

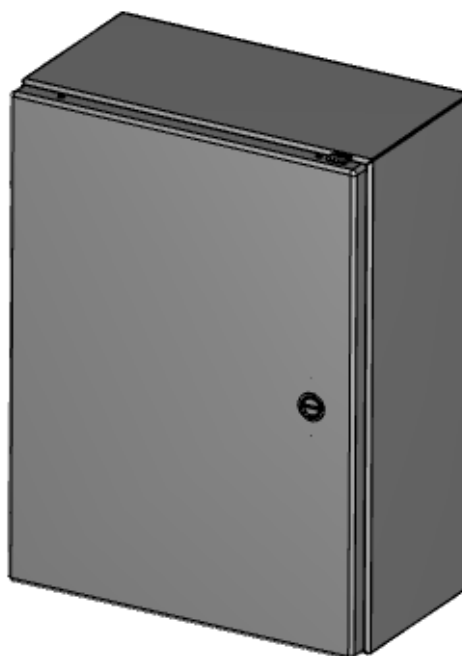
Dx-Interface : Dx-Controller (RA control type) Installation manual

Model name:

For commercial use

TCB-IFDA1GUL Dx-Controller (RA control type)

ENGLISH



Please read this Installation Manual carefully before installing the Dx-Interface RA control type.

- This Manual describes the installation method of the Dx-Controller.
- You must also refer to the Installation and Owner's Manual attached to the Toshiba Carrier VRF outdoor unit.
- Please follow the manual(s) for your local supplied products.
- Toshiba Carrier North America, Inc. does not take any responsibility on the local design.
- This product is exclusively designed to be connected to a field supplied Dx-Coil and AHU.
- Do not try to fix the controller if there is a malfunction

ADOPTION OF NEW REFRIGERANT

This Air Conditioner is a new type which adopts a new refrigerant HFC (R410A) instead of the conventional refrigerant R22 in order to prevent destruction of the ozone layer.

This appliance is for commercial use only and should not be accessible to the general public.

This appliance is not intended for use by person (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

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1 PRECAUTIONS FOR SAFETY

The manufacturer shall not assume any liability for the damage caused by not observing the description of this manual.

General

- Before starting to install the air conditioner, read through the Installation Manual carefully, and follow its instructions to install the air conditioner.
- Only qualified installer or service person is allowed to do installation work. Inappropriate installation may result in water leakage, electric shock or fire.
- Do not use any refrigerant different from the one specified for complement or replacement. Otherwise abnormally high pressure may be generated in the refrigerant cycle, which may result in a failure or explosion of the product or an injury to your body.
- Before opening the electrical control box or service panel of outdoor unit, set the circuit breaker to the OFF position. Failure to set the circuit breaker to the OFF position may result in electric shocks through contact with the interior parts. Only a qualified installer or qualified service person is allowed to remove the electrical control box cover or service panel of the outdoor unit and do the work required.
- Before carrying out the installation, maintenance, repair or removal work, set the circuit breaker to the OFF position. Otherwise, electrical shocks may result.
- Place a "Work in Progress" sign near the circuit breaker while the installation, maintenance, repair or removal work is being carried out. There is a danger of electric shocks if the circuit breaker is set to ON by mistake.
- Wear protective gloves and safety work clothing during installation, servicing and removal.
- The refrigerant used by this air conditioner is the R410A.

Selection of installation location

- When the air conditioner is installed in a small room, provide appropriate measures to ensure that the concentration of refrigerant leakage occur in the room does not exceed the critical level.
- Do not install in a location where flammable gas leaks are possible. If the gas leak and accumulate around the unit, it may ignite and cause a fire.
- Do not place any combustion appliance in a place where it is directly exposed to the wind of air conditioner. Otherwise, it may cause imperfect combustion.

Installation

- Install the air conditioner securely in a location where the base can sustain the weight adequately. If the strength is not enough, the unit may fall down and result in injury.
- Carry out the specified installation work to guard against the possibility of high winds and earthquake. If the air conditioner is not installed appropriately, a unit may topple over or fall down, causing an accident.
- If refrigerant gas has leaked during the installation work, ventilate the room immediately. If the leaked refrigerant gas comes in contact with fire, noxious gas may be generated.

Refrigerant piping

- Install the refrigerant pipe securely during the installation work before operating the air conditioner. If the compressor is operated with the valve open and without refrigerant pipe, the compressor sucks air and the refrigeration cycles is over pressurized, which may cause a injury.
- After the installation work, confirm that refrigerant gas does not leak. If refrigerant gas leaks into the room and flows near a fire source, such as a cooking range, noxious gas may be generated.
- When the air conditioner has been installed or relocated, follow the instruction in the Installation manual and purge the air completely so that no gases other than the refrigerant will be mixed in the refrigeration cycle. Failure to purge the air completely may cause the air conditioner to malfunction.
- Nitrogen gas must be used for the airtight test.
- The charge hose must be connected in such a way that it is not slack.

Electrical wiring

- Only a qualified installer or qualified service person is allowed to carry out the electrical work of the air conditioner. Under no circumstances must this work be done by an unqualified individual since failure to carry out the work properly may result in electric shocks and/or electrical leaks.
- To connect the electrical wires, repair the electrical parts or undertake other electrical jobs, wear gloves to provide protection for electricians, insulating shoes and clothing to provide protection from electric shocks.
- Use wiring that meets the specifications in the Installation Manual and the stipulations in the local regulations and laws. Using wiring which does not meeting the specifications may lead electric shocks, electrical leakage, smoking and/or a fire.
- Connect earth wire. (Grounding work)

- Incomplete grounding causes an electric shock.
- Do not connect earth wires to gas pipes, water pipes, and lightning conductor or telephone earth wires.
- After completing the repair or relocation work, check that the earth wires are connected properly.
- Install a circuit breaker that meets the specifications in the installation manual and the stipulations in the local regulations and laws.
- Install the circuit breaker where it can be easily accessed for service.
- When installing the circuit breaker outdoors, install one which is designed to used outdoors.
- Under the circumstances the power wire must not be extended. Connection trouble in the places where the wire is extended may give rise to smoking and/or a fire.
- Electrical wiring work shall be conducted according to law and regulation in the community and installation manual. Failure to do so may result in electrocution or short circuit.

Test run

- Before operating the air conditioner after having completed the work, check that the electrical cover box and service panel of outdoor unit are closed, and set the circuit breaker to the ON position. There is probability for electric shock if the power is turned on without first conducting these checks.
- If there is any kind of trouble (such as an error display appearing, smell of burning, abnormal sounds, the air conditioner fails to cool or heat or water is leaking) has occurred in the air conditioner, do not touch the air conditioner yourself but set the circuit breaker to the OFF position, and contact a qualified service person. Take steps to ensure that the power will not be turned on (by marking "out of service" near the circuit breaker, for instance) until qualified service person arrives. Continuing to use the air conditioner in this status may cause mechanical problems to escalate or result in electric shocks or other trouble.
- After the work has finished, use an insulation tester set (500V Megger) to check the resistance is 1M ohm or more between the charge section and the non-charge metal section (Earth section). If the resistance value is low, a disaster such as a leak or electric shock is caused at user's side.
- Upon completion of the installation work, check for refrigerant leaks and check the insulation resistance and water drainage. Then conduct a test run to check that the air conditioner is operating properly.

Explanations given to user

- Upon completion of the installation work, tell the user where the circuit breaker is located. If the user does not know where the circuit breaker is, he or she will not be able to turn it off in the event that trouble occurs in the air conditioner.
- After the installation work, follow the Owner's manual to explain to the customer how to use and maintain the unit.

Relocation

- Only qualified installer or qualified service person is allowed to relocate the air conditioner. It is dangerous for the air conditioner to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
- When carrying out the pump-down work, shut down the compressor before disconnecting the refrigerant pipe. Disconnecting the refrigerant pipe with the service valve left open and the compressor still operating will cause air or other gas to be sucked in, raising the pressure inside the refrigeration cycle to an abnormally high level, and possibly resulting in rupture, injury or other issues.

CAUTION

New Refrigerant Air Conditioner Installation

■ THIS AIR CONDITIONER ADOPTS THE NEW HFC REFRIGERANT (R410A) WHICH DOES NOT DESTROY OZONE LAYER.

The characteristics of R410A refrigerant are; easy to absorb water, oxidizing membrane or oil, and its pressure is approx. 1.6 times higher than that of refrigerant R22. Accompanied with the new refrigerant, refrigerating oil has also been changed. Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigerating oil does not enter the refrigerating cycle.

To prevent charging an incorrect refrigerant and refrigerating oil, the sizes of connecting sections of charging port of the main unit and installation tools are changed from those of conventional refrigerant.

Accordingly the exclusive tools are required for the new refrigerant (R410A).

For connecting pipes, use new and clean piping designed for R410A, and please take care so that water or dust does not enter the system. Moreover, do not use the existing piping because there are problems with the pressure-resistance force and impurity in it.

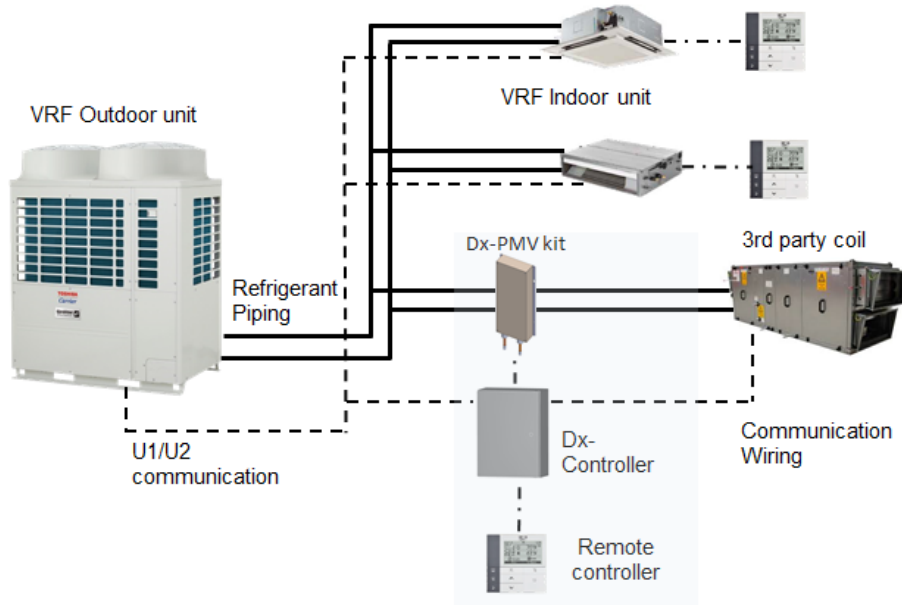
2 OVERVIEW: DX-INTERFACE RA CONTROL TYPE

The **Dx-Interface RA (Return air) control type** enables a third party DX-Coil to be connected to a Toshiba Carrier VRF system (SMMS-e, SHRM-e). This controller enables to handle up to 16 ton of Dx-Coil. The DX-Coil which is controlled by Dx-controller works as one of VRF indoor units.

