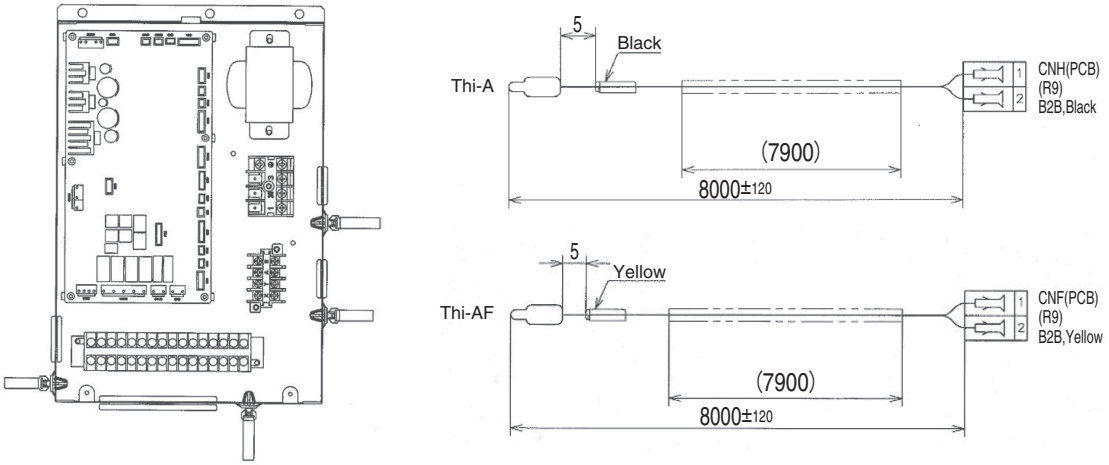
- The heat exchanger of the DX AHU needs to be designed and selected locally according to the customers requirements. However it is necessary to follow MHI's selection standards.
- If using the EEV-KIT, please submit the check sheet prepared by MHI after filling in all the necessary items. If not you may not receive any technical support from MHI.



5. Components of EEV-Control Assembly

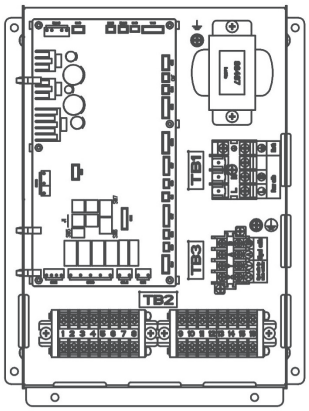
Model name: EEVKIT6-E-M (PCH001A055C)
(EEV-Control ASSY for master)

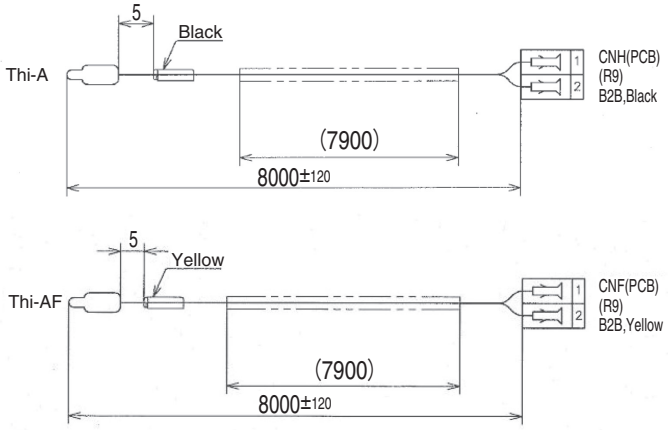
No.	Part name	Part No.	Pcs.	Remarks
①-1	CONTROL UNIT	PCH501A017AB	1	For multiple refrigerant system only
②-1	SENSOR ASSY	PCH551A010	1	Thi-A (for return air temperature)
③-2	SENSOR ASSY	PCH551A011	1	Thi-AF (for supply air temperature)



Model name: EEVKIT6-E-M/A, /B (PCH001F001C, AC)
(EEV-Control ASSY for master)

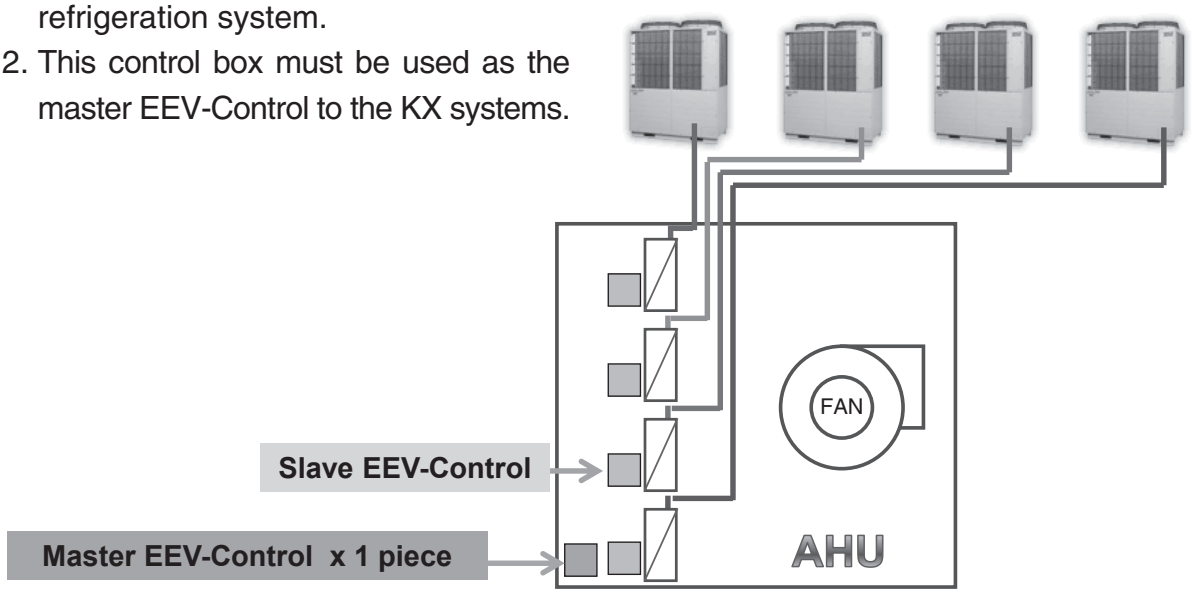
No.	Part name	Part No.	Pcs.	Remarks
①-1	CONTROL UNIT	PCH501A019AB, CB	1	For multiple refrigerant system only
②-1	SENSOR ASSY	PCH551A010	1	Thi-A (for return air temperature)
③-2	SENSOR ASSY	PCH551A011	1	Thi-AF (for supply air temperature)





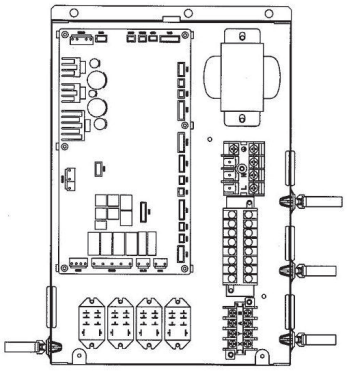
Model name: EEVKIT6-E-M、EEVKIT6-E-M/A, /B
(Master EEV-Control ASSY)

1. One control box is used for a multiple refrigeration system.
2. This control box must be used as the master EEV-Control to the KX systems.

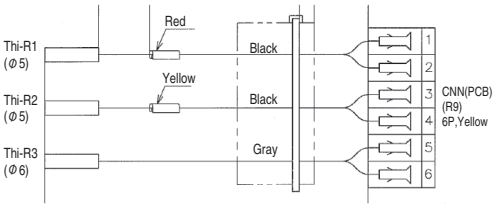


Model name: EEVKIT6-E-C (PCH001A055B)
(EEV-Control ASSY for slave)

No.	Part name	Part No.	Pcs.	Remarks
①-2	CONTROL UNIT	PCH501A017L	1	
②-1	SENSOR ASSY	PCH551A010	1	Thi-A (for retern air temperature)
②-2	SENSOR ASSY	PCH551A011	1	Thi-AF (for supply air temperature)
③	SENSOR ASSY	PCH551A012	1	Thi-R1, R2, R3 (for heat exchange temperature)
④	SPRING LEAF	PSA941F001	3	For Thi-R1, R2, R3

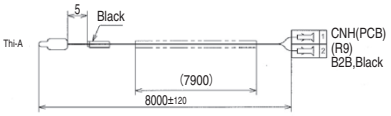


③ Heat exchanger sensor

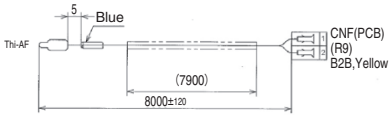


④ Spring leaf

②-1 Return air sensor

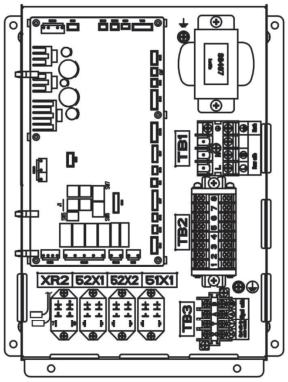


②-2 Supply air sensor

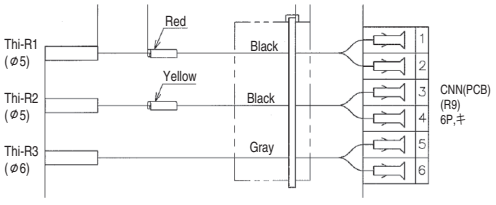


Model name: EEVKIT6-E-C/A, /B (PCH001F001B, AB)
(EEV-Control ASSY for slave)

No.	Part name	Part No.	Pcs.	Remarks
①-2	CONTROL UNIT	PCH501A019L, BL	1	
②-1	SENSOR ASSY	PCH551A010	1	Thi-A (for retern air temperature)
②-2	SENSOR ASSY	PCH551A011	1	Thi-AF (for supply air temperature)
③	SENSOR ASSY	PCH551A012	1	Thi-R1, R2, R3 (for heat exchange temperature)
④	SPRING LEAF	PSA941F001	3	For Thi-R1, R2, R3

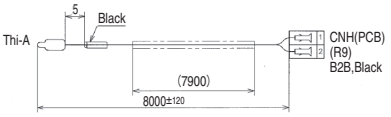


③ Heat exchanger sensor

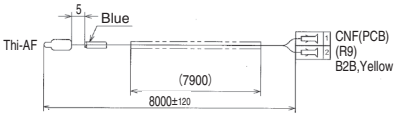


④ Spring leaf

②-1 Return air sensor

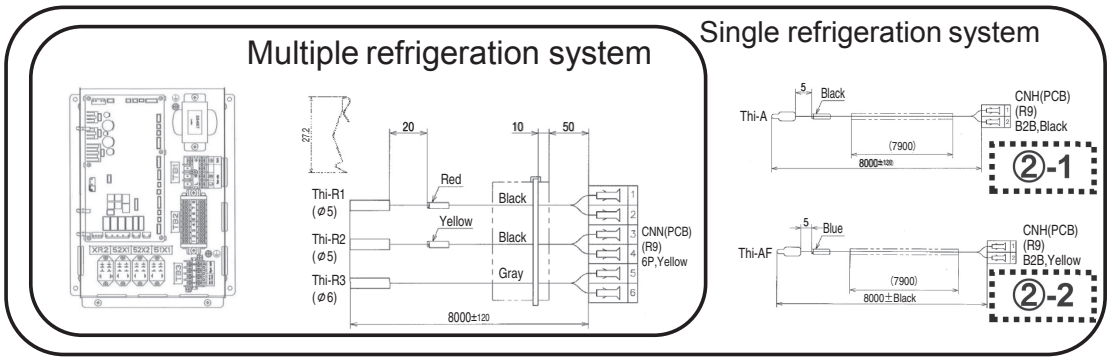


②-2 Supply air sensor



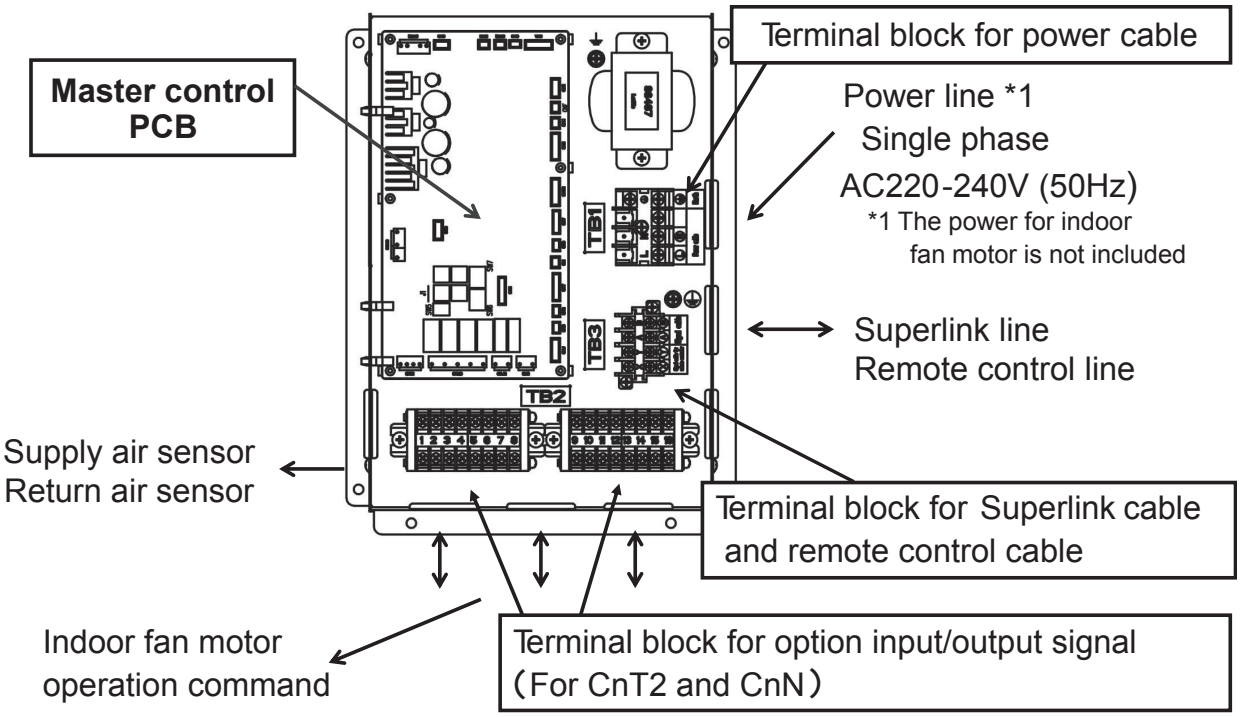
Model name: EEVKIT6-E-C、EEVKIT6-E-C/A, /B
(Slave EEV-Control ASSY)

1. This control unit is used for single refrigeration systems (EEV-Control ASSY) and for multiple refrigeration systems. (as slave EEV-Control ASSY)
2. In case of multiple refrigeration systems, ②-1 and ②-2 are not used.
2. Capacity setting at factory default is 280. Change setting to the required capacity as required.



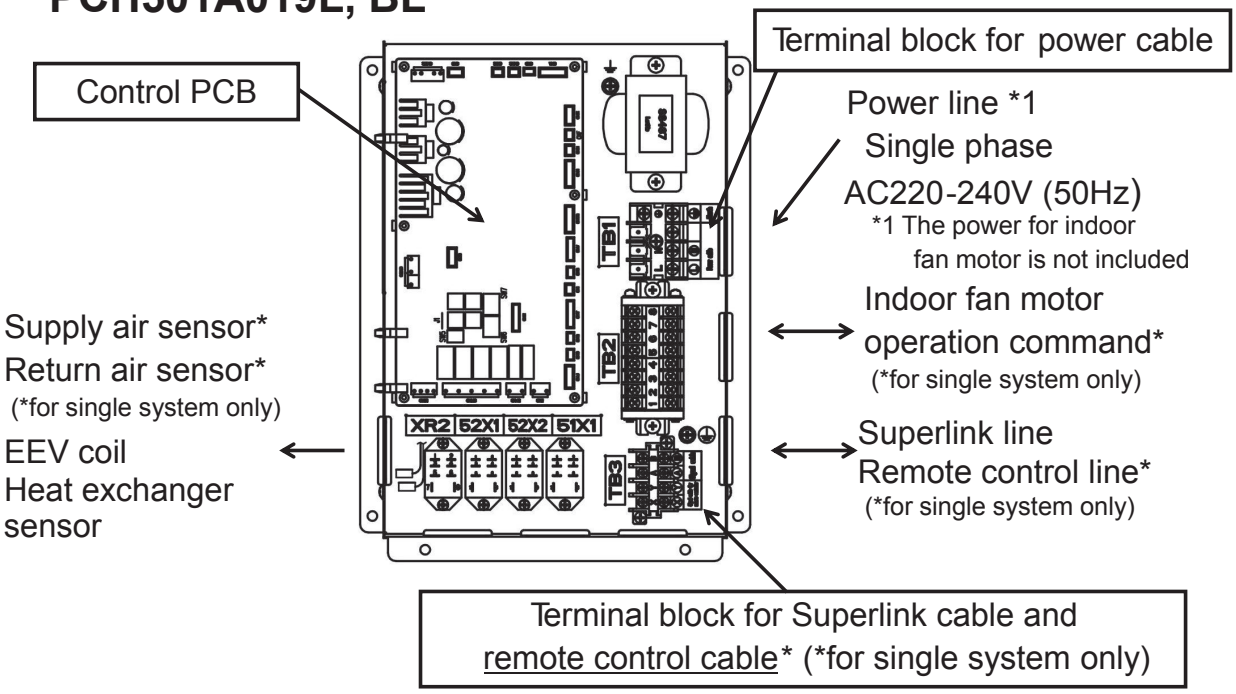
①-1 Master control box (EEVKIT6-E-M/A, /B)

PCH501A019AB,CB



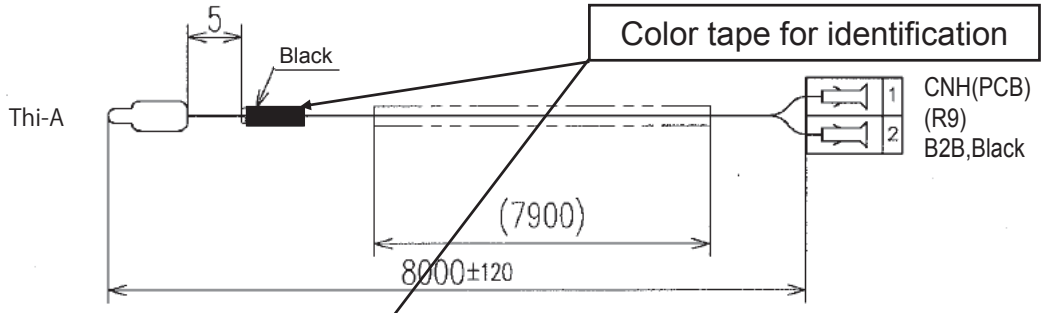
①-2 Slave control box (EEVKIT6-E-C/A, /B)

PCH501A019L, BL

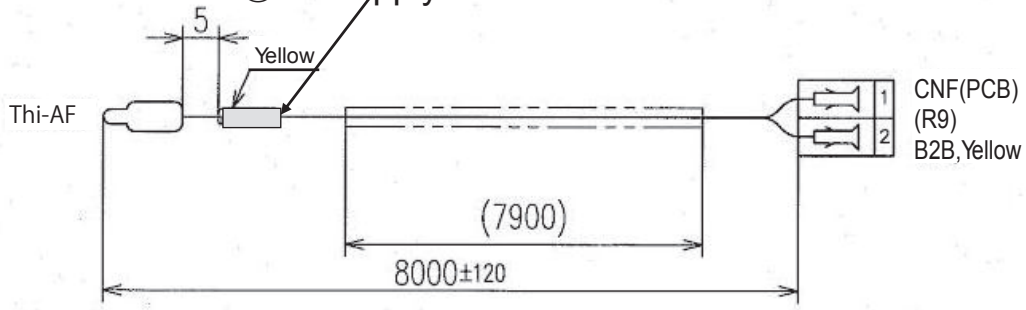


Return air sensor ／ Supply air sensor

PCH551A010: ②-1 Return air sensor

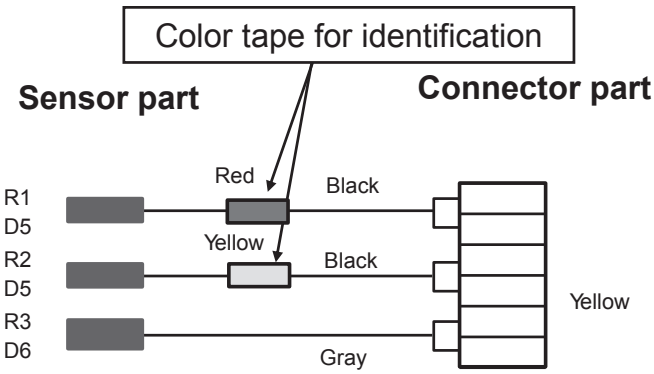


PCH551A011: ②-2 Supply air sensor

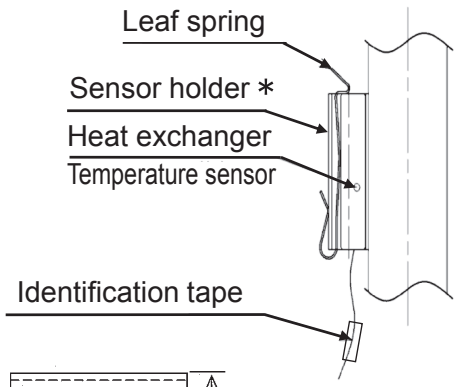


Heat exchanger temperature sensor

PCH551A012 : ③ Heat exchanger sensor

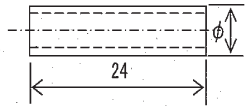


Mounting method of
Heat exchanger temperature sensor



* Sensor holder : Provided locally

Sensor	ϕ	Material
For Thi-R3	ϕ 9.52 x t0.6	Copper tube
For Thi-R1 and -R2	ϕ 8.0 x t0.6	



