

VRF DX COIL INTERFACE

MODEL NAME

Dx-coil controller

TCB-IFDMR01UP-UL

(Terminal block with relay)

Dx-valve kit

RBM-A0601UPVA-UL

RBM-A1201UPVA-UL

RBM-A1921UPVA-UL

Design Guideline

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1. Application

The VRF Dx-coil interface comes with Dx-coil controller which has 3 types of application (DDC type,TA type,TF type). Application types can be set and enable system to response according to the application.

- TA type : (Main application target – Room temperature conditioning)
The VRF Dx-coil interface(TA type) enables TA control of Toshiba Outdoor units connected to a DX COIL (with a field supplied AHU).
- DDC type : (Mainly discharge air temperature control linked AHU system.)
The VRF Dx-coil interface(DDC type) enables BMS capacity demand control of Toshiba Outdoor units connected to a DX COIL (with a field supplied AHU).
- TF type : (Main application target – Ventilation)
The VRF Dx-coil interface(TF type) enables TF control of Toshiba Outdoor units connected to a DX COIL (with a field supplied AHU).

■ Settings for each type (TA, TF, DDC)

Set with the SW501 switch on the control P.C. Board MCC-1777.



TA Type : SW501 all Bit=OFF

TF Type : SW501 Bit2=ON

DDC Type (0-10 V) Stepped Control : SW501 Bit3=ON

DDC Type (0-10 V) Linear Control : SW501 Bit3, Bit4=ON

SW501 : type setting

	Bit1	Bit2	Bit3	Bit4
TA type	OFF	OFF	OFF	OFF
TF type	OFF	ON	OFF	OFF
0-10 V type (Stepped AI)	OFF	OFF	ON	OFF
0-10 V type (Liner AI)	OFF	OFF	ON	ON

*1 : When Bit3 is OFF, type depends on the Bit2 setting.

*2 : When Bit3 is ON, Bit2 setting is invalid. (Type is 0-10 V type.)

Product	Model name	Capacity (Btu/h)	Ton
Dx-coil controller	TCB-IFDMR01UP-UL	7k, 9k, 12k, 15k, 18k, 24k, 27k, 30k, 36k, 48k, 54k, 60k, 72k, 96k, 120k, 144k, 168k, 192k 216k - 480k in form of combinations.	0.6, 0.8, 1.0, 1.25, 1.50, 2.0, 2.25, 2.50, 3.0, 4.0, 4.5, 5.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0 18.0 - 40 in combinations.
Dx-valve kit	RBM-A0601UPVA-UL	7k, 9k, 12k, 15k, 18k, 24k, 27k, 30k, 36k, 48k, 54k, 60k	0.6, 0.8, 1.0, 1.25, 1.5, 2, 2.25, 2.5, 3, 4, 4.5, 5
	RBM-A1201UPVA-UL	72k, 96k, 120k	6, 8, 10
	RBM-A1921UPVA-UL	144k, 168k, 192k	12, 14, 16

EN

2. System compatibility, Overview

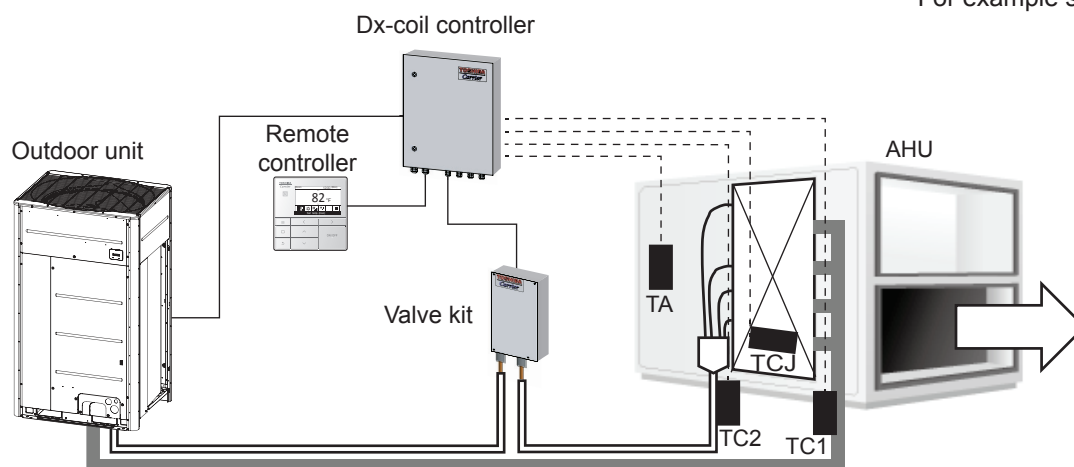
• Outdoor Unit

Type	SMMS-u Elite Heat	SMMS-u	SMMS-e	SHRM-e	SHRMu Elite Heat	SHRM-u	MCY 1ph
(communication)	(TU2C-LINK or TCC-LINK)		(TCC-LINK)		(TU2C-LINK or TCC-LINK)		(TCC-LINK)
TA type	○80-110%	○60-110%			○80-110%	○70-110%	○60 - 110% (*1 by 1 : 100% only)
DDC type	○80-100%	○75-100%		×	×	×	×
TF type	○80-100%		×	×	○80-100%		×

- SMMS-u (MMY-MUP***1HT9P-UL / MMY-MUP***1HT6P-UL)
- SMMSu Elite Heat (MMY-MUP***H1HT9PUL / MMY-MUP***H1HT6PUL)
- SMMS-e (MMY-MAP***6HT9P-UL / MMY-MAP***6HT6P-UL)
- SHRM-e (MMY-MAP***6FT9P-UL / MMY-MAP***6FT6P-UL / MMY-MAP***6FT2P-UL)
- SHRM-u (MMY-MUP***1FT9P-UL / MMY-MUP***1FT6P-UL)
- SHRMu Elite Heat (MMY-MUP***H1FT9PUL / MMY-MUP***H1FT6PUL)
- MCY 1ph (MCY-MAP***7HS-UL)

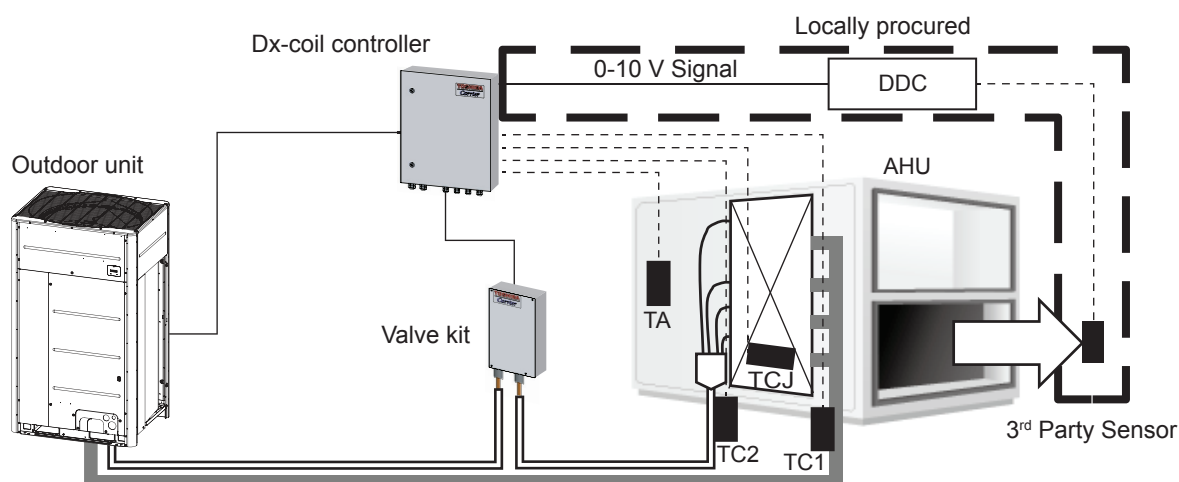
TA type

For example schematic of system ;



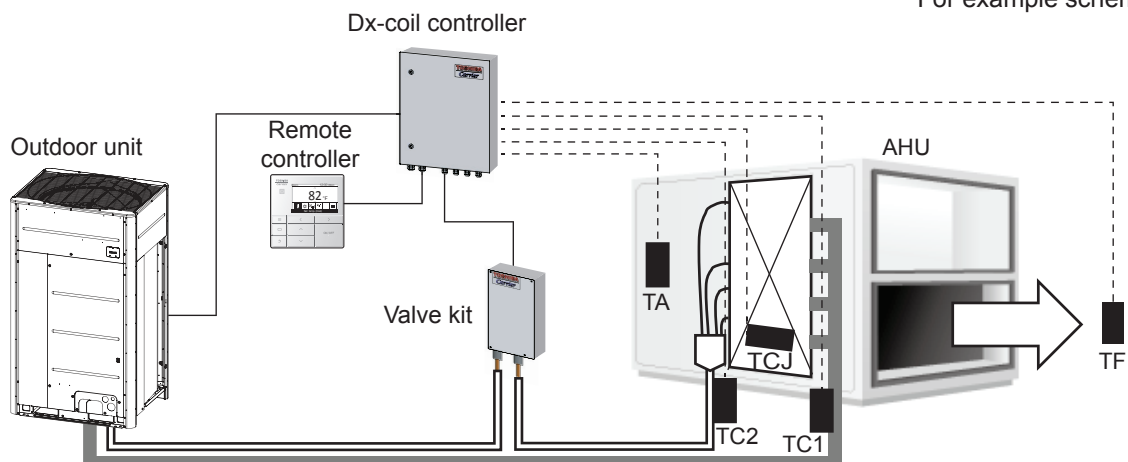
DDC type (1 : 1 only)

For example schematic of system ;



TF type (1 : 1 only)

For example schematic of system ;



3. Operating conditions

AHU

Ensure the “Coil on Air” temperature is within the range of the Dx-coil Design Guideline.

	OA	Outdoor Air
	SA	Supply Air
	CA	Coil on Air (After Heat Recovery Exchanger)
	RA	Return Air
	EA	Exhaust Air

	HP(TA) (Heating & Cooling)	Cooling Only*		HP(TF) (Heating & Cooling)
		Pattern A	Pattern B	
Control	TA or DDC			TF or DDC
Cooling mode “Coil on Air” temp.	59 - 75°F WB (64 - 90°F DB)	59 - 75°F WB (64 - 90°F DB)	59 - 90°F WB (64 - 109°F DB)	50 - 90°F WB (66 - 115°F DB)
Heating mode “Coil on Air” temp.	54 - 82°F DB	---	---	14 - 59°F DB

*Outdoor unit model or select cooling only mode with HP model
**Outdoor/Suction air temp. 115 - 126°F DB is also available but Temporarily operatable.

Note: If intake air temperature is out of range of the specification, the damage for the system may be caused.

Outdoor unit

Refer to specification of outdoor unit

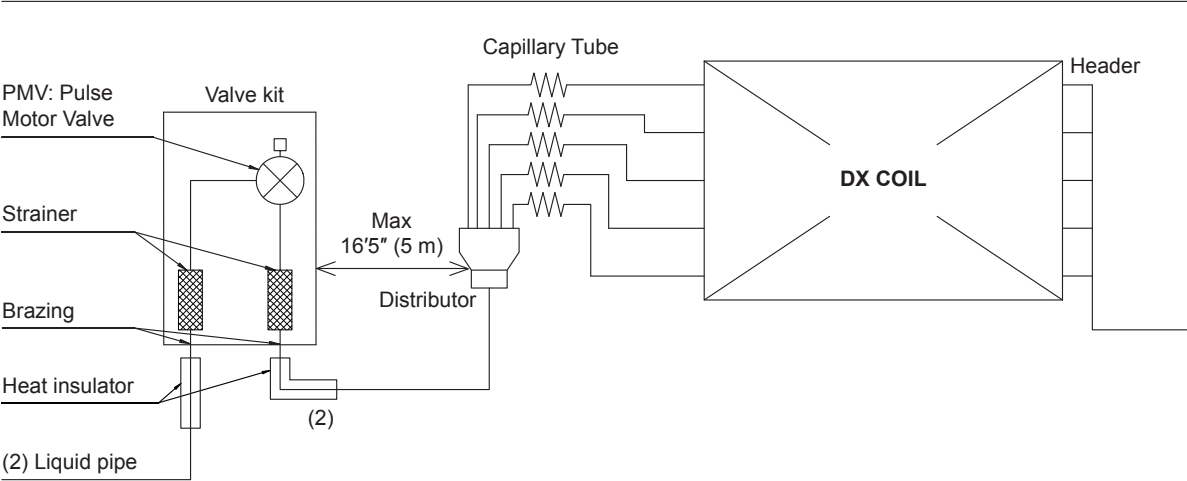
4. Pipe Size

- Maximum real piping length between valve kit and Dx coil is up to 16'5" (5 m).

DX COIL type	Pipe diameter			(Unit : in (mm))
	(1) Gas pipe	(2) Liquid pipe	(3) Liquid pipe	
Ton	Outer diameter			
0.6 - 1	3/8" (9.5)	1/4" (6.4)		
1.25 - 1.5	1/2" (12.7)	1/4" (6.4)		
2 - 5	5/8" (15.9)	3/8" (9.5)		
6	3/4" (19.1)	1/2" (12.7)		
8	7/8" (22.2)			
10	1.1/8" (28.6)		5/8" (15.9)	
12 - 14				
16				
18				
20 - 22	1.3/8" (34.9)		3/4" (19.1)	
24 - 27				
28 - 36	1.1/2" (38.1)		7/8" (22.2)	
38 - 40				

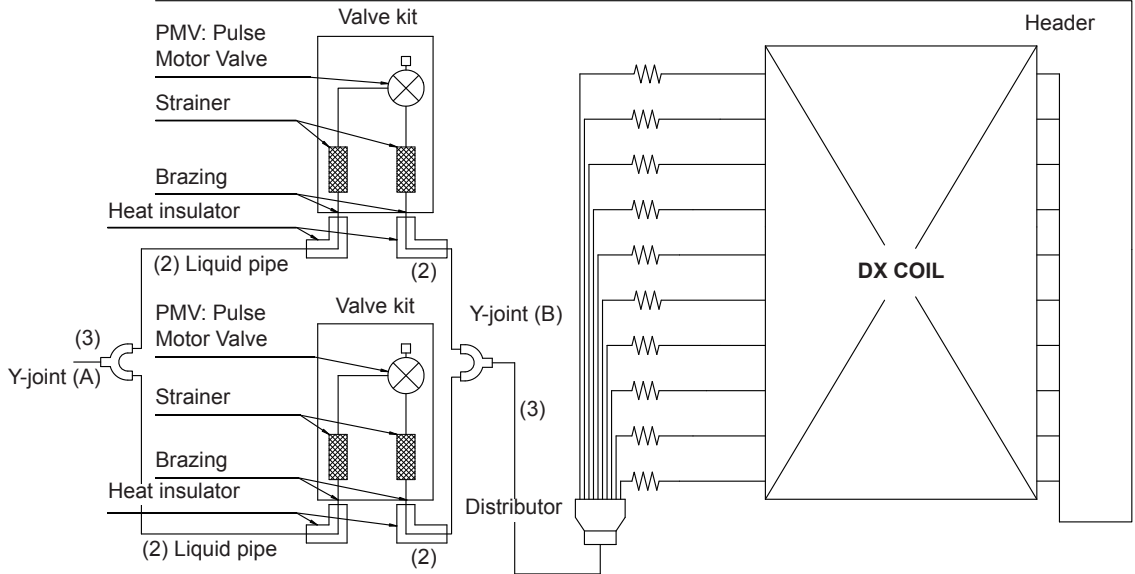
Refrigerant circuit diagram

(1) Gas pipe

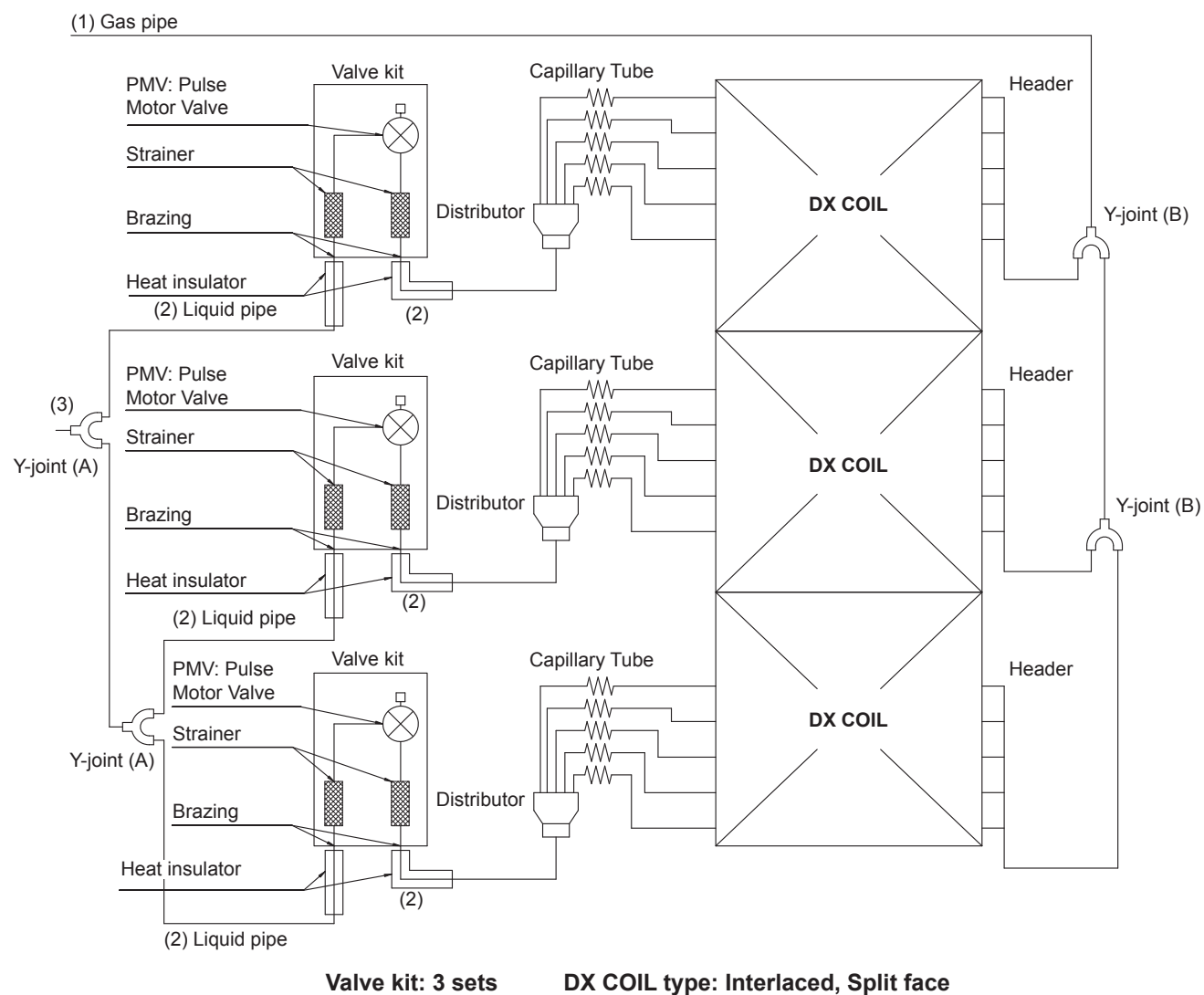


Valve kit: 1 set DX COIL type: Normal

(1) Gas pipe



Valve kit: 2 sets DX COIL type: Normal



5. Pipe length and height difference

Item			6 Ton or more				Less than 6 Ton
			TA type		TF, DDC type		
			ft	m	ft	m	
Main pipe equivalent length			Same as piping length restriction of outdoor unit				Standard VRF outdoor unit piping limitations based on model selection apply
Total piping length			656	200	328	100	
Furthest equivalent pipe length L (real length)			427 (394)	130 (120)	328	100	
Furthest equivalent pipe length from the 1st branch			131	40	-		
Furthest equivalent pipe length between outdoor unit			Same as piping length restriction of outdoor unit		-		
Max. real length of pipes connected to indoor units			66	20	-		
Maximum equivalent between branching section			98	30	-		
Max. Height Difference	Outdoor unit - Indoor unit (Upper outdoor unit) H1		131 (40 m) or the outdoor unit spec. Whichever is shorter of outdoor unit.		131	40	
	Outdoor unit - Indoor unit (Lower outdoor unit) H2	H2 > 9.8 ft (3 m)					
	Indoor unit - Indoor unit (Upper outdoor unit) H2				-		
	Indoor unit - Indoor unit (Lower outdoor unit) H2				-		
Amount of additional Refrigerant			Refer to specification of outdoor unit				

TF sensor can only be used with SMMS-u and SHRM-u.

