Fujitsu General Asia

DX-Kit for AHU

Design & Technical Training

FUJITSU

Sep 23rd, 2020 | FUJITSU GENERAL LIMITED

CONFIDENTIAL

Contents

- Over view
- Line up
- Main features
- Specification
- System Design
- Equipment selection

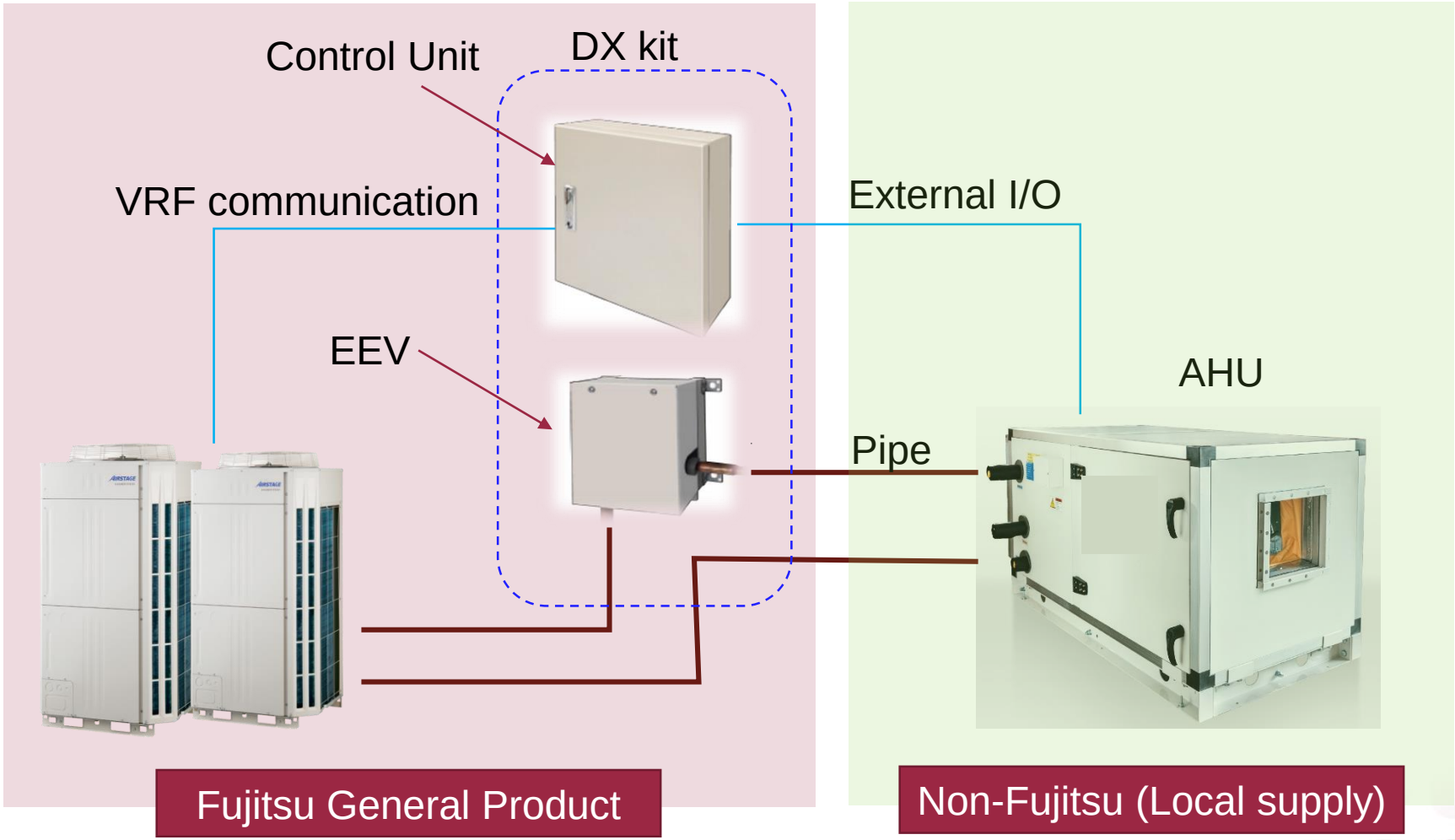
Over view

AHU

VRF

LIQUID CHILLER

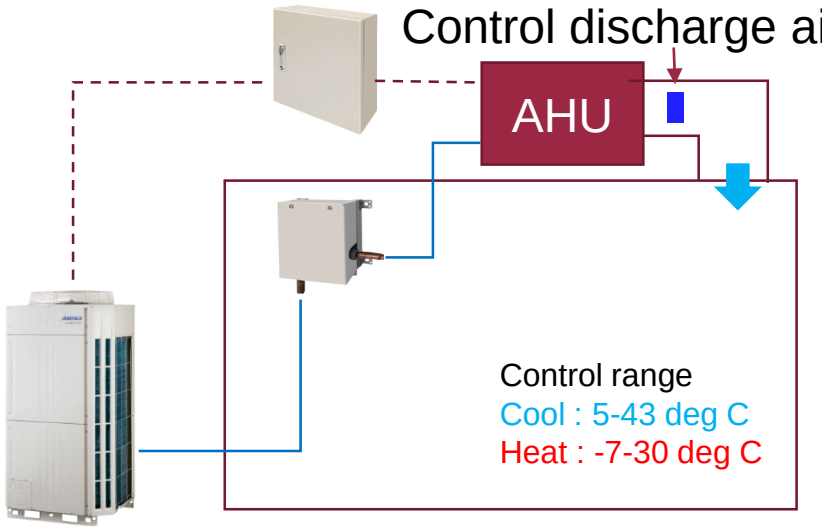
Over view



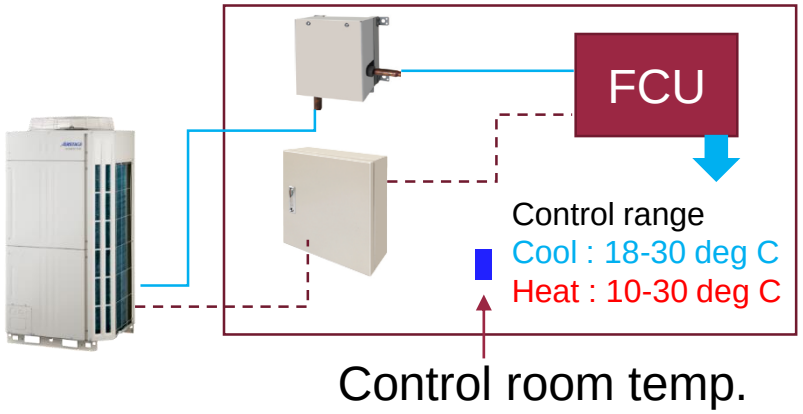
CONFIDENTIAL

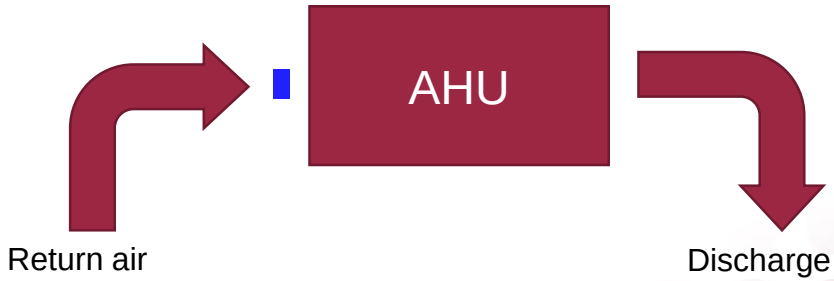
Over view

FOR AHU



FOR AIR Curtain



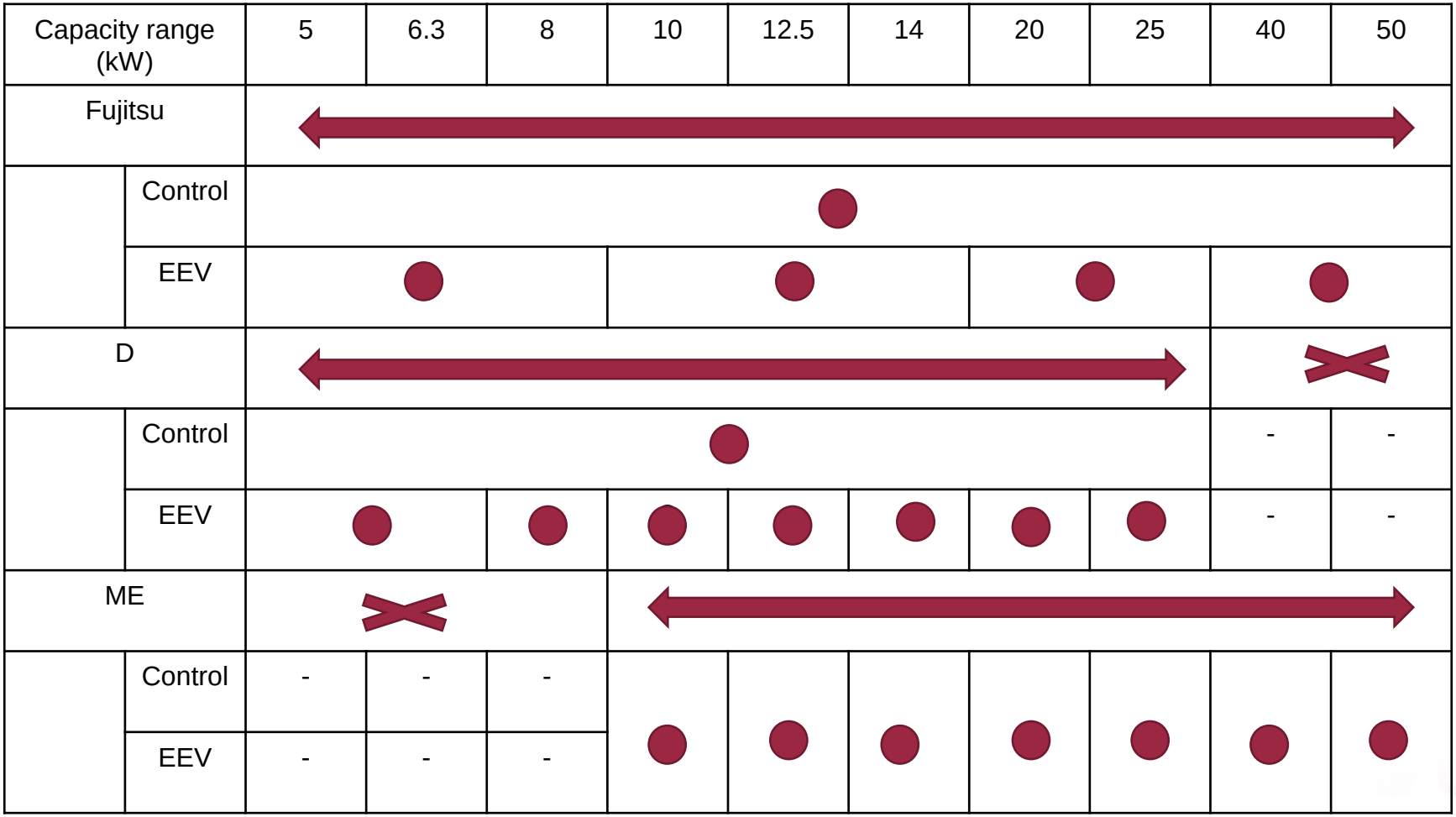


Line up

Capacity code	5~8 kw	10~14 kW	20~25 kW	40~50kW
Control Unit	 UTY-VDGX (common for all capacity class)*			
EEV Unit	 UTP-VX30A (4 Ton)	 UTP-VX60A (6 Ton)	 UTP-VX90A (10 Ton)	 UTP-VX90A x 2 (10 Ton x 2)**
Pipe Unit				 UTP-LX180A***

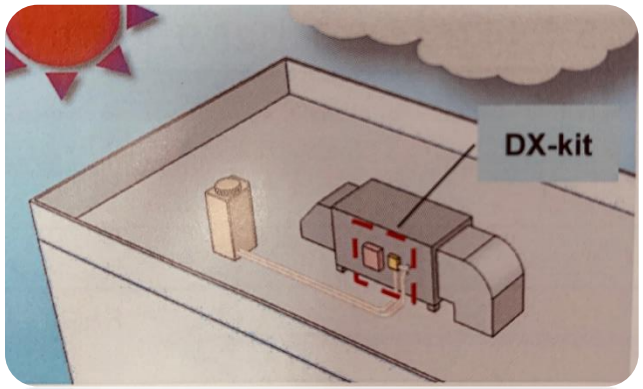
- *Capacity code are selectable by changing Dip-Switch setting on control unit.
- ** To connect 40~50kW, couple of EEV units and separations tubes are used.
- ***The branch pipe UTP-LX180A is contained 2 pcs in 1 package.

Main feature

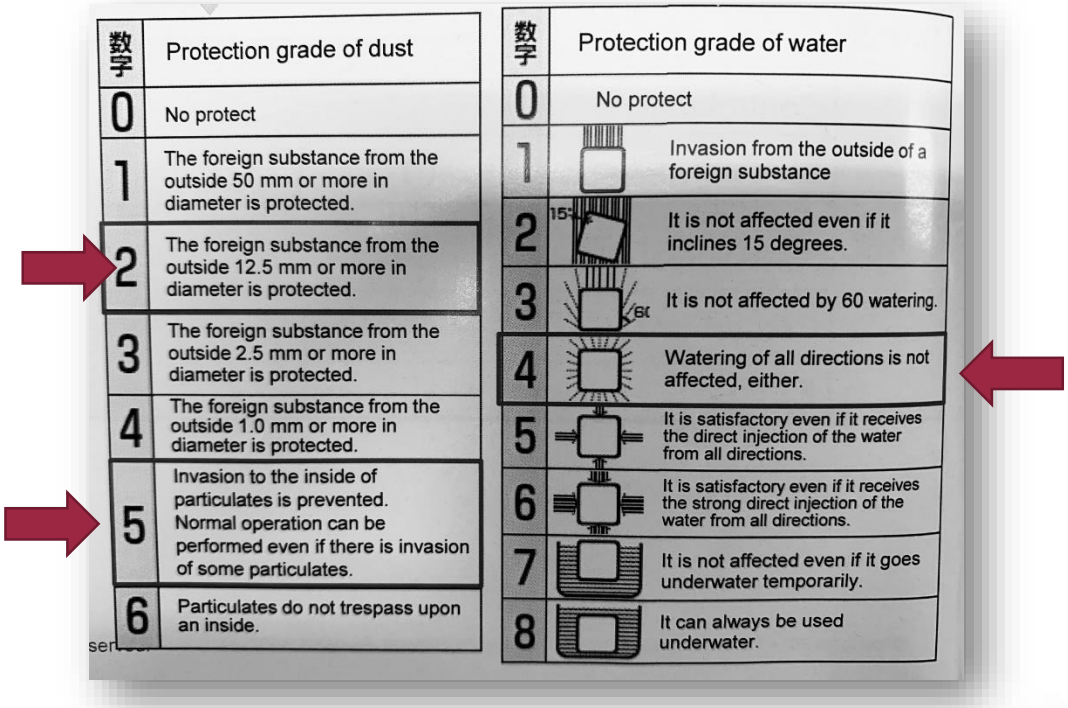


Main feature

- Enable to install outdoor side



Control	EEV
	
IP54	IP24



数字	Protection grade of dust