6. Components of EEV-Set

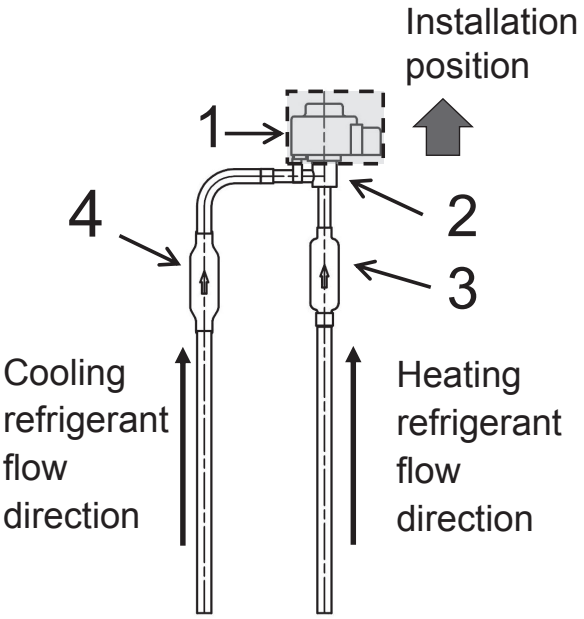
No.	Part name	Part No.	Model name		
			EEV6-71-E EEV6-71-E/A	EEV6-160-E EEV6-160-E/A	EEV6-280-E EEV6-280-E/A
⑤-1	VALVE, BODY (EXP) ASSY	PCH387F018	1		
⑤-2	VALVE, BODY (EXP) ASSY	PCH387F019		1	
⑤-3	VALVE, BODY (EXP) ASSY	PCH387F019A			1
	VALVE, BODY (EXP)	SSA387F047A	(1)		
	VALVE, BODY (EXP)	SSA387F045		(1)	
	VALVE, BODY (EXP)	SSA387F049A			(1)
	STRAINER	SSA357A005B	(1)	(1)	(1)
	STRAINER	SSA357A005T		(1)	(1)
	STRAINER	SSA357A005AC	(1)		
	COIL, SOLENOID	PCH387F002	(1)		
	COIL, SOLENOID	PCH387F002A		(1)	(1)

1. Select suitable model according to the required capacity.
2. One EEV-set is for one part of heat exchanger.
3. Number of pcs. in ( ) is just for reference. These parts are included in VALVE, BODY (EXP) ASSYs respectively.

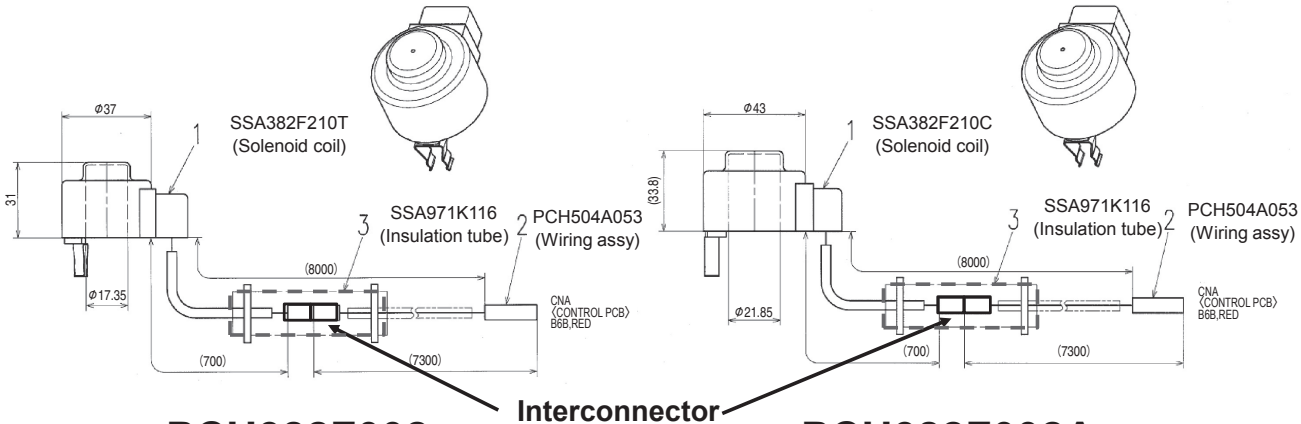
⑤ VALVE, BODY (EXP) ASSY : Electronic expansion valve assy

Model name	EEV-KIT	Model name	EEV-KIT
EEV6-71-E	PCH001A059	EEV6-71-E/A	PCH001F002
EEV6-160-E	PCH001A059A	EEV6-160-E/A	PCH001F002A
EEV6-280-E	PCH001A059B	EEV6-280-E/A	PCH001F002B

No.	Model name	Part No.
1	EEV6-71-E	PCH387F002
	EEV6-160,280-E	PCH387F002A
2	EEV6-71-E	SSA387F047A
	EEV6-160-E	SSA387F045
	EEV6-280-E	SSA387F049A
3	EEV6-71-E	SSA357A005AC
	EEV6-160,280-E	SSA357A005T
4	EEV6-71,160,280-E	SSA357A005B



COIL, SOLENOID : EEV coil



PCH382F002

For EEV6-71-E
(22-71)

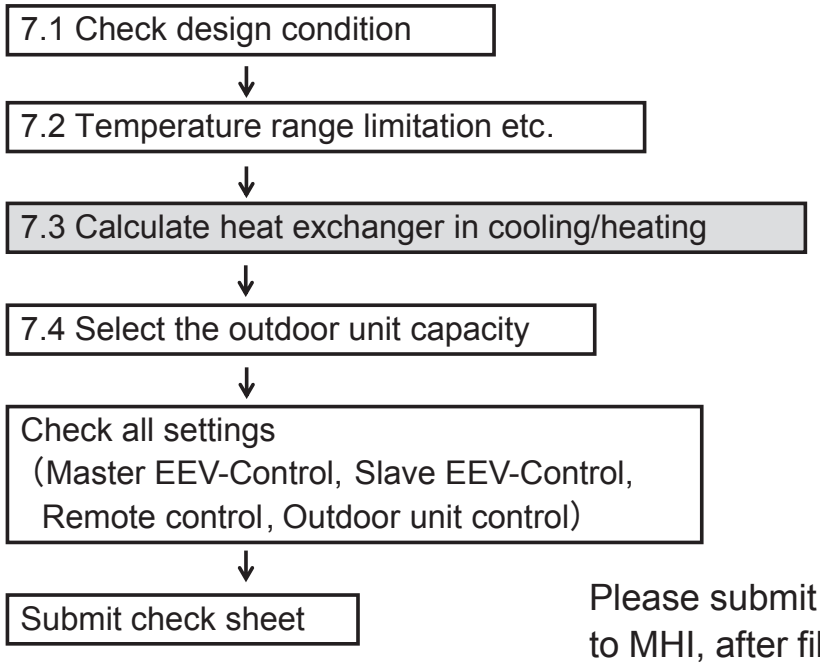
PCH382F002A

For EEV6-160-E & EEV6-280-E
(90-160) (224-280)

Note: Do not place the interconnector in the air flow to prevent any water intrusion into the connector. Protect the connector from water intrusion.

7. Designing a DX AHU system

Calculation flow for designing heat exchanger



Check sheet P3
DX AHU general

Check sheet P4, 5, 6
Confirmation of
the heat exchanger specification
capacity calculation result

Check sheet P7
Confirmation of
the outdoor unit and the refrigerant volume

Check sheet P8
Confirmation of selection result
(confirmation of order contents)

Please submit the check sheet to MHI, after filling in all the necessary items.

7.1 Check design condition

Supply air volume		m^3/h
Return air volume		m^3/h
Outdoor air volume		m^3/h

Inlet air temperature	**Summer**	**°CDB／ °CWB**
	Winter	**°CDB／ °CWB**

Indoor air temperature	**Summer**	**°CDB／ °CWB**
	Winter	**°CDB／ °CWB**
Outdoor air temperature	**Summer**	**°CDB／ °CWB**
	Winter	**°CDB／ °CWB**

Target supply temperature	**Summer**	**°CDB／ °CWB**
	Winter	**°CDB／ °CWB**

If necessary

7.2 Temperature range limitation

	Cooling	Heating
Inlet air temperature	15-26℃WB	0-27℃DB
Outdoor air temperature	–15-43℃DB	–20-15.5℃WB

The cooling lower limitation comes from lower limit of the setting temperature, to which we can guarantee the cooling operation. If the inlet temperature is below this temperature, the unit may be thermo OFF. You can use down to 0 deg. C but operation will be just fan operation. If the inlet temperature goes below 0 deg. C, there is a risk of freezing water, so we cannot recommend this. The heating limitation comes from the risk of freezing water or dew drops. During heating operation, the risk is low, but if the unit is OFF and fan is operating, the risk becomes higher. The outdoor air temperature range is the same as outdoor unit KXE6 or KXZ.

Recommended circuit number of each heat exchanger

Standard number (Heat exchanger tube size ϕ9.52)	5.6kW	14.0kW	28.0kW
	2-3	4-5	8-10

7.3 Calculation of heat exchanger in cooling/heating

Heat exchanger calculation condition

Superheat	Subcool
5 degrees	7 degrees

Piping size

Model capacity	**22**	**28**	**56**	**71**	**140**	**224**	**280**
Liquid line	**ϕ6.35**	**ϕ6.35**	**ϕ6.35**	**ϕ9.52**	**ϕ9.52**	**ϕ9.52**	**ϕ9.52**
Gas line	**ϕ9.52**	**ϕ9.52**	**ϕ12.7**	**ϕ15.88**	**ϕ15.88**	**ϕ19.05**	**ϕ22.22**

#

The DX heat exchanger must be designed and produced locally according to the customer requirements. Please follow MHI's selection standard.

The MHI EEV-KIT system can adjust the evaporating temperature / condensing temperature, to satisfy the required capacity or supply air temperature.

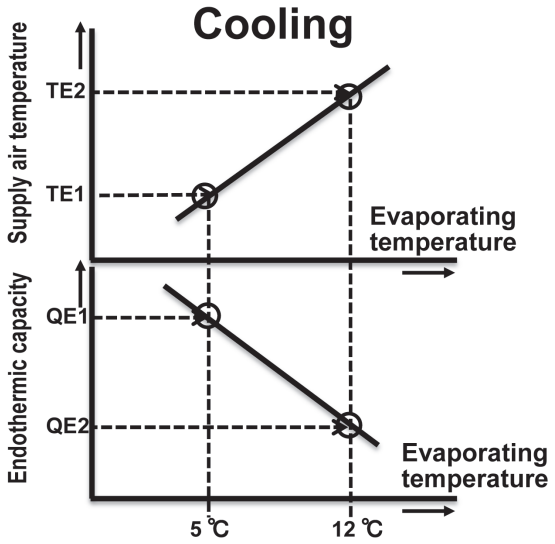
Usage limitation to be considered -

1. Inlet temperature range / outdoor temperature range
2. Evaporating temperature / Condensing temperature
3. Setting of supply air temperature
4. Volume of heat exchanger
5. Number of circuit
6. Superheat, subcool

Calculate the heat exchange capacity and air outlet temperature at the following two evaporating temperatures.
Plot your results as per drawing.

Cooling

Evaporating temperature	5℃	12℃
Cooling capacity	QE1	QE2
Supply air temperature	TE1	TE2

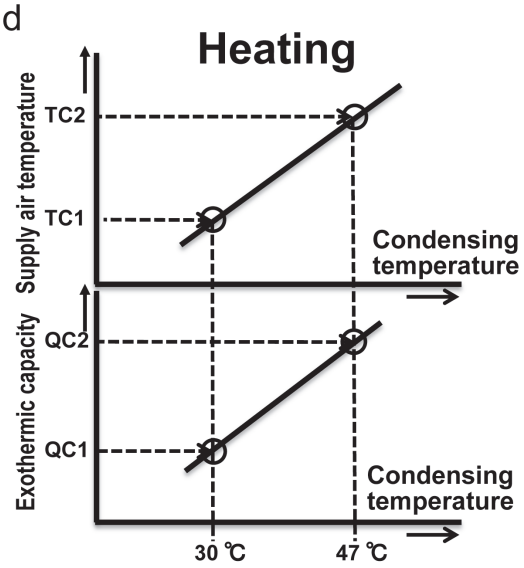


Maximum 3 row heat exchanger coil is the standard design. A 4-row or bigger coil like water coil is not effective, and the heat exchanger volume should be less than the limitations.

Calculate the heat exchange capacity and air outlet temperature at the following two condensing temperature.
Plot your results as per drawing.

Heating

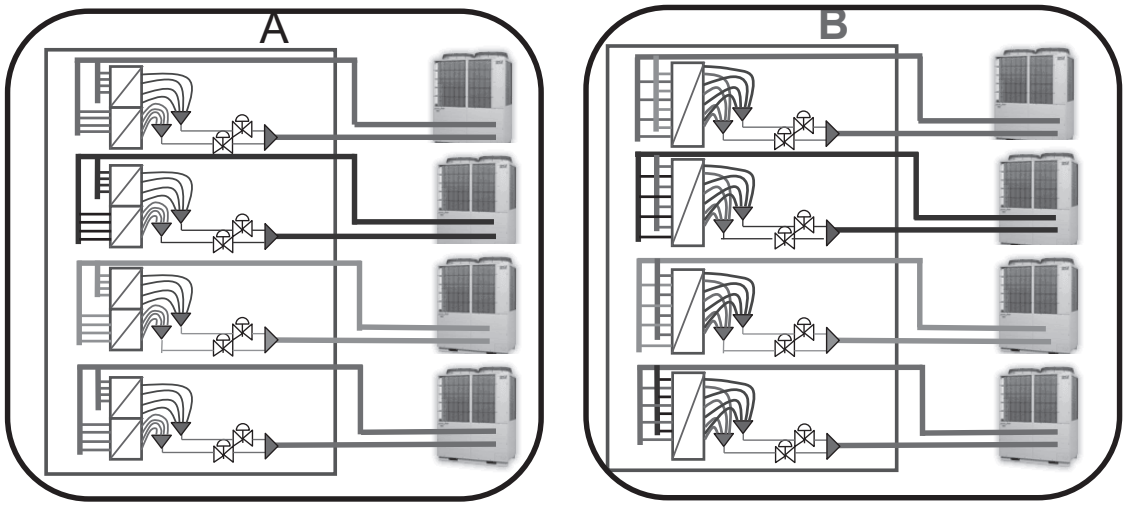
Condensing temperature	30℃	47℃
Heating capacity	QC1	QC2
Supply air temperature	TC1	TC2



Maximum 3 row heat exchanger coil is the standard design. A 4-row or bigger coil like water coil is not effective, and the heat exchanger volume should be less than the limitations.

Choose the number of divisions of the heat exchanger

Consider
1.Maximum capacity of 1 EEV-set :10HP
2.Number of refrigerant system
3.Multiple step control



MHI recommends system B circuit division

7.4 Select the outdoor unit capacity

7.4.1 Select system specification (refrigeration system, temperature control)

↓

7.4.2 Compensation coefficient fixed by air-conditioning method **(A)**

↓

7.4.3 Compensation coefficient calculated by evaporating (or condensing) temperature **(B)**

↓

7.4.4 Compensation coefficient calculated by design temperature **(C)**

↓

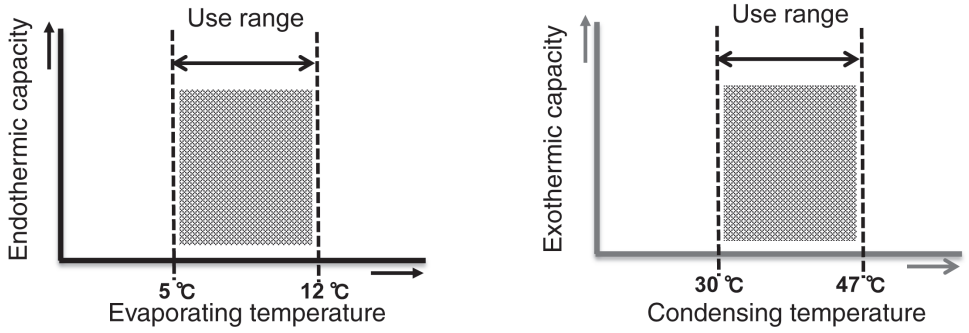
7.4.5 Compensation coefficient by piping and height difference **(D)**

↓

7.4.6 Select the outdoor unit capacity

7.4.1 Select system specification

- •Select air-conditioning mode (standard pressure control mode) or fesh air mode (TYPE1 pressure control mode) according to the evaporating temperature and condensing temperature the system uses.
- •It is not possible to select different mode for cooling mode and heating mode. (It is not possible to select standard pressure control mode in cooling and TYPE1 pressure control mode in heating.)
- •The selectable temperature range of evaporating temperature / condensing temperature are shown below.
- •The heat exchanger must be designed in this temperature range.



Note: With KXRE6 it is not possible to change the evaporating/condensing temperature.

(1) Select system specification (Single refrigeration system)

Control	Pressure control mode	Target pressure / supply air temperature setting guideline
Return air temperature control	STANDARD	Evaporating temperature : 5–12℃ Condensing temperature : 42–47℃
	TYPE1	Evaporating temperature : 5–12℃ Condensing temperature : 32–37℃
Supply air temperature control	STANDARD	Cooling supply air temperature : 12–18℃ Heating supply air temperature : 32–40℃
	STANDARD (SW7-2 ON)	Cooling supply air temperature : 12–18℃ Heating supply air temperature : 20–28℃
	TYPE1	Cooling supply air temperature : 22–28℃ Heating supply air temperature : 20–28℃

Cooling mode and heating mode must use same pressure control mode
(STANDARD mode or TYPE1 mode)

(2) Select system specification (Multi refrigeration system)

Control	Pressure control mode	Target pressure / supply air temperature setting guideline
System control A	STANDARD	Evaporating temperature : 5–12℃ Condensing temperature : 42–47℃
System control B	STANDARD	Evaporating temperature : 5–12℃ Condensing temperature : 42–47℃
System control C	STANDARD or TYPE1	Cooling supply air temperature : 18–30℃ Heating supply air temperature : 16–30℃
System control D	STANDARD or TYPE1	Cooling supply air temperature : 18–30℃ Heating supply air temperature : 16–30℃

7.4.2 Compensation coefficient : A

- Nominal indicated performance is based on nominal air-condition.
- When system purpose is OA intake, air-condition is different, and the system performance is also different.

Normal air-conditioner		OA intake
Cooling capacity 28 kW Heating capacity 31.5 kW	 10HP outdoor unit	Cooling capacity 30 kW Heating capacity 25.5 kW
Air-condition Nominal	**Difference** Compensation A	Air-condition Different

Air-conditioning mode

	Outdoor Conditions	Inlet air-conditions
Cooling	35℃DB／24℃WB	27℃DB／19℃WB
Heating	7℃DB／6℃WB	20℃DB／13.8℃WB

Fresh air-mode
(100% fresh air intake without total heat exchanger)

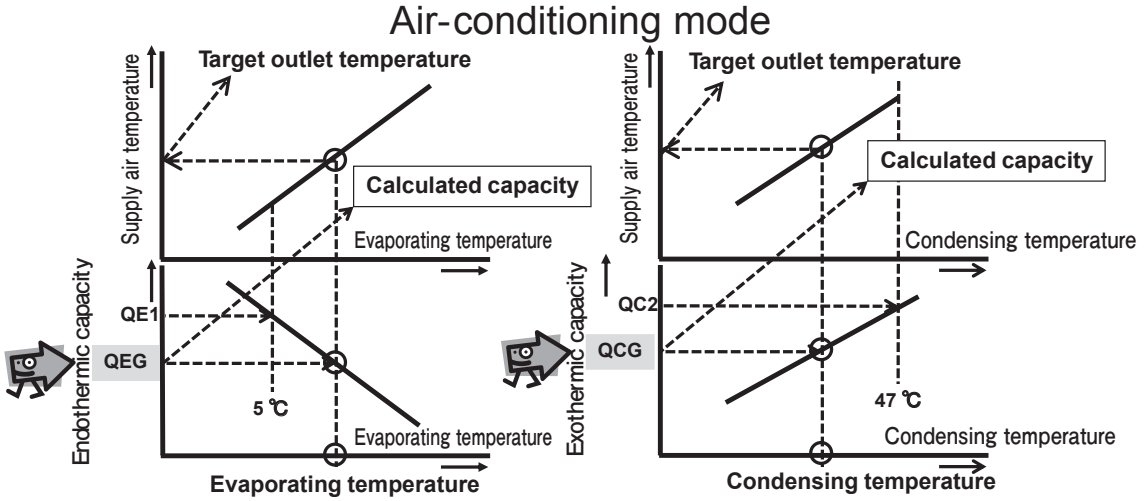
	Outdoor Conditions	Inlet air-conditions
Cooling	33℃DB／28℃WB	
Heating	7℃DB／6℃WB	

	Compensation coefficient	
	Standard mode	Fresh air mode
Cooling	1.00	1.068
Heating	1.00	0.811

If 100% fresh air intake without total heat exchanger, use the fresh air mode compensation coefficient.