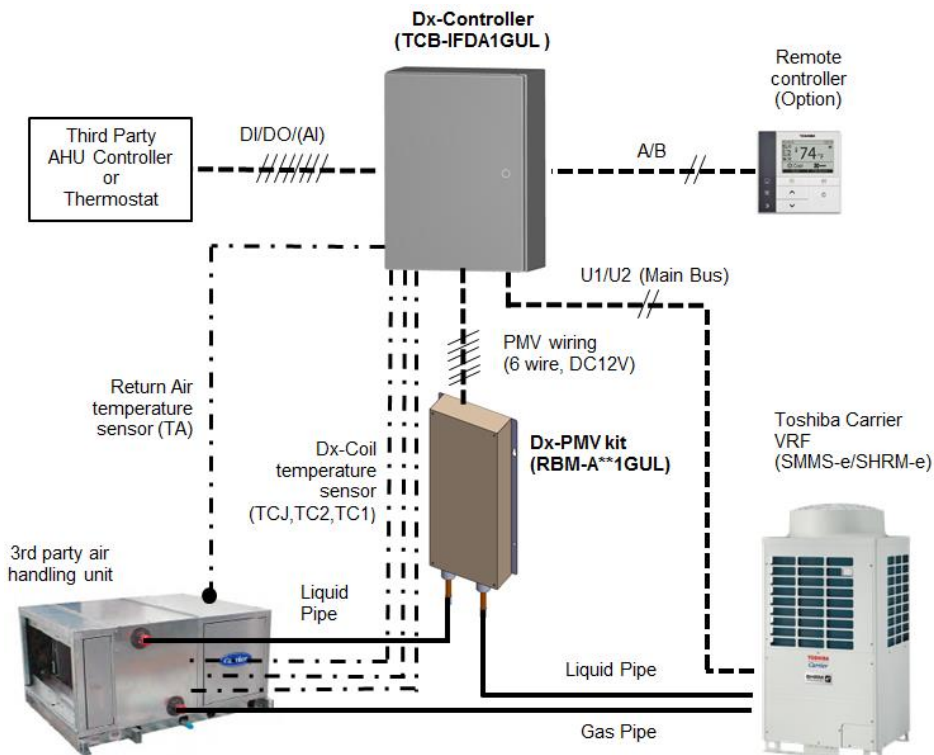
Additionally VRF systems require an appropriately sized **Dx-PMV kit** which must be brazed to the DX Coil used in conjunction with the **Dx-Controller**.

The Dx Interface RA control type also allows the larger Dx-Coil application by two Dx-PMV kit by one Dx-controller in one Dx-Coil, or Interlaced / Split faced Dx-Coil with multiple Dx-controller and Dx-PMV kit.

Example using SMMS-e Outdoor unit



System Schematic



■ Specifications

Model name	TCB-IFDA1GUL
For use with	SMMS-e, SHRM-e
Power supply V/Hz/Ph	208/230VAC, 60Hz, 1ph
Rating current A	0.2
Ambient operating temperature range (*1)	22 to 115F°
Ambient operating humidity range (*1)	10 to 90% (Non-condensing)
Storage temperature range	-4 to 140F°
Dimension H X W X D in.	16" X 12" X 6.8"
Net weight lbs	16.0
Control pollution degree	Degree 1

(*1) Install in the place avoiding direct sunlight and rain

3 SYSTEM CONFIGURATION

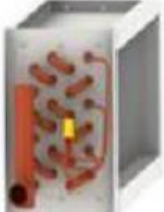



■ System design pattern

The following table shows the connectivity of 3rd party Dx-Coil by capacity.

Dx-Coil type		Normal						Interlaced, Split face			
Type		Dx-Controller	Dx-PMV kit					Dx-Controller	Dx-PMV kit		
Model Name		TCB-IFDA1 GUL	RBM-A0121 GUL	RBM-A0301 GUL	RBM-A0601 GUL	RBM-A0961 GUL	RBM-A1921 GUL	TCB-IFDA1 GUL	RBM-A0601 GUL	RBM-A0961 GUL	RBM-A1921 GUL
Connectable capacity	1 ton	1	1	-	-	-	-	-	-	-	-
	1.25 ton	1	-	1	-	-	-	-	-	-	-
	1.5 ton	1	-	1	-	-	-	-	-	-	-
	2 ton	1	-	1	-	-	-	-	-	-	-
	2.5 ton	1	-	1	-	-	-	-	-	-	-
	3 ton	1	-	-	1	-	-	-	-	-	-
	3.5 ton	1	-	-	1	-	-	-	-	-	-
	4 ton	1	-	-	1	-	-	-	-	-	-
	5 ton	1	-	-	1	-	-	-	-	-	-
	6 ton	1	-	-	-	1	-	-	-	-	-
	8 ton	1	-	-	-	1	-	-	-	-	-
	10 ton	-	-	-	-	-	-	2	2 (5+5)	-	-
	12 ton	-	-	-	-	-	-	2	-	2 (6+6)	-
	14 ton	1	-	-	-	-	1	-	-	-	-
	16 ton	1	-	-	-	-	1	-	-	-	-
	18 ton	-	-	-	-	-	-	3	-	3 (6+6+6)	-
	20 ton	-	-	-	-	-	-	3	-	3 (8+6+6)	-
	22 ton	-	-	-	-	-	-	3	-	3 (8+8+6)	-
	24 ton	-	-	-	-	-	-	3	-	3 (8+8+8)	-
	28 ton	1	-	-	-	-	2	2	-	-	2 (14+14)
	32 ton	1	-	-	-	-	2	2	-	-	2 (16+16)
SMMS-E		Available						Available			
SHRM-E		Available up to 8ton (096type)						Not available			

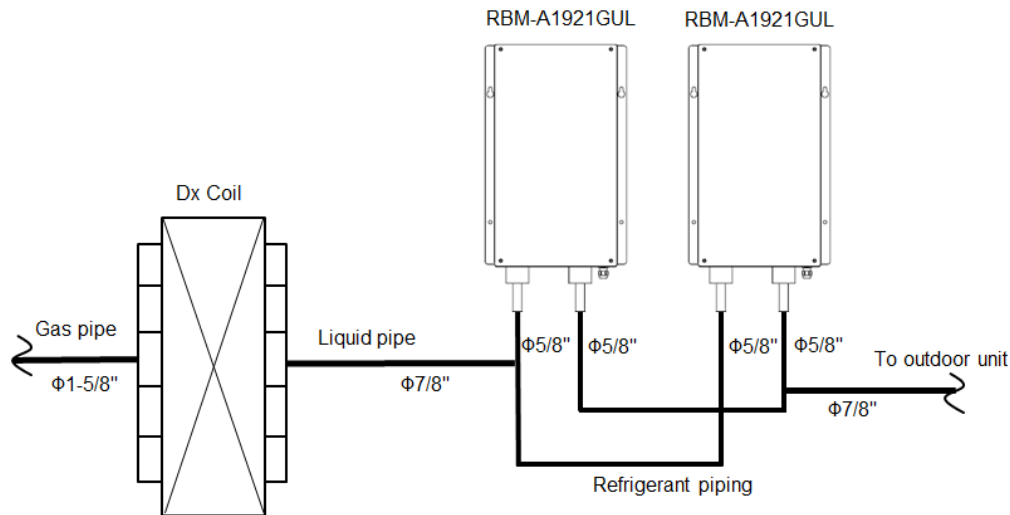
- Diversity (Capacity ratio between indoor unit and outdoor unit) is 60% to 110% when Dx-Coil is connected.
- Two or more Dx-Coil up to 8ton combination is available.
- Two Dx-Coil over 8ton combination is available on 28 and 32ton.
- Combination of Dx-Coil up to 8ton with VRF indoor unit (up to 8ton) is available.
- Combination of Dx-Coil over 8ton with VRF indoor unit (up to 8ton) is prohibited
- Wired remote controller is necessary when capacity code setting.

■ Coil type definition

Coil type	Normal	Split face	Interlaced	Sprit Row
Combined usage with Dx-Interface	Available up to 32 ton	Available	Available	Not Available
Specification	1 inlet & outlet port	2 or 3 inlet & outlet ports 2 or 3 path way are arranged up and down	2 or 3 inlet & outlet ports 2 or 3 path ways are interlaced	2 or 3 inlet & outlet ports 2 or 3 path ways are arranged in parallel
Coil configuration				

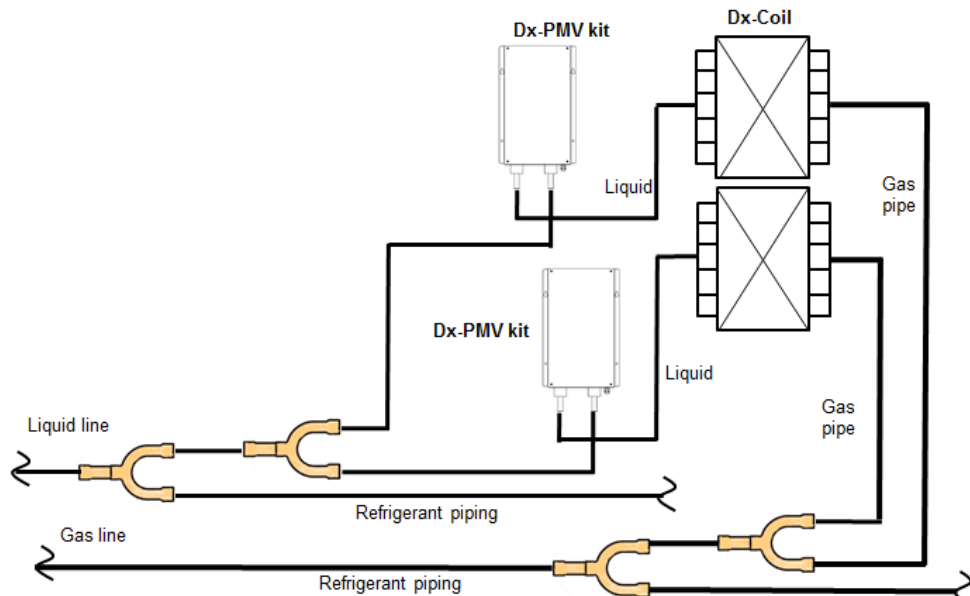
•Normal Coil Type (Large coil, 28, 32ton)

Two Dx-PMV kit in parallel in liquid line. (One Dx-Controller operates two PMVs in synchronization).



•Split face / Interlaced

Two Dx-PMV kit and Dx-controller in group control. Branch piping is split.