0	No protect
1	The foreign substance from the outside 50 mm or more in diameter is protected.
2	The foreign substance from the outside 12.5 mm or more in diameter is protected.
3	The foreign substance from the outside 2.5 mm or more in diameter is protected.
4	The foreign substance from the outside 1.0 mm or more in diameter is protected.
5	Invasion to the inside of particulates is prevented. Normal operation can be performed even if there is invasion of some particulates.
6	Particulates do not trespass upon an inside.

数字	Protection grade of water
0	No protect
1	Invasion from the outside of a foreign substance
2	It is not affected even if it inclines 15 degrees.
3	It is not affected by 60 watering.
4	Watering of all directions is not affected, either.
5	It is satisfactory even if it receives the direct injection of the water from all directions.
6	It is satisfactory even if it receives the strong direct injection of the water from all directions.
7	It is not affected even if it goes underwater temporarily.
8	It can always be used underwater.

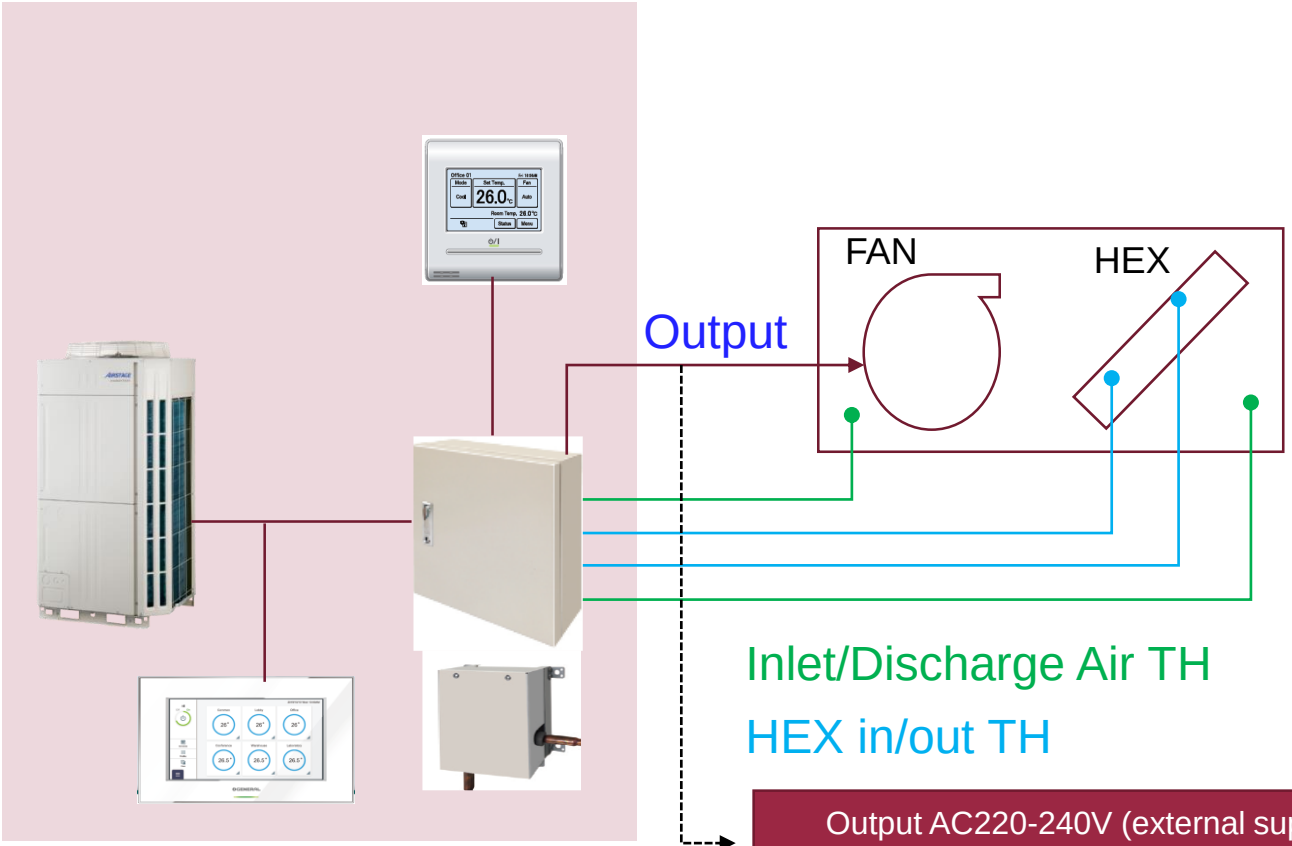
Main feature

- Connectable DX system

Series	JIIS	JIII/JIIIL	VIII
Profile			

Main feature

- Control (FG Controller)



