4. Installation of Indoor Unit

4.1 Ceiling Recessed Type (FDTA)

4.1.1 Selection of installation location

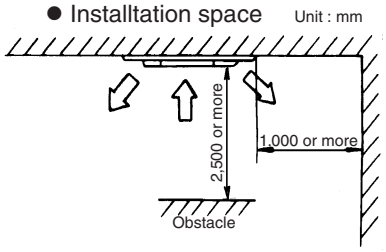
1. Select location where the space above ceiling is larger than those mentioned below and perfect condensate draining can be assured.

Model	Space above ceiling (h)
FDTA28, 36, 45, 56, 71	Over 290mm
FDTA90	Over 315mm
FDTA112, 140	Over 385mm

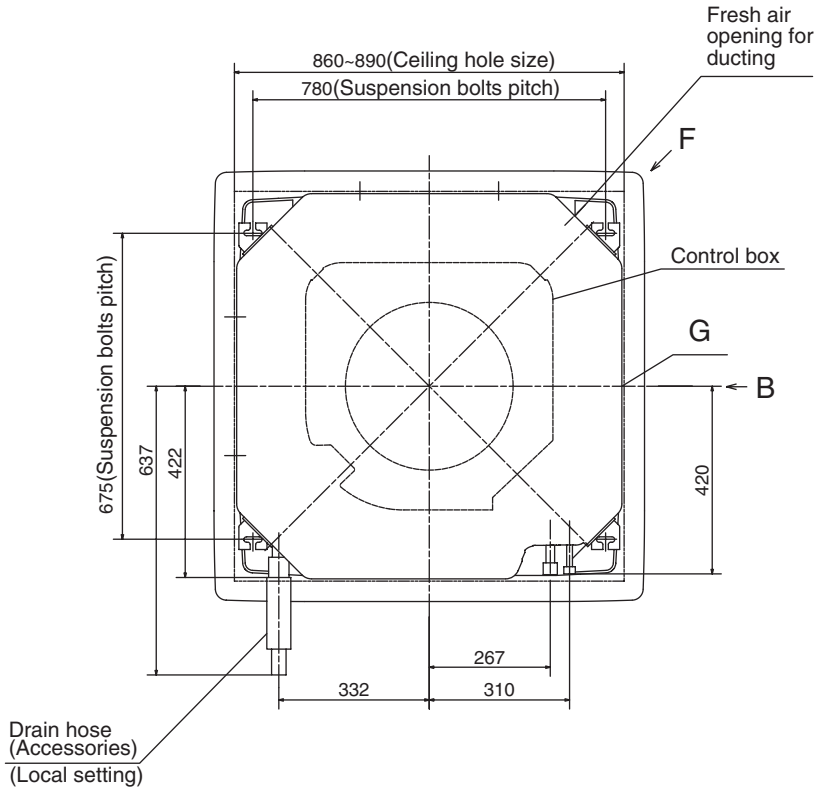
2. With the customer's consent, select a location with following suitable conditions.
   a) Where cool air or hot air can easily pass through.
      If the height of the location exceeds 3 m, hot air will gather in the ceiling. Suggest to the customer to also install a circulator.
   b) Where water can be completely drained. A sloping location for drainage.
   c) Where there are no wind disturbances to the suction inlet and blowing outlet, where the fire alarm will not be set off erroneosly, where no short circuits occur.
   d) Where there is no direct sunlight.
   e) Where the dew point temperature is below 28°C and the relative humidity is below 80%.
      The unit has been tested according to JIS dew point conditions and has been confirmed to operate without any problems. However, if the unit is operated in an environment with the humidity higher than the above limit, water condensation may occur. Accordingly, all pipes and drain pipes should be further covered with insulation materials of 10 - 20 mm thick.
3. Consider the supporting strength of the location. If the strength is not sufficient to sustain the unit weight, use reinforcing materials.

4.1.2 Installation space for unit

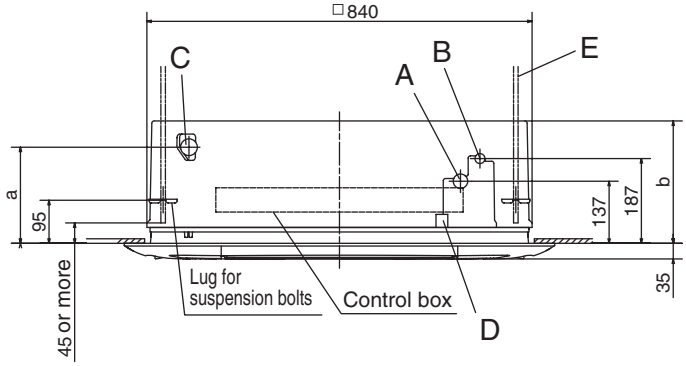
1. When a sufficient interval cannot be secured between the unit and a wall or another unit, shut up diffusers on that side to block winds and make sure that no short-circuiting is occurring. (A wind blocking material is available as an optional part)
   Do not use the unit in the "LO" wind mode, when winds are blown into two or three directions.



2. When the unit has 2500 mm or less clearance, attach a fan guard (option part) on the intake side of the fan.



A	Gas tube connecting port
B	Liquid tube connecting port
C	Drain line connecting port
D	Power intake
E	Hanging bolt
F	OA intake
G	Blowout branch duct connecting port



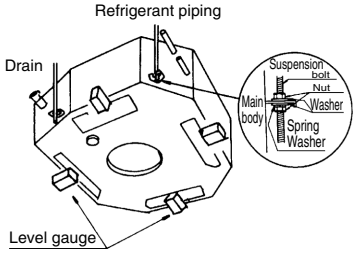
Model	a	b
FDTA 28~71	212	270
FDTA 90	212	295
FDTA 112, 140	269	365

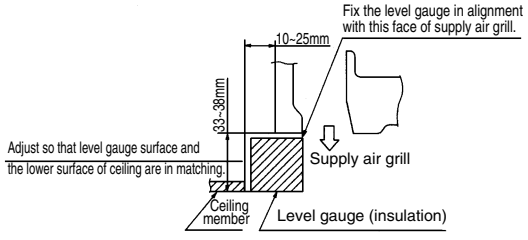
4.1.3 Suspension

- Please arrange four sets of a hanging bolt (M10 or M8), a nut matching the bolt, a flat washers and a spring washer on the installation site.

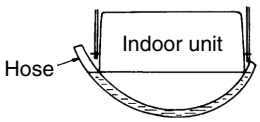
When suspension from the ceiling

1. In the case of the standard series: Cut and opening of □860 ~ □890
   In cutting an operating on the ceiling, use the unit's cardboard container for shipment as a reference of the size of opening.
   ■The center of the opening on the ceiling must match with the center of the unit.
2. Determine the positions of suspension bolts (675 × 780).
3. Use four suspension bolts, each fastened in such a manner that it can withstand pull force of 50 kgf.
4. Make suspension bolts to the length that leaves approximately 70 mm of them above the ceiling.
5. After hoisting in the unit, attach level gauges supplied as accessories and determine the unit position (height).





6. Use a transparent tube with water filled inside to check the level of the unit. (A tolerable height difference at an end of the unit is within 3 mm)

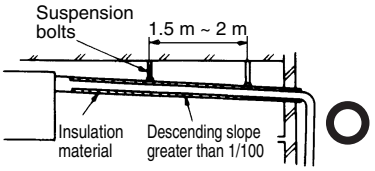


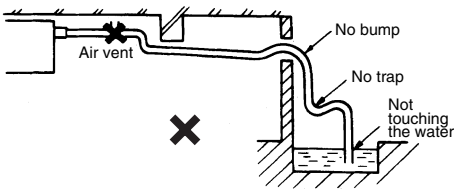
When embedded into ceiling

1. Determine the positions of hanging bolts (675 × 780).
   The pitch center of a hanging bolt must accord with the center of the unit.
2. Use four suspension bolts, each fastened in such a manner that it can withstand pull force of 50 kgf.
3. In cutting an opening on the ceiling, use the unit's cardboad container for shipment as a reference of the size of opening.
4. Fix the unit as per A-5 and 6 above.
   The unit's cardboard container for shipment can be used to cover the indoor unit.
   Note (1): When a hanging bolt exceeds 1.3 m in length, use an M10 bolt and give it reinforcements such as braces.

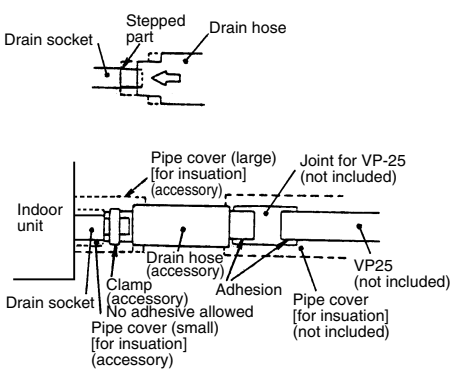
4.1.4 Drain piping

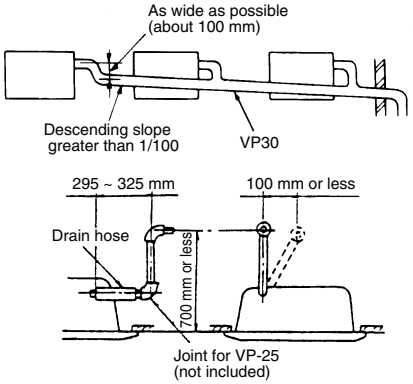
1. Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.





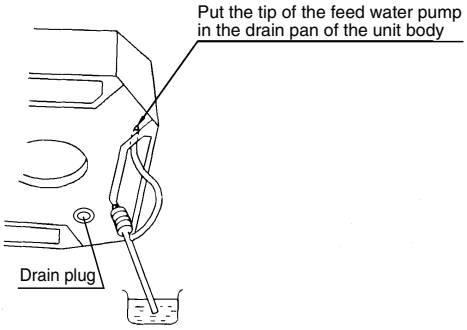
2. The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.
3. Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.
4. Use VP-25 general-purpose hard PVC pipes for drain piping.
5. Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
6. Adhesive must not be used.
   a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
   b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
   c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
   d) Do not create an air vent under any circumstances.
   e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the units' drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
   f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.
7. Drain socket
   After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.
   (Cut pipe covers into appropriate shapes)
8. Hard PVC pipes laid indoor
   a) Since a drain pipe outlet can be raised up to 700 mm from the ceiling, use elbows, etc. to install drain pipes, it there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
   b) Install the drain pipe outlet where no odor is likely to be generated.
   c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.





Drainage test

1. Check that water is draining thoroghly during test run, and that there are no water leaks from the joints and the drain pan.
2. The test has to be performed even if the unit is installed in the season when the unit is used for heating.
3. In a new house, perform the test before the ceiling is fitted.
   - Using a water pump, pour about 1000 cc of water to the drain pan through the blowing outlet.
   - Check the transparent drain-out section of the drain hose for normal flow of drainage. While observing the noise from the drain motor, test drain operation.
   - Take off the drain plug to release the water. After the water is drained, place the drain plug back where it was. While observing the noise from the drain motor, test drain operation.



Forced drain pump operation

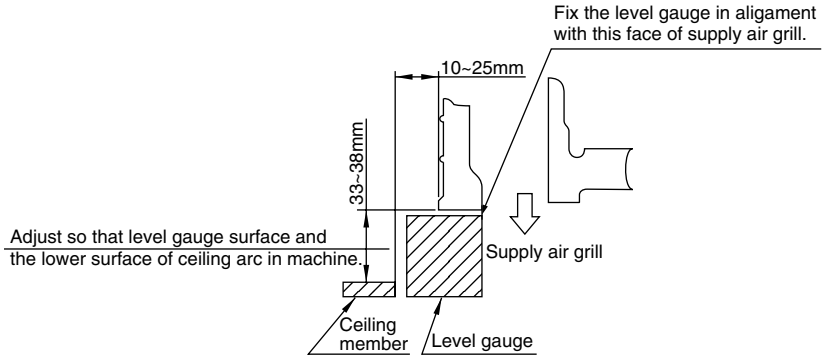
- Set up from a unit side.
  ① Turn on DIP switch 5-1 on the PCB of the indoor unit. The drain pump operates continuously.
  ② After the test, be sure to turn off the DIP switch.
  (When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain connections of the pipe)
- Setup from a remote controller side.
  Drain pump operation from a recomte controller unit is possible. Operate a remote controller unit by following the steps described below.
  1. To start a forced drain pump operation.
     ① Press the TEST button for three seconds or longer.
     The display will change from " ◆ SELECT ITEM " → " ○ SET " → " ✳ TEST RUN ▼ "
     ② Press the ▼ button once while " ✳ TEST RUN ▼ " is displayed, and cause "DRAIN PUMP ◆ " to be displayed.
     ③ When the SET button is pressed, a drain pump operation will start.
     Display: " DRAIN PUMP RUN " → " ○ →STOP "
  2. To cancel a drain pump operation.
     If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.
     The air conditioning system will become OFF.

4.1.5 Panel installation

1. Accessories

Name	Quantity	Remarks
Air inlet grille	1	
Air filter	1	
Suspension bolts	4	For panel installation

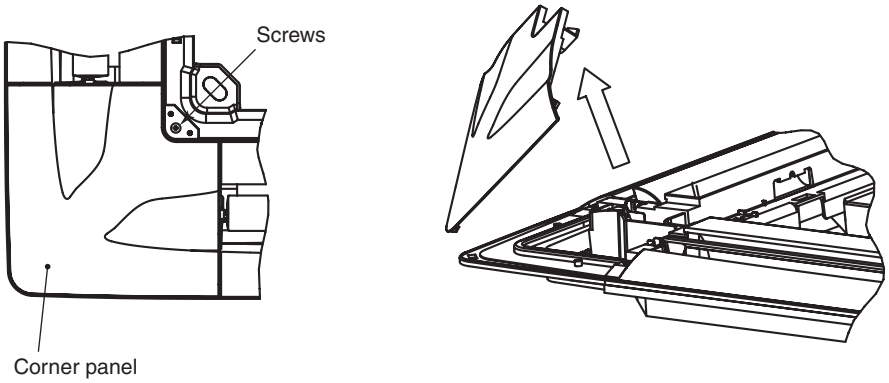
2. Confirm the unit's installation level.
   a) Make sure from the level gauge (insulation) packed with the air conditioner unit that the installation height of the unit and the dimensions of the opening in the ceiling are correct.
   b) Confirm the installation level of the air conditioner unit and ceiling material.
   c) Affix the level gauge included with the air conditioner unit and fix the unit's installation height.
   d) Remove the level gauge before installing the unit.
   e) The unit's installation height can be minutely adjusted by means of the corner openings after the panel is installed. (For details, see 6) "Installing the Panel.")



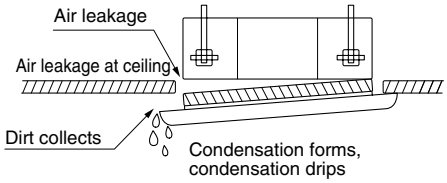
⚠ **Note** :If the installation level of the air conditioner unit and ceiling material exceed the proper range, it will cause an undue load to be borne during installation of the panel and could cause damage.

3. Unit installation direction and panel and air inlet grille direction
   a) The unit and panel installation orientation is directional.
      • Match up the outlet (small) parts with the refrigerant piping direction.
      • Make sure of the motor and switch connector connection directions. (For details, see 6) "Installing the Panel.")
   b) The panel and air inlet grille installation orientation is not directional.
      If you are changing the direction of the air inlet grille, change the panel's striker installation position to the "Pull" character position direction on the surface of the grille.

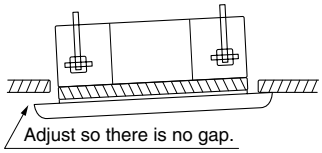
4. Removing the air inlet grille
   ① Raise up the notched portion of the air inlet grille and open it.
   ② With the air inlet grille open, remove the air inlet grille hinge from the decorator panel.
5. Removing the corner panel
   Take out the screw in the corner, then lift up the corner panel in the arrow direction and remove it.



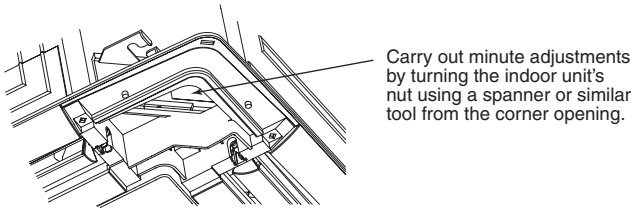
6. Panel installation
   ① Screw in lightly 2 of the 4 air conditioner unit suspension bolts in opposite corners from each other by about 5 mm.(Fasten the drain piping side and the opposite corner temporarily.)
   ② Hang the panel on the two suspension bolts to install it temporarily.
   ③ Install the two remaining suspension bolts and tighten all four of the bolts.
   ⚠ **Notes** :If the suspension bolts are not tightened sufficiently, it could cause the following trouble, so tighten the bolts securely.



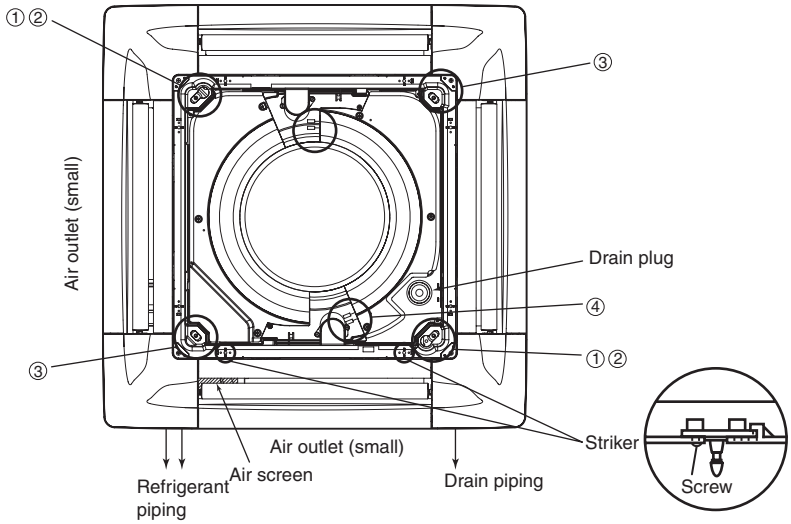
If there is still a gap between the ceiling and the decorator panel even after the suspension bolts are tightened, readjust the height of the indoor unit.



The unit's installation height can be minutely adjusted with the decorator panel as is as long as the indoor unit is level and drain piping are not affected.



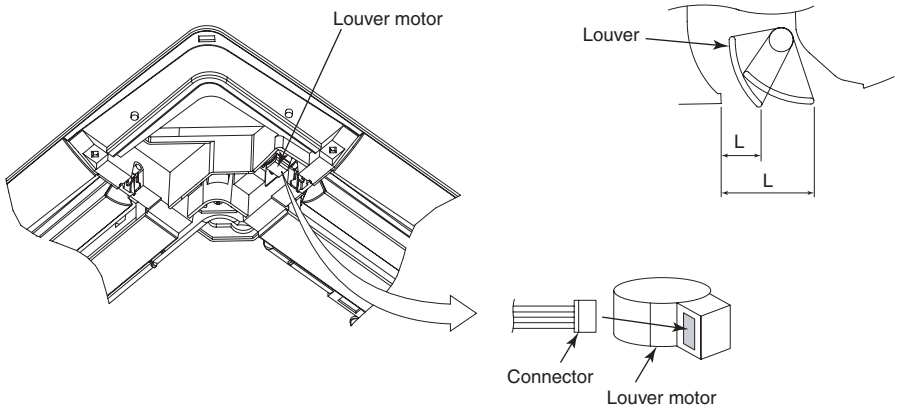
④ Connect the (white, 5p) louver motor connector.
⑤ Place each of the connectors inside the control box.



Note (1) : If the air outlet louver does not operate using the remote controller, check the connector's connection, then turn the main power supply OFF for 10 seconds or longer and turn the power ON again.

7. If the vertical air-flow direction is fixed
   This decorator panel is designed so that you can fix the vertical air-flow direction at each air outlet to match the environment at your installation location. Set it as required by the customer. Furthermore, when the vertical air-flow direction is fixed, remote control operation and all automatic controls are disabled. The actual setting may also differ from the LCD display in the remote controller.
   ① Turn off the main power supply (turn it off at the ground fault circuit breaker).
   ② Disconnect the connector to the louver motor at the air outlet you want to fix the position of.
   Wrap vinyl electrical tape around the disconnected connector to insulate it.

③ Slowly move the vertical air-flow louver you want to fix the position of by hand and set the vertical air-flow direction so that it is within the range shown in the table below.



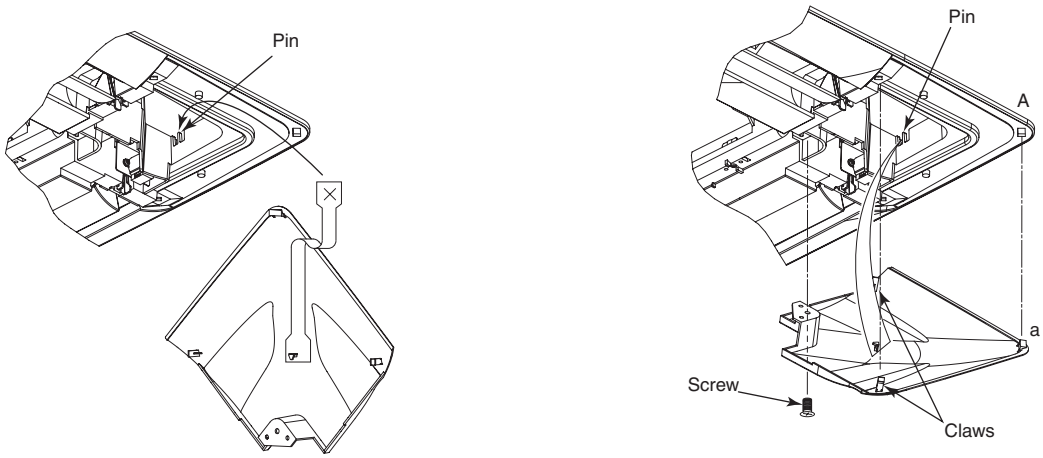
<Setting Range>

Vertical air-flow direction criterion	Horizontal 30º	Downward 70º
L Dimension (mm)	36.5	22.5

It can be set anywhere desires as long as it is within a range of 22.5 and 36.5mm.

⚠ **Note** : Do not set the position outside this range.
Doing so causes condensate to drip and to form as well as dirtying of the ceiling surface, and could cause abnormal operation.

8. Corner panel installation
① Hook the corner panel strap to the pin on the decorator panel as shown in the figure.
② Insert part a on the corner panel in part A on the decorator panel, then fit the 2 claws and fasten the corner panel screw.



9. Installing the air inlet grille
Install the air inlet grille by following the removal procedure (item 4) in reverse order.
⚠ **Note**: Match up the installation position of the panel's striker and the "Pull" character position direction on the surface of the grille. If these do not match, the striker could be damaged.

4.2 Ceiling recessed compact type (FDTCA)

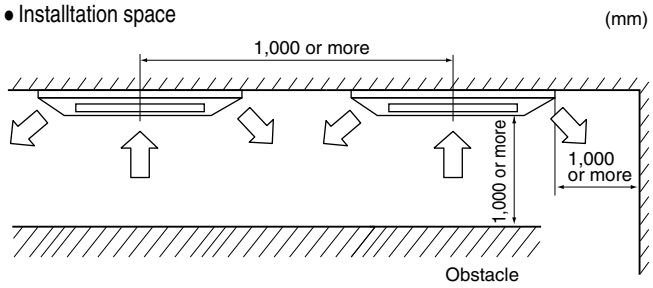
4.2.1 Selection of installation location

1. Select location where the space above ceiling is larger than those mentioned below and perfect draining can be assured.
2. With the customer's consent, select a location with following suitable conditions.
   a) Where cool air or hot air can easily pass through.
      If the height of the location exceeds 3 m, hot air will gather in the ceiling. Suggest to the customer to also install a circulator.
   b) Where water can be completely drained. A sloping location for drainage.
   c) Where there are no wind disturbances to the suction inlet and blowing outlet, where the fire alarm will not be set off erroneosly, where no short circuits occur.
   d) Where there is no direct sunlight.
   e) If the humidity above the ceiling exceeds 80% or the condensation temperature above the ceiling exceeds 28°C, affix polyurethane foam (with a thickness to 10 or greater) above the insulation in the ceiling panels.

   (Carry out tests of the main unit under the above conditions and confirm that there is no failure. However, if the environment where the unit is installed exceeds the above conditions and the unit is operated in high humidity conditions, there is danger of water drops dripping down. If there is a possibility that the unit will be used under such conditions, install 10 to 20 mm of insulation material to the main unit, piping and drain pipes.)
3. Consider the supporting strength of the location. If the strength is not sufficient to sustain the unit weight, use reinforcing materials.

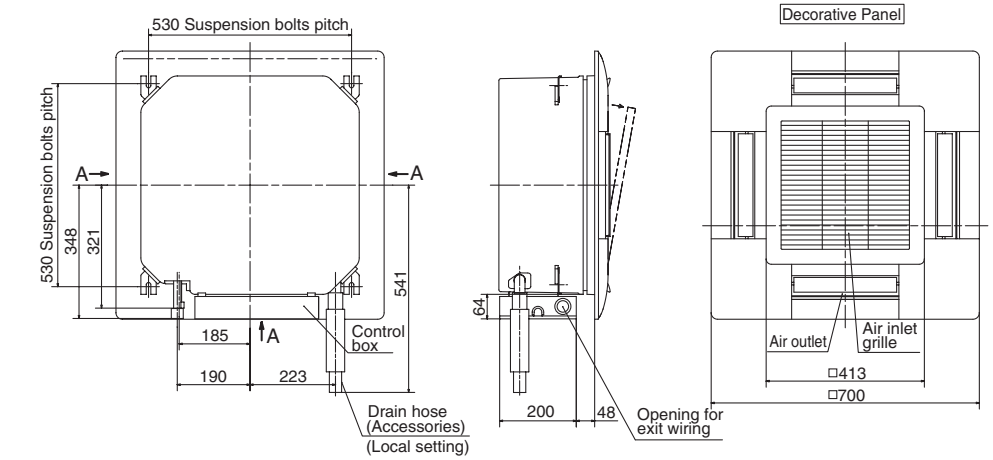
4.2.2 Installation space for unit

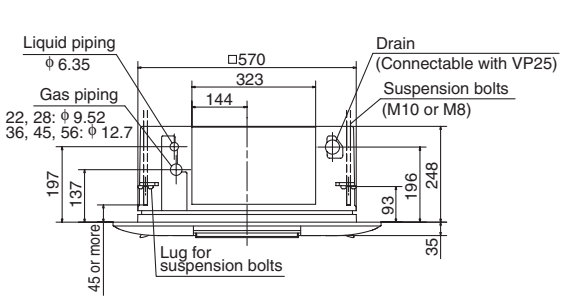
1. When a sufficient interval cannot be secured between the unit and a wall or another unit, shut up diffusers on that side to block winds and make sure that no short-circuiting is occurring. (A wind blocking material is available as an optional part)
   - Do not use the unit in the "Lo" wind mode, when winds are blown into two or three directions.

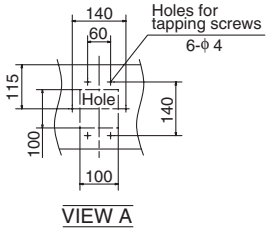


Note (1) This shows the installation interval dimensions between units centered on the units.

Unit:mm





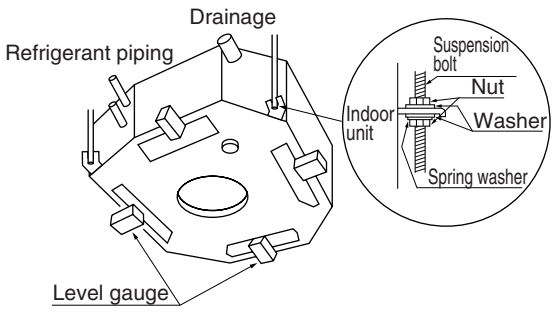


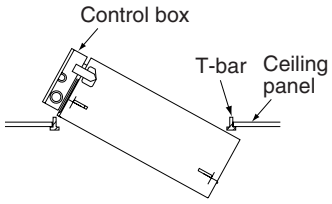
4.2.3 Suspension

- Please arrange four sets of a suspension bolt (M10 or M8), a nut matching the bolt, a flat washers and a spring washer on the installation site.

