Installation
Operation
Maintenance

VWV
Digital Air-Cooled Water Chiller With
Heat Pump Option/ Mini ICS
CGDR100-200(D-Koolman)

CG-SVX13A-EN
690001900200

Contents

Important Note: installation procedures should be performed in the sequence that they appear in this manual. This manual is customer's property. Do not destroy or remove the manual from the unit. The manual should remain weather protected with the unit until all installation procedures are completed.

Warning: Open and lock the disconnect switch before attempting any installation or maintenance. Failure to do so will cause severe injury even to death for electrical shock or contact with moving parts.

Note: It is not the intention of this manual to cover all possible variations in systems that may occur or to provide comprehensive information concerning every possible contingency that may be encountered during an installation. If additional information is required or if specific problems arise that are not fully discussed in this manual, contact your local Sales office.

Note: Warning: and **Cautions** appear at appropriate places in this manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The Company assumes no liability for installation or servicing performed by unqualified personnel.

Safety Precautions

To avoid electrical shock or fire and possible injury, the following points should be noted and strictly adhered to:

- **Do not sit in the direct air path for long periods of time.**

Sitting in the direct air path of the air steam for long periods of time isn't good for your health. Pay special attention when sleeping, and when infants,senior citizens,and invalids are present in the room.

- **Use only fuses of the proper amperage.**

Make shift replacement such as a piece of wire should never be used. Not onlycould the unit itself be damaged, but such action could be the cause of a major fire.

- **Heating appliances or other heat sources should not be placed under or near the air conditioner.**

Heat can cause the body to warp.

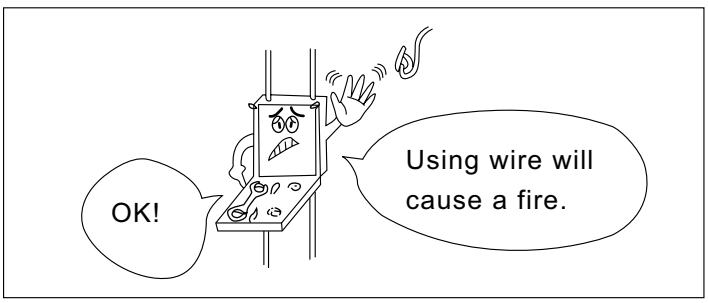
- **Avoid getting objects such as sticks, sand, or stones into the return air or discharge grilles.**

Since the fan revolves at high speed, it is very dangerous. Be especially careful with children.

- **Be sure to always have the air filter properly installed when the unit is operated.**

Otherwise, dirt can get into the inner workings and cause damages.

- **Be sure the power is disconnect before maintenance.**



- **Water should not be applied directly to the unit for cleaning purpose.**

Electrical shock may be resulted.

- **Do not block or cover the return air grille or discharge grille.**

Decreased performance as well as inability to operate normally could be resulted.

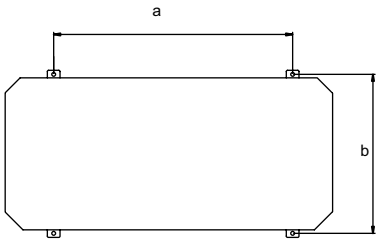
Model Nomenclature

C	G	D	R	1	0	0	5	H	E	A	Z	X	R	N	R	R	E
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

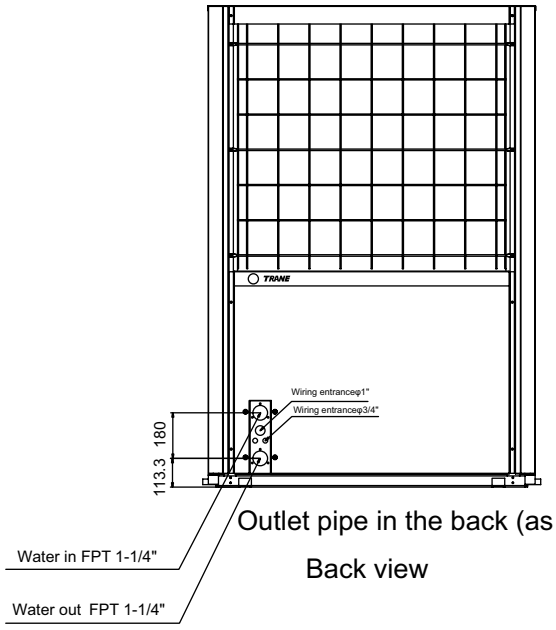
Digits 1, 2, 3	CGD=Digital air-cooled Chilled Water
Digits 4	R=Heat Pump
Digits 5, 6, 7	Nominal Cooling Capacity
	100; 120; 150; 175; 200
Digit 8	Power Supply
	5 = 380V/50Hz/3Ph
Digit 9	Mode of air outlet
	H=Horizontally air outlet
Digit 10	Refrigerant
	E=R22
Digit 11	Manufactory Code (not for clients)
	A=100,120 (Dual Compressors)
	B=150,175,200 (Three Compressors)
Digit 12	Main Controller
	Z=With Main Controller (as standard, applicable for main units)
	N= Without Main Controller (as optional, applicable for accessory units)
	Main controller is packed solely.
Digit 13	Standby
	X= Standby
Digit 14	Water Pump
	R= With Water Pump (as standard)
Digit 15	Auxiliary Electric Heater in Water Circuit
	N=None (as standard)
	E=12kw(380V/50Hz/3Ph)(GYS012-3 is for 1005/1205)
	F=15kw(380V/50Hz/3Ph)(GYS015-3 is for 1505)
	G=20kw(380V/50Hz/3Ph)(GYS020-3 is for 1705/2005)
Digit 16	Temperature Kit
	R= Standard Ambient Temperature Kit (as standard)
Digit 17	Water Pipe Direction
	R=Right (as standard)
	B=Back (as optional)
Digit 18	Design Sequence (not for clients)
	A=First
	E=Export

Dimensional Data

(1)CGDR1005/1205

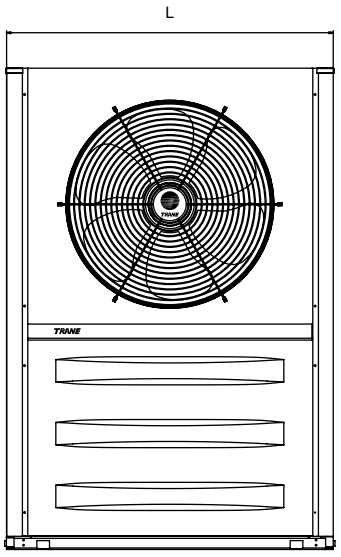


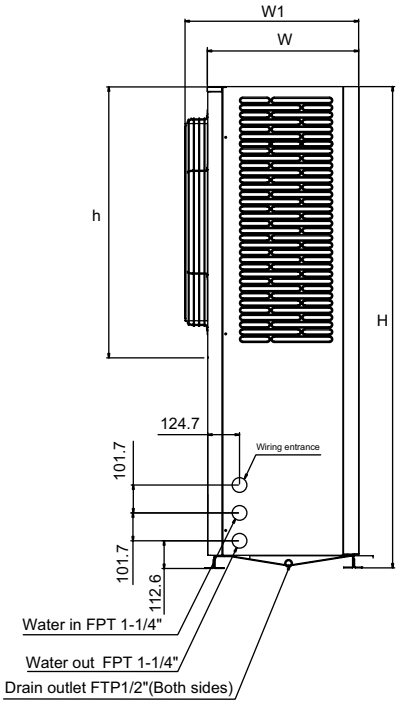
Footing installation dimension



Outlet pipe in the back (as optional)

Back view

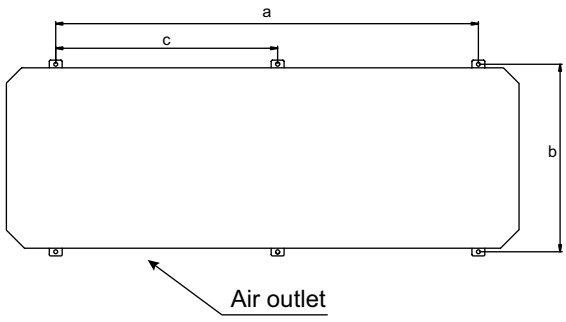




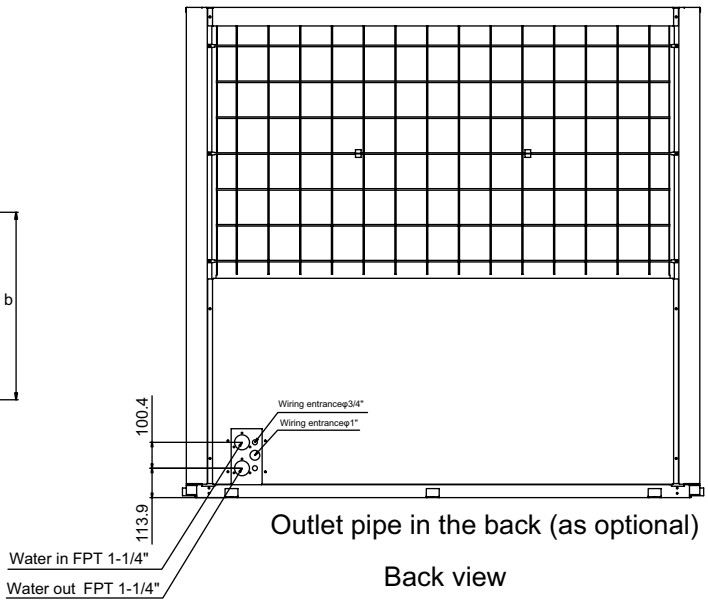
Unit	L	W	H	W1	h	a	b
Dimension (mm)	1290	600	1900	695	1068	1000	586.5

Dimensional Data

(2)CGDR1505/1755/2005

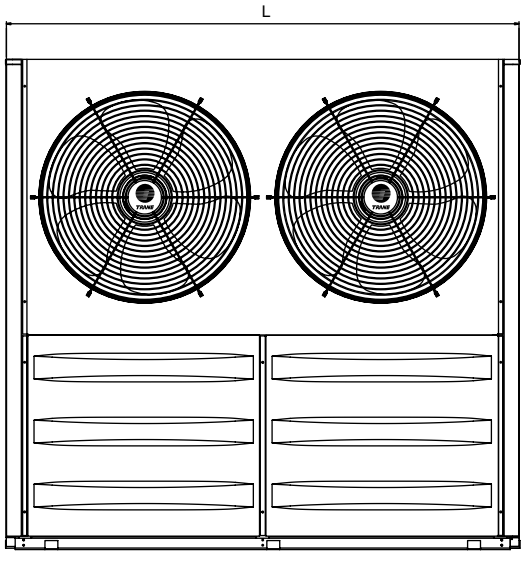


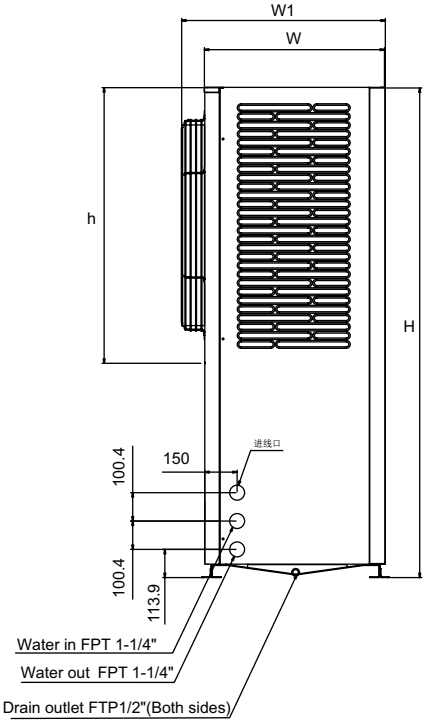
Footing installation dimension



Outlet pipe in the back (as optional)