INPUT
-

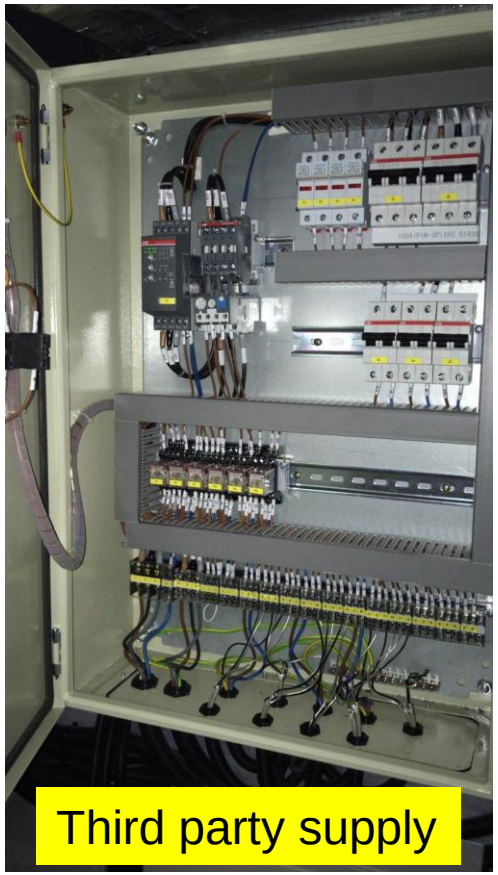
OUTPUT
-FAN ON/OFF
-Thermo ON/OFF

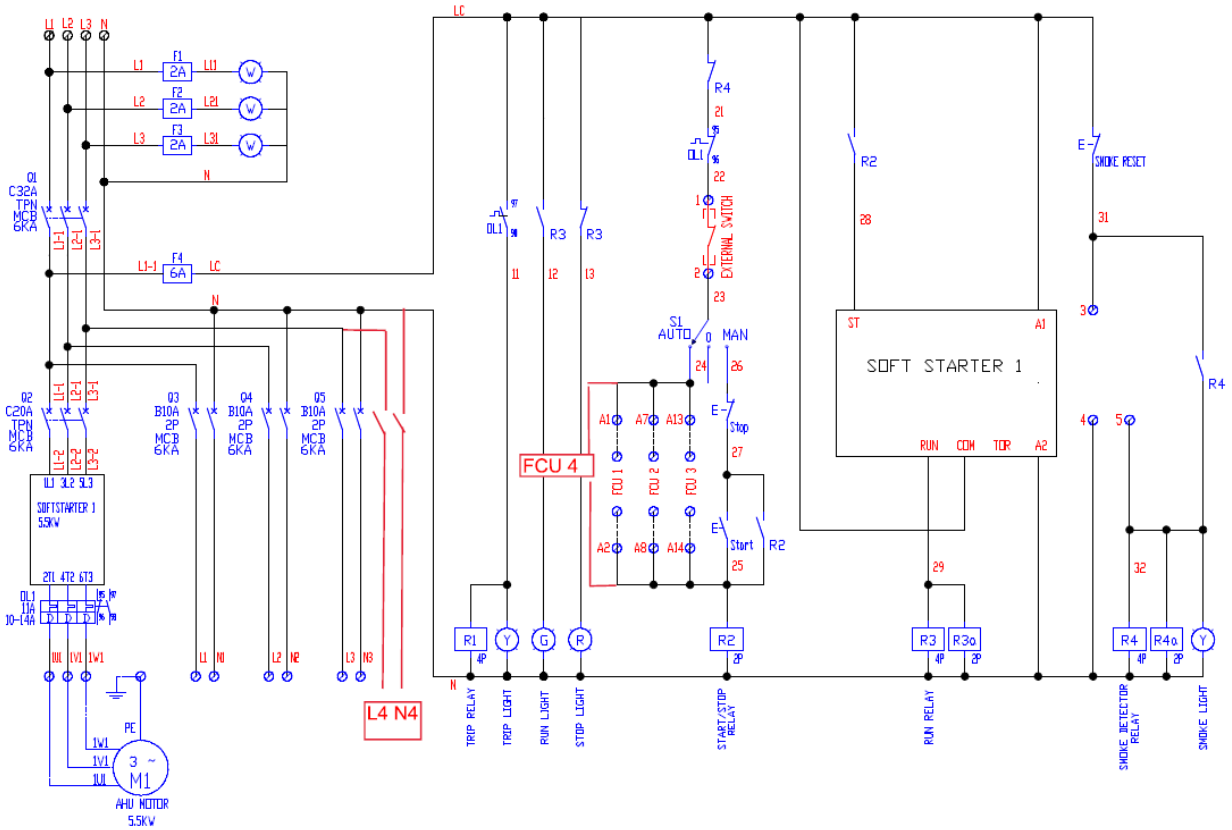
Output AC220-240V (external supply AC 220 to 240 V / 1 A max.)
Output DCDC12V±2V (external power supply DC 30 V max. / 1 A max.)

CONFIDENTIAL

Reference

- AHU fan motor control box (Reference)





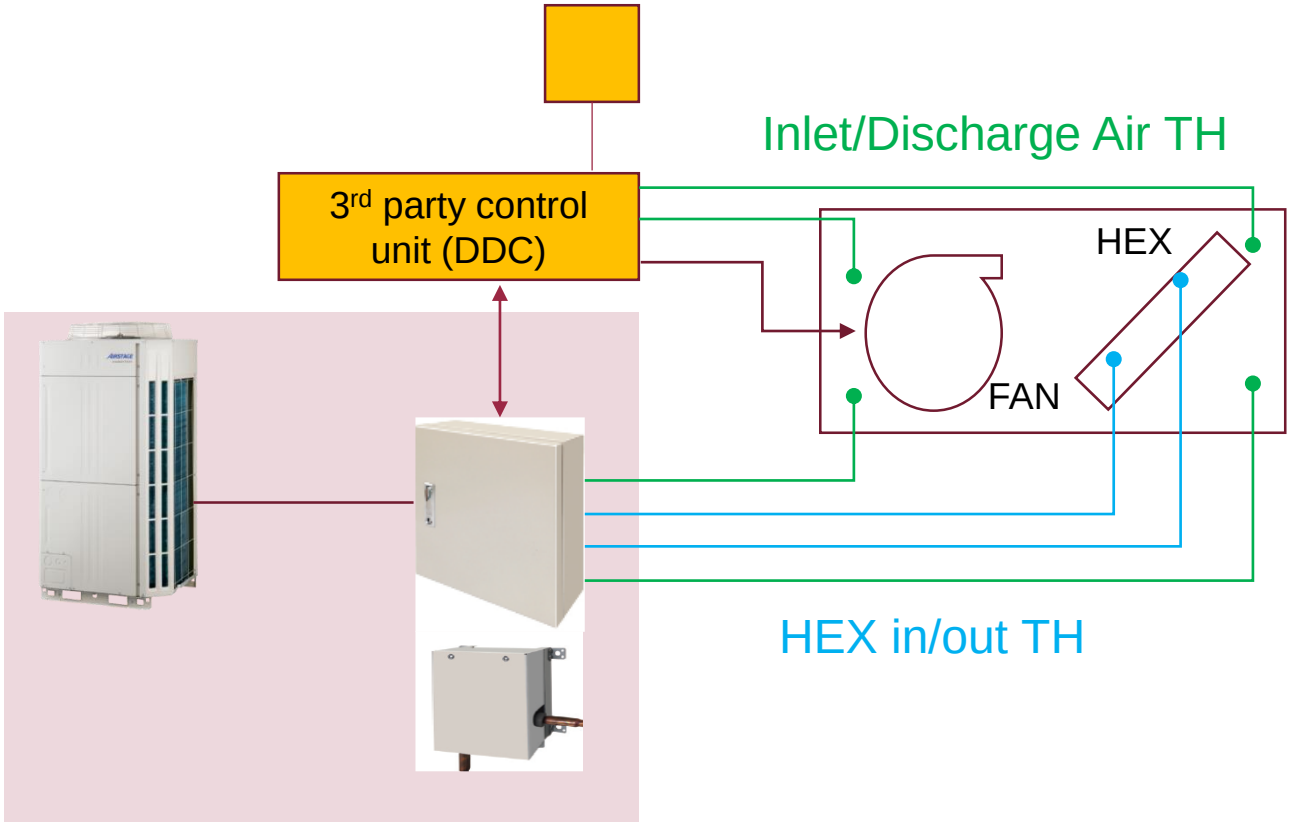
Main feature

- Control (FG Controller)

Control method	Return air	Outside air
DIP-SW SET3-3	Suction temp. control	Discharge temp. control
Set temperature range	Suction temperature Cool : 18~30 deg C Heat : 10~30 deg C	Discharge temperature Cool : 14~25 deg C Heat : 17~28 deg C
Thermostat off condition	Cool : Suc temp < set temp -0.5 C Heat : Suc temp > set temp+0.5 C	Cool : Suc temp < set temp -5 C Heat : Suc temp > set temp+5 C
Control device	FGL controllers	
Fan Control	The movement directive of a fan is outputted from the external output terminal of DX kit.	

Main feature

- Control (DDC Direct digital control)



INPUT
- START/STOP
- COOL/HEAT
- TEMP or capacity demand
(DPSW SET3-2)

OUTPUT
-ON/OFF
-ERROR
-Defrost/Oil recovery

Main feature

- Control (DDC Direct digital control)

	Control method	Return air	Outside air
	DIP-SW SET3-3	Suction temp. control	Discharge temp. control
	Analog input method	Set temperature input / capacity input : selection	
Set temp	Set temperature range	Suction temperature Cool : 18~30 deg C Heat : 10~30 deg C	Discharge temperature Cool : 14~25 deg C Heat : 17~28 deg C
Set temp	Thermostat off condition	Cool : Suc temp < set temp -0.5 C Heat : Suc temp > set temp+0.5 C	Cool : Suc temp < set temp -5 C Heat : Suc temp > set temp+5 C
Cap. Input	Capacity input range	0~100%(every 5% increments)	
Cap. Input	Thermostat off condition	It's control by external control device and when capacity input set0%, EEV close	
	The error (external)	The refrigerant cycle can be stopped of a problem occurs in the external device/	
	Fan Control	During the defrost operation, the external IN/OUT terminals can be used to send signals to the external device.	