6. Product Configuration

6-1. Product Configuration

DX coil type		Normal (TA, TF, DDC type)					Interlaced, Split face (TA type)				
Type		Dx-coil controller	Dx-valve kit				Dx-coil controller	Dx-valve kit			
Model name		TCB-IFDMR01UP-UL	RBM-A0601 UPVA-UL	RBM-A1201 UPVA-UL	RBM-A1921 UPVA-UL	HEX number	TCB-IFDMR01UP-UL	RBM-A0601 UPVA-UL	RBM-A1201 UPVA-UL	RBM-A1921 UPVA-UL	HEX number
Connectable Dx-coil capacity	0.6 Ton	1	1	-	-	1					
	0.8 Ton	1	1	-	-	1					
	1 Ton	1	1	-	-	1					
	1.25 Ton	1	1	-	-	1					
	1.5 Ton	1	1	-	-	1					
	2 Ton	1	1	-	-	1					
	2.25 Ton	1	1	-	-	1					
	2.5 Ton	1	1	-	-	1					
	3 Ton	1	1	-	-	1					
	4 Ton	1	1	-	-	1					
	4.5 Ton	1	1	-	-	1					
	5 Ton	1	1	-	-	1					
	6 Ton	1	-	1	-	1					
	8 Ton	1	-	1	-	1					
	10 Ton	1	-	1	-	1	2 (5+5)	2	-	-	2
	12 Ton	1	-	-	1	1	2 (6+6)	-	2	-	2
	14 Ton	1	-	-	1	1	2 (6+8)	-	2	-	2
	16 Ton	1	-	-	1	1	2 (8+8)	-	2	-	2
	18 Ton	-	-	-	-	-	2 (10+8)	-	2	-	2
							3 (6+6+6)	-	3	-	3
	20 Ton	1	-	2	-	1	2 (10+10)	-	2	-	2
							3 (6+6+8)	-	3	-	3
	22 Ton	-	-	-	-	-	3 (8+8+6)	-	3	-	3
	24 Ton	1	-	-	2	1	2 (12+12)	-	-	2	2
							3 (8+8+8)	-	3	-	3
	26 Ton	-	-	-	-	-	2 (12+14)	-	-	2	2
							3 (8+8+10)	-	3	-	3
	28 Ton	1	-	-	2	1	2 (14+14)	-	-	2	2
							3 (8+10+10)	-	3	-	3
	30 Ton	-	-	-	-	-	2 (14+16)	-	-	2	2
							3 (10+10+10)	-	3	-	3
	32 Ton	1	-	-	2	1	2 (16+16)	-	-	2	2
	36 Ton						3 (12+12+12)	-	-	3	3
	38 Ton						3 (14+12+12)	-	-	3	3
	40 Ton						3 (14+14+12)	-	-	3	3
SMMS-e		0.6 - 4.5 Ton (TA type), 5 - 32 Ton (TA, TF, DDC Type)					Up to 38 Ton				
SHRM-e		0.6 - 8 Ton (TA type)					Not available				
SMMSu Elite Heat		0.6 - 4.5 Ton (TA type), 5 - 30 Ton (TA, TF, DDC type)					Up to 30 Ton				
SMMS-u		0.6 - 4.5 Ton (TA type), 5 - 32 Ton (TA, TF, DDC type)					Up to 40 Ton				
SHRMu Elite Heat		0.6 - 4.5 Ton (TA type), 5 - 10 Ton (TA, TF type)					Not available				
SHRM-u		0.6 - 4.5 Ton (TA type), 5 - 10 Ton (TA, TF type)					Not available				
MCY 1ph		0.6 - 5 Ton (TA type) *Guideline HP only					Not available				

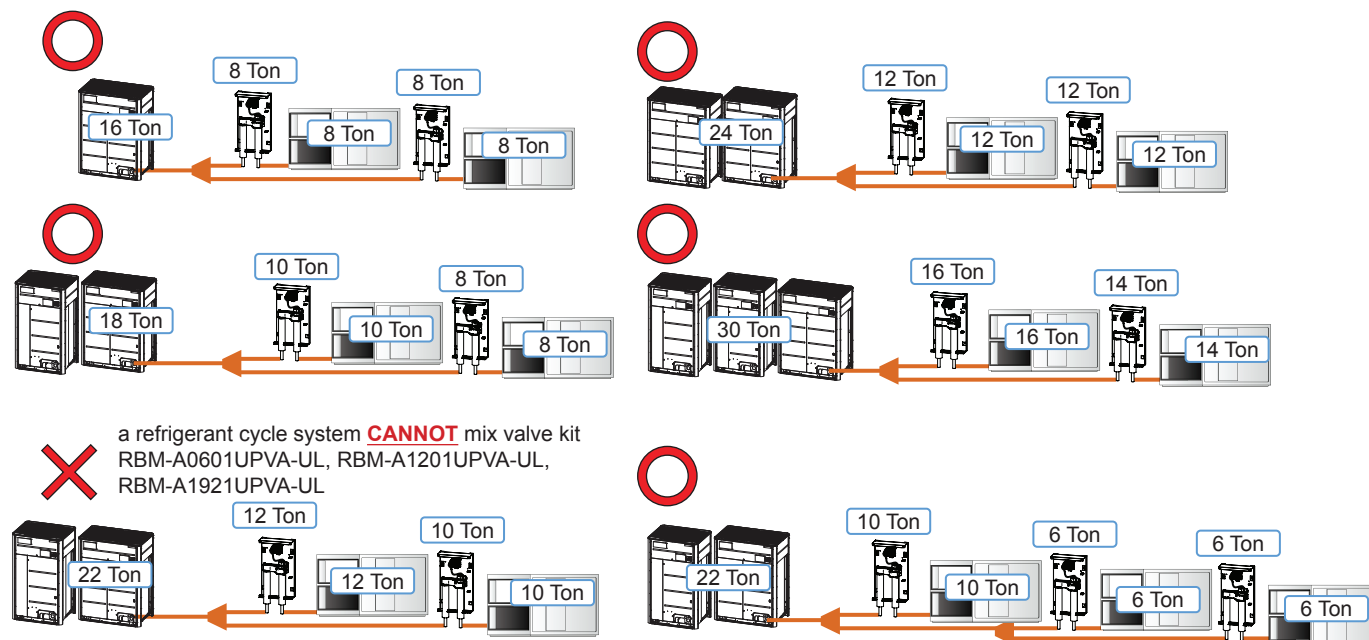
FS unit

	Single Port	Multi Port	Note
SHRM-e	Up to 8 Ton	Up to 5 Ton	RBM-Y*** (038,061,096)4FUL/RBM-Y0614FU*(4,6)FUL
SHRM-u	Up to 8 Ton	Up to 10 Ton (Use 2 port for more than 6 Ton)	RBM-Y*** (061,096)1FUPUL/RBM-Y0611FU*(4,8,12)PUL

- RBM-A0601UPVA-UL, RBM-A1201UPVA-UL, RBM-A1921UPVA-UL **CANNOT** combine in one refrigerant cycle system.

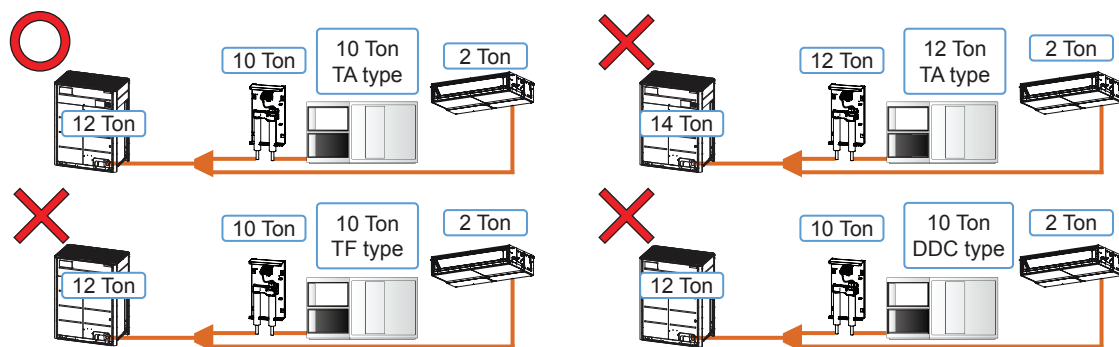
Therefore, two or more AHU from 10 Ton and below Ton combination is available.
In the other way, two or more AHU over 12 Ton combination is available.

Please see examples below:



- Dx-TA type with RBM-A0601UPVA-UL, RBM-A1201UPVA-UL can mix AHU with normal IDUs.
Combination AHU from 10 Ton and below Ton with VRF FCU is available.
Combination AHU over 12 Ton with VRF FCU is **prohibited**.

For example:



- For the AHU prepared on-site, please design by reference of AHU submittal.

6-2. Major Specifications

TCB-IFDMR01UP-UL (Dx-coil controller)

Description	Dx-coil controller in Metal Enclosure, comprising:- - MCC-1777 (Main Indoor (DX) P.C. Board) - TA sensor, Length : 24'7" (7.5 m), connector color: Yellow - TC1 sensor, Length : 24'7" (7.5 m), connector color: Brown - TC2 sensor, Length : 24'7" (7.5 m), connector color: Black - TCJ sensor, Length : 24'7" (7.5 m), connector color: Red - TF sensor, Length : 24'7" (7.5 m), connector color: Green - Strainer - Terminal block with relay							
External dimension	10.2" × 26.4" × 21.3"							
Net Weight (lbs)	27.8 lbs							
Note:								
1. Capacity code (DN[11]) need to be setup upon installation using wire remote controller (not supplied)								
Ton	<u>0.6*</u>	<u>0.8*</u>	1	1.25	1.5	2	2.25	2.5
DN[11]	<u>0001*</u>	<u>0003*</u>	0005	0007	0009	0011	0012	0013
Ton	3	4	4.5	5	6	8	<u>10*</u>	<u>12*</u>
DN[11]	0015	0017	0018	0019	0021	0023	<u>0024*</u>	<u>0026*</u>
Ton	14	16	<u>20*</u>	<u>24*</u>	28	32		
DN[11]	0027	0028	<u>0031*</u>	<u>0035*</u>	0037	0039		
* Can be set by only SMMS-u / SHRM-u or later models.								
• Only Heating and Cooling modes are available on the DDC type (No Automatic or Fan Only) • Components supplied loose, requires brazing and local pipework.								
2. Valve kit type name specification (This is basically set automatically).								
Valve kit model	RBM-A0601UPVA-UL		RBM-A1201UPVA-UL		RBM-A1921UPVA-UL			
DN[4AE]	0003		0001		0002			
• In case of installation of any combinations that are not listed in standard combination in P.8. Please confirm combination of valve kit model and DN[4AE] correctly.								

RBM-A0601UPVA-UL, RBM-A1201UPVA-UL, RBM-A1921UPVA-UL (Dx-valve kit)

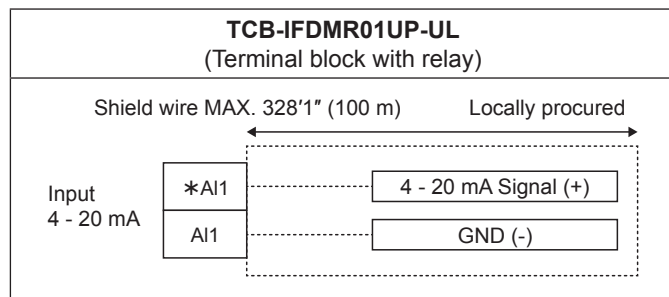
Description	The PMV (Pulse Motor Valve, 3 models), comprising:- - PMV body & PMV motor - Terminal block
RBM-A0601UPVA-UL	0.6 Ton & 0.8 Ton & 1 Ton & 1.25 Ton & 1.5 Ton & 2 Ton & 2.25 Ton & 2.5 Ton & 3 Ton & 4 Ton & 4.5 Ton & 5 Ton size
RBM-A1201UPVA-UL	6 Ton & 8 Ton & 10 Ton size
RBM-A1921UPVA-UL	12 Ton & 14 Ton & 16 Ton size

TCB-IFDES1001P-UL (Option sensor)

Description	Long wiring sensor - TA sensor, Length : 32'10" (10 m), connector color: Yellow - TC1 sensor, Length : 32'10" (10 m), connector color: Brown - TC2 sensor, Length : 32'10" (10 m), connector color: Black - TCJ sensor, Length : 32'10" (10 m), connector color: Red - TF sensor, Length : 32'10" (10 m), connector color: Green
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6-3. Control Input / Output Details

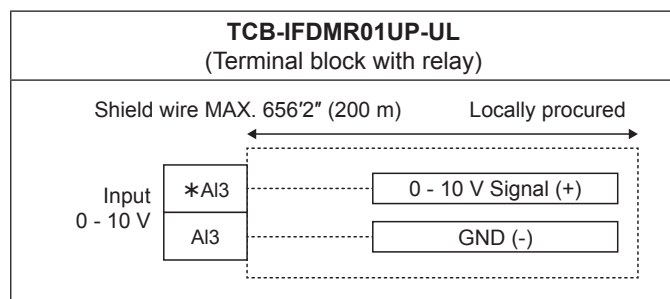
- Analog Input functions -



✓ : Available ✕ : Prohibition

Input	Name	Description	TA	DDC	TF
AI1	FAN interlock Analog Input 1 (4 - 20 mA)	FAN interlocking control by external input			
	- FAN mode is switched by external 4 - 20 mA input. - Both FAN control with 4 - 20 mA input and FAN mode change with remote controller are valid, but boost priority is given. - The FAN priority control is switched by the DN setting of [4A0]. 0000: Default (no change in FAN mode by 4 - 20 mA input) 0001: FAN control by 4 - 20 mA input, but priority is given to FAN control from the outdoor unit 0002: FAN control 4 - 20 mA input with priority - The FAN mode switching threshold value for 4 - 20 mA input can be changed in the DN setting. * The change in FAN speed with 4 - 20 mA input is also reflected in the 0 - 10 V output of AO1 / *AO1. mA 18 14 7 HH H L 17 13 6 [DN] Default Details [4A2] 0004 (4 mA) [4A1] +4 mA Applicable range +1 to +11 *1 [4A1] 0013 (13 mA) Applicable range 7 mA to 16 mA [4A3] 0007 (7 mA) [4A1] -7 mA Applicable range -1 to -12 *2 * 1: Upper limit. DN [4A1] + DN [4A2] ≤ 18 mA * 2: Lower limit. DN [4A1] - DN [4A3] ≥ 4 mA				
AI2	Nothing Analog Input 2 (4 - 20 mA)	Cannot be used.	-	-	-