7.4.3 Compensation coefficient : B

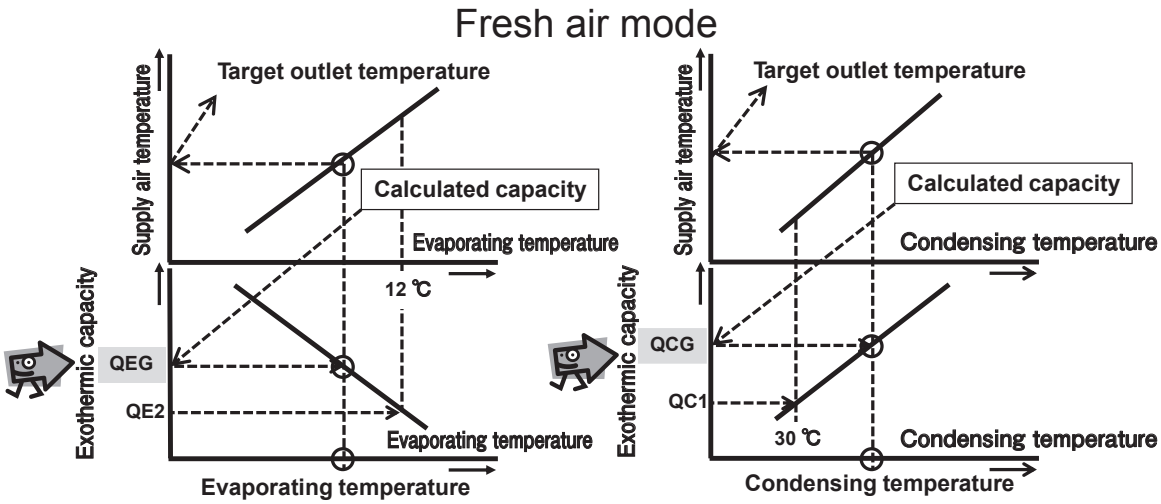
Compensation coefficient calculated by evaporating (or condensing) temperature (B)



	Compensation coefficient
Cooling	QEG/QE1
Heating	QCG/QC2

Calculate the evaporation (or condensing) temperature of the target outlet temperature. Then find the capacity in the evaporation (or condensing) temperature.

Compensation coefficient calculated by evaporating (or condensing) temperature (B)

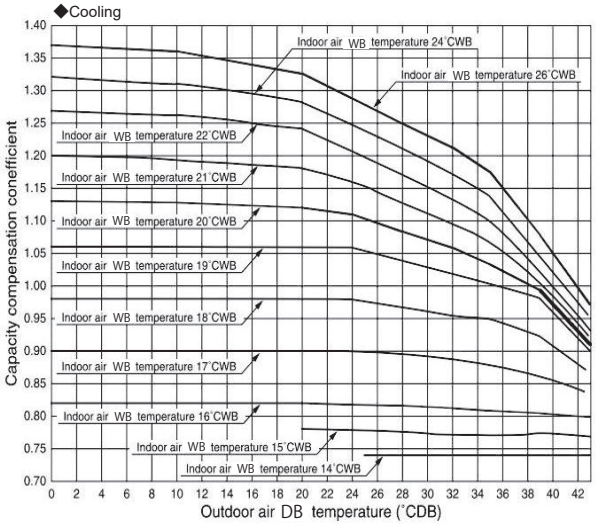


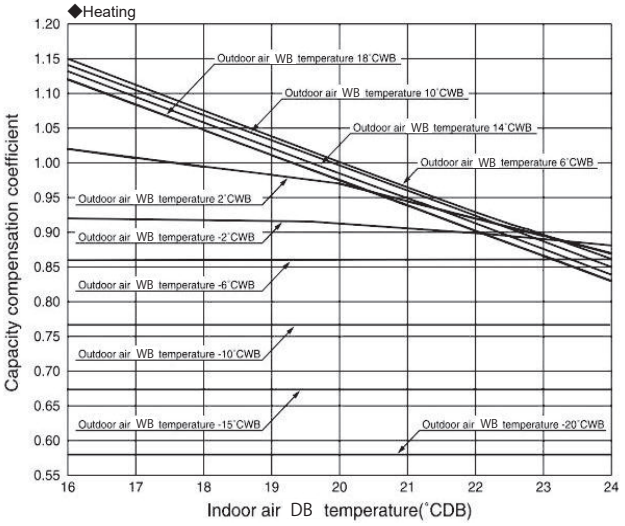
	Compensation coefficient
Cooling	QE2/QEG
Heating	QC1/QCG

Calculate the evaporation (or condensing) temperature of the target outlet. temperature. Then find the capacity in the evaporation (or condensing) temperature.

7.4.4 Compensation coefficient : C For KXE6

Compensation coefficient calculated by design temperature (C)



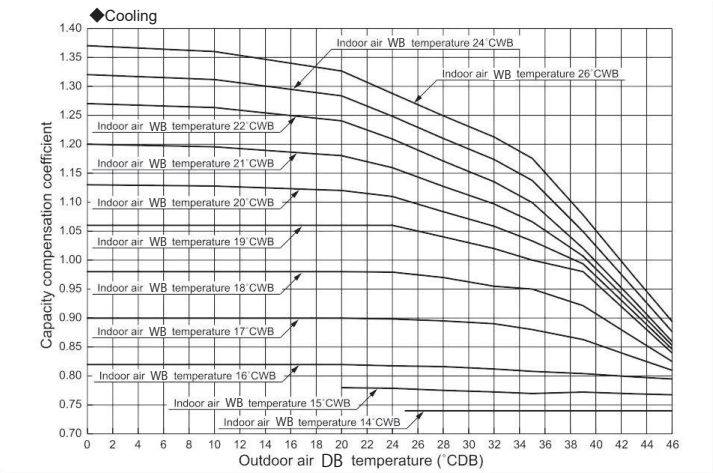


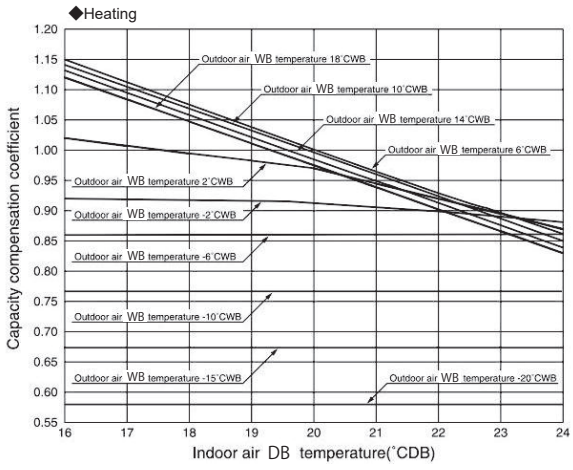
Air-conditioning mode

	Compensation coefficient
Cooling	Calculated from the left drawing
Heating	Calculated from the right drawing

For KXZE1,2

Compensation coefficient calculated by design temperature (C)



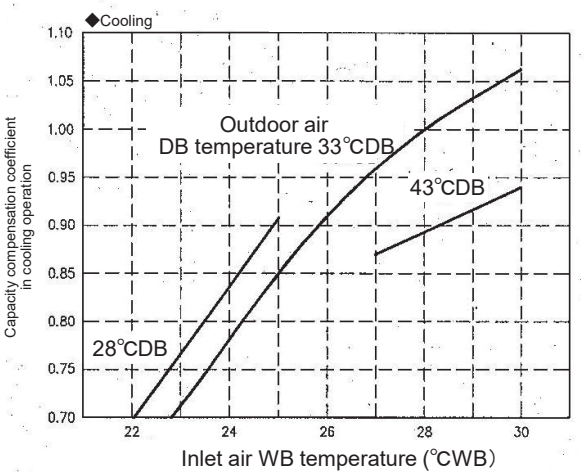


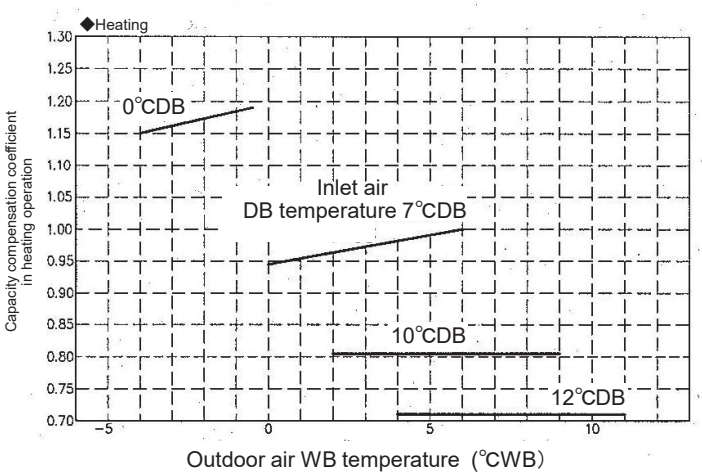
Air-conditioning mode

	Compensation coefficient
Cooling	Calculated from the left drawing
Heating	Calculated from the right drawing

#

Compensation coefficient calculated by design temperature (C)





Fresh air mode

	Compensation coefficient
Cooling	Calculated from the left drawing
Heating	Calculated from the right drawing

7.4.5 Compensation coefficient : D

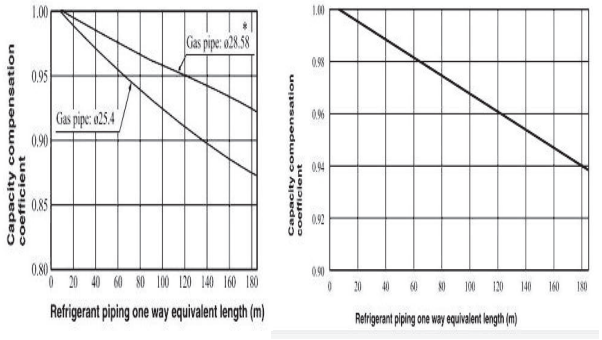
Compensation coefficient by piping and height difference (D)

Refer to the KXE6 or KXZ technical manual

	Piping length	Height difference	Frosting
Cooling			—
Heating			

(c) Correction of cooling and heating capacity in relation to one way length of refrigerant piping.

(Note) This table is for reference only. If the refrigerant piping one way equivalent after the first branch is extended longer than 40 m, it could drop further by about 10% in the worst case.



(c) When the outdoor unit is located at alower height than the indoor unit in cooling operation and when the outdoor unit is located at a higher height than the indoor unit in heating operation, the following values should be subtracted from the values in the above table.

Height difference between the indoor unit and outdoor unit in the vertical height difference	5 m	10 m	15 m	20 m	25 m	30 m	35 m
Adjustment coefficient	0.99	0.98	0.97	0.96	0.95	0.94	0.93

Height difference between the indoor unit and outdoor unit in the vertical height difference	40 m	45 m	50 m	55 m	60 m	65 m	70 m
Adjustment coefficient	0.92	0.91	0.90	0.89	0.88	0.87	0.86

Height difference between the indoor unit and outdoor unit in the vertical height difference	75 m	80 m	85 m	90 m
Adjustment coefficient	0.85	0.84	0.83	0.82

: KXZE1,2 only

: KXZE2 only

(d) Correction of heating capacity in relation to the frost on the outdoor unit heat exchanger

Air inlet temperature of outdoor unit in °C WB	-20	-15	-13	-11	-9	-7	-5	-3	-1	1	3	5 or more
Adjustment coefficient	0.96	0.96	0.96	0.95	0.94	0.93	0.91	0.88	0.86	0.87	0.92	1

The correction factors will change drastically according to weather conditions. So necessary adjustment should be made empirically according to the weather data of the particular area.

(e) The capacity compensation coefficient and power consumption compensation coefficient vary according to the total capacity of concurrently operating indoor units, as shown below.

(Note) This table shows typical values.

#

7.4.6 Select the outdoor unit capacity

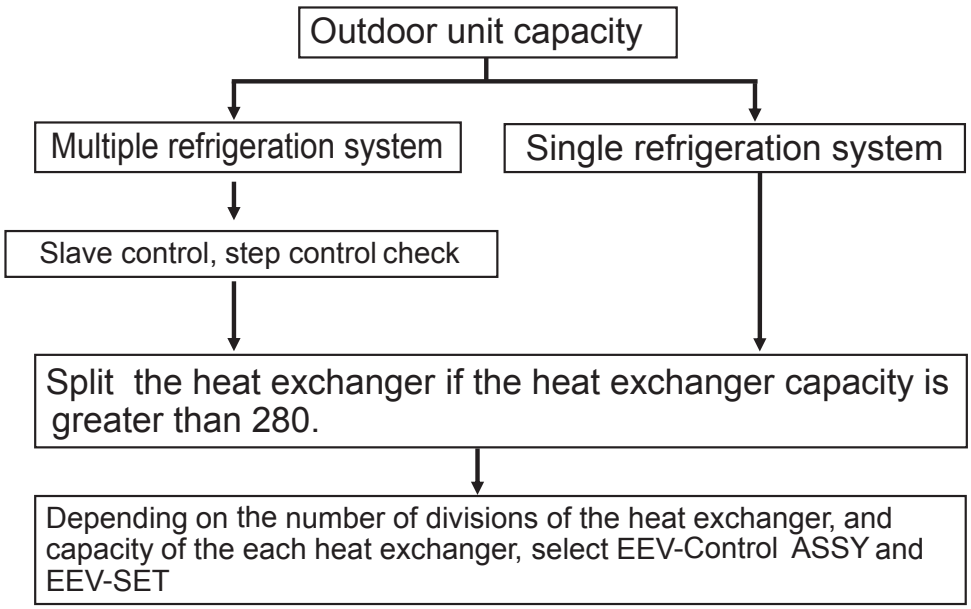
- Multiply the compensation coefficient from (A) to (D).
- Select the outdoor unit that satisfies the following equation.

	Total compensation coefficient
Cooling	**(A) x (B) x (C) x (D)**
Heating	**(A) x (B) x (C) x (D)**

$$\frac{\text{Target capacity}}{\text{Total compensation coefficient}} \leqq \text{Rated outdoor unit capacity (Nominal capacity)}$$

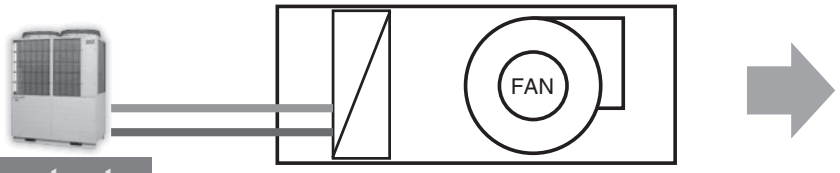
Check both cooling and heating capacity

7.5 Select the EEV-KIT



7.6 Requirement for heat exchanger

The heat exchanger must be suitable to the MHI system.



Important

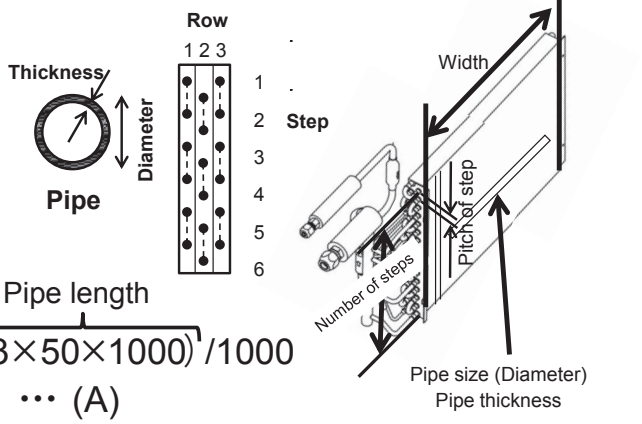
	Item	Limitation	Reason
1	Design pressure	> 4.15MPa (for R410A)	Safety
2	Internal volume	< **280**cm^3 /kW x rated O/U capacity (kW)	System reliability (O/U have refrigerant for I/U)
2	Internal volume	> **130**cm^3 /kW x rated O/U capacity (kW)	System reliability (O/U have refrigerant for I/U)

Recommendation

	Item	Limitation	Reason
3	Row number	< 3 rows	Economically
4	Air flow speed	< 2.5 m/s	

(1) Example calculation for heat exchanger volume

Specification of heat exchanger		
Pipe diameter (OD)	Φ9.52	mm
Pipe thickness	0.02	mm
Row number	3	—
Step number	50	—
Width	1000	mm



Heat exchanger volume

$$\underbrace{(9.52-0.02\times 2)^2 \times \pi / 4}_{\text{Surface area}} \times \underbrace{(3\times 50\times 1000)}_{\text{Pipe length}} / 1000 = \underbrace{\quad}_{\text{volume}} 10{,}588\ \text{cm}^3 \quad \cdots \text{(A)}$$

Selected outdoor unit nominal cooling capacity = 45 kW

45 kW× 130 cm^3/kW= 5,850 cm^3 ··· (B1)

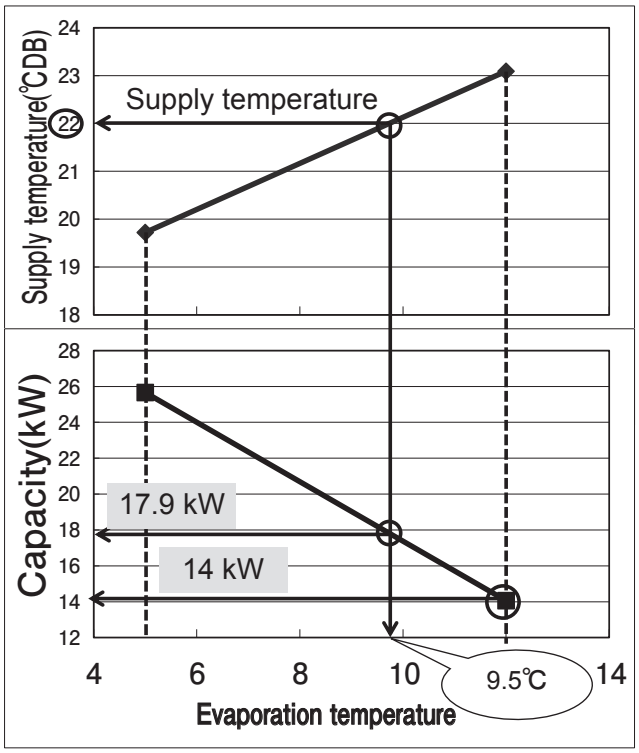
45 kW× 280 cm^3/kW= 12,600 cm^3 ··· (B2)

(B1) ≦ (A) ≦ (B2) ··· OK

Refrigerant charge calculation is same as normal KXE6 or KXZE1

⇨ Selected outdoor unit has enough refrigerant.

(2) Example calculation of evaporating temperature



Cooling	Fresh air mode	
Indoor air temperature	33℃DB	
	47.9	%
Outdoor air temperature	33℃DB	
	47.9	%

Target supply air temperature 22.5℃ below

Result

Compensation coefficient B
14 / 17.9 = 0.78

Compensation coefficient B
0.78

Calculation result of supply air temperature 22℃, It is OK.

Reference : Evaporation temperature =9.5

Please change the target pressure set in the outdoor unit.