Back view





Unit	L	W	H	W1	h	a	b	c
Dimension (mm)	1990	700	1900	795	1068	1640	686.5	860

Installation Instruction

Rigging

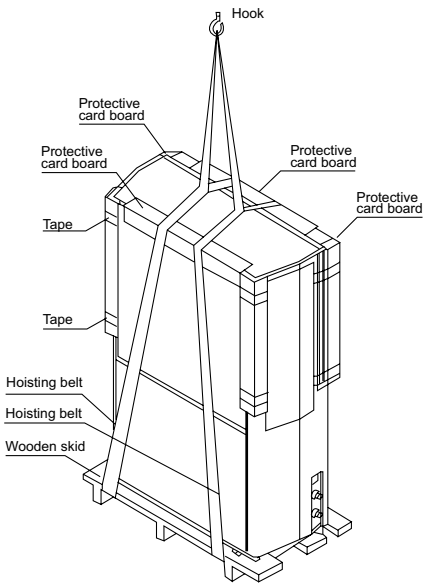
Move the unit using a forklift or crane of suitable capacity. See Table 1 for unit shipping weights. Locate the unit near a large-capacity drain to allow system drainage during unit shutdown and repair. Rig the unit using canvas belt. Fasten the belt over the units base as show in Figure 1.

Table 1

Model	Maximal Shipping Weight (kg) ≈
CGDR100	405
CGDR120	415
CGDR150	493
CGDR175	500
CGDR200	505

Figure 1:

Recommended hoisting arrangement



Installation Checklist

1). Reception

- Verify that unit nameplate data corresponds with ordering information.
- Inspect unit for shipping damages and material shortages; report any damages or shortages found to the carrier.

2). Unit Location and Mounting

- Inspect unit installation location for adequate ventilation.
- Provide drainage facilities for water accumulated from the base.
- Remove and discard any shipping materials (e.g. cartons, crate, etc.)
- Inspect to determine that service access clearances are adequate.
- Install the optional neoprene or spring isolators at each mounting location.
- Secure unit to mounting surface.
- Level the unit.

Mounting methods that will minimize sound and vibration problems are:

- Mount the unit directly on an isolated concrete pad or on isolated concrete footings at each unit mounting point.
- Install the optional neoprene or spring isolators at each mounting location.

Refer to Figure 2 for unit and base dimensions and Figure 3 for recommended service clearance.

Water piping

Evaporator Piping

- Thoroughly flush all water system piping before making the final piping connections to the unit.
- Connect the evaporator piping.
- Vent the air from chilled water system at the highest point.
- Install pressure gauges, thermometers and valves on water inlet and outlet piping.
- Install water strainer in evaporator supply line.
- Install balancing valve and flow switch on water outlet piping.

Cautions:

- If using an acidic commercial flushing solution, construct a temporary bypass around the unit to prevent damage to the evaporator.
- To avoid possible equipment damage, do not use untreated or improperly treated water.

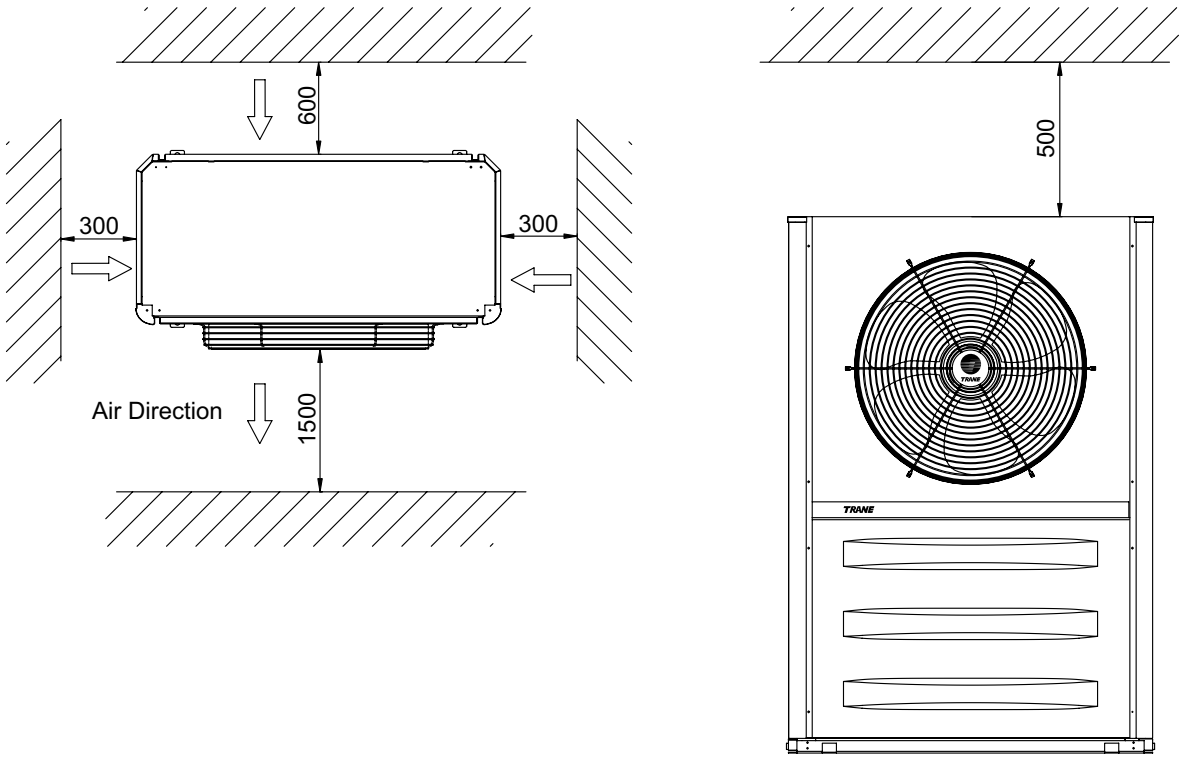
Figure 4 illustrates typical unit piping components. Components and layout will vary slightly depending upon the locations of the connections and water source.

Cautions:

- To prevent unit damage, do not reverse system piping connections to the unit; water entering the unit must enter at the designated "Water In" and leaving water must exit the unit through the designated "Water Out" connection.
- Provide vent valve at highest point in the piping to bleed air from the chilled water system.
- To prevent damage to the waterside components of unit, do not allow evaporator pressure to exceed 0.5MPa (i.e. maximum working pressure).
- Before the final connection, flush carefully of all the external piping system . We have no any warranty for the case that impurities are combined in the piping.

Installation Instruction

Figure 2: Service and Maintenance Clearance

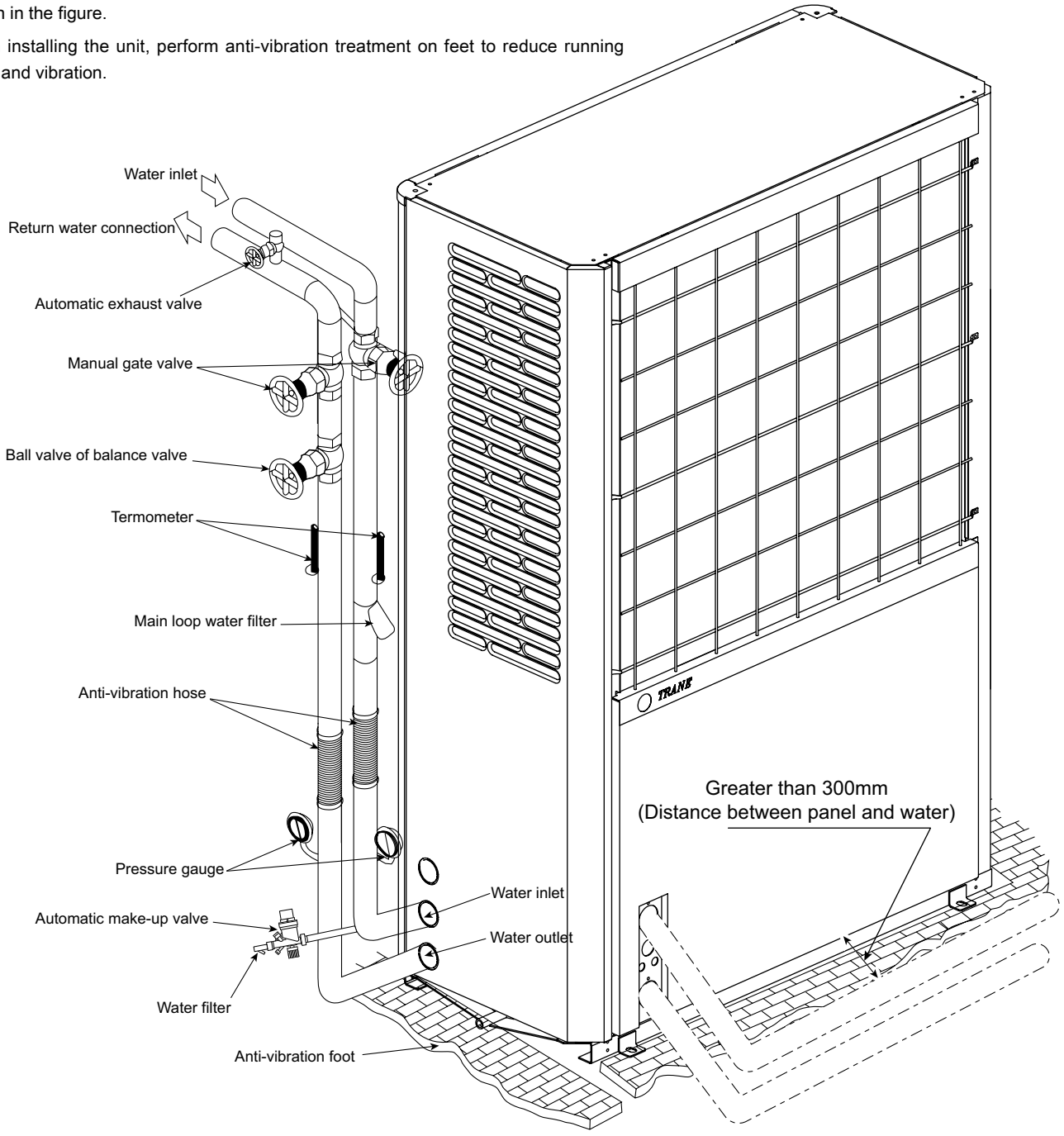


Installation

Figure 3 Schematic of typical piping accessories (unit model in this figure is CGDR120)