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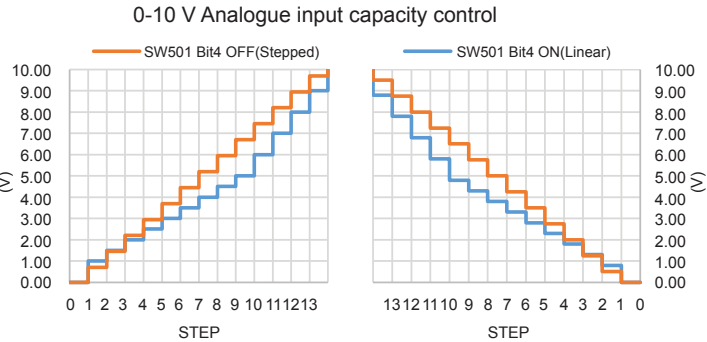
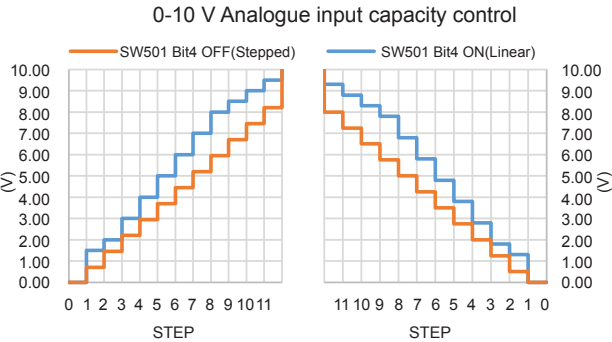
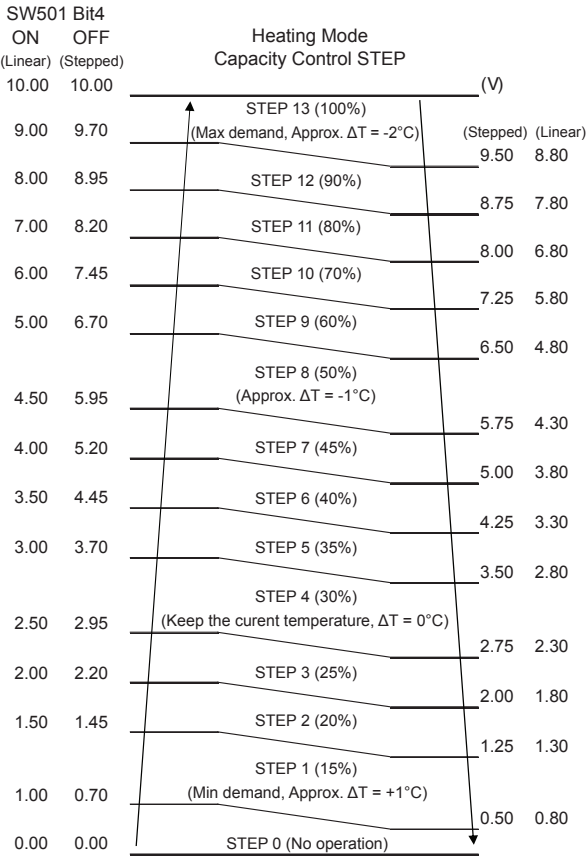
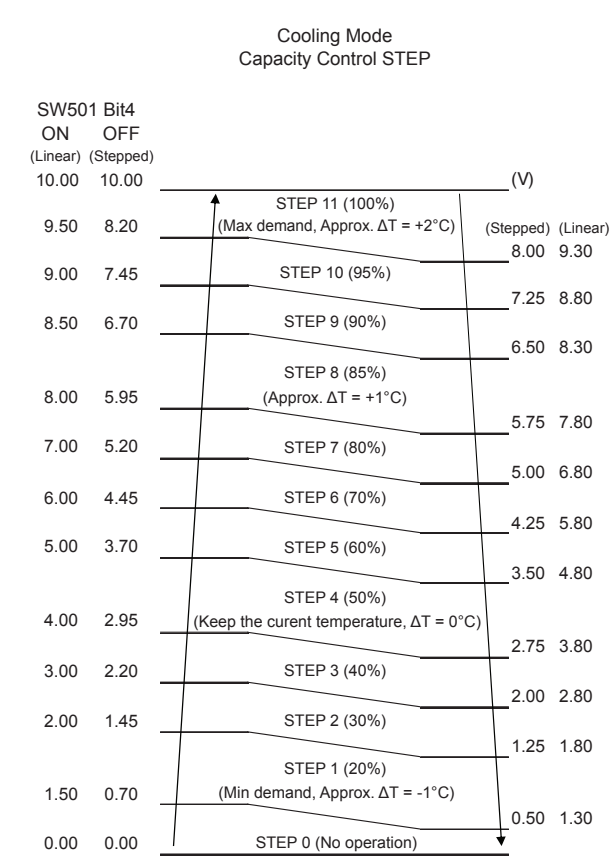
✓ : Available ✕ : Prohibition

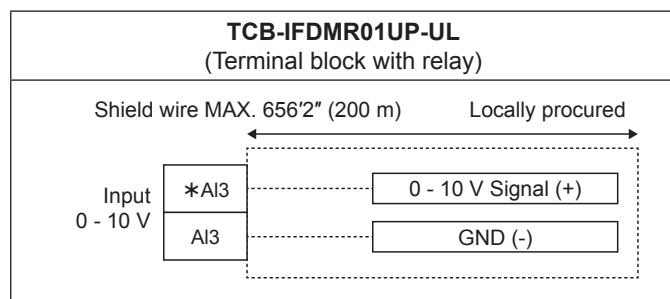
Input	Name	Description	TA	DDC	TF
AI3	Analogue Input Capacity Control Analog Input 1 (DC 0 - 10 V)	Analogue Input to Capacity control.			
	SW501 Bit-4(MCC-1777) <u>OFF</u>	STEPPED response to analogue input			
	SW501 Bit-4(MCC-1777) <u>ON</u>	LINEAR response to analogue input	✕	✓	✕
	- To ease the integration of the Dx-coil with the DDC the capacity control is able to operate with a STEPPED or LINEAR function from the analogue input. - To select either a STEPPED(default) or LINEAR response, from the analogue input, use SW501 Bit4 located on the DDC(0-10 V) interface P.C. Board (MCC-1777)				
AI4	Nothing Analog Input 2 (DC 0 - 10 V)	Cannot be used.	-	-	-

- Capacity control signal(analogue input voltage) will be used as the main control value for the compressor frequency.
- The control of capacity may not be able to be performed according to the state of an air-conditioner (During oil recovercontrol, defrost etc.).

1) Capacity control 0-10 V (Overview of capacity control)*

*There are possibilities of thermodynamic and/or mechanical limitation from many factors. which may affect our system's heat pump cycle (refrigerant cycle) during operation. Hence, there is a possibility that the capacity output may be different from capacity control setting.

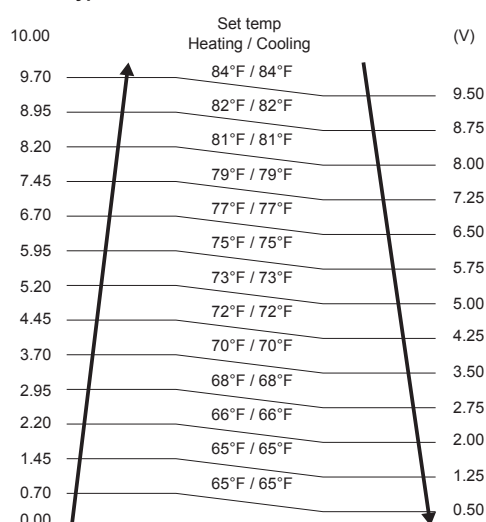




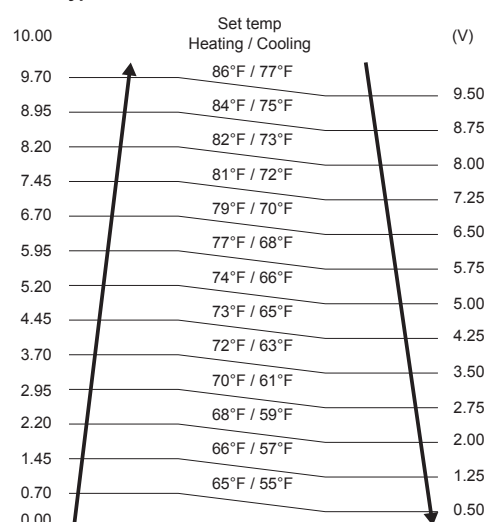
✓ : Available × : Prohibition

Input	Name	Description	TA	DDC	TF
AI3	Set temperature changed	- To use this control, set DN [4A9] = 1. - For TA and TF type, the set temperature can be changed according to the 0 - 10 V input of AI3. - In the set temperature with the remote controller and this control, the post-setting is prioritized. - The set temperature can be changed only for cooling and heating operations.	✓	×	✓
AI4	Nothing Analog Input 2 (DC 0 - 10 V)	Cannot be used.	-	-	-

▼ TA type



▼ TF type



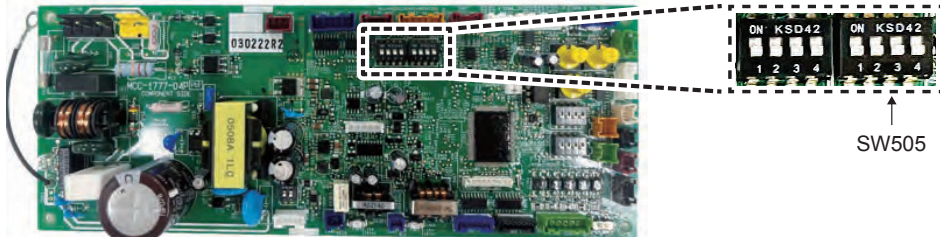
- Digital Input functions -

The specifications of Terminal DI1 to DI5 are as follows.

- You can switch between voltage and non-voltage with SW701.



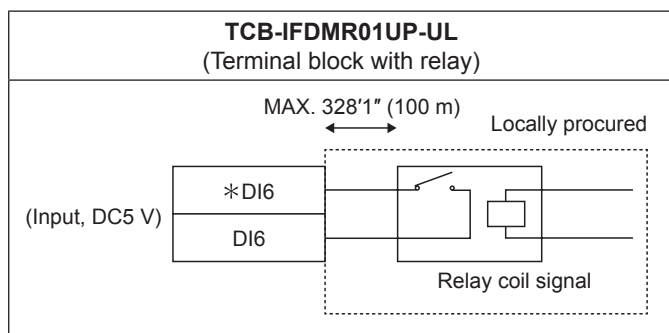
SW701 OFFON 1	SW701 OFFON 1
MAX. 328'1" (100 m) Locally procured GND SIGNAL (12 V) *DI1 - *DI5 DI1 - DI5	MAX. 328'1" (100 m) Locally procured SIGNAL (+) SIGNAL (-) *DI1 - *DI5 DI1 - DI5 Signal Voltage (DC12 V ± 10%) GND

Input	Name	Description	TA	DDC	TF								
DI1	Safety contact.	- MODE 1 (Normally close, DC12 V) *When Bit1 of SW505 is OFF If this contact is open for more than 1 minute, the check code P10 is generated and the Dx-coil controller switches off automatically. - MODE 2 (Normally open, DC12 V) *When Bit1 of SW505 is ON If this contact is short for more than 1 minute, the check code P10 is generated and the Dx-coil controller switches off automatically.											
													
<table><tr><td>SW701 OFF ON 1 ☐</td><td>SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: OFF</td><td>SW701 OFF ON 1 ☐</td><td>SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: OFF</td></tr><tr><td colspan="2"> MAX. 328'1" (100 m) Locally procured GND SIGNAL (12 V) *DI1 DI1 Normally closed </td><td colspan="2"> MAX. 328'1" (100 m) Locally procured SIGNAL (+) SIGNAL (-) *DI1 DI1 Signal Voltage (DC12 V ± 10%) GND (+) (-) Normally closed </td></tr></table>						SW701 OFF ON 1 ☐	SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: OFF	SW701 OFF ON 1 ☐	SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: OFF	MAX. 328'1" (100 m) Locally procured GND SIGNAL (12 V) *DI1 DI1 Normally closed		MAX. 328'1" (100 m) Locally procured SIGNAL (+) SIGNAL (-) *DI1 DI1 Signal Voltage (DC12 V ± 10%) GND (+) (-) Normally closed	
SW701 OFF ON 1 ☐	SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: OFF	SW701 OFF ON 1 ☐	SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: OFF										
MAX. 328'1" (100 m) Locally procured GND SIGNAL (12 V) *DI1 DI1 Normally closed		MAX. 328'1" (100 m) Locally procured SIGNAL (+) SIGNAL (-) *DI1 DI1 Signal Voltage (DC12 V ± 10%) GND (+) (-) Normally closed											
<table><tr><td>SW701 OFF ON 1 ☐</td><td>SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: ON</td><td>SW701 OFF ON 1 ☐</td><td>SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: ON</td></tr><tr><td colspan="2"> MAX. 328'1" (100 m) Locally procured GND SIGNAL (12 V) *DI1 DI1 Normally open </td><td colspan="2"> MAX. 328'1" (100 m) Locally procured SIGNAL (+) SIGNAL (-) *DI1 DI1 Signal Voltage (DC12 V ± 10%) GND (+) (-) Normally open </td></tr></table>						SW701 OFF ON 1 ☐	SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: ON	SW701 OFF ON 1 ☐	SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: ON	MAX. 328'1" (100 m) Locally procured GND SIGNAL (12 V) *DI1 DI1 Normally open		MAX. 328'1" (100 m) Locally procured SIGNAL (+) SIGNAL (-) *DI1 DI1 Signal Voltage (DC12 V ± 10%) GND (+) (-) Normally open	
SW701 OFF ON 1 ☐	SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: ON	SW701 OFF ON 1 ☐	SW505 ON OFF 1 ☐ 2 ☐ 3 ☐ 4 ☐ Bit1: ON										
MAX. 328'1" (100 m) Locally procured GND SIGNAL (12 V) *DI1 DI1 Normally open		MAX. 328'1" (100 m) Locally procured SIGNAL (+) SIGNAL (-) *DI1 DI1 Signal Voltage (DC12 V ± 10%) GND (+) (-) Normally open											
SW701	SW505	Function											
OFF	OFF	The coil drive voltage is input to the relay arranged locally for DI1, and judge that the close is positive. (Default) Relay: Local arrangement											
	ON	The coil drive voltage is not input to the relay arranged locally for DI1, and judge that the open is positive. Relay: Local arrangement											
ON	OFF	For *DI1, short-circuit the (+) signal voltage and DI1 (-) GND with a SW or harness, and judge that the close is positive. Relay: Not required * The signal voltage is DC12 V ± 10%, and it is necessary to add a SW element to the signal line.											
	ON	For *DI1, open the (+) signal voltage and DI1 (-) GND, and judge that the open is positive. Relay: Not required * The signal voltage is DC12 V ± 10%, and it is necessary to add a SW element to the signal line.											

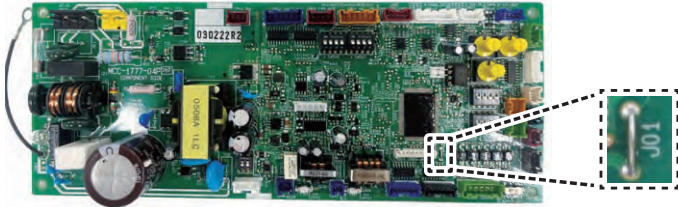
✓ : Available ✕ : Prohibition

Input	Name	Description	TA	DDC	TF												
DI2	External trouble Input	An AHU fan operation monitor (Field supply), could be attached at this dry contact terminal (For example, the abnormality of the fan motor). A closed contact generates the check code L30.	✓	✓	✓												
DI3	Forced thermostat OFF Input	When signal input, AHU is in “thermostat-off” status forcibly.	✓	✓	✓												
DI4	Notice code Input	- If there is input, a spanner mark will be displayed on the remote controller. The system will not stop.Check “DN settings” for the setting method. - Enter the Notice code when you want to report an abnormality that does not stop the air conditioner from the outside. - Used by switching functions with settings of Code No. (DN Code). - Notice code is continuously issued while input signal is ON. 201 is displayed in the Notice code history when there is input in DI4. * Notice code is a function dedicated to TU2C-LINK communication. Set data corresponding to Notice code to be used to one of Code No. 180 to 189, in accordance with following table. In case where data other than 0000 is already set, set to other Code No. (DN Code). <table><tr><th>Code No. (DN)</th><th>Set data</th><th>Notice code display</th></tr><tr><td rowspan="3">0180 ~ 189</td><td>0000</td><td>None (Factory default)</td></tr><tr><td>0129</td><td>201 (DI4 / *DI4 Notice input ON)</td></tr><tr><td>0134</td><td>206 (Tx sensor*1 trouble)</td></tr></table> *1: Refer to the Service Manual for support. * It may take up to ten minutes to be displayed on remote controller after Notice code is issued.	Code No. (DN)	Set data	Notice code display	0180 ~ 189	0000	None (Factory default)	0129	201 (DI4 / *DI4 Notice input ON)	0134	206 (Tx sensor*1 trouble)					
Code No. (DN)	Set data	Notice code display															
0180 ~ 189	0000	None (Factory default)															
	0129	201 (DI4 / *DI4 Notice input ON)															
	0134	206 (Tx sensor*1 trouble)															
DI5	Operation Mode Input (Cool / Heat)	Digital Input to control Mode:- Only cool mode and heat mode are available. <table><tr><th>Function</th><th>Terminal</th><th>Function</th><th>SHORT</th></tr><tr><td>Mode Input Cool / Heat</td><td>DI5 / *DI5</td><td>COOL mode active</td><td>HEAT mode active</td></tr></table>	Function	Terminal	Function	SHORT	Mode Input Cool / Heat	DI5 / *DI5	COOL mode active	HEAT mode active	✓	✓	✓				
Function	Terminal	Function	SHORT														
Mode Input Cool / Heat	DI5 / *DI5	COOL mode active	HEAT mode active														
DI2 ~ DI4	When Bit4 of SW502 is turned on in DDC type, capacity demand can be achieved by short-circuiting Terminals DI2 to DI4. <table><tr><th>Short - circuit</th><th>Cooling step</th><th>Heating step</th></tr><tr><td>*DI2 - DI2</td><td>2</td><td>3</td></tr><tr><td>*DI3 - DI3</td><td>5</td><td>9</td></tr><tr><td>*DI4 - DI4</td><td>11</td><td>13</td></tr></table> * If all are short-circuited, the DI3 function has priority. When SW701 is ON (no voltage), apply a voltage of DC12 V ± 10% and wiring as follows. MAX. 328'1" (100 m) Locally procured SIGNAL (+) SIGNAL (-) *DI2 - *DI4 DI2 - DI4 Signal Voltage (DC12 V ± 10%) GND (+) (-) Normally open		Short - circuit	Cooling step	Heating step	*DI2 - DI2	2	3	*DI3 - DI3	5	9	*DI4 - DI4	11	13			
Short - circuit	Cooling step	Heating step															
*DI2 - DI2	2	3															
*DI3 - DI3	5	9															
*DI4 - DI4	11	13															

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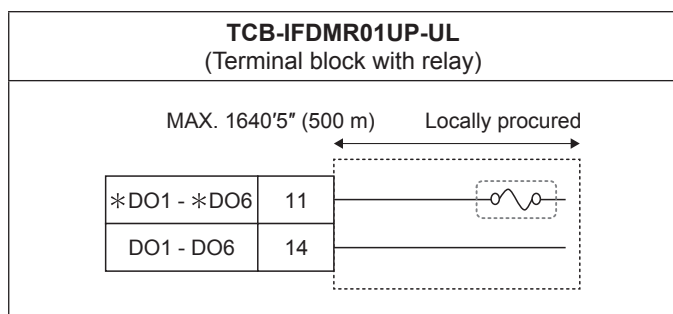


✓ : Available × : Prohibition

Input	Name	Description	TA	DDC	TF			
DI6	Operation ON/OFF Input	When using with DDC, it starts by turning on this terminal. External trouble Input signal type(pulse / static) is selectable by Jumper Wire J01 on the Indoor(DX) P.C. Board - MCC-1777 • Connect (Default) : Pulse / Cut : Static Note the unit will not operate until there is an appropriate 0-10 V Capacity Control signal. The position of J01 (MCC-1777)  <table><thead><tr><th>J01</th><th>Action</th></tr></thead><tbody><tr><td>Connect</td><td> Pulse input (At factory setting)  Pulse width 200 to 300 ms Pulse interval 200 to 300 ms or more. </td></tr><tr><td>Cut</td><td> Static input </td></tr></tbody></table> ✓ ✓ ✓	J01	Action	Connect	Pulse input (At factory setting)  Pulse width 200 to 300 ms Pulse interval 200 to 300 ms or more.	Cut	Static input 
J01	Action							
Connect	Pulse input (At factory setting)  Pulse width 200 to 300 ms Pulse interval 200 to 300 ms or more.							
Cut	Static input 							

- Digital Output functions -

The specifications of Terminal DO1 to DO6 are as follows.



