



0-10V AHU DX Coil Interface (LC / VRF) Installation manual

Model name:

For commercial use

- RBC-DXC031
- LC / VRF DX CONTROLLER (0-10V)
- MM-DXV141
- VRF DX PMV (16.0kW)
- MM-DXV281
- VRF DX PMV (22.4kW, 28.0kW)

ENGLISH

LC

RBC-DXC031



VRF

RBC-DXC031



+ MM-DXV141
MM-DXV281



Please read this Installation Manual carefully before installing the 0-10V AHU DX Coil Interface.

- This Manual describes the installation method of the LC / VRF DX Controller and VRF DX PMV.
- You must also refer to the Installation and Owner's Manual attached to the Toshiba outdoor unit.
- Please follow the manual(s) for your Air Handling Unit (AHU - local supply).
- Toshiba Carrier UK (Ltd) does not take any responsibility on the local design.
- This product is exclusively designed to be connected to a field supplied AHU. Do not use the LC DX Controller (0~10V AHU) for any other application
- Do not modify or alter the LC DX Controller (0~10V 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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This symbol mark is for EU countries only.

This symbol mark is according to the directive 2002/96/EC Article 10 Information for users and Annex IV.

This product is designed and manufactured with high quality materials and components which can be recycled and reused.

This symbol means that electrical and electronic equipment, at the end-of-life, should be disposed of separately from your household waste.

Please dispose of this equipment at your local community waste collection / recycling centre.

In the European Union there are separate collection systems for used electrical and electronic product.

1 OVERVIEW: 0-10V AHU DX Coil Interface

The new LC / VRF 0-10V AHU DX Coil Interface enables external BMS capacity control of Toshiba Outdoor units connected to an air handling unit with a DX Coil. It is compatible with either Toshiba LC outdoor units (DI /SDI / DI-Big) or Toshiba VRF outdoor units (SMMSi / SMMSe).

The interface includes a common DX CONTROLLER (RBC-DXC031) for both LC & VRF systems. As default this is configured as a LC model (changed by DIP-SW for use with a VRF system).

For VRF Applications the 0-10V DX Coil Interface is only compatible with SMMSi / SMMSe 8HP & 10HP outdoor units.

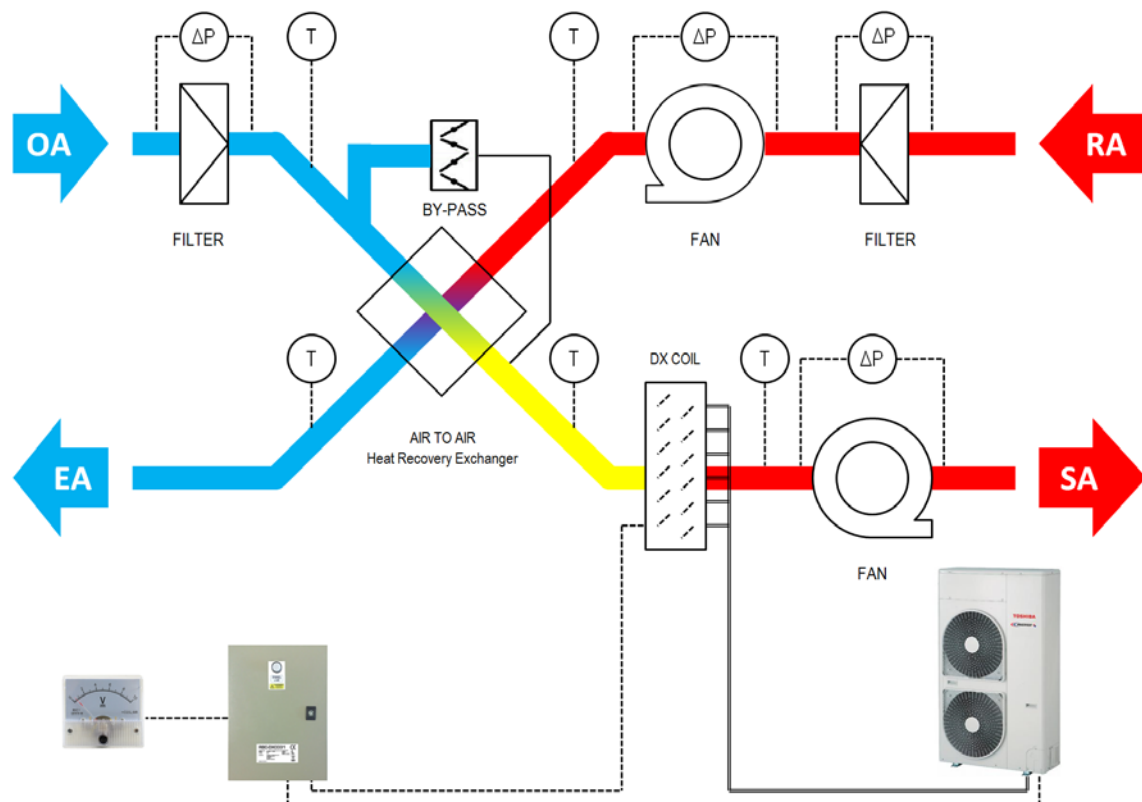
Outdoor Unit	Model	HP
VRF SMMSi /SMMSe Outdoor Units [75% - 100% Diversity]	MMY-MAP0804HT8P-E / MAP0806HT8P-E MMY-MAP0804HT8JP-E / MAP0806HT8JP-E MMY-MAP0804HT8P-ME / MAP0806HT8P-ME MMY-MAP0804HT8P-TR / MAP0806HT8P-TR MMY-MAP0804HT8JP-TR / MAP0806HT8JP-TR	8 [6, 8]
	MMY-MAP1004HT8P-E / MAP1006HT8P-E MMY-MAP1004HT8JP-E / MAP1006HT8JP-E MMY-MAP1004HT8P-ME / MAP1006HT8P-ME MMY-MAP1004HT8P-TR / MAP1006HT8P-TR MMY-MAP1004HT8JP-TR / MAP1006HT8JP-TR	10 [8, 10]

Additionally VRF systems require an appropriately sized VRF DX PMV which must be brazed to the DX Coil used in conjunction with the DX CONTROLLER.

For LC systems the DX Coil is connected directly to the outdoor unit (no VRF DX PMV required).

The Toshiba system must be connected 1:1 with a DX-Coil (up to 10HP). DX Coil's larger than 10HP need to be split into separate interlaced sections (each with separate AHU DX Coil Interface and Outdoor unit).







AHU example using DI-Big Outdoor unit:-








2 SUPPLIED PARTS






- LC applications only require the LC / VRF DX CONTROLLER (RBC-DXC031).
- VRF applications require the LC / VRF DX CONTROLLER plus an appropriately sized VRF DX PMV.
- The VRF DX PMV is a kit of parts which the installer needs to assemble (including brazing). There are 2 models which can be configured in to 3 sizes:
 - 6HP (16.0kW) MM-DXV141
 - 8HP (22.4kW) MM-DXV281
 - 10HP (28.0kW) MM-DXV281




RBC-DXC031 Contents

Item (Pre-Wired)	Description	Qty
	TC2 Sensor (Ø6) BLK	1
	TC2 Sensor Extension Lead 5m	1
	TCJ Sensor (Ø6) RED	1
	TCJ Sensor Extension Lead 5m	1
	TA Sensor (Resin) YEL	1
	TA Sensor Extension Lead 5m	1

Item	Description	Qty
	Sensor Holder (Ø6) (TCJ / TC2)	2
	Fix Plate (Ø6)	2
	P Clamp (TA)	1
	IOM: Installation & Owner's Manual (EN)	1
	Multi-Language CD DE / EN / ES / FR GR / IT / NE / TR / PT	1

MM-DXV141 / MM-DXV281 Contents

Item	Description	Qty
	PMV (Size 60) (MM-DXV141)	1
	PMV (Size 100) (MM-DXV281)	1
	PMV Sensor Extension Lead 5m	1
	TC1 Sensor (Ø4) BLU	1
	TC1 Sensor Extension Lead 5m	1

Item	Description	Qty
	Sensor Holder (Ø4) (TC1)	1
	Fix Plate (Ø4)	1
	Strainer	2

3 PRECAUTIONS FOR SAFETY

- Ensure that all Local, National and International regulations are satisfied.
- Read this "PRECAUTIONS FOR SAFETY" carefully before installation.
- The precautions described below include the important items regarding safety. Observe them without fail.
- After the installation work, perform a trial operation to check for any problem.
- Read this Manual to explain how to use and maintain the unit.
- Turn off the main power supply switch (or breaker) before the unit maintenance.
- Ask the customer to keep this installation owner's manual.

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.

CAUTION

To Disconnect the Appliance from Main Power Supply

This appliance must be connected to the main power supply by means of a switch with a constant separation of at least 3mm.

4 INSTALLATION

Operating Conditions:

AHU	<p>When used for Ventilation, the DX-Coil MUST be combined with other equipment such as heat recovery exchanger or heaters / coolers to ensure that the CA limits are not exceeded, in order to ensure reliable operation:-</p> <p>OA Outdoor Air SA Supply Air CA Coil Air (After Heat Recovery Exchanger) RA Return Air EA Exhaust Air</p> <p>Cooling mode DX coil "air on" temp: Min: 15°CWB (18°CDB) ~ Max: 24°CWB (32°CDB) Heating mode DX coil "air on" temp: Min: 12°CDB* ~ Max: 28°CDB (*Pull down to 7°C)</p>
	<p>Outdoor Unit Refer to specification of Outdoor Unit</p>

For LC DX Interface use the following table to size AHU / DX Coil:-

Total Size		HP	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0	10.0
RBC-DXC031		-	1	1	1	1	1	1	1	1	1
General	Standard Air volume flow rate (m ³ /hr)		570	610	900	1320	1600	2100	2720	3600	4200
	Min. DX Coil internal volume (dm ³)		0.5	0.5	0.8	1	1.5	1.7	1.7	3	3
	Max. DX Coil internal volume (dm ³)		0.7	0.7	1.1	1.4	2.1	2.7	3.2	4.2	5.4
	Recommended Liquid Capillary Distributor Orifice size (ID mm)		2.3 – 2.5	2.8 – 3.0	3.2 – 3.5	3.5 – 4.0	4.5 – 5.0	5.0 – 5.5	5.5 – 6.0	6.5 – 7.0	7.0 – 8.0
Cooling	Min. Cooling Capacity (kW)		0.9 SM	0.9 SM 1.5 SP	1.5 SM 1.2 SP	1.5 SM 1.9 SP	3.0 SM 2.6 SP / 2.6 SP8	3.0 SM 2.6 SP / 2.6 SP8	2.6 SM	9.8 SM	9.8 SM
	Max. Cooling Capacity (kW)		3.0 SM	4.0 SM 4.0 SP	5.6 SM 5.6 SP	8.0 SM 8.0 SP	11.2 SM 12.0 SP / 12.0 SP8	13.2 SM 14.0 SP / 14.0 SP8	16.0 SM	22.4 SM	27.0 SM
	Evaporating Temperature		7°C								
	Suction Superheat		5K								
	Evaporator Air Suction Temp.		27°CDB / 19°CWB								
Heating	Min. Heating Capacity (kW)		0.8 SM	0.8 SM 1.5 SP	1.5 SM 0.9 SP	1.5 SM 1.3 SP	3.0 SM 2.4 SP / 2.4 SP8	3.0 SM 2.4 SP / 2.4 SP8	2.4 SM	9.8 SM	9.8 SM
	Max. Heating Capacity (kW)		4.5 SM	5.0 SM 5.0 SP	6.3 SM 8.1 SP	9.0 SM 11.3 SP	13.0 SM 13.0 SP / 15.6 SP8	16.0 SM 16.5 SP / 18.0 SP8	19.0 SM	25.0 SM	31.5 SM
	Condenser Temperature		44°C								
	Sub Cooling		5K								
	Condenser Air Suction Temp.		20°CDB								

For VRF DX Interface use the following table to determine AHU and DX Coil sizes:-

Total Size		HP	6.0	8.0	10.0
RBC-DXC031		-	1	1	1
MM-DXV141		6.0	1		
MM-DXV281		8.0		1	
		10.0			1
General	Permitted Diversity (%)		75 to 100	75 to 100	75 to 100
	Standard Air volume flow rate (m ³ /hr)		3300	4300	5000
	Min. DX Coil internal volume (dm ³)		1.7	3	3
	Max. DX Coil internal volume (dm ³)		3.2	4.2	5.4
	Recommended Liquid Capillary Distributor Orifice size (ID mm)		5.5 – 6.0	6.5 – 7.0	7.0 – 8.0

Total Size		HP	6.0	8.0	10.0
Cooling	<i>Min. Cooling Capacity (kW)</i>		8.0	11.2	14.0
	<i>Max. Cooling Capacity (kW)</i>		16.0	22.4	28.0
	<i>Evaporating Temperature</i>		6.5°C		
	<i>Superheat</i>		5K		
	<i>Evaporator Air Suction Temp.</i>		27°CDB / 19°CWB		
Heating	<i>Min. Heating Capacity (kW)</i>		7.2	10.0	12.6
	<i>Max. Heating Capacity (kW)</i>		18.0	25.0	31.5
	<i>Condenser Temperature</i>		47°C		
	<i>Sub Cooling</i>		10K		
	<i>Condenser Air Suction Temp.</i>		20°CDB		

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 standard Air volume flow rate is a guideline. The required capacity should determine DX-Interface size selection.
- 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 Cool mode.
- 1:1 Connection: The DX Interface (0-10V) must be connected 1:1 with Toshiba outdoor units.
- Only Heating and Cooling Modes are available on the RBC-DXC031 (No Automatic or Fan Only).