■Dx-Coil design guideline

•AHU / DX-Coil Notes & Features:-

- 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 the Outdoor units.
- The DX Coil must be suitable for R410A.
- The design should allow operation as both an Evaporator and a Condenser (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
- It is recommended to fit droplet eliminator plates in the discharge air stream if used in cooling mode.



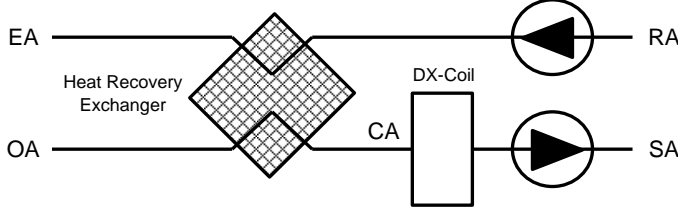
• Dx-coil design guideline

Be sure to refer to the guideline for 3rd party Coil and AHU design to ensure the operation.

Capacity code			012	015	018	021	024	030	036	042	048	060	072	096
Tonnage			1	1.25	1.5	1.75	2	2.5	3	3.5	4	5	6	8
Cooling Capacity			12	15.4	18	21	24	30	36	42	48	60	72	96
Air volume (cfm)	Standard		350	450	550	650	800	850	950	1,150	1,250	1,650	2,150	2,500
	Min.		280	360	440	520	640	680	760	920	1,000	1,320	1,720	2,000
	Max.		420	540	660	780	960	1,020	1,140	1,380	1,500	1,980	2,580	3,000
Coil internal volume (inch ³)	Standard		40	50	60	70	80	100	120	140	150	200	250	310
	Min.		34	43	51	60	68	85	102	119	128	170	213	264
	Max.		46	58	69	81	92	115	138	161	173	230	288	357
Number of circuits by U-Pipe diameter	5/16"	Min.	2	3	3	3	3	4	5	6	6	6	8	10
		Max.	3	4	4	4	4	6	8	8	8	8	12	14
	3/8"	Min.	2	2	2	2	2	3	3	4	4	4	6	8
		Max.	2	3	3	3	3	4	5	6	6	6	10	12
	1/2 "	Min.	2	2	2	2	2	2	2	3	3	3	4	5
		Max.	2	2	2	2	2	2	3	3	3	4	6	6
Distributor Orifice size (ID inch)		Min.	0.10	0.10	0.12	0.12	0.14	0.16	0.17	0.20	0.20	0.21	0.25	0.27
		Max.	0.12	0.12	0.14	0.14	0.16	0.18	0.20	0.24	0.24	0.24	0.28	0.32
Design evaporating temperature			44°F											
Suction Superheat			8°F											
Evaporator air suction temp.			80°F (DB) / 67°F (WB)											
Design condensing temperature			126°F											
Sub cooling			12°F											
Condenser air suction temp.			70°F (DB)											
Diversity			60 to 110%											
Cooling "Air ON" temp. ^(*)			59°F to 75°F (WB)											
Heating "Air ON" temp. ^(*)			59°F to 83°F (DB)											

Capacity code			120	144	168	192	216	240	264	288	336	384
Tonnage			10	12	14	16	18	20	22	24	28	32
Cooling Capacity			120	144	168	192	216	240	264	288	336	384
Air volume (cfm)		Standard	3,300	4,200	4,400	4,950	5,550	6,200	6,800	7,450	8,850	9,900
		Min.	2,640	3,360	3,520	3,960	4,440	4,960	5,440	5,960	7,080	7,920
		Max.	3,960	5,040	5,280	5,940	6,660	7,440	8,160	8,940	10,620	11,880
Coil internal volume (inch ³)		Standard	390	490	550	610	690	760	840	920	1,100	1,200
		Min.	332	417	468	519	587	646	714	782	935	1,020
		Max.	449	564	633	702	794	874	966	1,058	1,265	1,380
Number of circuits by U-Pipe diameter	5/16"	Min.	12	16	18	20	22	24	26	30	34	40
		Max.	16	24	24	26	28	32	36	40	46	54
	3/8"	Min.	8	12	14	16	16	18	20	22	26	30
		Max.	12	18	18	20	24	28	32	34	40	38
	1/2 "	Min.	6	8	8	10	12	12	14	14	16	18
		Max.	6	10	10	12	14	14	16	18	20	22
Distributor Orifice size (ID inch)		Min.	-	-	0.36	0.39	-	-	-	-	-	-
		Max.	-	-	0.42	0.45	-	-	-	-	-	-
Design evaporating temperature			44°F									
Suction Superheat			8°F									
Evaporator air suction temp.			80°F (DB)/67°F (WB)									
Design condensing temperature			126°F									
Sub cooling			12°F									
Condenser air suction temp.			70°F (DB)									
Diversity			60 to 110%									
Cooling "Air ON" temperature ^(*)			59°F to 75°F (WB)									
Heating "Air ON" temperature ^(*)			59°F to 83°F (DB)									

(*1) Operating Conditions:

AHU / 3 rd party Coil	<p>The DX interface is not designed to be used directly with outside air. It must be used in conjunction with either heat recovery exchanger or pre-conditioning heaters / coolers to ensure that the DX-Coil Air On limits are not exceeded and in order to ensure reliable operation:-</p>												
	<div><div><div>EA</div><div>Heat Recovery Exchanger</div><div>OA</div></div><div></div><div><table><tr><td>OA</td><td>Outdoor Air</td></tr><tr><td>SA</td><td>Supply Air</td></tr><tr><td>CA</td><td>Coil Air (After Heat Recovery Exchanger)</td></tr><tr><td>RA</td><td>Return Air</td></tr><tr><td>EA</td><td>Exhaust Air</td></tr></table></div></div>			OA	Outdoor Air	SA	Supply Air	CA	Coil Air (After Heat Recovery Exchanger)	RA	Return Air	EA	Exhaust Air
	OA	Outdoor Air											
SA	Supply Air												
CA	Coil Air (After Heat Recovery Exchanger)												
RA	Return Air												
EA	Exhaust Air												
<p>Cooling mode DX coil “Air ON” temp: Min: 59°F_{WB} (64°F_{DB}) ~ Max: 75°F_{WB} (95°F_{DB}) Heating mode DX coil “Air on” temp: Min: 59°F_{DB} ~ Max: 83°F_{DB}</p>													
Outdoor Unit	Refer to specification of Outdoor Unit												

4 SUPPLIED PARTS

VRF applications require the Dx-Controller RA control type (**TCB-IFDA1GUL**) plus an appropriately sized VRF Dx-PMV kit. The **Dx-PMV kit** (RBM-A___1GUL) is expansion valve box which the installer needs to connect by brazing work. There are 5 models which can be configured in to 15 sizes:

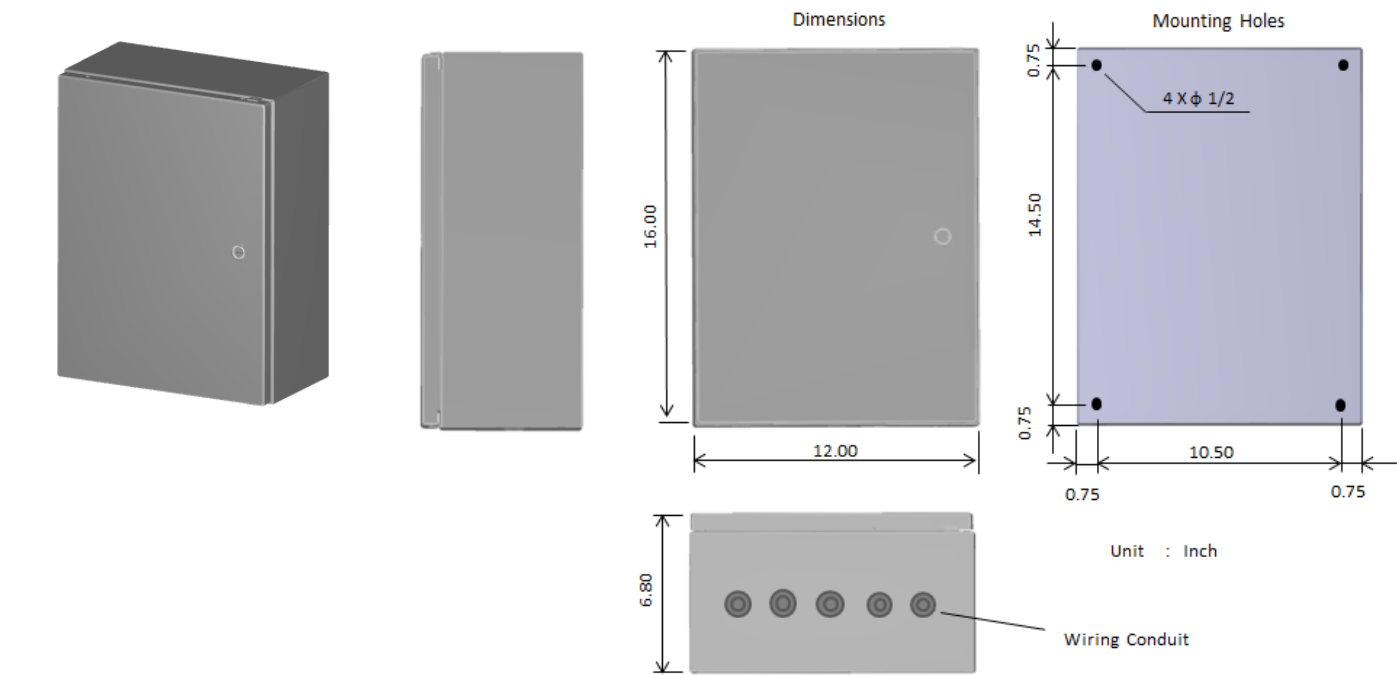
RBM-A_1GUL	0121	0301					0601					0961		1921	
Capacity	012	015	018	021	024	030	036	042	048	054	060	072	096	168	192
Ton	1	1.25	1.5	1.75	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	8.0	14	16
kBtu/h	12	15.4	18	21	24	30	36	42	48	54	60	72	96	168	192

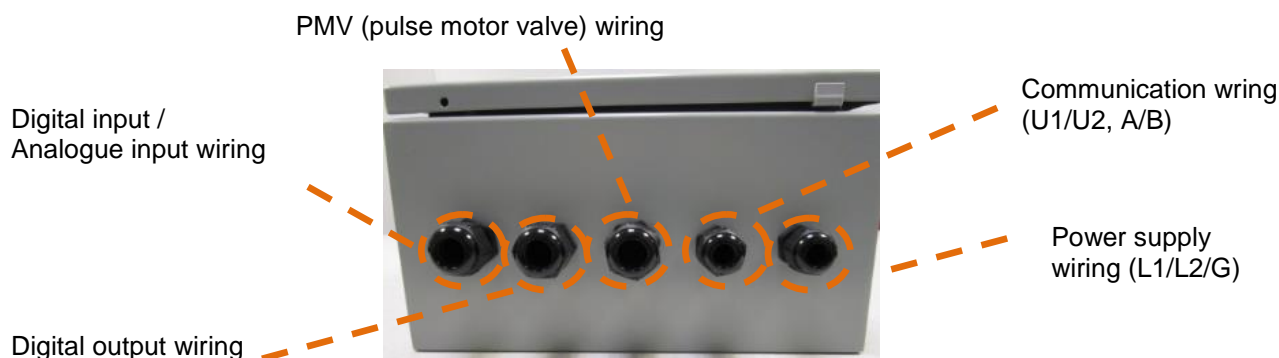
TCB-IFDA1GUL Contents			RBM-A0121/A0301/A0601/A0961/A1921GUL Contents		
Item	Description	Qty	Item	Description	Qty
	TC2 Sensor (6mm) BLK (8ft)	1		Sensor Holder (Ø6) (TCJ / TC2)	2
	TCJ Sensor (6mm) RED (8ft)	1		Sensor Fix Plate (Ø6)	2
	TC1 Sensor (4mm) BLU (8ft)	1		Sensor Holder (Ø4) (TC1)	1
	TA Sensor (Resin) BLK [Return Air] (10ft)	1		Fix Plate (Ø4)	1
	Installation Manual	1		Reducer pipe (3/8" - 1/4") (RBM-A0301GUL only)	2
				Installation manual	1

5 INSTALLATION

■ Dx-Controller (TCB-IFDA1GUL)

The Dx-Controller must be installed in vertical orientation (door front side). Mounting surface temperature limit is 140F.