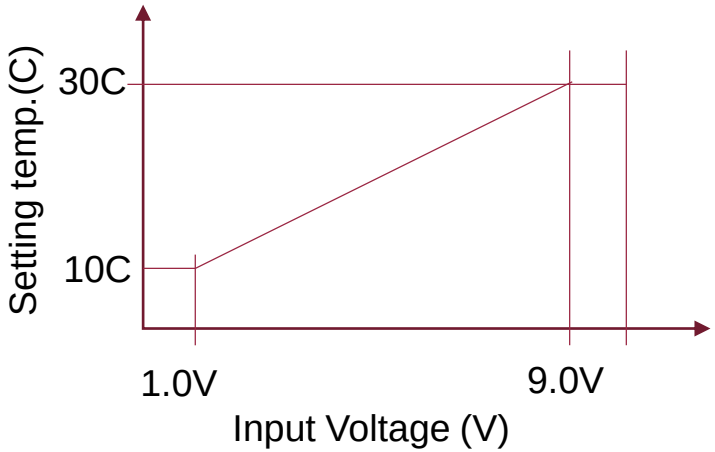
Main feature

- Control (DDC Direct digital control)

3rd party control unit (DDC)

DC0-10V analog input

Set temp. 10~30 C
or
Capacity demand 0~100%



Select by DIP-SW setting

Cool : super heat 2~8 C
- Capacity 60~100%

Heat : sub cool 4~50 C
- capacity5~100%

Specification

- Control Unit

Model name			UTY-VDGX
Power source			230 V ~, 50Hz
Available voltage range			198 to 264 V
Dimensions (H x W x D)	Net	mm	400 x 400 x 120
	Gross		500 x 500 x 266
Weight	Net	kg	10
	Gross		13

Specification

- DX kit and EEV

Model name			UTP-VX30A			UTP-VX60A			UTP-VX90A		UTP-VX90A x 2	
Connectable capacity class		kW	5.0	6.3	8.0	10.0	12.5	14.0	20.0	25.0	40.0	50.0
Capacity	Cooling	kW	5.6	6.3	8.0	10.0	12.5	14.0	22.4	25.0	33.5	50.4
	Heating		6.3	7.1	9.0	11.2	14.0	16.0	25.0	28.0	45.0	56.5
Capacity range	Cooling	kW	5.1-5.9	6.0-7.1	7.2-9.0	9.1-11.1	11.2-13.2	13.3-18.0	18.1-23.7	23.8-28.0	28.1-44.7	44.8-50.4
	Heating	kW	5.7-6.7	6.8-8.0	8.1-10.0	10.1-12.4	12.5-15.0	15.1-20.0	20.1-26.5	26.6-31.5	31.6-49.9	50.0-56.5
Airflow rate (reference)		m^3 / h	1060	1200	1520	1600	2000	2240	3560	4000	6400	8000
Dimensions (H x W x D)	Net	mm	160 x 220 x 90								(160 x 220 x 90) x 2	
	Gross		420 x 420 x 150								(420 x 420 x 150) x 2	
Weight	Net	kg	2								2 x 2	
	Gross		3								3 x 3	
Connection pipe diameter	Liquid	mm	ø 9.52 (Brazing)						ø 12.70 (Brazing)			

Specification

- Electrical characteristics

Model	Power Supply			
	Voltage (V)	Frequency (Hz)	MCA (A)	MFA (A)
UTY-VDGX	230~	50	0.096	20

Model	Recommended cable size (mm^2)	MFA (A)	Breaker for leakage current	Remarks
All models	2.5	20	Refer to Table B	230V~ 50Hz 2Wire + ground

System design

- Operation condition check

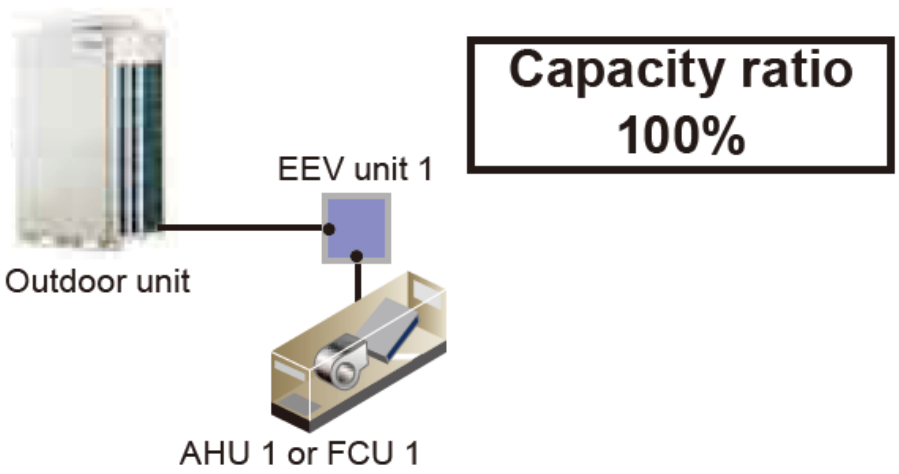
Check the cooling and heating conditions within the inlet temperature range

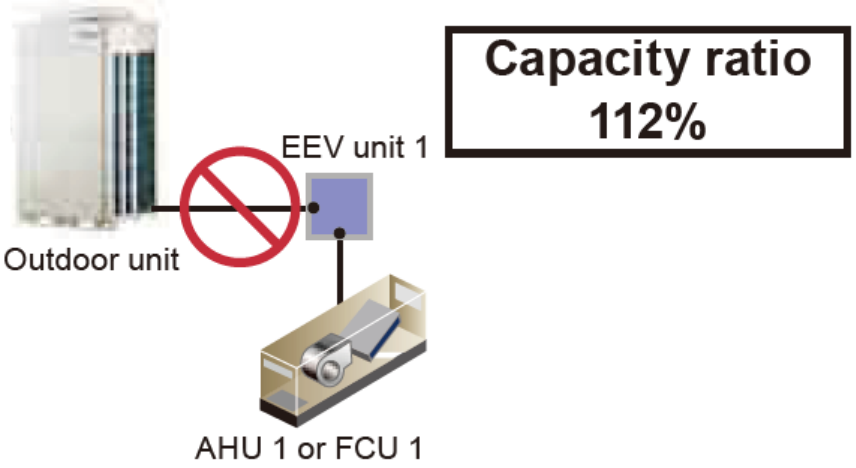
Operation	Air inlet temperatures
Cooling	5 to 43 C
Heating	-7 to 30 C

Rated Condition
Cool : IN Inlet air 27 DB/19 WB OUT 35C
Heat : IN Inlet air 20 DB / OUT 7 DB/6 WB