(3) Example calculation of condensing temperature

Heating	Fresh air mode	
Indoor air temperature	-3℃DB	
	90	%
Outdoor air temperature	-3℃DB	
	90	%

Target supply air temperature 21.5℃ or more

Result

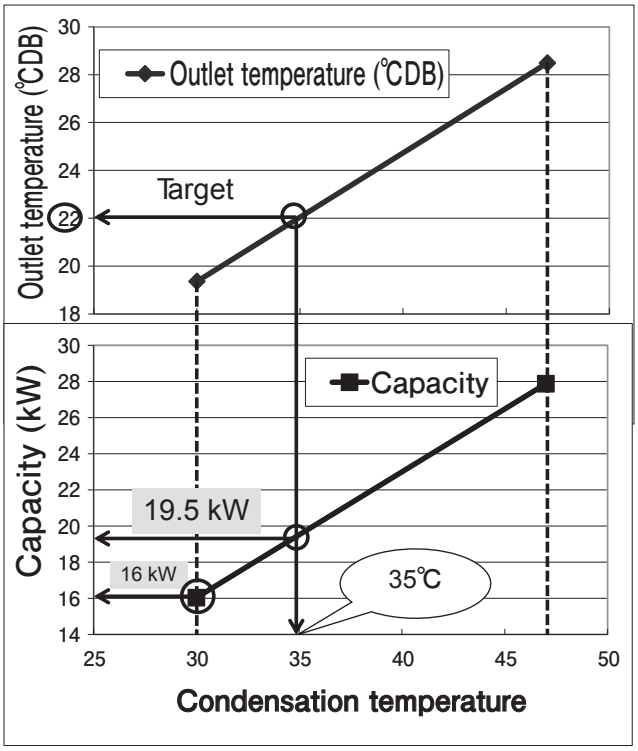
Compensation coefficient B
16 / 19.5 = 0.82

Compensation coefficient B
0.82

Calculation result of supply air temperature 22℃, It is OK.

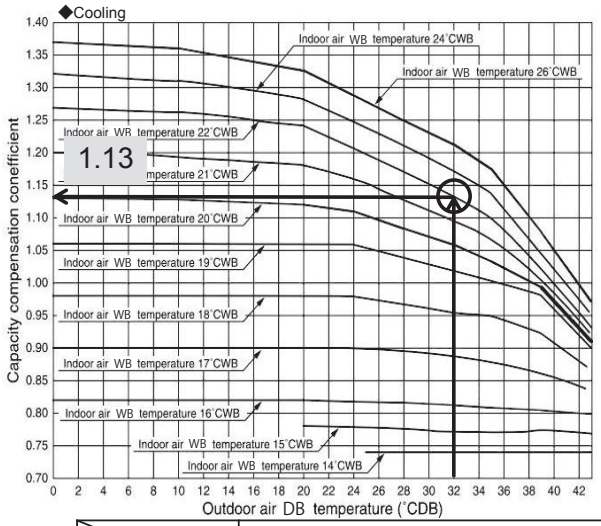
Reference : Condensation temperature =35

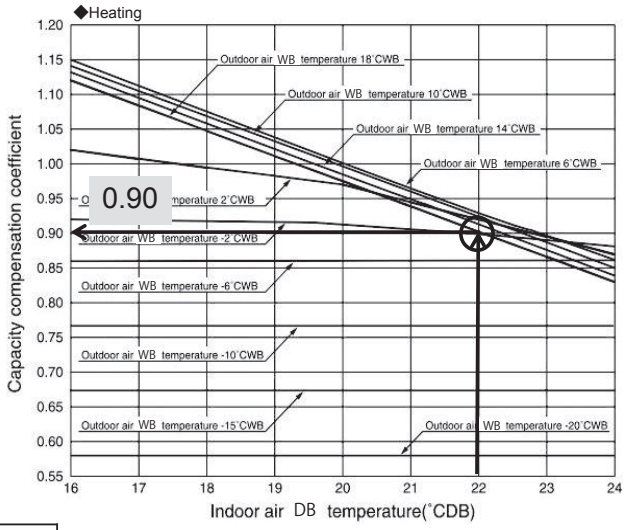
Please change the target pressure set in the outdoor unit.



(4) Example calculation of design temperature

Air-conditioning mode



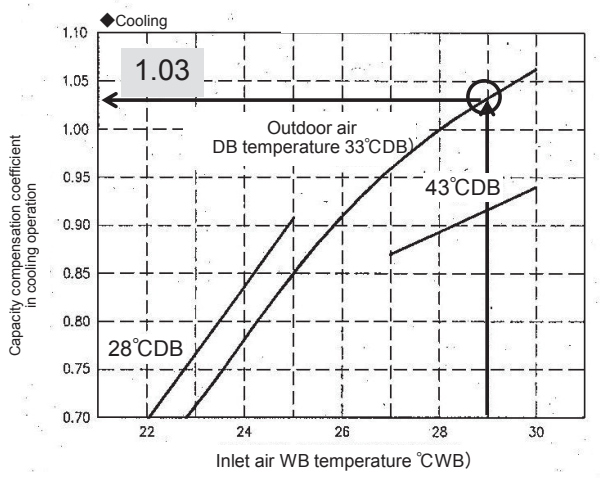


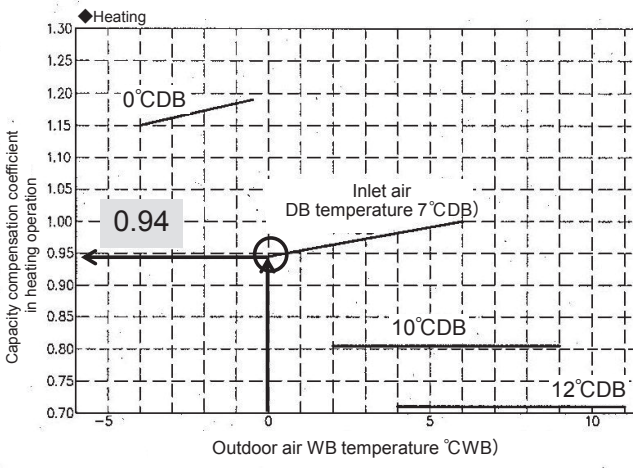
	Compensation coefficient
Cooling	**1.13**
Heating	**0.90**

⇨ Smaller outdoor unit is enough.

⇨ Larger outdoor unit is necessary.

Fresh air mode





	Compensation coefficient
Cooling	**1.03**
Heating	**0.94**

⇨ Smaller outdoor unit is enough.

⇨ Larger outdoor unit is necessary.

8. Submit check sheet to MHI

Check sheet P1

EEV-KIT chenk sheet cover

Project name（site name）：

This document is an EEV-KIT check sheet to be submitted to the Mitsubishi Heavy Industries (MHI).
The EEV-KIT, with KIT to make the indoor unit by the customer, the outdoor unit will use the MHI products.
The indoor unit is a product (specification) to be designed by the customer,MHI will guarantee the system control.
So, MHI need to understand the specification.
This check sheet, customers (EEV-KIT sales destination) is please submit to MHI grouped by property
MHI have to check and then returned to the customer.
(Each time there is a change in the check sheet, we'll continue to share information with revise this check sheet.)

The contents of this check sheet
(1) Notes on selection points and Important Information
→ P2 "Notes on the entry selected as a sheet" and read the sheet, please use
※ If you do not adhere to this content, MHI is not guaranteed.
(2) Confirmation of design conditions (Confirmation of customer request specifications)
→ P3 "_AHU general" please fill out the sheet
(3) Confirmation of heat exchange: calculation of heat exchange and MHI usage restrictions
(Confirmation of customer designed and MHI request specifications (use restrictions))
→ P4 "Confirmation of the heat exchanger specification" please fill out the sheet
→ P5,6 "Confirmation of capacity calculation result" please fill out the sheet
→ P7 "Confirmation of the outdoor unit and the refrigerant volume " sheet to please fill out
(4) Selection result summary of the EEV-KIT and outdoor unit
→ P8 "Confirmation of selection result (confirmation of order contents)" Please fill out the sheet
※Please re-check the order parts and summarizes the results that were selected in this sheet.
(5) Confirmation of the PCB board set of EEV-KIT
To meet the customer requirements specification,
Confirmation of the master board,and the slave board,and outdoor board,and remote control's functio
→ P9 "multiple system (the master board and the slave board) setting summary"
→ P9 "single system (the slave board-only) setting summary"
→ P9 "outdoor unit board setting summary"

Check sheet P2

Notes on selection and Important Announcement

The EEV-KIT, it is a combination of the expansion valve set and control box ASSY (for parent and child machines).
Customers in accordance with the purpose (specification), it is part of to your use to build a system.
Please refer to the technical documentation on the home page (HP) for more information.
Mitsubishi Heavy Industries (MHI) will support by this check sheet , but in MHI , the indoor unit can not be guaranteed.
Becase the indoor unit is your design. The parts of the indoor unit (ex. Heat exchanger and indoor fan etc) is your design.
By the same reason , it is also your responsibility about safety of the inddor unit.
Please consider in a safty of an electrical system in particular and sell safe goods with a rule in each assignment destination.
EEV-KIT selection support in MHI, done in the "EEV-KIT check sheet".
EEV-KIT check sheet, please be sure to submit it EEV-KIT check sheet to MHI pass sale window.
If the EEV-KIT check sheet of non-submission to MHI, in MHI, EEV-KIT system can not be guaranteed.
Please do all the items described in EEV-KIT check sheet.
In particular, two points are shown in the following is an important item.
· Check by volume calculation of the heat exchanger
· Outdoor unit setting of the target pressure change
Check mistakes and setting mistake can cause such as the outdoor unit failure.
Others, you will be sure to read the notes of spec sheet (a list of the table below), please follow.

	Model	SPECIFICATION	OUTLINE	WIRING DIAGRAM	RANGE OF USAGE & LIMITATIONS
EEV-Control ASSY	EEVKIT6-E-M	PCH000Z421	PCH000Z377	PCH000Z378	PCH000Z421
	EEVKIT6-E-C		PCH000Z375	PCH000Z376	
	EEVKIT6-E-M/A, /B		PCH000Z417	PCH000Z419	
	EEVKIT6-E-C/A, /B		PCH000Z418	PCH000Z420	
EEV-Set	EEV6-71-E		PCH000Z379	non	
	EEV6-160-E		PCH000Z380		
	EEV6-280-E		PCH000Z381		
	EEV6-71-E/A		PCH000Z422		
	EEV6-160-E/A		PCH000Z423		
	EEV6-280-E/A		PCH000Z424		

Check sheet P3

DX AHU general

DX AHU･Air handling unit equipped with the direct expansion coil

Design condition

Indoor air temperature	Summer		℃DB
			℃WB
	Winter		℃DB
			℃WB
Outdoor air temperature	Summer		℃DB
			℃WB
	Winter		℃DB
			℃WB

Air flow

Supply air (SA)	Air volume		m3/h
	External static pressure		Pa
	Motor output		kW
Return air (RA)	Air volume		m3/h
	External static pressure		Pa
	Motor output		kW
Outdoor air (OA)	Air volume		m3/h
	External static pressure		Pa
	Motor output		kW

Required capacity（Design capacity）

Required capacity	Cooling capacity		kW
	Heating capacity		kW
Inlet air temperature conditions at heat exchanger coil	Summer		℃DB
			℃WB
	Winter		℃DB
			℃WB

Specifications of air handling unit

Humidifier	Natural evaporating type	
	Steam spray type	
	Electrode steam generator	
	Others	
	Humidifying volume	
Filter	Pre-filter	
	High performance filter（Colorimetric method 65%）	
	High performance filter（Colorimetric method 90%）	
	Others	

Piping length

Between outdoor unit and air handling unit	One way length		
	Height difference		

Total heat exchanger

Total heat exchanger	With ( )	Without ( )
	If With, please describe the following numerical value	
	exchange efficiency （%）	
	Outdoor air volume （m3/h）	
	Exhaust air volume （m3/h）	

Anti-vibration device	Spring type	
	Rubber pad type	
Inverter control	With ( )	Without ( )
	If With, please describe the following specification	
	Control range of air volume %～ %	
	Controlled by Anemometer or pressure gauge	
	Others	
Special specifications	If it is not the manufacturer standard products, please describe the following specification	
	Corrosion protection type	
	Others	
Installation place	Outdoor	Indoor

Distance between AHU and O/U

Design condition

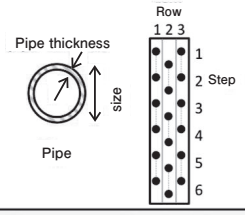
Reference

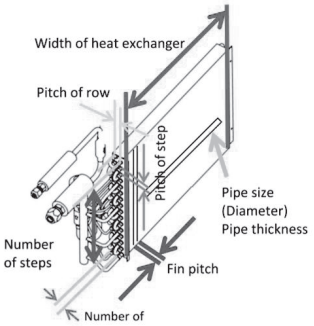
If you have any items to take note, please add here.

Check sheet P4

Please fill in the specifications of the heat exchanger

	Unit	
Number of heat exchanger coils	System	
Number of rows	—	
Number of steps	—	
Number of circuits	—	
Pitch of row	mm	
Pitch of step	mm	
Width of heat exchanger	mm	
Fin pitch	mm	
Pipe size (Diameter)	mm	
Pipe thickness	mm	
Fin thickness	mm	
The heat exchanger volume	cm3	





Recommended number of columns of MHI is within three rows,and front wind speed is less than 2.5m / s.However, there is no problem if the four columns and to satisfy the performance even in the case of 6-row volume is within the provisions of the heat exchange.

Example of calculating the internal volume of the heat exchanger

Pipe area × Pipe length

$(9.52-0.2\times2)^2\times\pi/4\times(3\times50\times1000)/1000$

$= \underbrace{10{,}588\ \mathrm{cm}^3}_{\text{volume}}$ ･･･(A)

Heat exchanger system		
Pipe size (Diameter)	9.52	mm
Pipe thickness	0.02	mm
Number of rows	3	-
Number of steps	50	-
Width of heat exchanger	1000	mm

If the specifications of each heat exchanger coil is different, please write individual specification.

Pattern	単位	1	2	3	4	5	6	7	8
Number of rows	—								
Number of steps	—								
Number of circuits	—								
Pitch of row	mm								
Pitch of step	mm								
Width of heat exchanger	mm								
Fin pitch	mm								
Pipe size (Diameter)	mm								
Pipe thickness	mm								
Fin thickness	mm								
Equivalent capacity									

Above table is for the heat exchanger divided into 8 coils. If necessary, please add columns.

Check sheet P5, 6-1

Cooling

Please calculate the evaporation capacity and the outlet temperature of the evaporation temperature 5 ℃ and 12 ℃ .

Please described in the table below.

Evaporation temperature	Evaporation capacity (kW)		Outlet temperature (℃)		
℃	Calculation result	Symbol	Calculation result	Symbol	
5		QE1		TE1	Standard mode
12		QE2		TE2	Fresh air mode

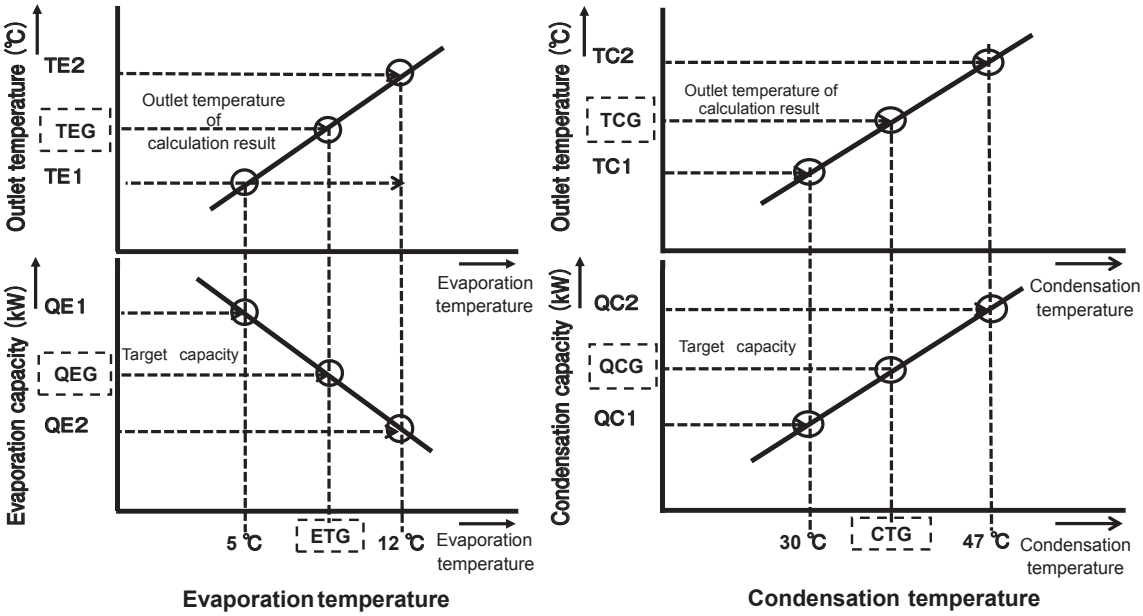
Heating

Please calculate the condensation calculations and the outlet temperature of the condensation temperature 30 ℃ and 47 ℃ .

Please described in the table below.

Condensation temperature	Condensation capacity (kW)		Outlet temperature (℃)		
℃	Calculation result	Symbol	Calculation result	Symbol	
30		QC1		TC1	Standard mode
47		QC2		TC2	Fresh air mode

Check sheet P5, 6-2



Check sheet P5, 6-3

Cooling

The required capacity (QEG) are plotted in figure, please seek ETG and TEG
Please describe the results in the table below.

ETG：Evaporation temperature that satisfies the required capacity

TEG：Air temperature that satisfies the required capacity

Target capacity (kW)		Evaporation temperature (℃)		Outlet temperature (℃)	
Calculation result	Symbol	Calculation result	Symbol	Calculation result	Symbol
	QEG		ETG		TEG

Heating

The required capacity (QCG) are plotted in figure, please seek CTG and TCG.
Please describe the results in the table below.

CTG：Satisfying condensation temperature the required capacity

TCG：Air temperature that satisfies the required capacity

Target capacity (kW)		Evaporation temperature (℃)		Outlet temperature (℃)	
Calculation result	Symbol	Calculation result	Symbol	Calculation result	Symbol
	QCG		CTG		TCG

Check sheet P5, 6-4

Please check the following three items
If the check is not attached (it is not possible to satisfy the request),
please re-design the heat exchanger.

Cooling

①QEG of the calculation result was satisfied customer request ?

②Is between the ETG is 5℃－12℃?

→ In the case of out of range, please try to re-selection of the outdoor unit

③When there is a request of the TEG, TEG of the calculation result was satisfied customer request ?

Heating

①QCG of the calculation result was satisfied customer request ?

②Is between the CTG is 30℃－47℃?

→ In the case of out of range, please try to re-selection of the outdoor unit

③When there is a request of the TCG, TCG of the calculation result was satisfied customer request ?

Check sheet P7

Selection check the outdoor unit and refigerant volume check

Selection check the outdoor unit: Please check whether the outdoor unit capacity satisfies the request.

Compensation coefficient fixed by air-conditioning method (A)

	Compensation coefficient	
	Standard mode	Fresh air mode
Cooling	1	1.068
Heating	1	0.811

Compensation coefficient calculated by evaporating(or condensing) temperature (B)

	Compensation coefficient	
	Standard mode	Fresh air mode
Cooling	QE1/QEG	QEG/QE2
Heating	QC2/QCG	QCG/QC1

Compensation coeficient calculated by design temperature (C)

	Compensation coefficient
Cooling	
Heating	

Compensation coefficient by piping and height difference (D)

	Compensation coefficient			Total
	Piping length	Height difference	Frosting	
Cooling	C1	C2	—	=(C1)×(C2)
Heating	H1	H2	H3	=(H1)×(H2)×(H3)

Total compensation coefficient (A)×(B)×(C)×(D)

	Total compensation coefficient
Cooling	
Heating	

Corrected indoor capacity EC(Cooling) or EH (Heating) {(A)x(B)x(C)x(D)}		Outdoor capacity (E)	Judgment (If corrected indoor capacity < outdoor capacity, it is OK)
Cooling capacity	kW	kW	
Heating capacity	kW	kW	

Compensation coefficient

The heat exchanger volume check

Calculation	Judgment
(F) = (E) × 280 cm3/kW	(F) ≧heat exchanger volume it is O K
Calculation (G) = (E) × 130 cm3/kW	Judgment (G) ≦heat exchanger volume it is OK

If you can not satisfy the above conditions, Please do is OK by treatment such as increasing the capacity of the outdoor unit.

Explantion of offset B
(There is need to increase the outdoor unit in order to compensate the shortage of the following description.offset B is the coefficient of order to increase the outdoor unit.)
Standard mode
In the case of Standard mode, in order to change the target pressure, the outdoor unit capacity will be less than the rated capacity (catalog display capability).
(The reason is because of the change is to lower the number of rotation of the compressor.)
Fresh air mode
In the case of Fresh air mode, in order to change the target pressure, the outdoor unit capacity will that is required to rated capacity (display capacity) or more of capacity.the outdoor unit capacity will increase in the rated conditions, but at the time of overload

Outdoor unit capacity check / Heat exchanger volume check

Check sheet P8

Please describe the selection result (confirmed the order details)

Selected models input

Master control PCB		Pcs
Slave control PCB		Pcs
Refrigeration systems		Systems

Selection sheet

Category	Part name	Pcs	Remarks
EEV-Control ASSY	EEVKIT-E-M		
	EEVKIT-E-C		
EEV-Set	EEV6-71-E		
	EEV6-160-E		
	EEV6-280-E		
Remote control			
Central control			
Superlink adaptor			
Outdoor unit			

Note

The following information in this check sheet also please attach.
In the case of attachment not due to circumstances, please describe the connection on the right side of the blank-part image view (electrical wiring in the refrigerant system, control panel view · AHU outline drawing, etc.).