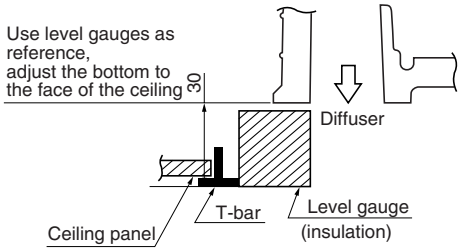
When suspension from the ceiling

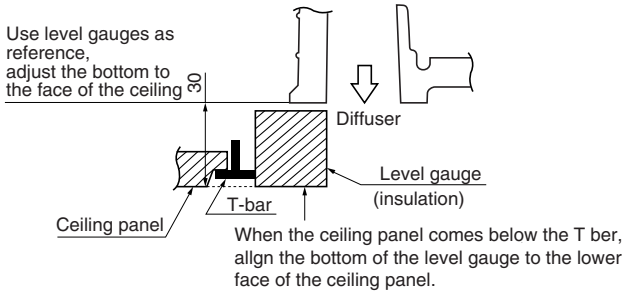
1. This unit is designed for installation on a 2 × 2 grid ceiling.
   If necessary, please detach the T bar temporarily before you install it.
   (When it is installed on a ceiling other than 2 × 2 grid ceiling, please do not fail to provide an inspection port on the control box side.)
2. Determine the positions of suspension bolts (530 × 530).
3. Use four suspension bolts, each fastened in such a manner that it can withstand pull force of 50kgf.
4. Make suspension bolts to the length that leaves approximately 45mm of them above the ceiling. In hoisting the unit main body in, temporarily fasten the four lower nuts of the suspension bolts approx. 93 mm from the ceiling and the four upper nuts at positions sufficiently far from the lower nuts so that they may not hamper installation work when the unit is hoisted in or the height is adjusted.
5. Put in the unit on an angle.

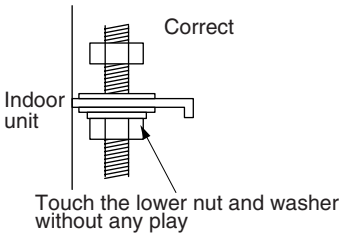


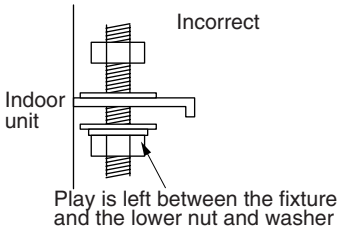


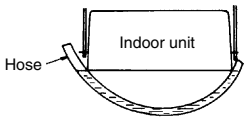
6. After hoisting in the unit, attach level gauges supplied as accessories and determine the unit position (height). To adjust height, use the four lower nuts with the four upper nuts left loose. Please make sure that the unit s four hanging fixtures touch the four lower nuts and washers evenly without any play.











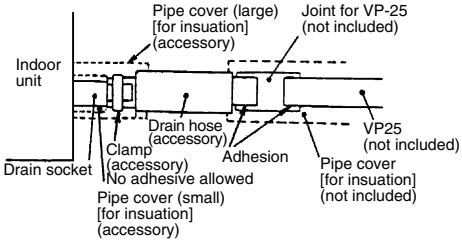
7. Please make sure that the unit main body is installed levelly. Level must be checked with a level or a clear hose filled with water. (A tolerable height difference at an end of the unit is eithin 3 mm)
8. After you have adjusted the height and level of the unit, fasten the four upper nuts to fix the unit.
   Note (1) Do not adjust the height with the upper nuts. It may cause deformation due to excessive force working on the unit main body, which can result in such problems that you cannot attach the panel or noises are generated from the interfering fan.

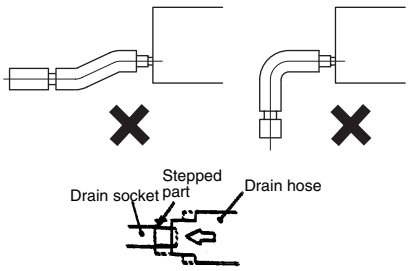
When embedded into ceiling

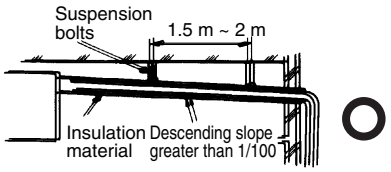
1. Determine the positions of hanging bolts (530 × 530).
   The pitch center of a suspension bolt must accord with the center of the unit.
2. Use four suspension bolts, each fastened in such a manner that it can withstand pull force of 50 kgf.
3. Fix the unit as per "4.2.3" "5" and "7"above.
   Note (1) When a suspension bolt exceeds 1.3 m in length, use an M10 bolt and give it reinforcements such as braces.

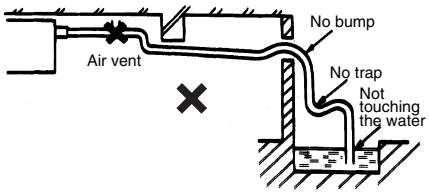
4.2.4 Drain Piping

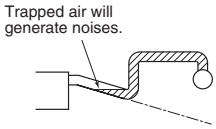
1. Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.
2. The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.
3. Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.
4. Use VP-25 general-purpose hard PVC pipes for drain piping.
5. Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
6. Adhesive must not be used.
   a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
   b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
   c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
   d) Do not create an air vent under any circumstances.
   e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the units' drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
   f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.
7. Drain socket
   After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.
   (Cut pipe covers into appropriate shapes)
8. Hard PVC pipes laid indoor
   a) Since a drain pipe outlet can be raised up to 600 mm from the ceiling, use elbows, etc. to install drain pipes, it there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
   b) Install the drain pipe outlet where no odor is likely to be generated.
   c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.

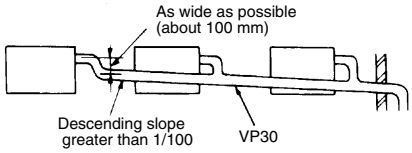


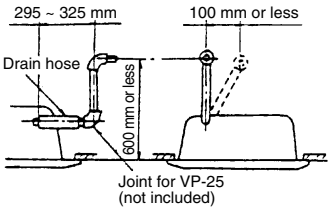






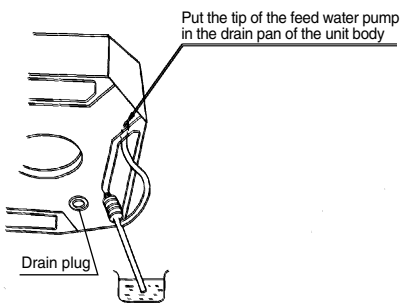






Drainage test

1. Check that water is draining thoroughly during test run, and that there are no water leaks from the joints and the drain pan.
2. The test has to be performed even if the unit is installed in the season when the unit is used for healting.
3. In a new house, perform the test before the ceiling is fitted.
   - Using a water pump, pour about 1000 cc of water to the drain pan through the blowing outlet.



- Check the transparent drain-out section of the drain hose for normal flow of drainage.
  * While observing the noise from the drain motor, test drain operation.
- Take off the drain plug to release the water. After the water is drained, place the drain pulg back where it was..
  * Be careful not to get splashed when pulling the drain plug.

Forced drain pump operation

- Set up from a unit side.

1. Turn on DIP switch SW5-1 on the PCB of the indoor unit. The drain pump operates continuously.
2. After the test, be sure to turn off the DIP switch.
   (When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain connections of the pipe)

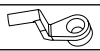
- Setup from a remote controller side.

Drain pump operation from a recomte controller unit is possible. Operate a remote controller unit by following the steps described below.

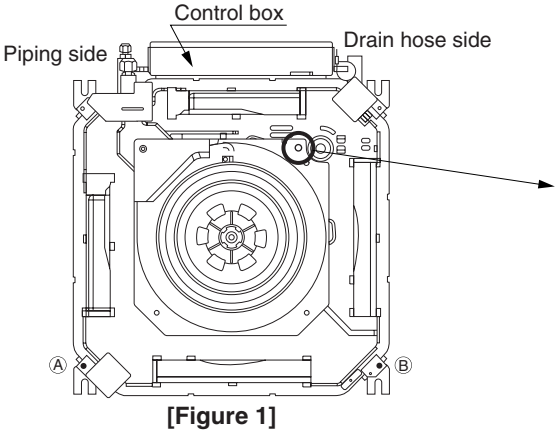
1. To start a forced drain pump operation.
   ① Press the TEST button for three seconds or longer.
   The display will change from " SELECT ITEM" → " SET" → " TEST RUN ▼ "
   ② Press the ▼ button once while " TEST RUN ▼ " is displayed, and cause "DRAIN PUMP ◆ " to be displayed.
   ③ When the SET button is pressed, a drain pump operation will start.
   Display: " DRAIN PUMP RUN" → " → STOP"
2. To cancel a drain pump operation.
   If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.
   The air conditioning system will become OFF.

4.2.5 Panel installation

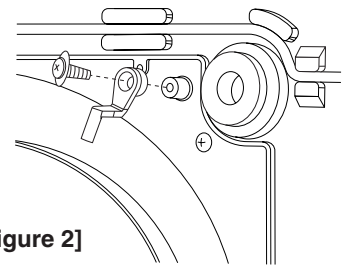
1. Accessories (It is attach to the panel)

1	Hook		1 piece	For fixing temporarily
2	Chain		2 piece	
3	Screw		4 piece	For hoisting the panel
4	Screw		1 piece	For attaching a hook
5	Screw		2 piece	For attaching a chain

2. Make sure that the unit main body is positioned at the correct height and the opening on the ceiling is made to the correct dimensions with the level gauge supplied with the main body.
   Remove the level gauge before you attach the panel.
3. Screw in two bolts out of the four supplied with the panel by about slightly less than 5mm. (v mark ⒶⒷ) [Figure 1]



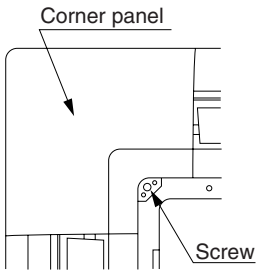
[Figure 1]



[Figure 2]

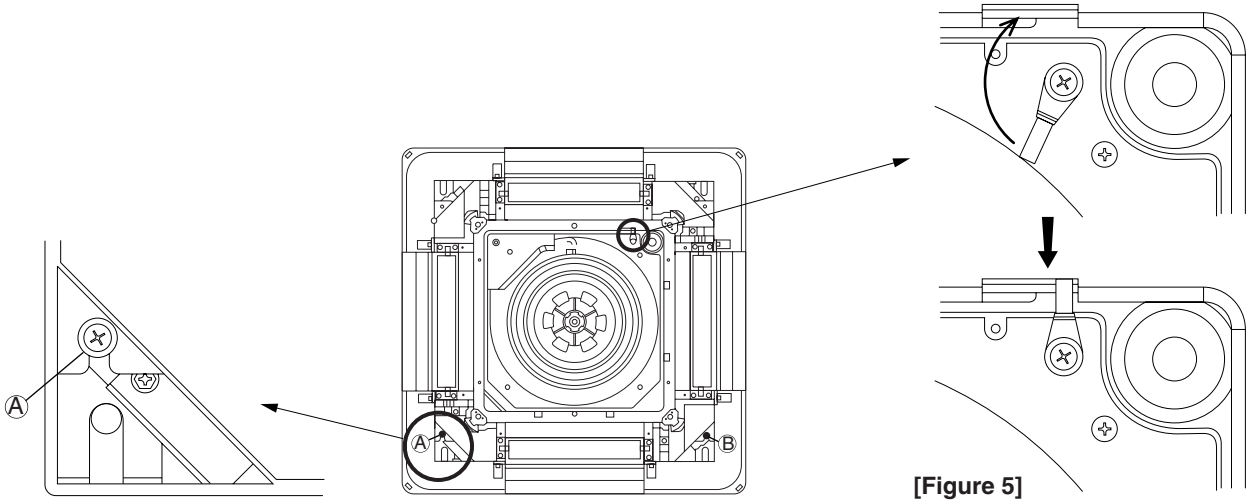
4. Attach the hook supplied with the panel to the main body with the hook fixing screw (1 screw). [Figure 2]
5. Open the air inlet grille.

6. Please remove the screw of a corner panel and remove a corner panel. (four places) [Figure 3]



[Figure 3]

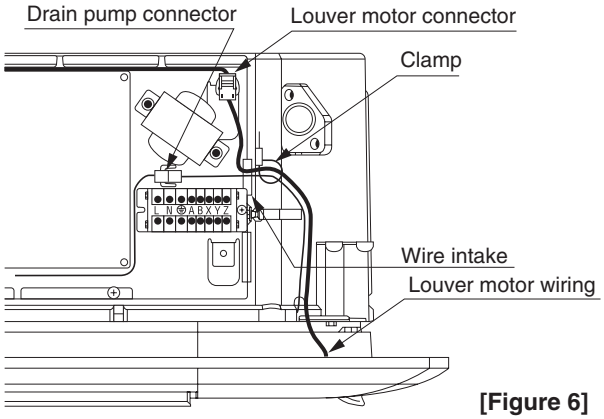
7. A panel is hooked on two bolts (O mark ⒶⒷ) [Figure 4]



[Figure 4]

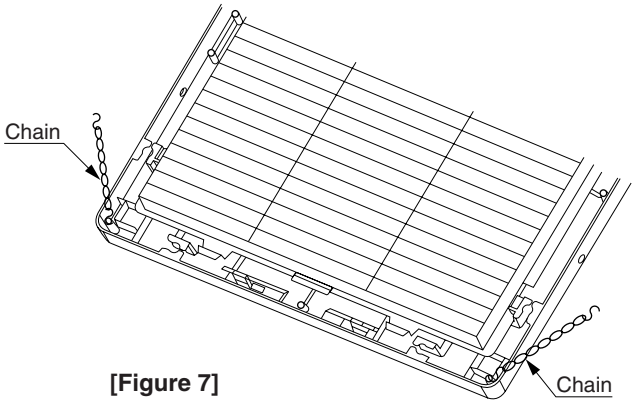
[Figure 5]

8. Please rotate a hook, put in the slot on the panel, and carry out fixing the panel temporarily. [Figure 5]
9. Tighten the two bolts used for fixing the panel temporarily and the other two.
10. Please open the lid of a control box.
11. Like drain pump wiring, please band together by the clamp and put in louver motor wiring into a control box. [Figure 6]
12. Please connect a louver motor connector. [Figure 6]



[Figure 6]

13. Attach two chains to the air inlet grille with two screws. [Figure 7]



[Figure 7]

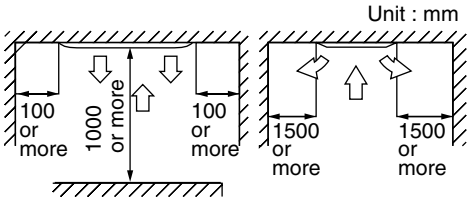
14. Replace the corner panels. Please also close a chain with a screw together then.
15. Close the air inlet grille.

4.3 2-way Outlet Ceiling Recessed Type (FDTWA)

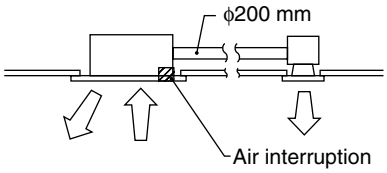
4.3.1 Selection of installation location

1. This unit is a ceiling surface direct return air and direct supply air type.
   Install the unit a place the allows air to reach every part of the room, in accordance with the shape and heigh of the room.

Installation space



2. This unit permits connecting a branch duct (ϕ 200 mm) according to the method shown in the figure below so that air disribution may be improved to the shape of the room. (For the connecting port of the duct, refer to the exterior dimension on page 104 ~ 114.)



3. Cold air throw

Unit : m

Item \ Models	FDTWA28, 45, 56	FDTWA71, 90	FDTWA112	FDTWA140
Standard	4.0	4.5	4.7	5.0
UHi	4.5	5.0	5.2	5.5

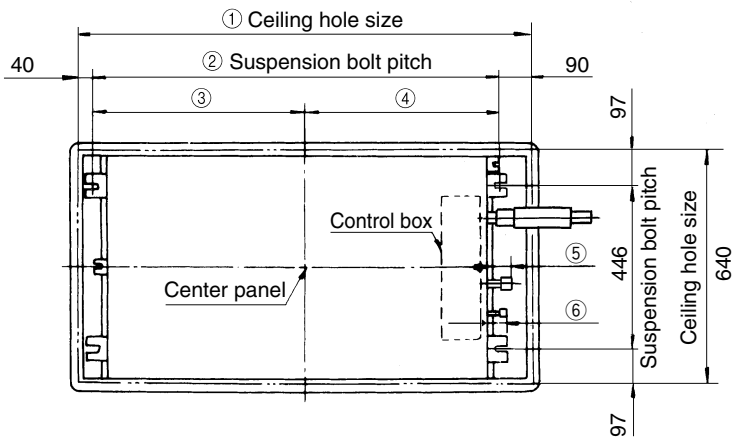
Note(1) The cold air throw is the same in 2 directions.
Conditions:
① Unit height: 3.0 m above the floor
② Fan speed: Hi
③ Location: Freee space without obstacle
④ The throw is as the per the table above
⑤ Air velocity at the throw: 0.3(m/s)

4. Places where cooled or heated air circulates freely. When the installation height exceeds 3.5m, warmed air stays close to the ceiling. In such cases, suggest your client users to install air circulators.
5. Places where perfect drainage can be prepared and sufficient drainage gradient is available.
6. Places free from air disturbances to the return air port and supply hole of the indoor unit, places where the fire alarm may not malfunction to short circuit.
7. Places with the environmental dew-point temperature is lower than 28°C and the relative humidity is less than 80%. (When installing at a place under a high humidity environment, pay suffcient attention to prevention of dewing such as thermally insulating the unit properly.)
8. Places exposed to oil splashes or steam (e.g. kitchens and machine plants.)
   Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
9. Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is generated or remains.
   Installation and use at such places will cause corrosion in the heat exchanger and damage in molded synthetic resin parts.
10. Place adjacent to equipment generating electromagnetic waves or high-frquency waves such as in hospitals. Generated noise may cause malfunctioning of the controller.

4.3.2 Preparations for installation

1. Ceiling hole and suspension bolt positions
   a) The pattern sheet shrinks or expands as humidity changes, so check the actual size before use.
   b) The ceiling hole sizes and suspension bolt sizes are shown in the following figure.

Unit : mm



Dimension table

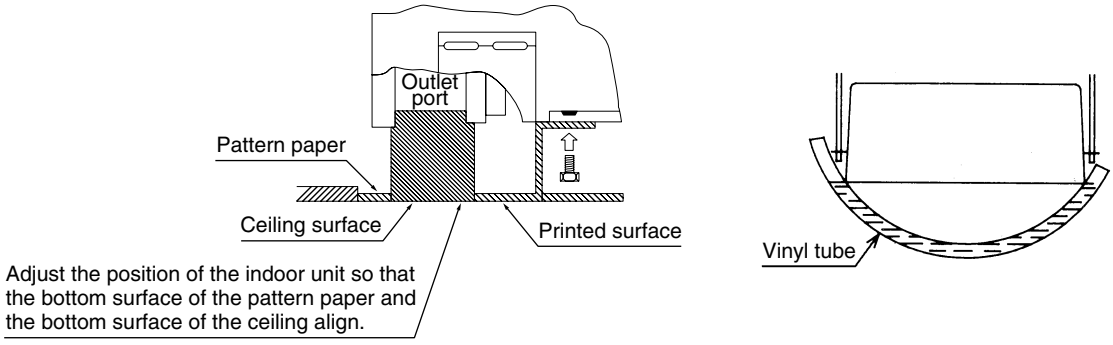
Unit : mm

Mark / Models	①	②	③	④	⑤	⑥
FDTWA28, 45, 56	1015	885	468	417	70	60
FDTWA71, 90	1260	1130	590	540	87.5	65
FDTWA112, 140	1730	1600	825	775	80.5	70

4.3.3 Installation

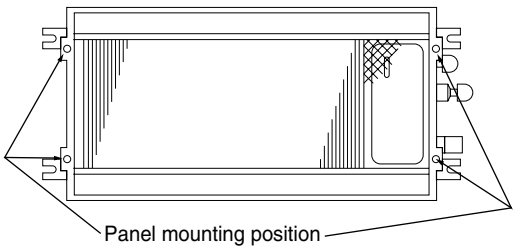
For the suspension bolt, use four M10 or W 3/8 bolts and secure so that each bolt can withstand a 50 kg/f pullout load. Use a suspension bolt length that extends approximately 95 mm for the ceiling surface.

1. If there is a ceiling
   a) Open the hole in the installation location to the ceiling opening dimensions.
   b) Install the suspension bolts (procured locally) at the designated locations.
      (Use care as the center of the spacing for the suspension bolts is not at the center of the panel.)
   c) Hang the unit, use the four bolts to mount the pattern paper provided to the panel mounting section and adjust the height.
   d) Use a level or transparent hose with water in it to confirm that the unit is level. If the unit is not level, problems such as water leakage or improper operation of the float switch could occur.



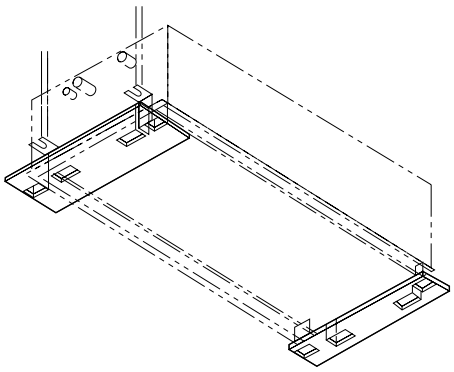
Application Data

e) After confirming the above, secure the unit in position.



<Panel mounting position>

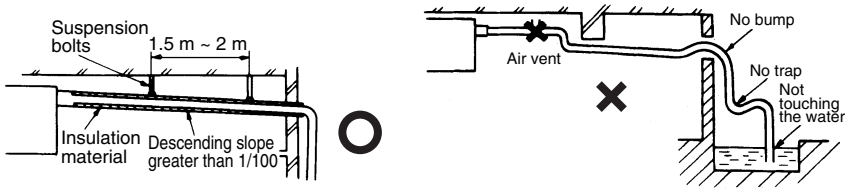
2. If ceiling is to be installed later
   a) Follow steps (a) to (d) in the previous section "1. If there is a ceiling" to install the unit and mount the pattern paper.
   b) When the ceiling is installed, the outer perimeter of the pattern paper can be referred to for making the opening in the ceiling.
   c) After checking the height and that the unit is level, secure the unit in position.



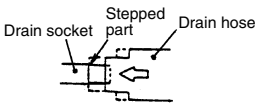
<Pattern paper mounting configuration>

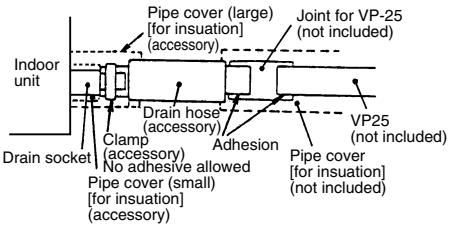
4.3.4 Drain piping

1. Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.

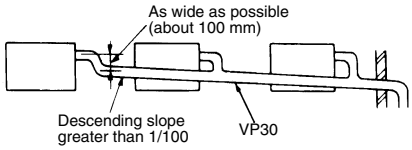


2. The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.
3. Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.

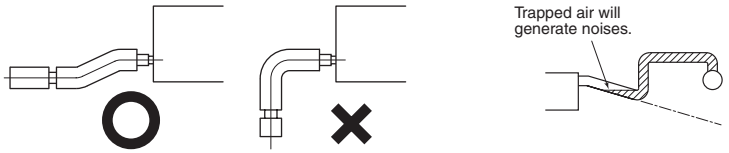




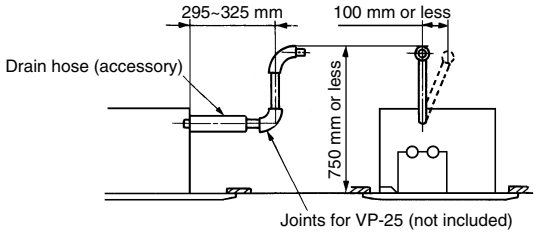
4. Use VP-25 general-purpose hard PVC pipes for drain piping.



5. Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
6. Adhesive must not be used.



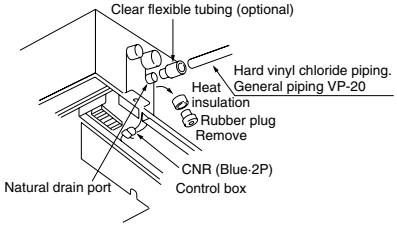
   a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
   b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
   c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
   d) Do not create an air vent under any circumstances.
   e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the units' drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
   f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.
7. Drain socket
   After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.
   (Cut pipe covers into appropriate shapes)



8. Hard PVC pipes laid indoor
   a) Since a drain pipe outlet can be raised up to 750 mm from the ceiling, use elbows, etc. to install drain pipes, it there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
   b) Install the drain pipe outlet where no odor is likely to be generated.
   c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.

When using a natural drain port

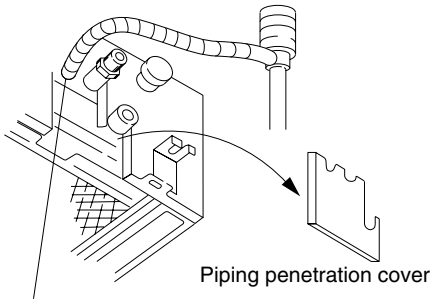
1. Remove the heat insulating material and rubber plug of the gravity drain port.
2. By using the gravity drain connecting tube (option), connect the drain pipe (VP-20) and completely clamp it with a clamp.
   ⚠ **Note** (1) If the drain pipe is directly connected to the natural drain port, the drain pan becomes unremovable.
3. Disconnect the connector CNR (blue, 2P) for the drain motor.
   ⚠ **Note** (1) If the connector remains connected, drain water is discharged from the standard pipe connecting port, leading to water leakage.



Drainage test

When using the standard drain port, execute a drainage test after completion of electric work.

1. During the test run, make sure that drain flows properly through the piping and that no water leaks from connections.
2. Be sure to conduct this test even when the unit is installed in the heating season.
3. In case of a new building, conduct the test before it is furnished with the ceiling.
   a) Inject about 1,000cc by using a feed water pump from the grommet on the drain pump side.
   b) At the drain port (transparent portion), check if drainage is performed.
   c) After completion of the drain test, completely perform heat insulation fot the drain pipe up to the indoor unit.



Insert the tip of the supply water pump approximately 50 mm in a downward direction.

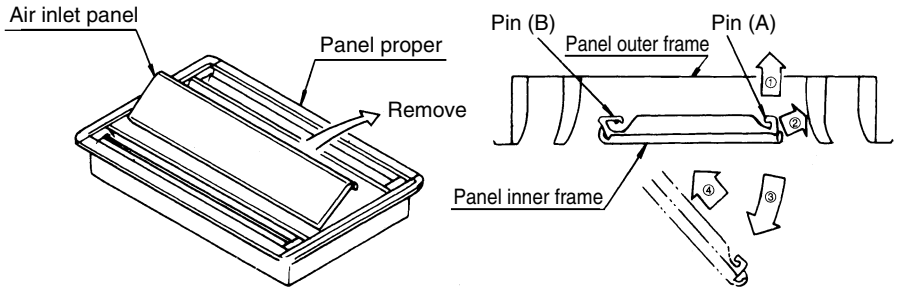
Forced drain pump operation

- Setup from a unit side.
  ① Turn on DIP switch SW5-1 on the PCB of the indoor unit. The drain pump operates continuously.
  ② After the test, be sure to turn off the DIP switch.
  When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain conditions of the pipe.
- Setup from a remote controller side.
  Drain pump operation from a remote controller unit is possible. Operate a remote controller unit by following the steps described below.
  1. To start a forced drain pump operation
     ① Press the TEST button for three seconds or longer.
     The display will change from " SELECT ITEM" → " SET" → " TEST RUN ▼ "
     ② Press the ▼ button once while " TEST RUN ▼ " is displayed, and cause "DRAIN PUMP ◆ " to be displayed.
     ③ When the SET button is pressed, a drain pump operation will start.
     Display:"DRAIN PUMP RUN" → " → STOP"
  2. To cancel a drain pump operation.
     If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.
     The air conditioning system will become OFF.