LC Models: Recommended No. of Ref. Circuit by DX-Coil U-Pipe Dia. and DX Coil Size (HP)

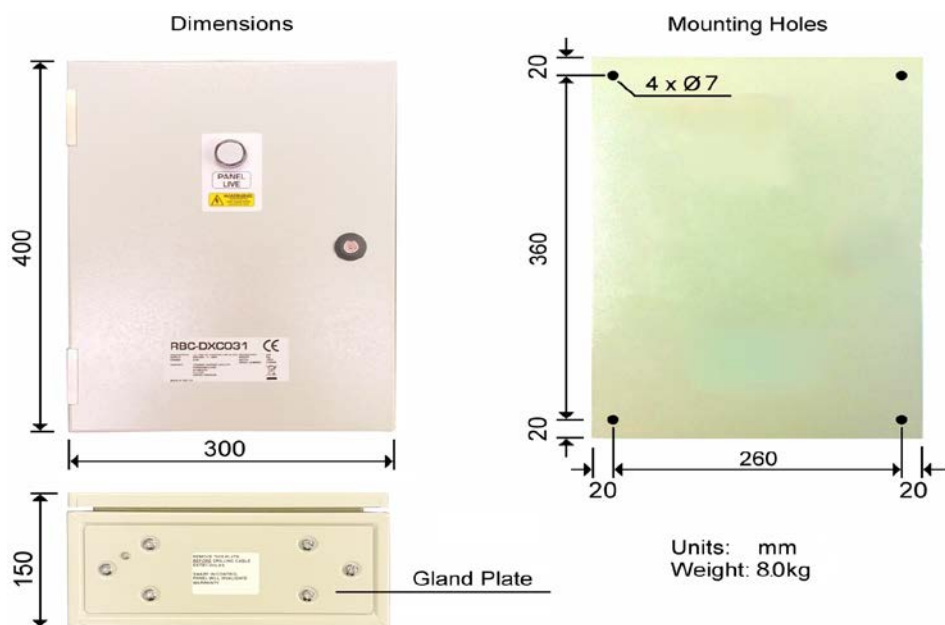
U-Pipe Diameter	HP	No. of Circuits	
		Min	Max
8.00	1	1	2
	1.5	2	2
	2	2	3
	2.5	3	4
	3	3	5
	4	4	7
	5	5	8
	6	6	10
	8	8	12
9.52	10	10	14
	1	1	1
	1.5	1	1
	2	2	2
	2.5	2	3
	3	3	3
	4	3	5
	5	4	6
	6	5	7
12.70	8	6	10
	10	8	12
	2	1	1
	2.5	1	2
	3	2	2
	4	2	3
	5	3	3
	6	3	4
	8	4	6
	10	5	7

VRF Models: Recommended No. of Ref. Circuit by DX-Coil U-Pipe Dia. and DX Coil Size (HP)

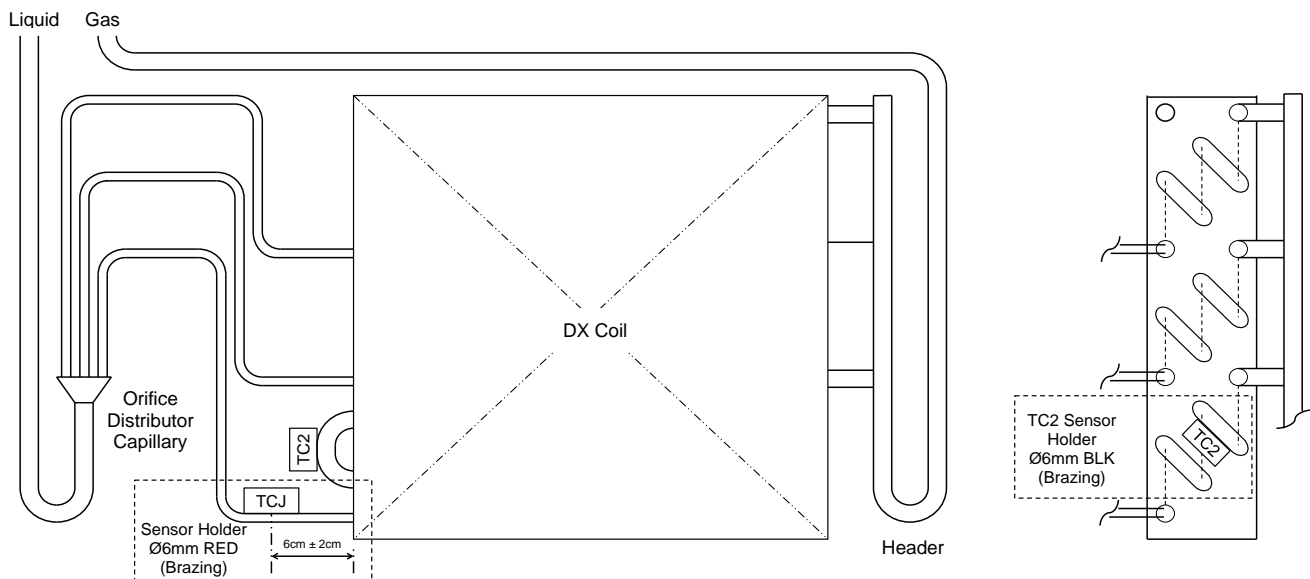
U-Pipe Diameter	HP	No. of Circuits	
		Min	Max
8.00	6.0	6	10
	8.0	8	12
	10.0	10	14
9.52	6.0	5	7
	8.0	6	10
	10.0	8	12
12.70	6.0	3	4
	8.0	4	6
	10.0	5	7

■ DX COIL CONTROLLER (RBC-DXC031)

The DX Coil CONTROLLER must not be installed outside. To maintain waterproof integrity IP65 glands must be used through the gland plate (To avoid damage; when making holes for cable glands, please first remove the Gland Plate from the DX CONTROLLER).



■ LC DX-Coil Schematic (Note the TC sensor is called TC2 due to common LC / VRF Controller)

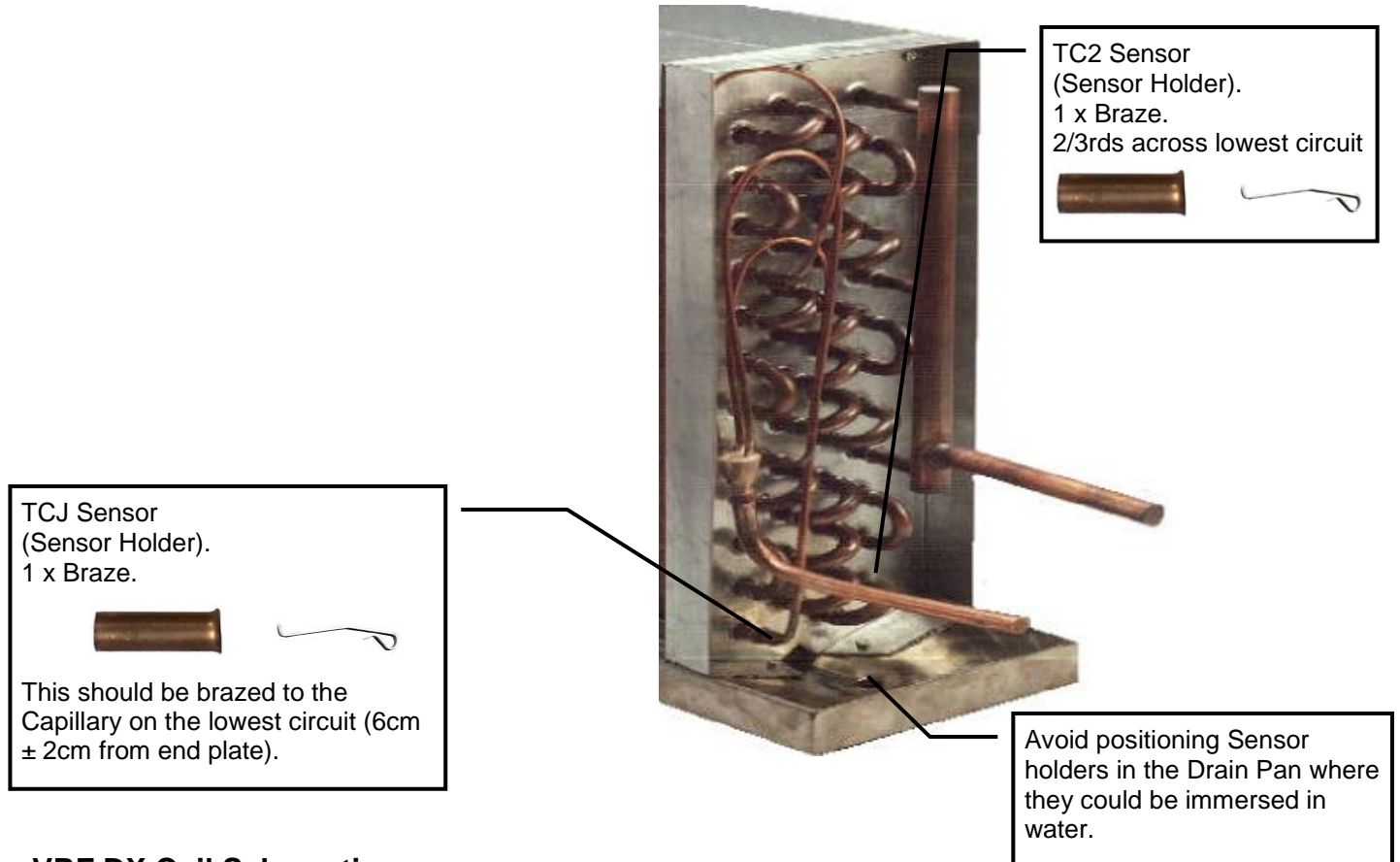


Notes:

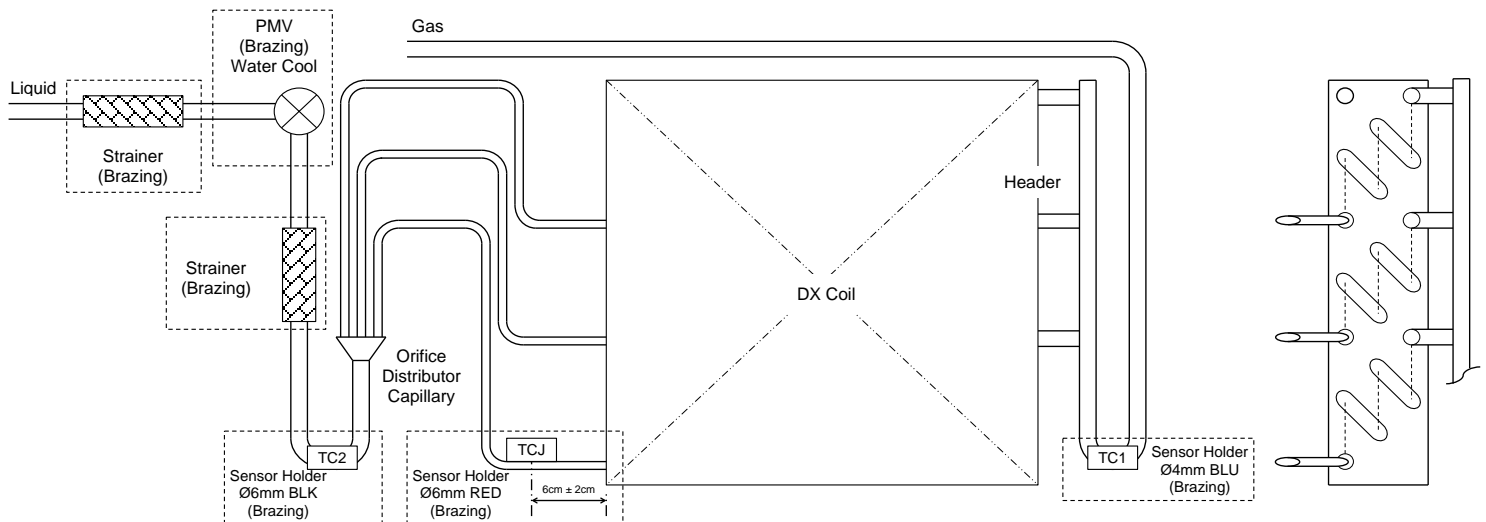
- 1) To ensure reliable operation, all Sensor Holders must be fitted by brazing.
- 2) The TC2 Sensor Holder must be brazed to return bend 2/3rds through pass on the DX Coil's lowest circuit.
- 3) For brazing, be sure to use nitrogen gas to avoid oxidation of pipe inner surface.