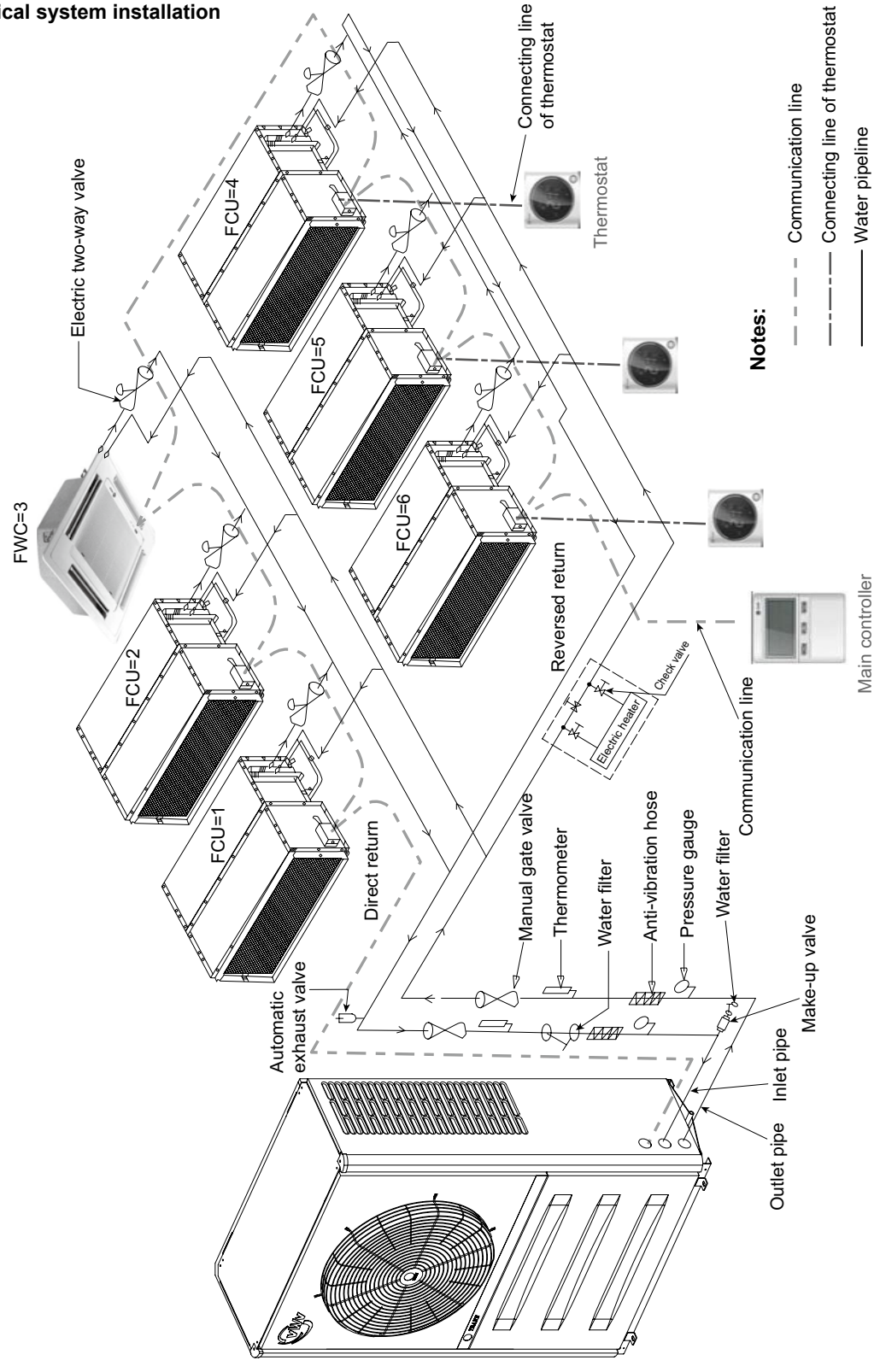
Description:

1. In water pipeline, parts of waterway system built in the unit are: closed expansion tank and safety valve; accessories enclosed are: automatic make-up valve and main loop water filter; other parts are required to be purchased by user at installation.
2. When installing rear outlet pipe system, it is required to reserve service clearance as shown in the figure.
3. When installing the unit, perform anti-vibration treatment on feet to reduce running noise and vibration.



Installation

Figure 4 Schematic of typical system installation

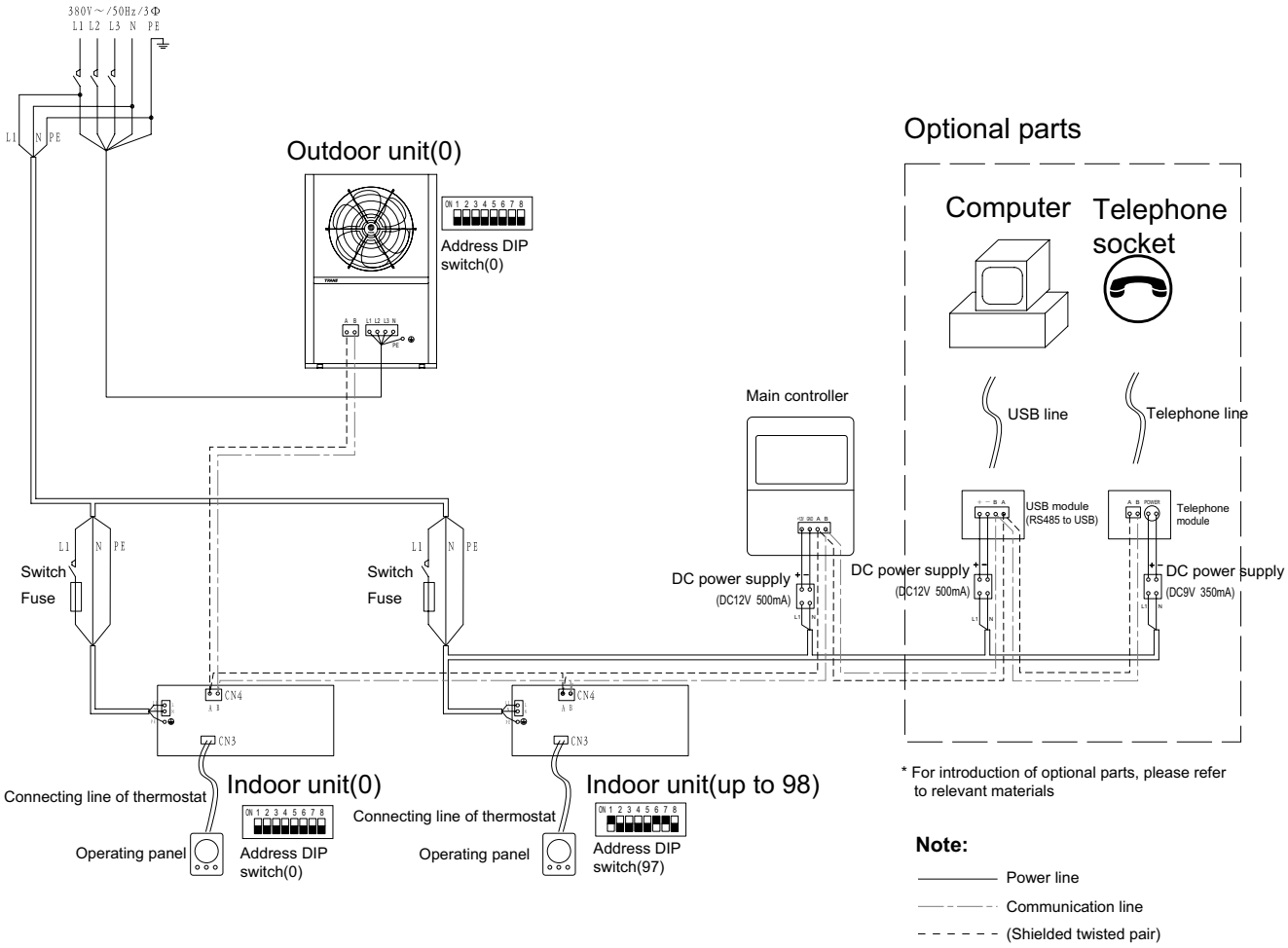


Note:

1. The indoor unit selected must be "Trane" networking indoor unit so that normal system operation can be guaranteed.
2. Electric two-way valve must be installed at the outlet of each indoor unit; the electric two-way valve selected must obtain "Trane" quality verification.
3. Standard length of thermostat connecting line is 7m. If any special requirements, please specify in order; Cassette indoor unit is operated by remote control.
4. Communication line type is No. 18 ~22 twisted (shielded) pair wire. The factory can provide 150m optionally, please specify additionally in order.

Electrical wiring diagram

System wiring diagram



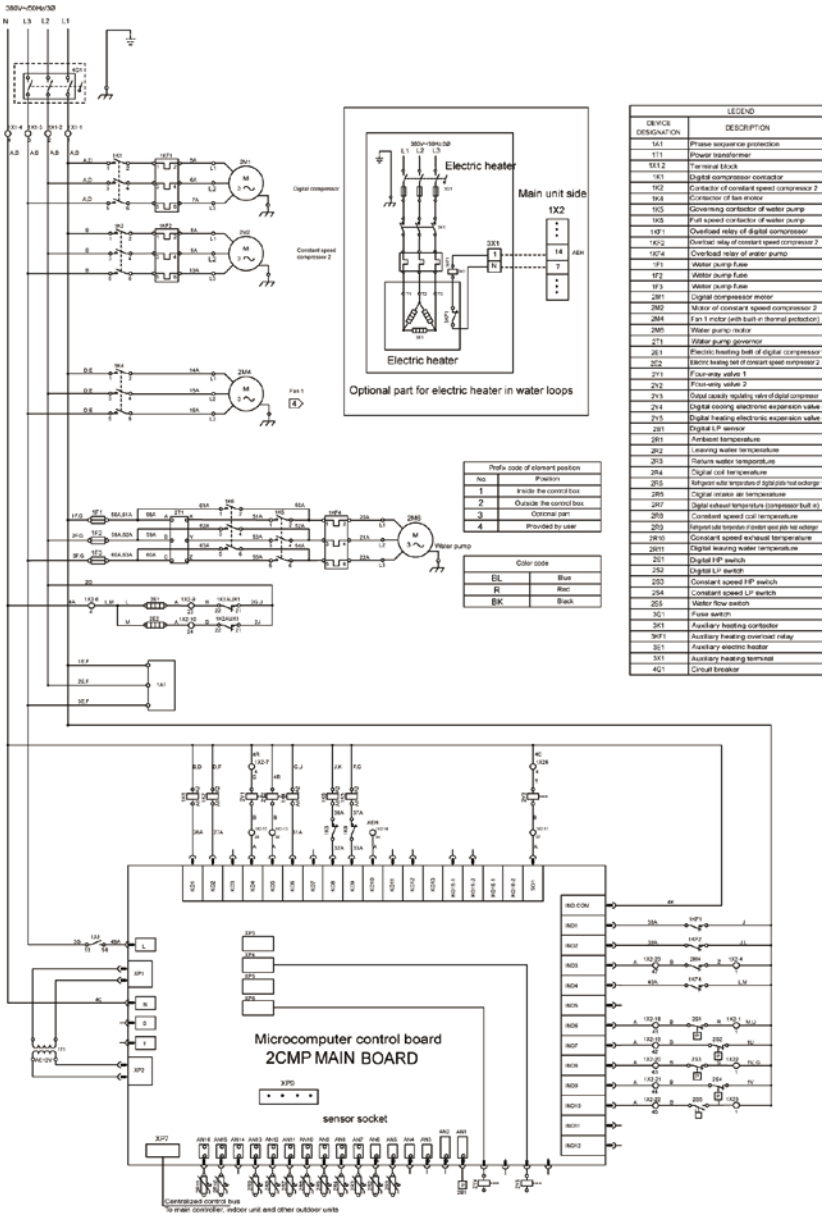
Note:

- All wire harnesses, components and parts and materials provided on site must meet national regulations.
- Only copper conductor is allowed.
- For details, see relevant electrical wiring diagrams.
- Install circuit breaker to guarantee safety.
- All field wire harnessed and elements must be operated by certificated electrician.
- Equipments should be grounded as per national regulations.
- The wire harness shown is only contact orientation diagram, specific installation details are not involved or included.
- Install a circuit breaker that can cut off all power supplies uniformly, because this system consists of equipments using multi-power supply.
- Switches and fuses must be installed on power circuits of all equipments.

Electrical wiring diagram

Electrical diagram of outdoor unit

CGDR1005/1205



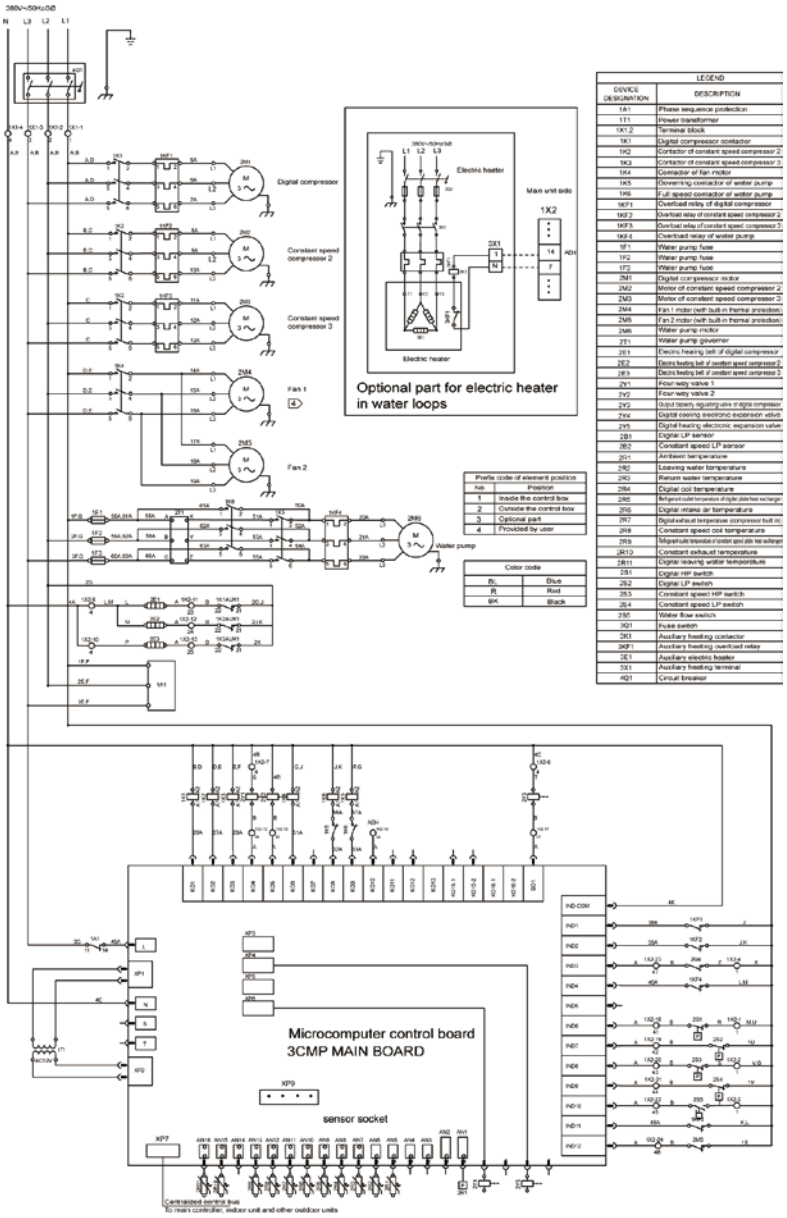
Note:

1. Otherwise specified, all switches indicate 25℃ (77° F), a normal atmosphere, 50% relevant humidity, used equipments are cut off, the condition after one normal cutoff.
2. Dotted line indicates recommended wiring, external frame in dotted line or elements and parts drawn in dotted line indicate elements provided on site, external frame in ghost line indicates optional parts, and solid line indicates parts provided by TRANE.
3. Figure on the left of the schematic diagram indicates line number of element position; figures with underline indicate normally connected, open arrow upwards under the line number indicates timing switch triggered to start counting.
4. This unit requires fan motor rotating clockwise from the view of output shaft end. The motor is wired for counter clockwise rotation; therefore phases A, B and C of motor's outgoing line are white, red and black wires in order.

Electrical wiring diagram

Electrical diagram for outdoor unit

CGDR1505/1755/2005



Note:

1. Otherwise specified, all switches indicate 25℃ (77° F), a normal atmosphere, 50% relevant humidity, used equipments are cut off, the condition after one normal cutoff.
2. Dotted line indicates recommended wiring, external frame in dotted line or elements and parts drawn in dotted line indicate elements provided on site, external frame in ghost line indicates optional parts, and solid line indicates parts provided by TRANE.
3. Figure on the left of the schematic diagram indicates line number of element position; figures with underline indicate normally connected, open arrow upwards under the line number indicates timing switch triggered to start counting.

4. This unit requires fan motor rotating clockwise from the view of output shaft end. The motor is wired for counter clockwise rotation; therefore phases A, B and C of motor's outgoing line are white, red and black wires in order.

Electrical wiring diagram

Recommended cable specification for outdoor unit is shown as the following table:

Model	Power supply V/Hz/ φ	Rated current of digital compressor RLA(A)	Rated current of constant speed compressor 1 RLA(A)	Rated current of constant speed compressor 2 RLA(A)	Full-load current of water pump (high speed)	Rated current of fan 1 RLA(A)	Rated current of fan 2 RLA(A)	Mini. Circuit current of the unit MCA(A)	Max. overcurrent protection of the unit MOP(A)	Recommended fuse specification REC(A)	Mini. diameter of the copper core of the power wire mm^2
CGDR100	380/50/3	7.4	7.2	—	1.3	1.4	—	22.1	28.4	25	6
CGDR120	380/50/3	8.8	8.6	—	1.4	1.4	—	26.1	34.2	32	6
CGDR150	380/50/3	7.7	7.2	7.2	1.9	1.4	1.4	31.1	37.4	36	10
CGDR175	380/50/3	9.3	8.8	8.8	2.1	1.4	1.4	36.9	45.0	40	10
CGDR200	380/50/3	11	10.4	10.4	3.2	1.4	1.4	44.7	55.2	50	16

Recommended cable specification for electric heater in water loops is shown as the following table:

Model	Voltage V/Hz/ φ	Power (kW)	Rated current (A)	Unit with standard configuration	Mini. diameter of the copper core of the power wire mm^2
DR3-12	380/50/3	12	18.2	CGDR1005/1205	6
DR3-15	380/50/3	15	22.8	CGDR1505	8
DR3-20	380/50/3	20	30.4	CGDR1755/2005	10

Note:

power supply for electric heater in water loops should be fed individually; for detailed wiring, please refer to wiring diagram for outdoor unit;

For heater profile and installation dimension, please refer to relevant operation manual.

The recommended communication line is No. 18 ~22 twisted (shielded) pair wire. Its shielded layer should be grounded.

Setting of unit address and function

Address and function settings of outdoor unit

Description:

- Circuit board of each outdoor unit has 3 groups of DIP switches, SA1: Setting of indoor unit address (Table 2); SA2: setting of outdoor unit function (Table 3); SB2: setting of outdoor unit programming (Table 4). For detailed position, please refer to Figure 5 – Schematic diagram for circuit board of outdoor unit
- Default setting for No. of each outdoor unit is 0 at factory (main controller displays A0).
- No. of outdoor units displayed on the main controller is A0, A1 , ……, BF.
- The address code is unique and unrepeatable.

Note:

- SA1: address setting switch of outdoor unit. It requires manual setting additionally only under the condition that several outdoor units are used in parallel.
- SA2: function setting switch of outdoor unit. Functions of each outdoor unit have been set up before ex-factory, never tamper them without permission. If installation initialization function is required, do remember resetting to home position on completion of commissioning.
- Never tamper all code setting on completion of commissioning setting. If change is needed, permission must be obtained from our commissioning personnel; or we will bear no corresponding liability.

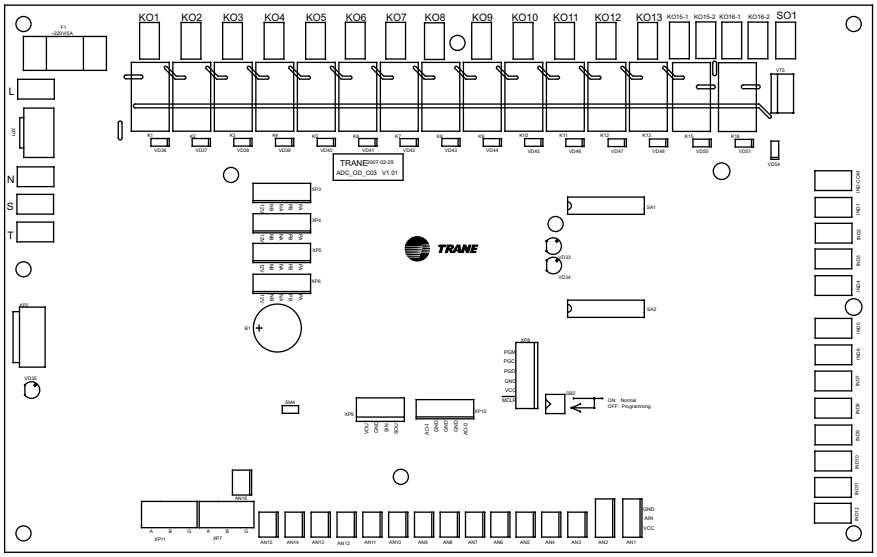


Figure 5 Schematic diagram for circuit board of outdoor unit

Setting of unit address and function

Table 2: Addresses setting switch SA1 of outdoor unit.