System design

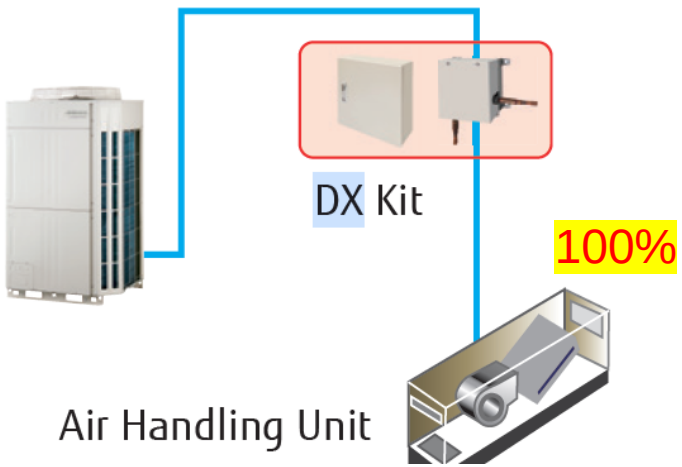
- Capacity range check



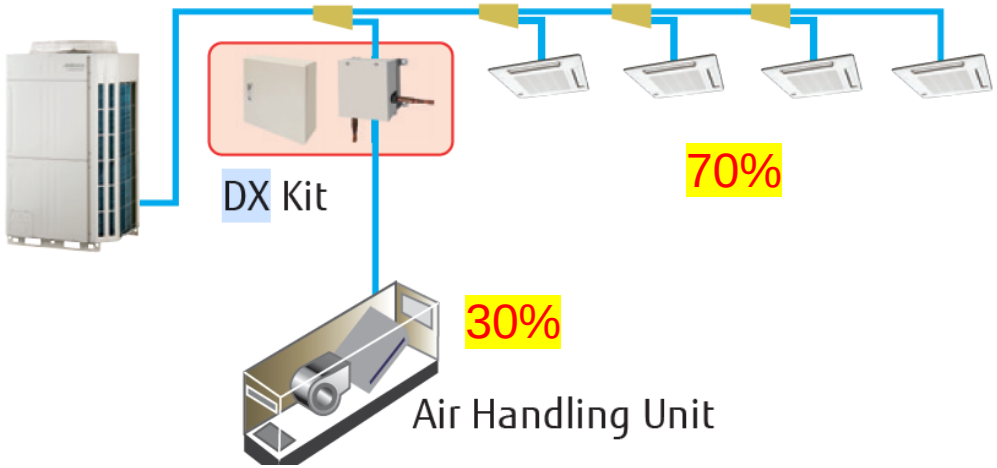


System design

- Single connection

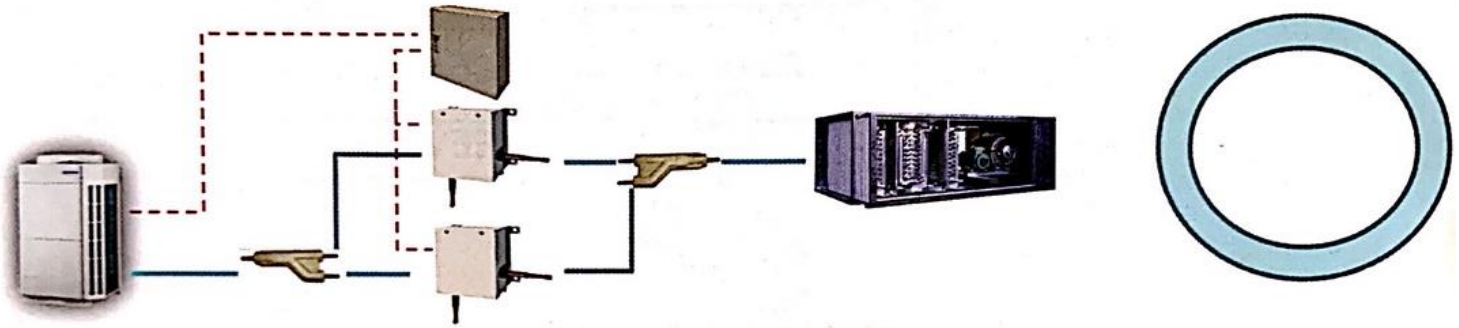


Mixed connection

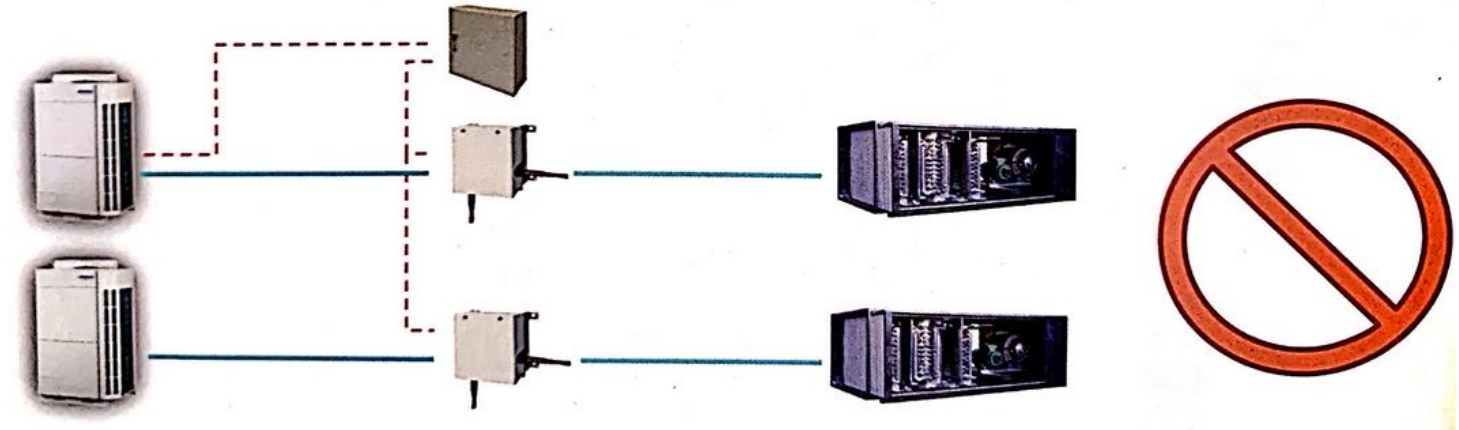


System design

- Capacity range check



Two EEV units in different system cannot be controlled by one control unit.



System design

- DX kit and EEV selection

Model name			UTP-VX30A			UTP-VX60A			UTP-VX90A		UTP-VX90A x 2	
Connectable capacity class		kW	5.0	6.3	8.0	10.0	12.5	14.0	20.0	25.0	40.0	50.0
Capacity	Cooling	kW	5.6	6.3	8.0	10.0	12.5	14.0	22.4	25.0	33.5	50.4
	Heating		6.3	7.1	9.0	11.2	14.0	16.0	25.0	28.0	45.0	56.5
Capacity range	Cooling	kW	5.1-5.9	6.0-7.1	7.2-9.0	9.1-11.1	11.2-13.2	13.3-18.0	18.1-23.7	23.8-28.0	28.1-44.7	44.8-50.4
	Heating	kW	5.7-6.7	6.8-8.0	8.1-10.0	10.1-12.4	12.5-15.0	15.1-20.0	20.1-26.5	26.6-31.5	31.6-49.9	50.0-56.5
Airflow rate (reference)		m^3 / h	1060	1200	1520	1600	2000	2240	3560	4000	6400	8000
Dimensions (H x W x D)	Net	mm	160 x 220 x 90								(160 x 220 x 90) x 2	
	Gross		420 x 420 x 150								(420 x 420 x 150) x 2	
Weight	Net	kg	2								2 x 2	
	Gross		3								3 x 3	
Connection pipe diameter	Liquid	mm	ø 9.52 (Brazing)						ø 12.70 (Brazing)			

System design

- DX kit and EEV selection

Model name			UTP-VX30A			UTP-VX60A			UTP-VX90A		UTP-VX90A x 2	
Connectable capacity class		kW	5.0	6.3	8.0	10.0	12.5	14.0	20.0	25.0	40.0	50.0
Capacity	Cooling	kW	5.6	6.3	8.0	10.0	12.5	14.0	22.4	25.0	33.5	50.4
	Heating		6.3	7.1	9.0	11.2	14.0	16.0	25.0	28.0	45.0	56.5
Capacity range	Cooling	kW	5.1-5.9	6.0-7.1	7.2-9.0	9.1-11.1	11.2-13.2	13.3-18.0	18.1-23.7	23.8-28.0	28.1-44.7	44.8-50.4
	Heating	kW	5.7-6.7	6.8-8.0	8.1-10.0	10.1-12.4	12.5-15.0	15.1-20.0	20.1-26.5	26.6-31.5	31.6-49.9	50.0-56.5
Airflow rate (reference)		m^3 / h	1060	1200	1520	1600	2000	2240	3560	4000	6400	8000
Dimensions (H x W x D)	Net	mm	160 x 220 x 90								(160 x 220 x 90) x 2	
	Gross		420 x 420 x 150								(420 x 420 x 150) x 2	
Weight	Net	kg	2								2 x 2	
	Gross		3								3 x 3	
Connection pipe diameter	Liquid	mm	ø 9.52 (Brazing)						ø 12.70 (Brazing)			

Equipment selection

1. Check AHU specification
2. Select VRF outdoor unit
3. Check heat exchanger volume
4. Select DX kit and controller

Equipment selection

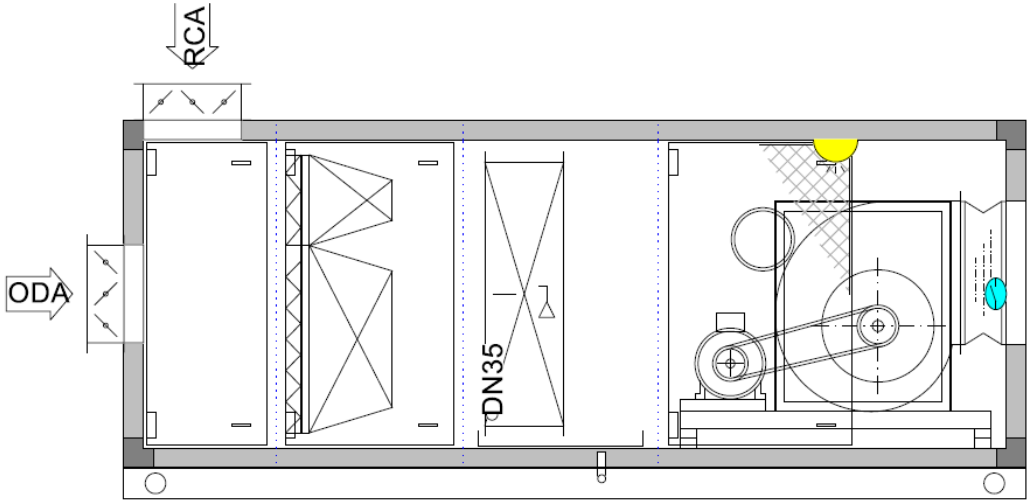
1. Check AHU specification

2. THÔNG SỐ AHU

REFERENCE			**AHU-R-1,2**	L x W x H	mm		
SYSTEM			Air Handling Unit	Weight	kg		
NO			2	Casing Thickness / Type	mm	50	
MIXING BOX		Y/N	Y	Length	mm		
PANEL FILTER	(Method of Withdrawal)	Grade	EU3	Length	mm	200	
BAG FILTER	(Method of Withdrawal)	Grade	EU7	Length	mm	600	
MIXING BOX		Y/N	Y	Length	mm	800	
COOLING COIL SECTION	Air Flow	l/s	**2250.0**	Max. Coil Face Velocity	m/s	2.5	
	Duty	kW	**90.0**	Liquid pipes	mm	12.7x2	
	Entering Air Condition (Db/Wb)	°C	29.2 / 23.1	Gas pipes	mm	28.6x2	
	Leaving Air Condition (Db/Wb)	°C	12.8 / 9.6				
	Material Tube/Fins		Copper				
	Stainless Steel Driptray	Y/N	Y				
ACCESS SECTION		Y/N	n/a	Length	mm	600	
SUPPLY FAN SECTION	Type		Backward curve aerofoil	Maximum Fan Sound Power Levels (Inlet/Outlet)	63Hz		
	Duty @ External Static Pressure	l/s@Pa	**2250 @ 500**		125Hz		
	Volume Control		VSD		250Hz		
	Electrical Supply	Ph/V/Hz	3 / 380 / 50		500Hz		
	Starting/Running Current	A			1kHz		
	Motor Rating	kW	4		2kHz		
	Configuration		Horizontal		4kHz		
	Fan Discharge		Horizontal		8kHz		
ACCESSORIES	Fan AVMS, Type (SD)	mm	40	Noise Attenuator (Inlet/Outlet)	63Hz		
	AHU AVMS, Type (SD)	mm	**25**		125Hz		
	Roof Pitch	Y/N	N		250Hz		
	Valve Walkway	Y/N	N		500Hz		
	Control Panel	Y/N	N		1kHz		
	Lights	Y/N	Y		2kHz		
	Viewing Portholes	Y/N	N		4kHz		
					8kHz		

Equipment selection

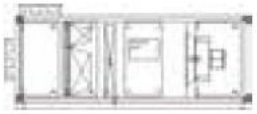
1. AHU specification check



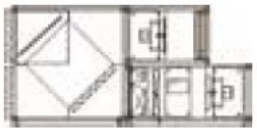
Airflow	m³/h	8,100
Ext. pressure	Pa	500
Tot. pressure	Pa	1,017
Motorpower	kW	4.000
Power supply		380V/3/50Hz
DX-cooling	kW	90.00