■ LC DX COIL PREPARATION

Sensor Holders **MUST** be brazed on to the DX Coil pipe work to ensure reliable temperature sensing. There are two coil sensors, these are inserted into the Sensor Holders, and secured with the sensor-fix-plate. It is essential that the sensors are correctly located to ensure efficient system performance. For brazing, be sure to use nitrogen gas to avoid oxidation of pipe inner surface.



■ VRF DX Coil Schematic



Notes:

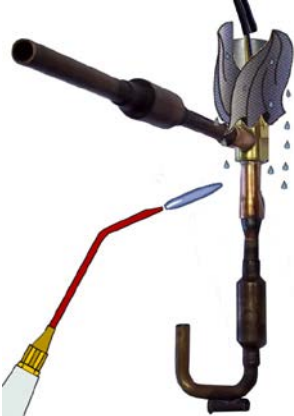
- 1) The PMV must be water cooled whilst brazing, to prevent damage to the mechanism.
- 2) To ensure reliable operation, all Sensor Holders must be fitted by brazing.
- 3) The TCJ Sensor Holder must be brazed to the capillary on the DX Coil's lowest circuit.
- 4) For brazing, be sure to use nitrogen gas to avoid oxidation of pipe inner surface.

■ VRF DX COIL PREPARATION

The VRF DX PMV is supplied as a kit of separate components. 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. Note that the PMV body **MUST** be water cooled whilst brazing. For brazing, be sure to use nitrogen gas to avoid oxidation of pipe inner surface.

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

PMV Body, 2 x Strainer, TC2 Sensor Ø6 (Large Sensor Holder). Custom local Pipework.

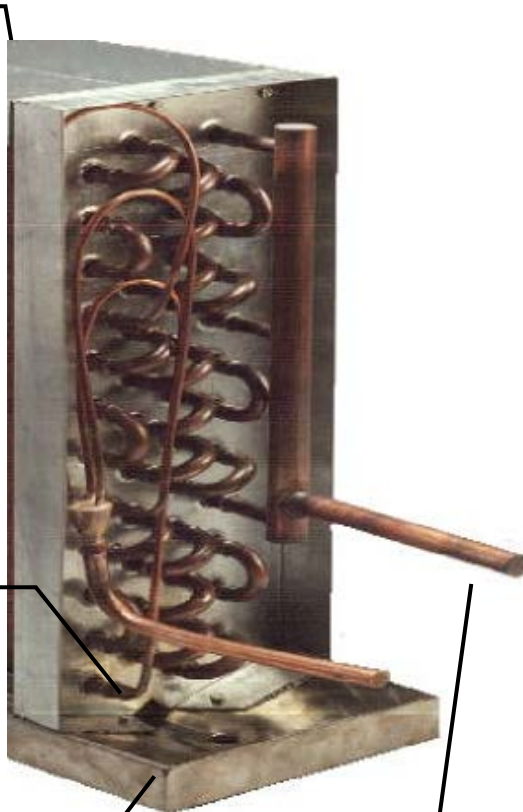


TCJ Sensor Ø6 (Large Sensor Holder).



This should be brazed to the Capillary on the lowest circuit (6cm ± 2cm from end plate).

Avoid positioning Sensor holders in the Drain Pan where they could be immersed in water.



TC1 Sensor Ø4 (Small Sensor Holder). Gas Header Pipe.

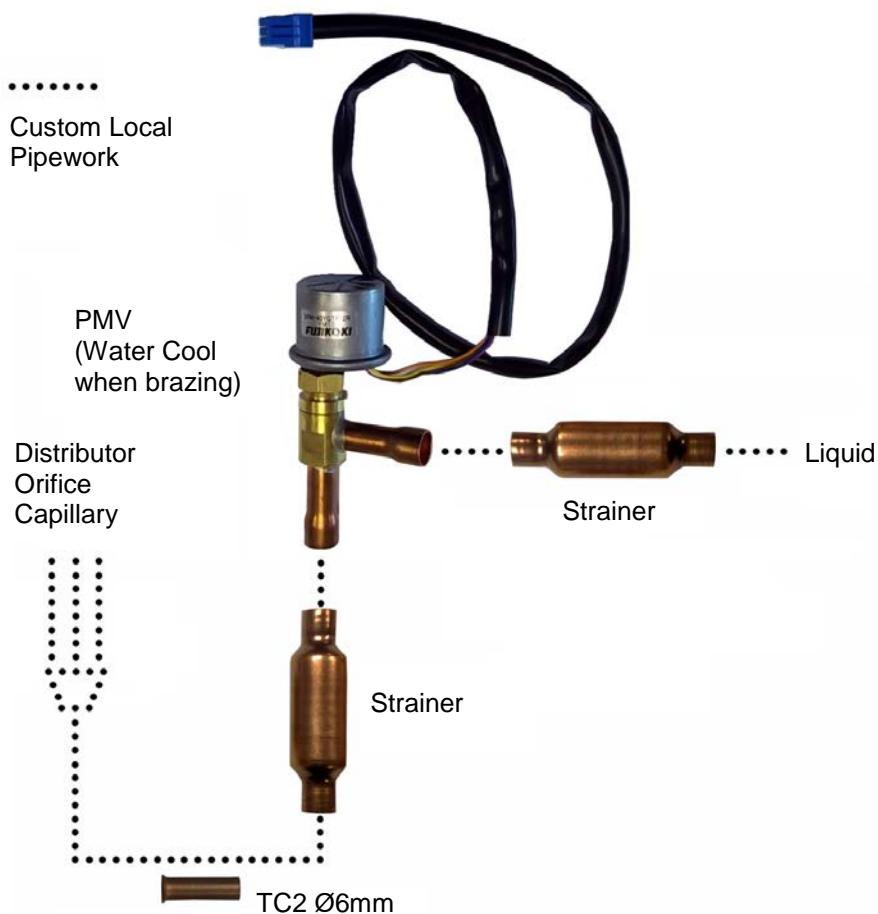


Example (3x10HP) VRF DX Coil with separate Distributors and Headers:-



VRF DX PMV

The supplied components need to be assembled on to the DX Coil locally. Note the PMV body **MUST** be water cooled whilst brazing.



The PMV must be installed upright (as shown).

The flow through the PMV can be in either direction; however the TC2 sensor must be fitted on the distributor side.

The PMV and Strainer have an internal diameter of 12.8mm.

Example



NOTES

1. The connection angle between PMV body and PMV head is fixed at the factory (using thread lock) and should not be changed.
2. The PMV head should not be removed from PMV body.
3. Carefully handle and prepare the PMV when fitting to prevent ingress of foreign matter such as dust or water.
4. Cautions when Brazing PMV
 - A) Whilst brazing, the PMV body and PMV head must be water cooled to keep the component's temperature below 100°C.
 - B) Whilst brazing, nitrogen gas must be flowed through the 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.

5 LC ELECTRICAL WORK

WARNING

1. **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.
2. **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.
3. **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

- This DX CONTROLLER has no power cord.
- If incorrect / incomplete wiring is carried out, it will cause an electrical fire or smoke.
- Install an earth leakage breaker.
If an earth leakage breaker is not installed, an electric shock may be caused.
- 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

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.
- Never connect 220-240V power to the terminal blocks (Ⓐ, Ⓑ, etc) for control wiring (otherwise the system will fail).
- 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
- Run the refrigerant piping and control wiring line in the same line
- Do not turn on the power of the indoor unit until vacuuming of the refrigerant pipes is completed.

Remote controller wiring

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

How to wire

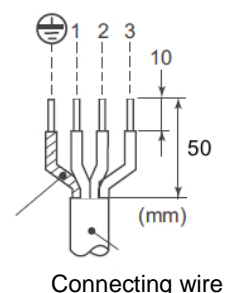
1. Connect the wires from the terminal block on the outdoor unit to the same numbered terminal on the DX CONTROLLER terminal block. Use wires to H07 RH-F or 60245 IEC 66 (1.5mm² or more).
2. In the case of unsheathed redundant cords (conductors) be sure to insulate with electrical insulation tape.
Fix them so that they do not touch any electrical or metal parts.

REQUIREMENT

- Be sure to connect the wires matching the terminal numbers. Incorrect connection causes a trouble.
- Be sure remove the gland plate from the DX CONTROLLER when drilling gland holes. Use IP65 cable glands when installing wires through the gland plate of the DX CONTROLLER.
- The low-voltage circuit is provided for the remote controller (**Do not connect the high-voltage circuit**).

■ Wiring

1. Open the DX CONTROLLER using the key provided.
2. Strip wire ends (10mm).
3. Connect the wires from the terminal block on the outdoor unit to the same numbered terminal on the DX CONTROLLER terminal block.
4. Connect the ground wires to the corresponding terminals.
5. Close the DX CONTROLLER with key provided.



Earth Line

Connecting wire

VRF 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 220-240V power to the terminal blocks (U, V, 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 IP65 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 wire specification: Cable 3-Core 2.5mm², **in conformity with Design 60245 IEC 57.**

▼ Power supply.

Power supply	220~240V ~ 50Hz	
Power supply switch / Earth leakage breaker or power supply wirings / fuse rating for DX CONTROLLERS should be selected by the accumulated total current values of the DX CONTROLLERS.		
Power supply wiring	Below 50m	2.5mm ²

Control wiring, Central controller wiring

- 2-core with polarity wires are used for the Control wiring between indoor and outdoor unit and Central controller 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.

▼ LC / VRF Communication Line

VRF Control wiring between DX CONTROLLER and outdoor unit (2-core shield wire)	Wire Size	(Up to 1000m) $\geq 1.5\text{mm}^2$ (Up to 2000m) $\geq 2.5\text{mm}^2$
Central control line wiring (2-core shield wire)	Wire Size	(Up to 1000m) $\geq 1.5\text{mm}^2$ (Up to 2000m) $\geq 2.5\text{mm}^2$

LC / VRF Remote controller wiring

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

Remote controller wiring.	Wire size: 0.75mm^2 to 2.5mm^2
Total wire length of remote controller wiring	Up to 500m

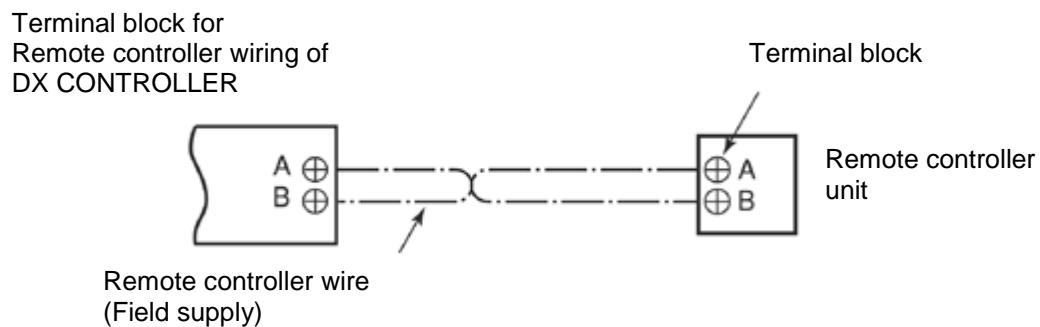
⚠ CAUTION

The remote controller wire (communication line) and AC220-240V 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.