Unit No.	Display on main controller	Condition of each DIP digit							
		1	2	3	4	5	6	7	8
0	A0	0	0	0	0	0	0	0	0
1	A1	1	0	0	0	0	0	0	0
2	A2	0	1	0	0	0	0	0	0
3	A3	1	1	0	0	0	0	0	0
4	A4	0	0	1	0	0	0	0	0
5	A5	1	0	1	0	0	0	0	0
6	A6	0	1	1	0	0	0	0	0
7	A7	1	1	1	0	0	0	0	0
8	A8	0	0	0	1	0	0	0	0
9	A9	1	0	0	1	0	0	0	0
10	AA	0	1	0	1	0	0	0	0
11	AB	1	1	0	1	0	0	0	0
12	AC	0	0	1	1	0	0	0	0
13	AD	1	0	1	1	0	0	0	0
14	AE	0	1	1	1	0	0	0	0
15	AF	1	1	1	1	0	0	0	0
Note: “1” indicates “ON” , “0” indicates “OFF”									

Table 3: Function setting switch SA2 of outdoor unit.

Status	Corresponding function							
	1	2	3	4	5	6	7	8
ON	Commission-ing mode	Independent running of outdoor unit	Standby					Installation initialization
OFF	Normal mode	Networked running of outdoor unit						Automatic running

Description:

- Default setting is OFF when leaving factory. User mustn’ t change setting without permission.
- Commissioning mode: under this mode, independent operation can be performed for various outputs only by using special software; ON command is not performed on outdoor unit.
- Independent running of outdoor unit: under this mode, outdoor unit condition is not checked when it is running; outdoor unit can not find indoor unit, and it does not alarm either.
- Installation initialization: under this mode, water pump of outdoor unit is running at high speed, two-way valve of indoor unit opens fully; ON command is not performed on outdoor unit.

Setting of unit address and function

Table 4 Programming setting switch SB2 of outdoor unit

Status	Corresponding function	
	1	2
ON	Programming disabled	Programming disabled
OFF	Programming enabled	Programming enabled

Description:

- All setting is at ON status when leaving factory.
- Programming enabled: under this mode, it is possible to update outdoor unit software by programming socket (XP8) on the control panel. On completion of programming, both switches should be set to ON status again.

Address and function settings of indoor unit

Note:

- Set address code manually for each indoor unit by 8-digit DIP switch SW1. Set according to Table 5.
- Indoor unit No. is displayed as 0, 1, 2, ……, 98.
- The address code is unique and unrepeatable.
- Total sum of indoor and outdoor unit is up to 100.
- Indoor unit functions are factory setting. Never tamper them without permission.
- This is setting description for networked fan coil. For setting of online cassette wind plate, please refer to relevant operation manual.

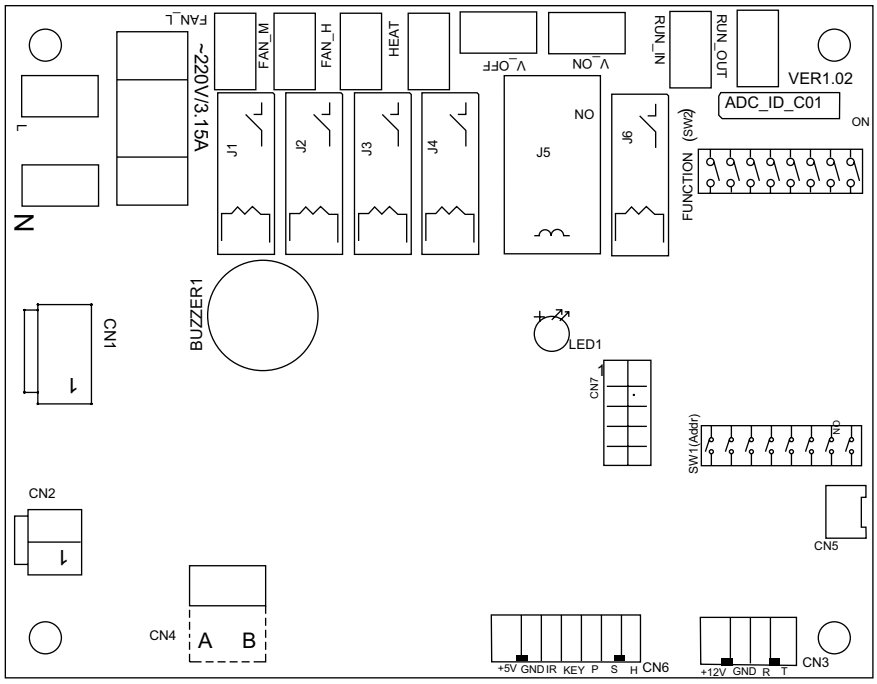


Figure 6 Schematic diagram of circuit board of networked fan coil

Setting of unit address and function

Table 5: Address setting switch SW1 of indoor unit

Unit No.	Display on main controller	Condition of each DIP digit							
		1	2	3	4	5	6	7	8
0	00	0	0	0	0	0	0	0	0
1	01	1	0	0	0	0	0	0	0
2	02	0	1	0	0	0	0	0	0
3	03	1	1	0	0	0	0	0	0
4	04	0	0	1	0	0	0	0	0
5	05	1	0	1	0	0	0	0	0
6	06	0	1	1	0	0	0	0	0
7	07	1	1	1	0	0	0	0	0
8	08	0	0	0	1	0	0	0	0
9	09	1	0	0	1	0	0	0	0
10	10	0	1	0	1	0	0	0	0
11	11	1	1	0	1	0	0	0	0
12	12	0	0	1	1	0	0	0	0
13	13	1	0	1	1	0	0	0	0
14	14	0	1	1	1	0	0	0	0
15	15	1	1	1	1	0	0	0	0
16	16	0	0	0	0	1	0	0	0
17	17	1	0	0	0	1	0	0	0
18	18	0	1	0	0	1	0	0	0
19	19	1	1	0	0	1	0	0	0
20	20	0	0	1	0	1	0	0	0
21	21	1	0	1	0	1	0	0	0
22	22	0	1	1	0	1	0	0	0
23	23	1	1	1	0	1	0	0	0
24	24	0	0	0	1	1	0	0	0
25	25	1	0	0	1	1	0	0	0
26	26	0	1	0	1	1	0	0	0
27	27	1	1	0	1	1	0	0	0
28	28	0	0	1	1	1	0	0	0
29	29	1	0	1	1	1	0	0	0
30	30	0	1	1	1	1	0	0	0
31	31	1	1	1	1	1	0	0	0
Note: “1” indicates “ON” , “0” indicates “OFF”									

Table 6: Function setting switch SW2 of indoor unit.

DIP digit	OFF	ON	Default status
SW2-1	Two-pipe	Standby	OFF
SW2-2	Standby	Bypass active	ON
SW2-3	No power off memory	Power off memory (status)	OFF
SW2-4	Return air temperature sensor inactive	Return air temperature sensor active	OFF
SW2-5	Valve closed without fan closed	Standby	OFF
SW2-6	Networking of indoor and outdoor units	Standby	OFF
SW2-7	℃	℉	OFF
SW2-8	Thermostat operation enabled	Thermostat operation disabled	OFF
Note: Never place DIP switch at standby status, or it may cause this system working abnormally.			

Installation and common operation instruction of main controller

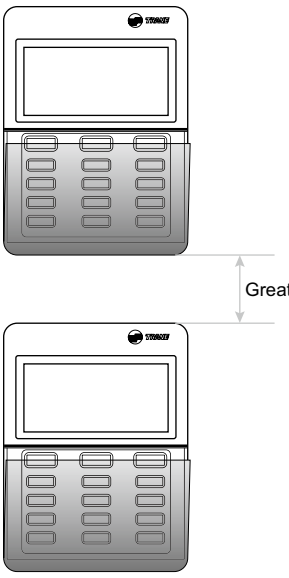
Main controller installation

Installation location

Select a place easy to operate under the condition that customer can accept. Do not install the main controller at the following places, such as: touchable by kids; places where supply air from air conditioner can blow directly.

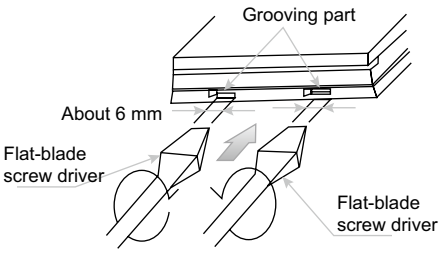
Installation space

If install more than one main controller vertically, the space should be greater than 50mm at vertical direction, or it will be difficult to remove the main controller. (As shown in the figure below)



Installation procedure

① Insert the blade of flat-blade screw driver into grooving part of installation seat of the main controller, remove the main controller from the installation seat by pushing and rotating the screw driver. Note: never apply force too violently, or plastic part may be damaged.



② Install electric line.

Connect communication line a and b, and anode and cathode of DC power supply into 4-core terminal block at the back of electric control board. See Figure 7 – Main controller.

③ Installation and fixing

Fix installation seat on the wall with screws, then take out the conductor, install the main controller on the seat finally.