4.3.5 Fixing of panel (The panel fixing bolts are attached on the panel.)

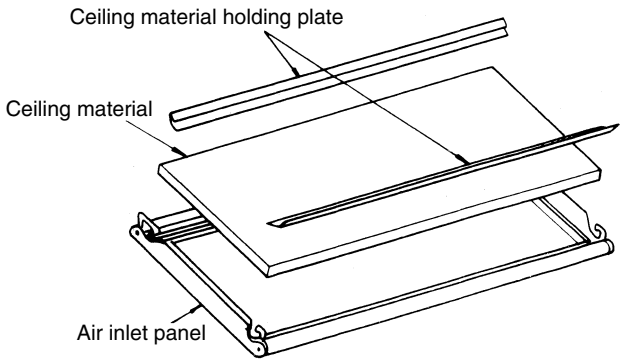
⚠ **Note** (1) Care should be exercised in handling the supply air port on the panel because it is easily depressed by finger nail.

1. Check with the accessory level gauges that the indoor unit height and the size of ceiling hole are correct.
   Notes (1) Remove the level gauge from the indoor unit before fixing the panel.
   (2) Remove the Air inlet panel from the panel proper.
   Procedure for dismounting the air inlet panel
   ① Remove the panel from the pin (A) in the order of the arrows ① and ②.
   ② Open the panel slightly as shown by the arrow ③ and move it to the arrow ④. Then remove it from the pin (B).



2. Screw two bolts out of four accessory bolts less than 5mm in the panel diagonally.
3. Hook the panel on the two bolts and set it temporarily.
4. Tighten the bolts fixed temporarily and the remaining two bolts.
5. Connect the louver motor connector (white, 3P) and the limit switch connector (white, 2P) to the panel respectively.
6. When the louver motor cannot be operated by remote controller operation, check the connector connections and turn off the power suppy for 10 sceonds or more for restting.

For ceiling material inlaid panel



Ceiling material dimensions Unit : mm

Item \ Models	FDTWA28, 45, 56	FDTWA71, 90	FDTWA112, 140
Width	300	300	300
Length	970	1215	1685

① Remove the air inlet panel from panel proper.
② Remove the ceiling holding plates (2 sheets) temporarily set on the suction panel with screws.
③ Install the ceiling material on the air intel panel and fix it with the ceiling holding plates so as not to produce any play.
Note (1) Use a ceiling material with a thickness of 6-15mm and a side length of 300mm or more.

Ceiling material thickness : 6-10 mm 10 ~ 15 mm

Ceiling material installing direction.

4.4 Ceiling Recessed Single Air Supply Port Type (FDTQA)

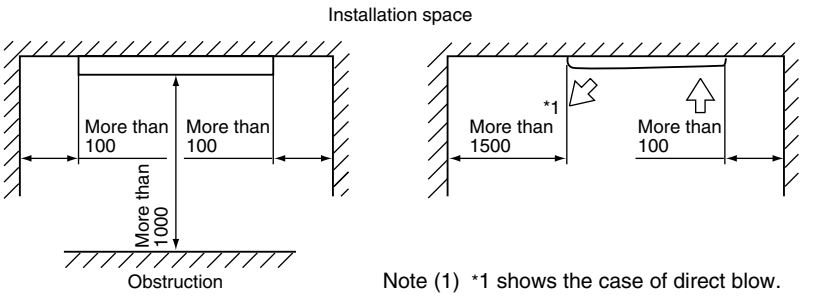
4.4.1 Selection of installation location

Avoid the following locations for installation and uses

1. Locations where oil splashes and moisture are abundant (e.g., kitchens, mechanical workshops). These locations may result in corrosion and lower performance of the heat exchanger and cause damage to plastic parts.
2. Locations with corrosive gases (such as sulfurous acid gas), flammable gases (such as thinners, gasoline) and areas where there are possibilities of gas accumulation. These locations can result in corrosion of the heat exchanger and damage plastic parts. Also, the flammable gas could cause a fire.
3. Locations near medical equipment radiating electromagnetic waves in hospitals or other facilities, and around appliances emitting high frequencies. The electromagnetic noise may cause the controller to malfunction.
4. Locations exposed to sea breezes (seaside areas). Sea breezes may cause corrosion of the outer frame and the heat exchanger.

4.4.2 Installation space for the indoor unit

Unit : mm



Note (1) *1 shows the case of direct blow.

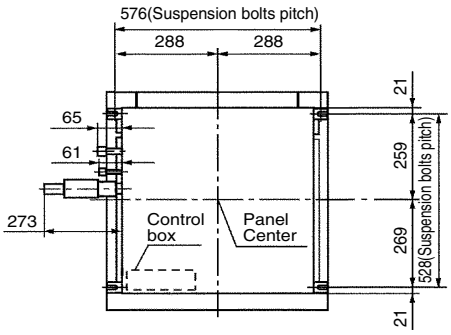
1. With the customer's consent, select a suitable location according to the following conditions.
   a) Where cool air or hot air can easily pass through.
      If the height of the location exceeds 3 m, hot air will gather below the ceiling. Suggest to the customer to also install a circulation fan.
   b) Where wiring and plumbing to outdoor areas may easily be conducted.
   c) Where water can be completely drained. A sloping location for drainage.
   d) Where there is no wind disturbance to the suction inlet and blowing outlet, the fire alarm will not be set off erroneously, and no air short circuits occur.
   e) Where there is no direct sunlight.
   f) Where the ambient dew point temperature is below 28°C and the relative humidity is below 80%.
      The unit has been tested according to JIS dew point conditions and has been confirmed to operate without any problems. However, if the unit is operated in an environment with a humidity higher than the above limit, condensation may occur. Accordingly, all pipes and drain pipes should be further covered with insulation materials 10 - 20 mm thick.
2. Consider the supporting strength of the location. If the strength is not sufficient to sustain the unit weight, use reinforcing materials.

4.4.3 Suspension the unit

Use four (4) M10 or W3/8 suspension bolts. Secure them firmly so that each can withstand a pull-out load of 50 kg/f. Adjust their length to approximately 40 mm from the ceiling.

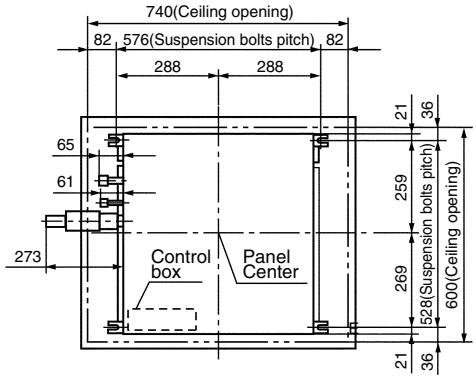
■ **For TQ-PSA-13W-E panel**

Unit : mm



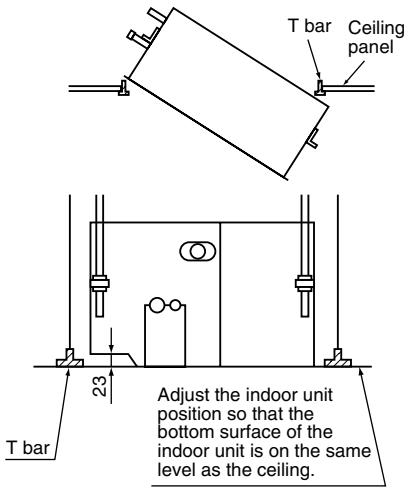
■ **For TQ-PSB-13W-E panel**

Unit : mm

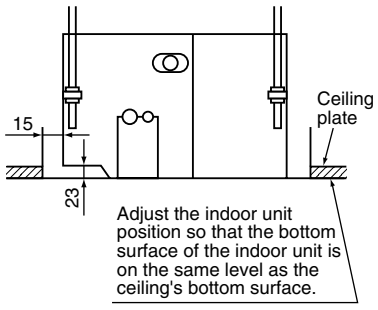


1. When hanging from the ceiling
   a) The panel has two types: for 2 × 2 grid ceiling and for conventional ceiling.
      ① When installing on a 2 × 2 grid ceiling, put in the unit on an angle, or hang the unit with the T bar temporarily removed.
      ② When installing on a conventional ceiling, cut an installation opening (740 mm × 600 mm) in the ceiling, and hang the unit.
   b) Set the suspension bolts (to be prepared at job site) in place.
   c) Adjust the unit's height so that the bottom surface of the unit is on the same level as the ceiling (bottom surface of the T bar). (The blow outlet is contained in the ceiling.)
      The allowable difference in height between the bottom surface of the ceiling and that of the indoor unit is when the indoor unit face is no higher than 5 mm.
      Caution
      Do not install the indoor unit lower than the bottom surface of the ceiling.

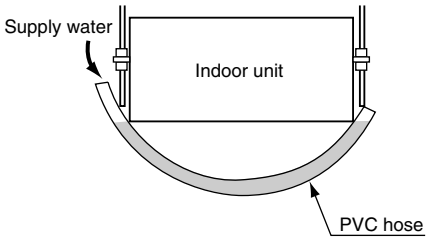
■ **For TQ-PSA-13W-E panel**



■ **For TQ-PSB-13W-E panel**



d) Level the unit using a hose filled with water. If the unit is out of level, water leaks or malfunctioning of the floating switch may occur.

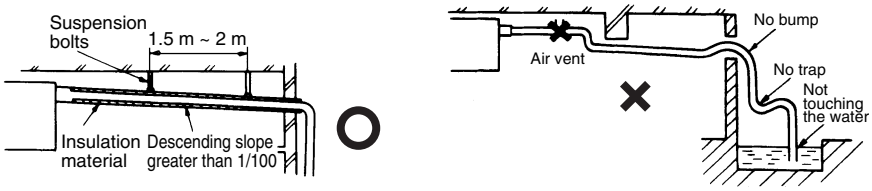


e) After ensuring the above, secure the unit.

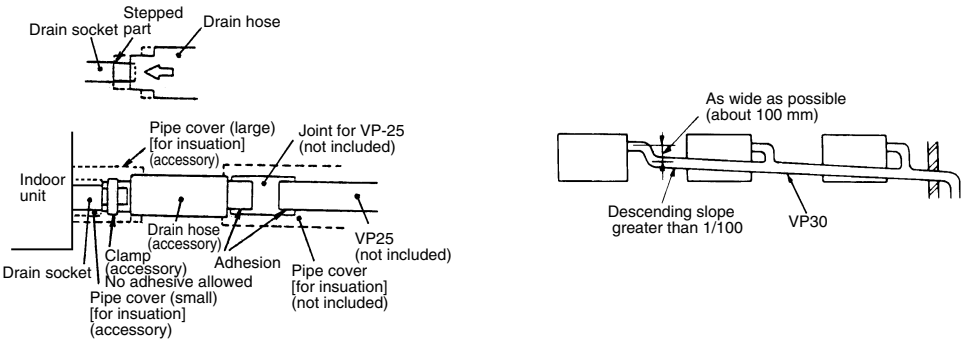
2. When embedded into ceiling
   a) Install the unit following steps b) and c) of the above part 1).
   b) When installing on a conventional ceiling, cut an installation opening (740 mm × 600 mm) in the ceiling.
   c) Check the installation height and level, and after that, secure the unit.

4.4.4 Drain piping

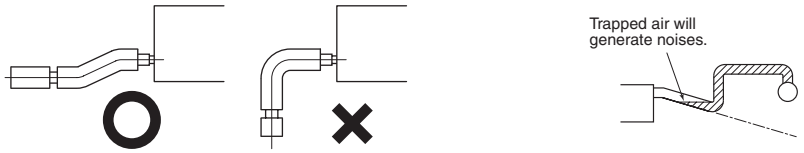
1. Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.



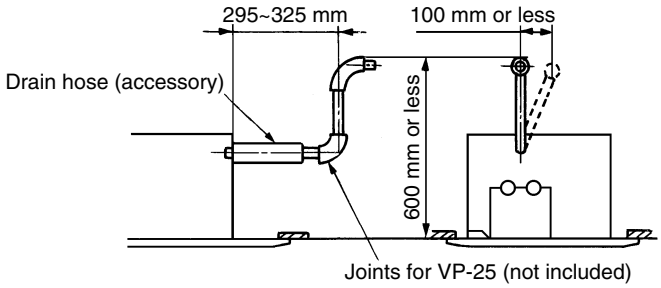
2. The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.
3. Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.
4. Use VP-25 general-purpose hard PVC pipes for drain piping.



5. Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
6. Adhesive must not be used.
   a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
   b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
   c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
   d) Do not create an air vent under any circumstances.
   e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the units' drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
   f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.



7. Drain socket
   After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.
   (Cut pipe covers into appropriate shapes)

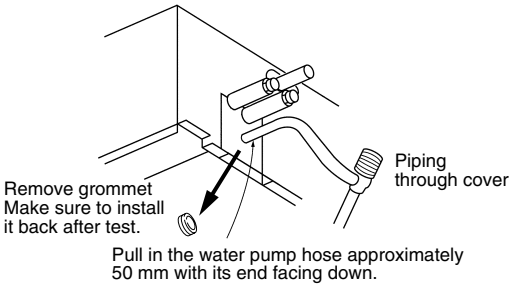


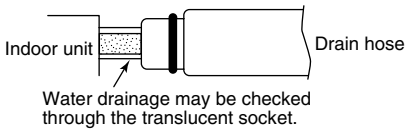
8. Hard PVC pipes laid indoor
   a) Since a drain pipe outlet can be raised up to 600 mm from the ceiling, use elbows, etc. to install drain pipes, it there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
   b) Install the drain pipe outlet where no odor is likely to be generated.
   c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.

4.4.5 Drain test (Perform the drain test after the electrical wiring work has been finished.)

- Check that water is draining thoroughly during the test run, and that there are no water leaks from the joints.
- The test has to be performed even if the unit is installed in a season when the unit is used for heating.
- In a new house, perform the test before the ceiling is fitted.

1. Remove the grommet, and using a water pump, pour about 1000cc of water, from the position shown in the left figure.
   Caution
   When pour water, be sure to perform the drain pump forced operation.
2. Check the drain-out section (transparent section) for normal flow of drainage.
3. Take off the drain plug to release the water. After water release has been confirmed, replace the drain plug as it was.
   *Be careful not to get splashed when pulling the drain plug.
4. After the drain test, thoroughly insulate the drain pipe, up to the main unit.





Forced drain pump operation

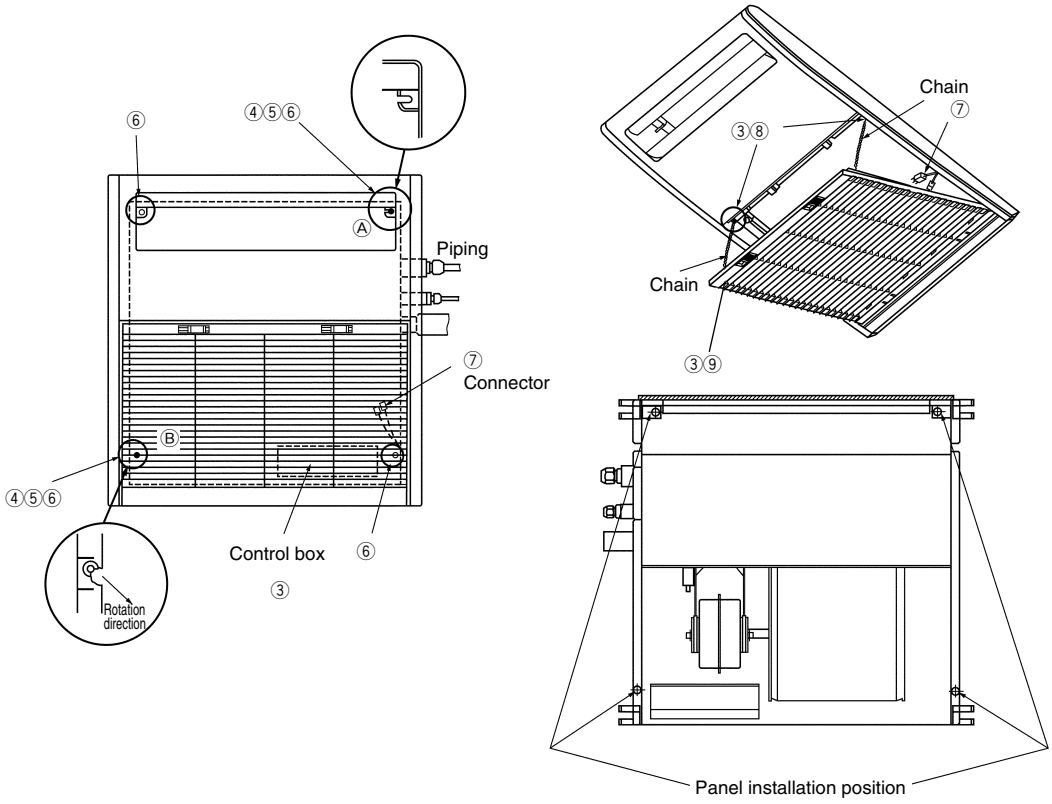
- Setup from a unit side.
  Turn on DIP switch SW5-1 on the PCB of the indoor unit. The drain pump will operate continuously.
  After the drain test, be sure to turn off the DIP switch.
  When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain conditions of the pipe.

Setup from a remote controller side.

- Drain pump operation from a remote controller unit is possible. Operate a remote controller unit by following the steps described below.
  1. To start a forced drain pump operation
     ① Press the TEST button for three seconds or longer.
     The display will change from" ◆ SELECT ITEM" → " ○ SET" → " TEST RUN ▼ "
     ② Press the ▼ button once while" TEST RUN ▼ "is displayed, and cause"DRAIN PUMP ◆ "to be displayed.
     ③ When the SET button is pressed, a drain pump operation will start.
     Display:"DRAIN PUMP RUN" → " ○ → STOP"
  2. To cancel a drain pump operation.
     ① If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.
     The air conditioning system will become OFF.

4.4.6 Panel installation (Panel installing bolts are attached to the panel.)

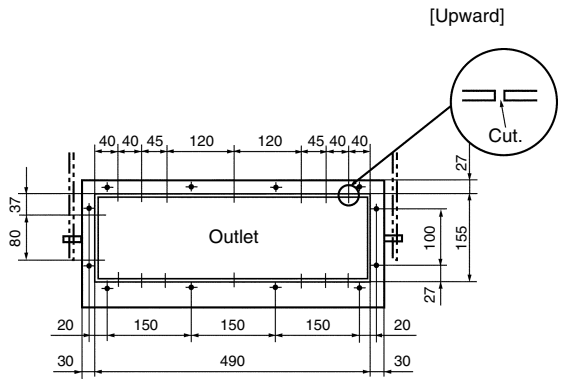
1. Check that the indoor unit's height and opening dimensions in the ceiling are correct.
2. Check that level is ensured.
3. Open the suction grill.
4. Screw in two of the four suspension bolts attached to the panel, on the piping side and at its opposite angle, by a little less than 5 mm (● marks).
5. Hook the panel into two of the suspension bolts to pre-install it.
   With pre-installation is performed, first hook the panel to bolt A, then to bolt B while rotating the panel.
   (Take care so that the unit does not rotate during pre-installation.)
6. Tighten the pre-installed suspension bolts and two remaining suspension bolts.
7. Attach the louver motor connector (white, 4P) and the limit switch connector (white, 2P).
8. Use the provided screws to tighten chains to the panel. Chain installing screws is contained in the same bag as suspension bolts.
9. Close the suction grill. Now installation is complete.
10. When the louver motor does not operate with the remote control, check connections of the connectors, turn off the power for more than 10 seconds and reset.



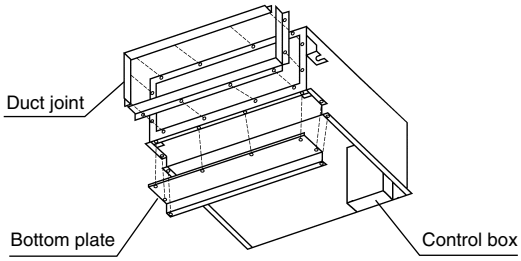
4.4.7 Indoor unit repair procedure for duct connection

1. Drill hole for duct
   a) While referring to the following dimensions, notch the insulation. (The insulation is equipped with the marks in advance.)
   b) Cut joints for the hole, and drill hole.
   c) Connect the duct joint using screws attached to the panel.

Unit : mm



   d) Connect the bottom plate using screws attached to the panel.



   e) Blower fan tap switch
   The following two methods are available in switching the blower fan tap. Switch to the high-speed tap with one of these methods.
   ① Set SW9-4 provided on the indoor unit PCB to ON.

SW9-4	ON	Fan control,high speed (High ceiling)
	OFF	Fan control,standard

   ② By means of function setting from the remote control unit, set the setting Ⓒ of "I/U FUNCTION ▲" (indoor unit function) to "Hi CEILING 1" (high-speed tap) as shown below.
   For the details of operating procedures, please refer to the installation manual of your remote control unit.

Function number Ⓐ	Function description Ⓑ	Setting Ⓒ
01	Hi CEILING SET	Hi CEILING 1

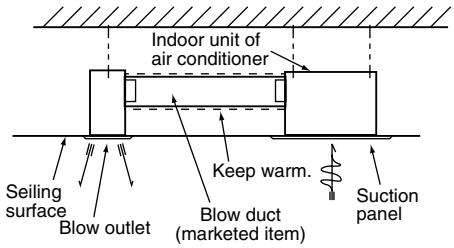
   f) LOUVER switch disabled setting
   By means of function setting from the remote control unit, set the setting Ⓒ of "FUNCTION ▲" (remote control unit function) to" INVALID"(LOUVER switch disabled) as shown below.
   For the details of operating procedures, please refer to the installation manual of your remote control unit.

Function number Ⓐ	Function description Ⓑ	Setting Ⓒ
07	LOUVER S/W	INVALID

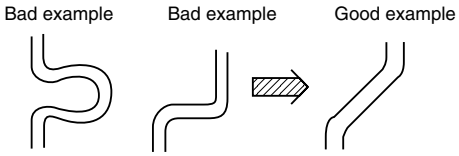
2. Duct work

a) Calculate air capacity and the outside static pressure to select the duct's length and shape, and blow outlet.

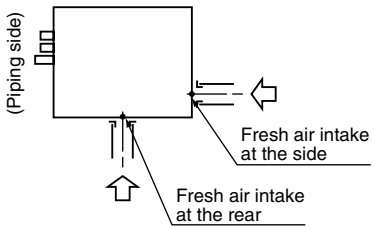
⚠ **Caution** Take care that the outside static pressure does not exceed 30 Pa.
The unit has condensation owing to the decrease in air capacity, possibly causing the ceiling and household goods to become wet.



b) Reduce the number of bends as much as possible. (Corner R should be as larger as possible.)



c) Connecting the air inlet duct



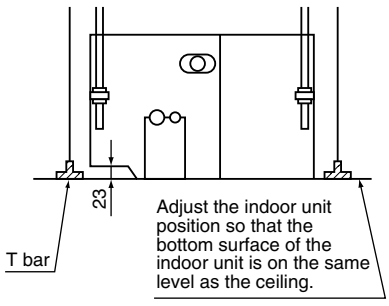
d) Fresh air intake
Use the intake, which is easier for work, either at the rear or the side.

e) Duct connection
Connect the 125 mm diameter round duct, using the air inlet/exhaust duct flange separately sold (for connecting the 125 mm diameter round duct). (Band clamp)
Keep the duct warm to protect from condensation.

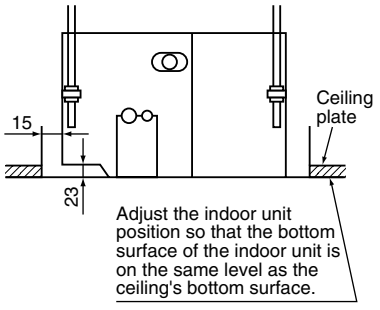
f) Checking of indoor unit installation level

- There are two kinds of panel, which are TQ-PSA-13W-E panel and TQ-PSB-13W-E panel. When installing to the existing ceiling, check that opening dimensions in the ceiling are correct.
  Check the installation level of the air-conditioner indoor unit and the ceiling members.
- Adjust the air-conditioner indoor unit height so that the under surface of the indoor unit and the under surface of the ceiling agree with each other. (The blowout port shall be housed in the ceiling.)
- The allowable height difference between the under surface of the ceiling and the under surface of the indoor unit is less than 5 mm upward shift of the indoor unit.
  Do not install the indoor unit lower than the bottom surface of the ceiling.

■For TQ-PSA-13W-E panel



■For TQ-PSB-13W-E panel



g) Panel installation

① Insert a flat head screw driver, etc. into the slot on the blowout port cover of the panel to remove the cover from the panel.

② Open suction grill.

③ Screw in two of the four suspension bolts attached to the panel, on the piping side and at its opposite angle, by a little less than 5 mm (● marks).

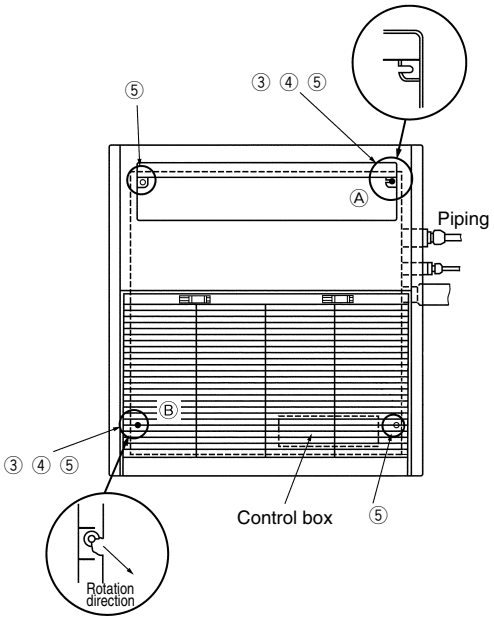
④ Hook the panel into two of the suspension bolts to pre-install it.
With pre-installation is performed, first hook the panel on the bolt A Then to the bolt B .While rotating the panel.
(Take care so that the unit does not rotate during pre-installation.)

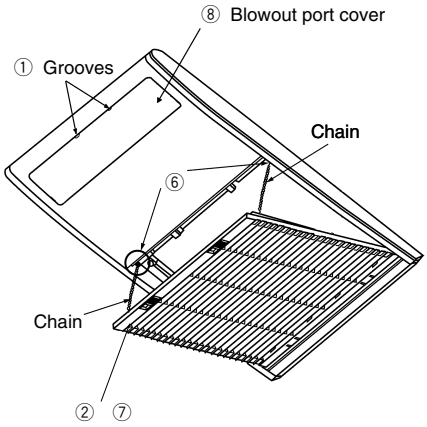
⑤ Tighten the pre-installed suspension bolts and two remaining suspension bolts.

⑥ Use the provided screws to tighten chains to the panel. Chain installing screws is contained in the same bag as suspension bolts.

⑦ Close the suction grill. (Check whether the chain is installed securely.)

⑧ Push the blow outlet cover into place from the bottom of the panel, and fit it as it was.
Check that the blow outlet cover is securely fitted and does not fall.

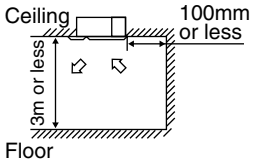
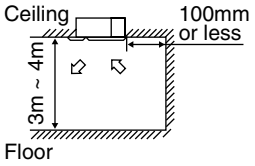




4.5 1-way Outlet Ceiling Recessed Type (FDTSA)

4.5.1 Preparation of indoor unit

It can be installed by either one of the following methods. Select the most adequate method for your particular case.

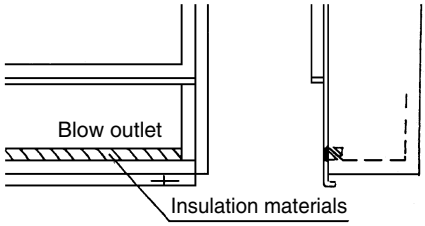
	Ⓐ Standard installation	Ⓑ Higher ceiling
Installation example and limitation		

Note (1) In the case of installing on the high ceiling, part of indoor unit requires some modification.

Procedures of rework

Installation on higher ceiling

Adhere the insulation materials attached to the direct blow panel on the blow outlet of indoor unit.



4.5.2 Selection of installation location

1. Where cool and hot air will be distributed sufficiently.
   Where the installation heigh exceeds 3m, warmed air is likely to concentrate close to the ceiling. In such case, you should install also a circulator.