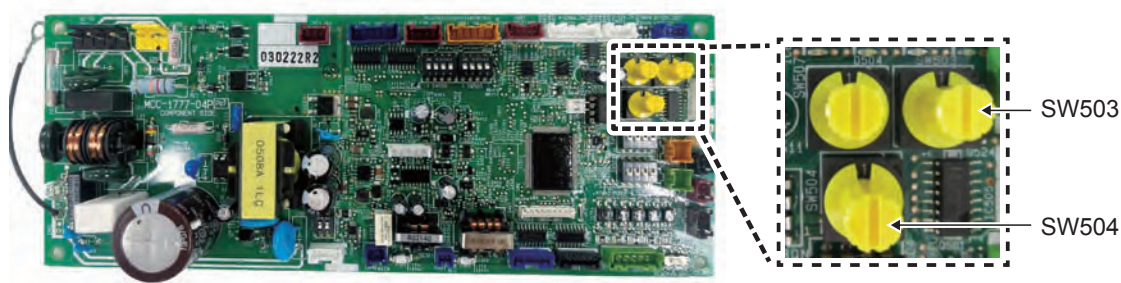
- Use the contact side of the relay terminal used in TCB-IFDMR01UP-UL according to the specifications shown in the table below.

Relay model name	Contact rating	Load conditions
G2RV-SR700-12DC	250 V max / 3 A max (Minimum Current: 10 mA more)	Resistive load

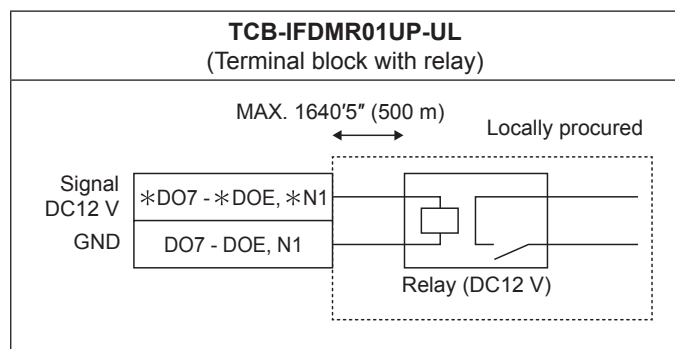
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Output	Name	Description	TA	DDC	TF
DO1	Operating Output	Displayed when the system starts operation (output with both thermostat ON / OFF)	✓	✓	✓
DO2	Alarm Active Digital Output	During Alarm operation, Alarm Active Digital Output is active.	✓	✓	✓
DO3	Fan Motor Active Digital Output	A fan control signal is output. It is usually the ON output at the time of operating, but it is the OFF output in defrosting.	✓	✓	✓
DO4	Defrost Mode Digital Output	During Defrost operation, Defrost Mode Output is active.	✓	✓	✓
DO5	DO_1 Digital Output 1 (User Defined)	Output function set using rotary switch “ SW503 ” on the DDC(0-10 V) interface P.C. Board (MCC-1777)	✓	✓	✓
		SW503 Output function			
		1 Outdoor unit(s) operation level is lower than capacity command			
		2 Outdoor unit(s) operation level is higher than capacity command			
		3 Cooling oil recovery/Heating refrigerant recovery control			
		4 Cooling operation output or Secondary heating output			
		5 Heating operation output			
		6 Thermostat ON			
		7 ~ 15 Do not use			
DO6	DO_2 Digital Output 2 (User Defined)	Output function set using rotary switch “ SW504 ” on the DDC(0-10 V) interface P.C. Board (MCC-1777)	✓	✓	✓
		SW504 Output function			
		1 Outdoor unit(s) operation level is lower than capacity command			
		2 Outdoor unit(s) operation level is higher than capacity command			
		3 Cooling oil recovery/Heating refrigerant recovery control			
		4 Cooling operation output or Secondary heating output			
		5 Heating operation output			
		6 Thermostat ON			
		7 ~ 15 Do not use			
		16 Under Hz upper limit regulation due to heat sink overheating			

Set with the SW503 or SW504 switch on the control P.C. Board MCC-1777.



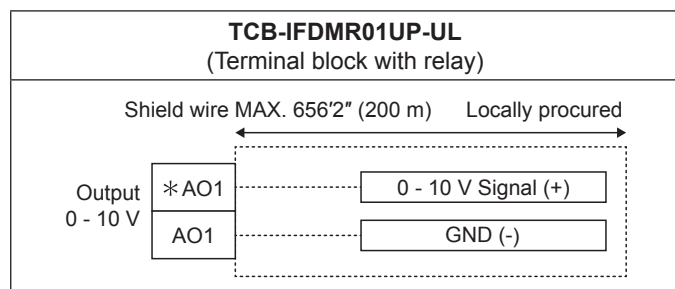
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✓ : Available ✕ : Prohibition

Output	Name	Description	TA	DDC	TF
DO7	Thermostat On Digital Output	Thermostat ON signal is output. It is usually the ON output at the time of operating.	✓	✓	✓
DO8	Cooling / heating start up control signal output	Outputs the start control signal for cooling and heating operation.	✓	✓	✓
DO9	Pre defrost signal	Outputs just before defrosting (at least 5 minutes before).	✓	✓	✓
DOA	Cooling/ heating output	Output as OPEN during cooling operation, and CLOSE during heating operation.	✓	✓	✓
DOB	Notice code Output	Output to display Notice code (if there is any at the time.) For details, see the outdoor unit Service Manual.	✓	✓	✓
DOC	FAN mode Output	Output Fan Mode : DOC = High • If select the fan output from interface, use this output. For TA and TF types, the output changes by changing the fan speed from the remote controller.	✓	✓	✓
DOD	FAN mode Output	Output Fan Mode : DOD = Mid • If select the fan output from interface, use this output. For TA and TF types, the output changes by changing the fan speed from the remote controller.	✓	✓	✓
DOE	FAN mode Output	Output Fan Mode : DOE = Low • If select the fan output from interface, use this output. For TA and TF types, the output changes by changing the fan speed from the remote controller.	✓	✓	✓
N1	Ventilation fan output	The signal operation setting by FAN button on the remote controller is performed on the remote controller DN[31] : 00(OFF), 01(ON).	✓	✓	✓

- Analog Output functions -



✓ : Available ✕ : Prohibition

Output	Name	Description	TA	DDC	TF																				
AO1	FAN speed 0 - 10 V output Analog Output 1 (0 - 10 V)	- Each FAN speed is output at 0 - 10 V. - The output voltage can be changed by DN setting [4A4] to [4A6]. <table><thead><tr><th>FAN speed</th><th>Output (Def)</th><th>Initial (Def)</th><th>Applicable range</th></tr></thead><tbody><tr><td>HH</td><td>9 V</td><td>4A4 (0009)</td><td>8 V (0008) - 10 V (0010)</td></tr><tr><td>H</td><td>6 V</td><td>4A5 (0006)</td><td>4 V (0004) - 7 V (0007)</td></tr><tr><td>L</td><td>2 V</td><td>4A6 (0002)</td><td>1 V (0001) - 3 V (0003)</td></tr><tr><td>STOP</td><td>0 V</td><td>-</td><td>-</td></tr></tbody></table>	FAN speed	Output (Def)	Initial (Def)	Applicable range	HH	9 V	4A4 (0009)	8 V (0008) - 10 V (0010)	H	6 V	4A5 (0006)	4 V (0004) - 7 V (0007)	L	2 V	4A6 (0002)	1 V (0001) - 3 V (0003)	STOP	0 V	-	-	✓	✓	✓
FAN speed	Output (Def)	Initial (Def)	Applicable range																						
HH	9 V	4A4 (0009)	8 V (0008) - 10 V (0010)																						
H	6 V	4A5 (0006)	4 V (0004) - 7 V (0007)																						
L	2 V	4A6 (0002)	1 V (0001) - 3 V (0003)																						
STOP	0 V	-	-																						
AO2	Nothing Analog Output 2 (0 - 10 V)	Cannot be used.	-	-	-																				

- Summary of Digital input / output function (MCC-1777) -

Function	Connector No. CN	Connector collar	Pin No.	Wire collar	Specification
PMV1	82	(BLU)	1	(WHI)	-
			2	(YEL)	-
			3	(ORN)	-
			4	(BLU)	-
			5	-	-
			6	(RED)	DC12 V
PMV2	84	(BLK)	1	(WHI)	-
			2	(YEL)	-
			3	(ORN)	-
			4	(BLU)	-
			5	-	-
			6	(RED)	DC12 V
TC1	100	(BRN)	1	(BLU)	-
			3		
TCJ	102	(RED)	1	(RED)	-
			2		
TC2	101	(BLK)	1	(BLK)	-
			2		
TA	104	(YEL)	1	(BLK)	-
			2		
TF	103	(GRN)	1	(RED)	-
			2		
TX*1	105	(WHI)	1	-	-
			2		
Defrost mode Digital output	60	(WHI)	2	(BLU)	Output
Thermostat on Digital output	60	(WHI)	3	(ORN)	Output
	62	(BLU)	1	(RED)	12 V
Fan motor active Digital output	60	(WHI)	6	(BLK)	Output
Output 1 (0-10 V)	602	(BLU)	1	(BLU)	Output
2			(BLK)	GND	
Output 2 (0-10 V) (No function)		(BLU)	3	(BLU)	Output
			4	(BLK)	GND
Input 1 (0-10 V)	601	(WHI)	1	(WHI)	Input
2			(BLK)	GND	
Input 2 (0-10 V) (No function)		(WHI)	3	(WHI)	Input
			4	(BLK)	GND
Input 1 (4-20 mA)	600	(WHI)	3	(BLU)	Input
4			(BLK)	GND	
Input 1 (4-20 mA) (No function)		(WHI)	5	(YEL)	Input
			6	(BLK)	GND

*1 : TX temperature sensor is an option accessory part. TX can be used with application TA type or TF type.

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Function	Connector No. CN	Connector collar	Pin No.	Wire collar	Specification
External ON/OFF input	61	(YEL)	1	(BLU)	5 V
			2	(BLK)	GND
Operating output		(YEL)	4	(WHI)	Output
			5	(RED)	12 V
Alarm active Digital output		(YEL)	6	(BRN)	Output
FAN speed HH	63	(RED)	2	(YEL)	Output
FAN speed H		(RED)	3	(GRN)	Output
FAN speed L		(RED)	4	(BLU)	Output
Cooling oil recovery/Heating refrigerant recovery control	62	(BLU)	3	(WHI)	Output
Pre defrost signal output		(BLU)	4	(BRN)	Output
Cool(open)/Heat(close)output		(BLU)	5	(BLU)	Output
Notice output		(BLU)	6	(GRN)	Output
Ventilation fan output	62	(BLU)	1	(YEL)	Output
	63	(RED)	1	(RED)	12 V
Safety (Normal close)	90	(GRN)	1	(RED)	GND* ²
			2	(WHI)	Input
External error input		(GRN)	3	(BLU)	Input
Forced thermostat OFF Input		(GRN)	4	(ORN)	Input
Notice Input		(GRN)	5	(GRN)	Input
Operation Mode Input (Cool/Heat)		(GRN)	6	(YEL)	Input
Modbus A	45	(WHI)	5	(YEL)	-
Modbus B		(WHI)	4	(ORN)	-
Degital output 1 (user defined)	64	(RED)	2	(RED)	Output
Degital output 2 (user defined)		(RED)	3	(WHI)	Output

*2 : Safety (SW701) output will depend on combinations. For more detail, please refer to Terminal DI1/ * DI1.

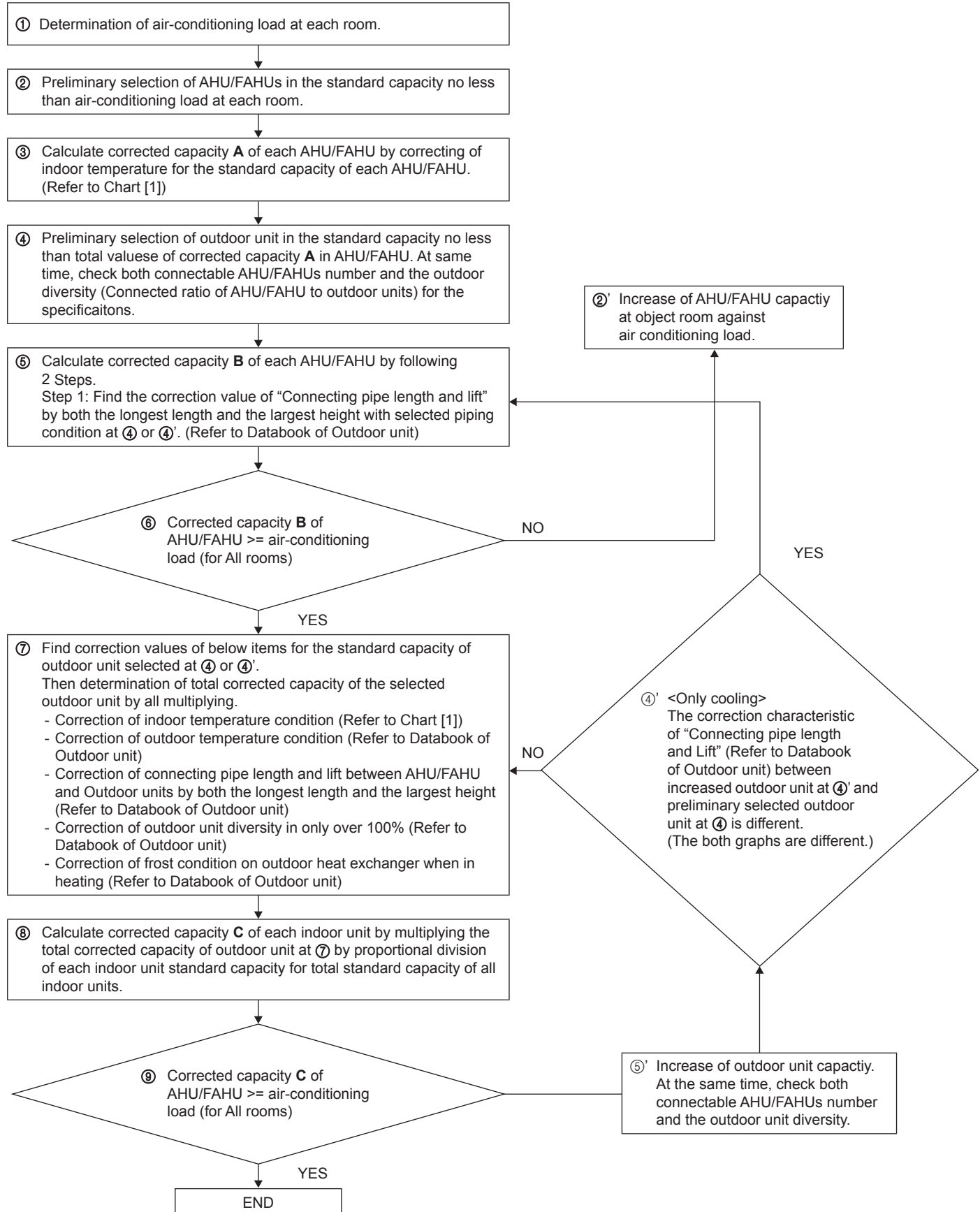
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Terminal	Function	Description	
DO1	Operating output	Digital output	DC12 V
DO2	Alarm active digital output	Digital output	DC12 V
DO3	Fan motor active digital output	Digital output	DC12 V
DO4	Defrost mode digital output	Digital output	DC12 V
DO5	DO1 Digital output 1 (User defined)	Digital output	DC12 V
DO6	DO2 Digital output 2 (User defined)	Digital output	DC12 V
DO7	Thermostat ON digital output	Digital output	DC12 V
DO8	Cooling / heating start up control signal output	Digital output	DC12 V
DO9	Pre defrost signal output	Digital output	DC12 V
DOA	Cooling OPEN / heating CLOSE output	Digital output	DC12 V
DOB	Notice code output	Digital output	DC12 V
DOC	Fan high speed output	Digital output	DC12 V
DOD	Fan medium speed output	Digital output	DC12 V
DOE	Fan low speed output	Digital output	DC12 V
N1	Ventilation fan output	Digital output	DC12 V
N2	Blank	none	-
DI1	Safety (Normal close)	Digital input	DC12 V or Dry contact
DI2	External trouble input	Digital input	DC12 V or Dry contact
DI3	Forced thermostat OFF input	Digital input	DC12 V or Dry contact
DI4	Notice code input	Digital input	DC12 V or Dry contact
DI5	Operation mode input (cool / heat)	Digital input	DC12 V or Dry contact
DI6	External ON / OFF input	Digital input	Dry contact ^{*1}
AI1	Input 1 (4-20 mA)	Analog input	4 - 20 mA
AI2	Input 2 (4-20 mA)	Analog input	4 - 20 mA
AI3	Input 1 (0-10 V)	Analog input	0 - 10 V
AI4	Input 2 (0-10 V)	Analog input	0 - 10 V
AO1	Output 1 (0-10 V)	Analog output	0 - 10 V
AO2	Output 2 (0-10 V)	Analog output	0 - 10 V
R, BL, OR, Y, W	PMV 1 / PMV 2	-	R: DC12 V
MdG	Modbus G	-	-
MdA / MdB	Modbus A / Modbus B	-	-
AB	Remote Controller	-	-
Uv	Mainbus	-	-

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7. AHU / DX COIL Design

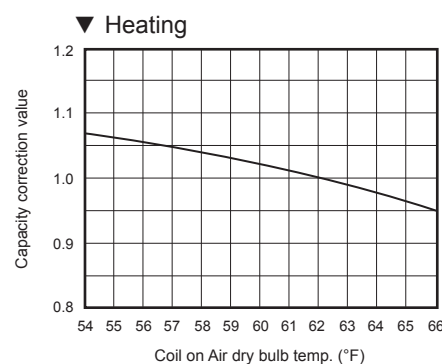
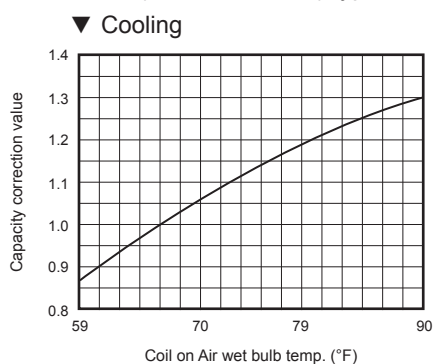
7-1. Equipment selection procedure -Selection flow chart-



7-2. Correction charts for AHU/FAHU unit capacity calculation

[1] Coil on Air temperature vs. capacity correction value

< TA, DDC (control with RA) type >



The above capacity values are generated depends on each compressor operation level.