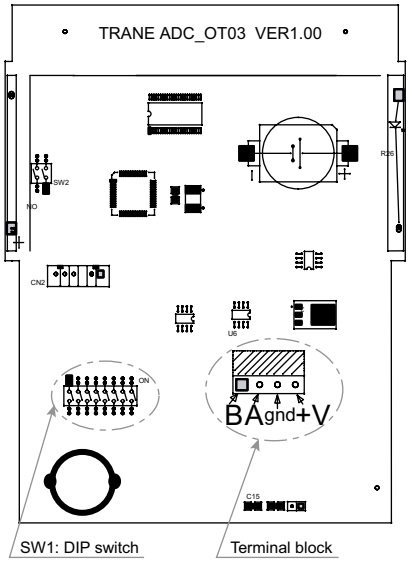


Figure 7 Circuit board diagram of main controller

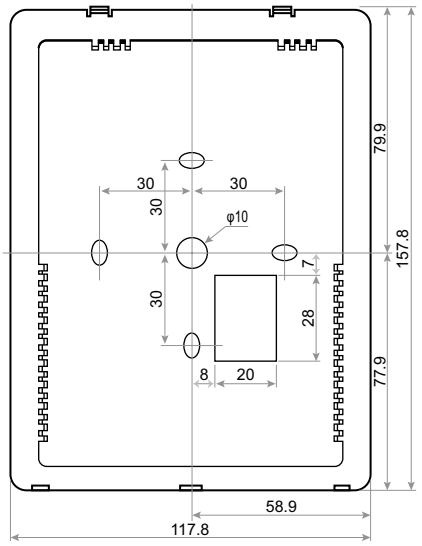


Figure 8 Installation dimension diagram for seat of main controller

Installation and common operation instruction of main controller

DIP setting and function description

DIP switch setting SW1

DIP digit	OFF	ON	Default status
SW1-1	Linkage control of indoor and outdoor units is valid	Linkage control of indoor and outdoor units is invalid	OFF
SW1-2	Network operation is under normal condition	Network testing status	OFF
SW1-3	Total number of units is displayed	Loop browsing is displayed	OFF
SW1-4	Used as one indoor unit:	It is valid as the thermostat of indoor unit	OFF
SW1-5	Commercial mode	Residential mode	ON
SW1-6	HEAT locking is invalid	HEAT locking is valid	OFF
SW1-7	Repeated unit No. on the network is not displayed	Repeated unit No. on the network is displayed	OFF
SW1-8	Backlight is turned on by any button	Backlight is turned on by Button ⑧	OFF

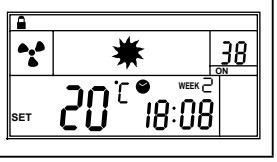
Function description

a. Linkage control function of indoor and outdoor units
SW1_1=OFF, when this function is active, i.e. one indoor unit is switched on, outdoor unit starts automatically; when all indoor units shut down, outdoor unit shuts down automatically.

b. Used as one indoor unit:
When SW1_4=ON, the condition of indoor unit with minimum No. is displayed in normal condition, and it can also be used as indoor unit thermostat for direct operation. Pressing (Group) button will step into normal mode of the main controller. At this time various typical operations can be carried out. When pressing Exit button, return to thermostat operation of single indoor unit.

c. Commercial mode/residential mode
SW1_5 =OFF, commercial mode. Indoor unit is running according to the mode of outdoor unit. If conflicted, then indoor unit is not allowed to start; SW1_5 =ON, residential mode. Determine modes of outdoor unit and other indoor units by mode of the indoor unit started first.
Note: After shifting commercial/residential mode, it will be active only after "network binding function" is performed again.

d. Heat locking condition (active when SW1_6 =ON)

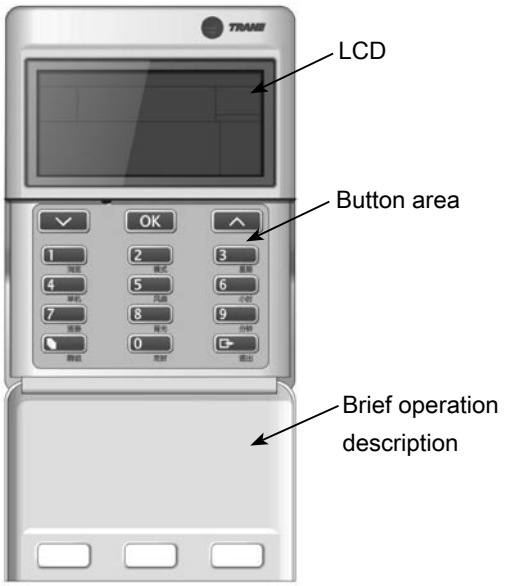
Procedure	Operation	Legend
1. Step into.	When SW1_6 =0, press button ② for 3s , when icon of locking status appears at left upper corner, the main controller locks all units on the network at heating condition; press button ② for 3s again, heating is unlocked, icon of locking status disappears.	

e. Backlight start
When SW1_8 =OFF, turn on backlight for 30s by pressing any button; when SW1_8 =ON, backlight can be turned on only by pressing button ⑧ (backlight).

Note: on completion of installation and commissioning, user mustn' t change DIP settings without permission to avoid normal unit running being affected.

Installation and common operation instruction of main controller

Actual picture of main controller



Function and common operation description of buttons

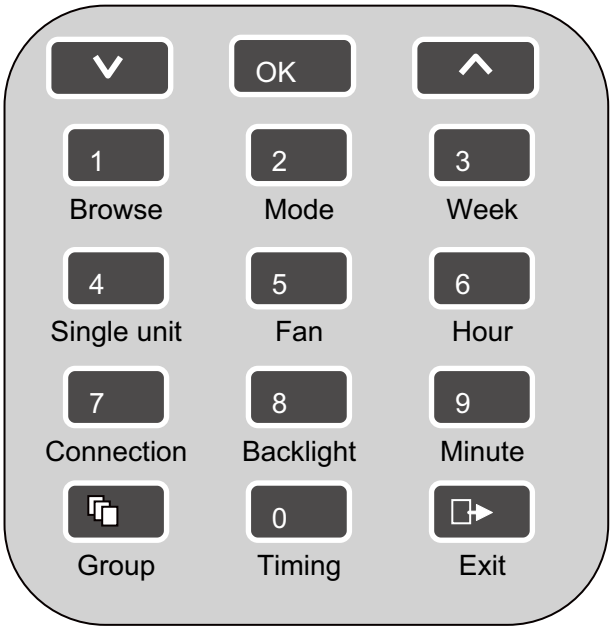


Figure 9 Display of button area

Table 7 Description of button function (other functions in addition to digital function)

Button	Function	Button	Function	Button	Function
1	Browse condition of networking units	2	Mode/month setting	3	Week setting/sleep function
4	Setting of single unit mode	5	Air velocity/date setting of indoor unit	6	Hour setting
7	Binding of equipment network	8	Screen backlight	9	Trouble reset/minute setting
	Group control	0	Timing setting	ESC	Exit/locking (press this button for a long period)

Operation description of common buttons

- Unit binding, press button ⑦ .
- Quick query of networking unit, press button ① .
- Time adjustment, ② for month, ③ for week, ⑤ for date, ⑥ for hour and ⑨ for minute.
- Single unit operation, ④ and ⌃ ⌄ for temperature setting, ② for mode, ③ for sleep, ⑤ for air velocity and ⑨ for reset.
- Group operation, button and ② for mode, ⌄ for ON/OFF, ⌃ for temperature setting.

Installation and common operation instruction of main controller

Thermostat installation

Installation location

Select a place easy to operate under the condition that customer can accept. Do not install the main controller at the following places, such as: touchable by kids; places where supply air from air conditioner can blow directly.

Installation procedure

During installation, pry two clips under the housing with flat-blade screw driver, then open the upper housing from the lower part to remove it. Connect all wires, snap two pillars inside the upper part of the upper housing into two holes in the upper part of bottom housing, then snap the lower slip by pressing the lower part of the upper housing.

Thermostat display and button description

Common operation description of thermostat

Operation	Procedure
ON/OFF	Perform ON/OFF operation by pressing " ⏻ " button. Each time it is pressed, ON/OFF will be shifted one time. Operate it according to the mode set currently after start. When switching off, only time is displayed.
Temperature setting	Under ON or OFF condition, temperature setting can be carried out by pressing buttons "▲" and "▲" , adjustment range: 5 ~35℃ (41-95 ℉).
Mode setting	Under ON condition, press button "M" to shift 5 running modes in cycle: cooling, heating, dehumidification, ventilation and automation, icon illuminating indicates that this mode is active. Cooling → Automation → Dehumidification → ventilation → heating → ↑ ↓
Air velocity setting	Select Fan Air Velocity by pressing " " button, shift "(Low) , (Medium) , (High) and (Automatic) " in cycle.

Note:

- When the thermostat is networking and linkage control mode is commercial mode, if the outdoor unit is running, thermostat mode can only be set into the mode compatible with that of the outdoor unit.
- When the thermostat is networking and linkage control mode is residential mode, if the outdoor unit is running, thermostat mode can only be set into the mode compatible with that of the indoor unit which starts running first.

Unit inspection before commissioning

Warning!

Never feed power supply before completion of electric wiring to prevent injury or death accident.

Specification of power line and circuit breaker must meet unit running requirements and conform to relevant national regulations.

Only copper conductor can be used for terminal connection to prevent corruption or overheating.

All equipments requiring grounding must be grounded reliably, grounding devices should conform to national regulations.

Voltage range

Power supply to the unit must conform to operating power supply identified on the nameplate of this unit. Measure voltage between phases, its reading must be within the allowable tolerance (± 10%) of the voltage indicated on the nameplate. If voltage between any two phases exceeds this tolerance range, notice power company for improvement before starting this unit. Improper voltage may cause controller function abnormal, shorten lifecycles of various electric components and compressors.

Voltage unbalance

Voltage unbalance between phases of 3-phase electric system is too great, which may cause motor overheating thus cause trouble. Allowable maximum unbalance voltage is 2 %, otherwise please notice power company for improvement before starting this unit.

$$\text{Voltage unbalance \%} = \frac{(Va-Vd)}{Va}$$

Va=(V1+V2 +V3)/3 (average voltage)
V1,V2 ,V3= voltage between phases
Vd= voltage between phases that deviates from Va the most

Reversed phase or open phase

Because this unit uses scroll compressor and is equipped with reversed phase and open phase protector for power supply, energization check should be performed before starting the unit. When green lamp of phase sequence protector in the electric control box illuminates, it indicates that phase sequence is correct; if red lamp illuminates, it indicates that phases are reversed, it is required to exchange any two phases after power supply is cut off; if yellow lamp illuminates, it indicates open phase, it must be checked after cutting off power supply.

Under reversed phase or open phase condition, unit will deactivate start automatically, and the main controller can not search this unit simultaneously.

Compressor warm-up

When starting the unit initially or after a long period of shutdown, warm up the compressor 4 hours ahead of starting, or the compressor may be damaged.

Water filling and air exhaust of water system

Before filling water into the water system, please confirm that water system is cleaned, water pipe is without leakage and air in the water system has been exhausted. This unit provide trial running function of water pump, move DIP switch SW 2-8 of main unit board to OFF position, at this time electric 2-way valves of all indoor coils are opened, and water pump keeps running continuously. Before this operation, ensure that water system is filled with water and that all indoor and outdoor units have been searched.

After water flow is stable and there is no noise from indoor coil, trial running of water pump can complete. Place DIP switch to the home position on completion of trial running.

Anti-freezing in winter

Note: after water system is filled with water in winter, specially under OFF condition of commissioning procedure and using procedure, never cut off power supply to prevent water system from cracking resulted from freezing caused by sudden drop of ambient temperature. Anti-freezing protection in winter is active for the unit only when indoor and outdoor units including main controller are energized and under standby condition.

If it is required to cut off power supply for a long period of shutdown, do remember to drain out water from the system. Especially cycle water left in plate heat exchanger and water pump.

Water flow

Water flow through the unit must be between the upper limit and the lower limit listed in Table 8, if cold water flow

Table 8 Water flow of the main unit

Unit: l/minute (LPM)

Unit	Lower flow limit	Rated flow	Upper flow limit
CGDR100	42	70	84
CGDR120	48	80	96
CGDR150	60	100	120
CGDR175	72	120	144
CGDR200	84	140	168

Unit inspection before commissioning

getting into the evaporator is less than the lower limit, it may cause discontinuous flow, reduce heating transfer effect, and even cause evaporator freezing and unit damage. Otherwise, if water flow is higher than the upper limit, it may accelerate corruption of evaporator and internal pipeline. The unit has built-in flow switch, user should not short this switch without permission, our company will bear no liability for unit damage caused by this reason.