   [Reference]

   Cold air throw Unit : m

Item / Models	Air throw distance	
	Standard	Higher ceiling
All models	7	

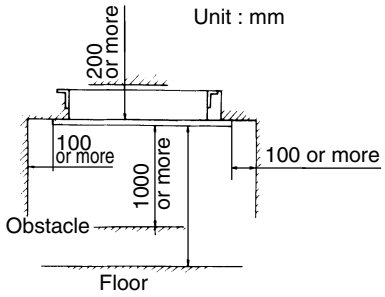
   [Conditions]

   ① Unit heigh
   Standard ceiling: 2.4 ~ 3.0(m) above floor Higher ceiling: 3.0 ~ 4.0(m) above floor
   ② Kind of operation: Hi
   ③ Place: Free space without obstruction;
   ④ Throw distance means the horizontal distance for the wind to reach the floor.
   ⑤ Wind velocity at the reaching distance: 0.5m/s

   Note (1) Wind capacity is UHi in case of a higher ceiling. It is value of Hi for other cases.

2. Where the ceiling has sufficient rigidity.
3. Where there is no obstacles in front of the suction inlet and blow outlet.
4. It should be avoided such places as kitchen, machine factory, etc. where there profuse liquid splashes or thick steam.
5. Where the height of ceiling exceeds 200mm.

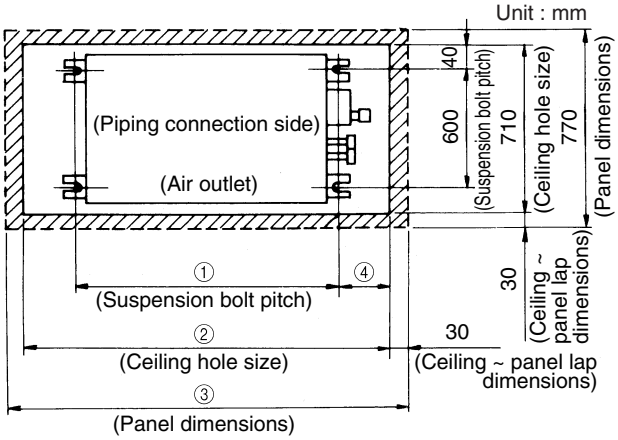
6. Where a space as shown below can be secured.



7. It should be avoided where a machine generating high frequency waves is installed.
8. Select a place to branch the piping so that same distance will be a obtained for each of one way piping.
9. Where humidity may exceed 80% behind the ceiling or the dew point may exceed 28×C, adhere polyurethane foam materials (t 10 or more) over the insulation materials on the external plate.
10. Where it is convenient for the piping and wiring to the outdoor.
11. Where protected from direct exposure to sun beams.
12. Where it is free from volatile gas generation.

4.5.3 Standard location

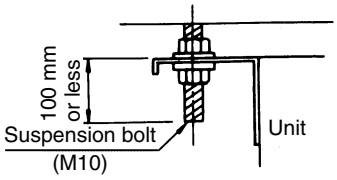
1. Installation
   a) Ceiling hole size and position of suspension bolt



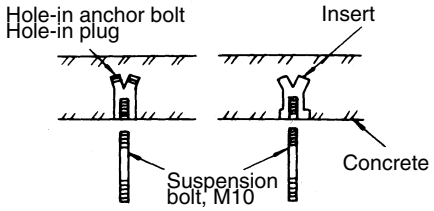
Unit : mm

Mark / Models	①	②	③	④
FDTSA45	990	1230	1290	180
FDTSA71	1250	1440	1500	145

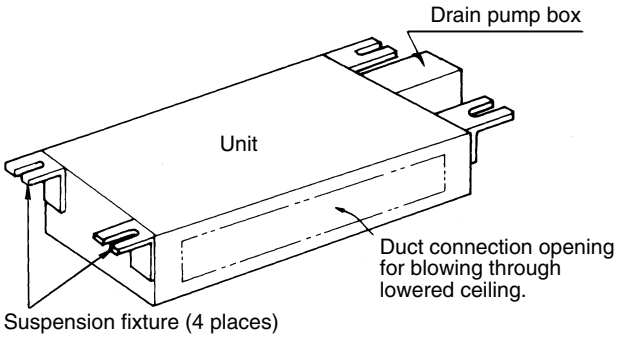
   b) Length of fixed suspension bolt (customer orderd parts M10)
   [Reference] Suspension bolt pitch is adjustable within ±10mm in sidewise direction. Since there is no adjustment allowance in back and forth direction, determine the position exactly with a measure. (Lap margin between ceiling and panel is 30mm.)



c) Fixing of suspension bolt.
Fix the bolts securely as shown below or by any other adequate means.



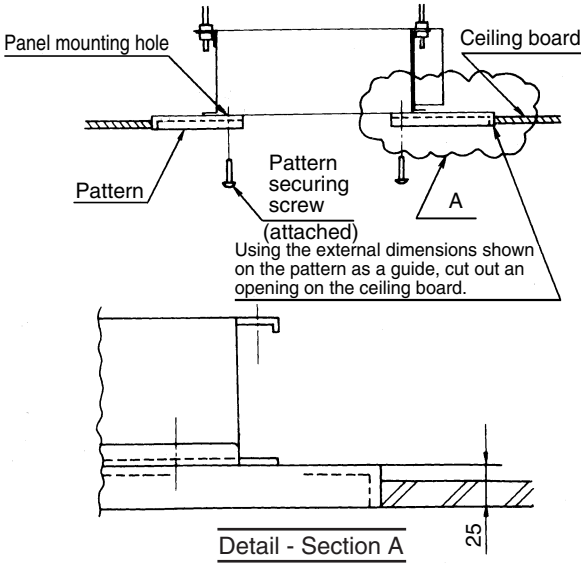
d) Installation



Procedures

① Install nuts on the Suspension bolts at onside. Suspension the suspension fixtures on the Suspension bolts first and then insert the remaining fixtures on the remaining Suspension bolts at and lock them with nuts.

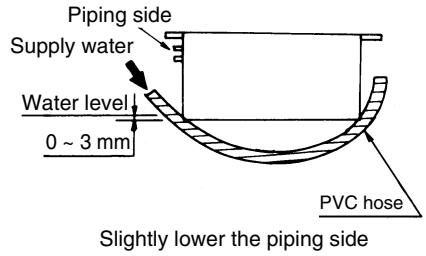
② Since the indoor unit and the panel height cannot be adjusted, adjust the height using an attached pattern before fixing the indoor unit.



Check of levelness

Check the levelness as follows. Use a level gauge or adjust the levelness with the following method.

■ Adjust the bottom of indoor unit and the water level as shown below.

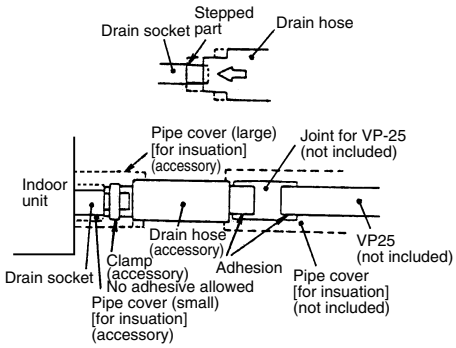


Slightly lower the piping side

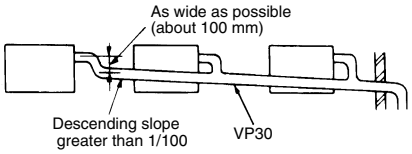
4.5.4 Drain piping

1. Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.

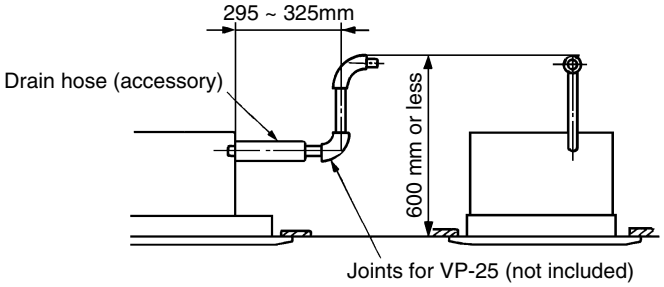
2. The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.
3. Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.



4. Use VP-25 general-purpose hard PVC pipes for drain piping.

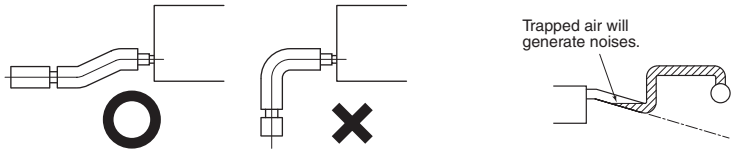


5. Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
6. Adhesive must not be used.
   a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
   b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
   c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
   d) Do not create an air vent under any circumstances.
   e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the unit's drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
   f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.



7. Drain socket
   After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.
   (Cut pipe covers into appropriate shapes)

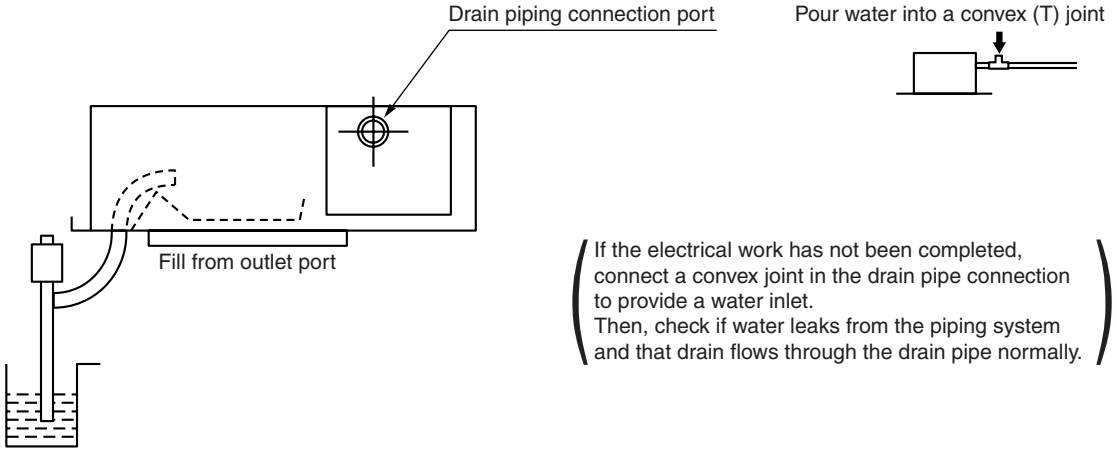
8. Hard PVC pipes laid indoor
   a) Since a drain pipe outlet can be raised up to 600 mm from the ceiling, use elbows, etc. to install drain pipes, it there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
   b) Install the drain pipe outlet where no odor is likely to be generated.
   c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.



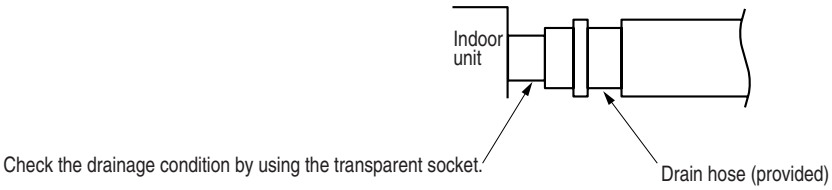
Drain test

[Perform this before installing the ornament panel]

- Perform this upon completion of electrical work.
- Gradually introduce 2,000~3,000cc of water as shown below.



- Connect the remote control switch and set to cooling operation. The drain pump will operate with the compressor on.
- Test whether or not the water is draining while listening to the operating sounds of the electric motor for the drain water.



- Check that water is draining smoothly and that there is no water dripping from the connections or other areas.

Forced drain pump operation

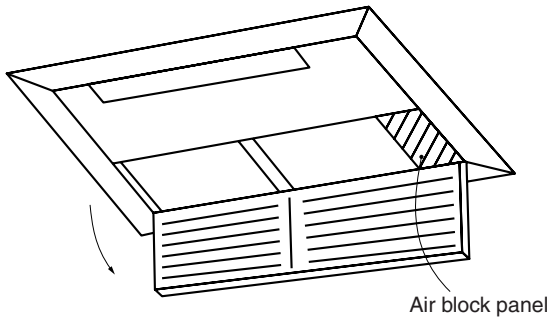
- Setup from a unit side.
  ① Turn on DIP switch SW5-1 on the PCB of the indoor unit. The drain pump operates continuously.
  ② After the test, be sure to turn off the DIP switch.
  When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain conditions of the pipe.
- Setup from a remote controller side.
  Drain pump operation from a remote controller unit is possible. Operate a remote controller unit by following the steps described below.
  1. To start a forced drain pump operation
     ① Press the TEST button for three seconds or longer.
     The display will change from " SELECT ITEM" → " SET" → " TEST RUN ▼ "
     ② Press the ▼ button once while " TEST RUN ▼ " is displayed, and cause "DRAIN PUMP ◆ "to be displayed.
     ③ When the SET button is pressed, a drain pump operation will start.

Display: DRAIN PUMP RUN" → " ○ → STOP"

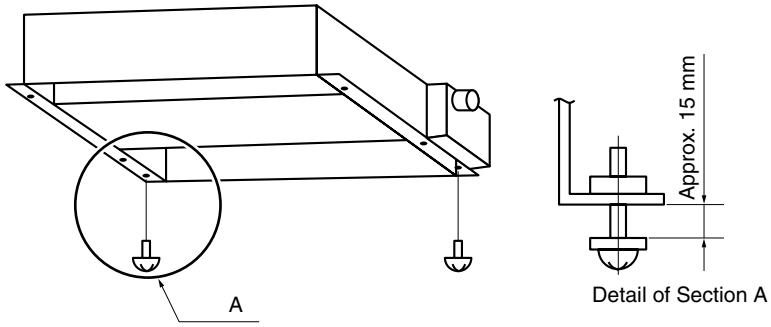
2. To cancel a drain pump operation.
   If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.
   The air conditioning system will become OFF.

4.5.5 Mounting the panel

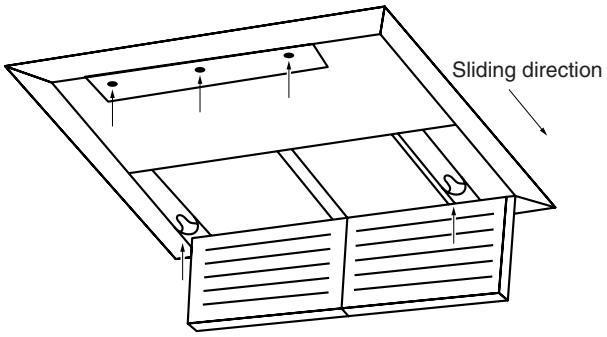
1. Open the inlet grille and remove the air block panel from the inside. (Remove the 2 screws.)



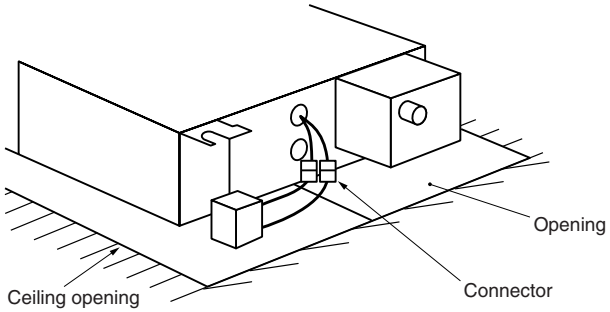
2. Mount the two (M5 × 35) panel mounting screws to the indoor unit



3. Hang the panel on the two mounting screws on the indoor unit by using the two ⌂ shaped holes. Slide the panel approximately 10 mm. Use the 5 panel mounting screws to secure the panel.



4. Use the opening to connect the connectors for the louver motor and limit switches.



5. Reinstall the wind shield plate.

Installation on higher ceiling

Adhere the insulation materials on the blow outlet of the indoor unit. All others are same as the standard installation.

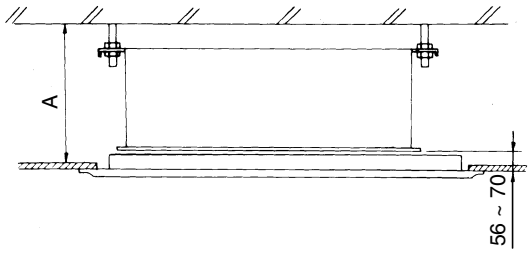
4.6 Cassetteria Type (FDRA)

4.6.1 Selection of installation location

1. Preparation of indoor unit
   Before of during the installation of the unit, assemble necessary optional panel, etc. depending on the specific type.
2. Select places for installation satisfying following conditions and, at the same time, obtain the consent on the part of your client user.
   a) Places where cooled or heated air circulates freely.
      When the installation height exceeds 3 m, warmed air stays close to the ceiling. In such cases, suggest your client users to install air circulators.
   b) Places where perfect drainage can be prepared and sufficient drainage.
   c) Places free from air disturbances to the suction port and blowout hole of the indoor unit, places where the fire alarm may not malfunction or short-circuit.
   d) Places with the environmental dew-point temperature is lower that 28°C and the relative humidity is less than 80%.
      (When installing at a place under a high humidity environment, pay sufficient attention the prevention of dewing such as thermal insulation of the unit properly.)
3. Avoid installation and use at those place listed below.
   a) Places exposed to oil splashes or steam (e.g. kitchens and machine plants).
      Installation and use at such places incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic vesin parts.
   b) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc) in generated or remains.
      Installation and use at such places cause corrosion in the heat exchanger and damage in molded synthetic resin parts.
   c) Places adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals.
      Generated noise may cause malfunctioning of the controller.

4.6.2 Preparation for installation

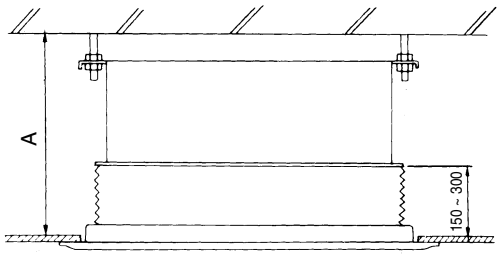
1. Selection of suspension pattern
   When the unit is hanged from ceiling, select one of following patterns depending on the dimensions of the ceiling.
   < Combination with silent panel >



Unit : mm

Mark / Models	A
FDRA45, 56, 71, 90	365 or more
FDRA112, 140	416 or more

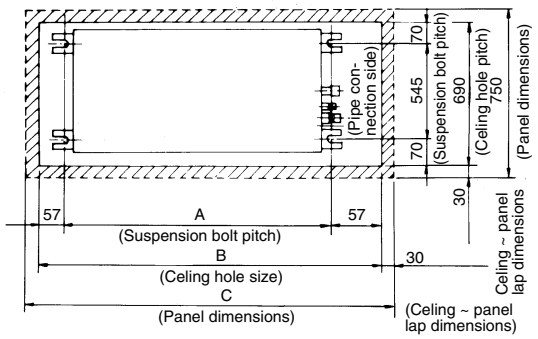
< Combination with canvas panel >



Unit : mm

Mark / Models	A
FDRA45, 56, 71, 90	495 or more
FDRA112, 140	510 or more

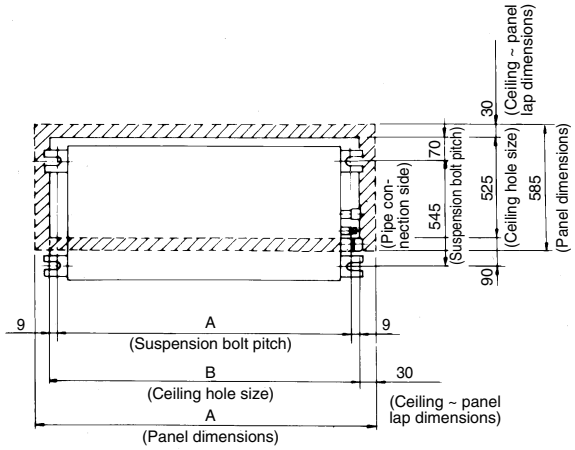
2. Ceiling hole size and position of suspension bolt
When boring at the ceiling, use the pattern sheet included in the accessory of the unit.
Leave the pattern sheet on the unit till decorative panel is installed.
< Combination with silent panel >



Unit : mm

Mark / Models	A	B	C
FDRA45, 56	786	980	1040
FDRA71, 80	986	1180	1240
FDRA112, 140	1406	1600	1660

< Combination with canvas panel >

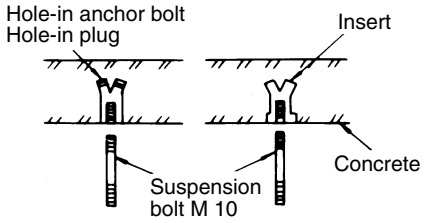


Unit : mm

Mark / Models	A	B	C
FDRA45, 56	786	804	864
FDRA71, 80	986	1004	1064
FDRA112, 140	1406	1424	1484

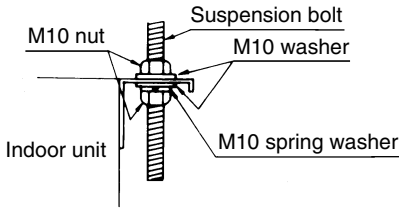
Application Data

3. Suspension bolts installation
   Locate the suspension bolts position by using the pattern sheet
   (Use care of the piping direction when the unit is installed)

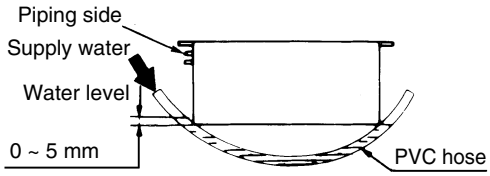


4.6.3 Installation of indoor unit

1. Fix the indoor unit to the suspension bolts.
   If required, it is possible to suspend the unit to the beam, etc. Directly by use of the bolts without using the suspension bolts.



   Note (1) When the dimensions of indoor unit and ceiling holes does not match, it can be adjusted with the slot holes of mounting bracket.
2. Adjusting the unit's levelness
   ① Adjust the out-of levelness using a level vial or by following method.
   - Make adjustment so that the relation between the lower surface of the indoor unit proper and water level in the hose becomes as given below.



   Bring the piping side slightly lower.

   ② Unless the adjustment to the levelness is made properly, malfunctioning or failure of the float switch may occur.
3. Blower fan tap switch
   The following two methods are available in switching the blower fan tap. Switch to the high-speed tap with one of these methods.
   - Set SW9-4 provided on the indoor unit PCB to ON.

SW9-4	ON	Fan control,high speed (High ceiling)
	OFF	Fan control,standard

   - By means of function setting from the remote control unit, set the setting ⓒ of "I/U FUNCTION ▲ " (indoor unit function) to "Hi CEILING 1" (high-speed tap) as shown below.

Function number Ⓐ	Function description Ⓑ	Setting Ⓒ
01	Hi CEILING SET	Hi CEILING 1

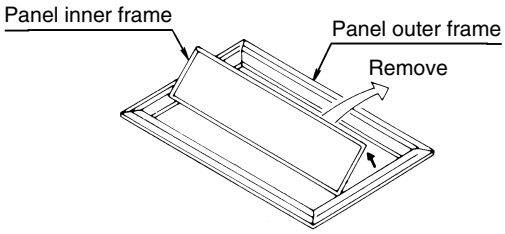
   For the details of operating procedures, please refer to the installation manual of your remote control unit.

4.6.4 Installation of decorative panel

1. Case of silent pane
   1) Accessory

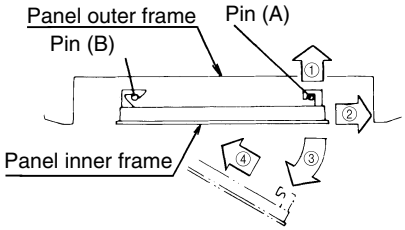
Name	Q'ty	Position
Round head machine screw (M5 × 35) 	4 pcs.	Securing the panel

2. Installation procedures
   ① Remove the inner frame of panel



< How to remove the panel inner frame >

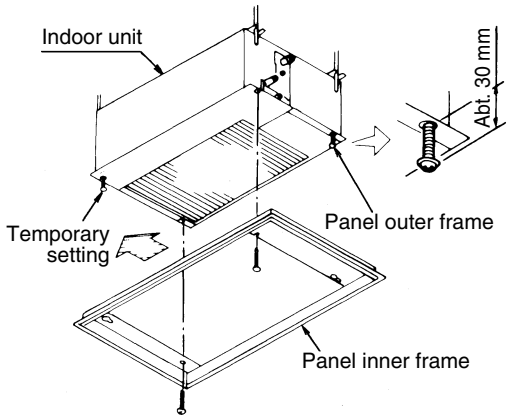
- Detach from pins (A) in the order of arrow ① → ②
- Open slightly as the arrow ③ and move toward the arrow ④ and detach from pin (B)



② Install the panel outer frame on the indoor unit.

Procedures of installation

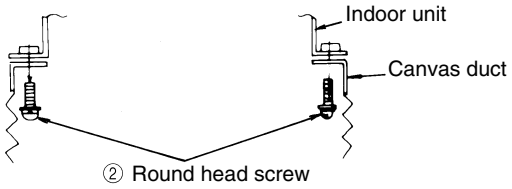
① Secure the panel tentatively with 2 of 4 panel set screws (panel accessory) as shown above.
② When the panel is supported with a pair of set screws, slide it in the arrow direction.
Note (1) Panel outer frame has the orientation.
③ Lock the former 2 and remaining 2 set screws.
④ Install the panel inner frame in the reverse order of removal.



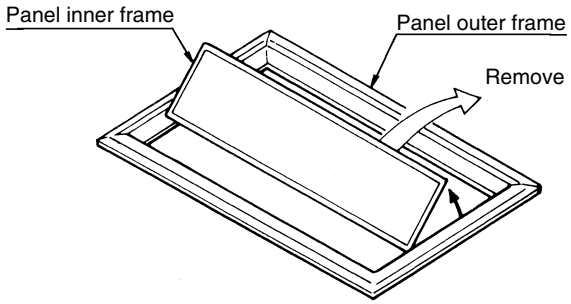
3. Case of canvas panel
   (Canvas duct (option) is necessary to install the canvas panel.)
   1) Accessory

Symbol	Name	Q' ty	Position
①	Round head machine screw (M4 × 16)	4	Panel securing
②	Round head machine screw (M5 × 16)	8	Canvas duct securing
③	Round head machine screw (M5 × 25)	4	Chain securing
④	Holder	4	
⑤	Chain	4	

   2) Mounting procedures
   ① Install the canvas duct (option, 4 places) on the Indoor unit.

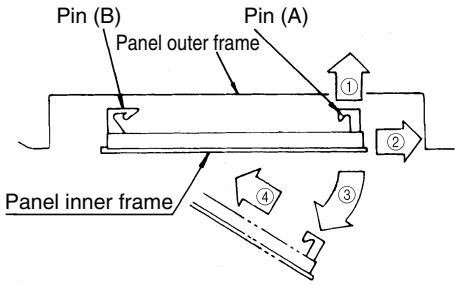


   ② Remove the panel inner frame.
   It can be removed same as the silent panel.

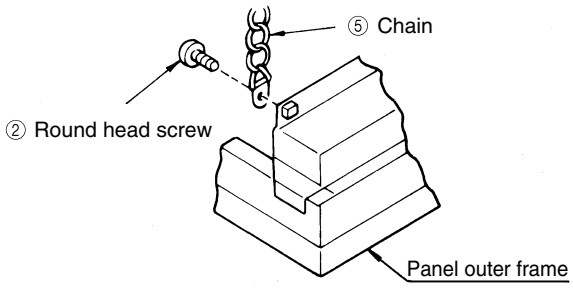


< How to remove the panel inner frame >

- Detach from pins (A) in the order of arrow ① → ②
- Open slightly as shown by the arrow ③ . move in the ④ arrow direction and detach from pin (B).



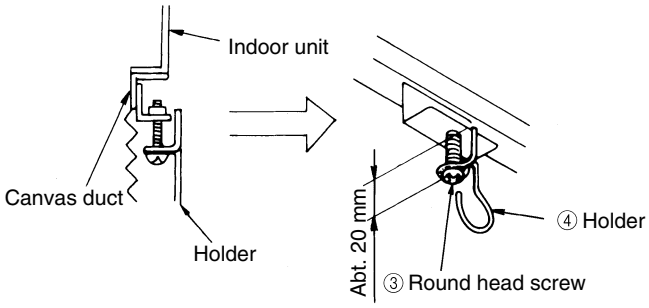
   ③ Install the chains on the panel outer frame. (4 places)



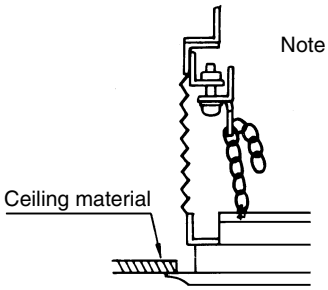
④ Install the panel outer frame.