Front inlet type

Top inlet type



Mixing Box inlet type



Heat recovery with Cross-flow exchanger

Heat recovery with Heat Wheel

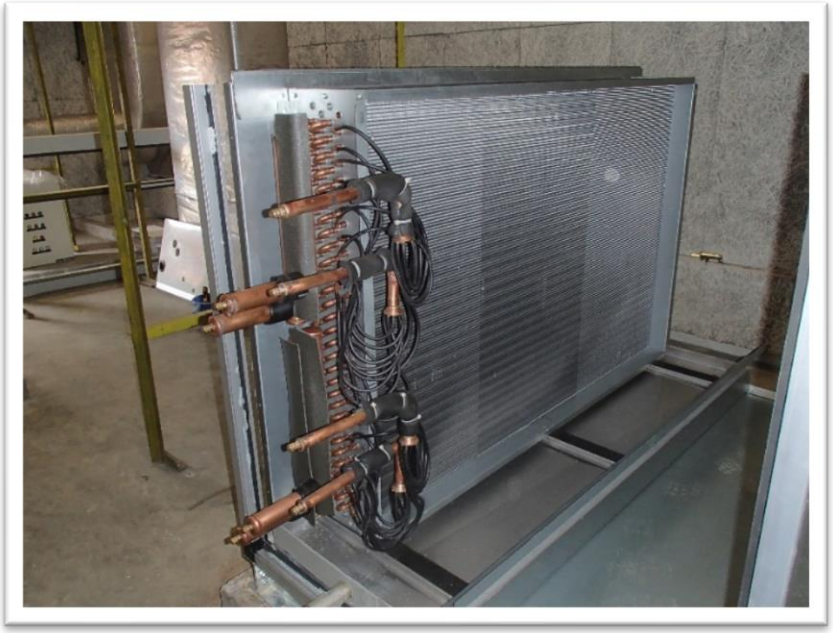
Equipment selection

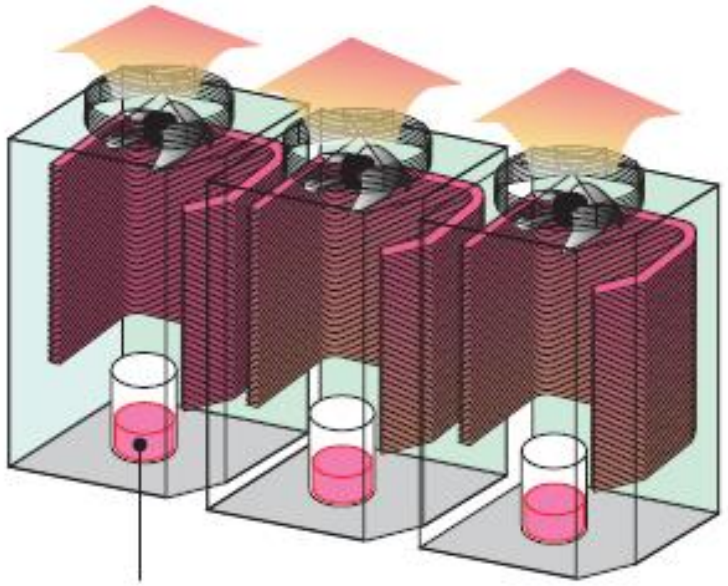
2. VRF outdoor specification check (kW)

Rating Capacity range			HP	32	34	36	38	40
								
Model name				AJY288LNTCH	AJY306LNTCH	AJY324LNTCH	AJY342LNTCH	AJY360LNTCH
Unit 1				AJY144LNTCH	AJY162LNTCH	AJY162LNTCH	AJY162LNTCH	AJY144LNTCH
Unit 2				AJY144LNTCH	AJY144LNTCH	AJY162LNTCH	AJY090LNTCH	AJY126LNTCH
Unit 3							AJY090LNTCH	AJY090LNTCH
Maximum Connectable Indoor Unit				53	55	55	55	55
Indoor unit connectable capacity		Cooling	kW	45.0-117.0	47.5-123.5	50.0-130.0	53.0-137.8	56.5-146.9
Power source								3 pha
T1 condition	Capacity	Cooling	kW	90.0	95.0	100.0	106.0	113.0
		Heating		100.0	100.0	100.0	113.0	126.5
		Cooling	Btu/h	307,000	324,100	341,200	361,600	385,500
		Heating		341,200	341,200	341,200	385,600	431,600
	Input power	Cooling	kW	26.02	29.57	33.12	31.12	31.25
		Heating		27.26	27.26	27.26	28.13	32.05
	Current	Cooling	A	-	-	-	-	-
		Heating		-	-	-	-	-
	EER	Cooling	W/W	3.46	3.21	3.02	3.41	3.62
	COP	Heating		3.67	3.67	3.67	4.02	3.95
	EER	Cooling	Btu/h/W	11.8	11.0	10.3	11.6	12.3
	COP	Heating		12.5	12.5	12.5	13.7	13.5

Equipment selection

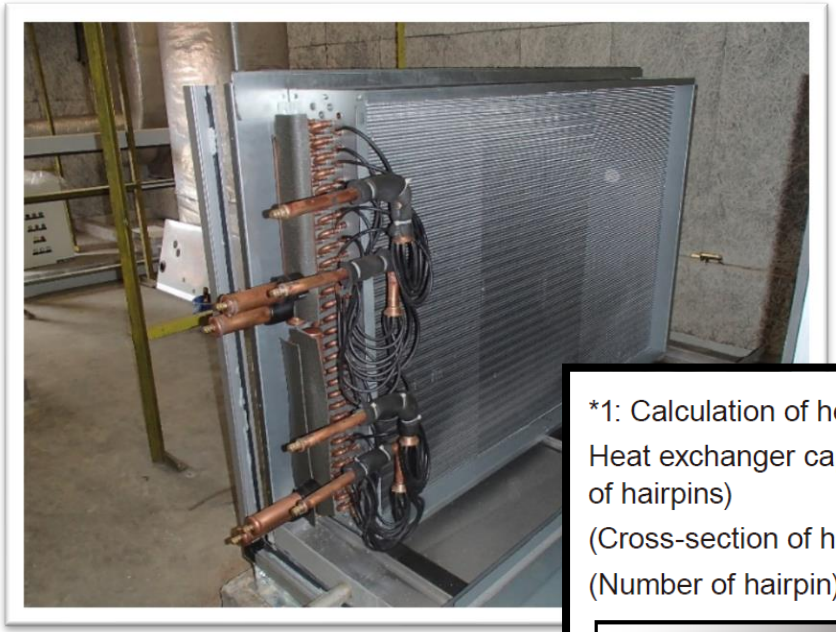
3. VRF outdoor Heat exchanger volume check





Equipment selection

3. VRF outdoor Heat exchanger volume check



Rows	8
N° of refr.circuits	2 circuits
Circuits	30
Fin space [mm]	2.60
Coil's volume [dm3]	23
N° of headers	2

23,000cm3

*1: Calculation of heat exchanger capacity

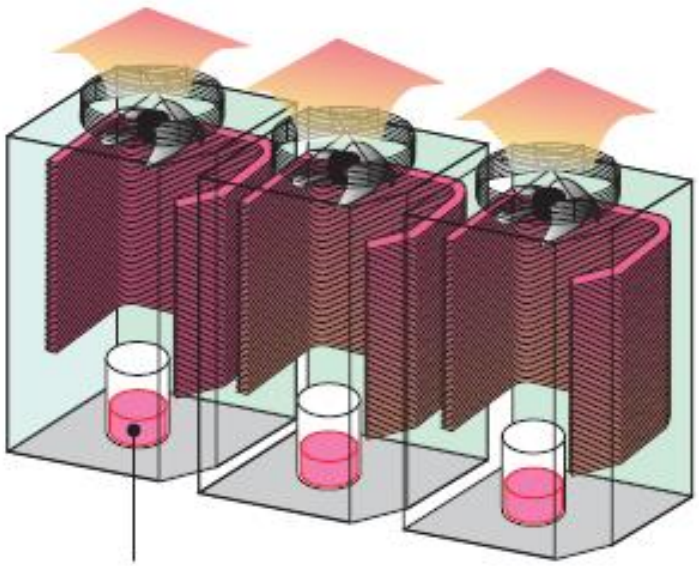
Heat exchanger capacity = (Cross-section of hairpin) × (Width of heat exchanger) × (Number of hairpins)

(Cross-section of hairpin) = $\pi \times (\text{Internal diameter of hairpin} / 2)^2$

(Number of hairpin) = (Row) × (Stage)

Equipment selection

3. VRF outdoor Heat exchanger volume check

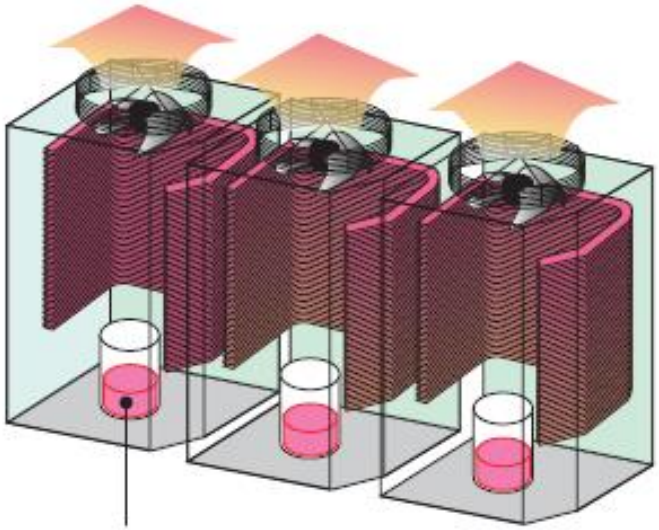


Rated condition
Indoor 27 DB/ 19WB
Outdoor 35 DB / 24 WB

Series	Capacity *2	Rated capacity [kW]	Capacity range of connectable heat exchanger [cm³]	
			Min.	Max. *3
J-IIS	4HP	12.1	1000	4150
	5HP	14.0	1150	4800
	6HP	15.1	1250	5200
J-III J-II	4HP	12.1	850	4500
	5HP	14.0	950	5200
	6HP	15.5	1050	5750
J-IIIL	8HP	22.4	1400	6750
	10HP	28.0	1750	8450
	12HP	33.5	2050	10100
	14HP	40.0	2450	12000
	16HP	45.0	2750	13500
	18HP	50.0	3050	15050
V-II	8HP	22.4	1350	9400
	10HP	28.0	1650	11750
	12HP	33.5	2000	14050
	14HP	40.0	2400	16800
	16HP	45.0	2700	18900
V-III	8HP	22.4	1350	9650
	10HP	28.0	1650	12100
	12HP	33.5	2000	14450
	14HP	40.0	2400	17250
	16HP	45.0	2700	19450
	18HP	50.0	2700	19450
VR-II	8HP	22.4	1350	9650
	10HP	28.0	1650	12100
	12HP	33.5	2000	14450
	14HP	40.0	2400	17250
	16HP	45.0	2700	19450