① Customer requirements specification (equipment table)
② System block diagram
③ Control panel
④ Electrical wiring
⑤ Dimensions of AHU
⑥ Dimensions of heat exchanger
⑦ Calculation results of heat exchanger

We want you to document list that was attached to the check sheet.

Check sheet 9-1

Fill in the setting of dip switch, jumper wire, remote control function, input/output signal.

1. Multiple refrigeration system
   1.1 Setting of master control PCB
   1.2 Setting of slave control PCB
   1.3 Setting of outdoor control PCB
2. Single refrigeration system
   2.1 Setting of slave control PCB
   2.2 Setting of outdoor control PCB

Outdoor unit setting

Setting shall be done by using 7-segment of outdoor unit.

Check sheet 9-2

Input for multiple refrigerant system

Please fill in the setting of the dip switch, jumper wire, remote control function and input/output signal

1.In case of multiple refrigeration system

1.1Setting of master control PCB

Master control

Software version	
①DIP switch and Jumper wire	
	Setting
SW1	
SW2	
SW3	
SW4	
SW5-1	
SW5-2	
SW6-1	
SW6-2	
SW6-3	
SW6-4	Keep OFF
SW7-1	
SW7-2	
SW7-3	
SW7-4	
J1	

Remote control

②Indoor function setting of remote control

Function No.	Display		
02	Standard	High speed 1	High speed 2
17	Standard	Type 1	

③Input/Output signal

	Input/Output signal	
CnN	Yes	No
CnI	Yes	No
CnM3	Yes	No
CnT1	Yes	No
CnT2	Yes	No

④Special instruction for the communication with central contral

Master control external input

1.2Setting of slave control PCB

Slave control

(Please set up all PCB in the same pattern	
Soft version	
①DIP switch and Jumper wire	
	Setting
SW1	
SW2	
SW3	
SW4	
SW5-1	
SW5-2	
SW6-1	
SW6-2	
SW6-3	
SW6-4	
SW7-1	
SW7-2	
SW7-3	
SW7-4	Keep OFF
J1	

Outdoor

1.3 Setting of outdoor control PCB

Soft version	
①KXE6(4, 5, 6HP)	
7-segment No.	Setting
P54	
P11	
P12	

②KXE6(8, 10HP)	
7-segment No.	Setting
P54	
P11	
P12	

③KXE6(14HP or bigger)	
7-segment No.	Setting
P54	
P72	
P73	

④ KXZ (12HP or bigger)	
7-segment No.	Setting
P68	
P40	
P41	

IMPORTANT
Change in the target pressure of the outdoor unit, please set the calculation result ETG(cooling) and CTG(heating) of check sheet.

#

Check sheet 9-3

Input for single refrigeration system

Please fill in the setting of the dip switch, jumper wire, remote control function and input/output signal

Slave control

2. In case of single refrigeration system
2.1 Setting of slave control PCB (Please set up all PCB in the same pattern)

Software version	

①DIP switch and Jumper wire

	Setting
SW1	
SW2	
SW3	
SW4	
SW5-1	Keep OFF
SW5-2	
SW6-1	
SW6-2	
SW6-3	
SW6-4	
SW7-1	
SW7-2	
SW7-3	
SW7-4	Keep OFF
J1	Keep short

Remote control

②Function setting of remote control

Function No.	Display	
01	Invalid	Valid

③Indoor function setting of remote control

08	No offset	+1.0	+2.0	+3.0
09	+2.0	+1.5	+1.0	No offset
	-1.0	-1.5	-2.0	
17	STANDARD	TYPE1		
11	Automatic operation A (No Vent.)	Automatic operation B (Vent. Link)	Automatic operation C (No Vent. Link)	

④Special instruction for the communication with central contral

Note
RC-E5 have no function for No.01.For No.01 function , special RC-EX1 software is necessary.

Outdoor

1.3 Setting of outdoor control PCB

Soft version	

①KXE6(4, 5, 6HP)

7-segment No.	Setting
P11	
P12	

②KXE6(8, 10HP)

7-segment No.	Setting
P11	
P12	

③KXE6(14HP or bigger)

7-segment No.	Setting
P72	
P73	

④ KXZ (12HP or bigger)

7-segment No.	Setting
P40	
P41	

IMPORTANT
Change in the target pressure of the outdoor unit, please set the calculation result ETG(cooling) and CTG(heating) of

1.3 Setting of outdoor control PCB

Soft version	

①KXE6(4, 5, 6HP)

7-segment No.	Setting
P54	
P11	
P12	

②KXE6(8, 10HP)

7-segment No.	Setting
P54	
P11	
P12	

③KXE6(14HP or bigger)

7-segment No.	Setting
P54	
P72	
P73	

④ KXZ (12HP or bigger)

7-segment No.	Setting
P68	
P40	
P41	

Software version can be checked by 7-segment “98”.
In case of old software, some functions are not available
Therefore updating is required.
Please set the target pressure of the outdoor unit to ETG（cooling）and CTG（heating）calculated in sheet 5.
If you do not do this setting, you will not be able to satisfy the customer's request. As a result, Lack of ability and compressor failure will occur.

#

9. Guidelines of heat exchanger temperature sensors

Temperature sensors for heat exchanger

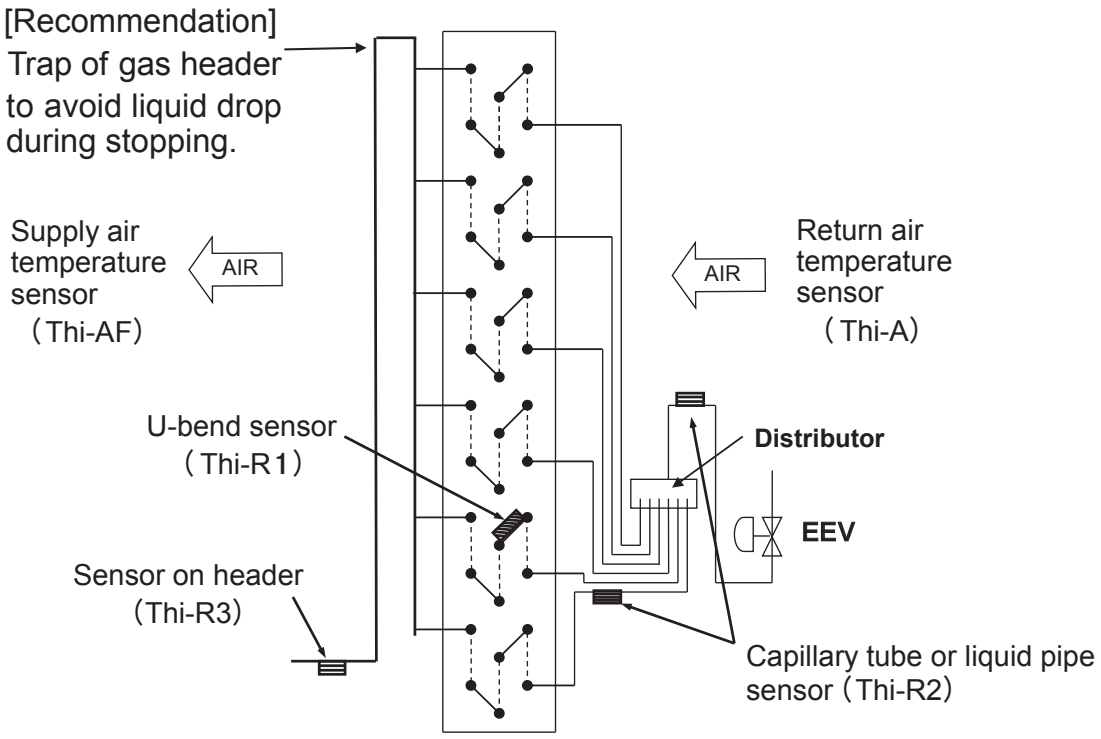
- 3 heat exchanger temperature sensors are necessary for each heat exchanger coil (indoor unit).
- Heat exchanger temperature sensors are attached to EEVKIT6-E-C.
- Each sensor must be fixed to correct location of heat exchanger as following table.

Sensor	Mounting position
Thi-R1	On the U-bend section
Thi-R2	On the capillary tube section of distributor
Thi-R3	On the header section

Detected temperature range

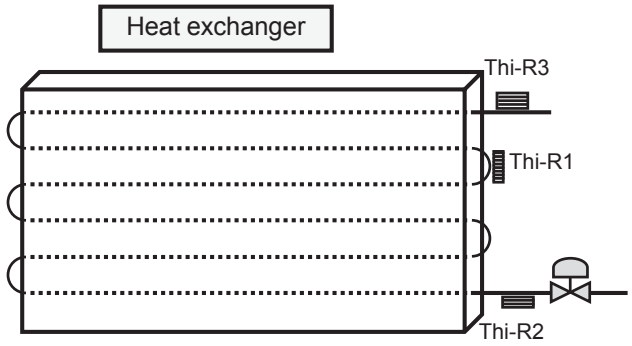
- The control range (accuracy) of heat exchanger temperature sensors (Thi-R1, -R2, -R3) is from 0℃ to 63 (±2)℃.
- The usage range of heat exchanger temperature sensors is from -30℃ to + 72℃ .

Mounting position of temperature sensors



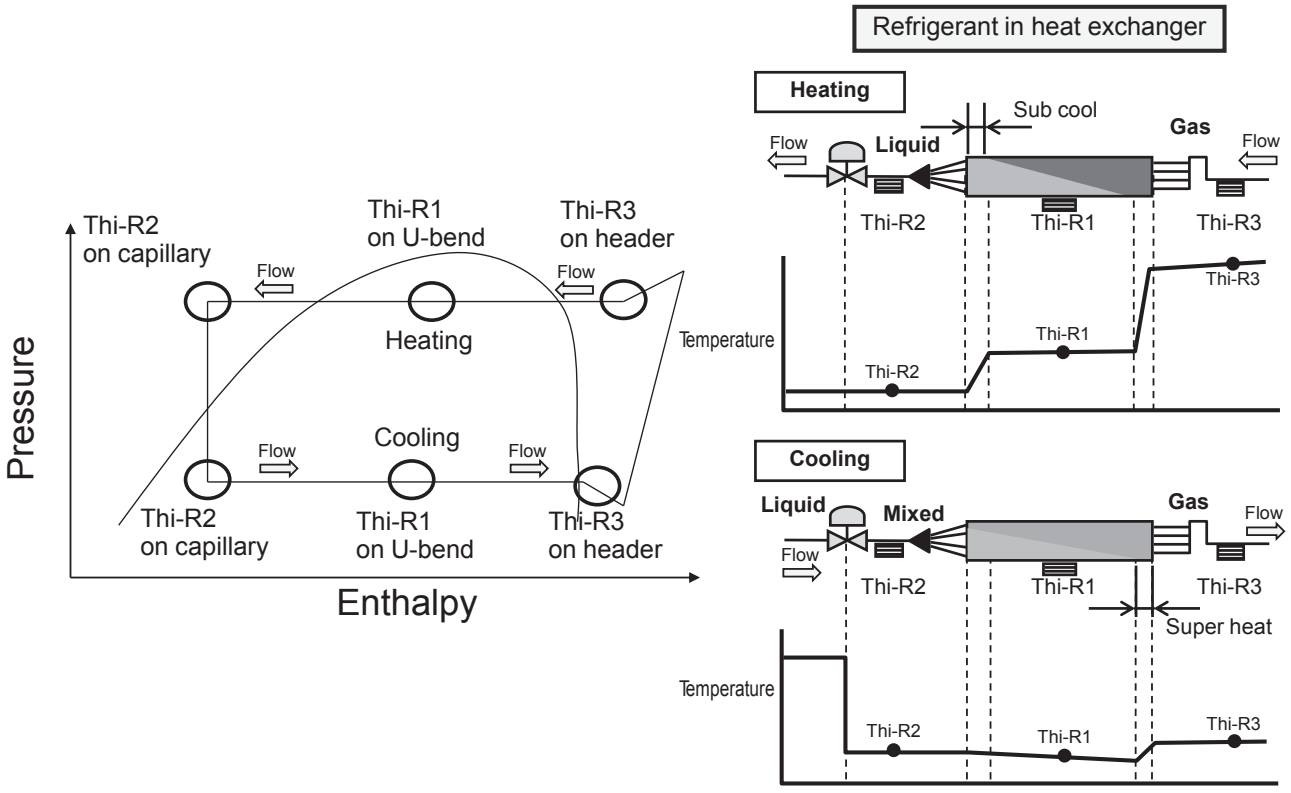
Function of each heat exchanger sensor

	Mounting position	Detected temperature		Purpose
		Cooling	Heating	
Thi-R1	U Bend	Evaporating temperature	Condensing temperature	Anti-freezing protection
Thi-R2	Capillary	Evaporating temperature	Outlet temperature	Anti-freezing protection EEV-Control (Heating)
Thi-R3	Header	Outlet temperature	Inlet gas temperature	EEV-Control (Cooling)



Each sensor has unique function,
Important to fix to correct location.
If fixed to incorrect location, the system will not be controlled correctly, double check during commissioning.
The Thi-R3 sensor diameter is larger than the others to avoid mistakes.

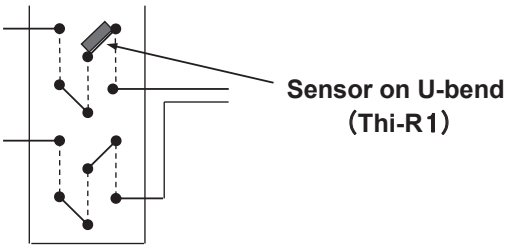
Refrigerant temperature in heat exchanger



Items to be checked

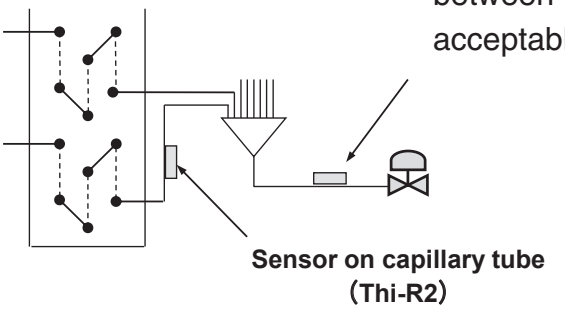
1. Thi-R1 : On U-bend section (with **RED** tape)
   a) Considering the frost of the heat exchanger in cooling, mount the sensor on the circuit with the lowest temperature among all circuits (Avoid mounting on the lowest position of the circuit). However the circuit in which the liquid refrigerant is not held in heating operation is better.
   b) Mounting the sensor at the middle point of the circuit pass is recommended. If it is mounted near to the header side or the distributor side, it will detect the temperature at the overheat or sub cool area, so it cannot detect the actual condensing/ evaporating temperature correctly.

      Be sure to check whether the refrigerant is 2-phase flow in the circuit by testing the actual unit.

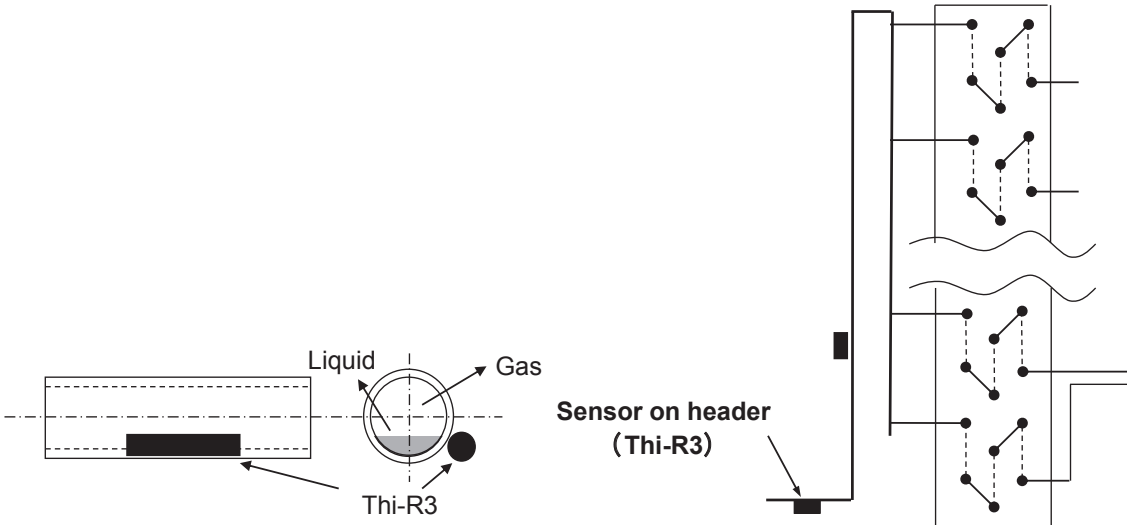


2. Thi-R2 : On capillary tube section of distributor (with **YELLOW** tape)
   a) It should be mounted on the capillary tube section to detect the evaporating temperature under the condition for good response.
   b) It should be mounted at the position to be able to detect the averaged outlet temperature and not to hold the liquid refrigerant in heating operation.

If temperature different is large, location between EEV and distributor is acceptable.



3. Thi-R3 : On header section (without tape)
   a) It should be mounted on the header main pipe after collecting refrigerant in cooling.
   b) If the header main pipe runs horizontally, be sure to mount the sensor on the side part of the pipe to prevent from evaporating liquid refrigerant.



4. Thi-A : Return air temperature sensor. (with **BLACK** tape)
   Fixed location
   a) Position where the air flow does not stagnate.
   b) Position not to be affected by other heat source. (heat exchanger and etc.)
5. Thi-AF : Supply air temperature sensor. (with **BLUE** tape)
   Fixed location
   Same as Thi-A
6. Be careful to mount the sensors in the correct position and by identifying the attached colour tape of each sensor.
7 Be sure to confirm whether the sensed temperature of each sensor is correct or not by actual operation testing at commissioning.

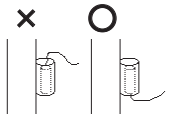
Other items to be checked

1. The indoor heat exchangers should have pockets for installing sensors.

2. The indoor heat exchanger sensors should not be affected by other heat sources.
   - Avoid installing the sensors near any electrical devices that generate heat.
   - Wrap the sensors with insulation and check any affect of temperature change from air flow.
   - Confirm that the sensors do not touch incorrect piping.
   - The sensors must be installed where the temperature can be measured accurately.
   - The sensors must have a good response and vary correctly.

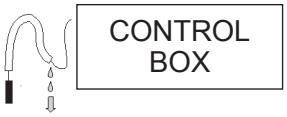
3. The sensor should be inserted into the holder from the bottom side and the wiring should have a trap. This is to avoid intrusion of drain water into the sensor through the gap between the lead wire and the resin at the connecting part of sensor.

To avoid water intrusion from molding part



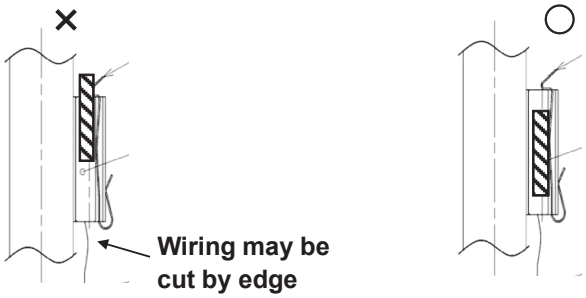
To have a trap

4. The drain water does not intrude into the connection part of the control box through the sensor wire (protective tube). The wiring route must have a trap so that the drain water drops down just before the control box.



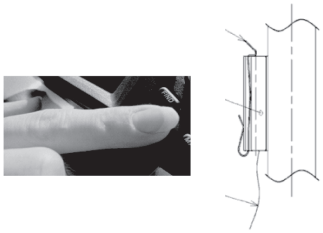
5. The sensor wiring should be loose and not tight.

6. The sensors should not be inserted into the holder too deeply in order to prevent the sensor wire being damaged.



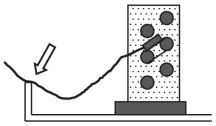
7. The sensors should not make contact with other parts.

8. The sensor wiring should not be in the place where a person can touch it.
   If it can be touched, ensure it is covered by a protective tube with 1mm or more thickness. (for safety reasons)



9. The sensors should not be mounted in a position where the drain water accumulates.

10. The sensor wiring should be covered by a protective tube or rerouted to prevent it from been cut by metal edges.



10. Summary

1. EEV-KIT has two types control boxes, master control box and slave control box.
2. Three type of EEV-Sets have been prepared, need to be chosen according to heat exchanger capacity.
3. MHI outdoor unit can select the evaporating temperature / condensing temperature.
4. MHI EEV-KIT has return air temperature control and supply air temperature control.
5. Design AHU heat exchanger according to MHI requirement.
6. Select outdoor unit by compensating the AHU capacity.
7. Position all the temperature sensors correctly.