[NOTE]

TOSHIBA Selection Tool allows users to select [add] or [not add] the Capacity correction value.

For more information, please check with TOSHIBA Selection Tool* or ask our authorized dealer.

* : Please confirm Version Information by TOSHIBA HVAC Global Portal (THGP).

< TF, DDC (control with SA) type >

▼ Cooling

Outdoor temperature	°F WB								
	59	64	68	72	75	79	82	86	90
°F DB									
66	0.290	0.398							
73	0.290	0.390	0.460	0.520					
81		0.390	0.455	0.513	0.648				
84			0.455	0.513	0.640	0.826	1.022		
91			0.451	0.505	0.624	0.799	1.000	1.196	1.410
100					0.604	0.777	0.987	1.156	1.313
109							0.951	1.121	1.170
115								1.004	0.942

▼ Heating

Outdoor temperature	°F WB										
	10	16	19	23	27	32	36	39	43	50	57
°F DB											
14	1.058										
18	1.087										
21		1.155									
23			1.209								
28				1.086							
32					1.000						
36					0.923	0.923	0.923				
41					0.806	0.806	0.806				
45							0.727	0.727	0.727		
50							0.603	0.603	0.603		
54								0.522	0.522	0.522	
59									0.403	0.403	0.403

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7-3. Charging requirement with additional refrigerant

Additional refrigerant charge amount (case of SMMS-u)

This item describes the refrigerant correction amount of the Dx coil Interface system when connects with SMMS-u.

For more information please refer to Engineering Databook of SMMS-u.

Additional refrigerant charge amount at site = [1] + [2] + [3] + [4]

[1]. Compensation by system Ton.

[2]. Real length of liquid pipe × Additional refrigerant charge amount per liquid pipe 1 ft.

[3]. Corrective amount of refrigerant depending on the indoor units(Dx-coil interface capacity). Please refer to table below.

For Guideline TF, Dx-coil volume is relatively small. Hence, the additional refrigerant correction amount shall be 0 lbs for all cases.

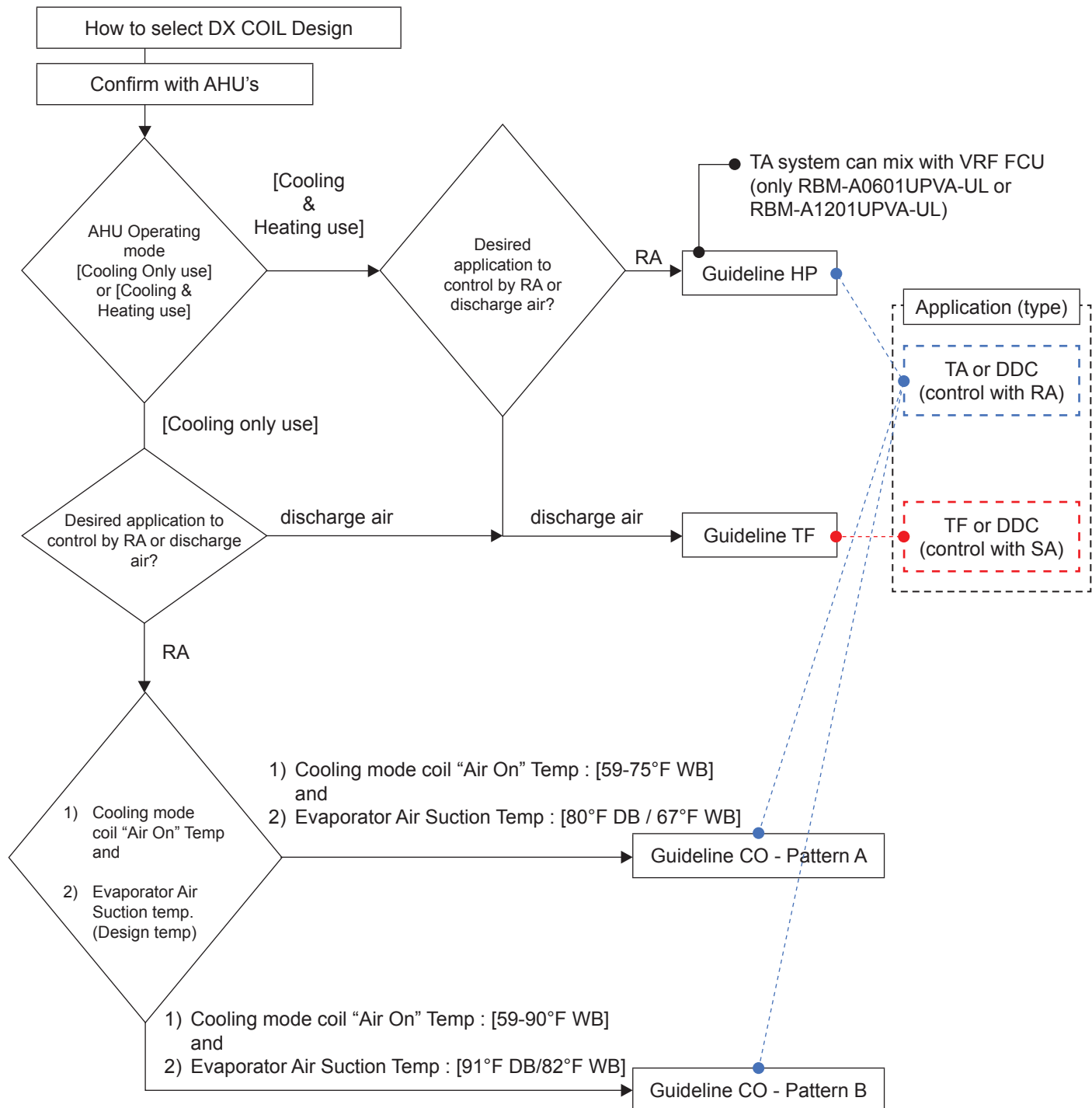
[4]. Corrective amount of refrigerant depending on the outdoor unit diversity (Connected ratio of indoor units to outdoor units).

Corrective amount of refrigerant depending on the Dx-coil interface capacity (Ton). Guideline HP, cooling only pattern A and B.

Ton	0.6	0.8	1	1.25	1.5	2	2.25	2.5	3	4	4.5	5
Lbs	0.24	0.32	0.42	0.60	0.72	0.92	1.12	1.20	1.51	1.91	2.11	2.5

Ton	6	8	10	12	14	16	18	20	22	24	26	28	30	32	36	38	40
Lbs	3.09	3.97	4.68	6.26	7.06	7.85	8.84	9.83	11.8	12.6	13.4	14.2	15.0	15.8	17.3	18.1	18.9

7-4. How to select DX COIL Design Guideline



AHU / DX COIL Design Notes:

- Cooling & Heating output figures are based on calculations and "general" test data. All figures are to be taken as approximations. The properties of the 3rd Party DX COIL will have an effect on the performance of Outdoor units.
- For the AHU/DX COIL prepared on site, please design with referring to submittal of AHU.
 - The DX COIL must be suitable for R410A.
 - The design should allow operation an Evaporator and a Condenser depends on selected usage. (Features: Multiple circuits / Liquid Capillary Distributor / Gas Header)
 - The counter flow principle must be observed for the DX COIL Design.
 - A Drain Pan must be fitted (even if only used in Heat mode) due to defrost cycles.

EN

7-5. DX COIL Guideline H/P

- Guideline H/P -

< TA type >

No. of refrigerant circuit by Dx-coil copper tube dia. and Dx-coil size (Ton)

Copper tube diameter	Number of Circuits					
	5/16"		3/8"		1/2"	
Dx-coil capacity	Min	Max	Min	Max	Min	Max
0.6 Ton	2	3	2	2	2	2
0.8 Ton	2	3	2	2	2	2
1 Ton	2	3	2	2	2	2
1.25 Ton	3	4	2	3	2	2
1.5 Ton	3	4	2	3	2	2
2 Ton	3	4	2	3	2	2
2.25 Ton	4	6	3	4	2	2
2.5 Ton	4	6	3	4	2	2
3 Ton	5	8	3	5	2	3
4 Ton	6	8	4	6	3	3
4.5 Ton	6	8	4	6	3	4
5 Ton	6	8	4	6	3	4
6 Ton	8	12	6	10	4	6
8 Ton	10	14	8	12	5	7
10 Ton	16	22	12	16	8	10
12 Ton	16	24	12	18	8	10
14 Ton	18	24	14	18	8	10
16 Ton	20	26	16	20	10	12
20 Ton	24	32	18	28	12	14
22 Ton	26	30	20	32	14	16
24 Ton	30	40	22	34	14	18
26 Ton	32	42	24	30	14	18
28 Ton	34	46	26	36	16	20
30 Ton	36	48	26	36	16	20
32 Ton	40	54	30	38	18	22

Ton		0.6	0.8	1	1.25	1.5	2	2.25	2.5	3
AHU Air flow rate (cfm)	Std.	250	300	350	450	550	650	750	800	950
	Min.	200	240	280	360	440	520	600	640	760
	Max.	300	360	420	540	660	780	900	960	1140
Dx-coil internal volume (inch ³)	Min.	18	26	34	43	51	68	77	85	102
	Max.	30	38	46	58	69	92	104	115	138
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)								
Cooling	Capacity (kBtu/h)	7	9	12	15	18	24	27	30	36
	Coil on Air temp.	59 - 75°F WB (64 - 90°F DB)								
	Evaporating temp.	44°F								
	Superheat	10.8°F								
	Air Suction temp. (Design temp.)	80°F DB / 67°F WB								
Heating	Capacity (kBtu/h)	8.5	10.5	13.5	17	20	27	30	34	40
	Coil on Air temp.	54 - 82°F DB								
	Evaporating temp.	126°F								
	Subcool	7.2°F								
	Air Suction temp. (Design temp.)	68°F DB								

Ton		4	4.5	5	6	8	10	12	14	16
AHU Air flow rate (cfm)	Std.	1250	1450	1650	2120	2470	3120	4240	4590	4940
	Min.	1000	1160	1320	1696	1976	2496	3392	3672	3952
	Max.	1500	1740	1980	2544	2964	3744	5088	5508	5928
Dx-coil internal volume (inch³)	Min.	128	149	170	207	259	311	414	466	518
	Max.	173	202	230	281	351	421	562	632	702
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)								
Cooling	Max. Capacity (kBtu/h)	48	54	60	72	96	120	144	168	192
	Coil on Air temp.	59 - 75°F WB (64 - 90°F DB)								
	Evaporating temp.	44°F								
	Superheat	10.8°F								
	Air Suction temp. (Design temp.)	80°F DB / 67°F WB								
Heating	Max. Capacity (kBtu/h)	54	61	67	81	108	135	162	189	216
	Coil on Air temp.	54 - 82°F DB								
	Evaporating temp.	126°F								
	Subcool	7.2°F								
	Air Suction temp. (Design temp.)	68°F DB								

Ton		18	20	22	24	26	28	30	32	36	38	40
AHU Air flow rate (cfm)	Std.	5590	6240	7360	8480	8830	9180	9530	9880	12720	13070	13420
	Min.	4472	4992	5888	6784	7064	7344	7624	7904	10180	10460	10740
	Max.	6708	7488	8832	10176	10596	11016	11436	11856	15260	15680	16100
Dx-coil internal volume (inch³)	Min.	570	622	725	828	880	932	984	1036	1242	1294	1346
	Max.	772	842	983	1124	1194	1264	1334	1404	1686	1756	1826
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)										
Cooling	Max. Capacity (kBtu/h)	216	240	264	288	312	336	360	384	432	456	480
	Coil on Air temp.	59 - 75°F WB (64 - 90°F DB)										
	Evaporating temp.	44°F										
	Superheat	10.8°F										
	Air Suction temp. (Design temp.)	80°F DB / 67°F WB										
Heating	Max. Capacity (kBtu/h)	242	270	297	324	351	378	405	432	486	513	540
	Coil on Air temp.	54 - 82°F DB										
	Evaporating temp.	126°F										
	Subcool	7.2°F										
	Air Suction temp. (Design temp.)	68°F DB										

< DDC type >

No. of refrigerant circuit by Dx-coil copper tube dia. and Dx-coil size (Ton)

Copper tube diameter	Number of Circuits					
	5/16"		3/8"		1/2"	
Dx-coil capacity	Min	Max	Min	Max	Min	Max
5 Ton	6	8	4	6	3	4
6 Ton	8	12	6	10	4	6
8 Ton	10	14	8	12	5	7
10 Ton	16	22	12	16	8	10
12 Ton	16	24	12	18	8	10
14 Ton	18	24	14	18	8	10
16 Ton	20	26	16	20	10	12
20 Ton	24	32	18	28	12	14
24 Ton	30	40	22	34	14	18
28 Ton	34	46	26	36	16	20
32 Ton	40	54	30	38	18	22

Ton		4.5	5	6	8	10	12	14	16
AHU Air flow rate (cfm)	Std.	1450	1650	2120	2470	3120	4240	4590	4940
	Min.	1160	1320	1696	1976	2496	3392	3672	3952
	Max.	1740	1980	2544	2964	3744	5088	5508	5928
Dx-coil internal volume (inch ³)	Min.	149	170	207	259	311	414	466	518
	Max.	202	230	281	351	421	562	632	702
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)							
Cooling	Max. Capacity (kBtu/h)	54	60	72	96	120	144	168	192
	Coil on Air temp.	59 - 75°F WB (64 - 90°F DB)							
	Evaporating temp.	44°F							
	Superheat	10.8°F							
	Air Suction temp. (Design temp.)	80°F DB / 67°F WB							
Heating	Max. Capacity (kBtu/h)	61	67	81	108	135	162	189	216
	Coil on Air temp.	54 - 82°F DB							
	Evaporating temp.	126°F							
	Subcool	7.2°F							
	Air Suction temp. (Design temp.)	68°F DB							

Ton		18	20	24	28	32
AHU Air flow rate (cfm)	Std.	5590	6240	8480	9180	9880
	Min.	4472	4992	6784	7344	7904
	Max.	6708	7488	10176	11016	11856
Dx-coil internal volume (inch ³)	Min.	570	622	828	932	1036
	Max.	772	842	1124	1264	1404
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)				
Cooling	Max. Capacity (kBtu/h)	216	240	288	336	384
	Coil on Air temp.	59 - 75°F WB (64 - 90°F DB)				
	Evaporating temp.	44°F				
	Superheat	10.8°F				
	Air Suction temp. (Design temp.)	80°F DB / 67°F WB				
Heating	Max. Capacity (kBtu/h)	241.92	270	324	378	432
	Coil on Air temp.	54 - 82°F DB				
	Evaporating temp.	126 °F				
	Subcool	7.2°F				
	Air Suction temp. (Design temp.)	68°F DB				

7-6. DX COIL Guideline TF

- Guideline TF -

< TF, DDC (control with SA) type >

No. of refrigerant circuit by Dx-coil copper tube dia. and Dx-coil size (Ton)

Copper tube diameter	Number of Circuits					
	5/16"		3/8"		1/2"	
Dx-coil capacity	Min	Max	Min	Max	Min	Max
5 Ton	6	8	4	6	3	4
6 Ton	8	12	6	10	4	6
8 Ton	10	14	8	12	5	7
10 Ton	16	22	12	16	8	10
12 Ton	16	24	12	18	8	10
14 Ton	18	24	14	18	8	10
16 Ton	20	26	16	20	10	12
20 Ton	24	32	18	28	12	14
24 Ton	30	40	22	34	14	18
28 Ton	34	46	26	36	16	20
32 Ton	40	54	30	38	18	22

Ton		4.5	5	6	8	10	12	14	16
AHU Air flow rate (cfm)	Std.	656	689	848	1059	1254	1695	1907	2119
	Min.	530	577	706	865	1042	1413	1572	1730
	Max.	742	806	989	1236	1483	1978	2225	2472
Dx-coil internal volume (inch ³)	Min.	79	85	105	131	157	210	236	262
	Max.	161	174	215	268	322	429	483	537
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)							
Cooling	Max. Capacity (kBtu/h)	54	60	72	96	120	144	168	192
	Coil on Air temp.	50 - 90°F WB (66 - 115°F DB)**							
	Evaporating temp.	44°F							
	Superheat	10.8°F							
	Air Suction temp. (Design temp.)	91°F DB / 82°F WB							
Heating	Max. Capacity (kBtu/h)	61	67	81	108	134	162	189	215.04
	Coil on Air temp.	14 - 59°F DB							
	Evaporating temp.	126°F							
	Subcool	7.2°F							
	Air Suction temp. (Design temp.)	32°F DB							

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Ton		20	24	28	32
AHU Air flow rate (cfm)	Std.	2507	3390	3814	4238
	Min.	2084	2825	3143	3461
	Max.	2967	3955	4450	4944
Dx-coil internal volume (inch ³)	Min.	315	420	472	525
	Max.	644	859	966	1074
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)			
Cooling	Max. Capacity (kBtu/h)	240	288	336	384
	Coil on Air temp.	50 - 90°F WB (66 - 115°F DB)**			
	Evaporating temp.	44°F			
	Superheat	10.8°F			
	Air Suction temp. (Design temp.)	91°F DB / 82°F WB			
Heating	Max. Capacity (kBtu/h)	270	324	378	430
	Coil on Air temp.	14 - 59°F DB			
	Evaporating temp.	126°F			
	Subcool	7.2°F			
	Air Suction temp. (Design temp.)	32°F DB			

** Outdoor/Suction air temp 115 - 126°F(DB) is also available but temporary operatable

7-7. DX COIL Guideline CO Pattern A

- Guideline Cooling Only Pattern A -

No. of Ref. Circuit by DX Coil Copper Tube Dia. and DX Coil Size (HP)

Copper tube	Number of Circuits					
	5/16"		3/8"		1/2"	
Dx-coil	Min	Max	Min	Max	Min	Max
0.6 Ton	No restriction	3	No restriction	2	No restriction	2
0.8 Ton		3		2		2
1 Ton		3		2		2
1.25 Ton		4		3		2
1.5 Ton		4		3		2
2 Ton		4		3		2
2.25 Ton		6		4		2
2.5 Ton		6		4		2
3 Ton		8		5		3
4 Ton		8		6		3
4.5 Ton		8		6		4
5 Ton		8		6		4
6 Ton		12		10		6
8 Ton		14		12		7
10 Ton		16		16		10
12 Ton		20		18		10
14 Ton		22		18		10
16 Ton		24		20		12
20 Ton		30		28		14
22 Ton		30		32		16
24 Ton		40		34		18
26 Ton		42		30		18
28 Ton		46		36		20
30 Ton		48		36		20
32 Ton		54		38		22

* It is able to connect SMMS-e,u H/P model when you set it as Cooling only mode.

Please setup the Function CODE(DN code) [0F] : "0000" to "0001" by a wired remote controller.