Equipment selection

3. VRF outdoor Heat exchanger volume check



Series	capacity	Rated capacity [kW]	Capacity range of connectable heat exchanger [cm³]											
			Inlet temperature											
			32 °C or less	33 °C	34 °C	35 °C	36 °C	37 °C	38 °C	39 °C	40 °C	41 °C	42 °C	43 °C
J-IIS	4HP	12.1	4150	3950	3700	3450	3250	3000	2800	2550	2350	2100	1900	1650
	5HP	14.0	4800	4550	4300	4050	3750	3500	3250	2950	2700	2450	2200	1900
	6HP	15.1	5200	4900	4650	4350	4050	3750	3500	3200	2900	2650	2350	2050
J-III J-II	4HP	12.1	4500	4250	4000	3750	3500	3250	3000	2750	2500	2250	2050	1800
	5HP	14.0	5200	4900	4650	4350	4050	3800	3500	3200	2900	2650	2350	2050
	6HP	15.5	5750	5450	5100	4800	4500	4200	3850	3550	3250	2900	2600	2300
J-IIIL	8HP	22.4	6750	6350	6000	5600	5250	4900	4500	4150	3800	3400	3050	2700
	10HP	28.0	8450	7950	7500	7050	6600	6140	5650	5200	4750	4300	3800	3350
	12HP	33.5	10100	9500	8950	8400	7850	7300	6750	6200	5650	5100	4550	4000
	14HP	40.0	12000	11300	10650	10000	9350	8700	8050	7400	6750	6100	5450	4800
	16HP	45.0	13500	12750	12000	11250	10550	9800	9050	8300	7600	6850	6100	5400
	18HP	50.0	15050	14200	13400	12550	11750	10900	10100	9300	8450	7650	6800	6000
V-II	8HP	22.4	9400	8850	8350	7850	7350	6800	6300	5800	5300	4750	4250	3750
	10HP	28.0	11750	11100	10450	9800	9150	8550	7900	7250	6600	5950	5300	4700
	12HP	33.5	14050	13250	12500	11750	10950	10200	9450	8650	7900	7150	6350	5600
	14HP	40.0	16800	15850	14950	14000	13100	12200	11300	10350	9450	8550	7600	6700
	16HP	45.0	18900	17850	16800	15800	14750	13700	12700	11650	10650	9600	8550	7550
V-III	8HP	22.4	9650	9150	8600	8050	7550	7000	6500	5950	5450	4900	4400	3850
	10HP	28.0	12100	11400	10750	10100	9450	8800	8100	7450	6800	6150	5500	4800
	12HP	33.5	14450	13650	12850	12100	11300	10500	9700	8900	8150	7350	6550	5750
	14HP	40.0	17250	16300	15400	14450	13500	12550	11600	10650	9700	8800	7850	6900
	16HP	45.0	19450	18350	17300	16250	15200	14100	13050	12000	10950	9900	8800	7750
	18HP	50.0	19450	18350	17300	16250	15200	14100	13050	12000	10950	9900	8800	7750
VR-II	8HP	22.4	9650	9150	8600	8050	7550	7000	6500	5950	5450	4900	4400	3850
	10HP	28.0	12100	11400	10750	10100	9450	8800	8100	7450	6800	6150	5500	4800
	12HP	33.5	14450	13650	12850	12100	11300	10500	9700	8900	8150	7350	6550	5750
	14HP	40.0	17250	16300	15400	14450	13500	12550	11600	10650	9700	8800	7850	6900
	16HP	45.0	19450	18350	17300	16250	15200	14100	13050	12000	10950	9900	8800	7750

Equipment selection

4. DX-kit selection

Capacity code	5~8 kw	10~14 kW	20~25 kW	40~50kW
Control Unit	 UTY-VDGX (common for all capacity class)*			
EEV Unit	 UTP-VX30A (4 Ton)	 UTP-VX60A (6 Ton)	 UTP-VX90A (10 Ton)	 UTP-VX90A x 2 (10 Ton x 2)**
Pipe Unit				 UTP-LX180A***

Equipment selection

2. VRF outdoor unit selection

AHU				Outdoor Unit					
Name	Capacity (kW)	Cooling Coils		No	Models	Total Capacity (kW)	②Min 50%	③Max 100%	Judgement ②≤①≤③
		No.	① Capacity (kW) Max. 50kW						
AHU R-1	90	1	45	1	AJ*144LNTCH	45	22.5	45	OK
		2	45	2	AJ*144LNTCH	45	22.5	45	OK
		3	NIL						
		4	NIL						
AHU R-2	90	1	45	1	AJ*144LNTCH	45	22.5	45	OK
		2	45	2	AJ*144LNTCH	45	22.5	45	OK
		3	NIL						
		4	NIL						

Equipment selection

3. Check heat exchanger volume

AHU				Outdoor Unit					
Name	①Heat exchanger inner volume (cm3) Formula (AxBxC) A. Cross section of hairpins = π x (ID/2)² B. Length of heat exchanger C. No of hairpins = row x stage			No	Models	Inlet Temperature. Deg. C	Heat exchanger (cm3)		Judgement ②≤①≤③
							②Min 50%	③Max 100%	
AHU R-1		1	11500	1	AJ*144LNTCH	32	2700	19450	OK
		2	11500	2	AJ*144LNTCH	32	2700	19450	OK
AHU R-2		1	11500	1	AJ*144LNTCH	32	2700	19450	OK
		2	11500	2	AJ*144LNTCH	32	2700	19450	OK

Equipment selection

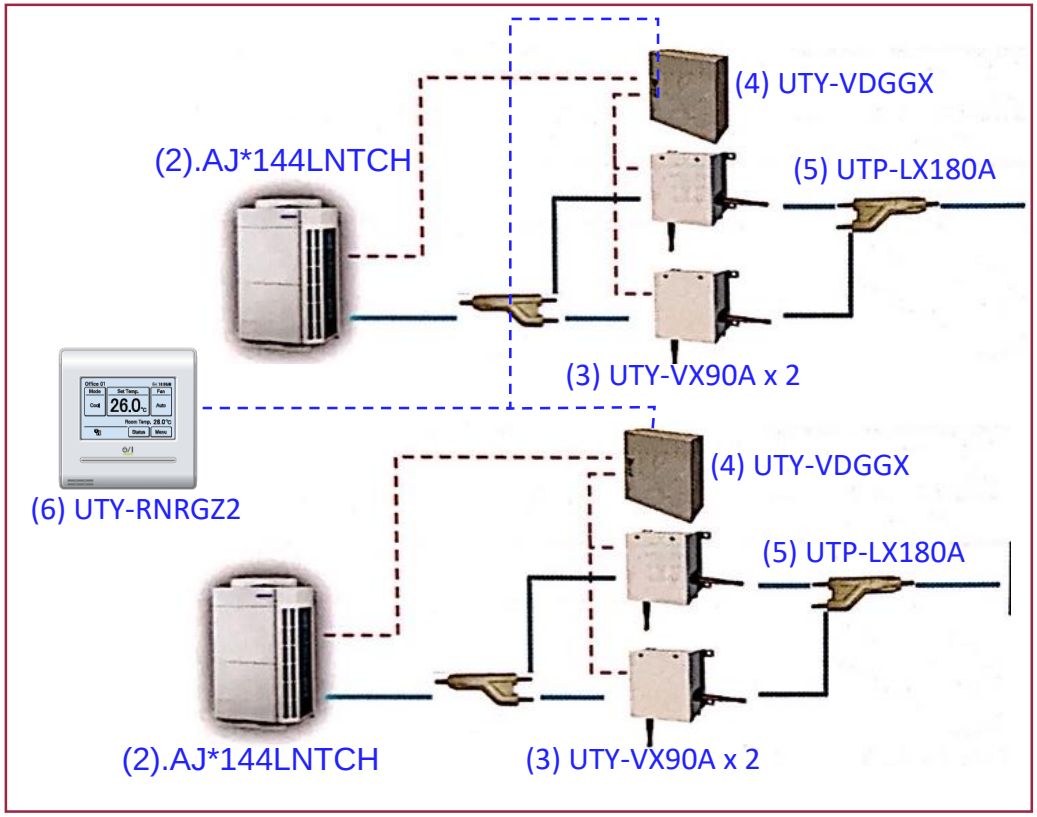
4. DX kit selection

AHU				EEV kit					
Name	Capacity (kW)	Cooling Coils		No	Models	Control Unit	②Min 50%	③Max 100%	Judgement ②≤①≤③
		No.	① Capacity (kW) Max. 50kW						
AHU R-1	90	1	45	1	UTY-VX90A x 2	UTY-VDGGX	25.2	50.4	OK
		2	45	2	UTY-VX90A x 2	UTY-VDGGX	25.2	50.4	OK
		3	NIL						
		4	NIL						
AHU R-2	90	1	45	1	UTY-VX90A x 2	UTY-VDGGX	25.2	50.4	OK
		2	45	2	UTY-VX90A x 2	UTY-VDGGX	25.2	50.4	OK
		3	NIL						
		4	NIL						