Procedures of installation

■ Secure the holder tentatively as shown below. (4 places)



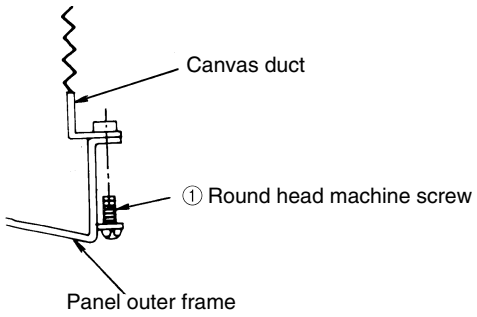
■ Hook the chain of panel outer panel on the holder.



Note (1) When hooking the chain. make sure to avoid slack-ness on it by pushing hard the panel outer frame against the ceiling material.

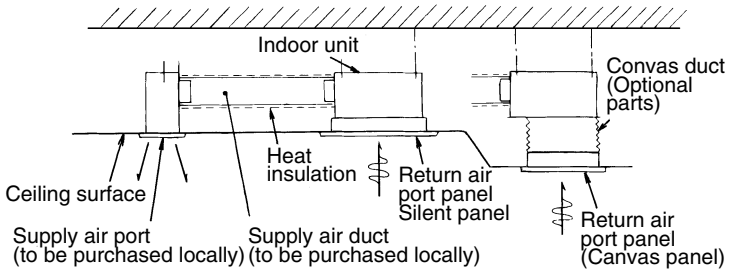
■ Tighten ③ screw in the step ① till the panel outer frame contacts closely with the ceiling material.

■ Secure the canvas duct and the panel outer frame with screws.



⑤ Remove the panel inner frame and install in the reverse order of removal.

⑥ Cautions for duct installation work



Calculate the draft and external static pressure and select the length, shape and blowout.

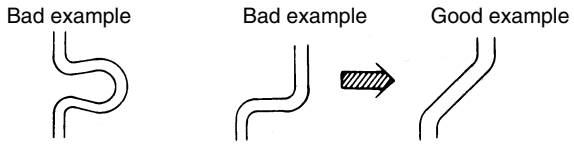
■ Supply air duct

① 2-spot, 3-spot and 4-spot with ϕ200 type duct are the standard specifications. Determine the number of spots based on following table.

FDRA45, 56	FDRA71, 90	FDRA112, 140
2-spot	2 ~ 3-spot (1)	3 ~ 4-spot (2)

Notes (1) Shield the central supply air port for 2-spot.
(2) Shield the supply air port around the center for 3-spot.

② Limit the difference in length between spots at less than 2:1.
③ Reduce the length of duct as much as possible.



④ Use a band, etc. to connect the indoor unit and the supply air duct flange.
⑤ Conduct the duct installation work before finshing the ceiling.

4.6.5 Connection of air intake and exhaust ducts

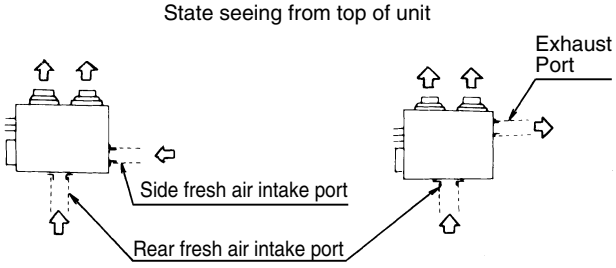


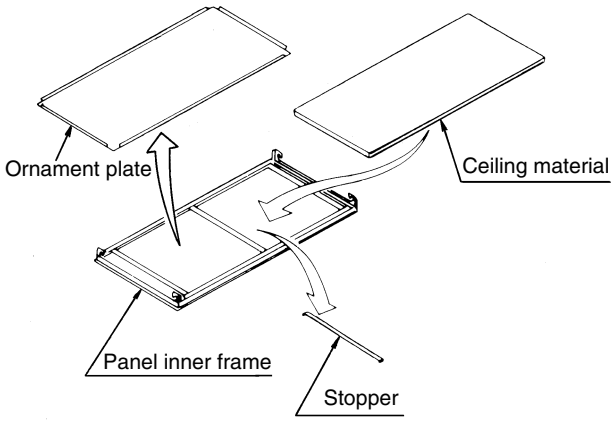
Fig.1 Fig.2

Duct connecting position

a) Fresh air intake
Inlet can be selected from the side or rear faces depending on the working conditions.
Use the rear fresh air inlte when the simultaneous intake and exhaust is conducted. (Side inlet cannot be used.)
b) Exhaust (Make sure to use also the air intake.)
Use the side exhaust port.

Attachment of ceiling material

Ceiling material can be attached to the panel inner frame.
(Plate thickness max. 15mm)

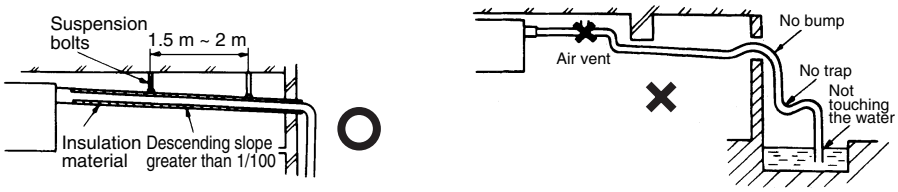


Attachment procedures

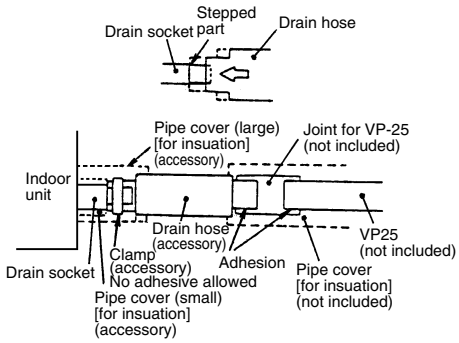
① Remove the stopper.
② Remove the ornament plate and attach the ceiling material.
③ Hold down the ceiling material and return the stopper in position.
Note (1) If the ceiling material is attached, the ornament plate is not used.

4.6.6 Drain piping

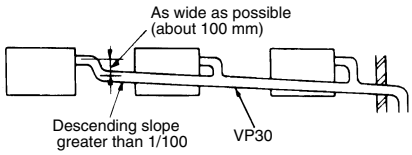
1. Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.



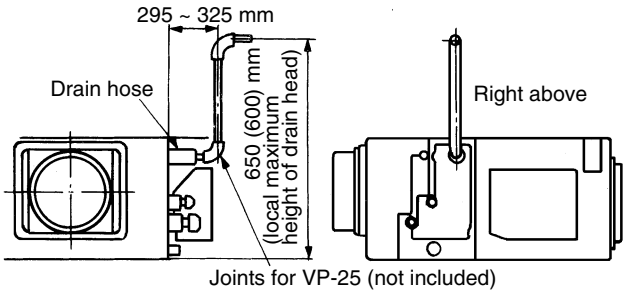
2. The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.
3. Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.



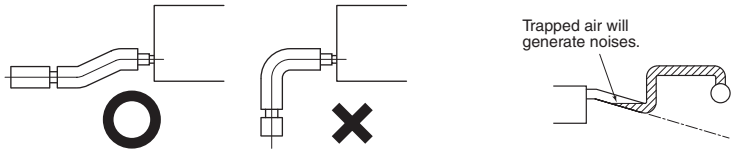
4. Use VP-25 general-purpose hard PVC pipes for drain piping.



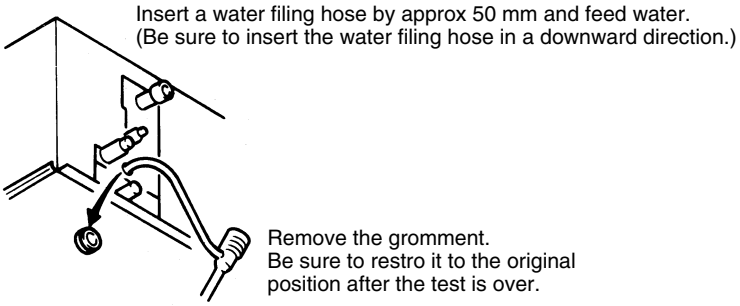
5. Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
6. Adhesive must not be used.
   a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
   b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
   c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
   d) Do not create an air vent under any circumstances.
   e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the unit's drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
   f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.
7. Drain socket
   After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.
   (Cut pipe covers into appropriate shapes)



8. Hard PVC pipes laid indoor
   a) Since a drain pipe outlet can be raised up to 650 (600: Canvas panel) mm from the ceiling, use elbows, etc. to install drain pipes, it there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
   b) Install the drain pipe outlet where no odor is likely to be generated.
   c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.



9. Drainage test
   a) During trial operation, make sure that drainage is properly executed and check that leakage is not found at connections.
   b) Be sure to carry out a drainage test when installing the system during a heating season.
   c) When installing the system in a building under construction, carry out the drainage test before ceiling tiles are installed.



- Supply approx 1000cc of water through the outlet of the unit using a feed water pump.
- Make sure that drainage is proceeding properly at the see-through outlet of the unit.
  *Also confirm the revolving sound of the condensate motor when checking the drainage.
- Then remove the drain plug at lower section of the unit to drain water off. After making sure water is not left, restore the drain plug to the original position.

Forced drain pump operation

■ Setup from a unit side.

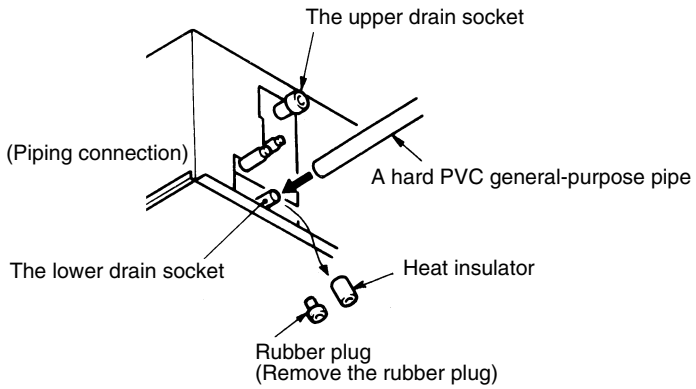
① Turn on DIP switch 5-1 on the PCB of the indoor unit. The drain pump operates continuously.

② After the test, be sure to turn off the DIP switch.
When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain conditions of the pipe.

■ Setup from a remote controller side.
Drain pump operation from a remote controller unit is possible. Operate a remote controller unit by following the steps described below.

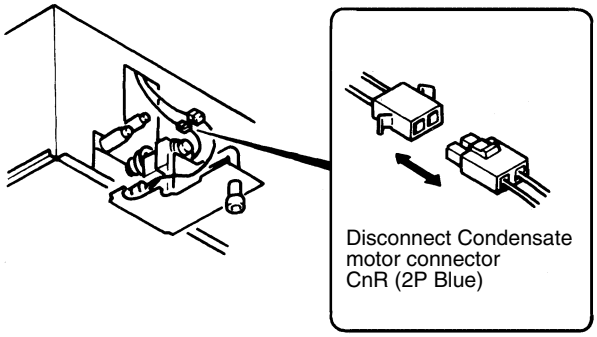
1. To start a forced drain pump operation
   ① Press the TEST button for three seconds or longer.
   The display will change from " SELECT ITEM" → " SET" → " TEST RUN ▼ "
   ② Press ▼ the button once while " TEST RUN ▼ " is displayed, and cause "DRAIN PUMP ◆ "to be displayed.
   ③ When the SET button is pressed, a drain pump operation will start.
   Display: "DRAIN PUMP RUN" → " → STOP"
2. To cancel a drain pump operation.
   If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.
   The air conditioning system will become OFF.

10. Drainage from the lower drain socket
Only if the drain pipe can be installed in a downhill grade (1/50-1/100), the lower drain socket can be used for connecting to the drain pipe as illustrated.



(Disconnect the connector for the drain motor)
As shown in the sketch to the right, disconnect the drain motor connector CnR (blue color coding).

⚠ **Caution** If the system is started with this connector connected as is, drain water is discharged out of the upper drain socket causing a heavy water lekage.

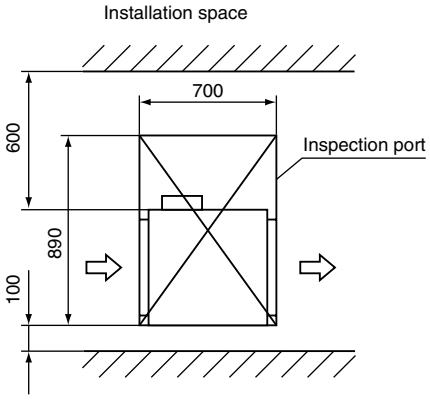


4.7 Medium Static Pressure Ducted Type (FDQMA)

4.7.1 Selection of installation location

1. Avoid installation and use at those places listed below.
   a) Places exposed to oil splashes or steam (e.g. kitchens and machine plants).
   Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
   b) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is gnerated or remains. Installation and use at such places will cause corrosion in the heat exchanger and damage in molded synthetic resin parts.
   c) Places adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals. Generated noise may cause malfunctioning of the controller.
2. Select places for installation satisfying the following conditions and, at the same time, obtain the consent on the part of your client user.
   a) Places where cooled or heated air circulates freely. When the installation height exceeds 3m, warmed air stays close to the ceiling. In such cases, suggest your client users to install air circulators.
   b) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
   c) Places free from air disturbances to the return air port and supply hole of the indoor unit, places where the fire alarm may not malfunction to short circuit.
   d) Places with the environmental dew-point temperature is lower than 28°C and the relative humidity is less than 80%.
   (When installing at a place under a high humidity environment, pay sufficient attention to prevention of dewing such as thermally insulating the unit properly.)
3. Check if the selected place for installation is rigid enough to stand the weight of the unit.
   Otherwise, apply reinforcement using boards and beams before starting the installation work.

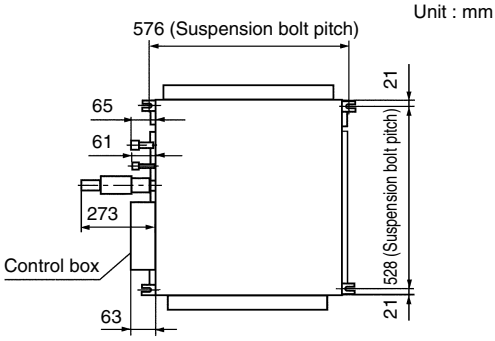
Unit : mm



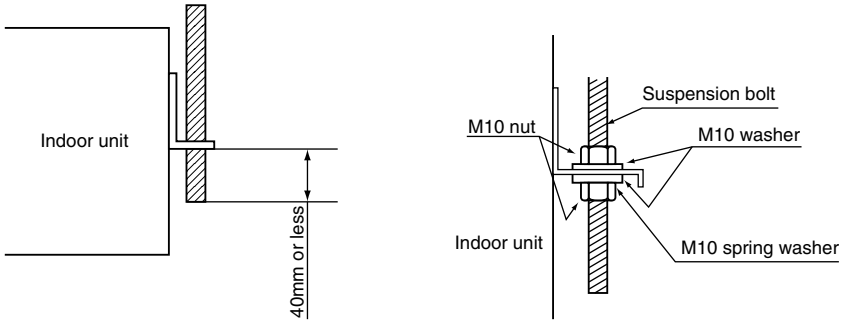
4.7.2 Suspension the unit

Use four (4) M10 or W3/8 suspension bolts. Secure them firmly so that each can withstand a pull-out load of 50 kg/f.

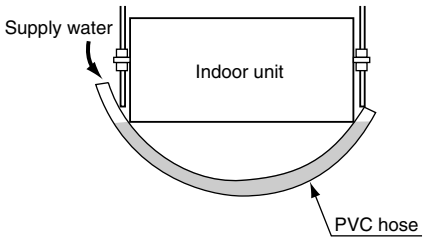
Unit : mm



1. Adjust suspension bolts length to the following dimension.

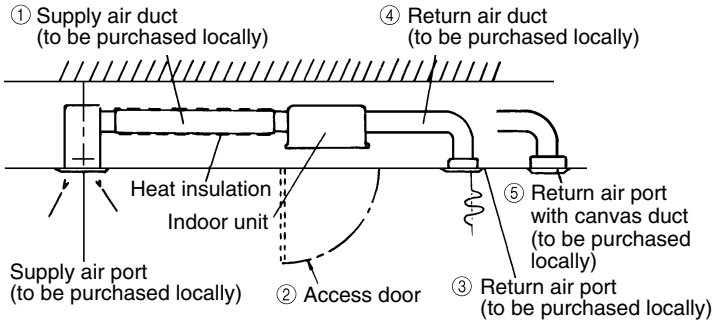


2. Set the suspension bolts (to be prepared at job site) in place.
3. Level the unit using a level or a hose filled with water. If the unit is out of level, water leaks or malfunctioning of the floating switch may occur.

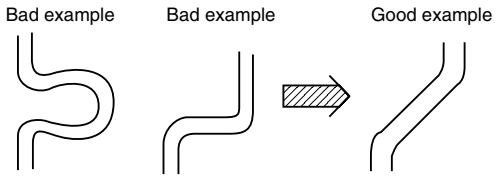


4. After ensuring the above, secure the unit.

4.7.3 Duct installation



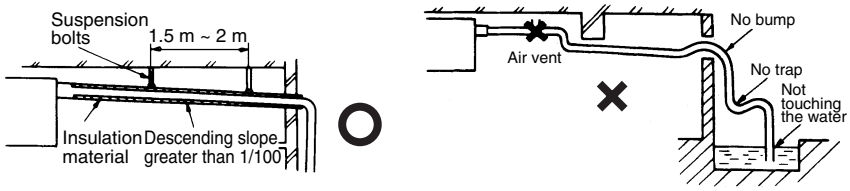
1. Calculate air capacity and the outside static pressure to select the duct's length and shape, and blow outlet.
   ⚠ **Caution** Take care that the outside atatic pressure does not exceed 30 Pa. The unit has condensation owing to the decrease in air capacity, possibly causing the ceiling and household goods to become wet.
2. The indoor unit is not provided with an air filter. Assemble it into the suction grill for which cleaning is easy.
3. Make the duct the shortest in length.



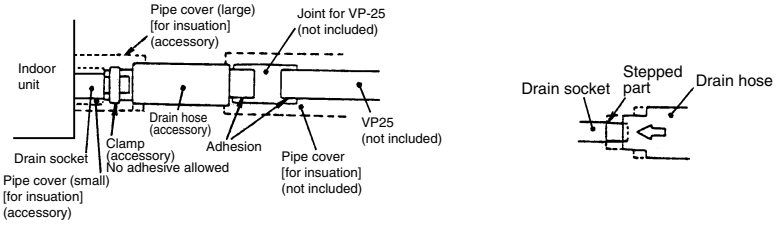
4. Bend a lot less abruptly. (Make the bend radius a lot larger.)
5. When connecting the indoor unit to the duct flange of the blow outlet, attach the insulation material to the fixed portion to protect it from condensation.
6. Conduct the duct work before ceiling attachment.
7. Make sure to keep the suction duct warm to protect it from condensation.
8. Install the blowout hole where air can flow all over the room.
9. Make sure to install the inspection opening in the ceiling. It is needed for the maintenance of electrical parts, the motor and other parts.

4.7.4 Drain piping

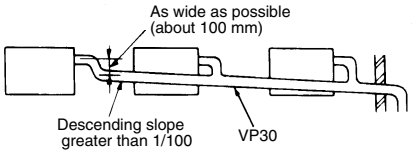
1. Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.



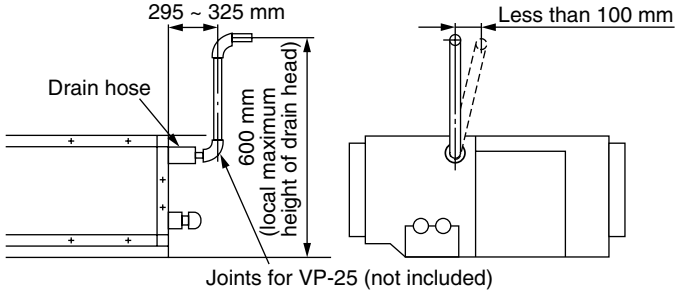
2. The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.
3. Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.



4. Use VP-25 general-purpose hard PVC pipes for drain piping.



5. Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
6. Adhesive must not be used.
   a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
   b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
   c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
   d) Do not create an air vent under any circumstances.
   e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the units' drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
   f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.
7. Drain socket
   After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.
   (Cut pipe covers into appropriate shapes)



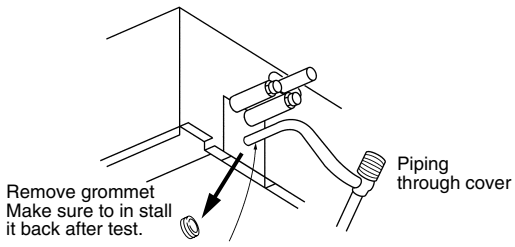
8. Hard PVC pipes laid indoor
   a) Since a drain pipe outlet can be raised up to 600 mm from the ceiling, use elbows, etc. to install drain pipes, it there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
   b) Install the drain pipe outlet where no odor is likely to be generated.
   c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.

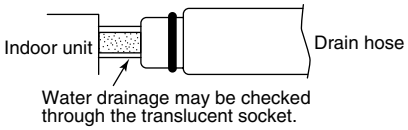
4.7.5 Drain test (Perform the drain test after the electrical wiring work has been finished.)

- Check that water is draining thoroughly during the test run, and that there are no water leaks from the joints.
- The test has to be performed even if the unit is installed in a season when the unit is used for heating.
- In a new house, perform the test before the ceiling is fitted.

Forced drain pump operation

- Setup from a unit side.
  ① Turn on DIP switch SW5-1 on the PCB of the indoor unit. The drain pump operates continuously.
  ② After the test, be sure to turn off the DIP switch.
  When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain conditions of the pipe.
- Setup from a remote controller side.
  Drain pump operation from a remote controller unit is possible. Operate a remote controller unit by following the steps described below.
  1. To start a forced drain pump operation
     ① Press the TEST button for three seconds or longer.
     The display will change from " SELECT ITEM" → " SET" → " TEST RUN ▼ "
     ② Press the ▼ button once while " TEST RUN ▲ " is displayed, and cause [DRAIN PUMP " to be displayed.
     ③ When the SET button is pressed, a drain pump operation will start.
     Display: "DRAIN PUMP RUN" → " → STOP"
  2. To cancel a drain pump operation.
     If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.
     The air conditioning system will become OFF.



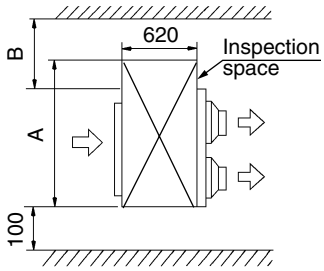


   1) Remove the piping through cover, and using a water pump, pour about 1000cc of water, from the position shown in the left figure.
      Caution
      When pour water, be sure to perform the drain pump forced operation.
   2) Check the drain-out section (transparent section) for normal flow of drainage.
   3) Take off the drain plug to release the water. After water release has been confirmed, replace the drain plug as it was.
      Be careful not to get splashed when pulling the drain plug.
   4) After the drain test, thoroughly insulate the drain pipe, up to the indoor unit.

4.8 Satellite Ducted Type (FDUMA)

4.8.1 Selection of installation location

1. Avoid installation and use at those places listed below.
   a) Places exposed to oil splashes or steam (e.g. kitchens and machine plants).
   Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
   b) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is generated or remains. Installation and use at such places will cause corrosion in the heat exchanger and damage in molded synthetic resin parts.
   c) Places adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals. Generated noise may cause malfunctioning of the controller.
2. Select places for installation satisfying the following conditions and, at the same time, obtain the consent on the part of your client user.
   a) Places where cooled or heated air circulates freely. When the installation height exceeds 3m, warmed air stays close to the ceiling. In such cases, suggest your client users to install air circulators.
   b) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
   c) Places free from air disturbances to the return air port and supply port of the indoor unit, places where the fire alarm may not malfunction to short circuit.
   d) Places with the environmental dew-point temperature is lower than 28°C and the relative humidity is less than 80%.
   (When installing at a place under a high humidity environment, pay sufficient attention to prevention of dewing such as thermally insulating the unit properly.)
3. Check if the selected place for installation is rigid enough to stand the weight of the unit.
   Otherwise, apply reinforcement using boards and beams before starting the installation work.

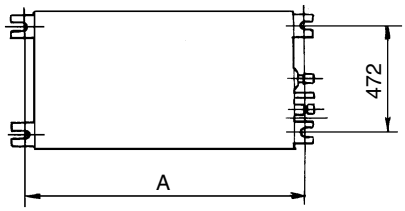


Unit : mm

Mark / Models	A	B
FDUMA45, 56	1100	630
FDUMA71, 90	1300	830
FDUMA112, 140	1720	1250

4.8.2 Suspension

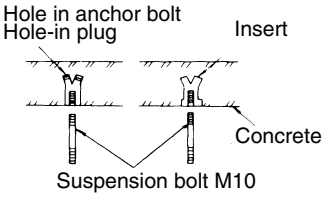
Be sure to observe the finished length of the suspension bolts given below.

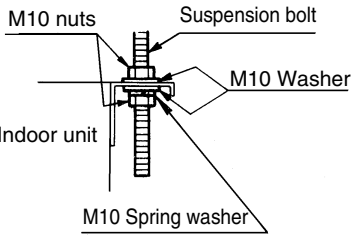


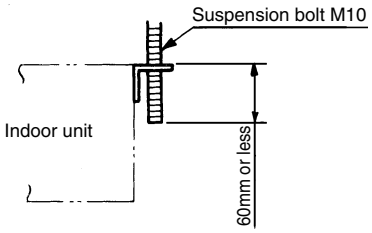
Unit : mm

Mark / Models	A
FDUMA45, 56	786
FDUMA71, 90	986
FDUMA112, 140	1406

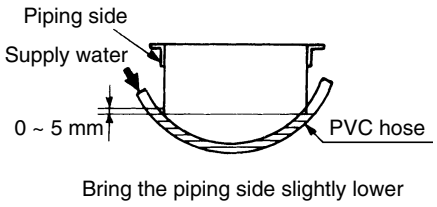
1. Fixing the suspension bolt (customer ordered parts M10)
   Securely fix the suspension bolt as illustrated below or in another way.







2. Adjusting the unitfs levelness
   a) Adjust the out-levelness using a level vial or by the following method.
      - Make adjustment so that the relation between the lower surface of the indoor unit proper and water level in the hose becomes given below.



Bring the piping side slightly lower

   b) Unless the levelness is adjusted properly, the malfunction of the float switch will occur.
3. Blower fan tap switch
   The following two methods are available in switching the blower fan tap. Switch to the high-speed tap with one of these methods.
   ① Set SW9-4 provided on the indoor unit PCB to ON.

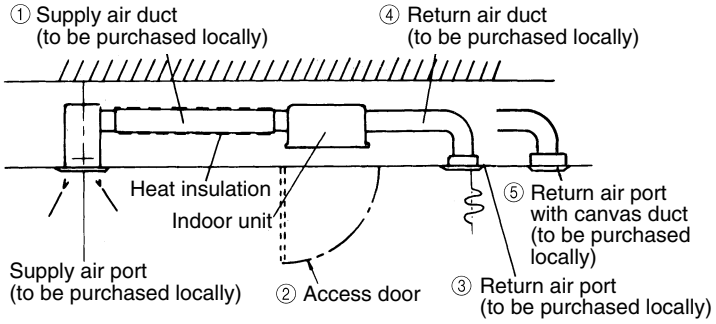
SW9-4	ON	Fan control, high speed (High ceiling)
	OFF	Fan control, standard

   ② By means of function setting from the remote control unit, set the setting Ⓒ of "I/U FUNCTION ▲ " (indoor unit function) to "Hi CEILING 1" (high-speed tap) as shown below.