Search of indoor and outdoor units

After indoor and outdoor units are energized correctly, check and that the number of indoor and outdoor units searched conforms to installed number by manual search function of the main controller. If not conform, it is required to check lacked connection of unit power line and communication line, and the setting condition of DIP switch until they are consistent.

Start procedure

After connecting power supply to the unit, it can be started according to the operation procedure mentioned above using the main controller or indoor thermostat. Note: When setting running mode (cooling or heating), it should be selected according to actual outdoor temperature then (this unit has corresponding requirements on outdoor temperature for different running mode, unit start will be disabled if exceeding this range).

Cleaning of plate heat exchanger

Trane company suggests cleaning plate heat exchanger by chemical cleaning method, cleaning agent should be hot phosphoric acid solutions, its using condition is: 50~ 60℃ , concentration 15%, rinse 3~6 hours in cycle. (see Figure 10)

Warning!

- **Never clean the plate heat exchanger with toxic or corrosive cleaning agent.**

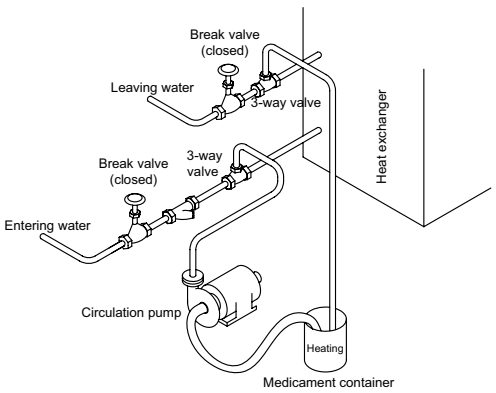


Figure 10 Schematic diagram for cleaning of plate heat exchanger

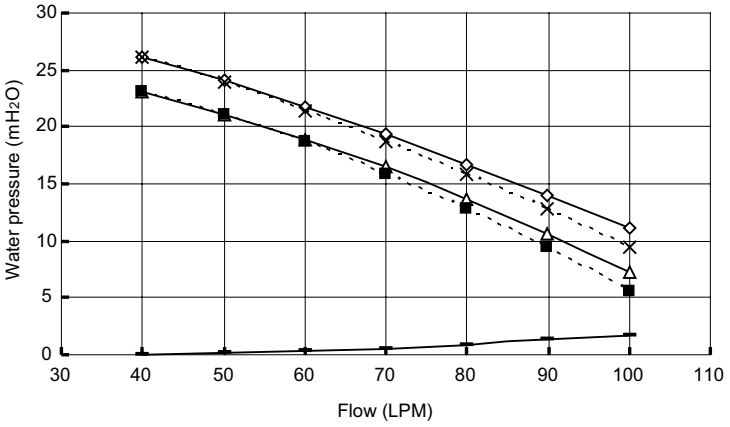
Unit running and operation

Water pressure drop

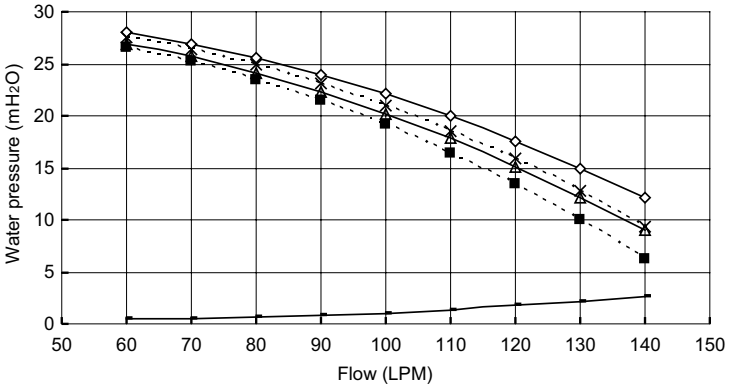
Measure water pressure difference (external lift) between water inlet and water outlet of the unit (with water pump inside), i.e. water flow of the unit under this condition can be evaluated by “water flow – external net lift” curve, and water power can also be adjusted accordingly. The curve shown in the figure is data of water pump running at high speed, which can be used for reference to pipeline design of water system.

Characteristic curve of water pressure drop

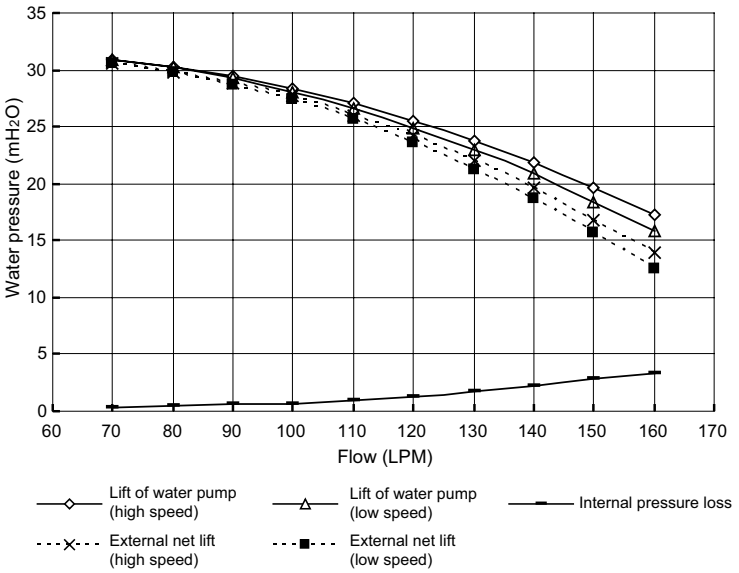
CGDR100/120



CGDR150/175



CGDR200



Unit running and operation

Inspection of running status

Run the water pump first after starting the unit (cooling or heating), if water flow is normal, then compressor will start automatically according to loading requirements, or water flow trouble may be reported. After the compressor runs over 30 minutes, and the system is running stably, check the following items to ensure normal system running:

1. Check that water flow and water pressure readings of the unit is stable and within the normal range.
2. Measure high and low pressure of the unit. During normal running, low pressure should be 50 ~ 85psig (0.446 ~ 0.687MPa), and high pressure should be 200 ~ 310psig (1.48 ~ 2.24MPa). When adjusting energy for digital compressor, HP and LP will have cyclical fluctuation, this is normal.
3. Check current reading of the compressor.
4. Check that there is sufficient water in the sight glass of the liquid pipe.
5. Measure the degree of superheat. Under GB operating mode (entering water temperature 12℃ , leaving water temperature 7℃ , ambient temperature 35 ℃), normal system superheat for each loop is 3 ~ 5 ℃ . If superheat measured on any loop is not within this range, superheat setting on the expansion valve should be adjusted to proper reading. Each time the expansion valve is adjusted, wait for 15-30 minutes to stabilize the new setpoint. Electronic expansion valve of digital system can adjust automatically.
6. Measure the degree of sub-cooling. Under GB operating mode, normal system sub-cooling for each loop is 1 ~ 3℃ . If sub-cooling measured on any loop is not within this range, necessary adjustment should be performed after checking loop superheat. If superheat is normal while sub-cooling is abnormal, please contact professional repair staff.
7. If it indicates that refrigerant is insufficient by running pressure, sight glass, degree of superheat and sub-cooling, find out and repair the leaking point, then fill gaseous refrigerant into the loop. During unit running, fill refrigerant from LP pipe until the operating pressure is normal.
8. If operating pressure indicates that excessive refrigerant, draw back refrigerant at liquid pipe slowly.
9. Confirm that all temperature sensors are installed in proper positions, capillary tubes of temperature sensors must be fixed securely to prevent vibration and abrasion.

On completion of check, clean up all castoff, tools and parts. Fix all sheet metal of housing, including control board and access cover of the compressor, then reassemble all screws to the original position.

Note:

Bubbles in sight glass indicate insufficient refrigerant or too great pressure drop in liquid pipe. But bubbles do not necessarily indicate abnormal system running, especially when heating.

Clear sight glass does not surely indicate sufficient refrigerant in the system, do take system overheating, overcooling, operating pressure and ambient temperature into account.

If HP and LP are too low, and sub-cooling degree is normal, this condition is not insufficient refrigerant, refilling refrigerant may cause it excessive.

Long-term shutdown

If this system is not used for a long term, implement the following procedure before shutdown:

1. Check that refrigerant is without leakage, if any, it must be repaired.
2. Maintain water pump and air conditioning equipments as suggested by manufacturer.
3. Drain out circulating water in the system. Close make-up valve, unscrew water drain in water supply loop, then disassemble rear panel of the unit and unscrew water drains at the bottom of water pump and plate heat exchanger, and ensure the circulating water is drained completely.
4. It is necessary to confirm that power switches of indoor and outdoor units are allowed to be turned off only after circulating water is drained completely from the system.

Unit running and operation

Note:

When draining water in winter, it is required to close water supply valves of all evaporators and open drain valves and exhaust valves on unit pipeline in order to exhaust water in the evaporator, then assemble drain plug. For super-thin ceiling machine, drain out water in the pipeline by means of drain valve, then open drain valve at the bottom to drain out residual water in the evaporator. If water in cold water pipe can not be drained out completely, proper anti-freeze fluid should be injected to prevent residual water icing which results in unit damage. Please consult the dealer before purchasing anti-freeze fluid to prevent system or pipeline corrosion.

Restarting this system after long-term shutdown

1. Open valves in return water and supply water pipeline, and fill clean water into cold water pipeline. It is necessary to exhaust air when filling water, and close the exhaust valve after the system is filled with water.
2. Turn on power switch of the unit.
3. Start the unit by main controller or thermostat. When cold water is circulating in the water system, check leakage for all piping connectors.
4. Adjust water flow in cold water pipeline using balance valve, and check water pressure of the unit.
5. Stop running after check unit condition.

Main protection function

LP protection

The unit has LP protection function, when suction pressure is lower than the protective value, stop compressor running. Main controller alarms and displays corresponding fault code.

HP protection

The unit has HP protection function, when suction pressure is higher than the protective value, stop compressor running. Main controller alarms and displays corresponding fault code.

Anti-freezing function in winter

With the unit under standby condition in winter, when water temperature is lower than the anti-freezing setpoint for winter and this condition is maintained over 30s, the unit will start and step into anti-freezing heating automatically, " " appears. Therefore, when it is icing weather in winter, indoor and outdoor units should be powered on even the unit is under shutdown condition, including power supply of the main controller.

Anti-freezing of plate heat exchanger

When cooling is running, if leaving water temperature is 3 ℃ lower than the setpoint or more and it maintains over 30s, all compressor will be turned off, water pumps keep running.

To prevent plate heat exchanger damage due to repeated restart, it should deactivate compressor starting within 15 minutes after the trouble occurs, i.e. this trouble signal can not be eliminated even though it is powered off; after 15 minutes, if this trouble disappears, unit operation can be recover only after eliminating the trouble signal on main controller manually.