Equipment selection

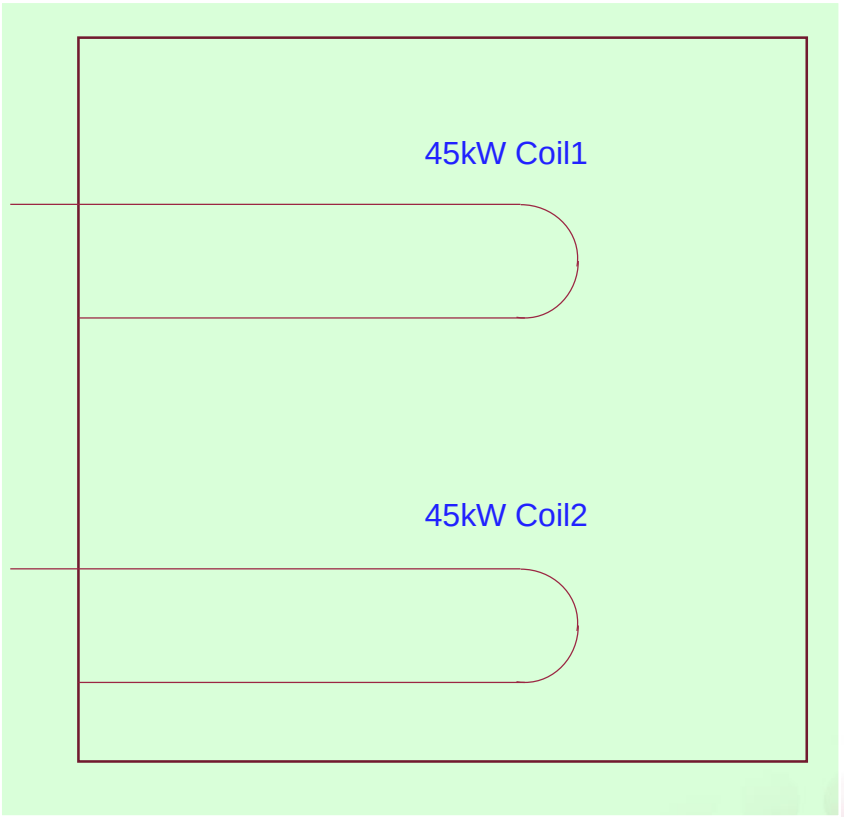
- Layout

Fujitsu Product



AHU (Others)

(1) AHU (90kW)



Equipment selection

Equipment List

Item	Unit	Model	Qty	Remark
1	AHU	GI	2	Not include starter panel
2	Outdoor	AJ*144LNTCH	4	
3	EEV unit	UTY-VX90A x 2	4	
4	Control unit	UTY-VDGGX	4	
5	Separation tube	UTP-LX180A	4	
6	Remote control	UTY-RNRGZ2	2	

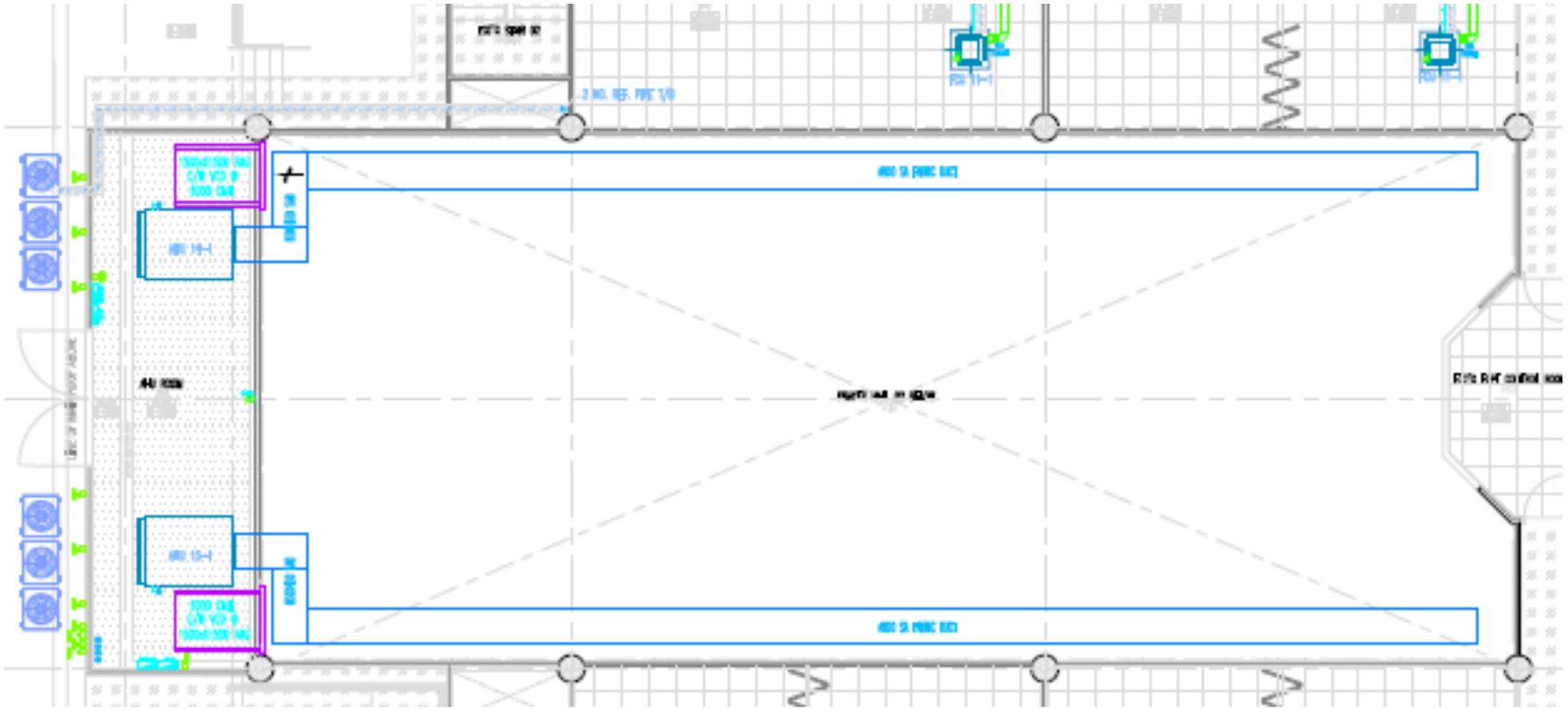
Inquiry

- Complete AHU inquiry form (PDF)
- Complete equipment selection form (Excel)
- Project information (Equipment list, price, etc.)
- Submit to FGA for quotation.

FUJITSU

Reference

St. Joseph church

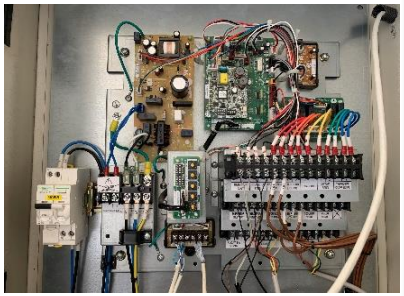


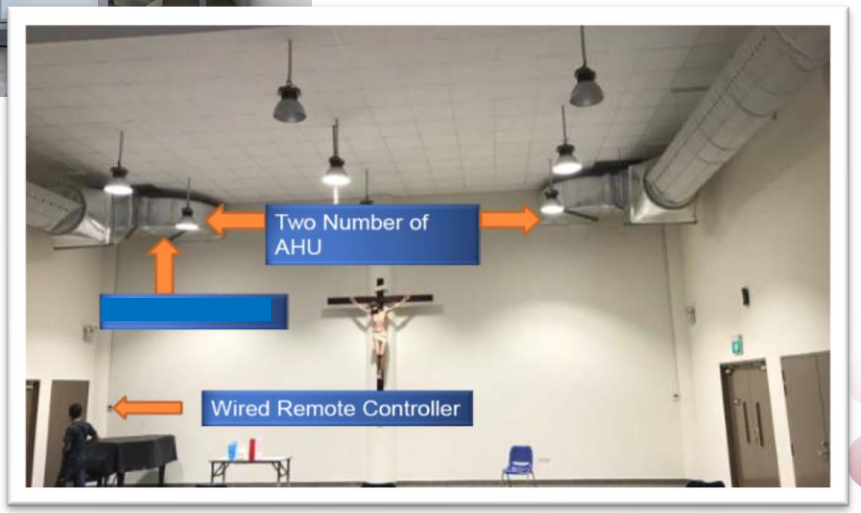
CONFIDENTIAL

Reference

St. Joseph church

AHU	Others
Capacity	100 kW
Qty	2
Cooling coils	2

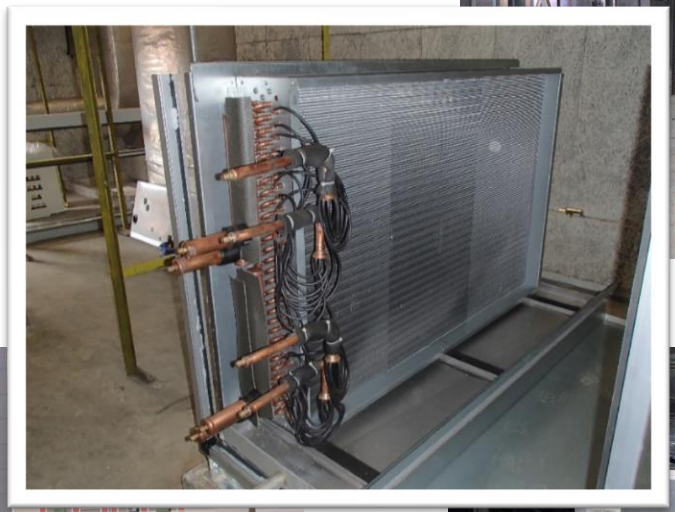


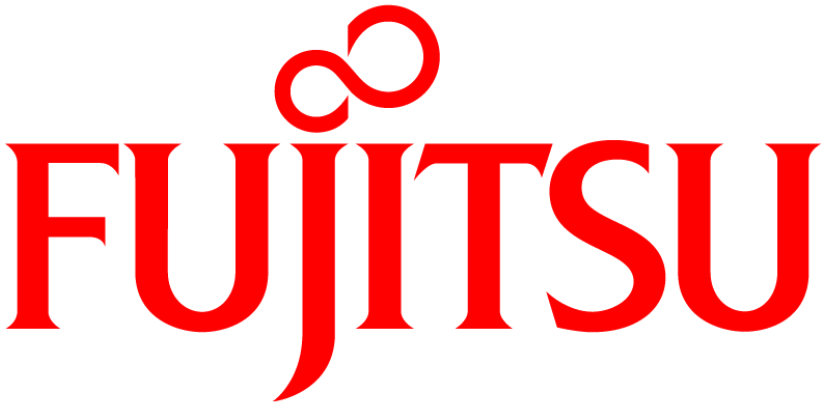


Reference

TMJC

AHU	Others
Capacity	136 kW
Qty	4
Cooling coil	4





FUJITSU GENERAL

– Living together for our future –