11. Spec sheet list

11.1 EEV-KIT

Specification PCH000Z421

11.2 EEV-Control ASSY

	OUTLINE	WIRING
EEVKIT6-E-M	PCH000Z377	PCH000Z378
EEVKIT6-E-C	PCH000Z375	PCH000Z376
EEVKIT6-E-M/A, /B	PCH000Z417	PCH000Z419
EEVKIT6-E-C/A, /B	PCH000Z418	PCH000Z420

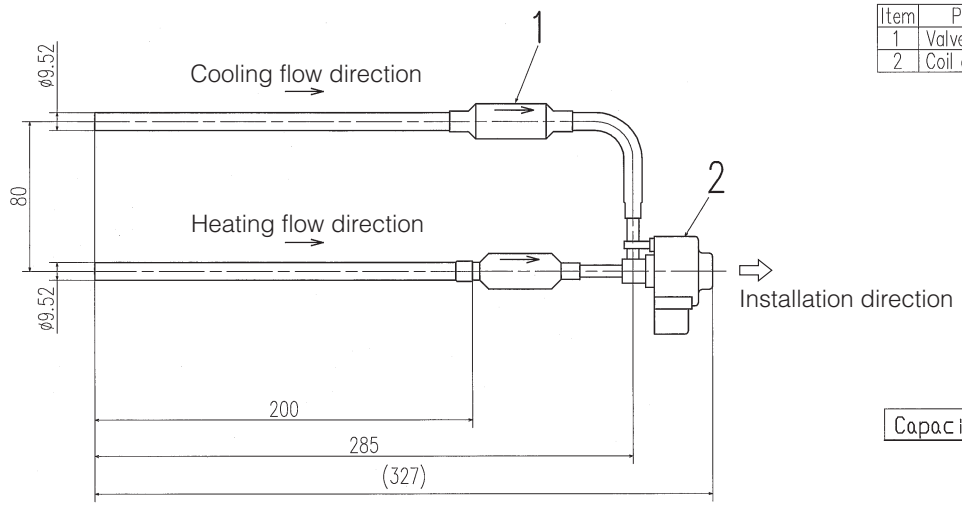
11.3 EEV-Set

	OUTLINE		
	71	160	280
EEV6- ＊＊ -E	PCH000Z379	PCH000Z380	PCH000Z381
EEV6- ＊＊ -E/A	PCH000Z422	PCH000Z423	PCH000Z424

12. Exterior dimensions & electrical wirings

12.1 Exterior dimensions

Model EEV6-71-E/A

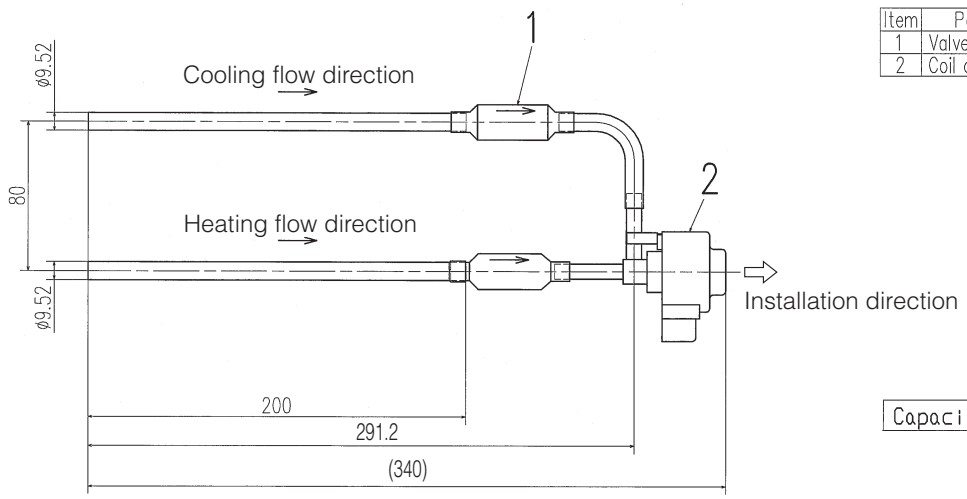


Item	Part name	Part No.
1	Valve assy expansion	PCH387F021
2	Coil assy,solenoid	PCH382F002

Capacity	22, 28, 36, 45, 56, 71

PCH000Z422

Model EEV6-160-E/A

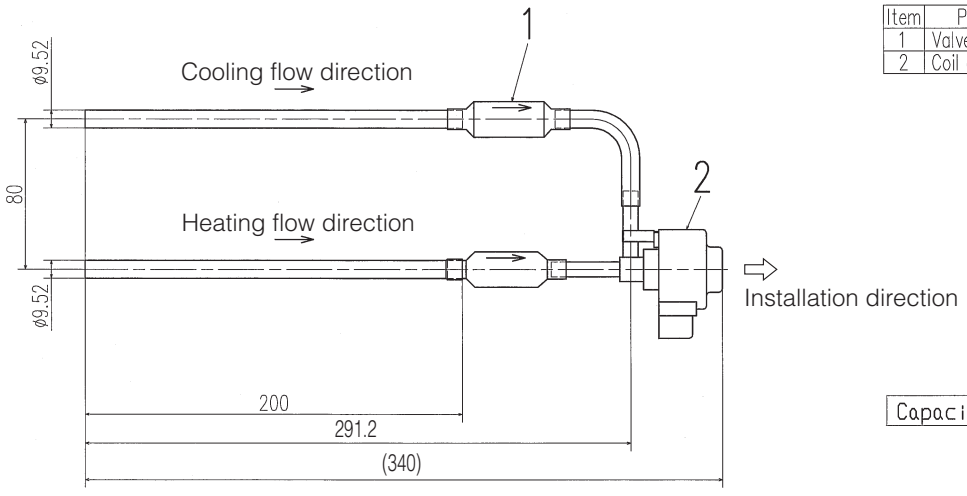


Item	Part name	Part No.
1	Valve assy expansion	PCH387F022
2	Coil assy,solenoid	PCH382F002A

Capacity	90, 112, 140, 160

PCH000Z423

Model EEV6-280-E/A



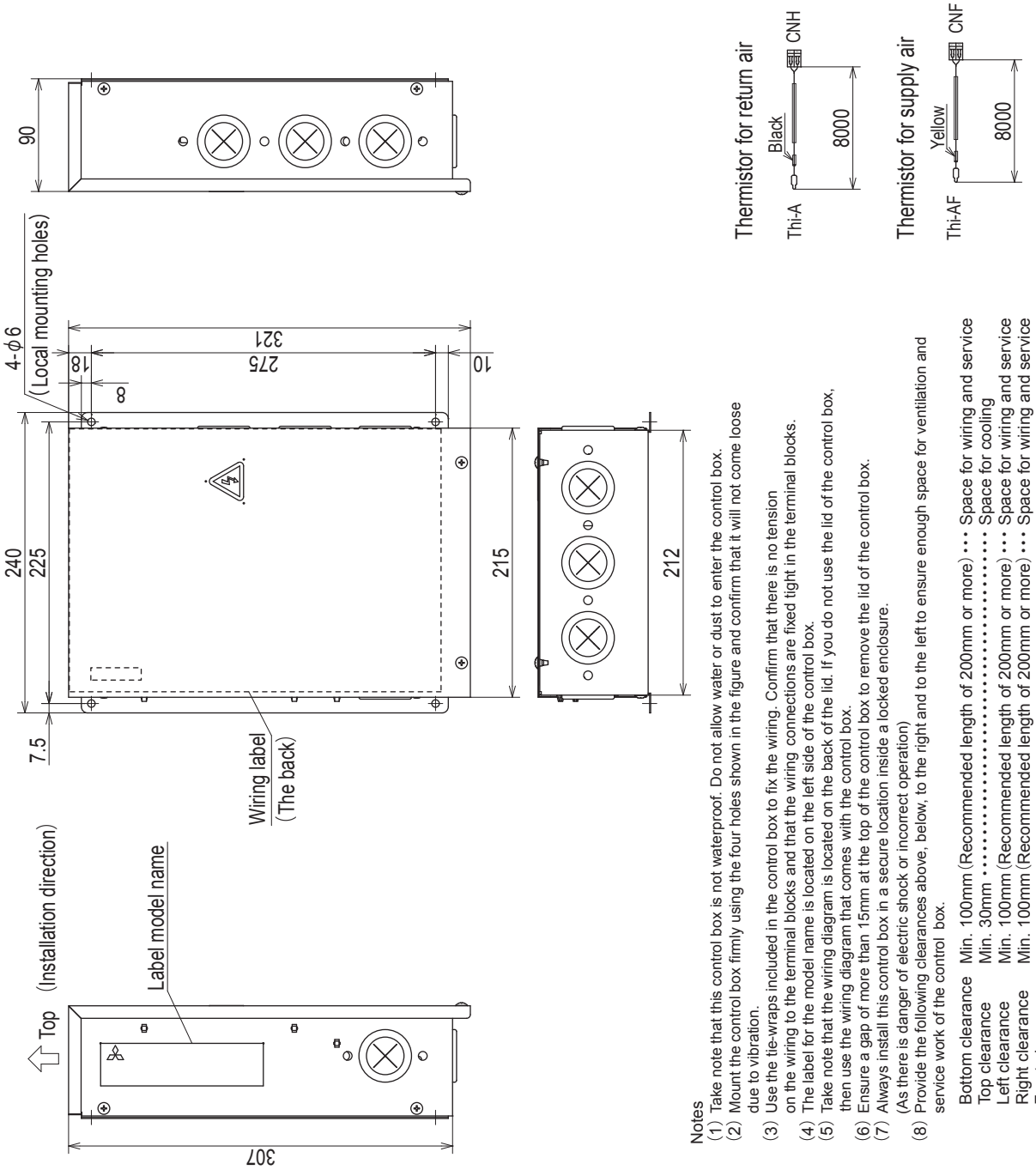
Item	Part name	Part No.
1	Valve assy expansion	PCH387F022A
2	Coil assy,solenoid	PCH382F002A

Capacity	224, 280

PCH000Z424

12.1 Electrical wirings

(1) Model EEVKIT6-E-E/A, /B (Master)

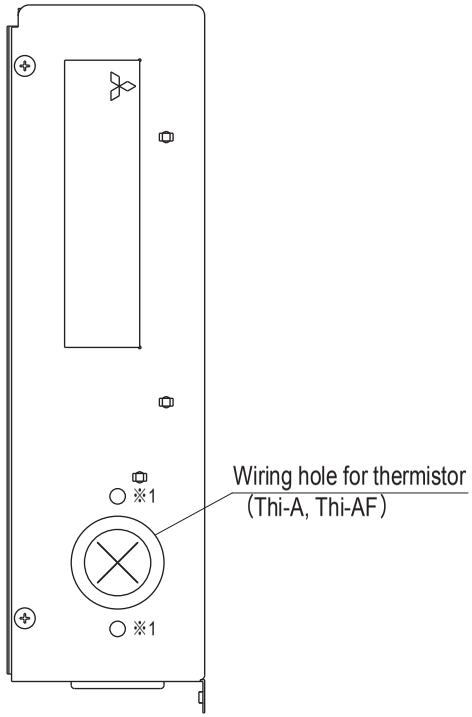


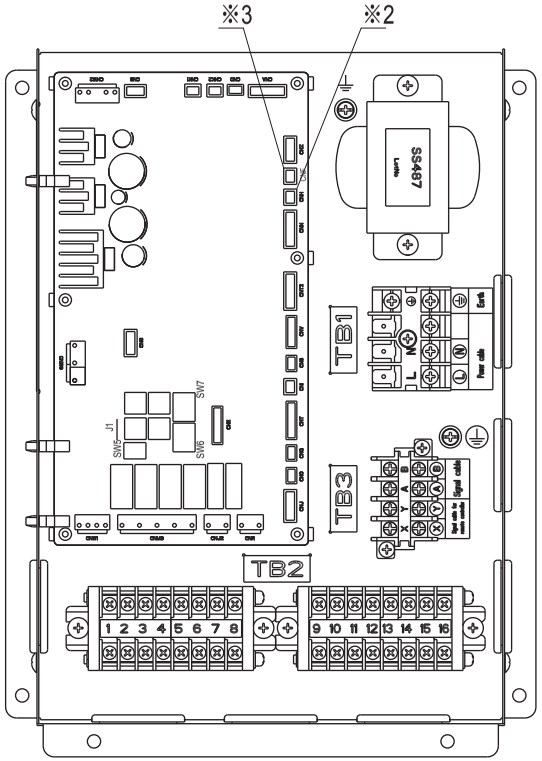
Notes

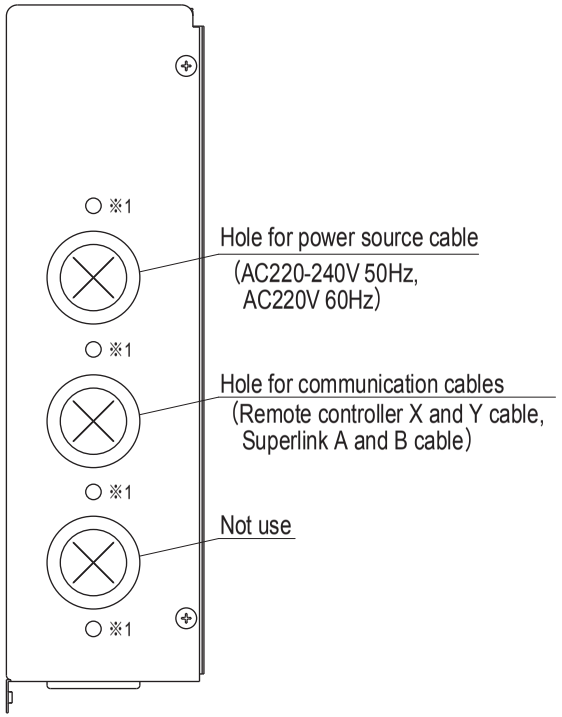
(1) Take note that this control box is not waterproof. Do not allow water or dust to enter the control box.
(2) Mount the control box firmly using the four holes shown in the figure and confirm that it will not come loose due to vibration.
(3) Use the tie-wraps included in the control box to fix the wiring. Confirm that there is no tension on the wiring to the terminal blocks and that the wiring connections are fixed tight in the terminal blocks.
(4) The label for the model name is located on the left side of the control box.
(5) Take note that the wiring diagram is located on the back of the lid. If you do not use the lid of the control box, then use the wiring diagram that comes with the control box.
(6) Ensure a gap of more than 15mm at the top of the control box to remove the lid of the control box.
(7) Always install this control box in a secure location inside a locked enclosure.
(As there is danger of electric shock or incorrect operation)
(8) Provide the following clearances above, below, to the right and to the left to ensure enough space for ventilation and service work of the control box.

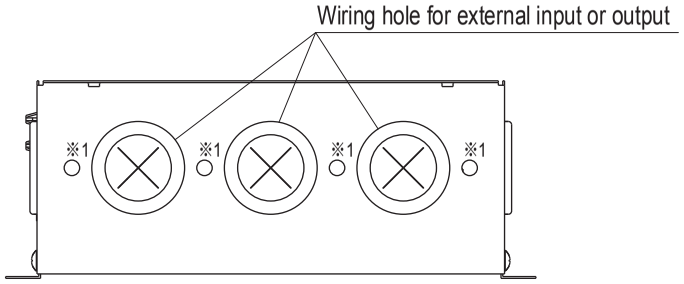
Bottom clearance	Min. 100mm (Recommended length of 200mm or more)	Space for wiring and service
Top clearance	Min. 30mm	Space for cooling
Left clearance	Min. 100mm (Recommended length of 200mm or more)	Space for wiring and service
Right clearance	Min. 100mm (Recommended length of 200mm or more)	Space for wiring and service
Front clearance	Min. 30mm	Space for cooling

PCH000Z417A





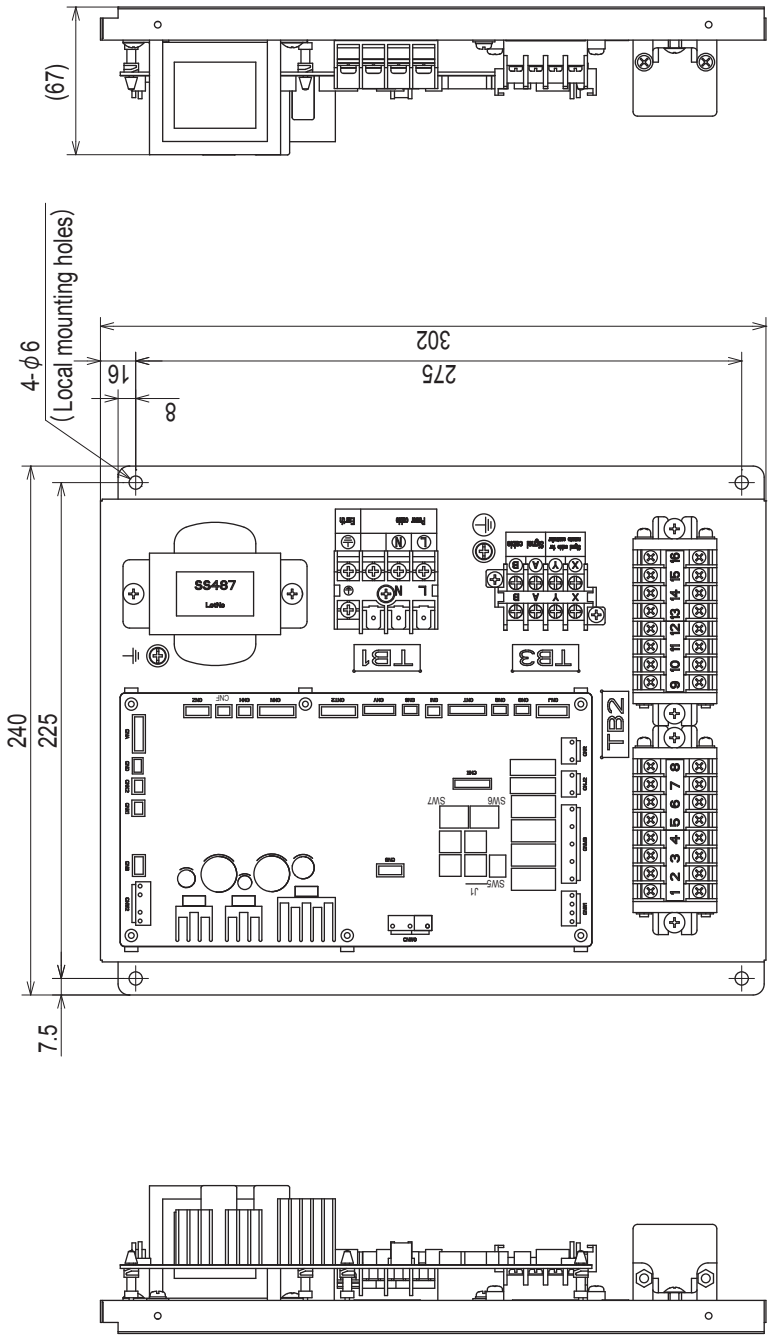




Notes

(1) This view is shown by removing the lid. The wiring diagram has been pasted to the back of the lid. If you do not want to use the lid, then use the wiring diagram supplied as an accessory.
(2) ※1 are the holes for accessory cable tie bands for fixing the site wiring.
(3) ※2 is a connector to be connected to thermistor Thi-A.
(4) ※3 is a connector to be connected to thermistor Thi-AF.

PCH000Z417A



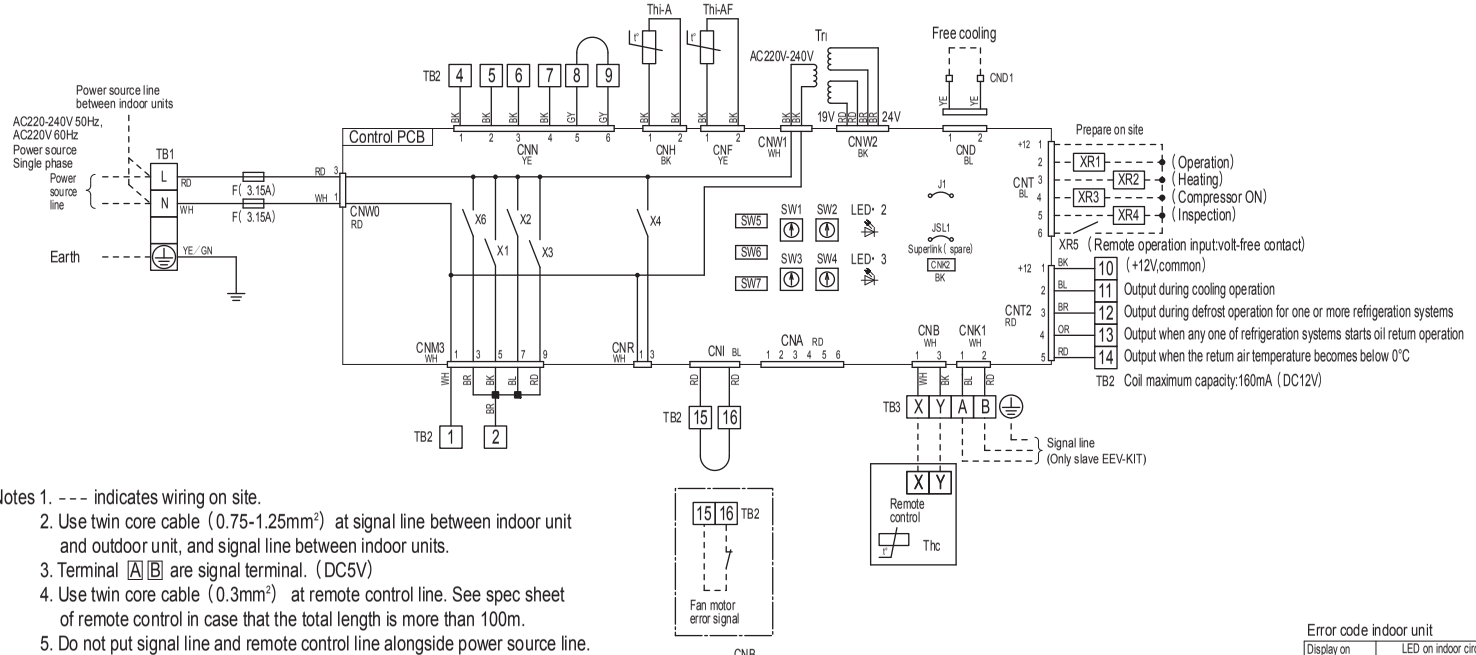
Notes

(1) When removing the sheet metal cover take care not to damage the internal control box wiring.