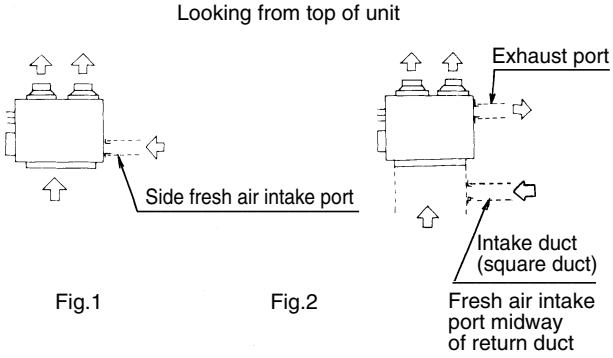
Function number Ⓐ	Function description Ⓑ	Setting Ⓒ
01	Hi CEILING SET	Hi CEILING 1

   For the details of operating procedures, please refer to the installation manual of your remote control unit.

4.8.3 Duct installation



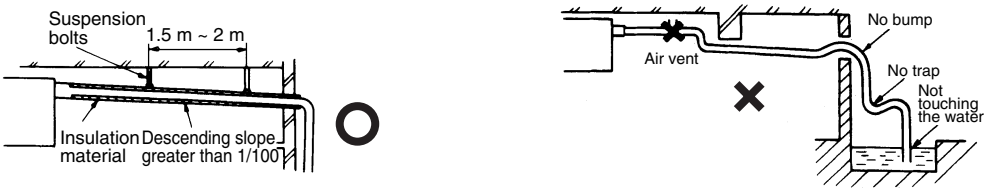
1. Supply air duct
   Same as FDRA series. Refer to page 292.
2. Access door
   Access door must be provided without fail.
   Dimensions of access door and service space
   (See exterior dimensions in page 104 to 114.)
3. Return air port
   An air filter is not included in the indoor unit. Use the return air port with air filter.
4. Return air duct: Use square duct.
5. Return air port with canvas duct
   1. Connection of intake and exhaust ducts.



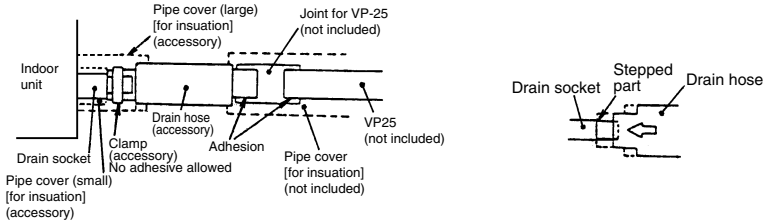
2. Duct connecting position.
   < Fresh air intake >
   a) Use side air intake port.
   b) In case of simultaneous intake and exhaust, the side air intake port cannot be used, therefore, take air from the midway air intake port along the intake duct.
   < Exhaust > Make sure to use suction as well.
   c) Use a side exhaust port.
3. Duct connection
   Use intake and exhaust duct flange of separately sold (for connection of ϕ125mm round duct) to connect ϕ125mm round duct. The duct clamped by bands must be thermally insulated to prevent dew condensation.

4.8.4 Drain piping

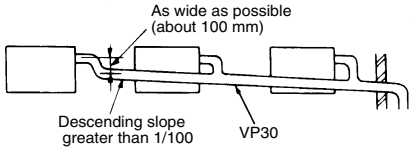
1. Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.



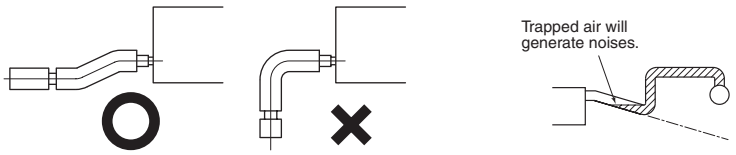
2. The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.
3. Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.



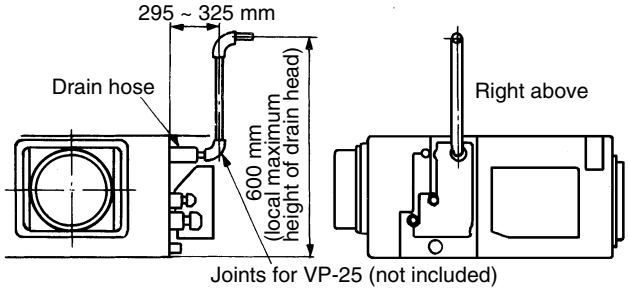
4. Use VP-25 general-purpose hard PVC pipes for drain piping.



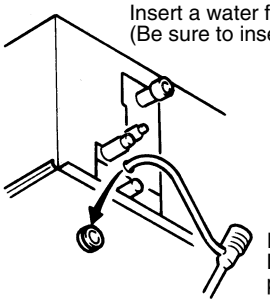
5. Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
6. Adhesive must not be used.
   a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
   b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
   c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
   d) Do not create an air vent under any circumstances.
   e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the units' drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
   f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.



7. Drain socket
   After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.
   (Cut pipe covers into appropriate shapes)



8. Hard PVC pipes laid indoor
   a) Since a drain pipe outlet can be raised up to 600 mm from the ceiling, use elbows, etc. to install drain pipes, it there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
   b) Install the drain pipe outlet where no odor is likely to be generated.
   c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.
9. Drainage test
   a) During trial operation, make sure that drainage is properly execued and check that leakage is not found at connections.
   b) Be sure to carry out a drainage test when installing the system during a heating season.
   c) When installing the system in a building under construction, carry out the drainage test before ceiling tiles are installed.



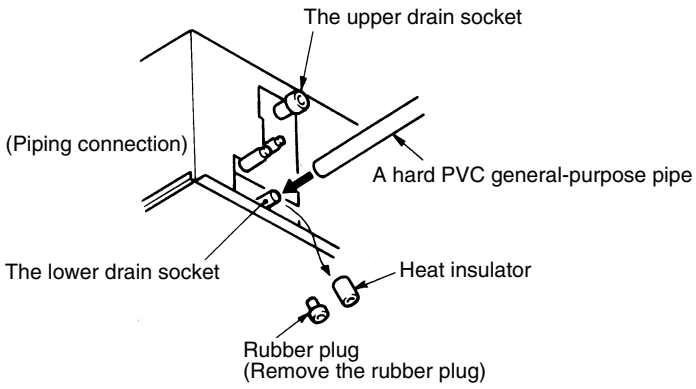
① Supply approx 1000cc of water through the outlet of the unit using a feed water pump.
② Make sure that drainage is proceeding properly at the see-through outlet of the unit.
* Also confirm the revolving sound of the condensate motor when checking the drainage.
③ Then remove the drain plug at lower section of the unit to drain water off. After making sure water is not left, restore the drain plug to the original position.

Forced drain pump operation

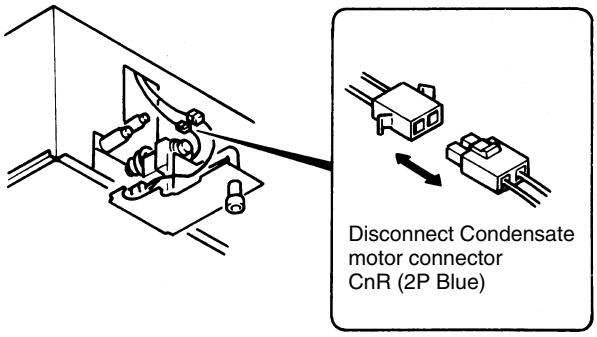
■ Setup from a unit side.
① Turn on DIP switch SW5-1 on the PCB of the indoor unit. The drain pump operates continuously.
② After the test, be sure to turn off the DIP switch.
When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain conditions of the pipe.

■ Setup from a remote controller side.
Drain pump operation from a remote controller unit is possible. Operate a remote controller unit by following the steps described below.

1. To start a forced drain pump operation
   ① Press the TEST button for three seconds or longer.
   The display will change from " SELECT ITEM" → " SET" → " TEST RUN ▼ "
   ② Press the ▼ button once while " TEST RUN ▼ " is displayed, and cause "DRAIN PUMP ◆ " to be displayed.
   ③ When the SET button is pressed, a drain pump operation will start.
   Display: "DRAIN PUMP RUN" → " → STOP"
2. To cancel a drain pump operation.
   ① If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.
   The air conditioning system will become OFF.



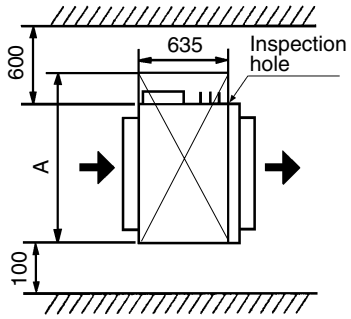
10. Drainage from the lower drain socket
    Only if the drain pipe can be installed in a downhill grade (1/50-1/100), the lower drain socket can be used for connecting to the drain pipe as illustrated.
    (Disconnect the connector for the drain motor)
    As shown in the sketch to the right, disconnect the drain motor connector CnR (blue color coding).
    If the system is started with this connector connected as is, drain water is discharged out of the upper drain socket causing a heavy water lekage.



4.9 Ceiling Mounted Duct Type (FDURA)

4.9.1 Selection of installation location

1. Avoid installation and use at those places listed below.
   a) Places exposed to oil splashes or steam (e.g. kitchens and machine plants).
   Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
   b) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is gnerated or remains. Installation and use at such places will cause corrosion in the heat exchanger and damage in molded synthetic resin parts.
   c) Places adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals. Generated noise may cause malfunctioning of the controller.
2. Select places for installation satisfying the following conditions and, at the same time, obtain the consent on the part of your client user.
   a) Places where cooled or heated air circulates freely. When the installation height exceeds 3m, warmed air stays close to the ceiling. In such cases, suggest your client users to install air circulators.
   b) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
   c) Places free from air disturbances to the return air port and supply hole of the indoor unit, places where the fire alarm may not malfunction to short circuit.
   d) Places with the environmental dew-point temperature is lower than 28°C and the relative humidity is less than 80%.
   (When installing at a place under a high humidity environment, pay sufficient attention to prevention of dewing such as thermally insulating the unit properly.)
3. Check if the selected place for installation is rigid enough to stand the weight of thew unit.
   Otherwise, apply reinforcement using boards and beams before starting the installation work.

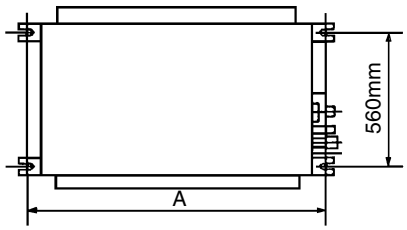


Unit : mm

Mark / Models	A
FDURA45, 56, 71	1200
FDURA90, 112, 140	1720

4.9.2 Suspension

Be sure to observe the finished length of the suspension bolts given below.

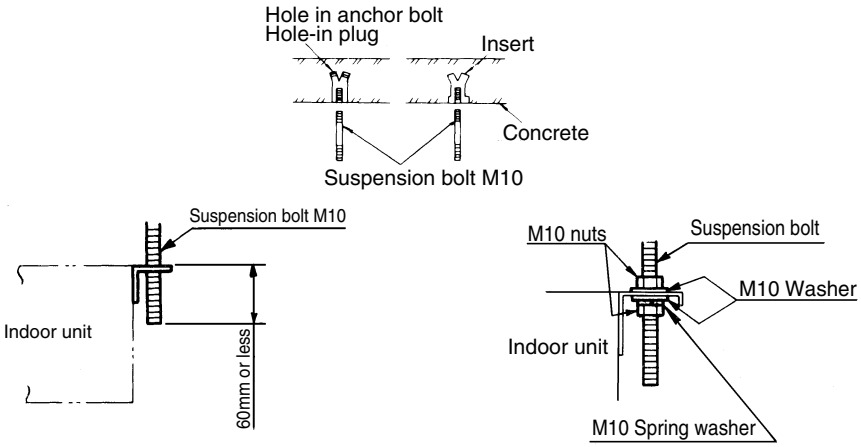


Unit : mm

Mark / Models	A
FDURA45, 56, 71	886
FDURA90, 112, 140	1406

Fixing the suspension bolt (customer ordered parts M10)

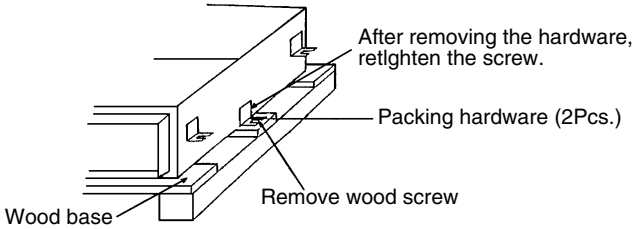
Securely fix the suspension bolt as illustrated below or in another way.



4.9.3 Installation of indoor unit packing hardware

Two pieces of packing handware are used.

Discard them after unpacking.



When installing the unit, heed must be taken that the side touching the wood frame is the top surface of the unit.

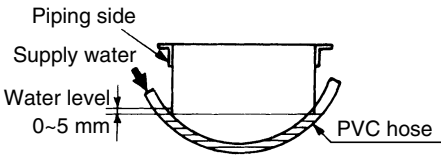
Fix the indoor unit to the hanger bolts.

If required, it is possible to suspend the unit to the beam,etc.

Directly by use of the bolts without using the hanger bolts.

Note (1) When the dimensions of indoor unit and ceiling holes does not match, it can be adjusted with the slot holes of hanging bracket.

1. Adjusting the unit's levelness
   a) Adjust the out-levelness using a level vial or by the following method.
   Make adjustment so that the relation between the lower surface of the unit proper and water level in the hose becomes given below.



Bring the piping side slightly lower

   b) Unless the levelness is adjusted properly, the malfunction of the float switch will occur.
2. Blower fan tap switch
   The following two methods are available in switching the blower fan tap. Switch to the high-speed tap with one of these methods.
   ① Set SW9-4 provided on the indoor unit PCB to ON.

SW9 - 4	ON	Fan control, high speed (High ceiling)
	OFF	Fan control, standard

   By means of function setting from the remote control unit, set the setting Ⓒ of "I/U FUNCTION ▲ " (indoor unit function) to "Hi CEILING 1" (high-speed tap) as shown below.

Function number Ⓐ	Function description Ⓑ	Setting Ⓒ
01	Hi CEILING SET	Hi CEILING 1

   For the details of operating procedures, please refer to the installation manual of your remote control unit.

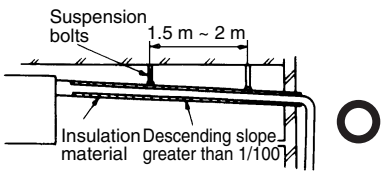
Unit : Pa

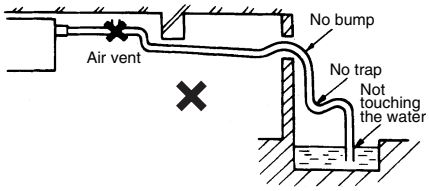
Models \ Static Pressure	Standard tap	High tap
FDURA45, 56, 71	50	85
FDURA90, 112, 140	50	130

⚠ **CAUTION** (1) Taps should not be used under static pressure outside the unit mentioned above. Dew condensation may occur with the unit and wet the ceiling or furniture.
(2) Do not use under static pressure outside the unit of 50Pa or less. Water drops may be blown from the diffuser outlet of the unit and wet the ceiling or furniture.

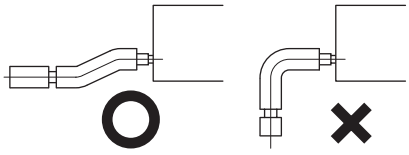
4.9.4 Drain piping

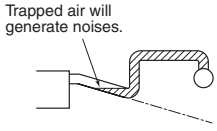
1. Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.



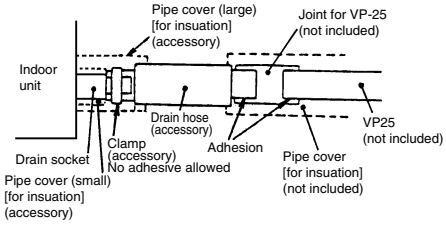


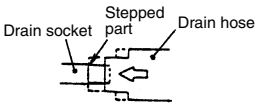
2. The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.



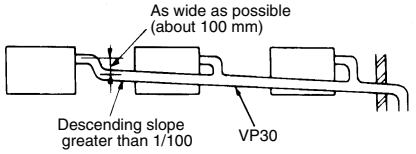


3. Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.

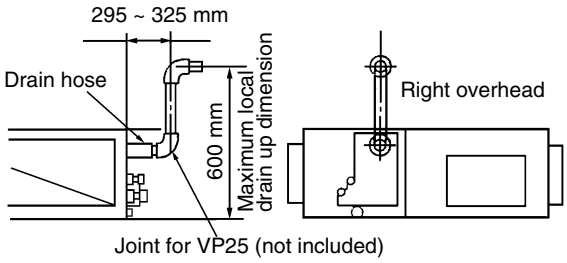




4. Use VP-25 general-purpose hard PVC pipes for drain piping.



5. Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
6. Adhesive must not be used.
   a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
   b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
   c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
   d) Do not create an air vent under any circumstances.
   e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the units' drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
   f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.
7. Drain socket
   After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.
   (Cut pipe covers into appropriate shapes)

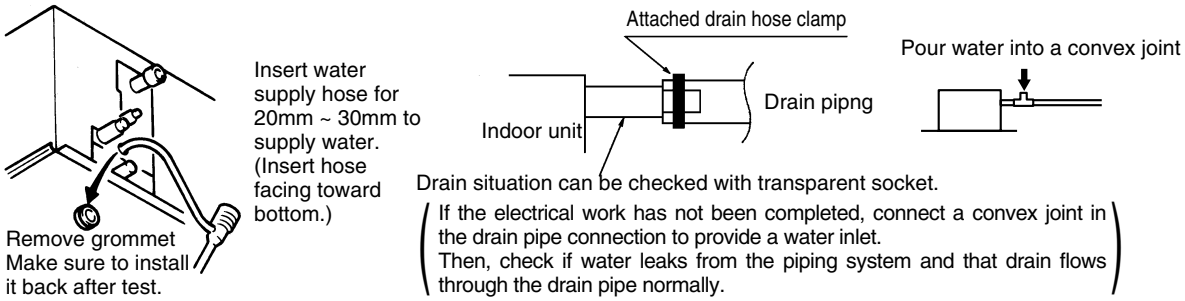


8. Hard PVC pipes laid indoor
   a) Since a drain pipe outlet can be raised up to 600 mm from the ceiling, use elbows, etc. to install drain pipes, it there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
   b) Install the drain pipe outlet where no odor is likely to be generated.
   c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.
9. Drainage test
   1) Conduct a drainage test after completion of the electrical work.
   2) During the trial, make sure that drain flows properly through the piping and that no water leaks from connections.
   3) In case of a new building, conduct the test before it is furnished with the ceiling.
   4) Be sure to conduct this test even when the unit is installed in the heating season.

Procedures

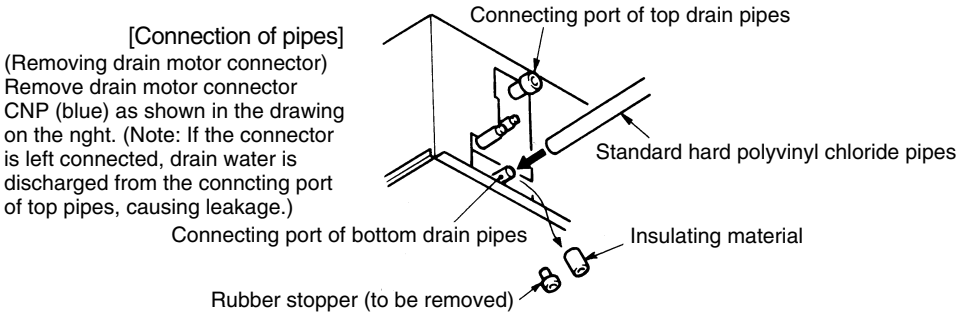
① Supply about 1000 cc of water to the unit through ghe air outlet by using a feed water pump.

② Check the drain while cooling operation.

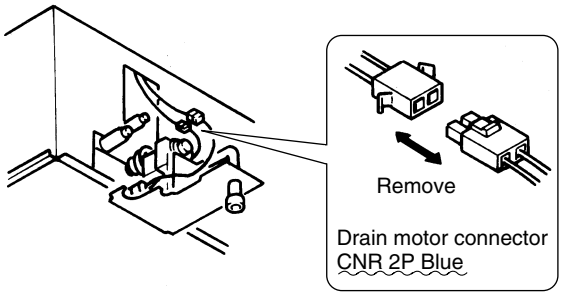


10. Outline of bottom drain piping work

a) If the bottom drain piping can be done with a descending gradient (1/50-1/100), it is possible to connect the pipes as shown in the drawing below.



b) Do not use acetone-based adhesives to connect to the drain socket.



Forced drain pump operation

■Setup from a unit side.

① Turn on DIP switch SW5-1 on the PCB of the indoor unit. The drain pump operates continuously.

② After the test, be sure to turn off the DIP switch.

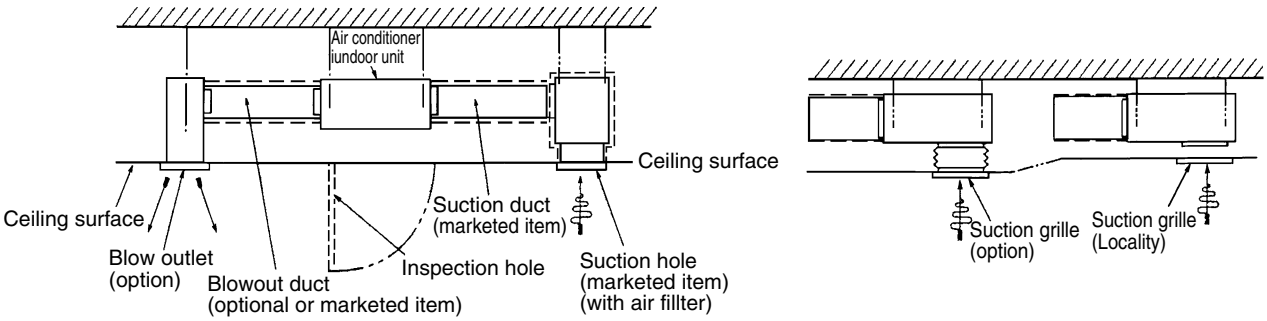
When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain conditions of the pipe.

■Setup from a remote controller side.

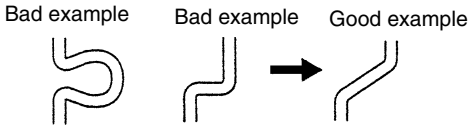
Drain pump operation from a remote controller unit is possible. Operate a remote controller unit by following the steps described below.

1. To start a forced drain pump operation
   ① Press the TEST button for three seconds or longer.
   The display will change from " ◆ SELECT ITEM" → " ○ SET → " ✳ TEST RUN ▼ "
   ② Press the ▼ button once while " ✳ TEST RUN ▼ " is displayed, and cause "DRAIN PUMP ◆ " to be displayed.
   ③ When the SET button is pressed, a drain pump operation will start.
   Display: "DRAIN PUMP RUN" → " ○ → STOP"
2. To cancel a drain pump operation.
   If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.
   The air conditioning system will become OFF.

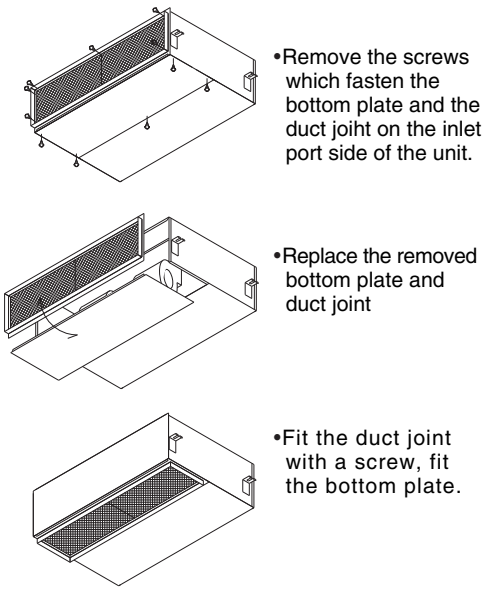
4.9.5 Duct work



1. A corrugated board (for preventing sputtering) is attached to the main body of the air conditioner (on the outlet port). Do not remove it until connecting the duct.
   a) An air filter is provided on the main body of the air conditioner (on the inlet port). Remove it when connecting the duct on the inlet port.
2. Blowout duct
   a) Reduce the length of duct as much as possible.
   b) Reduce the number of bends as much as possible.
   c) (Corner R should be as larger as possible.)

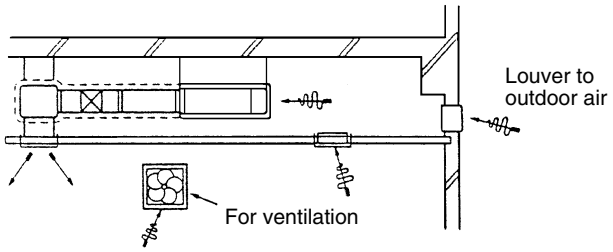


   d) Conduct the duct installation work before finishing the ceiling.
3. Inlet port
   a) When shipped, the inlet port lies on the back.
   b) When connecting the duct to the inlet port, remove the air filter fitted to the inlet port.
   c) When placing the inlet port to carry out suction from the bottom side, use the following procedure to replace the suction duct joint and the bottom plate.



4. Make sure to insulate the duct to prevent dewing on it.
5. Location and form of blow outlet should be selected so that air from the outlet will be distributed all over the room, and equipped with a device to control air volume.
6. Make sure provide an inspection hole on the ceiling. It is indispensable to service electric equipment, motor, functional components and cleaning of heat exchanger.

Bad example of duct work



7. If a duct is not provided at the suction side but it is substituted with the space over the ceiling, humidity in the space will increase by the influence of capacity of ventilation fan, strength of wind blowing against the out door air louver, weather (rainy day) and others.

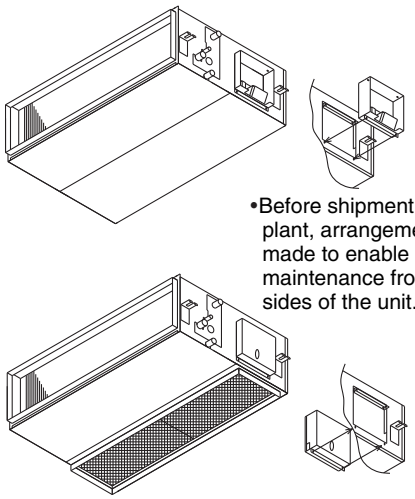
⚠ **Notes** (1) Moisture in air is likely to condense over the external plates of the unit and to drip on the ceiling.
Unit should be operated under the conditions as listed in the above table and within the limitation of air flow rate.
When the building is a concrete structure, especially immediately after the construction, humidity tends to rise even if the space over the ceiling is not substituted in place of a duct. In such occasion, it is necessary to insulate the entire unit with glass wool (25mm). (Use a wire net or equivalent to hold the glass wool in place.)

(2) It may run out the allowable limit of unit operation (Example: When outdoor air temperature is 35°C DB, suction air temperature is 27°C WB) and it could result in such troubles as compressor overload, etc..

(3) There is a possibillty that the fan air volume may exceed the allowable range of operation due to the capacity of ventilation fan or strength of wind blowing against external air louver so that drainage from be heat exchanger may fail to reach the drain pan but leak outside (e. g. drip on to the ceiling) with consequential water leakage in the room.

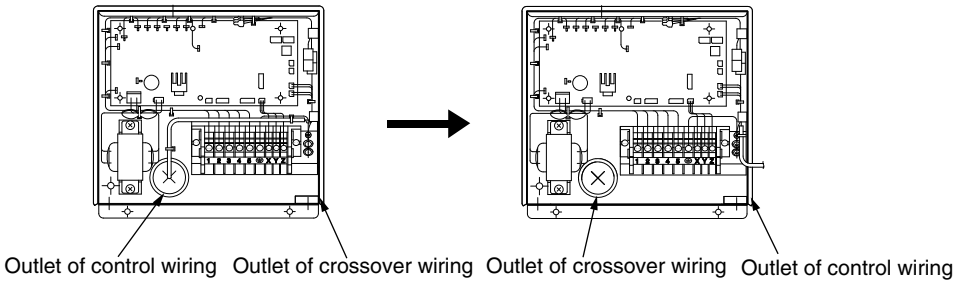
4.9.6 Control box (Only case of FDURA90, 112, 140)

- During bottom side suction, the orientation of the control box can be changed to allow the control box to be maintained from the inlet port.



•Before shipment from the plant, arrangements are made to enable maintenance from the sides of the unit.