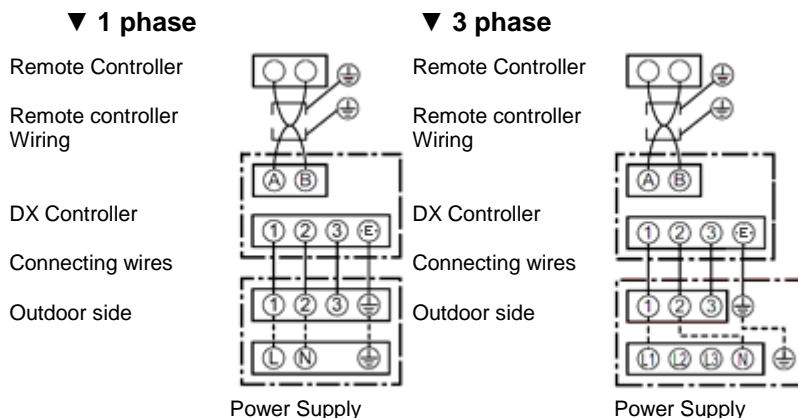
■ LC / VRF Remote controller wiring (Optional)

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

▼ Wiring diagram

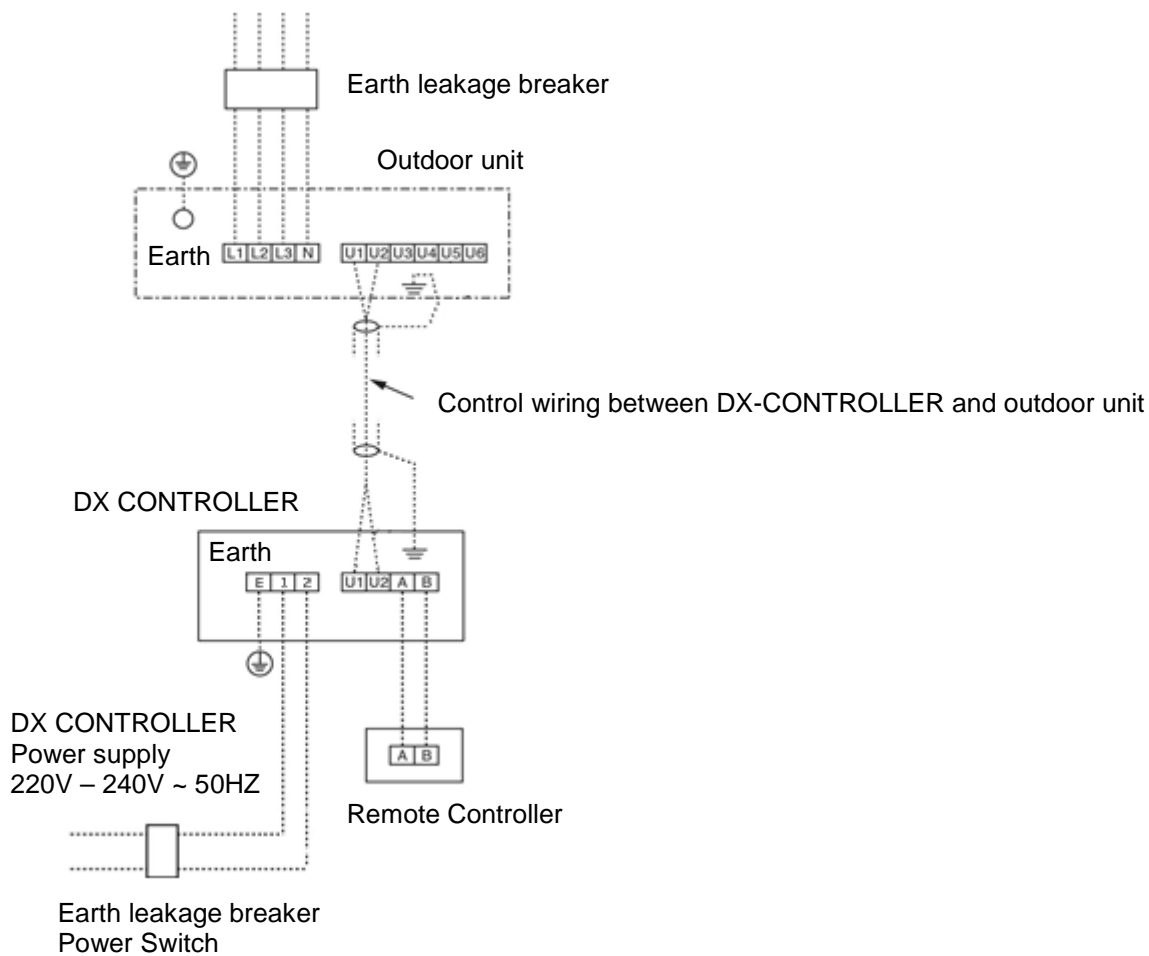


■ LC Wiring between DX CONTROLLER and outdoor unit



■ VRF Wiring between DX CONTROLLER and outdoor unit

Outdoor Unit
Power supply
380V – 415V ~ 50HZ



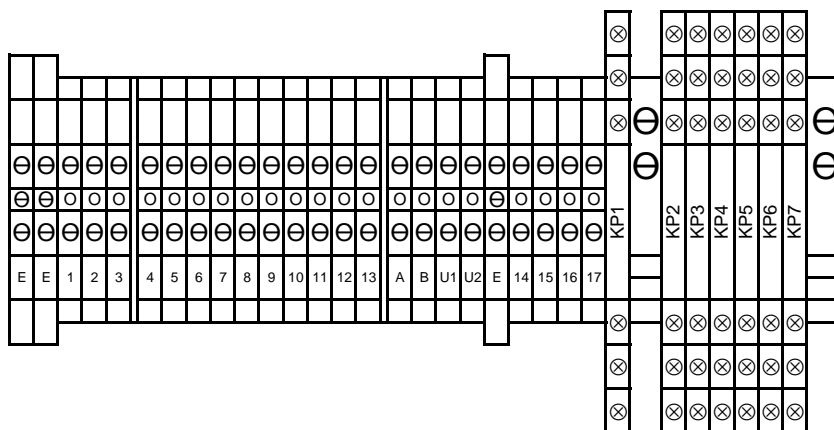
■ VRF Address setup

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

■ Summary of BMS Inputs and Outputs

Description	Type	Terminal
LC Outdoor interconnect	230 VAC	E & 1 & 2 & 3
VRF Power Supply	230 VAC	E & 1 & 2 (3 Not used for VRF)
Capacity Demand Input	AI (0-10V)	4 & 5
ON / OFF Input	DI	6 & 7
Mode Input (Heat Closed / Cool Open)	DI	8 & 9
Capacity lower than Capacity Demand	DO	10 & 11 (SW1_0) / 12 & 13 (SW2_0)
Capacity higher than Capacity Demand	DO	10 & 11 (SW1_1) / 12 & 13 (SW2_1)
VRF Cooling Oil Recovery / VRF Heating refrigerant recovery control	DO	10 & 11 (SW1_2) / 12 & 13 (SW2_2)
Cooling Mode Active	DO	10 & 11 (SW1_3) / 12 & 13 (SW2_3)
Heating Mode Active	DO	10 & 11 (SW1_4) / 12 & 13 (SW2_4)
Sub-Bus (AB)	Serial	A & B
VRF / Central Control (U1/U2)	Serial	U1 & U2 & E
Safety contact input (P10)	DI (NC)	14 & 15
Fan error input (L30)	DI	16 & KP1.14_NO
Fan Operation (Contact Rating: 250VAC 6A)	DO	KP2.11 & KP2.12_NC / KP2.14_NO
Alarm output (Contact Rating: 250VAC 6A)	DO	KP3.11 & KP3.12_NC / KP3.14_NO
Defrost output (Contact Rating: 250VAC 6A)	DO	KP4.11 & KP4.12_NC / KP4.14_NO
VRF Start-up Control (Contact Rating: 250VAC 6A)	DO	KP5.11 & KP5.12_NC / KP5.14_NO
VRF Pre-Defrost Active (Contact Rating: 250VAC 6A)	DO	KP6.11 & KP6.12_NC / KP6.14_NO
Heat Mode Active (Closed) / Cool Mode Active (Open) (Contact Rating: 250VAC 6A)	DO	KP7.11 & KP7.12_NC / KP7.14_NO

■ LC / VRF ELECTRICAL CONNECTIONS (RBC-DXC031)



LC: Indoor / Outdoor Connection

Terminal E & 1 & 2 & 3. The DX CONTROLLER should be connected to the corresponding terminals on the outdoor unit.

VRF: Supply

Terminal E & 1 & 2 (3 Not used for VRF). The DX CONTROLLER should be connected to the main power supply by means of a switch with a contact separation of at least 3mm.

Analogue Input 1 (0-10V Capacity Control)

Terminal 4 & 5. See BMS section for details.

Digital Input 1 (ON / OFF)

Terminal 6 & 7. 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. Note that an appropriate capacity control demand (AI_1) is additionally required for the system to start.

Digital Input 2 (Mode)

Terminal 8 & 9. HEAT / COOL mode selection over a dry contact. If the contact is closed, the system changes to HEAT mode. If the contact is opened, the system changes to COOL mode. Mode changes can also be made using a wired remote controller (if fitted). Note only COOL mode and HEAT mode are available.

Digital Output 1 (User Defined)

Terminal 10 & 11. See BMS section for details.

Digital Output 2 (User Defined)

Terminal 12 & 13. See BMS section for details.

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).

LC: Inside device BUS line (U1 / U2 / E)

Terminal U1 & U2 & E Details regarding the wiring of the Central Control BUS can be found in the installation manual of the Central Control devices (Optional).

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

Terminal U1 & U2 & E 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 14 & 15 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 16 & KP1.14_NO. 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.

Fan Operation Output

Terminal KP2.11 & KP2.12_NC / KP2.14_NO. The installer chooses NC or NO operation by wiring directly to relay. During Fan Motor operation NO / NC signal is active (Contact Rating 250VAC 6A).

Alarm signal Output

Terminal KP3.11 & KP3.12_NC / KP3.14_NO. The installer chooses NC or NO operation by wiring directly to relay. During Alarm Operation NO / NC signal is active (Contact Rating 250VAC 6A).

Defrost Operation Output

Terminal KP4.11 & KP4.12_NC / KP4.14_NO. The installer chooses NC or NO operation by wiring. During both reverse defrost operation and hot gas defrost operation (SMMSe only) NO / NC signal is active (Contact Rating 250VAC 6A).

Startup Control Output (VRF Only)

Terminal KP5.11 & KP5.12_NC / KP5.14_NO. The installer chooses NC or NO operation by wiring. During Startup Control NO / NC signal is active (Contact Rating 250VAC 6A). On Start up the VRF system overrides the 0-10V Capacity Command which can last for up to 20mins.

Pre-Defrost Signal Output (VRF Only)

Terminal KP6.11 & KP6.12_NC / KP6.14_NO. The installer chooses NC or NO operation by wiring. Five minutes before the scheduled start of both reverse defrost operation and hot gas defrost operation (SMMSe only) a NC / NO signal is active (Contact Rating 250VAC 6A). During reverse defrost operation the Pre-Defrost signal output terminates when the defrost starts. During hot gas defrost operation (SMMSe only) the Pre-Defrost signal output terminates when the defrost ends.

Cool / Heat Model Output

Terminal KP7.11 & KP7.12_NC / KP7.14_NO. The installer chooses NC or NO operation by wiring. Heat (NC) / Cool (NO) (Contact Rating 250VAC 6A).

LC: Temperature sensors

The refrigerant temperature sensors are inserted into the brazed sensor. The sensor cables are to be attached as follows:

CN101	TC2 Sensor Ø6mm (BLK Plug / BLK Vinyl Tube)	Factory Fitted to DX Controller
CN102	TCJ Sensor Ø6mm (RED Plug / RED Vinyl Tube)	Factory Fitted to DX Controller
CN104	TA Sensor Resin (YEL Plug / BLK Vinyl Tube)	Factory Fitted to DX Controller

The sensor cables cannot be extended; they are supplied at the maximum permissible length of 5m.

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 FIX-PLATE (There are 2 sizes of FIX-PLATE).

The sensor cables are to be attached as follows:

CN101	TC2 Sensor Ø6 (BLK Plug / BLK Vinyl Tube)	Factory Fitted to DX Controller
CN102	TCJ Sensor Ø6 (RED Plug / RED Vinyl Tube)	Factory Fitted to DX Controller
CN104	TA Sensor Resin (YEL Plug / BLK Vinyl Tube)	Factory Fitted to DX Controller
CN100	TC1 Sensor Ø4 (BRN Plug / BLU Vinyl Tube)	MM-DXV141 / MM-DXV281

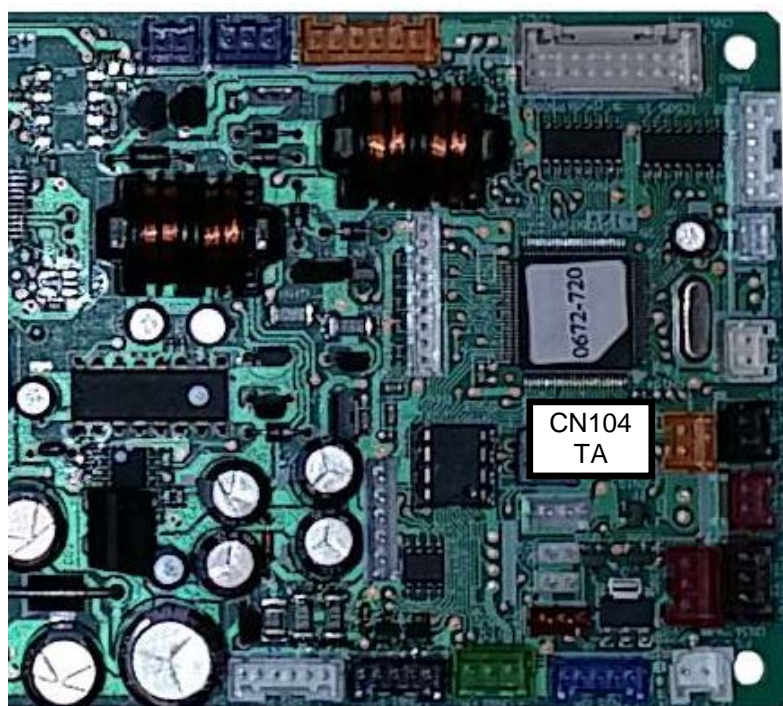
The sensor cables cannot be extended; they are supplied at the maximum permissible length of 5m.