Overload protection

- Overload and overheat protection for compressor motor.
- Overload protection for water pump motor.
- Overheat protection for fan motor.

Protection for temperature probe

When trouble occurs on temperature probe, the system will alarm and shut down.

Flow protection

To prevent evaporator icing due to water flow reduction, a flow switch has been set in the unit. When the water flow is under the lower limit, the setpoint of the switch shold ensure that the main controller alarms and stops compressor running immediately, water pump etc. will delay to close.

Note: all trouble alarms are required to be reset manually, the unit will recover running only after trouble signal in the main controller is eliminated. For detailed operation, please see “Trouble analysis and shooting” .

Running mode

Cooling

After cooling starts, electronic expansion valve opens to the initial opening

Unit running and operation

first (for 40s), then water pump starts, if flow switch closes after 100s, digital compressor starts and loads to the targeted loading. After that, control ON/OFF operation of the constant speed compressor according to the condition of actual loading. ON/OFF operation of outdoor fan is performed according to coil temperature. Unless it shuts down, water pump will keep running.

Heating

After heating starts, electronic expansion valve opens to the initial opening first (for 40s), 4-way valve is energized, then water pump starts, if flow switch closes after 100s, outdoor fan starts and keep running, and digital compressor starts 5s later and loads to the targeted loading. After that, control ON/OFF operation of the constant speed compressor according to the condition of actual loading. Unless it shuts down, water pump and fan will keep running.

Cooling/heating shutdown

After shutdown, close all compressors every 2s, close digital compressor finally. Delay 30s to close the fan, then close water pump 90s later, cut off the power supply to four-way reversing valve 1s later (heating), at last place all electronic expansion valves to 200 steps.

Maintenance

- At least annually or once after running 2000 hours.
- Maintenance work must be carried out by qualified professional personnel.

Notice for start and use

A. Before start in winter, main power switch should be powered on, and start it after warming up the compressor for 24H

B. When closing heating in winter, main power switch of the unit should not be powered off, or its anti-freezing function will be inactive thus the unit will be damaged due to frost cracking

C. After using cooling only unit in cooling season, drain out the water left in the pipe of water system before winter is coming, and open the exhaust port to facilitate thorough drainage of residual water.

D. Y-type water filter in the water system must be rinsed often.

E. Pay attention that exhaust and water make-up of water system is normal.

Operating temperature range of the unit

Cooling condition	18℃ ~ 43℃
Heating condition	-7℃ ~ 21℃

Fault code and trouble analysis & shooting

Warning

If welding is required during maintenance, before using open flame, refrigerant in corresponding systems must be drained out, and confirm this by observing all relevant service valve ports. Welding operation must be performed by personnel holding valid certificates. Pay attention to the ventilation at welding place.

Fault code (displayed on the main controller)

Fault code	Trouble description	Fault code	Trouble description
20	Digital LP sensor in trouble	67	LP switch of constant speed system tripped
24	Ambient temperature sensor in trouble (outdoor unit)	68	Digital compressor overloaded
25	Leaving water temperature sensor in trouble	69	Constant speed compressor 2 overloaded
26	Return water temperature sensor in trouble	6A	Water pump overloaded
27	Digital coil temperature sensor in trouble	6B	Fan motor 1 overloaded
28	Refrigerant outlet temperature sensor of digital plate heat exchanger in trouble	6C	Fan motor 2 overloaded
29	Digital suction temperature sensor in trouble	6D	Flow switch alarm
2A	Digital exhaust temperature sensor (built-in) in trouble	73	Constant speed compressor 3 overloaded
2B	Constant speed coil temperature sensor in trouble	7E	Ambient temperature sensor in trouble (indoor unit)
2C	Refrigerant outlet temperature sensor of constant speed plate heat exchanger in trouble	87	Ambient temperature exceeds operating range
2E	Constant speed exhaust temperature sensor in trouble	8D	Anti-freezing of cooling
2F	Digital leaving water temperature sensor in trouble	91	Suction temperature is abnormal (outlet of any plate heat exchanger)
64	HP switch of digital system tripped	EF	Communication between indoor and outdoor units in trouble
65	HP switch of constant speed system tripped	C8	Water system of indoor unit in trouble (cassette unit)
66	LP switch of digital system tripped	-	-

Note:

1. Under standby condition in winter, if main controller shows "≋" icon, it indicates that the unit starts "Anti-freezing function in winter" at this time, outdoor unit steps into heating mode automatically.
2. Under heating condition, if thermostat shows 3 air velocity icons flashing simultaneously, but the fan of indoor unit does not rotate, it does not indicate unit trouble, because the thermostat starts "cold air protection function" at this time.
3. Under heating condition, if the thermostat shows "dF" , it does not indicate unit trouble either, it indicates that outdoor unit is under defrosting condition at this time.

Trouble shooting

Procedure	Operation description
Eliminate alarm sound	Eliminate it by pressing "Exit" button on the main controller.
Trouble reset	Press button "⑨" on the main controller.
Report for repair	Record the fault code and dial free repair hotline.

Fault code and trouble analysis & shooting

Trouble analysis

A. No display on the main controller

Possible cause	Action
(1) Power supply is not connected or the polarity is reverse	Check the following items: a. DC power to the main controller is not supplied b. Input polarity of DC power to the main controller is connected reversely. c. The main controller is in trouble

B. There is display on the main controller, but indoor and outdoor units can not be searched

Possible cause	Action
(1) Communication line in trouble (2) Power supply is not connected	Check the following items: a. Communication line is not connected b. Polarity is connected reversely for terminals a and b of communication line c. Corresponding indoor or outdoor unit is not powered on

C. Compressor fails to start or sound

Possible cause	Action
(1) Power supply is not connected	Check the following items: a. Main power switch is not turned on b. Fuse is blown out
(2) There is no compressor control signal output from microcomputer	Check the following items: a. Check fault code of the main controller b. There is problem with microcomputer controller
(3) Internal protective contact of the compressor tripped	Check the following items: a. Check compressor current b. Wait for internal contact resetting (about 10-20 minutes)

D. The compressor sounds but fails to start

Possible cause	Action
(1) Compressor voltage is too low	Check the following items: a. Certain fuse is blown out b. Power voltage is too low c. Electromagnetic contactor of the compressor in trouble d. Piping connection is loose
(2) Compressor problem	Check the following items: a. Motor winding is open b. Current for various phases is too high

E. The compressor is running ceaselessly

Possible cause	Action
(1) Unit energy can not bear the loading (can not reach unloading water temperature)	Check the cause for too heavy loading
(2) Temperature probe or control circuit is poor	Replace the temperature probe Replace or repair control circuit
(3) Electromagnetic contactor of the compressor is in trouble	Repair or replace the electromagnetic contactor
(4) Compressor valve is leaking (exhaust pressure is low and suction pressure is high)	Replace the compressor
(5) Refrigerant is insufficient (capacity reduced, superheat degree too high, sub-cooling degree too low and HP low)	Find out refrigerant leaking point, repair it, and then refill refrigerant

F. Cooling capability is insufficient

Possible cause	Action
(1) Refrigerant filling is insufficient (superheat degree and sub-cooling degree are not enough)	Refill refrigerant
(2) Dry filter is clogged (temperature from refrigerant pipe to dryer changed)	Replace the dry filter
(3) The expansion valve is adjusted incorrectly	Readjust the expansion valve
(4) The expansion valve is clogged (superheat degree or water temperature is too high)	Repair or replace the expansion valve
(5) Water flow of the evaporator is too low	Check the strainer and adjust water flow
(6) Non-condensable gas exists in the system	Refill refrigerant after the system is vacuumed
(7) Compressor valve is leaking and suction pressure is high (HP is low and LP is high)	Replace the compressor

G. Suction pressure is too low

Possible cause	Action
(1) Refrigerant filling is insufficient (i.e. superheat degree is high and sub-cooling degree are low)	Find out leaking point, repair it, and then refill refrigerant
(2) Temperature switch is set too low (i.e. both LP and leaving water temperature are too low)	Readjust the temperature switch
(3) Cold water flow is too small	Check that the strainer is clogged or the balance valve is set correctly
(4) Dry filter clogged	Check that dry filter is frosting, if necessary, replace it
(5) Expansion valve clogged (i.e. superheat is high)	Clean or replace the expansion valve

Fault code and trouble analysis & shooting

H. Suction pressure is too high

Possible cause	Action
(1) Cooling loading is too high (i.e. supply water temperature is high)	See Section E
(2) The expansion valve supplies too much liquid (i.e. superheat is too low, liquid splashes onto the compressor)	Adjust superheat setting, and check that the temperature sensor is certainly installed in the gaseous pipe.
(3) Suction valve is cracked (i.e. compressor noise is high)	Replace the compressor

I. Exhaust pressure is too low

Possible cause	Action
(1) Refrigerant filling is insufficient (i.e. superheat degree is high, sub-cooling degree are low and bubbles exist in the sight glass)	Refill refrigerant
(2) The system is leaking	Find out leaking point, repair it, and then refill refrigerant
(3) LP switch is poor	Replace poor control elements
(4) Running below the lowest ambient temperature	Install proper switch for exhaust pressure control or ambient temperature locking

J. Exhaust pressure is too high

Possible cause	Action
(1) Heat dissipation room is not reserved for the main unit as per installation requirement.	Change installation position
(2) Condensation air is too less or too hot, air flow is blocked	Clean coil, and check that fan and motor are normal
(3) Air or non-condensable gas exists in the system (i.e. condenser is hot abnormally)	Refill refrigerant after the system is vacuumed
(4) Fill refrigerant excessively (i.e. sub-cooling is high, superheat is low and suction pressure is high)	Draw back excessive refrigerant
(5) Condensation fan is in trouble	Replace the faulty parts
(6) System loading is too high (total capacity of indoor unit coil installed is too large)	Reduce loading (reduce the number of indoor units used simultaneously)

K. The unit is not heating

Possible cause	Action
(1) Running mode is set incorrectly for the unit	Set heating mode
(2) Indoor temperature setpoint is too low	Adjust the setpoint higher
(3) Four-way valve is in trouble	Replace the four-way valve
(4) Outdoor temperature is too high (over 25c)	Not trouble (to protect the unit, heating is disabled at this time)

Fault code and trouble analysis & shooting

L. LP pressure is too low – heating condition

Possible cause	Action
(1) Refrigerant is insufficient	Fill refrigerant
(2) Air volume entered into the coil is too small or too cold	Clean coil, and check that functions of fan motor are normal
(3) The unit is running below the lowest operating temperature	Mount an ambient temperature cutoff switch
(4) The expansion valve is inactive	Replace the expansion valve

M. HP pressure is too high – heating condition

Possible cause	Action
(1) Water flow is too small	Rinse water filter
(2) Indoor unit strainer is clogged	Check and rinse the strainer
(3) Leaving water temperature sensor is in trouble	Replace temperature sensor

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