1. Remove the bottom plate (on the inlet port side), and all wiring connectors from the control box.
2. Remove the three screws that fasten the cabinet inside the control box.
3. Pull the control box toward the outside of the unit.
4. Change the exit position of the wiring from inside the control box.
5. Fit the control box from the inside of the unit.
6. Fit the three screws that fasten the cabinet.
7. Correctly connect all wiring connectors.



4.10 Ceiling Suspension Type (FDEA)

4.10.1 Selection of installation location

1. A place where good air circulation and delivery can be obtained.
   Cold air throw

Unit: m

Models	FDEA36, 45	FDEA56, 71	FDEA112, 140
Air throw	7.5	8	9

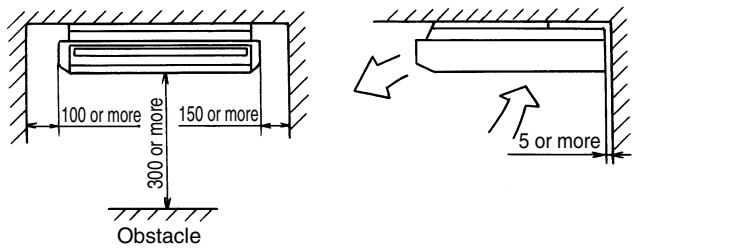
Conditions

① Installation height: 2.4 ~ 3.0 m above the floor
② Fan speed: Hi
③ Location: Free space without obstacles
④ Distance of reach indicates the horizontal distance after the wind touched down the floor.
⑤ Air velocity at the throw: 0.5 (m / sec.)

2. A place where ceiling has enough strength to support the unit.
3. A place where there is no obstruction to the return air inlet and supply air outlet ports.
4. Places exposed to oil splashes or steam (e.g. kitchens and machine plants).
   Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
5. A place where the space shown below may be secured.

Ceiling mouting installation

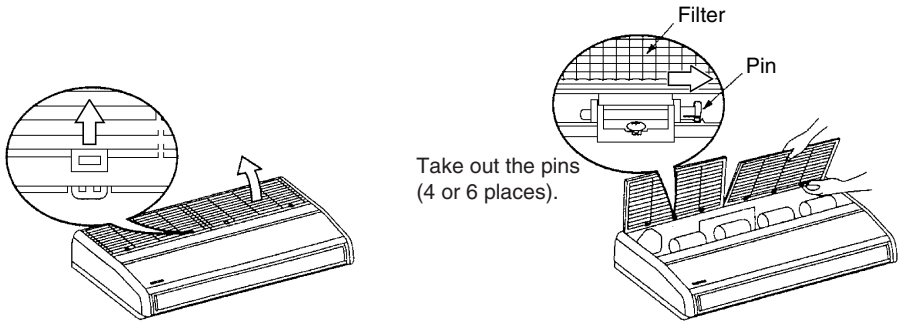
Unit : mm



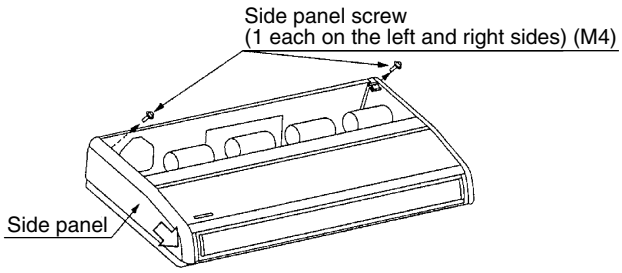
6. This unit uses a microcomputer as a control device. Therefore avoid installing the unit near the equipment that generates strong electromagnetic waves and noise.

4.10.2 Installation preparation

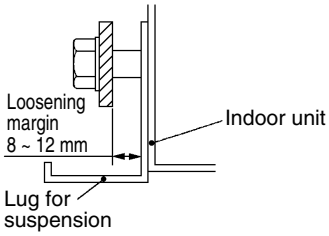
1. Remove the air inlet grille.
   Slide the stoppers (4 places).

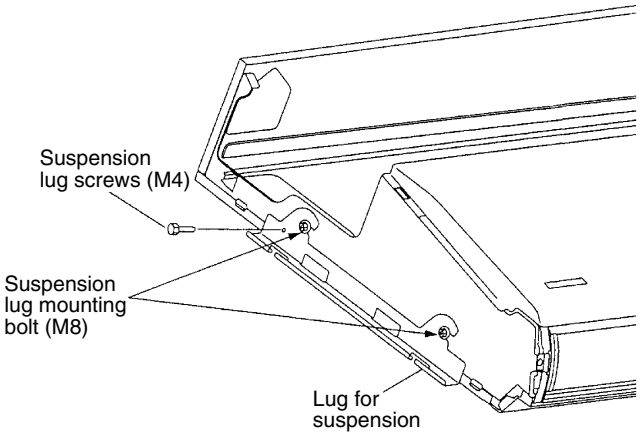


2. Remove the side panels.
   Take out the screws, then slide the side panels in the arrow direction to remove them.

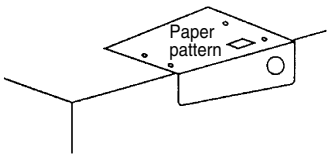


3. Remove the suspension lug.
   Take out the screws, then loosen the installation bolt.

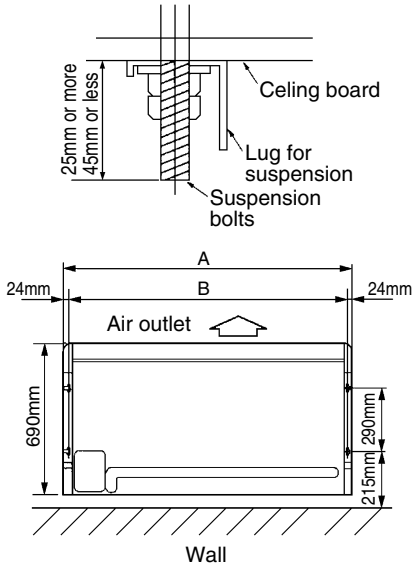




4. Suspension bolt position
   a) Using the paper pattern supplied as an accessory as a criterion, select suspension bolt positions and piping hole positions, then install the suspension bolts and make holes for piping. After positioning, remove the paper pattern.



   b) Keep strictly to the suspension bolt lengths specified below.

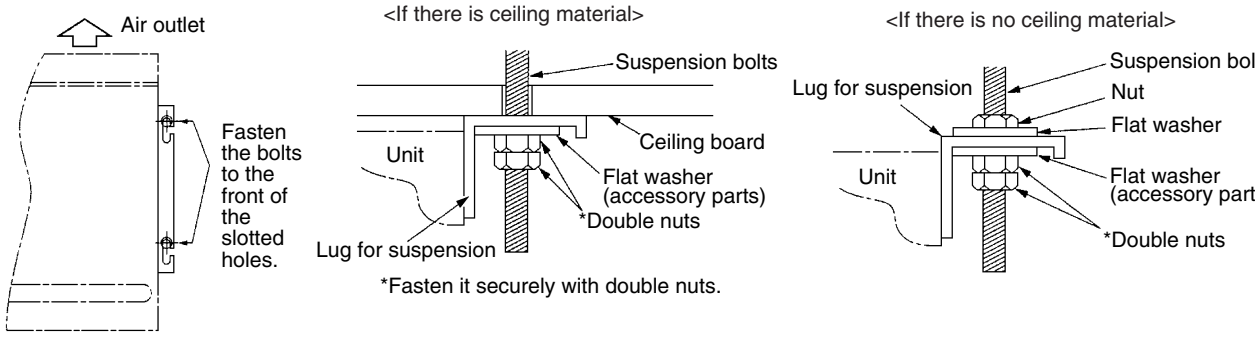


Unit : mm

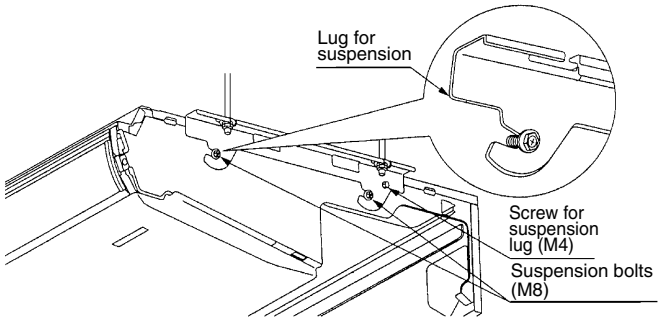
Model	A	B
FDEA 36, 45	1070	1022
FDEA 56, 71	1320	1272
FDEA 112, 140	1620	1572

4.10.3 Installation

1. Fasten the suspension lugs to the suspension bolts.

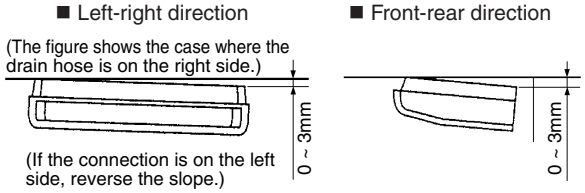


2. Attach the unit to the suspension lugs.
   ① Slide the unit onto the suspension lugs from the front, hanging it on the bolts.
   ② Fasten the unit securely on the left and right sides with 4 suspension bolts (M8).
   ③ Tighten the 2 screws (M4) on the left and right sides.



Note (1) After sliding the side panels on from the front to rear, fasten them securely with the screws.

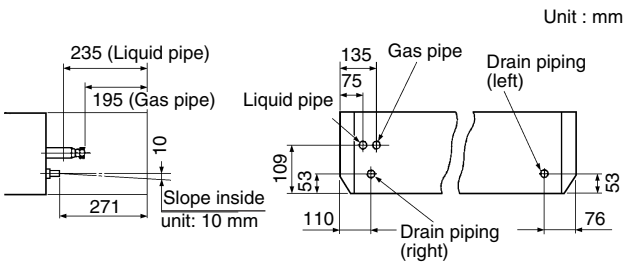
3. In order to make it easier for water to drain out. install the unit so that the water drain side slopes downward.



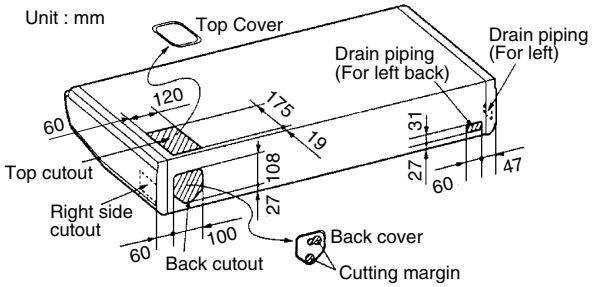
⚠ **Note**: If the slope is reversed, there is danger of water leaking out.

4.10.4 Refrigerant piping

1. Piping position



2. Piping connection position
   Piping can be connection from 3 different directions. Remove the cutout from hole where the piping will be connected using side cutters or similar tool. Cut a hole for the piping connection in the back cover according to the cutting margin shown. Cut a hole in the ceiling side in accordance with the position of the piping. Also, after the piping is installed, seal the space around the piping with putty, etc. to keep dust from getting inside the unit. (In order to prevent damage to wires from the edges, be sure to use the back and top covers.)

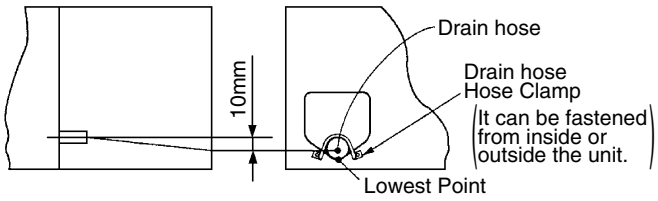


4.10.5 Drain piping

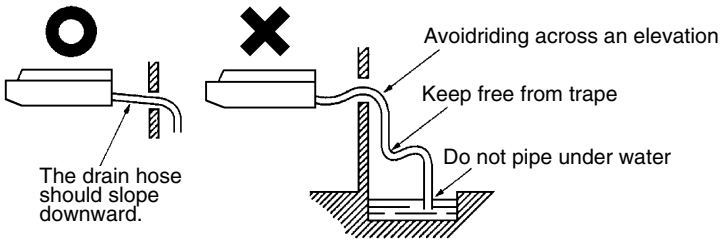
1. Drain piping can be connected from the back, right and left sides.
2. When installing drain piping, be sure to use the insulating material supplied for the drain hose and drain hose clamp.
   (a) Connect the drain hose fully all the way to the base of the fitting.
   (b) Fasten the hose securely with the drain hose clamp.
   (c) Keep strictly within the lengths specified below for the suspension bolts.
3. If drain piping is installed on the left side, change the rubber plug and insulating material (tubular) from the left side piping connection port to the right side.

⚠ **Note**: Be careful that water doesn't pour out when the drain plug is removed.

⚠ **Warning**: Use the fitting supplied with the unit to connect the drain hose, fastening it at the lowest point so that there is no slack, and establishing a 10 mm drain slope.
* Keep electrical wiring from running beneath the drain hose.



⚠ **Note**: Be sure to fasten the drain hose down with a clamp.
There is danger of water overflowing the drain hose.



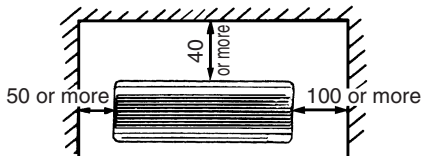
4. After piping has been installed, check to make sure water drains well and that there is no overflow.

4.11 Wall Mounted Type (FDKA)

4.11.1 FDKA22~56KXE4A

4.11.1.1 Selection of installation location

Unit : mm



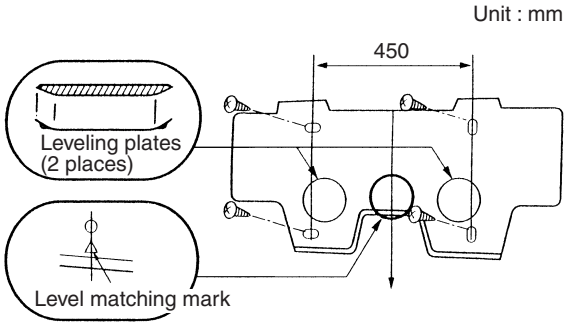
Select the installation location that meets the following conditions and obtain the customer's consent.

a) Location where cold and warm air spread all over the room.
b) Location where piping and wiring to the outdoors can easily be laid down.
c) Location where the drain can be discharged completely.
d) Location where the wall to mount the unit is rigid.
e) Location where there is no wind obstruction to the return air and supply air grills.
f) Location not exposed to direct sunshine.
g) Avoid the location exposed to oil splash or vapor.
h) Avoid the location near to the machine emitting high-frequency radio wave.
i) Avoid the location where the receiver of remote control is subject to strong illumination.
j) Select the location where the unit can securely be operated by the wireless remote controller referring to the Article "Effective distance of wireless remote controller" indicated at the backside.
k) Secure the space for inspection and maintenance work.

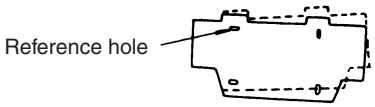
4.11.1.2 Attaching of mounting plate

1. The indoor unit weighs approx, FDKA22~56 model : 12kg. Therefore, check whether the portion to install the unit can bear the weight of unit. If it seems to be danger, reinforce the portion by a plate or a beam before installing the unit. It is not allowed to install the unit directly on the wall. Whenever you install the unit, use the attached mounting plate.
2. Find structural members (Intermediate pillar, etc.) suitable for mounting the unit, then install the unit firmly while checking levelness.

Unit : mm



3. Adjust the level of mounting plate under the condition that four screws are tightened temporarily.

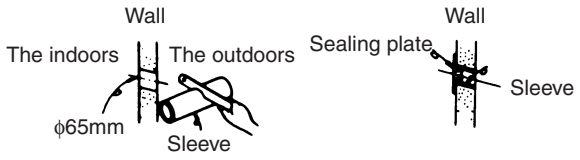


4. Turn the mounting plate around the reference hole to adjust the levelness.

⚠ **WARNING** Install the unit where it can bear the weight with sufficient strength margin. In the case of insufficient strength or insufficient installation work, the unit may fall and cause injury.

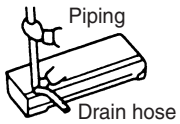
4.11.1.3 Procedure for making hole on the wall

Make a downgrade (5°) from the indoors toward the outdoors.



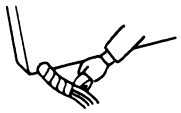
4.11.1.4 Forming of piping and drain hose

1. Rear take out case
   a) Forming of piping



Hold the root portion of piping, change the direction then expand and make forming.

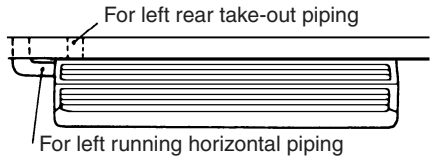
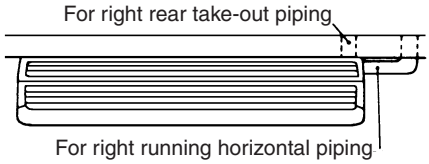
   b) Tape winding



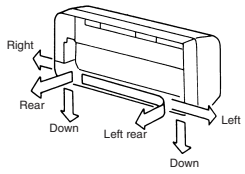
Wind the tape on the portion which passes through the hole on the wall.
Always make taping on the wiring which crosses with the piping, if any.

Note (1) After forming of piping and before tape winding, confirm that the connecting wire is securely fixed to the terminal block.

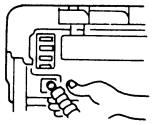
2. Cautions for left take-out and rear take-out case
   a) Looking down

For left running horizontal piping	For right running horizontal piping
	

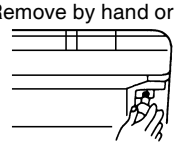
   b) The piping can be taken out from the rear, left, left rear, right and down.



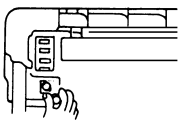
   c) Procedure for changing drain hose
      ① Remove the drain hose.
      Pull the drain hose off while turning the end around.



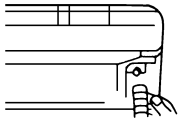
      ② Remove the drain cap.
      Remove by hand or pliers.



      ③ Insert the drain cap.
      Insert the drain cap which was removed in procedure 2 securely using a hexagonal wrench, etc.
      ⚠ **Note** When it is not inserted securely, water leakage may occur.

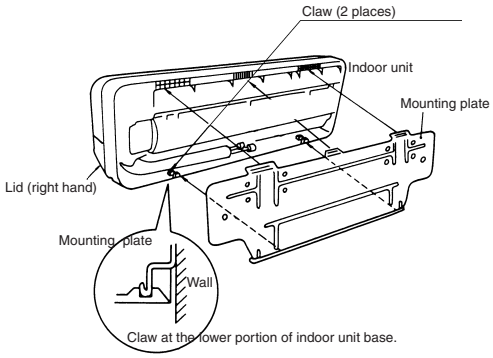


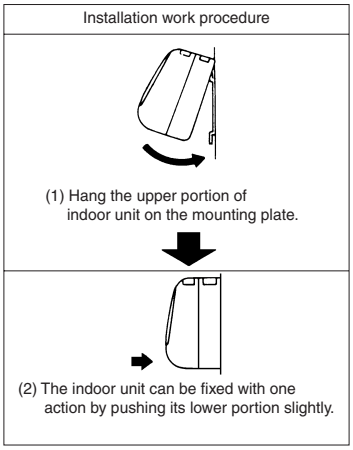
④ Connect the drain hose.
Push the end of the drain hose onto the fitting while turning it around
Note When it is not inserted securely, water leakage may occur.



4.11.1.5 Installation of unit

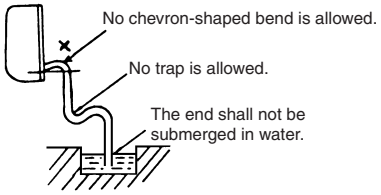
To remove the unit from the mounting plate, remove the right and left lids then remove the claw at the lower portion of base.

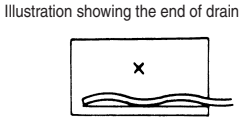




4.11.1.6 Drain piping

1. Lay the drain piping with downgrade to facilitate flow of drain,and do not make a trap or chevron-shaped bend. (The drain piping can be taken out from the unit to the left, right, rear and down direction.)
2. Wrap the thermal insulator on the hard vinyl chloride pipe (VP-16) laid in the room.
3. Run the drain piping in a place where there is no fear of abnormal odors being generated at the end of the drain hose.
4. Do not run the drain piping directly into a sewer where sulfur-based poisonous or flammable gases are generated. There is danger of poisonous or flammable gases penetrating into the building through the drain piping.
5. Pour water into the drain pan below the heat exchanger to check that water is drained outdoors.

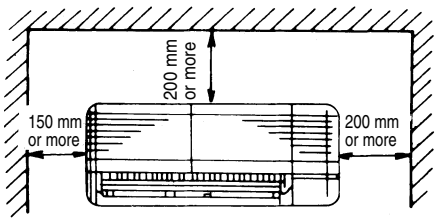




4.11.2 FDKA71KXE4A

4.11.2.1 Selection of installation location

1. Select the best position and direction depending on the shape of room and height of ceiling to ensure that the cooled or warmed air will be circulated sufficiently.



Cold air throw Unit : m

Item \ Model	FDKA71
Air throw	8

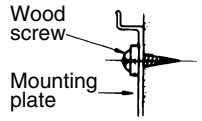
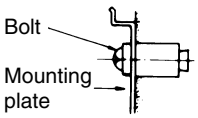
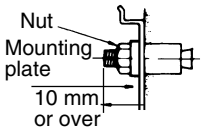
[Conditions]

① Fan speed: Hi
② Location: Free space without obstacles
③ Distance of reach indicates the horizontal distance after the wind touched down the floor.
④ Air yelocity at the throw:0.5 (m/sec.)

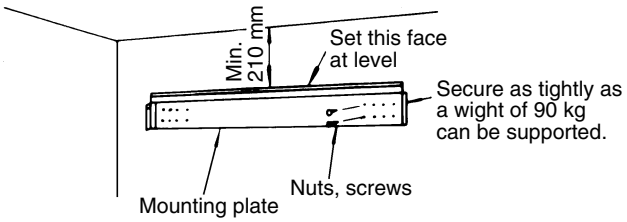
2. Where there is no obstacle around the air inlet port or air outlet port.
3. Where a sufficient space can be reserved for the service of air filter and the attachment/removal of panels.
4. Places exposed to oil splashes or steam (e.g. kitchens and machine plants).
   Installation and use at such place will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
5. Where pipes and wires can be arranged conveniently.
6. On the solid floor
7. Where the unit is not exposed directly to sun light.
8. Place where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is generated or remains.
   Installation and use at such places will cause corrosion in the heat exchanger and damage in molded synthetic resin parts.
9. Where a complete draining can be assured.
10. Where a sufficient space can be reserved for service.

4.11.2.2 Method to install the mounting plate

1. Indoor unit weighs about 20 kgs. Be sure to check closely the installation place and, if any risk is expected, provide a sufficient reinforcement with plates or beams. Indoor unit cannot be secured directly on the wall, etc. Attached mounting plate must be used.

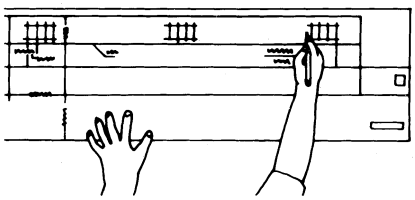
Wooden wall	Concrete wall (Use marketed anchors (M6))	
	Example of nut anchor	Example of bolt anchor
		

2. When installing a mounting plate on the wall, adjust it at level precisely and fix securely. Use the marketed anchor bolts (M6) when the wall is made of concrete.

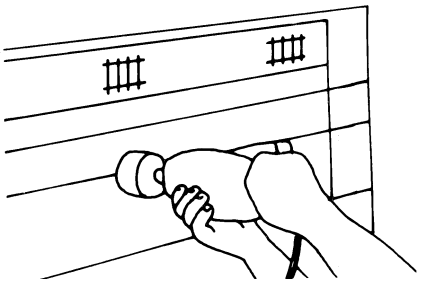


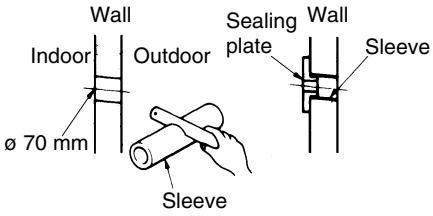
4.11.2.3 Installation

1. Use an attached pattern sheet and mark the position of screws to attach the mounting plate.



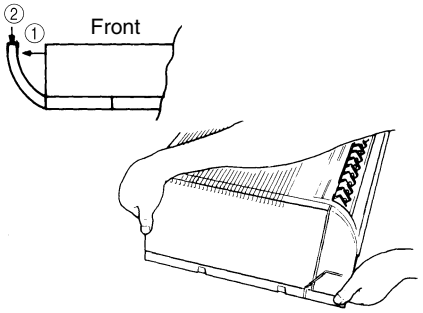
2. Determine the direction to lead the pipe and bore a through hole on the wall aligning with the pipe hole of unit.



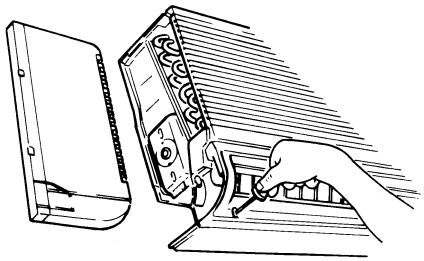


Cut the sleeve for the thickness of wall and insert in the hole.

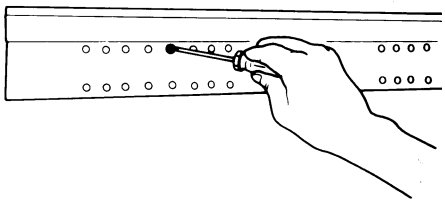
3. Remove screws (2 pcs.) and remove the right and left panels from the Indoor unit. (Remove screws first, move slightl to remove.)



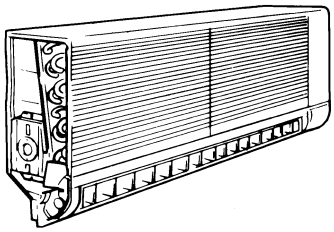
4. Remove the lower panel from the Indoor unit. It can be remove if 3 screws are loosened but not removed.



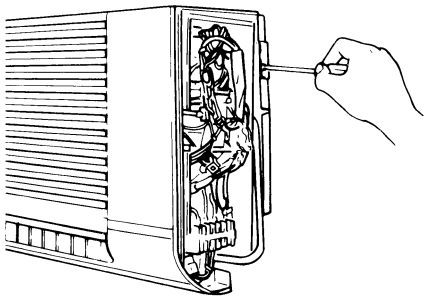
5. Secure the mounting plate with screws at a selected place on the wall. When the wall is made of concrete, use the marketed anchor bolts (M6)



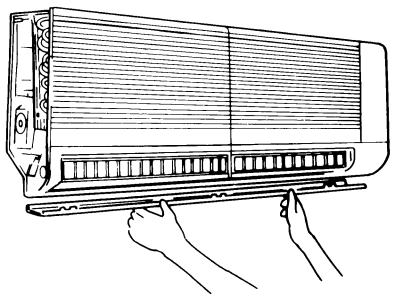
6. Hook and install the indoor unit on the mounting plate from top. Hook slightly at left at first and return to right.



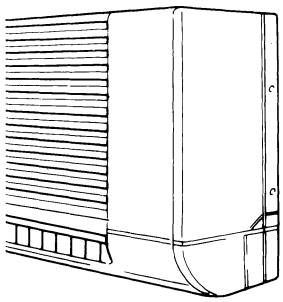
7. Fix the indoor unit on the mounting plate with a screw.



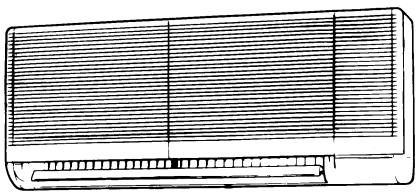
8. Install the lower panel at the original position.



9. Install the right and left side panels at their original position.



10. This is all for the installation.



4.12 Floor Standing Exposed Type (FDFLA)

4.12.1 Selection of installation location

1. A place where good air circulation and delivery can be obtained.

Cold air throw Unit : m

Item \ Models	All models
Air throw	4

[Conditions]

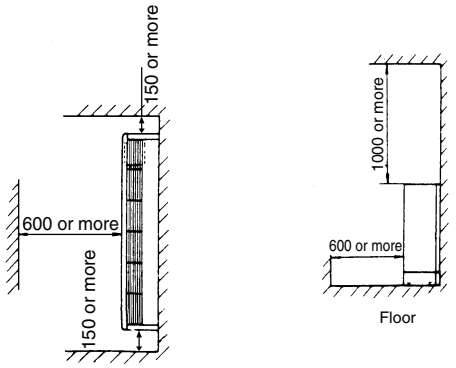
① Fan speed: Hi
② Location: Free space without obstacles
③ Distance of reach indicates the horizontal distance after the wind touched down the floor.
④ Air velocity at the throw: 0.5 (m/sec.)