■ Refrigerant piping design

• Allowable length/height difference of refrigerant piping

Outdoor unit					SMMS-e	SMMS-e SHRM-e
Piping specification items					Dx-Interface connection (More than 8ton)	Dx-Interface connection (8ton or less)
Pipe length	Total extension (Liquid pipe, Actual length)				656ft (200m)	Standard VRF outdoor unit piping limitations based on model selection apply
	Furthest piping length (L)		Equivalent length		427ft (130m)	
			Actual length		394ft (120m)	
	Furthest equivalent piping length from the first branching section (Li)			H1 > 9.8ft	131ft (40m)	
				H1 =< 9.8ft	213ft (65m)	
	Furthest equivalent piping length between outdoor units (LO)				(*1)	
	Main piping length	H2 > 9.8ft	Equivalent length	Below 432kBtu/h	(*1)	
				432kBtu/h or more	(*1)	
			Actual length	Below 432kBtu/h	(*1)	
				432kBtu/h or more	(*1)	
		H2 =<9.8ft	Equivalent length	Below 432kBtu/h	(*1)	
				432kBtu/h or more	(*1)	
	Actual length		Below 432kBtu/h	(*1)		
			432kBtu/h or more	(*1)		
Maximum equivalent length of outdoor unit connecting pipe				(*1)		
Maximum actual length of pipes connected to indoor units				66ft (20m)		
Maximum equivalent length between branching sections				98ft (30m)		
Height difference	Height between outdoor and indoor units H1		H2 > 9.8ft	Upper outdoor units	131ft (40m)	
				Lower outdoor units	(*1)	
			H2 =< 9.8ft	Upper outdoor units	131ft (40m)	
				Lower outdoor units	(*1)	
	Height between indoor unit (H2)		Upper outdoor units	(*1)		
			Lower outdoor units	(*1)		
	Height between outdoor units (H3)				(*1)	

FS unit connection (SHRM-e only)	Maximum equivalent length indoor units in group control by one single port Flow Selector unit (Ln)			(*1)	Standard VRF outdoor unit piping limitations based on model selection apply
	Maximum real length between Flow Selector unit and indoor unit		Single port type	(*1)	
			Multi port type	(*1)	
	Height difference between indoor units in group control by one Flow Selector unit (H4)				

(*1) Follow the piping design specification of outdoor units.

•Selection of refrigerant piping

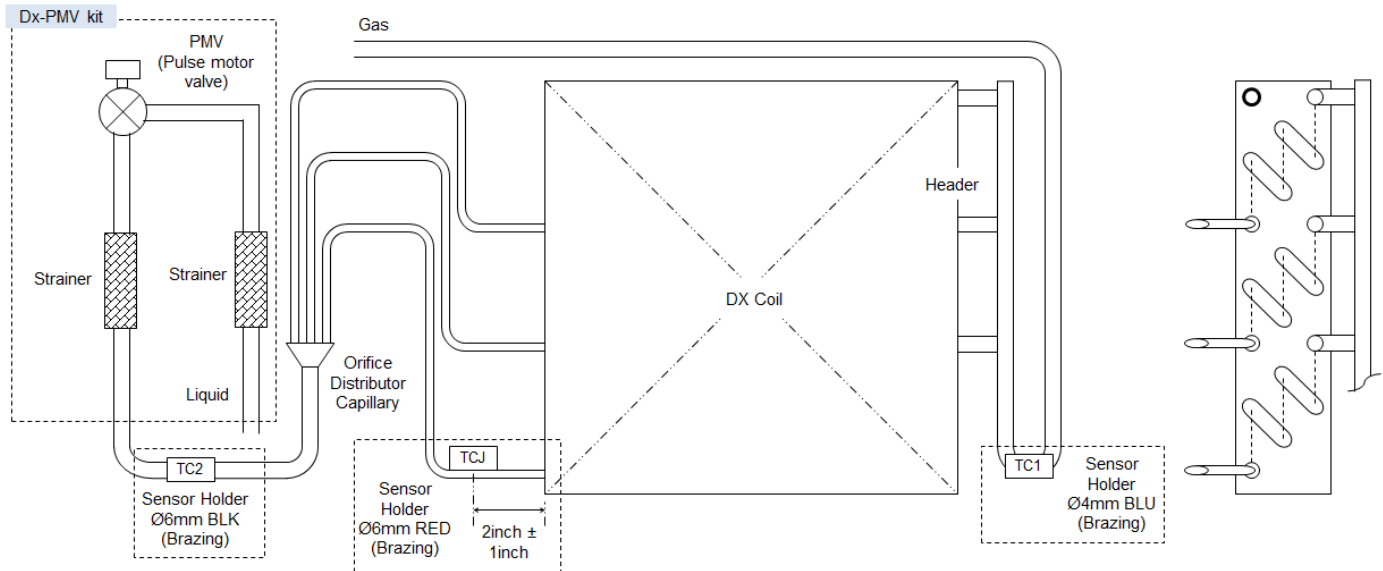
Follow the selection of refrigerant piping of outdoor units.

Dx-Coil connection pipe

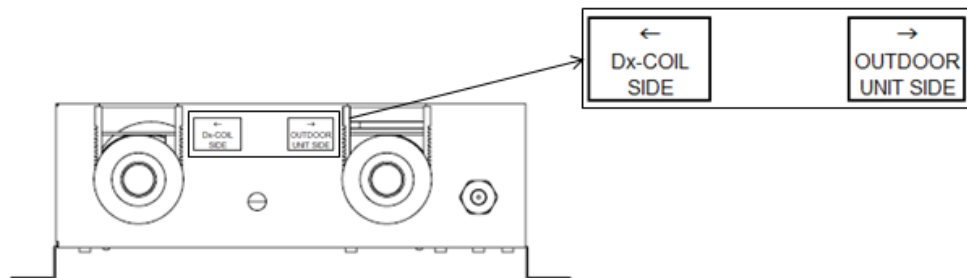
Dx-Coil capacity code			Gas side	Liquid side
12	Pipe length (Actual length)	49ft or less	Φ3/8"	Φ1/4"
		Over 49ft	Φ1/2"	Φ1/4"
15.4 to 18			Φ1/2"	Φ1/4"
21 to 60			Φ5/8"	Φ3/8"
72 to 96			Φ7/8"	Φ1/2"
168 to 192			Φ1-1/8"	Φ5/8"
336, 384			Φ1-5/8"	Φ7/8"

■ DX Coil Schematic and coil preparation

Maximum real piping length between Dx-PMV kit and Dx-Coil is up to 16ft.

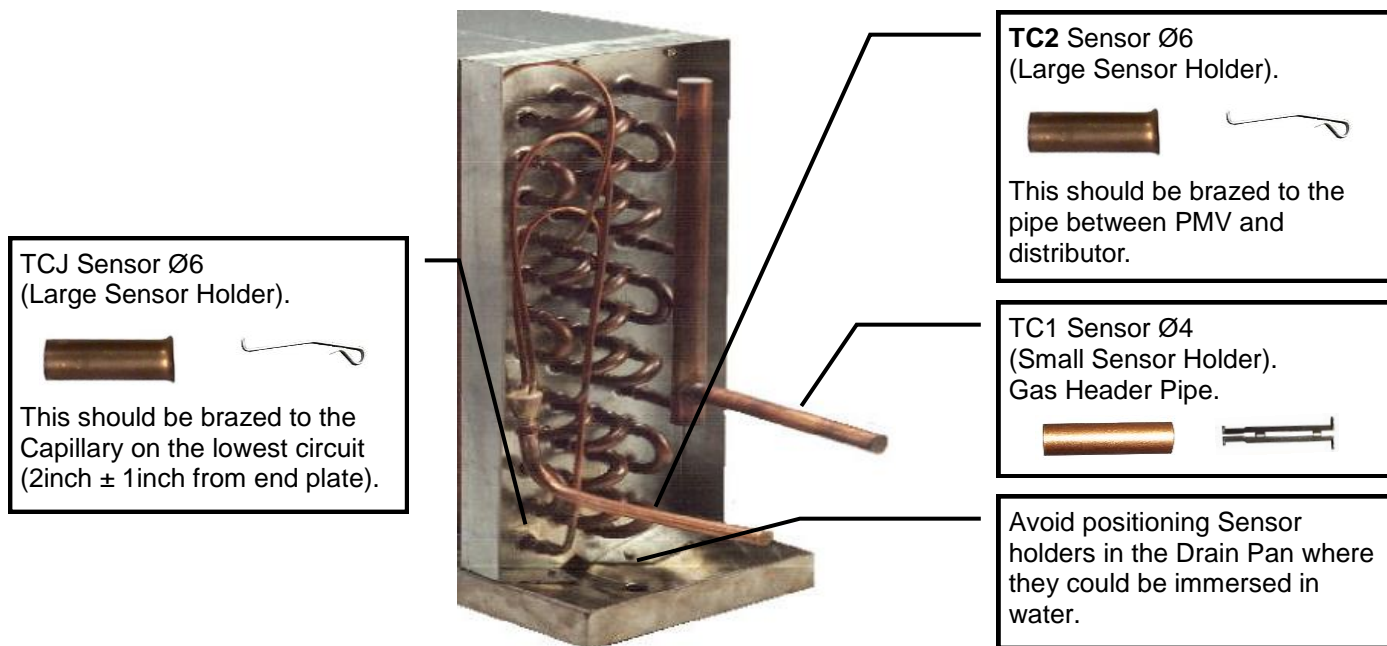


(Note) Be sure to connect piping in correct direction. On the bottom on base box, there is the label to indicate the direction of inlet coming from outdoor unit and outlet to Dx-Coil.