VRF: Pulse modulation valve (PMV)

The connecting cable of the PMV is to be attached as follows:

CN82	PMV Extension Cable	MM-DXV141 / MM-DXV281
------	---------------------	-----------------------

The PMV cable cannot be extended; it is supplied at the maximum permissible length of 5m.



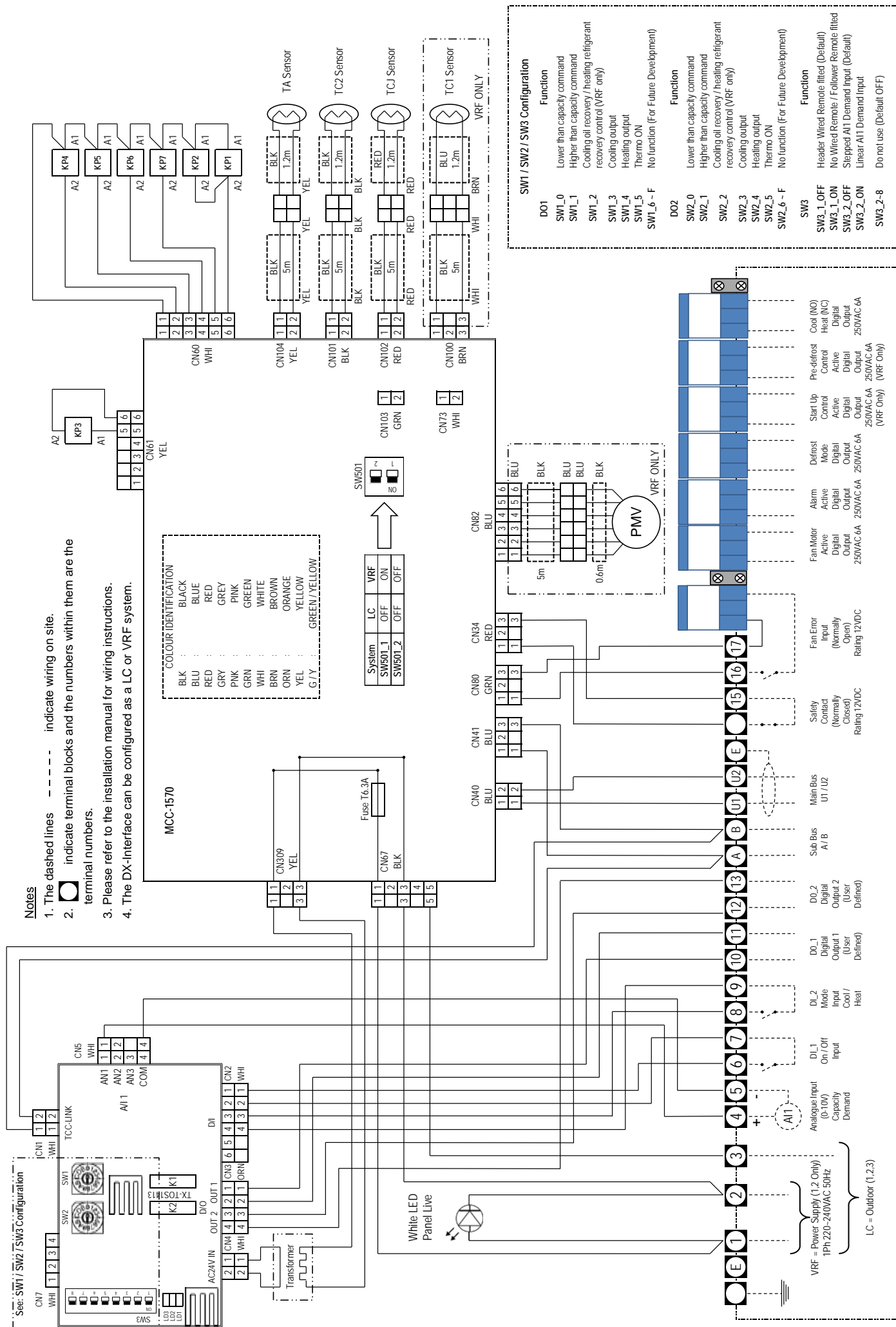
CN101
TC2

CN102
TCJ

CN100
TC1

CN82
PMV

LC / VRF WIRING DIAGRAM (RBC-DXC031)

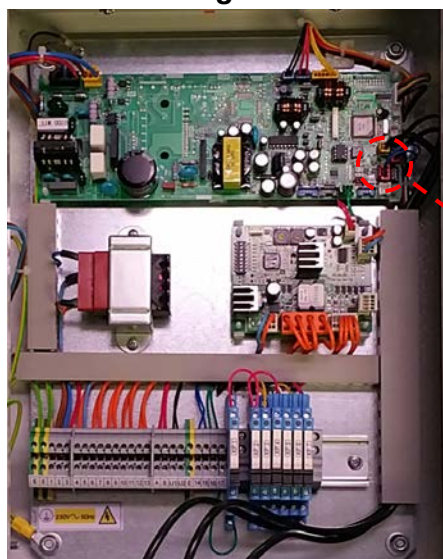


6 APPLICABLE CONTROLS / BMS INTERGRATION

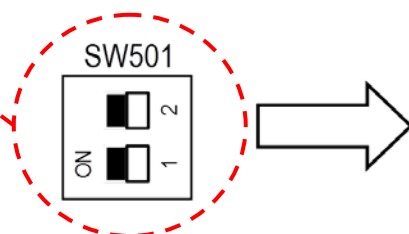
- A **wired remote controller is required during installation of the 0-10V DX Controller.**
- The 0-10V PCB communicates on the AB BUS, as default it is configured as a FOLLOWER. In order to use a wired remote controller for installation and maintenance purposes the wired remote controller **MUST** be configured as a HEADER (if the wired remote controller has previously been set to a FOLLOWER using the dip-switch on the back of the remote, you will get E01 Check Code as there would be no HEADER).
- **Should you wish to use the system without a wired remote controller (or with a wired remote controller set as a FOLLOWER) then it is possible to configure the 0-10V DX Controller to be a HEADER by setting DPSW03_1 on 0-10V PCB to ON (otherwise you will get E01 Check code).**
- If you have both the 0-10V DX Interface and wired remote controllers set as HEADER's you will get E09 check code.

■ DX CONTROLLER Configuration

LC / VRF Configuration



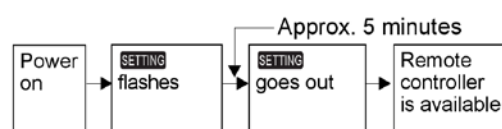
- The DX CONTROLLER (RBC-DXC031) is common for both LC & VRF systems.
- As default this is configured as a LC model (changed by DIP-SW501 on MCC-1570 for use with a VRF system).



System	LC	VRF
SW501_1	OFF	ON
SW501_2	OFF	OFF

REQUIREMENT

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



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

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



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

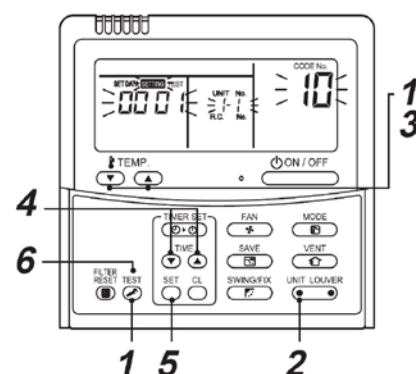
■ Changing of settings for applicable controls

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).

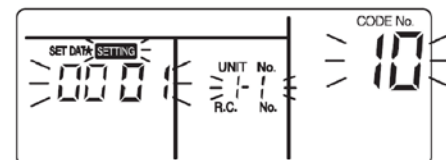
Procedure 1

Push + + buttons simultaneously for at least 4 seconds.
After a while, the display flashes as shown in the figure.
Confirm that the CODE No. is [10].



- If the CODE No. is not [10] push  button to erase the display content and repeat the procedure from the beginning.

(No operation of the remote controller is accepted for a while after  button is pushed).



(* Display content varies with the DX CONTROLLER model).


Procedure 2

Using "TEMP",  /  buttons, specify CODE NO. [******].


Procedure 3


Using timer "TIME"  /  buttons, select SET DATA [********].

Procedure 4


Push  button. When the display changes from flashing to lit, the setup is completed.


- To change other settings of the selected DX CONTROLLER, repeat from procedure 2.

Use  button to clear the settings.

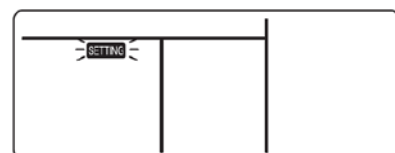
To make settings after  button was pushed, repeat from procedure 2.

Procedure 5

When settings have been completed, push  button to determine the settings.

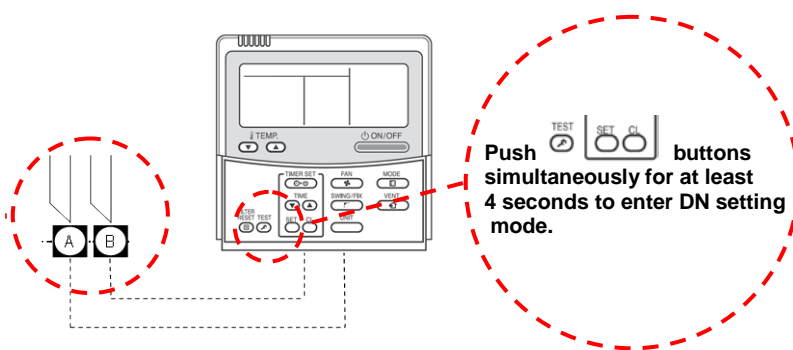
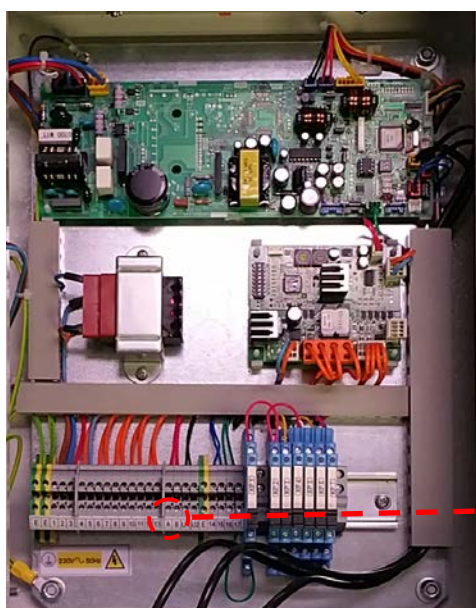
When  button is pushed, **SETTING** flashes and then the display content disappears and the air conditioner enters the normal stop mode.

(While **SETTING** is flashing, no operation of the remote controller is accepted).



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

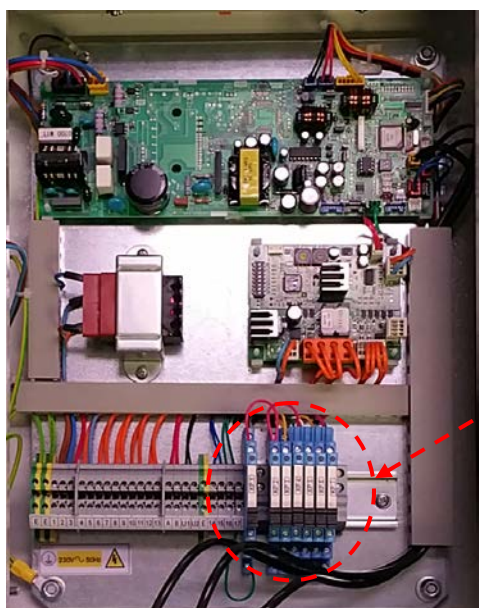
- Follow the basic operation Procedure (1 → 2 → 3 → 4 → 5 → 6) outlined above.
- The interface uses a new Device Type DN Code 10_55. This is set at the factory.
- The installer must set Capacity Code (DN Code 11). As default this is configured as a 10HP model at the factory (DN 10_23). See table on page 20.