(2) After connecting the local wiring, confirm that there is no direct tension of the local wiring onto the terminal blocks or the connectors of printed circuit board (PCB).

(3) If you are using the control box as shown in the figure, take note of the following points.
- Ensure that the exposed high-temperature and the high-voltage parts do not come into contact with any wiring.
- Ensure that there is an air gap of more than 90mm above the high-temperature and the high-voltage parts.

PCH000Z417A



Notes 1. --- indicates wiring on site.
2. Use twin core cable (0.75-1.25mm²) at signal line between indoor unit and outdoor unit, and signal line between indoor units.
3. Terminal A B are signal terminal. (DC5V)
4. Use twin core cable (0.3mm²) at remote control line. See spec sheet of remote control in case that the total length is more than 100m.
5. Do not put signal line and remote control line alongside power source line.

External input

Connector	TB2	Operation mode			
		No signal	Cooling	Heating	Fan
CNN1, 2	4,5	0	1	0	1
CNN3, 4	6,7	0	0	1	1

0: Open (OFF) ,1: Short (ON)

Color Marks

Mark	Color
BK	Black
BL	Blue
BR	Brown
GY	Gray
OR	Orange
RD	Red
WH	White
YE	Yellow
YE/GN	Yellow/Green

Meaning of marks

Mark	Parts name
CNA–Z	Connector
F	Fuse
FS	Float switch
JSL1	Spare Superlink terminal setting (for spare)
J1	Setting of indoor fan control during defrosting (☆Short)
LED・2	Indication lamp (Green-Normal operation)
LED・3	Indication lamp (Red-Inspection)
SM	Stepping motor (for electronic expansion valve)
SW1	Supply air temperature setting at system control D in cooling mode
SW2	Changing the temperature interval for multiple step control in cooling mode
SW3	Supply air temperature setting at system control D in heating mode
SW4	Changing the temperature interval for multiple step control in heating mode
SW5-1,2	Multiple step control (☆OFF)
SW6-1,2	Automatic operation valid/invalid and switching operation pattern (☆OFF)
SW6-3	Hot start control (☆ON)
SW6-4	Medium temperature cooling setting (☆OFF)
SW7-1	Check indoor fan operation (☆OFF)
SW7-2,3	Switching return/supply air temperature control (☆OFF) ※1
SW7-4	1 fan tap/3 fan tap (☆OFF/ON)
TB1	Terminal block (Power source line) (□mark)
TB2	Terminal block (Relay connect) (□mark)
TB3	Terminal block (Signal line) (□mark)
Thc	Thermistor (Remote control)
Thi-A	Thermistor (Return air)
Thi-AF	Thermistor (Supply air)
Thi-R1,2,3	Thermistor (Heat exchanger)
Tri	Transformer
X1–3,6	Relay for FM
■mark	Closed-end connector

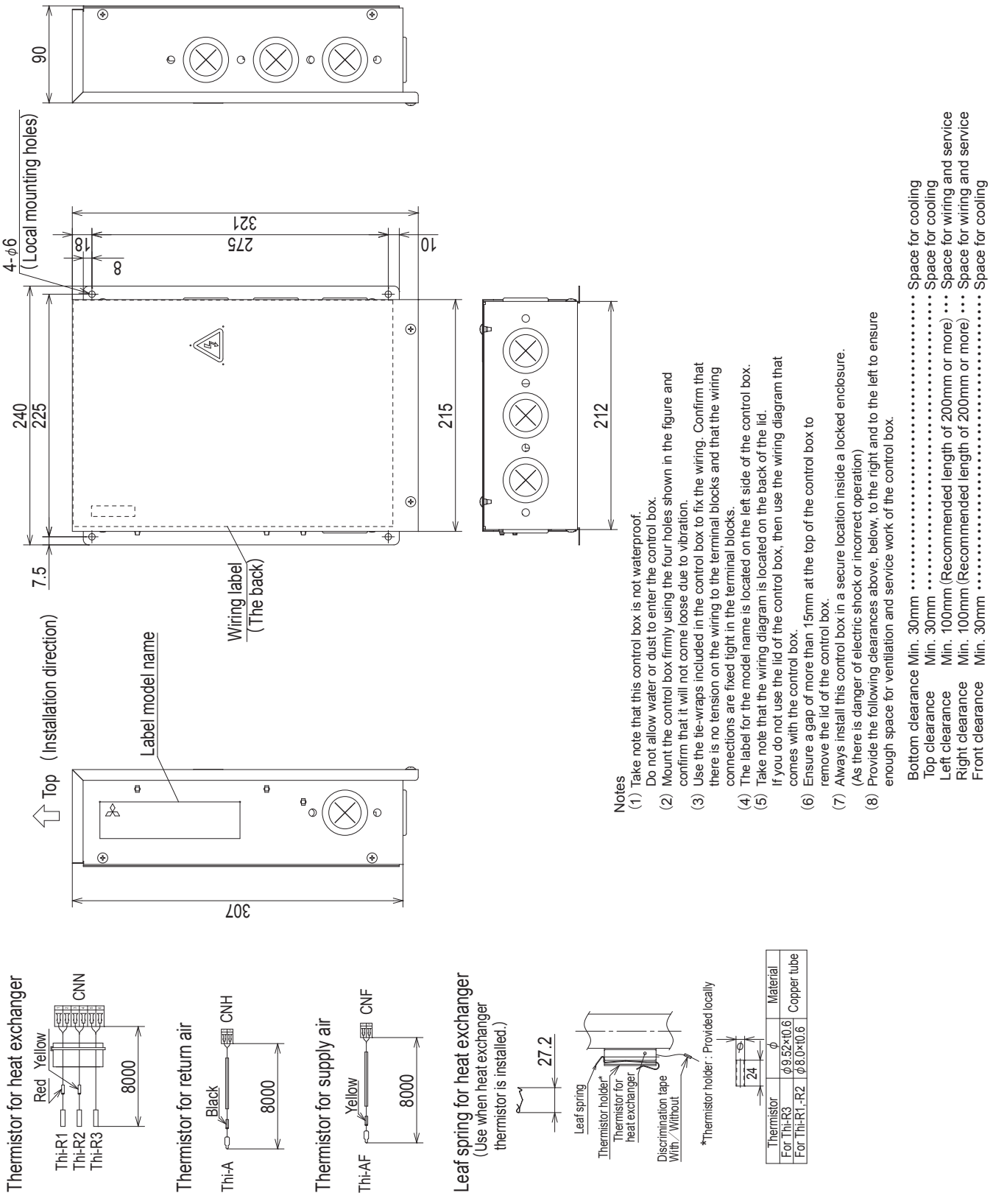
☆ Factory default
※1 You must also configure the slave EEV-KIT. Refer to the technical documentation of slave EEV-KIT how to set. When the multiple refrigeration system is in use, it is necessary to set it with the outdoor unit control. Refer to the technical documentation.

Error code indoor unit

Display on remote control	LED on indoor circuit board		Content		
	Red (Checking)	Green (Normal)			
OFF	Stays OFF	Keeps flashing	Normal		
	Stays OFF	Stays OFF	Fault in power source,indoor power off or one phase down		
E1	Stays OFF	Keeps flashing	Fault on the transmission between indoor circuit board and remote control		
	Not sure	Not sure	Indoor computer abnormal		
E2	1-time flash	Keeps flashing	Duplication of indoor address No. (can only be detected during operation) Excess number of remote controllers (can only be detected during operation)		
E3	2-time flash	Keeps flashing	Outdoor power off or one phase down There is no corresponding outdoor unit address.		
E5	2-time flash	Keeps flashing	Fault on outdoor-indoor transmission		
E6	1-time flash	Keeps flashing	Indoor heat exchanger thermistor interrupted or short-circuit		
E7	1-time flash	Keeps flashing	Return air thermistor interrupted or short-circuit		
E9	1-time flash	Keeps flashing	Indoor unit operation check/drain pump motor check mode faulty		
E10	Stays OFF	Keeps flashing	Excess number of remote control connections		
E11	Stays OFF	Keeps flashing	The master indoor unit is not set properly.		
E12	1-time flash	Keeps flashing	Superlink	Indoor unit address switch	
				Indoor No.	Outdoor No.
			New specification	001–127	49
			Old specification	0–47	48,49
				48,49	0–47
E14	3-time flash	Keeps flashing	Communication abnormal between master-slave indoor units		
E15	1-time flash	Keeps flashing	Indoor supply air thermistor interrupted or short-circuit		
E18	1-time flash	Keeps flashing	The address configuration fault for master-slave indoor units.		
E28	Stays OFF	Keeps flashing	Remote control thermistor anomaly		
E30	1-time flash	Keeps flashing	Indoor unit system connection abnormal		
Over E30	Stays OFF	Keeps flashing	Outdoor unit checking (outdoor circuit board LED checking)		
E43	1-time flash	Keeps flashing	Indoor unit system local and setting defects		
E63	Stays OFF	Keeps flashing	Emergency stop		

Mark	Terminal	Use	Capacity	Note
TB1	L,N, ⏚	Input for power source line	AC300V,25A	Screw: M4
TB2	1,2	Input for relay connect (Indoor fan motor)	AC600V,15A	Screw: M3.5
TB2	4,5,6,7	Input for switching operation mode (Cooling,Fan,Heating)	DC5V,max 2mA	
TB2	8,9	Input for emergency stop		
CNT	6P	Output for operation mode	Relay capacity,DC12V,max 160mA at total use	Connector: Made by Molex 5264-06 Terminal: Made by Molex 5263T
CNT2	5P	Output for mode select (Cooling,Defrost,Oil return on cooling, Return air temp.0deg.C)	Relay capacity,DC12V,max 160mA at total use	
CND	2P	Output for free cooling	Relay capacity,DC12V,max 160mA at total use	Connector includes control unit
CN	2P	Input for indoor unit error signal	DC5V,max 2mA	

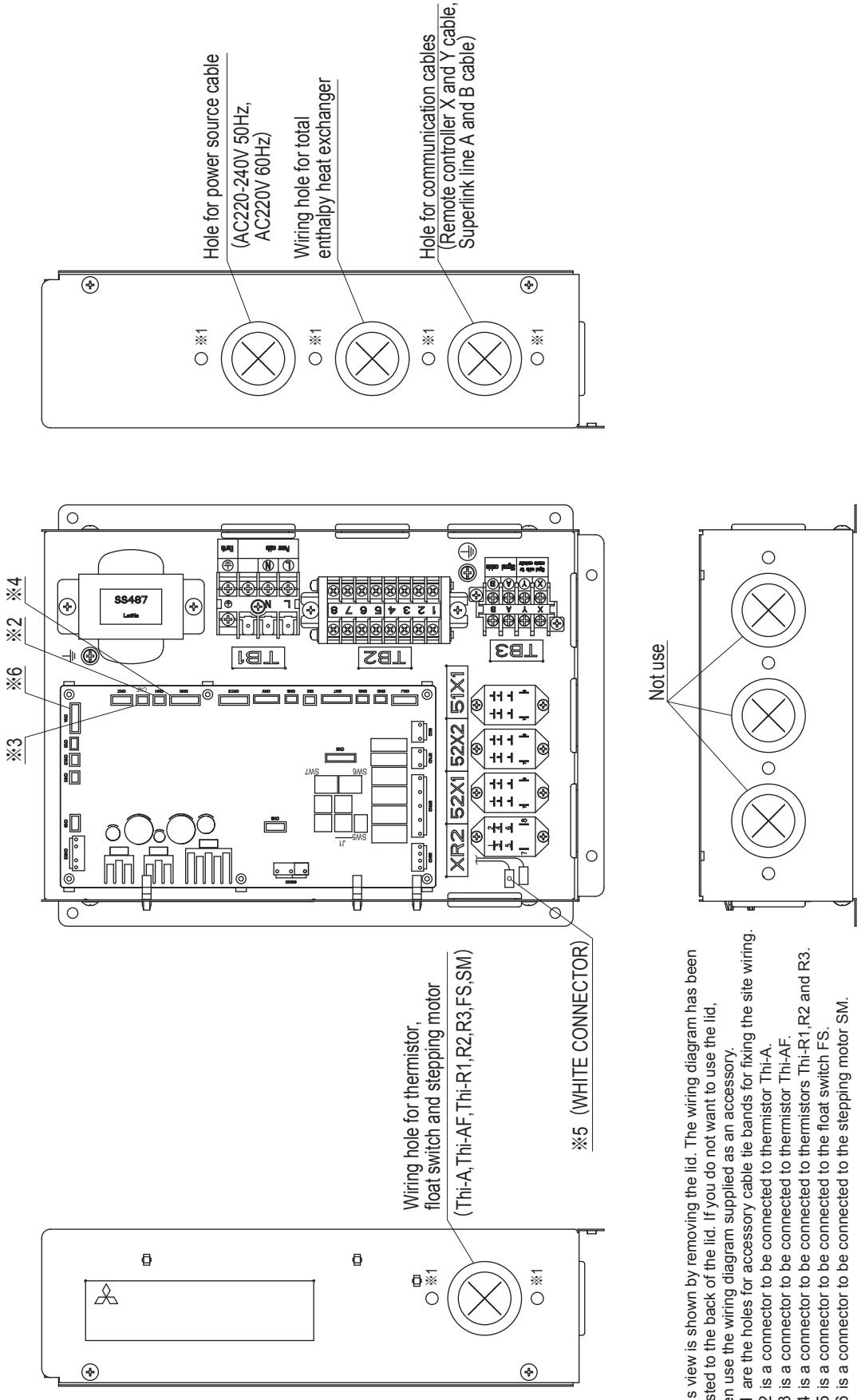
(2) Model EEVKIT6-E-C/A, /B (Slave)



Notes
(1) Take note that this control box is not waterproof.
Do not allow water or dust to enter the control box.
(2) Mount the control box firmly using the four holes shown in the figure and confirm that it will not come loose due to vibration.
(3) Use the tie-wraps included in the control box to fix the wiring. Confirm that there is no tension on the wiring to the terminal blocks and that the wiring connections are fixed tight in the terminal blocks.
(4) The label for the model name is located on the left side of the control box.
(5) Take note that the wiring diagram is located on the back of the lid.
If you do not use the lid of the control box, then use the wiring diagram that comes with the control box.
(6) Ensure a gap of more than 15mm at the top of the control box to remove the lid of the control box.
(7) Always install this control box in a secure location inside a locked enclosure.
(As there is danger of electric shock or incorrect operation)
(8) Provide the following clearances above, below, to the right and to the left to ensure enough space for ventilation and service work of the control box.

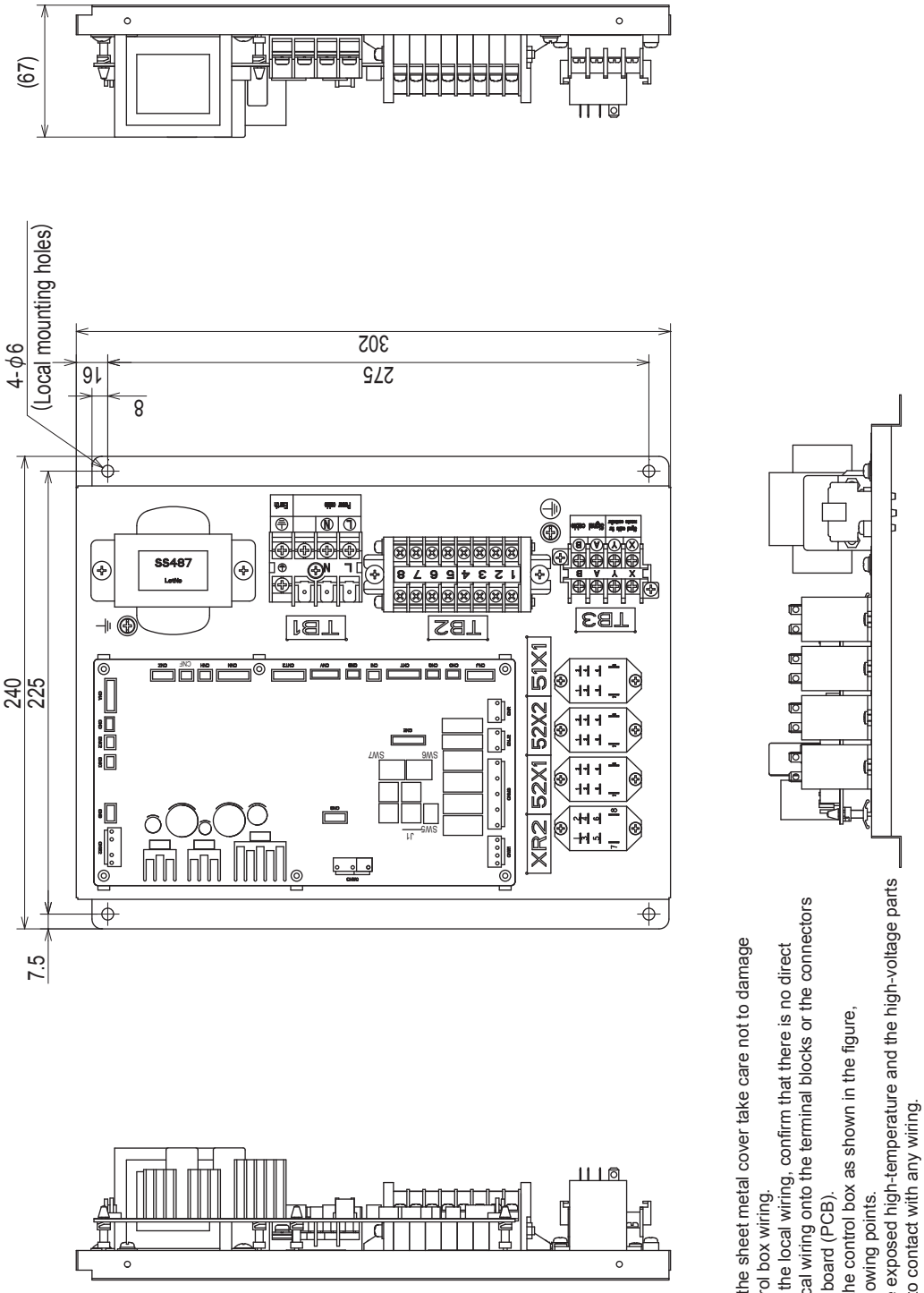
Bottom clearance	Min. 30mm	Space for cooling
Top clearance	Min. 30mm	Space for cooling
Left clearance	Min. 100mm (Recommended length of 200mm or more)	Space for wiring and service
Right clearance	Min. 100mm (Recommended length of 200mm or more)	Space for wiring and service
Front clearance	Min. 30mm	Space for cooling

PCH000Z418A



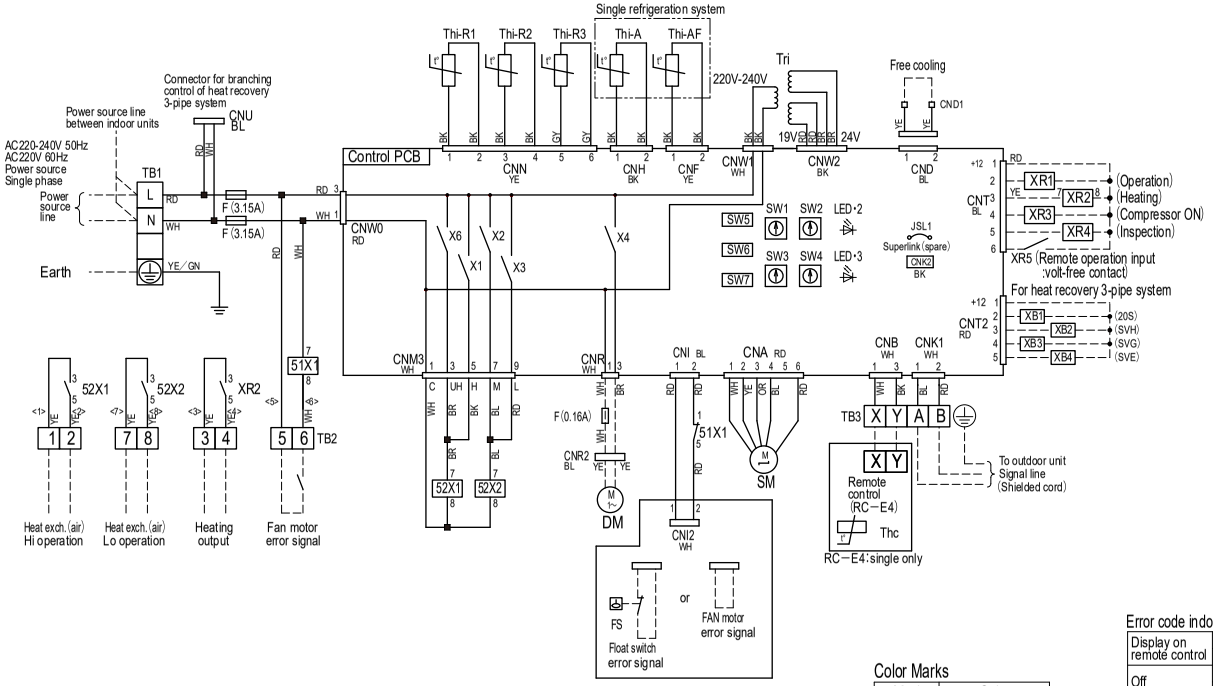
Notes
(1) This view is shown by removing the lid. The wiring diagram has been pasted to the back of the lid. If you do not want to use the lid, then use the wiring diagram supplied as an accessory.
(2) ※1 are the holes for accessory cable tie bands for fixing the site wiring.
(3) ※2 is a connector to be connected to thermistor Thi-A.
(4) ※3 is a connector to be connected to thermistor Thi-AF.
(5) ※4 is a connector to be connected to thermistors Thi-R1,R2 and R3.
(6) ※5 is a connector to be connected to the float switch FS.
(7) ※6 is a connector to be connected to the stepping motor SM.