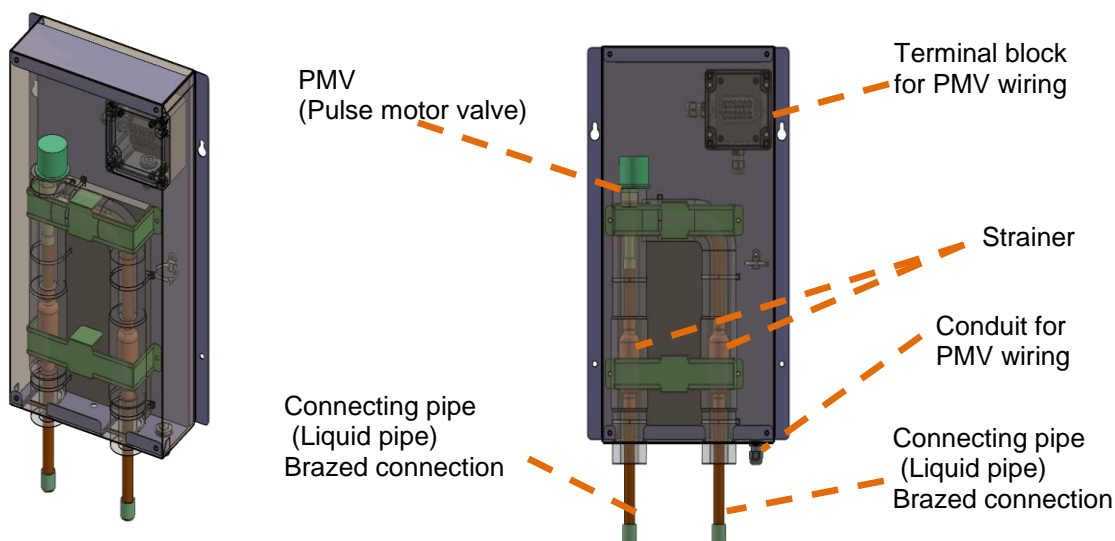
The VRF Dx-PMV kit (RBM-A__1GUL) is necessary as separate products. These will need to be assembled and then fitted to Dx-Coil. This is a custom process as each Dx-Coil will be different. Time and care should be given to this activity, and it should be prepared off-site.

The 3rd Party Dx-Coil should be supplied with a Gas Header and Liquid Capillary Distributor (see below):-



■ Dx-PMV kit

DX-PMV kit (RBM-A____1GUL) should be connected in liquid pipe line between outdoor unit and 3rd party coil. Please refer to the installation manual of Dx-PMV kit.



NOTES (Cautions when Brazing Dx-PMV kit)

- A) Whilst brazing, PMV body and PMV head must be cooled to keep the component's temperature below 212°F.
- B) Whilst brazing, nitrogen gas must be flowed through PMV valve and pipework to prevent internal oxidization.
- C) Prevent cooling water from getting inside the PMV valve and connector of the lead during brazing.
- D) Take care not to damage the PMV cables during brazing.

■ TA SENSOR



Secure this sensor using the supplied plastic clamp. It must be located before the DX-Coil after pre-conditioning (Air to Air Heat exchanger / Return Air Mixing / Auxiliary Heating or Cooling). Ensure that the Resin Sensor bulb is not covered by the protective vinyl-tube.

Installer must procure the extension field wire compliant to NFPA70/NEC for local cables to connect temperature sensor and to connect the terminal block as necessary.

6 ELECTRICAL WORK

WARNING

- **Using the specified wires, ensure to connect the wires, and fix wires securely so that the external tension to the wires does not affect the connecting part of the terminals.**
Incomplete connection or fixation may cause a fire, etc.
- **Be sure to connect earth wire (grounding work).**
Incomplete grounding causes an electric shock.
Do not connect ground wires to gas pipes, water pipes, lightning rods or ground wires for telephone wires.
- **Appliance shall be installed in accordance with national wiring regulations.**
Capacity shortage of power circuit or incomplete installation may cause an electric shock or a fire.

CAUTION

- If incorrect / incomplete wiring is carried out, it will cause an electrical fire or smoke.
- Be sure to install an earth leakage breaker that is not tripped by shock waves.
If an earth leakage breaker is not installed, an electric shock may be caused.
- Be sure to use the cord clamps attached to the product.
- Do not damage or scratch the conductive core and inner insulator of power and inter-connecting wires when peeling them.
- Use the power cord and inter-connecting wire of specified thickness, type and protective devices required
- Never connect 208-230V power to the terminal blocks (U1/U2, A/B, etc) for control wiring (otherwise the system will fail).

REQUIREMENT

- For power supply wiring, strictly conform to the Local Regulation for each country.
- For wiring of power supply of the outdoor units, follow the Installation manual of each outdoor unit.
- Perform the electric wiring so that it does not come in to contact with the high-temperature part of the pipe. The coating may melt in an accident
- Be sure remove the gland plate from the Dx-Controller when drilling gland holes. Use cable glands when installing wires through the gland plate of the Dx-Controller.
- Run the refrigerant piping and control wiring line in the same line.
- Do not turn on the power of the Dx-Controller until vacuuming of the refrigerant pipes completes.

■ Power supply wire and communication wires specifications

Power supply wire and communication wires are procured locally.

For the power supply specifications, follow to the table below. If capacity is little, it is dangerous because overheat or seizure may be caused.

For specifications of the power capacity of the outdoor unit and the power supply wires, refer to the Installation manual attached to the outdoor unit.

Cable size must be calculated for site condition and correct glands fitted. All cables should be in conduit or armoured cables correctly glanded. This has to be done by the site installer.

Dx-Controller power supply

- For the power supply of the Dx-Controller, prepare the exclusive power supply separated from that of the outdoor unit.
- Arrange the power supply, earth leakage breaker and main switch of the Dx-Controller connected to the same outdoor unit so that they are commonly used.

▼ Power supply

Power supply	208 / 230V 1ph 60Hz	
Power supply switch / Earth leakage breaker or power supply wirings / fuse rating for Dx-Controller should be selected by the accumulated total current values of the Dx-Controller.		
Power supply wiring	Up to 164'1" (50m)	MCA: 0.4A, MOCP: 15A

Control wiring, Central control wiring

- 2-core with polarity wires are used for the Control wiring between indoor and outdoor unit and Central control wiring.
- To prevent noise trouble, use 2-core shield wire.
- The length of the communication line means the total length of the inter-unit wire length between indoor and outdoor units added with the central control system wire length.

▼ VRF Communication Line (U1/U2)

VRF Control wiring between Dx-Controller and outdoor unit (2-core shield wire)	Wire Size	(Up to 3280'10" (1000m)) AWG16 (Up to 6561'8" (2000m)) AWG14
Central control line wiring (2-core shield wire)	Wire Size	(Up to 3280'10" (1000m)) AWG16 (Up to 6561'8" (2000m)) AWG14

▼ VRF Remote controller wiring (A/B)

- 2-core with non-polarity wire is used for wiring of the remote controller wiring.

Remote control wiring.	Wire size: AWG20
Total wire length of remote control wiring	Up to 1640'5" (500m)

▼ PMV (Pulse motor wiring (6 wire))

PMV wiring.	Wire size: AWG20 to 22
-------------	------------------------

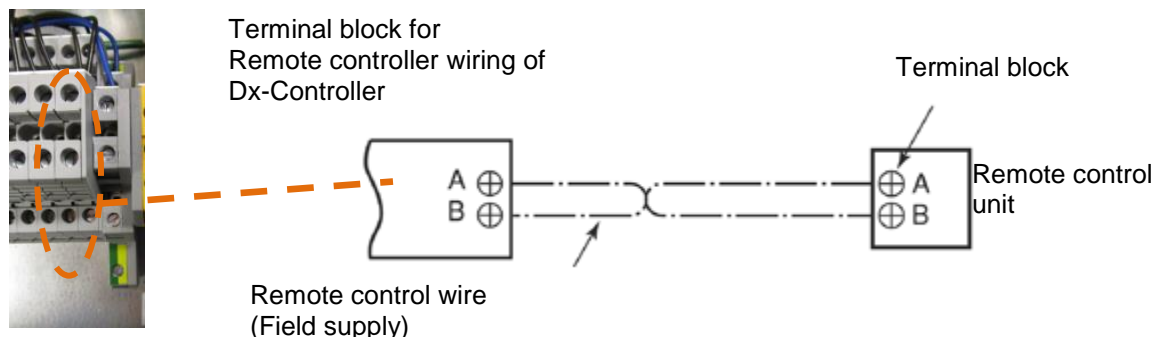
CAUTION

The remote control wire (communication line) and AC208/230V wires cannot be parallel to contact each other and cannot be stored in the same conduits. If doing so, a trouble may be caused on the control system due to noise, etc.