Capacity (HP)	1	1.5	2	3	4	5	6	8	10
Capacity Code (DN 11)	0003	0006	0009	0012	0015	0017	0018	0021	0023
LC	•	•	•	•	•	•	•	•	•
VRF (MM-DXV***)	-	-	-	-	-	-	141	281	281

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

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

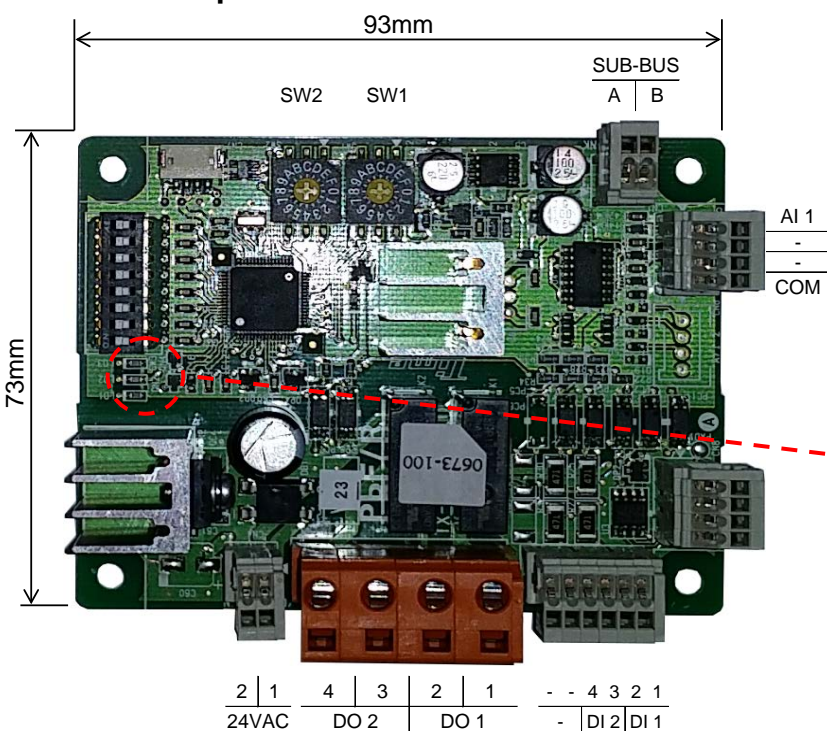


CN60 Output	Output Function	Relay Number
CN60.1+2	Defrost output	KP4
CN60.1+3	Cooling / Heating start up control	KP5
CN60.1+4	Pre-defrost output (static or pulse*)	KP6
CN60.1+5	Cooling (NO) / Heating mode (NC)	KP7
CN60.1+6	Fan operation	KP2

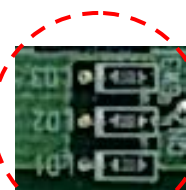
* Set by DN Code (CB)

0000	Static	Default
0001	100ms Pulse (0002=200ms / 0003=300ms 0010=1sec)	

■ BMS Specification: 0~10V PCB

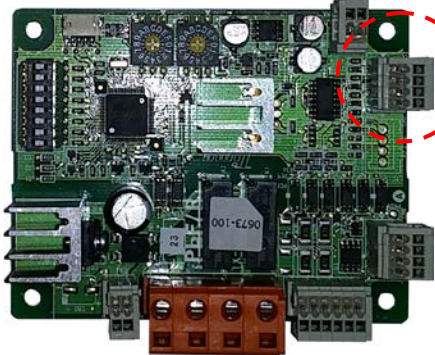


Function	Description
Power supply	Sub bus connection (AB): 15V ~ 24VDC 24VAC (supplied from DX CONTROLLER)
LED display	LD1 (GRN ON): Power Supply OK LD3 (RED FLASH): Communication Error LD3 (RED ON): Alarm Active



Function	Terminal	Max. Cable Length (m)	Cable Specification
Analogue input	4 & 5	200	Screened cable: 0.5 ~ 1.0mm ²
Digital input	6 & 7 / 8 & 9	100	Non screened cable: 0.5 ~ 1.0mm ²
Digital output	10 & 11 / 12 & 13	500	Non screened cable: 0.5 ~ 1.0mm ²

BMS Specification: Analogue Input 1



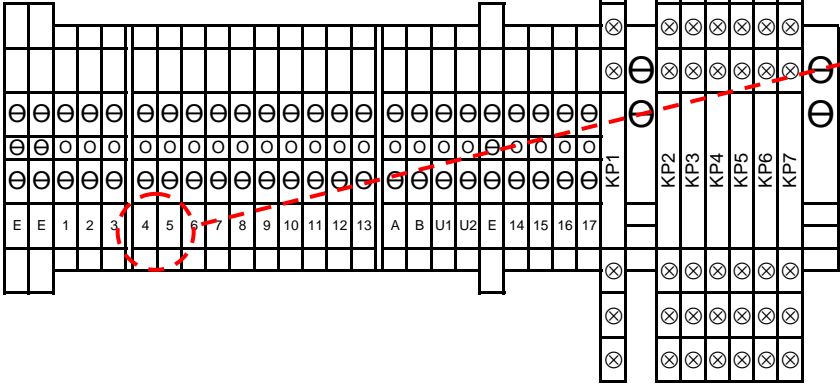
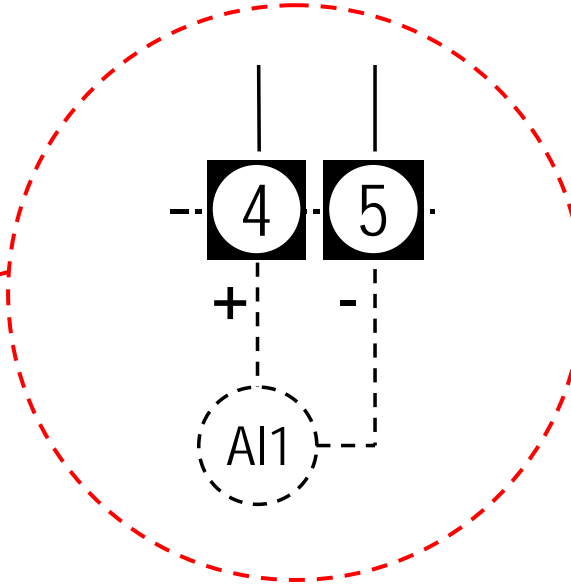
1: AI 1 = Capacity control

2: - = Not Used

3: - = Not Used

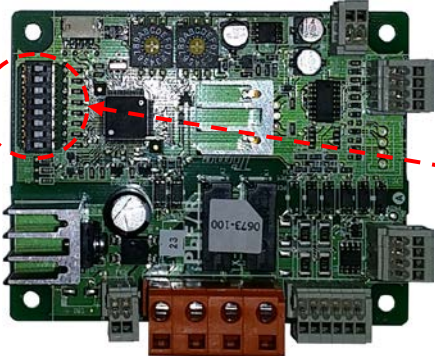
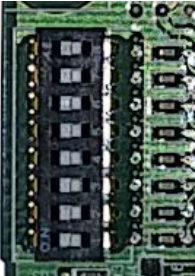
4: COM = Common

* Be sure NOT to input more than DC10V in analogue input terminal

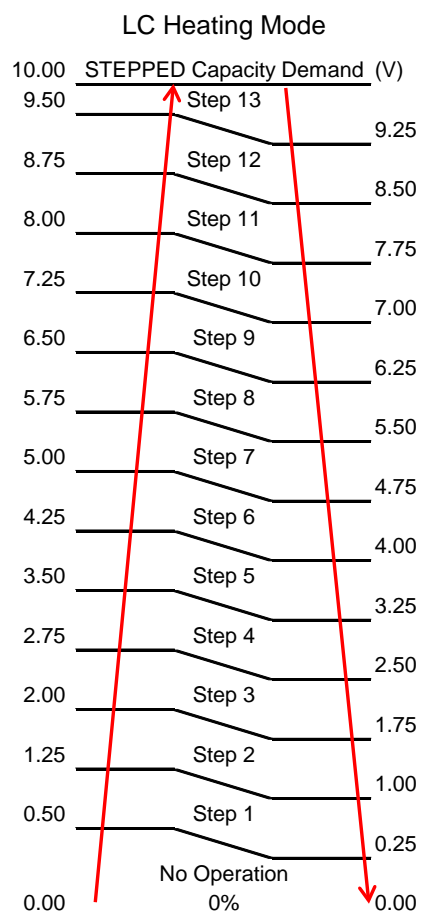
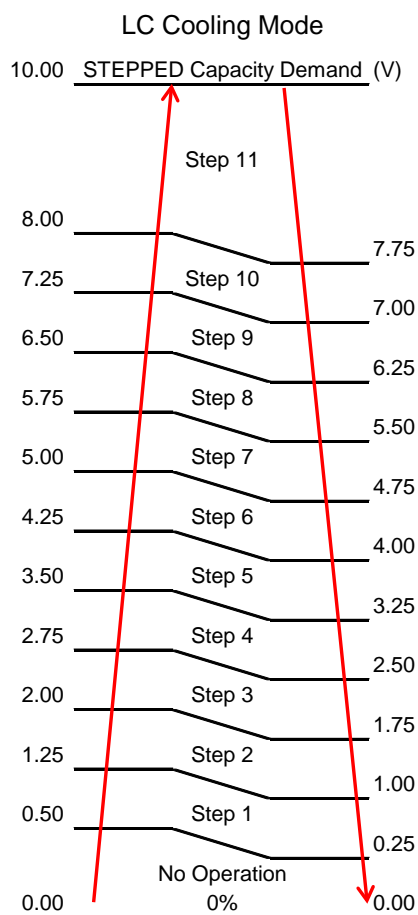



- To ease the integration of the DX interface with the AHU DDC the capacity control is able to operate with a STEPPED or LINEAR function from the analogue input
- To select either a STEPPED (default) or LINEAR response, from the analogue input, use DPSW03 located on the 0~10V IF PCB

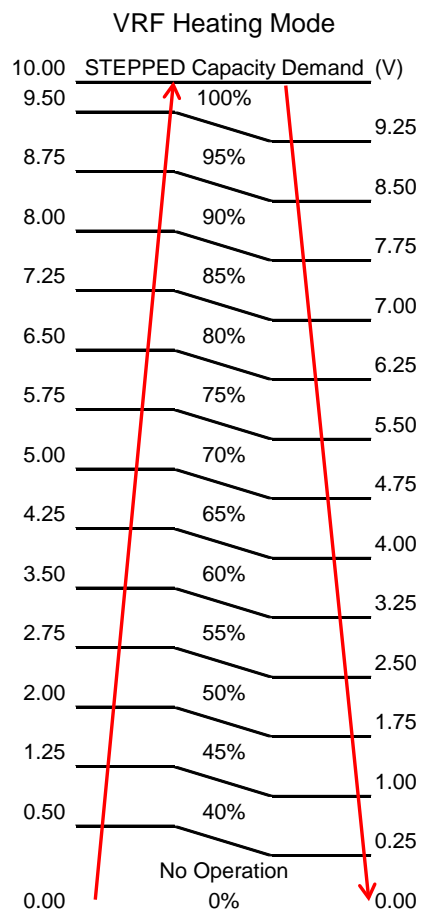
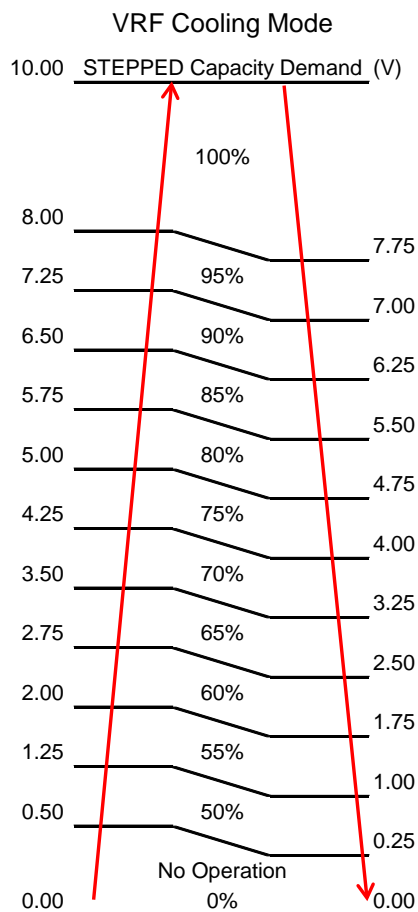
DPSW03_2	Function
OFF	STEP response to analogue input
ON	LINEAR response to analogue input