Ton		0.6	0.8	1	1.25	1.5	2	2.25	2.5	3	4	4.5	5	6
AHU Air flow rate (cfm)	Std.	250	300	350	450	550	650	750	800	950	1250	1450	1650	2120
	Min.	No restriction												
	Max.	No restriction												
Dx-coil internal volume (inch³)	Min.	18	26	34	43	51	68	77	85	102	128	149	170	207
	Max.	52	65	78	93	109	141	157	173	204	268	299	331	391
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)												
Cooling	Max. Capacity (kBtu/h)	7	9	12	15	18	24	27	30	36	48	54	60	72
	Coil on Air temp.	59 - 75°F WB (64 - 90°F DB)												
	Evaporating temp.	44°F												
	Superheat	10.8°F												
	Air Suction temp. (Design temp.)	80°F DB / 67°F WB												
Heating	Max. Capacity (kBtu/h)	-												
	Coil on Air temp.	-												
	Evaporating temp.	-												
	Subcool	-												
	Air Suction temp. (Design temp.)	-												

EN

Ton		8	10	12	14	16	18	20	22	24	26	28	30	32	36	38	40
AHU Air flow rate (cfm)	Std.	2470	3120	4240	4590	4940	5590	6240	7360	8480	8830	9180	9530	9880	12720	13070	13420
	Min.	No restriction															
	Max.	No restriction															
Dx-coil internal volume (inch ³)	Min.	259	311	414	466	518	570	622	725	828	880	932	984	1036	1242	1294	1346
	Max.	488	683	781	879	976	1172	1367	1465	1562	1660	1757	1855	1953	2343	2441	2539
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)															
Cooling	Max. Capacity (kBtu/h)	96	120	144	168	192	216	240	264	288	312	336	360	384	432	456	480
	Coil on Air temp.	59 - 75°F WB (64 - 90°F DB)															
	Evaporating temp.	44°F															
	Superheat	10.8°F															
	Air Suction temp. (Design temp.)	80°F DB / 67°F WB															
Heating	Max. Capacity (kBtu/h)	-															
	Coil on Air temp.	-															
	Evaporating temp.	-															
	Subcool	-															
	Air Suction temp. (Design temp.)	-															

7-8. DX COIL Guideline CO Pattern B

Guideline Cooling Only Pattern B -

No. of Ref. Circuit by DX Coil Copper Tube Dia. and DX Coil Size (HP)

Copper tube	Number of Circuits					
	5/16"		3/8"		1/2"	
Dx Coil	Min	Max	Min	Max	Min	Max
0.6 Ton	No restriction	3	No restriction	2	No restriction	2
0.8 Ton		3		2		2
1 Ton		3		2		2
1.25 Ton		4		3		2
1.5 Ton		4		3		2
2 Ton		4		3		2
2.25 Ton		6		4		2
2.5 Ton		6		4		2
3 Ton		8		5		3
4 Ton		8		6		3
4.5 Ton		8		6		4
5 Ton		8		6		4
6 Ton		12		10		6
8 Ton		14		12		7
10 Ton		16		16		10
12 Ton		20		18		10
14 Ton		22		18		10
16 Ton		24		20		12
20 Ton		30		28		14
22 Ton		30		32		16
24 Ton		40		34		18
26 Ton		42		30		18
28 Ton		46		36		20
30 Ton		48		36		20
32 Ton		54		38		22

* It is able to connect SMMS-e,u H/P model when you set it as Cooling only mode.

Please setup the Function CODE(DN code) [0F] : "0000" to "0001" by a wired remote controller.

Ton		0.6	0.8	1	1.25	1.5	2	2.25	2.5	3	4	4.5	5	6
AHU Air flow rate (cfm)	Std.	250	300	350	450	550	650	750	800	950	1250	1450	1650	2120
	Min.	No restriction												
	Max.	No restriction												
Dx-coil internal volume (inch³)	Min.	15	18	22	26	31	40	44	49	57	75	84	93	110
	Max.	32	40	48	58	68	88	98	108	127	167	187	207	244
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)												
Cooling	Max. Capacity (kBtu/h)	7	9	12	15	18	24	27	30	36	48	54	60	72
	Coil on Air temp.	59 - 90°F WB (64 - 110°F DB)												
	Evaporating temp.	44°F												
	Superheat	10.8°F												
	Air Suction temp. (Design temp.)	91°F DB / 82°F WB												
Heating	Max. Capacity (kBtu/h)	-												
	Coil on Air temp.	-												
	Evaporating temp.	-												
	Subcool	-												
	Air Suction temp. (Design temp.)	-												

EN

Ton		8	10	12	14	16	18	20	22	24	26	28	30	32	36	38	40
AHU Air flow rate (cfm)	Std.	2470	3120	4240	4590	4940	5590	6240	7360	8480	8830	9180	9530	9880	12720	13070	13420
	Min.	No restriction															
	Max.	No restriction															
Dx-coil internal volume (inch ³)	Min.	137	192	220	247	275	330	384	725	439	880	494	984	549	659	687	714
	Max.	305	427	488	549	610	732	854	1465	976	1660	1098	1855	1220	1465	1526	1587
Copper tube dia. (inch)		Ø1/2", Ø3/8", Ø5/16" (Recommended Ø3/8" or less)															
Cooling	Max. Capacity (kBtu/h)	96	120	144	168	192	216	240	264	288	312	336	360	384	432	456	480
	Coil on Air temp.	59 - 90°F WB (64 - 110°F DB)															
	Evaporating temp.	44°F															
	Superheat	10.8°F															
	Air Suction temp. (Design temp.)	91°F DB / 82°F WB															
Heating	Max. Capacity (kBtu/h)	-															
	Coil on Air temp.	-															
	Evaporating temp.	-															
	Subcool	-															
	Air Suction temp. (Design temp.)	-															

7-9. DX COIL Manufacturing

- DX COIL & Pipework Design Pressure: 601 PSI (4.15 MPa)
- DX COIL & Pipework Burst Pressure (withstand): 1806 PSI (12.45 MPa) (more than 3 × Design Pressure)

DX COIL Contamination:

- Ensure the DX COIL is cleaned, using detergent, after manufacture to remove contaminants from the coil
- Do not use chlorinated detergent during the cleaning process
- Do not leave flux on or inside the DX COIL

DX COIL & Pipework Contamination (Allowable Limits):	Residual water amount	6.46×10 ⁻⁶ oz. / ft (0.6 mg / m)
	Residual oil amount	5.38×10 ⁻⁶ oz. / ft (0.5 mg / m)
	Amount of solid contaminants	1.94×10 ⁻⁵ oz. / ft (1.8 mg / m)

- DX COIL contaminants must be equal to or less than the values shown above. The allowable contaminant levels shown assumes Ø3/8 in. (Ø9.52 mm) copper tube has been used for the manufacture of the DX COIL

7-10. DX Controller Installation

Installation Site	Avoid Direct Sunlight. DO NOT install outside. • Avoid locations exposed to steam or oil vapours. • Avoid locations where combustible gas may leak, settle or be generated. • Avoid installation near machines emitting high-frequency waves. • Avoid places where acidic solutions are frequently used. • Avoid places where sulphur based or other sprays are frequently used. • Avoid places where vibrations may occur. • When installing the Dx-valve kit and the Dx-coil controller into the Air handling unit, do not install it where it is exposed to the cooled air of the secondary side of the heat exchanger. • Do not install in locations where iron or other metal dust is present. If iron or other metal dust adheres to or collects on the interior of the Dx-coil controller, it may spontaneously combust and start a fire. • Standard Rating ; IP65
Notes	To avoid damage; when making holes for cable glands, please first remove the Gland Plate from the Dx-coil controller
Ambient Temperature	126°F (52°C) (or less)
Ambient Humidity	Relative humidity 80% (or less). No dew condensation allowed. If the DX-Controller is to be installed where dew condensation could form, locally sourced insulation should be fitted to avoid condensation.
Installation Angle	Vertical Installation

EN

7-11. Sensor Connections

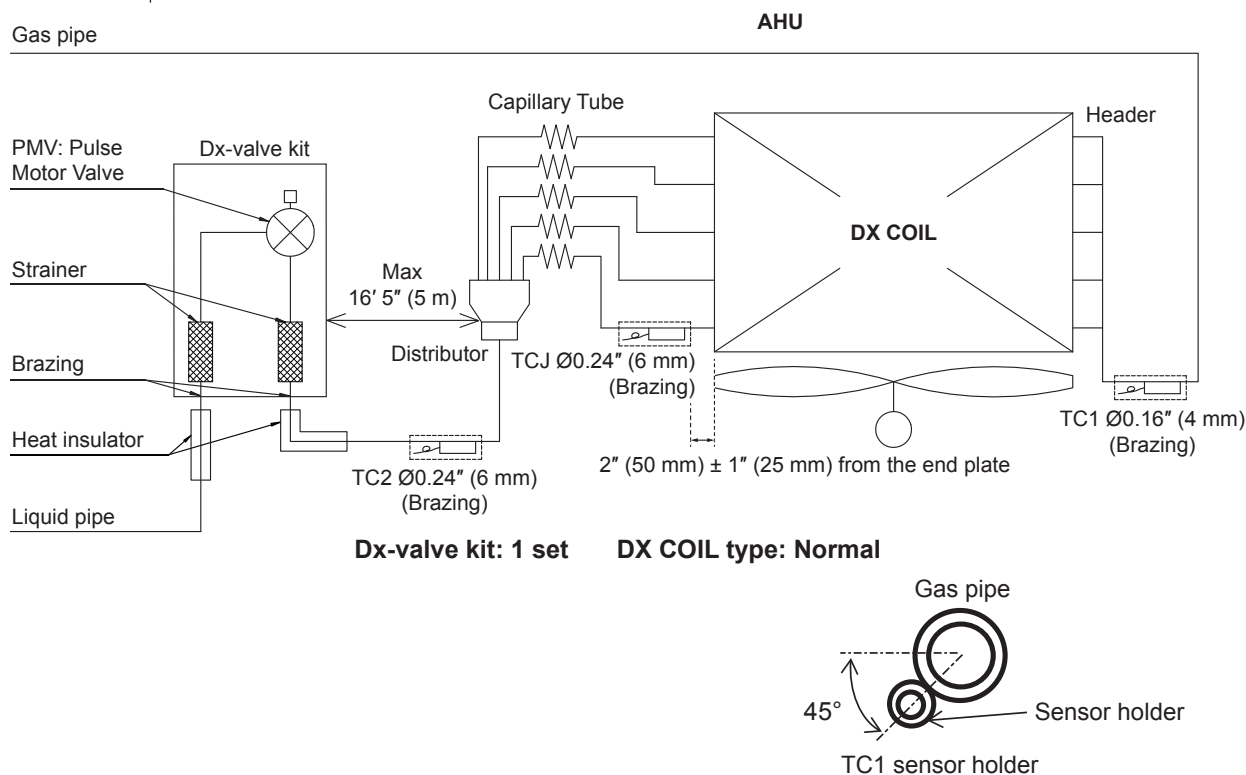
Installation	Sensor holders MUST be brazed to the DX COIL to ensure reliable temperature sensing. Follow the information in the Dx-coil controller Installation Manual for details.																						
Wire Connections	TC1, TC2, TC and TA, TF which have a 24'7" (7.5 m) cable are combined in the Dx-coil controller. If these Sensors are removed during installation ensure the sensors are reconnected to the Dx-coil controller main PCB (MCC-1777) as shown below: • TC1 Sensor (BRN Plug [2 Pin]) > MCC-1777 CN100 (BROWN Socket [2 Pin]) • TC2 Sensor (BLK Plug [2 Pin]) > MCC-1777 CN101 (BLK Socket [2 Pin]) • TCJ Sensor (RED Plug [2 Pin]) > MCC-1777 CN102 (RED Socket [2 Pin]) • TF Sensor (GRN Plug[2 Pin]) > MCC-1777 CN103 (GRN Socket [2 Pin]) • TA Sensor (YEL Plug[2 Pin]) > MCC-1777 CN104 (YEL Socket [2 Pin]) Take care to re-connect them correctly. The cables should be installed with a U-bend at Sensor ends to stop water dripping into components. The sensor cables vinyl tube can withstand up to 221°F (105°C) be careful to keep clear of high temperature parts. The extension cables' connectors are not IP rated. Ensure that they are located within the AHU. If the lead wires of various sensors do not reach, use the Optional Sensor 32'10" (10 m) - TCB-IFDES1001P-UL.																						
TA, TF Sensor position	The TA, TF sensor which is combined in the Dx-coil controller must be located right position for TOSHIBA control, not demand control. The cooling/heating demand is determined from the DDC. Following the below example picture: *1: TF sensor can only be used with SMMS-u and SHRM-u. <table><tr><td></td><td>TA</td><td>DDC</td><td>TF</td></tr><tr><td>Return air only</td><td></td><td></td><td></td></tr><tr><td>Fresh air only</td><td></td><td></td><td></td></tr><tr><td>FA mixed with RA</td><td></td><td></td><td></td></tr><tr><td>Heat recovery coil</td><td></td><td></td><td></td></tr></table> Please confirm specification of Heat Recovery Exchanger and apply within its specification.				TA	DDC	TF	Return air only				Fresh air only				FA mixed with RA				Heat recovery coil			
	TA	DDC	TF																				
Return air only																							
Fresh air only																							
FA mixed with RA																							
Heat recovery coil																							

※Each Dx-Type Design **MUST** follow the specified temperature range below.

Guidline	HP(TA) (Heating & Cooling)	Cooling Only*		HP(TF) (Heating & Cooling)
		Pattern A	Pattern B	
Control		TA or DDC		TF or DDC
Cooling mode "Coil on Air" temp.	59 - 75°F WB (64 - 90°F DB)	59 - 75°F WB (64 - 90°F DB)	59 - 90°F WB (64 - 109°F DB)	50 - 90°F WB (66 - 115°F** DB)
Heating mode "Coil on Air" temp.	54 - 82°F DB (Pull down to 45°F)	---	---	14 - 59°F DB

7-12. Dx-valve kit Installation

Installation	Avoid locations in direct sunlight. Standard Rating ; IPX4
Environment	Insulation should be fitted to Dx-valve kit (locally sourced). Ideally the Dx-valve kit should be contained within the AHU. If installed outside, a cover (locally sourced) should be fitted to protect from wind and rain in addition to Insulation.
Installation	The supplied components need to be assembled on to the DX COIL using custom locally sourced pipework. The PMV (Pulse Motor Valve) must be NOT installed upside down (PMV Motor on bottom). The connection angle between PMV body and PMV Motor is fixed at the factory (using thread lock) and should not be changed. The PMV Motor should not be removed from PMV body. Carefully handle and prepare the PMV when fitting to prevent ingress from foreign matter such as dust or water.
Brazing	• PMV A) Whilst brazing, the PMV body and PMV Motor must be water cooled to keep the component's temperature does not exceed 248°F (120°C). B) Whilst brazing, nitrogen gas must flowed through the PMV body and pipework to prevent internal oxidization. C) Prevent cooling water from getting inside the PMV body and connector of the lead during brazing. D) Take care not to damage the PMV cables during brazing. • Sensor holders • To ensure reliable operation, all Sensor holders must be fitted by brazing. • Be careful of that the brazing material does not enter into the sensor holder when attaching the TC1, TC2 and TCJ sensor holder. <u>TC1 Sensor</u> : Install it in the collecting part of the gas header. Braze the TC1 sensor on the location of the lower side 45° to detect the stable temperature. <u>TC2 Sensor</u> : Install it in the between the liquid pipe distributor and the PMV. (TC2 sensor is attached to the refrigerant cycle of AHU.) <u>TCJ Sensor</u> : Install it in the pass where the temperature of the capillary tube is the lowest. If the TC1, TC2 or TCJ sensors are easy to be subjected to the surrounding thermal effect, cover them with the heat insulator material, and fix them with the fixing band <u>TC1, TC2 and TCJ sensor position on DX COIL</u>



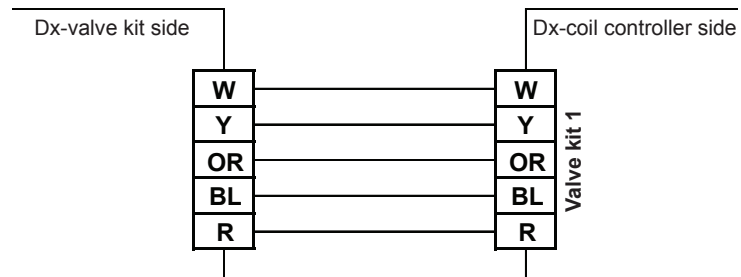
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Wire Connections

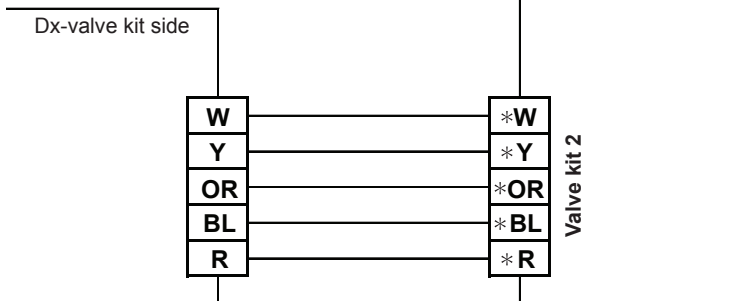
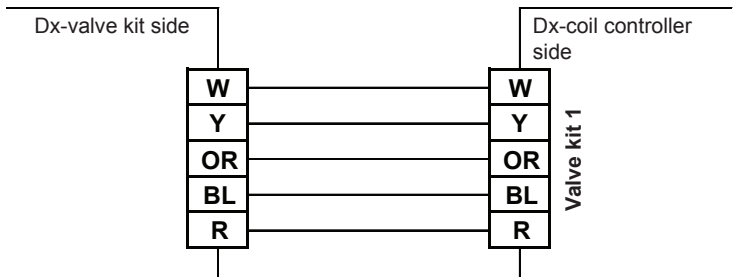
- Connect the cable from the PMV. Match the color of the wiring of the PMV side and the controller side.
- For the PMV, sensor wiring, do not bundle it with the motor wiring. The wrong operation may result in.
- The PMV cable is supplied at the maximum permissible length of 16'5".
- The PMV wiring can be extended up to 41ft with AWG 18 wiring size.