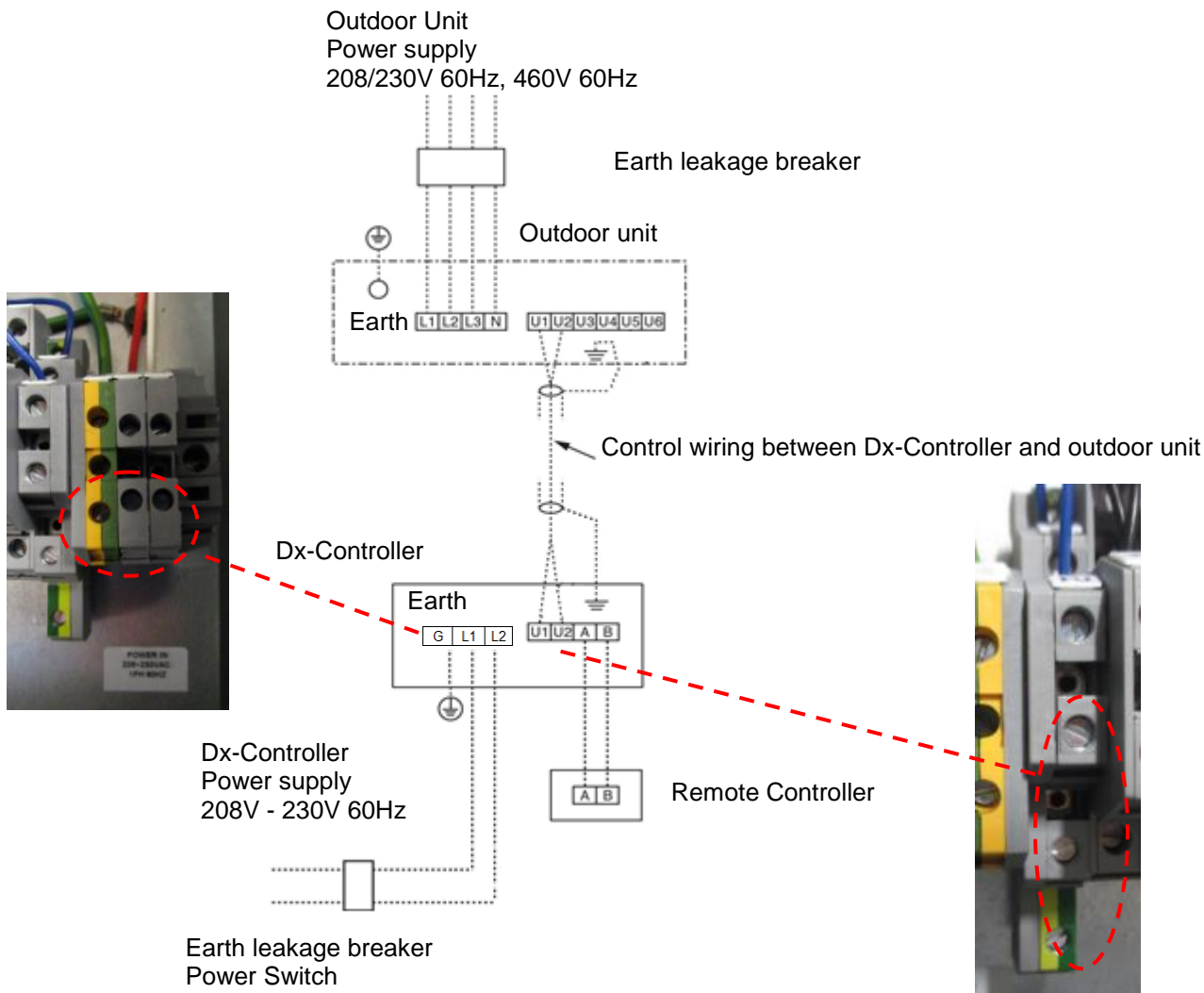
■ Remote control wiring

- As the remote control wire has non-polarity, there is no problem if connections to Dx-Controller terminal blocks A and B are reversed.

▼ Wiring diagram



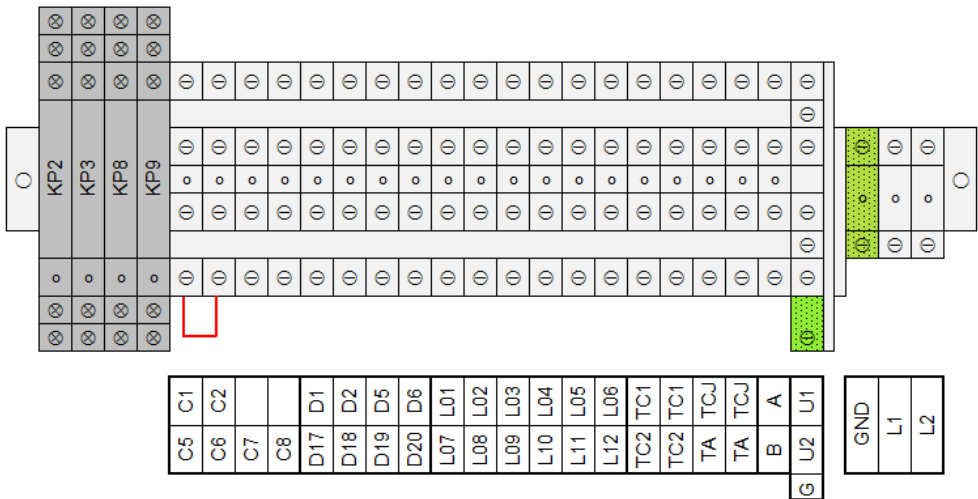
■ Wiring between Dx-Controller and outdoor unit



■ VRF Address Set Up

Set up the addresses as per the Installation manual supplied with the outdoor unit.

■ Electrical Connections (TCB-IFDA1GUL)



VRF: Supply

Terminal G & L1 & L2. The Dx-Controller should be connected to the main power supply by means of a switch with a contact separation of at least 0.12inch. (Impulse voltage : 1500V 3minutes)

Digital Input 1 (ON / OFF)

Terminal C1 & C2. ON / OFF over a dry contact. If the contact is closed, the system switches on. If the contact is opened, the system switches off. If the system is switched using the external contact, then switching ON / OFF using the remote control is still possible.

Remote control BUS line (A / B)

Terminal A & B At these terminals an optional wired remote control can be attached (useful for installation and maintenance).

VRF: Inside device BUS line (U1 / U2 / G)

Terminal U1 & U2 & G Details regarding the wiring of the Central Control BUS can be found in the installation manual of the VRF outdoor unit.

External safety Input

Terminal C7 & C8 If this contact is open for more than 1 minute, the error message P10 is generated and the ventilation kit switches off automatically (Rating 12VDC). This contact can, for instance, be used with an on-site frost protection monitor.

If the External safety contact is not used, then the contact should be bridged.

Fan Error Input

Terminal C7 & C8. An operation monitor (supplied locally) of the Air Flow is to be attached at this terminal as a dry contact (for instance, differential pressure monitor, vane relay or similar). A closed contact generates the error message L30.

Safety Input

Terminal C5 & C6. Factory setting is "CLOSED". This can be used as safety lock by external signal on 3rd party system. If this contact is "OPEN", system stops and generates the error code message P10.

Fan Operation Output

Terminal D1 & D2 (KP2). During Fan Motor operation, this signal is active..

Alarm signal Output

Terminal D5 & D6 (KP3). During Alarm status, this signal is active.

Thermo-ON Signal Output

Terminal D19 & D20 (KP8). During thermo-ON status, this is active.

Secondary Heating Signal Output (Cooling output)

Terminal D17 & D18 (KP9). Auxiliary heating output becomes active when thermo control status meets the condition.

VRF: Temperature sensors

The refrigerant temperature sensors are inserted into the brazed sensor holders (There are 2 sizes of refrigerant Sensors: Ø4 & Ø6) and secured using the supplied SENSOR FIX-PLATE (There are 2 sizes of FIX-PLATE).

The sensor cables are to be attached as follows:

TC2/TC2	TC2 Sensor Ø6 (BLK Plug / BLK Vinyl Tube)	Field Fitted to Dx-Controller
TCJ/TCJ	TCJ Sensor Ø6 (RED Plug / RED Vinyl Tube)	Field Fitted to Dx-Controller
TA/TA	TA Sensor Resin (YEL Plug / BLK Vinyl Tube)	Field Fitted to Dx-Controller
TC1/TC1	TC1 Sensor Ø4 (BRN Plug / BLU Vinyl Tube)	Field Fitted to Dx-Controller

VRF: Pulse modulation valve (PMV)

The PMV connecting is as follows:

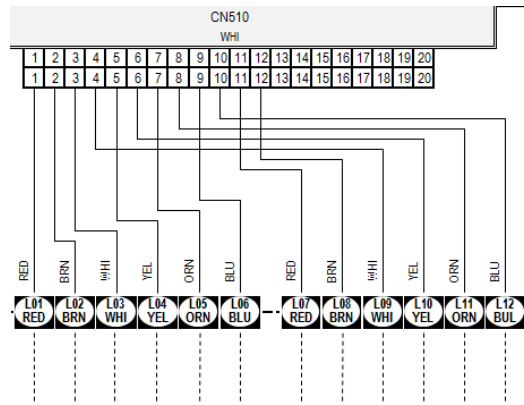
L01/L02/L03/L04/L05/L06	PMV1 wiring	Connecting to Dx-PMV kit
L07/L08/L09/L10/L11/L12	PMV2 wiring	Connecting to Dx-PMV kit (28, 32ton normal coil only)

Maximum wire length of PMV wiring is 16ft.

•PMV (Pulse motor valve) wiring

PMV wiring connection from Dx-Controller to Dx-PMV kit is as follows.

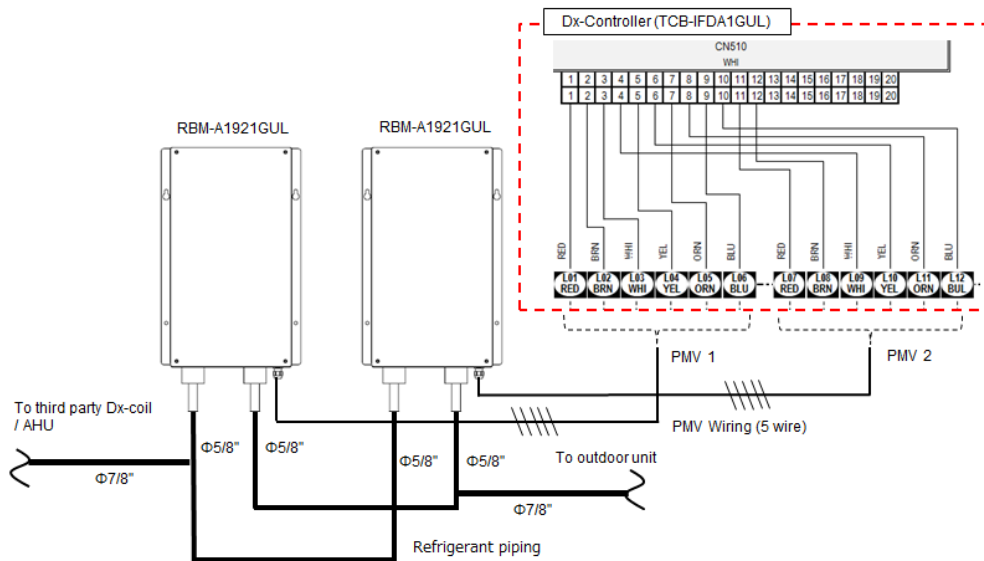
Terminal number		Colour	RBM-A0121GUL A0301GUL A0601GUL A0961GUL	RBM-A1921GUL
PMV1	PMV2			
L01	L07	RED	✓	✓
L02	L08	BRN	✓	
L03	L09	WHI	✓	✓
L04	L10	YEL	✓	✓
L05	L11	ORG	✓	✓
L06	L12	BLU	✓	✓



■Wiring in case of large normal coil and split/interlaced coil

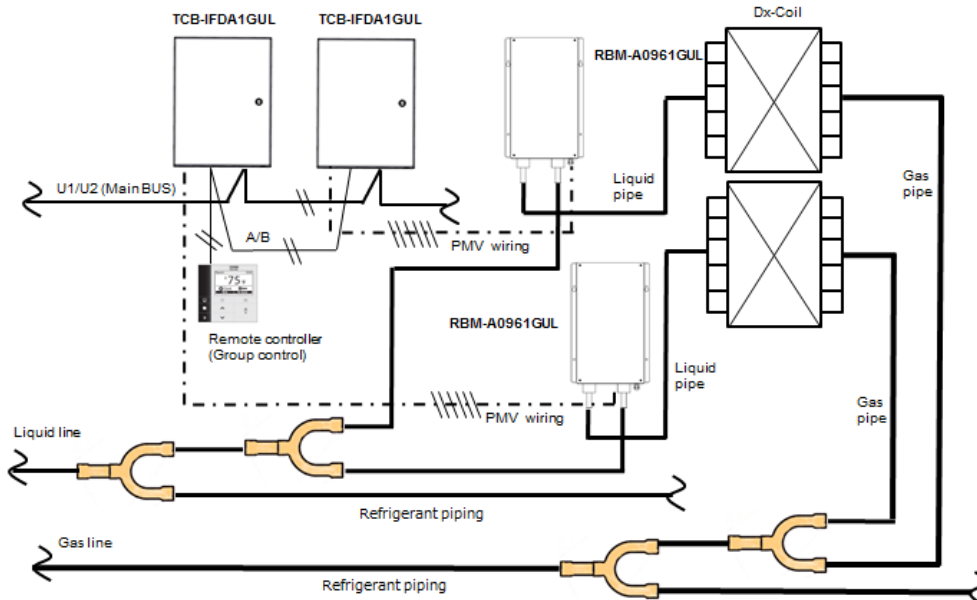
•Normal Coil Type (Large coil, 28, 32ton)

In case of 28 and 32 ton coil (Normal coil), two Dx-PMV kit is connected in parallel and controlled by PMV1 port (L01 to L06) and PMV2 port (L07 to L12) on Dx-Controller. These two PMVs move in synchronization.