PCH000Z418 A



Notes
(1) When removing the sheet metal cover take care not to damage the internal control box wiring.
(2) After connecting the local wiring, confirm that there is no direct tension of the local wiring onto the terminal blocks or the connectors of printed circuit board (PCB).
(3) If you are using the control box as shown in the figure, take note the following points.
- Ensure that the exposed high-temperature and the high-voltage parts do not come into contact with any wiring.
- Ensure that there is an air gap of more than 90mm above the high-temperature and the high-voltage parts.

PCH000Z418 A



Notes 1. ----- indicates wiring on site.

2. Use twin core cable (0.75−1.25mm²) at signal line between indoor unit and outdoor unit, and signal line between indoor units.
3. Terminal A B are signal terminal. (DC 5V)
4. Use twin core cable (0.3mm²) at remote control line.
   See spec sheet of remote control in case that the total length is more than 100m.
5. Do not put signal line and remote control line alongside power source line.

Color Marks

Mark	Color
BK	Black
BL	Blue
BR	Brown
GY	Gray
OR	Orange
RD	Red
WH	White
YE	Yellow
YE/GN	Yellow/Green

Mark	Terminal	Use	Capacity	Note
TB1	L,N, ⏚	Input for power source line	AC300V, 25A	Screw : M4
TB2	1,2	Output for heat exch. (air) Hi operation	DC5V, max 2mA	Screw : M3.5
TB2	7,8	Output for heat exch. (air) Lo operation		
TB2	3,4	Heating output		
TB2	5,6	Input for fan motor error signal	AC200V, 1A	
CNT	6P	Output for operation mode	Relay capacity, DC12V, max 160mA at total use	Connector : Made by Molex 5264-06 Terminal : Made by Molex 5263T
CNT2	5P	Output for heat recovery 3-pipe system	Relay capacity, DC12V, max 160mA at total use	
CND	2P	Output for free cooling	Relay capacity, DC12V, max 160mA at total use	Connector includes control unit

Meaning of marks

Mark	Parts name	
	Single refrigeration system	Multiple refrigeration system
CNA−Z	Connector	Connector
DM	Drain pump motor	Drain pump motor
F	Fuse	Fuse
FS	Float switch	Float switch
JSL1	Spare Superlink terminal setting (for spare)	Spare Superlink terminal setting (for spare)
LED•2	Indication lamp (Green-Normal operation)	Indication lamp (Green-Normal operation)
LED•3	Indication lamp (Red-Inspection)	Indication lamp (Red-Inspection)
SM	Stepping motor (for electronic expansion valve)	Stepping motor (for electronic expansion valve)
SW1	Indoor unit address : tens place	Slave box address : tens place ※1
SW2	Indoor unit address : ones place	Slave box address : ones place ※1
SW3	Outdoor unit address : tens place	Outdoor unit address : tens place ※1
SW4	Outdoor unit address : ones place	Outdoor unit address : ones place ※1
SW5-1	Switching PCB setting for single / multiple refrigeration system (☆OFF=single / ON=multiple)	Switching PCB setting for single / multiple refrigeration system (☆OFF=single / ON=multiple)
SW5-2	Indoor unit address : hundreds place (☆OFF)	Reserved (keep off)
SW6-1−4	Model capacity setting (☆ON)	Model capacity setting (☆ON)
SW7-1	Test run, drain pump motor test (☆OFF)	Reserved (keep off)
SW7-2	Target supply air temperature adjustment (heating mode) (☆OFF)	+15degC setting at supply air temperature control in heating (☆OFF)
SW7-3	Switching return / supply air temperature control (☆OFF)	Switching the control method of refrigerant flow volume (☆OFF=Super heat control , ON=Supply air temp.control)
SW7-4	Automatic supply air temperature adjust. control (☆OFF)	Reserved (keep off)
TB1	Terminal block (Power source line) (□mark)	Terminal block (Power source line) (□mark)
TB2	Terminal block (□mark)	Terminal block (□mark)
TB3	Terminal block (Signal line) (□mark)	Terminal block (Signal line) (□mark)
Thc	Temperature sensor (Remote control)	
Thi-A	Temperature sensor (Return air)	It is not used in the multiple system.
Thi-AF	Temperature sensor (Supply air)	
Thi-R1,2,3	Temperature sensor (Heat exchanger)	Temperature sensor (Heat exchanger)
Tri	Transformer	Transformer
X1−3,6	Relay for FM	Relay for FM
X4	Relay for DM	Relay for DM
XR2	Relay (DC12V)	Relay (DC12V)
52X1,52X2,51X1	Relay (AC200V)	Relay (AC200V)
■mark	Closed-end connector	Closed-end connector

☆ Factory default

※1 The method of setting the address of the multiple system is different than usual. Refer to the technical documentation.

Error code indoor unit

Display on remote control	LED on indoor circuit board		Content		
	Red (checking)	Green (normal)			
Off	Stays Off	Keeps flashing	Normal		
	Stays Off	Stays Off	Fault in power souce, indoor power off or one phase down		
E1	Stays Off	Keeps flashing	Fault on the transmission between indoor circuit board and remote control		
	Not sure	Not sure	Indoor computer abnormal		
E2	1-time flash	Keeps flashing	Duplication of indoor address No. (can only be detected during operation) Excess number of remote controllers (can only be detected during operation)		
E3	2-time flash	Keeps flashing	Outdoor power off or one phase down There is no corresponding outdoor unit address.		
E5	2-time flash	Keeps flashing	Fault on outdoor-indoor transmission		
E6	1-time flash	Keeps flashing	Indoor heat exchanger temperature sensor interrupted or short-circuit		
E7	1-time flash	Keeps flashing	Return air temperature sensor interrupted or short-circuit		
E10	Stays Off	Keeps flashing	Excess number of remote control connections		
E11	Stays Off	Keeps flashing	The master indoor unit is not set properly		
E12	1-time flash	Keeps flashing	Superlink	Indoor unit address switch	
				Indoor No.	Outdoor No.
			New specification	001～127	49
			Old specification	0～47	48,49
				48,49	0～47
E15	1-time flash	Keeps flashing	Indoor supply air temperature sensor interrupted or short-circuit		
E16	1-time flash	Keeps flashing	Float switch activation (only with FS) ,Fan motor (Faulty)		
E18	1-time flash	Keeps flashing	The address configuration fault for master-slave indoor units.		
E19	1-time flash	Keeps flashing	Indoor unit operation check / drain motor check mode faulty		
E28	Stays Off	Keeps flashing	Remote control temperature sensor anomaly		
Over E30	Stays Off	Keeps flashing	Outdoor unit checking (outdoor circuit board LED checking)		
E63	Stays Off	Keeps flashing	Emergency stop		

13. Notice on the safety

This document is an EEV-KIT check sheet to be submitted to the Mitsubishi Heavy Industries (MHI).
The EEV-KIT, with KIT to make the indoor unit by the customer, the outdoor unit will use the MHI products.
The indoor unit is a product (specification) to be designed by the customer,MHI will guarantee the system control.
So, MHI need to understand the specification.
This check sheet, customers (EEV-KIT sales destination) is please submit to MHI grouped by property
MHI have to check and then returned to the customer.
(Each time there is a change in the check sheet, we'll continue to share information with revise this check sheet.)

The contents of this check sheet

(1) Notes on selection points and Important Information
"Notes on the entry selected as a sheet" and read the sheet, please use
※ If you do not adhere to this content, MHI is not guaranteed.
(2) Confirmation of design conditions (Confirmation of customer request specifications)
"AHU general" please fill out the sheet
(3) Confirmation of heat exchange: calculation of heat exchange and MHI usage restrictions
(Confirmation of customer designed and MHI request specifications (use restrictions))
"Confirmation of the heat exchanger specification" please fill out the sheet
"Confirmation of capacity calculation result" please fill out the sheet
"Confirmation of the outdoor unit and the refrigerant volume " sheet to please fill out
(4) Selection result summary of the EEV-KIT and outdoor unit
"Confirmation of selection result (confirmation of order contents)" Please fill out the sheet
※Please re-check the order parts and summarizes the results that were selected in this sheet.
(5) Confirmation of the PCB board set of EEV-KIT
To meet the customer requirements specification,
Confirmation of the master board,and the slave board,and outdoor board,and remote control's function.
"Multiple system (the master board and the slave board) setting summary"
"Single system (the slave board-only) setting summary"
"Outdoor unit board setting summary"

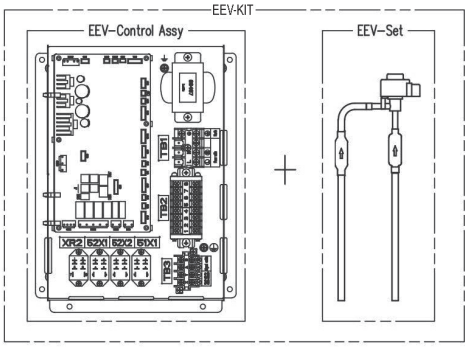
Notes on selection and Important Announcement

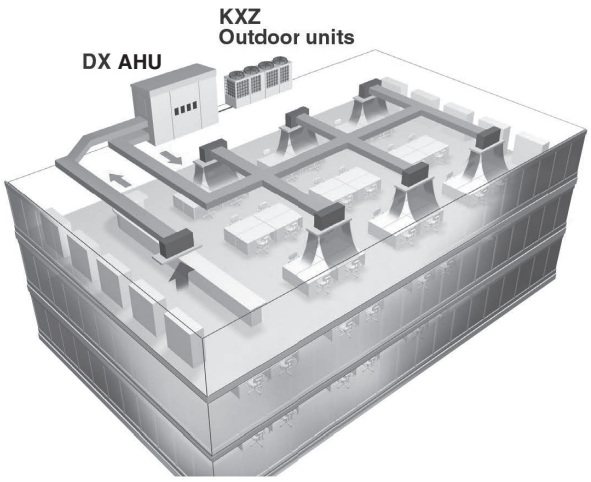
The EEV-KIT, it is a combination of the expansion valve set and control box ASSY (for parent and child machines).
Customers in accordance with the purpose (specification), it is part of to your use to build a system.
Please refer to the technical documentation on the home page (HP) for more information.
Mitsubishi Heavy Industries (MHI) will support by this check sheet , but in MHI , the indoor unit can not be guaranteed.
Becase the indoor unit is your design. The parts of the indoor unit (ex. Heat exchanger and indoor fan etc) is your design.
By the same reason , it is also your responsibility about safety of the inddor unit.
Please consider in a safty of an electrical system in particular and sell safe goods with a rule in each assignment destination.
EEV-KIT selection support in MHI, done in the "EEV-KIT check sheet".
EEV-KIT check sheet, please be sure to submit it EEV-KIT check sheet to MHI pass sale window.
If the EEV-KIT check sheet of non-submission to MHI, in MHI, EEV-KIT system can not be guaranteed.
Please do all the items described in EEV-KIT check sheet.
In particular, two points are shown in the following is an important item.
· Check by volume calculation of the heat exchanger
· Outdoor unit setting of the target pressure change
Check mistakes and setting mistake can cause such as the outdoor unit failure.
Others, you will be sure to read the notes of spec sheet (a list of the table below), please follow.

14. Main point of connection to Superlink system

EEV-KIT

- EEV-KIT is the control kit for operating the locally provided AHU or FCU with direct expansion heat exchanger coils in connection with the KXZ / KXE6 system.
  (AHU : Air Handling Unit, FCU : Fan Coil Unit)
- EEV-KIT is composed of one EEV-Control ASSY and one EEV-Set.





DX : Direct expansion coil

Features

EEV-Control Assy has 2 types.

Refrigeration system	EEV-Control Assy	
	EEVKIT6-E-M	EEVKIT6-E-C
Single	~~Not Use~~	1 box-Many boxes
Multiple	1 box (for master)	Many boxes(for slave)

EEV-Set Select from following 3 types according to the coil capacity.

Type	EEV6-71-E	EEV6-160-E	EEV6-280-E
Capacity	22-71	90-160	224-280

System configuration

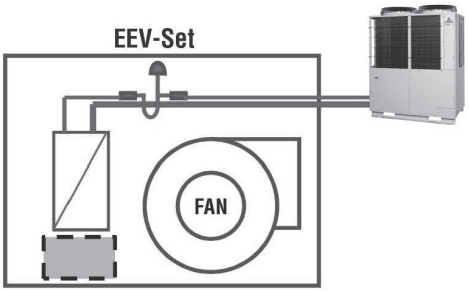
- Single refrigeration system EEVKIT6-E-C ··· Possible with multiple
- Multiple refrigeration system EEVKIT6-E-M (1) + EEVKIT6-E-C ···
  Possible with multiple (Max32)
- EEVKIT6-E-C is common for both single and multiple refrigeration systems

Single refrigerant system

- Single refrigeration system is one that can have multiple outdoor units on one refrigerant pipe work circuit.
- There are 2 types of EEV-KIT systems that can be built into the single refrigeration system.
- System A : one EEV-KIT.
- System B : multiple EEV-KIT's.

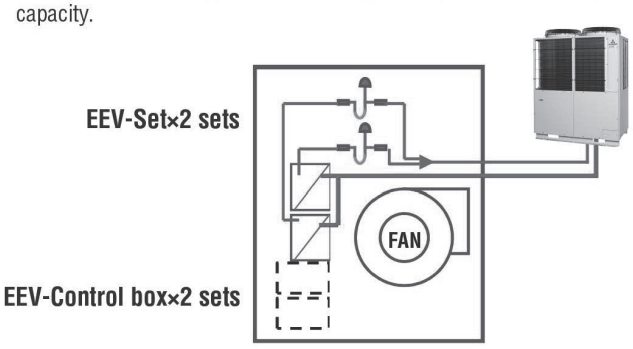
System A

- This system has only one set of EEV-KIT built into one indoor unit with only one heat exchanger. This system can be applied to an indoor unit whose capacity is up to 10HP.



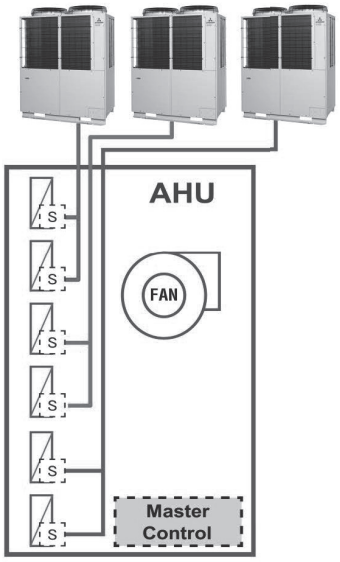
System B

- System B is a system that has multiple EEV-KIT's built into one indoor unit with multiple heat exchangers on one refrigerant circuit.
- This system can be applied up to 60HP(for KXZ), 48HP(for KXE6) AHU capacity.



Multiple refrigerant system

Multi refrigeration system is an AHU system with
1) Multiple independent refrigerant circuits
2) One master control to control the whole system.



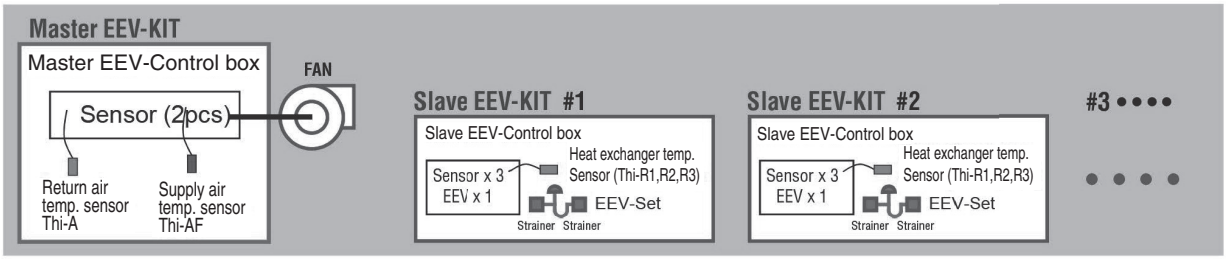
Advantage

- Large systems are possible [max capacity 896kW (Indoor unit : 28kW x 32)]
- External control
- Capacity step control

Additional parts over a single refrigeration system

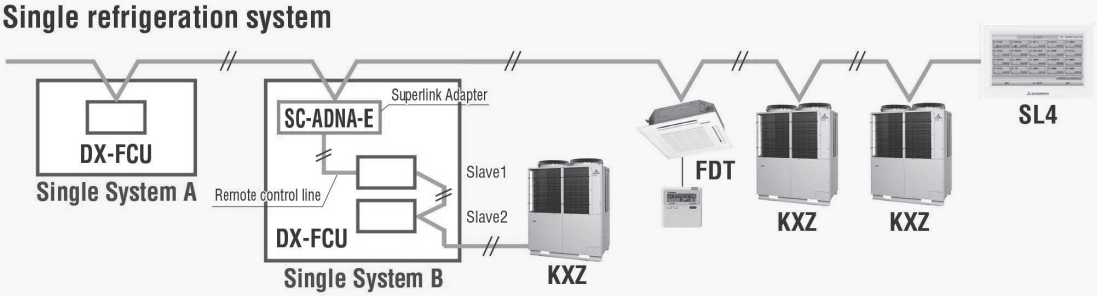
- One master control

The slave EEV control and EEV set are the same as a single refrigeration system.

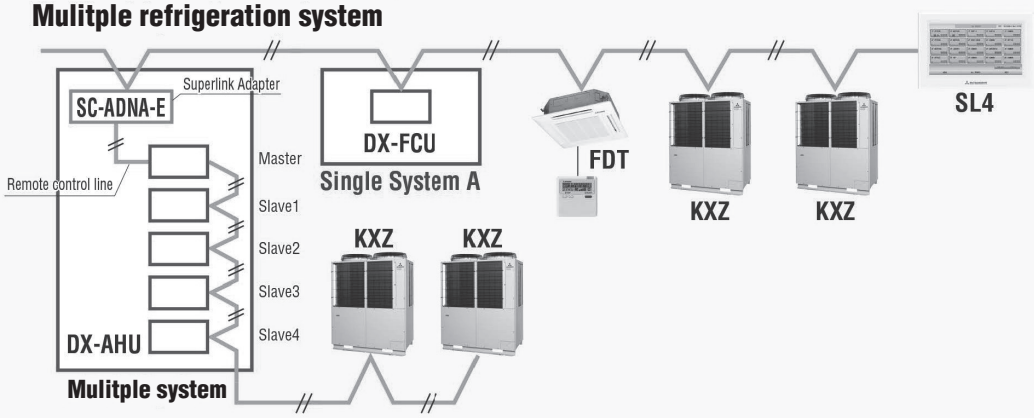


Connection to SUPERLINK II

Single refrigeration system



Mulitple refrigeration system



EEV-KIT
GENERAL INFORMATION

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