Color identification

W: White
Y: Yellow
OR: Orange
BL: Blue
R: Red



RBM-A0601UPVA-UL	0.6, 0.75, 1.0, 1.25, 1.5, 2.0, 2.25, 2.5, 3.0, 4.0, 4.5, 5.0 Ton
RBM-A1201UPVA-UL	6, 8, 10 Ton
RBM-A1921UPVA-UL	12, 14, 16 Ton



RBM-A1201UPVA-UL	20 Ton (10 Ton × 2)
RBM-A1921UPVA-UL	24 Ton (12 Ton × 2), 28 Ton (14 Ton × 2), 32 Ton (16 Ton × 2)

8. Control Outline

8-1. Cautions regard with DDC's programming

(1) Operation Start

- Capacity control signal(analogue input voltage) should be output after the AHU's fan operating.
Then, recommend to keep more than 50%(Heating; 40%) Capacity control signal during 5 mins.
- To protect the compressor, for 5 mins after operation start the compressor will continue to operate even if receives "Zero" Capacity control signal.

(2) Freeze prevention control (Low temperature release)

- When the compressor(s) stopped by Freeze prevention control, it will re-start after maximum 20 mins depends on DX-COIL condition.

(3) Recovery control

- Both refrigerant recovery and oil (lubricant) recovery control during cooling and heating operation.
When RSW503,504 is set as [3], when recovery control starts output signal will be from *DO5/DO5,*DO6/DO6.
Please check outdoor units' Service Manual for more detail.

(4) Defrost control (Full Defrost)

- Defrost control is designed to performed according to the amount of frost on the outdoor unit's time.
heat exchanger or the accumulation of operation
When defrost control starts, output signal will come from *DO4/DO4.
Please check outdoor units' Service Manual for more detail.

(5) Compressor restart prevention timer

- If the compressor(s) is stopped by Capacity control or protection function(except Freeze prevention control), normally the compressor will continue to stop for 2 mins 30 secs, even if receives Capacity control signal.

8-2. Protection Function Summary

- Protection Controls varies by Outdoor unit, please see appropriate Outdoor unit service manual for full details (Below "Protection Function Summary" is according to SMMS-u.)

Function	Summary																		
Freeze prevention control (Low temperature release)	In Cooling Mode prevents low DX-COIL temperatures by controlling compressor speed (based on TC1/TC2/TCJ sensor temperature).																		
Cooling oil (refrigerant) recovery control	This control periodically increases flow-rate to ensure refrigerant oil does not build up in inter-unit gas pipes (which can occur when operating command is inadequate, or while cooling is progressed under low ambient conditions). During this control the compressors are operated at a target speed, and Dx valve kit PMV is opened to a certain degree. Upon completion of recovery control normal Cooling operation resumes.																		
Heating refrigerant (oil) recovery control (Heating Start up Control)	This control periodically increases flow-rate to ensure liquid refrigerant trapped inside the DX COIL. It also serves the purpose of recovering DX COIL / Outdoor refrigerant after defrosting and recovering oil present in outdoor heat exchangers during heating overload operation. During this control the compressors are operated at a target speed, and Dx valve kit PMV is opened to a certain degree. Upon completion of recovery control normal Heating operation resumes. Recovery operation normally takes place after defrosting.																		
Defrost control (Full Defrost)	In Heating mode a defrost operation can be performed to reduce ice build-up on the Outdoor unit (based on TE1 & TE2, TE3 sensor). During Defrosting the refrigerant cycle is reversed temporarily cooling the DX COIL. During the heating operation, if the TE sensor detected temperature falls below the predicted TE sensor temperature by a specified amount, or if the TE sensor detected temperature falls below the frosting temperature for 300 minutes, the defrosting operation starts. (After start-up or when switching from cooling to heating, frost judgment is performed and the defrosting operation is started according to the judgment result.) While the outdoor unit is Defrosting the Dx valve kit PMV is opened to a certain degree. Heating Recovery operation normally takes place after defrosting. * In the case of the coupled system, when any of the outdoor units satisfies the defrosting start condition, all the units in the group to which the unit belongs start defrosting operation, and the other Gr units continue heating operation.																		
High Pressure release control	This control function is aimed at automatically shutting down a compressor in an outdoor unit depending on Pd. It is individually performed by the header unit and each follower unit. - Compressors are shut down when Pd reaches or exceeds P0 - The Pd control point P0 is switched according to the start priority of the outdoor unit - The compressor restart prevention timer (2 minutes 30 seconds) is set, and the control terminated. <table><tr><th colspan="2">Pd control point P0</th><th>Cooling</th><th>Heating</th></tr><tr><td rowspan="2">Outdoor unit priority1</td><td>compressor1</td><td>548 PST</td><td>512 PST</td></tr><tr><td>compressor2</td><td>540 PST</td><td>506 PST</td></tr><tr><td rowspan="2">Except outdoor unit priority1</td><td>compressor1</td><td>540 PST</td><td>500 PST</td></tr><tr><td>compressor2</td><td>540 PST</td><td>595 PST</td></tr></table>	Pd control point P0		Cooling	Heating	Outdoor unit priority1	compressor1	548 PST	512 PST	compressor2	540 PST	506 PST	Except outdoor unit priority1	compressor1	540 PST	500 PST	compressor2	540 PST	595 PST
Pd control point P0		Cooling	Heating																
Outdoor unit priority1	compressor1	548 PST	512 PST																
	compressor2	540 PST	506 PST																
Except outdoor unit priority1	compressor1	540 PST	500 PST																
	compressor2	540 PST	595 PST																
Case Heater control	There are 1 types of case heater: a compressor case heater. This control function is aimed at preventing the accumulation of refrigerant in those case, and is performed by all outdoor units. If the power supply has not been turned on for a specified period before a post-installation test run. Compressor failure may occur.Similarly, when starting compressors after a long period of no power supply, it is recommended that the power supply be turned on for a while before operation is resumed, just like a post-installation test run.																		

Function	Summary
IPDU control (IPDU = Inverter P.C. Board for compressor)	(1) Current, power release value control The purpose of this control is to prevent high pressure rise and overheating of electric parts by reducing the compressor speed when the maximum current and maximum power value set for each model are exceeded. (2) Heat sink overheat abnormality. • Stop the compressor operation when the TH sensor temperature exceeds 199°F (93°C). • When the above is stopped, the abnormal count is set to 1, and it restarts after 2 minutes and 30 seconds.If you continue the operation for 10 minutes or more after restarting, the trouble count will be cleared. • A trouble is confirmed with a trouble count of "4". (error code P07). (3) High pressure SW control Inverter compressor stops driving the compressor when the high pressure SW is operating. • When the above is stopped, the abnormal count is set to 1, and it restarts after 2 minutes and 30 seconds.If you continue the operation for 10 minutes or more after restarting, the trouble count will be cleared. • The trouble count becomes "4" and the trouble is confirmed.(error code P04)

9. Cable specifications

Communication line (Uv(U1), Uv(U2))

Uv: Control wiring between Dx-coil controller and outdoor unit

Wiring	2-core, non-polarity
Type	Shield wire
Size / Length	AWG 18 to AWG 16 / up to 3280'10" (1000 m)

Remote controller wiring (A, B)

Wiring	2-core, non-polarity
Size	AWG 20 to AWG 14
Length	- Up to 1640'5" (500 m) - Up to 1312'4" (400 m) (in case of two remote controller in group control) - Up to 656'2" (200 m) (total length of communication line between indoor units)

PMV wiring

Wiring	5 Wiring (5-core)
Size / Length	AWG 24 to AWG 20 / Up to 16'5" (5 m)
	AWG 18 / Up to 41' (12.5 m)

Terminal information

AWG 24 to AWG 18 - 0.5 mm² to 1.0 mm²

Function	Terminal	Max. Cable Length (m)	Cable Specification
Analogue Input (4 - 20 mA)	AI1, 2 / *AI1, 2	328'1" (100)	Non shield wire: AWG 24 to AWG 18
Analogue Input (0 - 10 V)	AI3, 4 / *AI3, 4	656'2" (200)	Shield wire: AWG 24 to AWG 18
Analogue Output (0 - 10 V)	AO1, 2 / *AO1, 2	656'2" (200)	Shield wire: AWG 24 to AWG 18
Digital Input	DI1 - 6 / *DI1 - 6	328'1" (100)	Non shield wire: AWG 24 to AWG 18
Digital Output	DO1 - E / *DO1 - E, N1 / *N1	1640'5" (500)	Non shield wire: AWG 24 to AWG 18

Use the following wiring materials to connect the communication cables and power cables. (locally procured)

Line	Description	
For RS-485	Type	2-core shielded wires
	Wire size	AWG 16, 1640'5" (500 m) Max.
	Length	(total length)

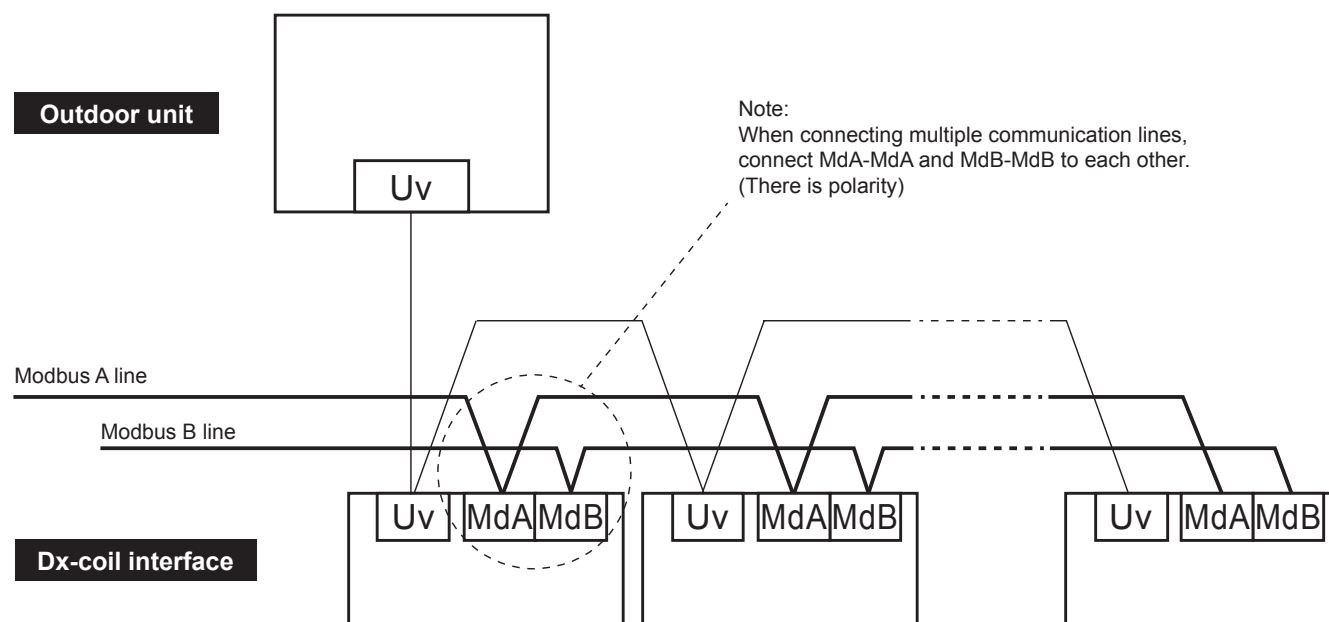
10. Modbus setting method

Modbus communication is available on this model. Follow the procedure below to set.

⚠ CAUTION

Use insulation type for Modbus devices to be connected.
If it is not an insulation type, it may affect the device due to noise, etc.

1. Wiring method



Baud Rate *1	SW506	Bit1: ON / Bit2: OFF (19200)	Bit1: ON / Bit2: OFF (19200)	...	Bit1: ON / Bit2: OFF (19200)
Address *2	SW507	1	2	...	16 (Up to 16)
Termination resistor *3	SW801	Bit1: ON	Bit1: OFF	...	Bit1: OFF

- * 1: Set the baud rate according to the communication device.
* 2: Up to 16 addresses can be set with the rotary switch.
* 3: Set the terminating resistor only for the unit with the latest address.

SW	Bit	Function Name	OFF (Default)	ON	Detail		
SW506	1	Modbus baud rate	Refer to right table		Bit1	Bit2	Baud rate
	OFF				OFF	9600	
	ON				OFF	19200	
	OFF				ON	38400	
	ON				ON	57600	
	3	No function	-	-	-		
4	No function	-	-	-			
SW507	1	Modbus address setting (RSW)	-	-	Refer to “Modbus setting method” in this Installation Manual.		
SW801	1	RS-485 terminating resistance setting	None	Can do (120 ohm)	Refer to “Modbus setting method” in this Installation Manual.		
	2	No function	-	-	-		

- RS-485 terminator resistor select switch SW801 (Bit1).
- For SW801 Bit1 (120 ohm), Set only the Dx-interface with the latest address, and turn off Bit1 for other Dx-interfaces.

2. Function codes

Function code	Sub function code	Function name
0×03	None	Read holding register
0×04	None	Read Input register
0×06	None	White single holding register
0×08	0×00, 01, 02, 04, 0A, 0B, 0C, 0D, 0E, 0F, 11, 12, 14	Diagnostics
0×0B	None	Get Comm. Event Counter
0×0C	None	Get Comm. Event Log
0×10	None	Write multiple holding registers

3. Address assignment table

Register	address	Read / Write	Data	Byte	Data Definition and remarks
Holding Register	40001	R / W	Operation / stop setting	2	0 : STOP 1 : OPERATE
	40002		Operation mode setting	2	1 : HEATING MODE 2 : COOLING MODE 3 : DRY MODE
	40003		Set temperature setting	2	10 times values
	40004		Automatic cooling set temperature (Dual set point) setting	2	10 times values
	40005		Automatic heating set temperature (Dual set point) setting	2	10 times values
	40006		Fan speed setting	2	1 : FAN STOP 2 : FAN AUTO 3 : FAN SPEED [HH] 4 : FAN SPEED [H] 5 : FAN SPEED [L]
	40007		Operation prohibition setting	2	Bit0 : Operation STOP Bit1 : Operation Mode Bit2 : temperature setting Bit4 : FAN
	40008		Analogue Input Capacity Control*	2	0 ~ 15
	40009 ~ 40019		Reserved		
	40020		CN90 DI1 (Safety contact input)	2	0 : OFF 1 : ON
	40021		CN90 DI2 (External error input)	2	0 : OFF 1 : ON
	40022		CN90 DI3 (Forced Thermo OFF input)	2	0 : OFF 1 : ON
	40023		CN90 DI4 (Notice input)	2	0 : OFF 1 : ON

Register	address	Read / Write	Data	Byte	Data Definition and remarks
Input Register	30001	R	Operation / stop setting	2	0 : STOP 1 : OPERATE
	30002		Operation mode setting	2	1 : HEATING MODE 2 : COOLING MODE 3 : DRY MODE
	30003		Set temperature setting	2	10 times values
	30004		Automatic cooling set temperature (Dual set point) setting	2	10 times values
	30005		Automatic heating set temperature (Dual set point) setting	2	10 times values
	30006		Fan speed setting	2	1 : FAN STOP 2 : FAN AUTO 3 : FAN SPEED [HH] 4 : FAN SPEED [H] 5 : FAN SPEED [L]
	30007		Operation prohibition setting	2	Bit0 : Operation STOP Bit1 : Operation Mode Bit2 : temperature setting Bit4 : FAN
	30008		Analogue Input Capacity Control*	2	0 ~ 15
	30009 ~ 30019		Reserved		
	30020		CN90 DI1 (Safety contact input)	2	0 : OFF 1 : ON
	30021		CN90 DI2 (External error input)	2	0 : OFF 1 : ON
	30022		CN90 DI3 (Forced Thermo OFF input)	2	0 : OFF 1 : ON
	30023		CN90 DI4 (Notice input)	2	0 : OFF 1 : ON
	30024 ~ 30039		Reserved		
	30040		TC1	2	10 times values
	30041		TC2	2	10 times values
	30042		TCJ	2	10 times values
	30043		TA	2	10 times values
	30044		TF	2	10 times values
	30045		Tx (Auxiliary temperature sensor)	2	10 times values
	30046		TO	2	10 times values
	30047 ~ 30059		Reserved		
	30060		Alarm Code	2	For example : remote controller display 「E04」 → 「0×0044」
	30061		Notice code 1	2	For example : remote controller display 「201」 → 「129」
	30062		Notice code 2	2	For example : remote controller display 「201」 → 「129」
	30063		Notice code 3	2	For example : remote controller display 「201」 → 「129」
	30064		Notice code 4	2	For example : remote controller display 「201」 → 「129」
	30065		Notice code 5	2	For example : remote controller display 「201」 → 「129」
	30066		Thermostat On Digital Output	2	0 : OFF 1 : ON
	30067		Cooling operation signal output / secondary heating signal output	2	0 : OFF 1 : ON
	30068		Heating operation signal output	2	0 : OFF 1 : ON
	30069		Fan Motor Digital Output	2	0 : OFF 1 : ON
	30070		Operating output	2	0 : OFF 1 : ON
	30071		Outdoor unit(s) operation level is lower than capacity command	2	0 : OFF 1 : ON
	30072		Outdoor unit(s) operation level is higher than capacity command	2	0 : OFF 1 : ON

* There are possibilities of thermodynamic and/or mechanical limitation from many factors. which may affect our system's heat pump cycle (refrigerant cycle) during operation. Hence, there is a possibility that the capacity output may be different from capacity control setting.