•Split face / Interlaced

Group control setting is necessary in Dx-Controller (DN code : 14).



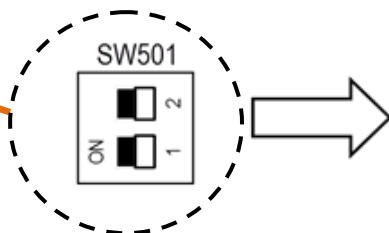
7 APPLICABLE CONTROLS / BMS INTERGRATION

A wired remote control is required during installation of the RA control DX-Controller.

■ Dx-Controller Configuration



- The Dx-Controller (TCB-IFDA1GUL) main PCB is common for 0-10V type (TCB-IFDD1GUL : Analogue input type) .
- As default this is configured as a RA control type in this model. Do not change the DIP-SW501 on MCC-1570.



System	RA control	0-10V
SW501_1	OFF	OFF
SW501_2	OFF	ON

REQUIREMENT

- When you use this air conditioner for the first time, it takes approx. 5 minutes until the remote control becomes available after power-on. This is normal.

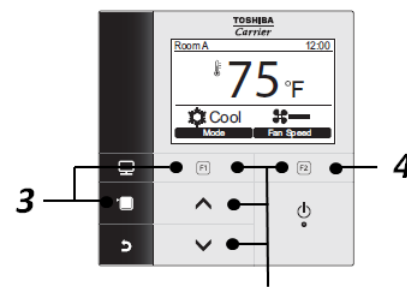
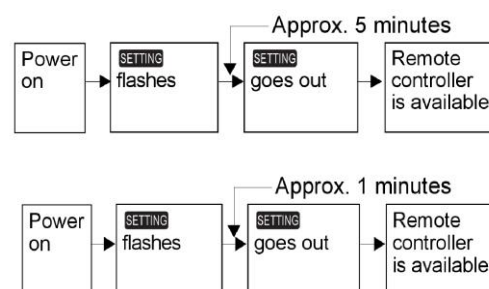
<When the power is turned on for the first time after installation>

It takes **approx. 5 minutes** until the remote control becomes available.

<When the power is turned on for the second (or later) time>

It takes **approx. 1 minute** until the remote control becomes available.

- Normal settings were made when the unit was shipped from factory. Change the Dx-Controller as required.
- Use the wired remote control to change the settings.
- The settings cannot be changed using the wireless remote control, sub remote control, or remote control-less system (for central remote control only). Therefore, install the wired remote control to change the settings.



■ Changing of settings for applicable controls

Basic procedure for changing settings

Change the settings while the air conditioner is not working.
(Be sure to stop the air conditioner before making settings).

Procedure 1

Push the [▲ ▲]/[▼ ▼] button to select "7. DN setting" on the "Field setting menu" screen, then push "Set" [F2] button.

Move the cursor to select "DN code" with the "<" [F1] button, then set "DN code" With the [▲ ▲]/[▼ ▼] button.

Move the cursor to select "data" with the ">" [F2] button, then set "data" with the [▲ ▲]/[▼ ▼] button.

Procedure 2

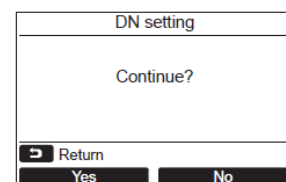
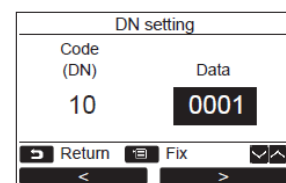
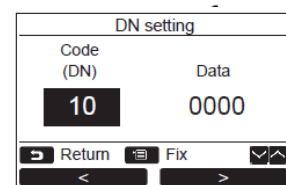
Refer to this installation manual for details about the DN code and data.

Procedure 3

Push the [MENU] button to set the other DN codes. After "Continue?" is displayed on the screen, push the "Yes" [F1] button

Procedure 4

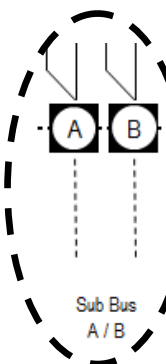
Push he "No" [F2] button to finish the setting operation. "⌚" appears on the screen for a while, then the screen return to the "Field setting menu" screen.



Device Type / Capacity DN Code setting (Requires wired Remote Controller)



- Follow the basic operation Procedure (1 → 2 → 3 → 4) outlined above.
- The interface uses a new Device Type DN Code 10_55. This is set at the factory.
- The installer must set Capacity Code (DN Code 11). As default this is configured as a 8ton model at the factory (DN 10_23). See table on next page.



<How to enter the DN setting>

1. Push the [MENU] button to display the menu screen.
2. Push and hold the [MENU] and [V V] button at the same time for more than 4 seconds to display the "Field setting menu".
3. Select "7. DN setting" on the "Field setting menu", then push the [F2] button to set.

Capacity code	012	015	018	021	024	030	036	042	048	060	072	096	168	192	336	384
Capacity (Ton)	1	1.25	1.5	1.75	2	2.5	3	3.5	4	5	6	8	14	16	28	32
Capacity Code (DN 11)	05	07	09	10	11	13	15	16	17	19	21	23	27	28	37	39
RBM-A***GUL	0121	0301				0601				0961			1921		1921 X 2	

■ Summary of Inputs and Outputs (Standard)

Description	Type	Terminal
VRF Power Supply	208/230 VAC	L1 & L2 & G (Ground)
VRF Main Bus (U1/U2)	Serial	U1/U2/G (Shield wire)
Sub-Bus (AB) : Remote controller wiring	Serial	A / B
ON / OFF input	DI	C1 & C2
Safety contact input (P10)	DI (Normal Close)	C5 & C6
Fan error input (L30)	DI	C7 & C8
Fan Operation (Contact Rating: 250VAC 6A)	DO	D1 & D2 (KP2)
Alarm output (Contact Rating: 250VAC 6A)	DO	D5 & D6 (KP3)
Thermo ON (NC) output (Contact Rating : 250VAC 6A)	DO	D15 & D16 (KP8)
Secondary Heating Output / Cooling output	DO	D19 & D20 (KP9)

■ Main Indoor PCB (MCC-1570): CN60/CN61/CN82 Configuration

- Digital output functions are available from the CN60/CN61/CN82 connector on the main indoor PCB (MCC-1570) inside the DX-controller.
- For ease of installation connection to the CN60/CN61/CN82 outputs are made on the relays included in the DX interface.



CN60/CN61/CN82 Output	Output Function	Relay Number
CN60.1+6	Fan operation output	KP2
CN61.5+6	Alarm output	KP3
CN82.6+3	Thermo ON output	KP8
CN82.6+4	Cooling output / Secondary heating output	KP9

As the factory setting, "CN82 Pin No.4" function is cooling output function. Secondary heating function becomes effective to set up DN code [DC] setting data [0001 to 0010].

Factory setting : DN code [DC :0000]	Secondary heating : DN code [DC : 0001 to 0010]
CN82, Pin No.4 ➡Cooling output function	CN82, Pin No.4 ➡Secondary heating output function

■Digital input / output function (MCC-1570)

Connector	Pin	Function	Remarks	Standard / Option	Relay
CN32 (WHI)	1	DC12V (COM)		-	
	2	Output	Ventilation control	Option	
CN34 (RED)	1	COM (DC12V)		-	
	2				
	3	External safety contact	Error code P10, Normal close	Standard	
CN60 (WHI)	1	DC12V (COM)		-	
	2	Defrosting output	ON while outdoor unit defrosted	Option	
	3	(No function)			
	4	(No function)			
	5	Operation mode output	Cooling : Open, Heating : Close	Option	
	6	Fan output	ON while fan ON	Standard	KP2
CN61 (YEL)	1	ON/OFF input	Start/Stop input	Standard	
	2	0V (COM) for pin 1, 3		-	
	3	Remote control disabling input	Enables/Disables start/stop control via remote controller	Option	
	4	In operation output	ON during operation	Option	
	5	DC12V (COM) for pin 4, 6		-	
	6	Alarm output	ON while alarm ON	Standard	KP3
CN70 (WHI)	1	Option	Option error input	Option	
	2	0V (COM)		-	
CN73 (RED)	1	Demand input	Forced thermos-off input	Option	
	2	0V (COM)		-	
CN80 (GRN)	1	COM(DC12V)		-	
	2	COM (DC12V)		-	
	3	External error input	Error input from outside (Interlock, error code L30)	Standard	
CN82 (BLU)	1	Heating output		Option	
	2	Fan active output		Option	
	3	Thermo-ON output	Signal output during thermos-ON	Standard	KP8
	4	Cooling/Secondary heating output	Select function by DN [DC]	Standard	KP9
	5	DC12V (COM)		-	
	6	DC12V (COM)		-	
CN510 (WHI)	1	PMV1 12V DC		Standard	
	2	PMV1 12V DC		Standard	
	3	PMV1 output A		Standard	
	4	PMV2 output A		Standard	
	5	PMV1 output B		Standard	
	6	PMV2 output B		Standard	
	7	PMV1 output /A		Standard	
	8	PMV2 output /A		Standard	
	9	PMV1 output /B		Standard	
	10	PMV2 output /B		Standard	
	11	PMV2 12VDC		Standard	
	12	PMV2 12VDC		Standard	
	13-20		No function	-	

7 TEST RUN

■ Preparation

- Before turning on the power supply, carry out the following procedure.
 - 1) Using 500V-Megger, check that the resistance of 1MΩ or more exists between the terminal block of the power supply and the earth (grounding).
If resistance of less than 1MΩ is detected, do not run the unit.
 - 2) Check the valve of the outdoor unit being opened fully.
- To protect the compressor at activation time, leave power-ON for 12 hours or more before operating.
- Never press the electromagnetic contactor to forcibly perform the test run. (This is very dangerous because the protective device does not work).
- Before starting a test run, be sure to set addresses following the installation manual supplied with the outdoor unit.