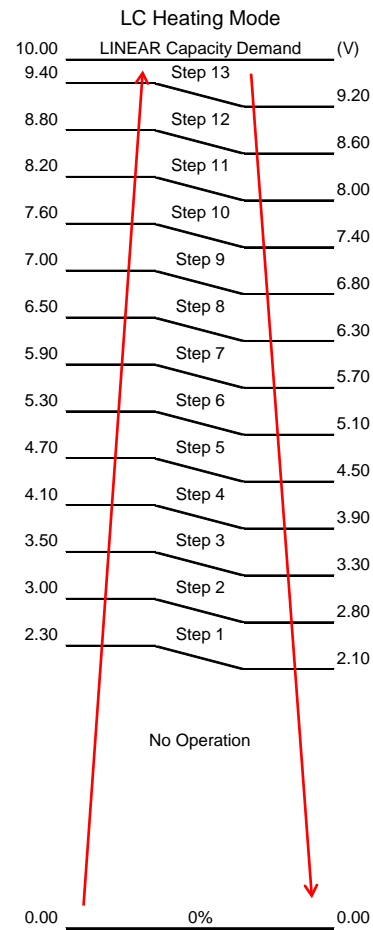
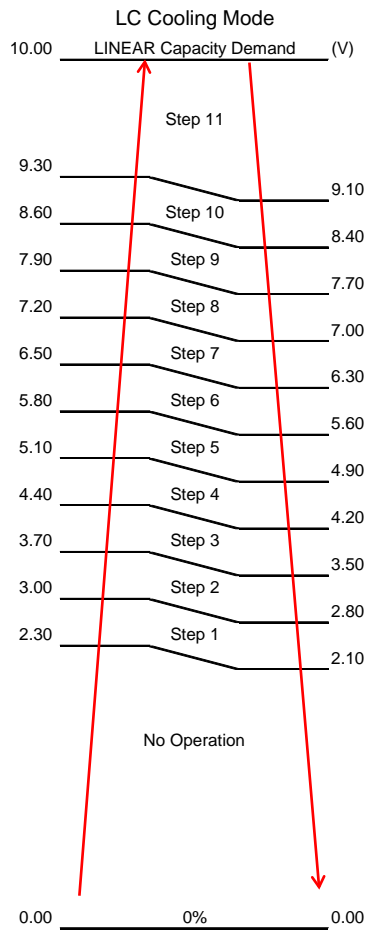
■ AI_1 Demand 0~10V Stepped Control (SW3_2 OFF – Default)



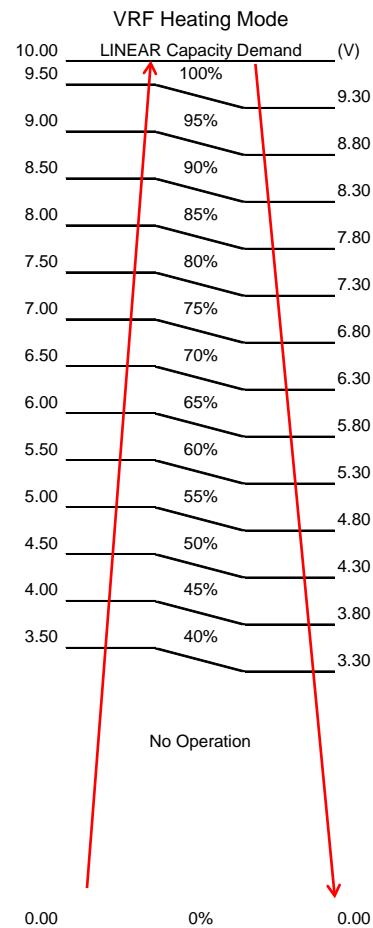
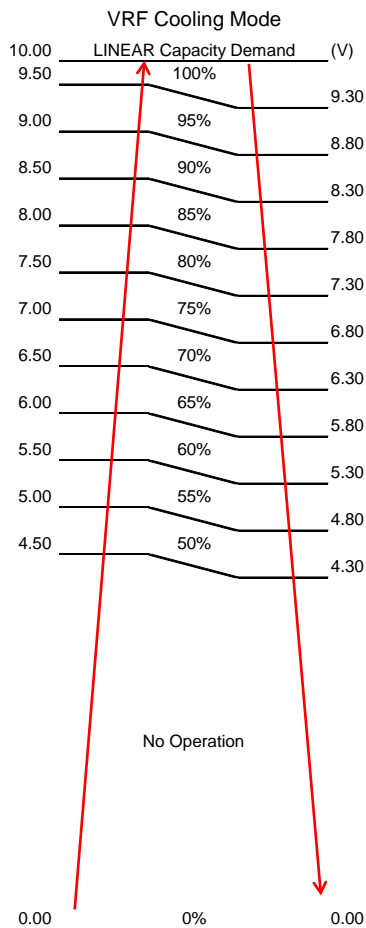
Note: For LC models the control steps are equally spaced between minimum and maximum compressor speed (actual limits vary by outdoor unit)



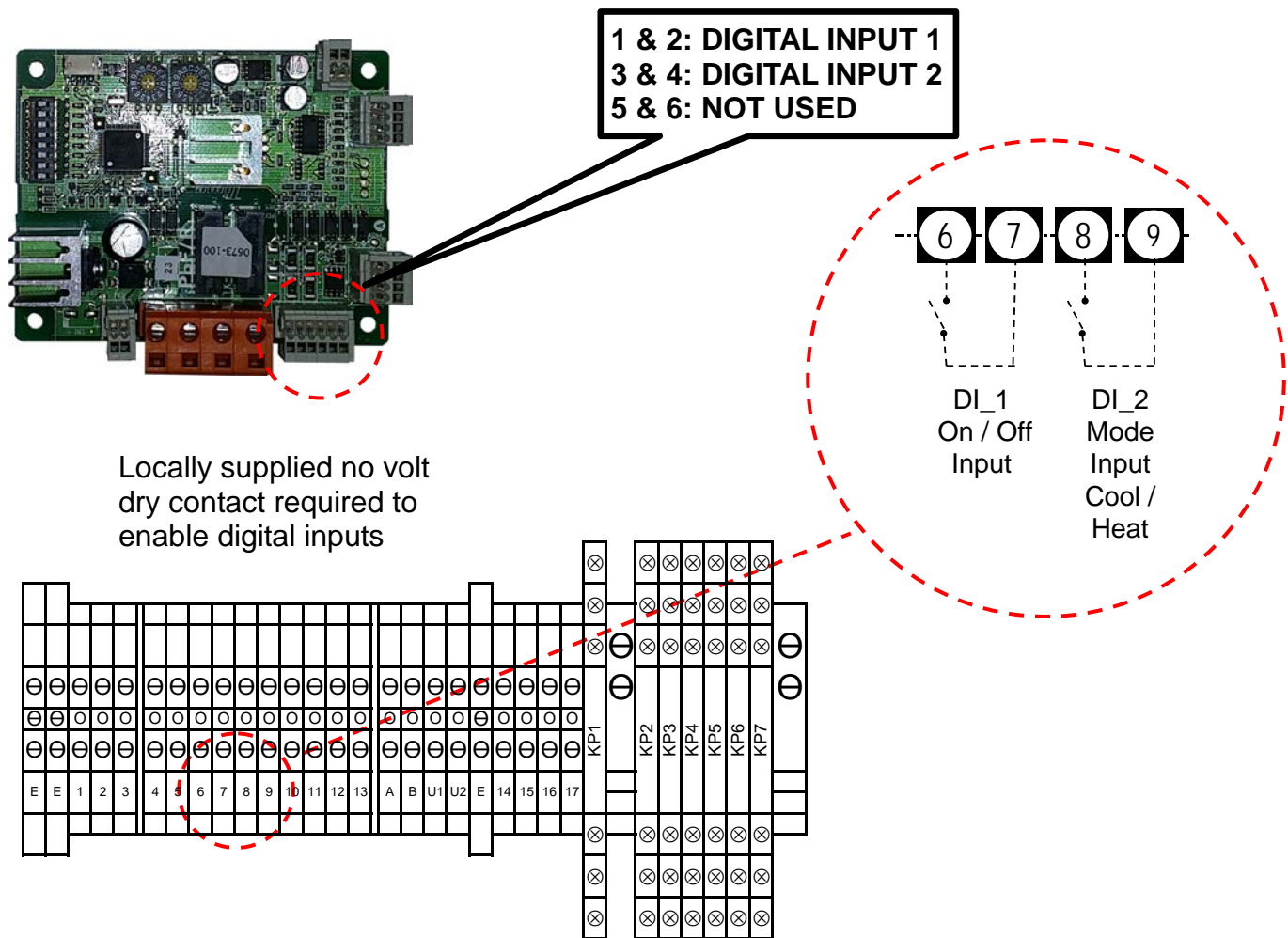
■ AI_1 Demand 0~10V Linear Control (SW3_2 ON)



Note: For LC models the control steps are equally spaced between minimum and maximum compressor speed (actual limits vary by outdoor unit)



■ BMS Specification: Digital Inputs

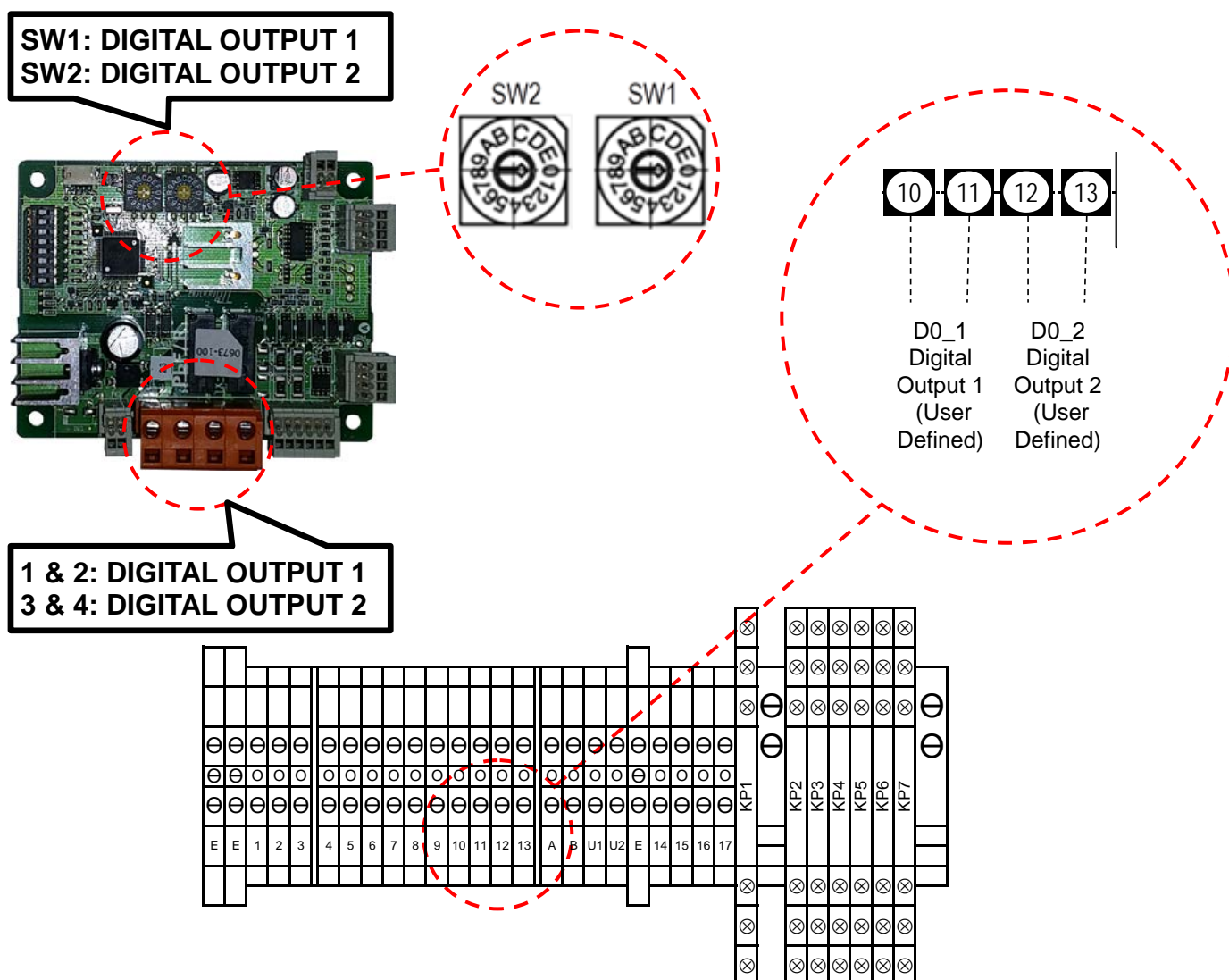


Function	DI OPEN	DI SHORT
DI1	Operation OFF	Operation ON
DI2	COOL mode active	HEAT mode active

Note:

- Digital Input terminal supply voltage (12VDC) from PCB.