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Register	address	Read / Write	Data	Byte	Data Definition and remarks
Input Register	30073 ~ 30078	R	Reserved		
	30079		Under restriction of compressor speed due to heat sink overheating in outdoor unit(s)	2	0 : OFF 1 : ON
	30080		Cooling / heating start control output	2	0 : OFF 1 : ON
	30081		Defrost Mode Digital Output	2	0 : OFF 1 : ON
	30082		Pre defrost signal output	2	0 : OFF 1 : ON
	30083		Cooling oil recovery / Heating ref recovery	2	0 : OFF 1 : ON
	30084 ~ 30099		Reserved		
	30100		Product type setting	2	FIX AT : 0
	30101		Control type	2	0 : TA type 1 : TF type 2 : DDC type
	30102		Operation mode range	2	Bit0 : FAN MODE Bit1 : COOLING Bit2 : DRY MODE Bit3 : HEATING Bit5 : AUTO MODE
	30103		Fan speed range	2	Bit1 : FAN [L] Bit2 : FAN [H] Bit3 : FAN [HH]
	30104		Cooling upper limit set temperature	2	10 times values
	30105		Cooling lower limit set temperature	2	10 times values
	30106		Heating upper limit set temperature	2	10 times values
	30107		Heating lower limit set temperature	2	10 times values
	30108		Dry upper limit set temperature	2	10 times values
	30109		Dry lower limit set temperature	2	10 times values
	30110		Automatic mode upper limit set temperature	2	10 times values
	30111		Automatic mode lower limit set temperature	2	10 times values
	30112		Dual Set point Function Status	2	0 : OFF 1 : ON
	30113		Setting capacity	2	Similar setting to DN[11] setting
	30114		Modbus band rate SW state	2	0 : 9600bps 1 : 19200bps 2 : 38400bps 3 : 57600bps
	30115		Modbus Slave Address SW state	2	0 ~ 15 (0=slave address 1)
	30116 ~ 30199		Reserved		
	30200		Model name	16	
	30201		Model name		
	30202		Model name		
	30203		Model name		
	30204		Model name		
	30205		Model name		
	30206		Model name		
	30207		Model name		
	30208 ~ 30249		Reserved		
	30250		Serial number	16	
	30251		Serial number		
	30252		Serial number		
	30253		Serial number		
	30254		Serial number		
	30255		Serial number		
	30256		Serial number		
	30257		Serial number		
	30258 ~ 30299		Reserved		
	30300		Firmware Definition (Firmware control number)	4	0×2199
	30301		Firmware Definition (Firmware control number)		0×0001
	30302		Software Version	2	

11. Function code (DN code)

▼ Function CODE No. (DN code) table (setting by wired remote controller)

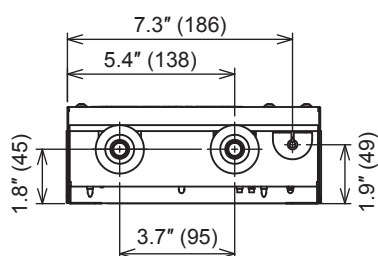
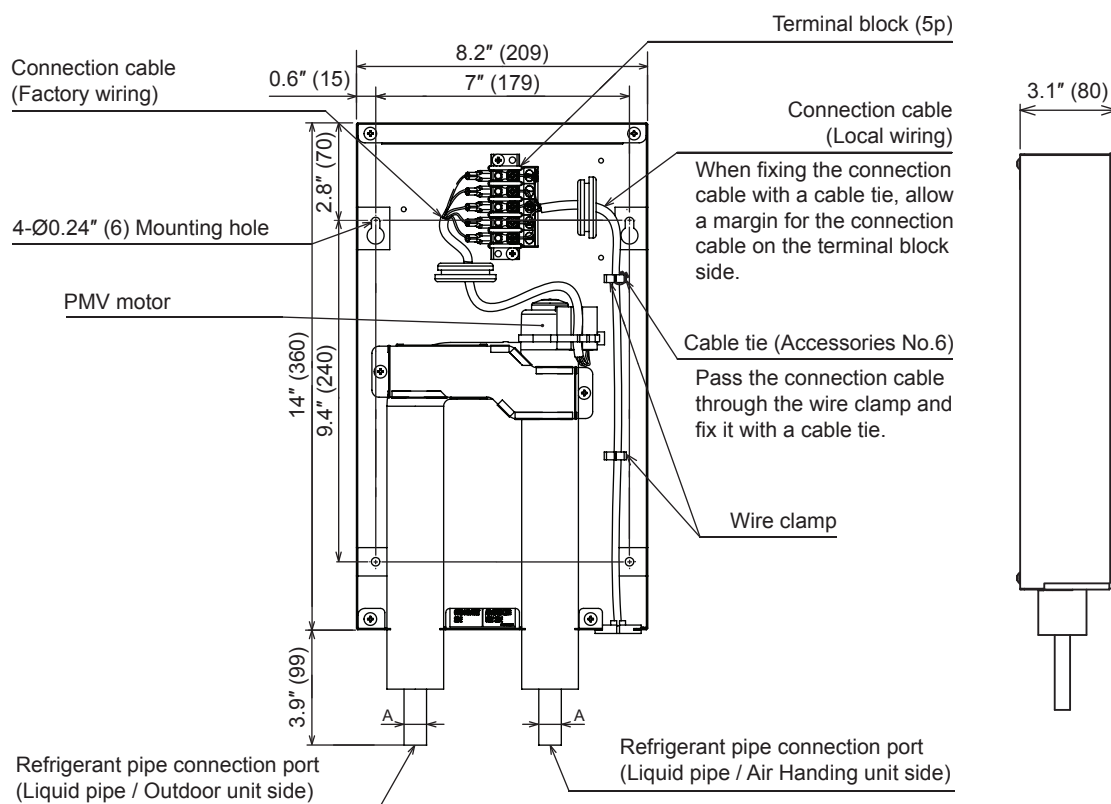
DN	Item	Description	Default (at shipment)									
01	Filter display delay timer	0000: None 0001: 150H 0002: 2500H 0003: 5000H 0004: 10000H	0000: None									
02	Dirty state of filter	0000: Standard 0001: High degree of dirt (Half of standard time)	0000: Standard									
04	Specific indoor unit priority	0000: No priority 0001: Priority	0000: No priority									
0F	Cooling only	0000: Heat Pump 0001: Cooling only (No display of [AUTO], [HEAT])	0000: Heat Pump									
10	Type	0055: Dx-coil interface	0055: Dx-coil interface									
11	Indoor unit capacity	0000: Unfixed	0000: Unfixed									
	<u>0001</u>	<u>0003</u>	0005	0007	0009	0011	0012	0013	0015	0017	0018	
	<u>0.6 Ton*</u>	<u>0.8 Ton*</u>	1 Ton	1.25 Ton	1.5 Ton	2 Ton	2.25 Ton	2.5 Ton	3 Ton	4 Ton	4.5 Ton	
	0019	0021	0023	<u>0024</u>	<u>0026</u>	0027	0028	<u>0031</u>	<u>0035</u>	0037	0039	
	5 Ton	6 Ton	8 Ton	<u>10 Ton*</u>	<u>12 Ton*</u>	14 Ton	16 Ton	<u>20 Ton*</u>	<u>24 Ton*</u>	28 Ton	32 Ton	
* Can be set by only SMMS-u / SHRM-u or later models.												
12	Line address	0001: No.1 unit to 0030 : No.30 unit	0000: Unfixed									
13	Indoor unit address	0001: No.1 unit to 0064 : No.64 unit	0099: Unfixed									
28	Automatic restart of power failure	0000: None 0001: Restart	0001: Restart									
33	Temperature unit select	0000: °C 0001: °F	0001: °F									
60	Timer setting (by Wired remote controller)	0000: Available(can be performed) 0001: Unavailable(cannot be performed)	0000: Available									
92	Fan trouble input release condition	0000: Operation stopped 0001: Release signal received	0000: Operation stopped									
7A	Change temperature unit on remote	0000: 2°F (1°C) 0001: 1°F (0.5°C)	0001: 1°F (0.5°C)									
E0	Destination	0000: Domestic 0001: For North American 0002: For Australia 0003: For China 0004: For Europe 0005: For South Korea	0001: For North American									
4AE	Dx-coil PMV kit type setting	0001: RBM-A1201UPVA-UL 0002: RBM-A1921UPVA-UL 0003: RBM-A0601UPVA-UL	Setting depending on HP (Horse Power)									

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12. Dx-coil controller, Dx-valve kit Dimensions

RBM-A0601UPVA-UL, RBM-A1201UPVA-UL, RBM-A1921UPVA-UL

(Unit: in (mm))

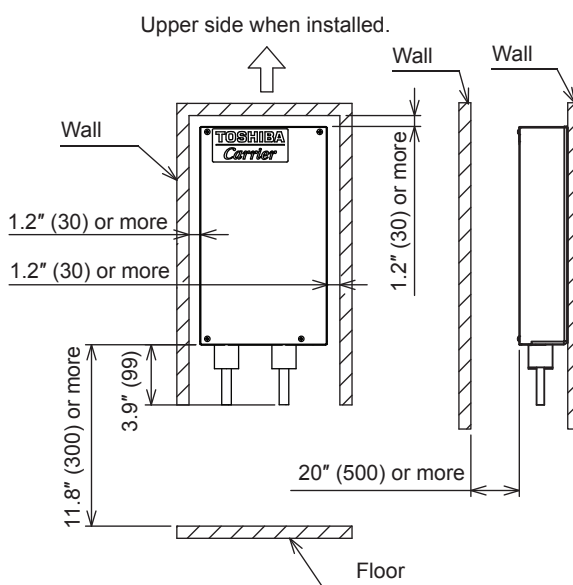


Note)

This product is designed for the indoor installation.

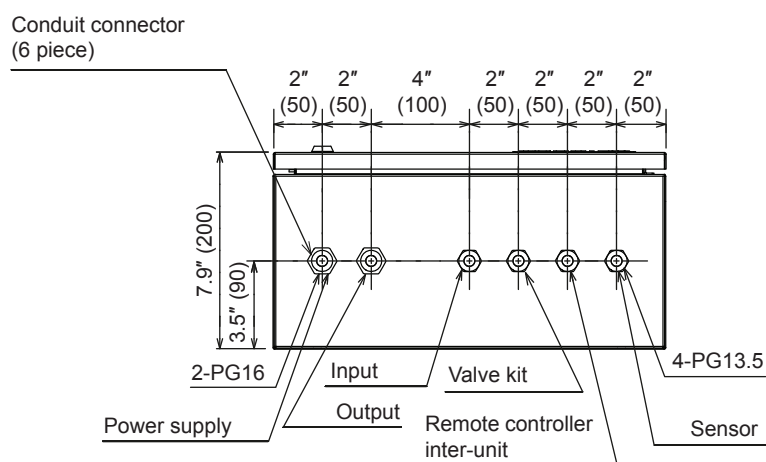
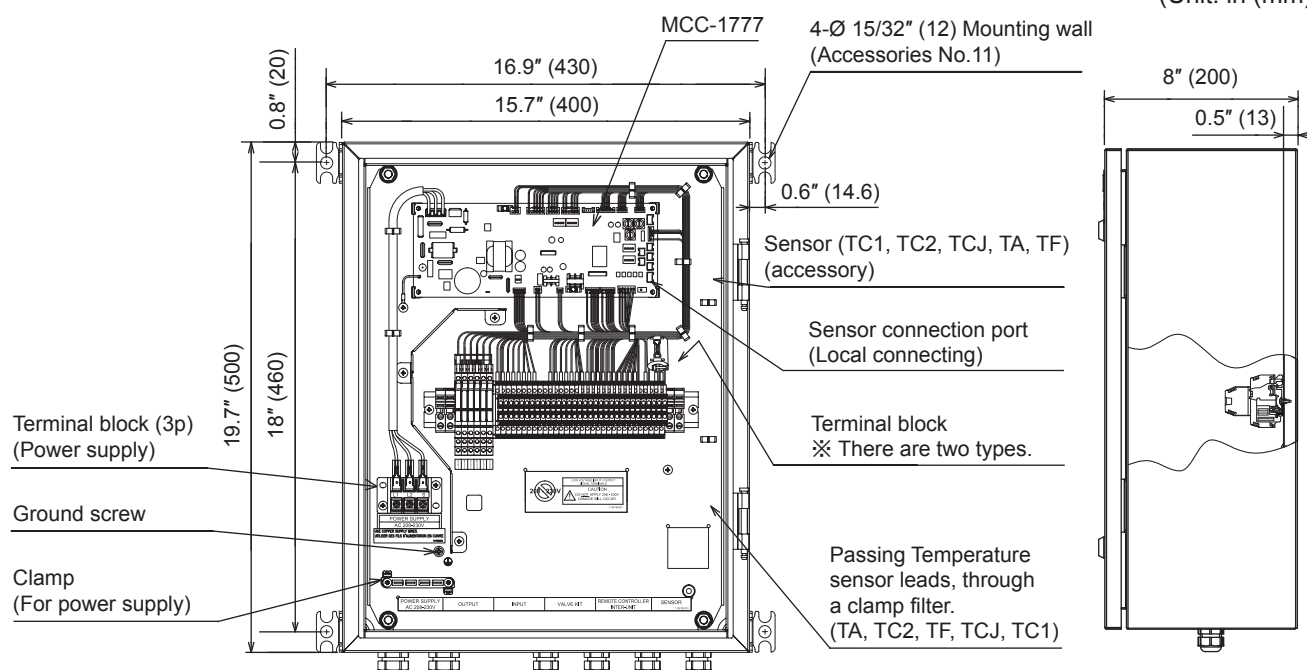
Model	A (Pipe)
RBM-A0601UPVA-UL	Ø3/8" (9.52)
RBM-A1201UPVA-UL	Ø1/2" (12.7)
RBM-A1921UPVA-UL	Ø5/8" (15.88)

• Installation space and maintenance space.

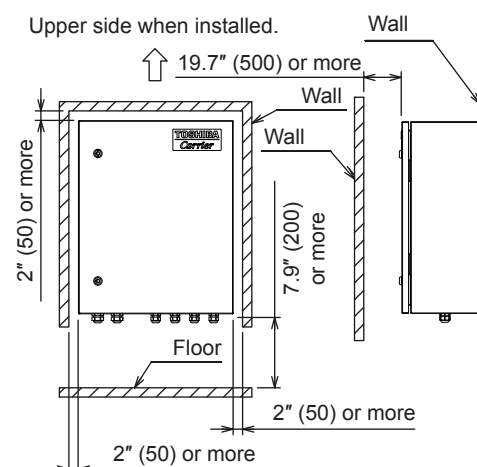


TCB-IFDMR01UP-UL

(Unit: in (mm))



- Installation space and maintenance space.



Note)

- This product is designed for the indoor installation.
- If the temperature sensor is short, use the Optional Sensor TCB-IFDES1001P-UL. (Temperature sensor with 32'10" (10 m) wiring length)

※ Terminal block type classification table.

TCB-IFDMR01UP-UL
(Terminal block with relay)

Terminal block (32P)
Terminal block (6P with relay)

EN

TCB-IFDMR01UP-UL



14. Compatibility with Remote Controller, BMS, Open network system

TU2C-LINK models

✓ : Available ✕ : Prohibition

Appliance name	Model Name and appearance	TA	DDC	TF
Remote Controller				
Wired remote controller	RBC-AWSU52-UL 	✓	✓	✓
	RBC-ASCU11-UL 	✓	✓	✓

Appliance name	Model Name and appearance	TA	DDC	TF
Open network and analog interface				
BACnet IP	BMS-IFBN1281U-UL 	✓	✕	✓
Advanced central control				
Touch Screen Controller	BMS-CT2560U-UL 	✓	✓*	✓*
Central remote controller				
Central remote controller	TCB-SC640U-UL 	✓	✕	✕

* : Can be used with Ver.10.3.0.0 or later

TCC-LINK models

✓ : Available ✗ : Prohibition

Appliance name	Model Name and appearance	TA	DDC	TF
Remote Controller				
Wired remote controller	RBC-ATM32UL 	✓	✓	✓
	RBC-AMS41UL 	✓	✓	✓
	RBC-AMS54E-UL 	✓	✓	✓
	RBC-AS41UL 	✓	✓	✓

Appliance name	Model Name and appearance	TA	DDC	TF
Open network and analog interface				
LON Interface	TCB-IFLN642TLUL 	✓	✗	✗
BACnet IP	BMS-IFBN640TLUL 	✓	✗	✓
Advanced central control				
Smart BMS Manager with data analyzer	BMS-SM1280HTLUL 	✗	✗	✗
Touch Screen Controller	BMS-CT1280UL 	✓	✗	✗
	BMS-CT5120UL 	✗	✗	✗

15. Check Codes

Common Check Codes (Note1 : DDC(0-10 V) type P.C. Board is classified as a Remote controller)
(Note2 : Regarding outdoor units, refer to their own service manuals)

- **E01 : No master remote controller, faulty remote controller communication**
The header remote controller has not been set.
Check the remote controller inter-unit tie cable (A/B).
- **E09 : Duplicated master remote controller**
Two remote controllers have been set master remote controller.
Check the remote controller inter-unit tie cable (A/B).
- **F01 : TCJ sensor trouble**
Check connection of TCJ sensor connector and wiring.
Check resistance characteristics of TCJ sensor.
Check for trouble in indoor P.C. Board.
- **F02 : TC2 Sensor trouble**
Check connection of TC2 sensor connector and wiring.
Check resistance characteristics of TC2 sensor.
Check for trouble in indoor P.C. Board.
- **F03 : TC1 Sensor trouble**
Check connection of TC1 sensor connector and wiring.
Check resistance characteristics of TC1 sensor.
Check for trouble in indoor P.C. Board.
Check whether the TC1 sensor is correctly installed in its place.
- **F10 : TA Sensor trouble**
Check the connection of TA sensor connector and wiring.
Check resistance characteristics of TA sensor.
Check for trouble in indoor P.C. Board.
- **F11 : TF Sensor trouble**
Check connection of TF sensor connector and wiring.
Check resistance characteristics of TF sensor.
Check for trouble in indoor P.C. Board.
- **L02 : Outdoor units model disagreement trouble**
Check outdoor unit model.
(Check whether the outdoor unit corresponds to Dx-coil interface or not.)
- **L09 : Indoor unit Power Code incorrect**
Check the settings of DN Code 11.
- **L22 : Incompatible group combination of indoor units**
Check indoor units model.
Check for trouble in indoor P.C. Board.
- **L30 : External trouble**
Check the operation monitoring of the fan at terminals *DI2 / DI2. If this contact is "CLOSED", the check code "L30" is generated.
- **P10 : Safety contact trouble**
Check the contact at terminals *DI1 / DI1. If the contact is "OPEN", the check code "P10" is generated.
If this contact is not used, a bridge connection should be installed on the terminals *DI1 / DI1.

16. Related cautions

(1) Installation work

- Secure enough service space for replacement of the Dx-valve kit and the thermistors.
After the AHU controller is installed, address setting and unit capacity setting is necessary.
Refer to the Installation Manual for the setting method.
- Refer to the outdoor unit Installation Manual or the data book for installation of the outdoor unit.

(2) Test run

- Turn on the main power of the unit at least 12 hours before test run to power the crankcase heater.
Insufficient powering time may result in compressor damage.
- Ensure the analogue input is voltage is set to ≥ 4.5 V before starting the test run.
- As the capacity setting is made at initial setting, a remote controller is necessary.
Remove the remote controller after making the initial settings if it is not used.
(Refer to the Installation Manual for remote controller for more details.)

(3) Operation control

- If the error display appears on the remote controller, do not reset an error by yourself.
Contact the service firm or the dealer.
- Refer to the data book for system controller when using the system controller.

(4) Service

- Regular maintenance is required to prolong the life of the units.
It is recommended that the maintenance contract be concluded with a maintenance firm.

17. Warranty

- Specifications of AHU and compatibility with National / Local regulations must be confirmed by your company.
- Selection of an appropriate AHU (with appropriate specifications to match those of units connected to the AHU such as configuration, dimension, life-span, vibration, noise level, or features) must be made by your company.
- Toshiba Carrier shall not be liable for any damage to the entire system or the AHU main body caused by connected AHU with wrong specification or wrong usage of AHU.
- Toshiba Carrier shall not be liable for any damage to the outdoor units and Dx-coil interface caused by AHU damage.
- Toshiba Carrier shall not be liable for capacity, responsiveness and accuracy of system.



VRF Dx-coil interface Design Guideline



1134755001-3

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