■ How to execute a test run

Alternatively (using a wired remote controller) a forced test run can be executed in the following procedure even if the operation stops by thermo-OFF.



In order to prevent a serial operation, the forced test run is released after 60 minutes have passed and returns to the usual operation.

CAUTION


- Do not use the forced test run for cases other than the test run because it applies excessive load to the devices.

In case of wired remote control.

Procedure 1

Push the  /  button to select "1.Test mode" on the field setting menu screen, then push the "Set" [F2] button.

Pushing the "Yes" [F1] button sets the test mode and the screen returns to the field setting menu screen.

Push  CANCEL twice, the screen (2) appears.

Procedure 2

Push  ON / OFF button to start the test mode.



The screen (1) shown in the left appears.

(The screen (2) appears when the operation is stopped.)

Perform the test mode in the "Cool" or "Heat."

Check codes are displayed as usual.

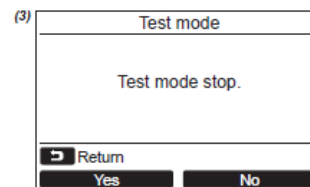
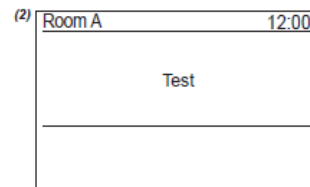
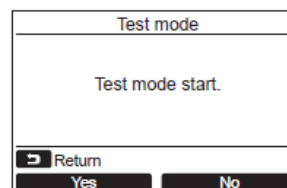
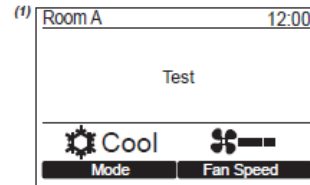
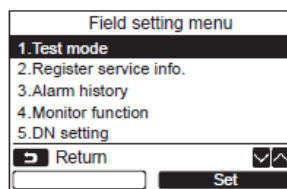
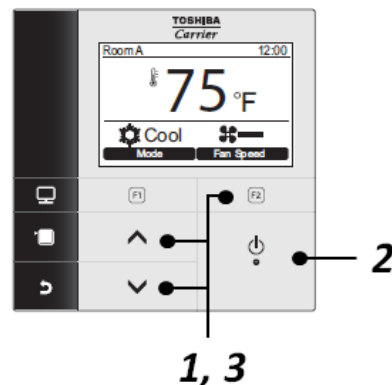
Procedure 3

When the test mode is finished, push the  /  button to select "1.Test Mode" on the "Field setting menu" screen, then push the "Set" [F2] button. The screen (3) appears.

Pushing the "Yes" [F1] button stops the test mode screen and continues the normal operation.

Note

The test mode stops after 60 minutes and the screen return to The normal / detailed display.



8 TROUBLE SHOOTING

■ Using Dx-Controller

In the case of a check code, the Alarm Digital output (Relay KP3, D5 / D6) is active. However a wired Remote Control (or Central Control device) is required to read the check code number.

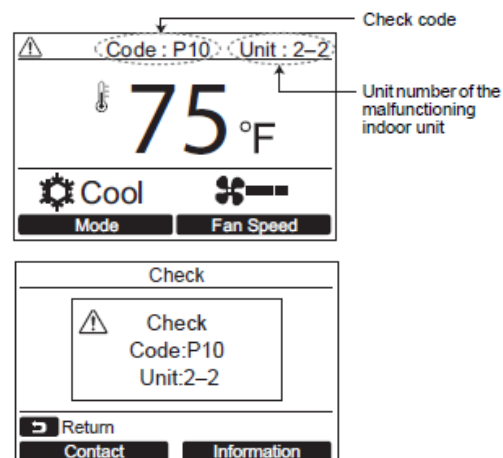
■ Using a wired remote control

Confirmation and Check

When a trouble occurred in the air conditioner, the check code and the DX CONTROLLER No. appear on the display part of the remote controller.

The check code is only displayed during the operation.

Push the [MONITOR] button or [CANCEL] button to display the check information screen



For detailed trouble shooting, refer to installation manual of outdoor units.

▼ Common Check Codes

- E01 Remote control address setting error** – incorrect remote controller setting. The header remote controller has not been set.
- E09 Remote control address setting error** – two remote controller are set as header devices in the double remote controller control.
- F01 TCJ Sensor error** – Resistance value of sensor is infinite or zero. Check sensor connection / cabling.
- F02 TC2 Sensor error** – Resistance value of sensor is infinite or zero. Check sensor connection / cabling.
- F03 TC1 Sensor error** – Resistance value of sensor is infinite or zero. Check sensor connection / cabling.
- F10 TA Sensor error** – Resistance value of sensor is infinite or zero. Check sensor connection / cabling.
- L09 DX controller capacity code incorrect** – check the settings of DN code 11 (see Device Type / Capacity Code setting)
- L30 External Interlock** – check the operation of C7 and C8 terminals. If this contact is “CLOSED” the error code L30 is generated
- P10 Safety contact error** – check the contact at terminals C5 and C6. If the contact is OPEN, the error code P10 is generated

DX-Controller (RA control type) Wiring Diagram : TCB-IFDA1GUL


COLOUR IDENTIFICATION	
BLU	: BLUE
RED	: RED
GRN	: GREEN
WHI	: WHITE
BRN	: BROWN
ORG	: ORANGE
YEL	: YELLOW
YEL/WHI	: YELLOW/WHITE

External ON/OFF input
Rating 12VDC

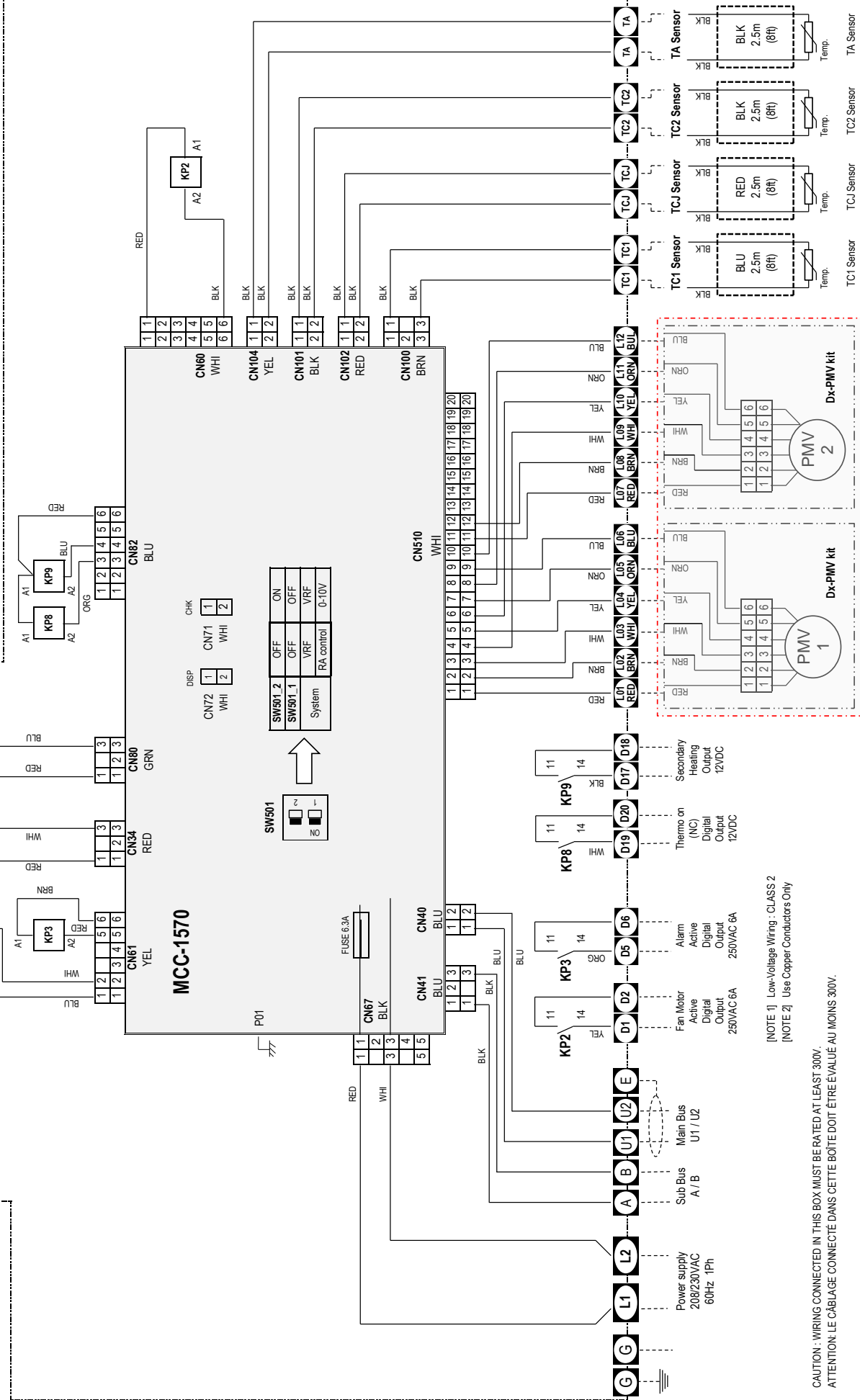
Safety contact
(Factory set : Closed)
Rating 12VDC

Fan Error Input
(Normally Open)
Rating 12VDC

Notes

1. The dashed lines - - - - - indicate wiring on site.
2.  indicate terminal blocks and the numbers within them are the terminal numbers
3. Please refer to the installation manual for wiring instructions.
4. The DX-Interface can be configured as a VRF system.
5. At shipment C5 and C6 are short-circuited. Remove it when you use the terminal.

(Classification of control against electric shock : CLASS I)



(REFERENCE) OPTIONAL PARTS

▼ Remote controllers (wired)

RBC-AMT32UL(Wired remote control)



RBC-AMS54E-UL (Wired remote control)



RBC-AMS41-UL(Remote control with schedule timer)

RBC-AS41UL (Simple remote control)

▼ Central control / BMS

The Dx-Controller RA control type is compatible with the range of Toshiba Carrier Central controllers and BMS interfaces (using U1/U2 connection).

Carrier Corporation
Carrier Ductless and VRF
Atlanta, Georgia, United States

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