■ BMS Specification: Digital Outputs



- Output function selected using rotary switches on PCB

Rotary Sw. Pos.	Output Function
0	Lower than capacity command
1	Higher than capacity demand
2	Cooling oil recovery control / heating refrigerant recovery control (VRF only)
3	Cooling output
4	Heating output
5	Thermo ON
6 ~ F	No Function (for future use)
Relay contact rating	250VAC: 5A (max) 30VDC: 5A (max)

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

Using the BMS inputs, operate the unit as usual. Analogue Input 1 (AI1) must be set to a voltage greater than 0.5V (4.5V recommended) when using the STEPPED function (DPSW03_2 OFF) or greater than 2.3V when using the LINEAR function (DPSW03_2 ON). If AI1 is set to 0V the Test function will not operate

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.

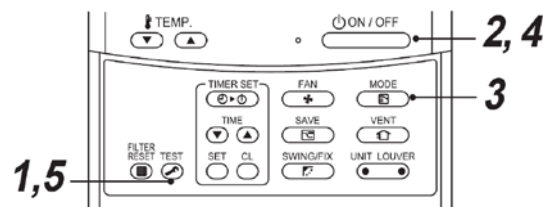
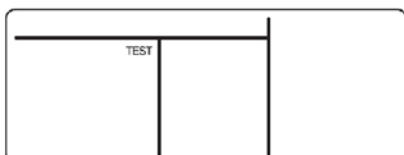
CAUTION

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

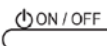
In case of wired remote controller.

Procedure 1


Keep  button pushed for 4 seconds or more. [TEST] is displayed on the display part and the selection of mode in the test mode is permitted.



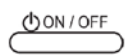
Procedure 2

Push  button.


Procedure 3

- Using  button, select the operation mode, [❄️ COOL] or [🔥 HEAT].
- Do not run the air conditioner in a mode other than [❄️ COOL] or [🔥 HEAT].
 - The temperature controlling function does not work during test run.

Procedure 4

After the test run, push  button to stop a test run.
(Display part is same as procedure 1).

Procedure 5

Push  check button to cancel (release from) the test run mode.
([TEST] disappears on the display and the status returns to normal).



8 TROUBLE SHOOTING

■ Using DX CONTROLLER

In the case of a check code, the Alarm Digital output (Relay KP3 T11 / T14) is active. However a wired Remote Controller (or Central Control device) is required to read the check code number.

■ Using a wired remote controller

■ 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.

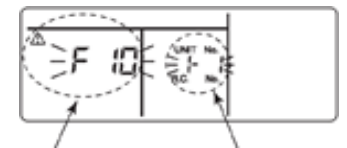
The check code is only displayed during the operation.

If the display disappears, operate the air conditioner according to the following "Confirmation of error history" for confirmation.

■ Confirmation of error history

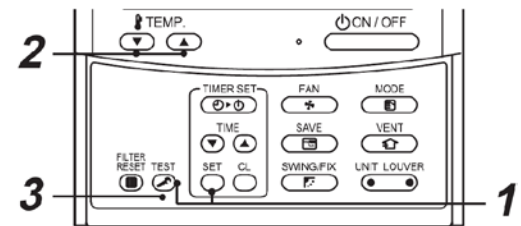
When a trouble occurred on the air conditioner, the trouble can be confirmed with the following procedure. (The trouble history is stored up to 4 troubles.)

The history can be confirmed from both operating status and stop status.



Check code

Indoor unit No. in which an error occurred



Procedure 1

When pushing and buttons at the same time for 4 seconds or more, the following display appears.

If [service check] is displayed, the mode enters in the trouble history mode.

- [01: Order of trouble history] is displayed in CODE No. window.
- [Check code] is displayed in CHECK window.
- [DX CONTROLLER address in which an error occurred] is displayed in Unit No.

Procedure 2

Every pushing of "TEMP." button used to set temperature, the trouble history stored in memory is displayed in order.

The numbers in CODE No. indicate CODE No. [01] (latest) → [04] (oldest).

REQUIREMENT

Do not push button because all of trouble history of the DX CONTROLLER will be deleted.

Procedure 3

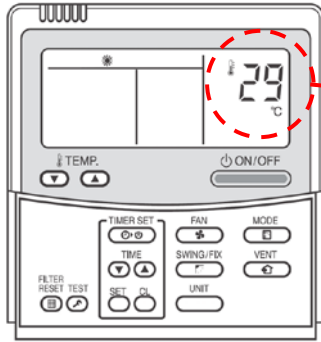
After confirmation, push button to return to the usual display.



▼ Common Check Codes (Note the 0-10V PCB is classified as a Remote controller)

- E01 Remote controller address setting error** – incorrect remote controller setting. The header remote controller has not been set
- E09 Remote controller 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.
- E14 Communication error between the indoor PCB (MCC-1570) and the 0~10V interface PCB** – no communication between the indoor PCB and the 0~10V interface PCB for more than 3 minutes (AB connection)
- L02 VRF Outdoor unit incorrect** – check the compatibility of the VRF Outdoor unit (see page 2).
- L09 DX controller capacity code incorrect** – check the settings of DN code 11 (see Device Type / Capacity DN Code setting)
- L30 Fan motor operation monitor** – check the operation of the fan at terminals T16 and T14 (on relay KP1). If this contact is "CLOSED" the error code L30 is generated
- P10 Safety contact error** – check the contact at terminals T14 and T15. If the contact is OPEN the error code P10 is generated

■ Temperature Set Point

When a wired remote controller is fitted the temperature setpoint can be changed, however this has no impact on the demand, which is controlled by the 0-10V Analogue Input.



The "TEMP"   buttons can change the displayed setpoint, however this has no impact on the demand.

9 OPTIONAL PARTS

▼ Remote controllers (wired)

RBC-AMT32E Wired remote controller



RBC-AMS51E Lite-Vision plus remote controller



Once installed the 0-10V AHU DX Coil Interface does not need to have a wired Remote Controller connected, however it is useful for fault finding and operation status.

▼ Central controllers

The 0-10V AHU DX Coil Interface is compatible with the range of Toshiba Central controllers and BMS interfaces (using U1/U2 connection):-

- Mode and ON / OFF monitoring
- Mode and ON / OFF control
- Check Code monitoring

Please note that it is not possible to monitor or control the 0-10V Analogue Input using Central Controllers.

10 DECLARATION OF CONFORMITY

Manufacturer: Sarum Electronics Limited
Clump Farm Industrial Estate
Higher Shaftesbury Road
Blandford
DORSET
DT11 7TD.
United Kingdom

According to the guidelines of the electromagnetic compatibility directive (2004/108/EC) and the low voltage directive (2006/95/EC) we declare that the product described below:

Generic Denomination: Air Conditioner

Model/type: RBC-DXC031, MM-DXV141, MM-DXV281

Commercial name: 0-10V AHU DX Coil Interface

Complies with the provisions of the following harmonized standard:

EN61000-6-2:2005
EN61000-6-4:2007 + A1: 2011
EN61000-3-2:2014
EN61000-3-3:2013
EN55016-1-2:2014
EN55016-2-3:2010 + A2: 2014
EN61000-4-2:2009
EN61000-4-3:2006 + A1:2008 +A2: 2010
EN61000-4-4:2004 + A1: 2010
EN61000-4-5:2006
EN61000-4-6: 2009
EN61000-4-11:2004
EN60335-2-40:2003 + A13: 2012

Note: This declaration becomes invalid if technical or operational modifications are introduced without the manufacturer's consent.

Signature:

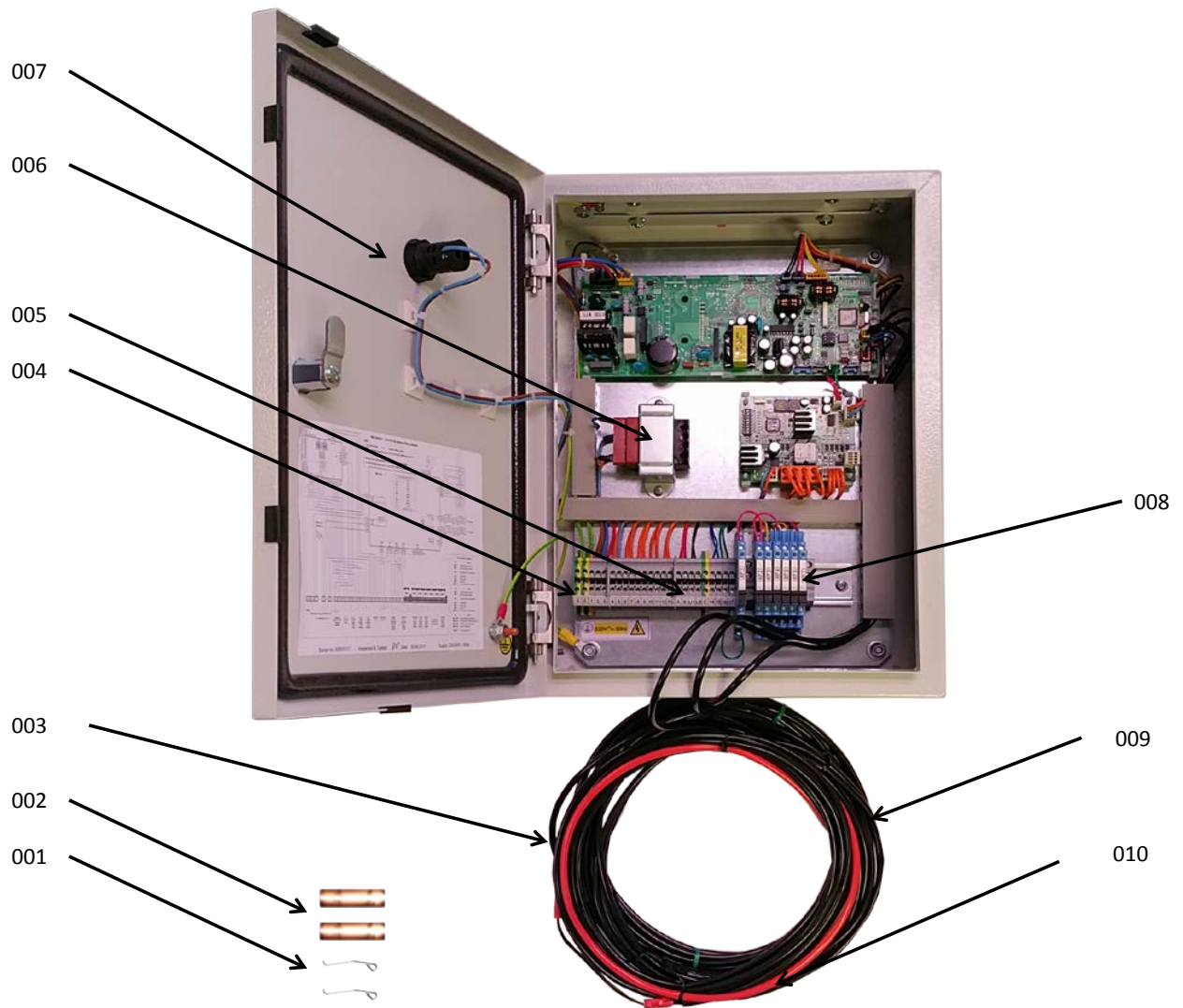


Name: Neil Young
Position: General Manager
Date: 11-Mar-2015
Place Issued: United Kingdom

The Air Handling equipment that this interface is incorporated into must be compliant with the Machinery Directive for the whole system to be compliant

11 SERVICE PARTS

RBC-DXC031 – LC / VRF DX Controller (0~10V AHU)



Location No.	Part No.	Description	Qty
001	43019904	Fix Plate Sensor (Ø6)	2
002	43149312	Sensor Holder (Ø6)	2
003	43050425	TC2 Sensor (Ø6)	1
004	43DX0007	4mm Electrical Terminal (Grn. / Yel. - Earth)	2
005	43DX0005	2.5mm Electrical Terminal (Grey)	17
006	43DX0015	24VAC Transformer	1
007	43DX0008	White Indicator Lamp (AD56LT-W)	1
008	43DX0004	KP1 ~ KP7 Relay & base	7
009	43050425	TCJ Sensor (Ø6)	1
010	43050426	TA Sensor	1



VRF DX PMV - MM-DXV141 & MM-DXV281



Location No.	Part No.	Description	Qty
101	43050398	Sensor (Ø4 - TC1)	1
102	4314Q051	Strainer	2
103	43107215	Fix Plate Sensor (Ø4)	1
104	43163030	Sensor Holder (Ø4)	1

Notes:

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