2. Where there is no obstacle around the Air inlet port or Air outlet port.
3. Where a sufficient space can be reserved for the service of air filter and the attachment/removal of panels.
4. Places exposed to oil splashes or steam (e.g. kitchens and machine plants).
   Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
5. Where pipes and wires can be arranged conveniently.
6. On the solid floor
7. Where the unit is not exposed directly to sun light.
8. Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is generated or remains.
   Installation and use at such place will cause corrosion in the heat exchanger and damage in molded synthtic resin parts.
9. Where a complete draining can be assured.
10. Where a sufficient space can be reserved for service.

Floor standing installation

Unit : mm

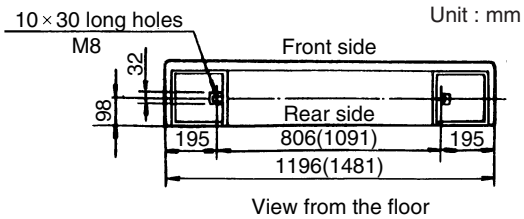
Floor fixation Wall fixation



4.12.2 Bolt positions

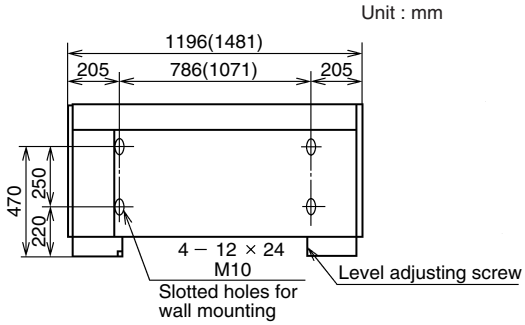
1. Bolt positions for metal settings used for floor fixation.
   Metal fitting used for floor fixation (accessories).

Unit : mm



Note (1) Value in ( ) indicates 71 type.

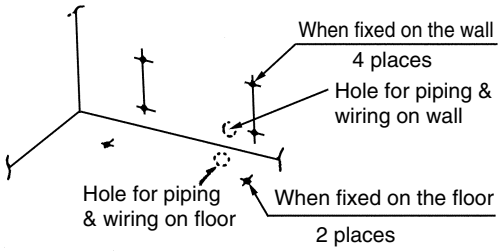
2. Bolt positions for wall fixation

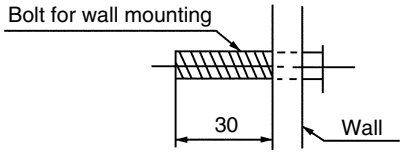


4.12.3 Installation of unit

1. Floor standing installation

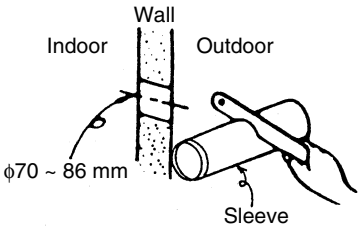
a) Position of mounting bracket fixing bolts Drill holes by referring to figures below.

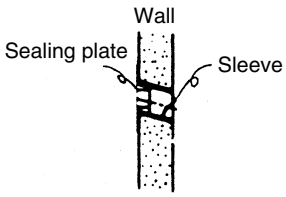




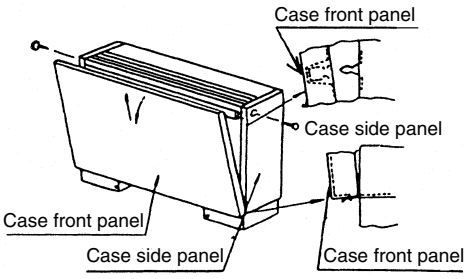
Note (1) Be sure to use a bolt of the length for wall mouning.

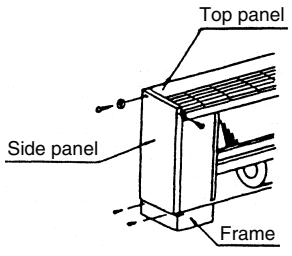
b) The methed of drilling the wall is as follows.





c) Remove the front and side panels.

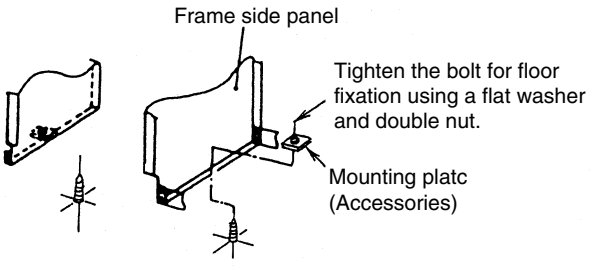




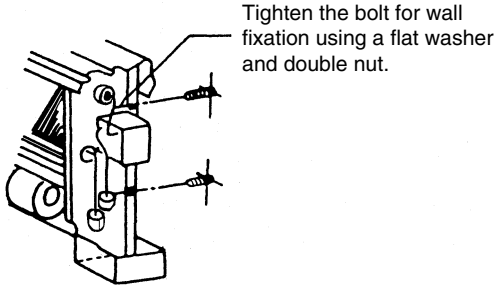
d) Level the unit using the level adjusting screw. Installation will be completed after attaching side and front panel.

e) Exceute fixation following the directions described below.

■ When fixed on the floor



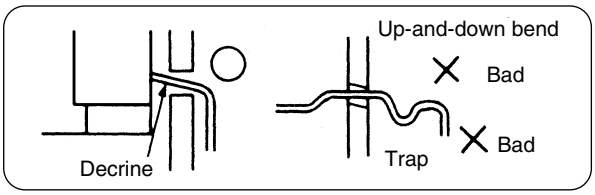
■ When fixed on the wall



4.12.4 Drain piping

The drain piping can be directed to the floor or rear sides as follows.

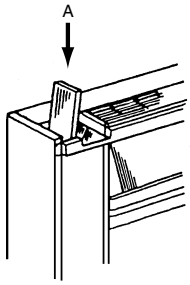
1. Connect a drain piping to the drain outlet and fix it by use of tigghening band.
2. Indoor side drain piping must be thermally insulated.
3. After finishing the drain piping, check the drainage by pouring some water in the drain pan.



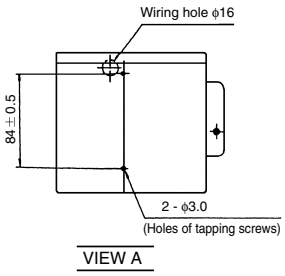
4.12.5 Installation of remote controller (on the indoor unit)

Attached remote controller may be installed on the indoor unit as shown below. The work can be done on the spot when the customer asks so or by other reasons.

4.12.5.1 Detach the front panel



Unit : mm

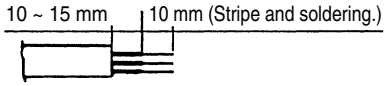


4.12.5.2 Remote controller installation

- Attach the lower case with the screws (M4 × 128) accessory.

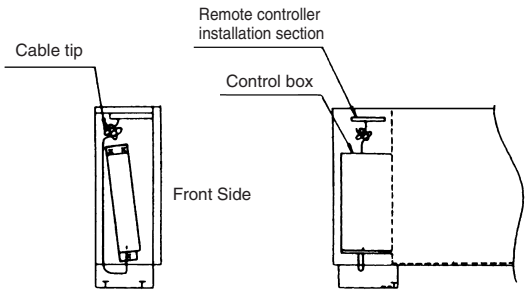
4.12.5.3 Remote controller wiring

1. Connect the terminals between the remote controller and the control box as per these wire color codes:[(X) (red). (Y) (white), (Z) (black)], using the wires included in the kit.
2. The wires should have a surplus length of approximately 30 cm. (Necessary when servicing with the front panel detached.)
3. Strip and solder as shown below when cutting the wire. (Omitting the soldering process may cause looseness of the wiring.)



4.12.5.4 Wiring route

1. Wire from the wiring hole through the rear side of the control box to the terminal block.
2. Any surplus wires should be tied up with a cable tie.



4.13 Floor Standing Hidden Type (FDFUA)

4.13.1 Selection of installation hidden location

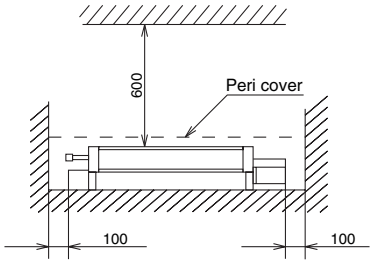
1. A place where good air circulation and delivery can be obtained.
   ■ Cold air throw Unit : m

Item \ Models	All models
Air throw	4

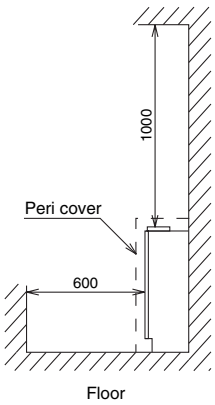
   [Conditions]
   ① Fan speed: Hi
   ② Location: Free space without obstacles
   ③ Distance of reach indicates the horizontal distance after the wind touched down the floor.
   ④ Air velocity at the throw: 0.5 (m/sec.)
2. Where there is no obstacle around the Air inlet port or Air outlet port.
3. Where a sufficient space can be reserved for the service of air filter and the attachment/removal of panels.
4. Places exposed to oil splashes or steam (e.g. kitchens and machine plants).
   Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
5. Where pipes and wires can be arranged conveniently.
6. On the solid floor
7. Where the unit is not exposed directly to sun light.
8. Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is generated or remains.
   Installation and use at such place will cause corrosion in the heat exchanger and damage in molded synthtic resin parts.
9. Where a complete draining can be assured.
10. Where a sufficient space can be reserved for service.
    Floor standing installation

Unit : mm

● Floor fixation



● Wall fixation

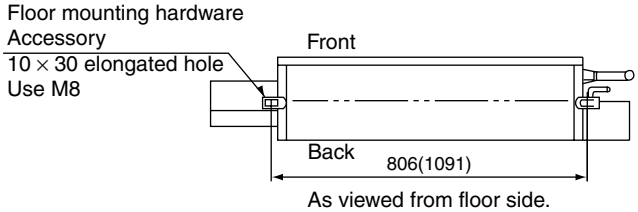


4.13.2 Bolt positions

1. Bolt positions for metal settings used for floor fixation.
   Metal fitting used for floor fixation (accessories).

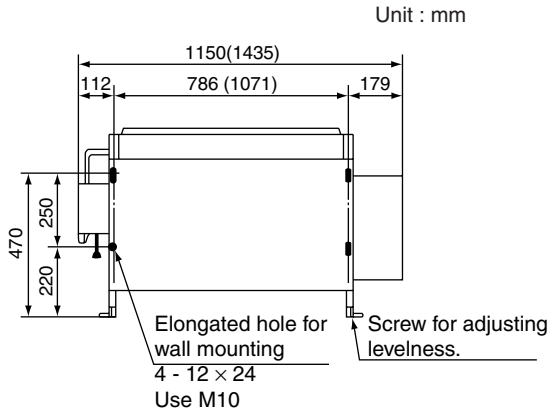
Unit : mm

Bolt positions for floor mounting hardware



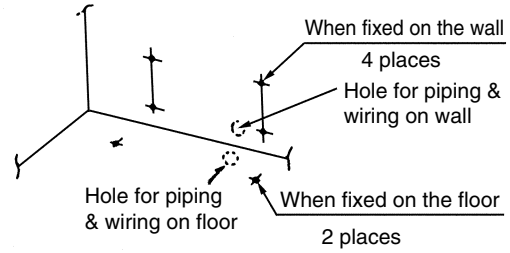
Note (1) Value in ( ) indicates 71 type.

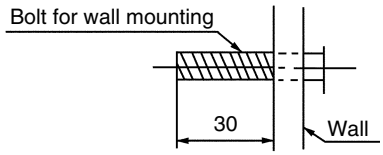
2. Bolt positions for wall fixation



4.13.3 Installation of unit

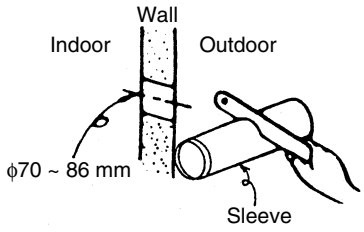
1. Floor standing installation
   a) Position of mounting bracket fixing bolts
   Drill holes by referring to figures below.

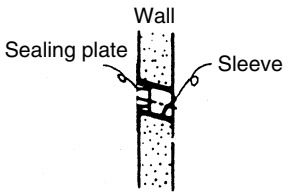




Note (1) Be sure to use a bolt of the length for wall mouning.

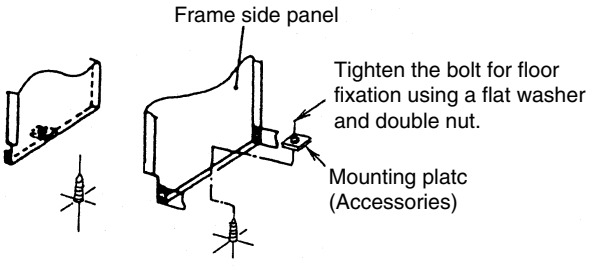
b) The methed of drilling the wall is as follows.



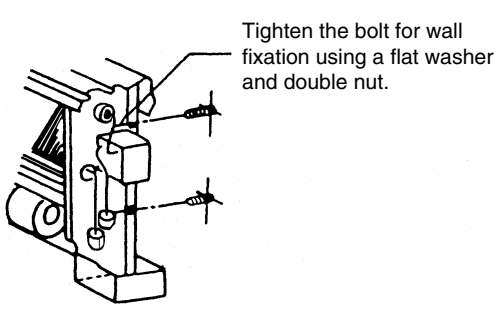


c) Level the unit using the level adjusting screw. Installation will be completed after attaching side and front panel.
d) Exceute fixation following the directions described below.

● When fixed on the floor



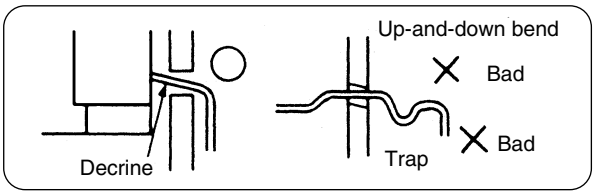
● When fixed on the wall



4.13.4 Drain piping

The condensate drain piping can be directed to the floor or rear sides as follows.

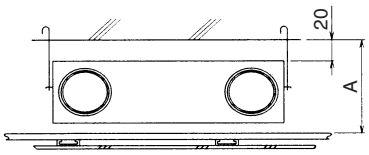
1. Connect a drain piping to the drain outlet and fix it by use of tigghening band.
2. Indoor side drain piping must be thermally insulated.
3. After finishing the drain piping, check the drainage by pouring some water in the drain pan.



4.14 Air-to-air Heat Exchange Unit (SAF)

4.14.1 Cautions for installation

1. This air-to-air Heat Exchange Unit should be installed at the place where a larger space than the sizes shown below can be secured for the ceiling space.

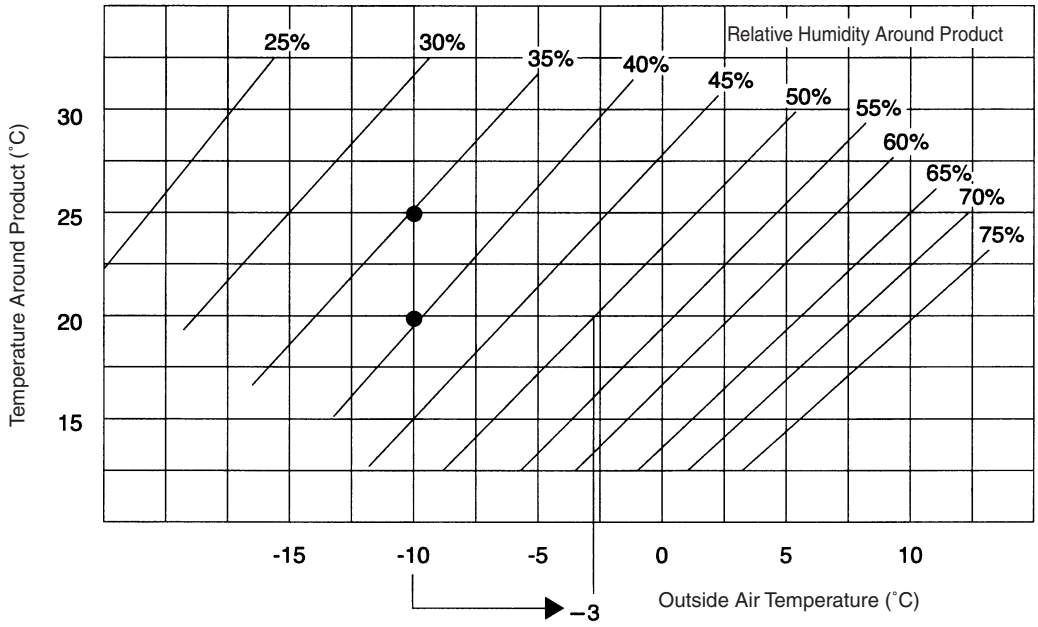


Unit : mm

Model No.	Ceiling Space A	Model No.	Ceiling Space A
SAF250E4	320	SAF800E4	440
SAF350E4		SAF1000E4	
SAF500E4		SAF1000E4S	

2. Don't install it near the water-heater.
3. Do not use in bathrooms or food preparation areas etc.
   If you use the unit at the place of much soot and high humidity, the filter or the heat exchange element gets clogged and disables you to use it.
4. Use the air-to-air Heat Exchange Unit in the ambient temperature of 40°C or less.
   Never install the unit at the place where the flame likely reaches directly the unit. If you use it at the atmosphere of more than 40°C, it is likely to cause deterioration or deformation or damege of the resin part.

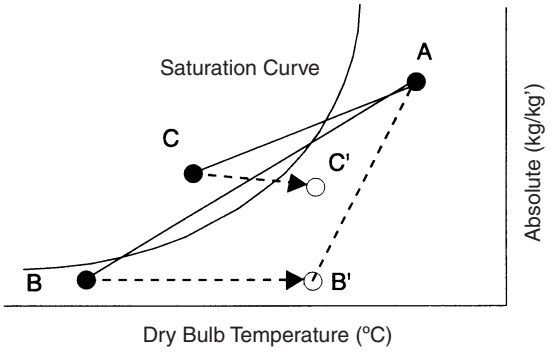
5. Be careful of dewing and frosting.
   a) Condensation on the product's surface
   If the temperature and humidity in the air around the product are high and the outside temperature is low, condensation may form on the outside surface of the product. The following graph shows the limit conditions for occurrence of condensation on the product's surface relative to the temperature and humidity surrounding the product and the outside air temperature.



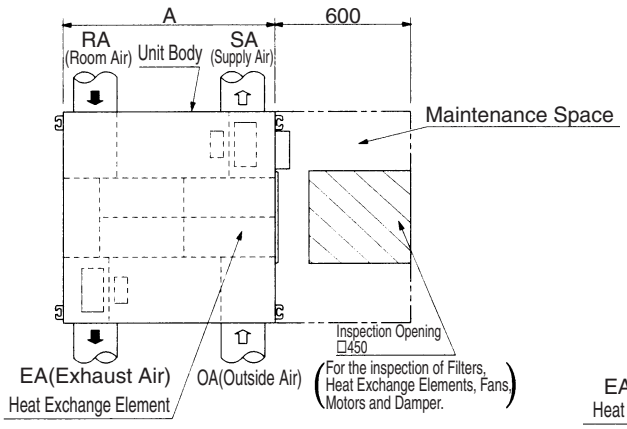
Use the humidity around the product determined from this graph as shown below.

[Example 1]
If the outside air temperature is –10°C and the temperature of the air around the product is 20°C, condensation will not form on the product's surface if the relative humidity around the product is below 40%. However, if the temperature of the air around the product is 25°C, it is necessary for the relative humidity around the product to be below approximately 35%.
[Example 2]
In places where the outside air temperature is –10°C and the temperature of the air around the product is 20°C, and there is danger of the relative humidity around the product changing to 40~50%, condensation may form on the surface of the product, so countermeasures to preheat the outside air from –10°C to –3°C are necessary.

   b) Condensation on the Heat Exchanger Element
   As shown in the graph at right, points are plotted along the line between condition A, with high temperature air being drawn in, and condition B, with low temperature air being drawn in. Heat is obtained by the heat in the air from high temperature side A being exchanged at the heat exchanger unit, and in the case where the air conditions exceed the saturation curve, as in the case of point C, condensation forms on the heat exchanger element or frost forms. In such a case, Use low temperature side air B by heating it to point B' so that point C does not exceed the saturation curve but remains inside it at point C'.



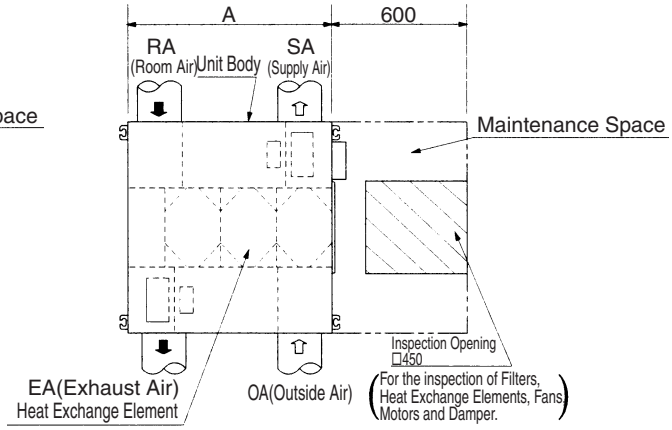
6. The inspection opening shown below is necessary to clean the heat exchange element and the filter once or twice a year. If not cleaned, they are likely to get clogged, resulting in poor performance.



Note) Model SAF250E4 has one Heat Exchange Element.

Unit : mm

Model No.	A
SAF250E4	599
SAF350E4	804
SAF500E4	904



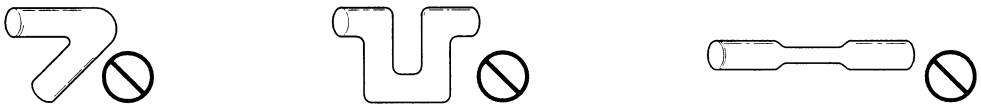
Note) Model SAF1000E4 and SAF1000E4S have four Heat Exchange Elements.

Unit : mm

Model No.	A
SAF800E4	884
SAF1000E4	1134
SAF1000E4S	1134

7. Avoid the following duct installation works.

(1) Excessive bending (2) Multi-time bending (3) Making the connecting duct smaller



4.14.2 Unit suspension

1. You are required to prepare the ceiling suspension bolts, nuts and washers.
2. Install the unit firmly and horizontally enough to support its weight. (Fig. 1)

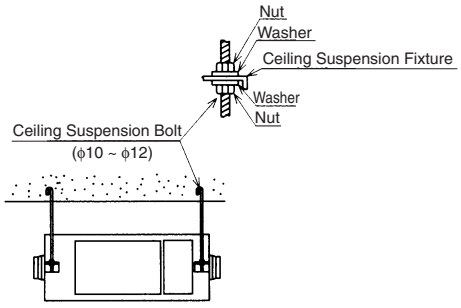


Fig. 1

3. If you do not fit it securely, it is not only dangerous but also can easily vibrate.
   If it is not fitted horizontally, the damper unit becomes defective in operation.

Caution(1) When you are required to be cautious on prevention of vibration, we recommend you to use the anti-vibration ceiling suspension fixtures.

(2) Never fail to make an inspection opening with □450mm or more at the place shown on the paragraph of "Cautions For Installation", so that you can inspect filters, Heat Exchange Elements, power source and motors.

(3) Cautions on installing the unit body upside down

a) Re-fit the ceiling suspension fixture in an opposite side.
(If they are left as it is, the foolproof function of ceiling suspension bolts do not work and will cause the danger of dropping of the unit.)

b) Printed indication is in a reversed position.
In particular, be careful of the arrow mark [⇧] showing the direction of inserting a Heat Exchange Element.

4.14.3 Duct installation

1. Seal the junction of an adaptor and a duct with an aluminum tape firmly to prevent any air leakage.
2. The room intake opening should be positioned as far as possible from the inside supply opening.
3. Use the specified ducts. (See the table below.)

Model	Nominal Diameter
SAF250E4	ϕ150
SAF350E4	
SAF500E4	ϕ200
SAF800E4	ϕ250
SAF1000E4	

4. Install two outdoor ducts so they will be in the down gradient toward outside to prevent water from coming in. (Gradient : 1/100~1/50) (Fig. 2)

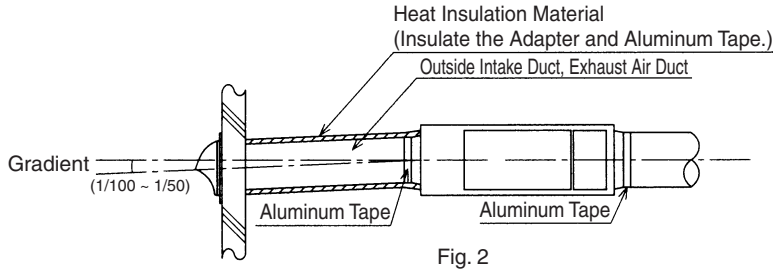


Fig. 2

5. Never fail to heat-insulate two outdoor ducts (including outside air and exhaust air duct) to prevent dewing. (Material : Glass Wool, Thickness-25mm) (Fig. 2)
6. When you want to pierce the metal duct through the metal lath or the wire lath or the wire lath or the metal plate of the wooden facility, do not forget to insulate electrically between the duct and the wall. (Refer to the laws and regulations of the country concerned and the technical standard.)

4.15 Notice on Installation

No.	Classification		Items to be Checked	Standard	Reference Page	Remarks
1	Indoor / Out-door	Insta-llation	Is the installation space for indoor and outdoor units within the specified limit? ■ Ventilation space ■ Indoor unit: dimension above the ceiling	1. Check whether the outdoor unit has any index of air circulation short circuit; the difference between the ambient air temperature and the air suction temperature of the outdoor unit must not exceed 3deg. 2. Indoor unit: are the air reaching distance limit, the air circulation short circuit limit and the upper dimension of the ceiling appropriate?	P.253, 260, 266, 272, 296, 300, 314, 318	■ The following troubles might occur if the outdoor units suffer from any short circuit of air circulation: 1. Malfunction: high pressure stop (E40), abnormal discharge temperature (E36), defrosting difficulty. 2. Poor heating and cooling effect due to capability decline. 3. Compressor failures
2			Has the base of outdoor units been processed? Have any base bolts been installed? ■ Have any anti-tipping methods been discussed? ■ Is the drainage of condensed water and rain water being obstructed?	■ A structure that enables the smooth drainage of rain water and condensed water is required to be available.	P.246	■ Malfunctions such as abnormal vibrations occur.
3	Indoor		Is the installation position for the indoor unit (the position of the suspension bolts) consistent with the position of the holes drilled on the ceiling?	1. The positions must be consistent.	P.254, 261,267, 273, 281, 296, 300, 315, 318	1. Position inconsistency →abnormal vibration; air leakage between the panel and the main body leads to poor cooling, heating effect and water leakage.
4			Is the size of the suspension bolts used the same as specified?	■ Confirmation is a must.		Abnormal vibrations and fall-off of air-conditioning units might occur.
5			Have any protection measures been taken to the indoor units to prevent possible contamination from the construction soldering material splashes?	1. The unit must not be unpacked until the installation starts. 2. The corrugated boards included must be used as a protection measure after the unit is installed.	—	■ Welding substances may splash onto and penetrate the drain pan, resulting in hazardous water leaking accidents.
6			Is the air condition inside the ceiling within the specified limit?	■ 28°CDB, relative humidity below 80%	—	■ Indoor unit: non-compliant air-conditions inside the ceiling →hazardous dew condensation and water leakage.
7	Outdoor		Are the combination air-conditioner and the main unit installed at the first branch manifold closest to the indoor unit?	1. The main unit must be located at the first branch manifold closest to the indoor unit.	—	1. The following malfunctions may arise when the sub unit stops for a long time due to excessively light load: ■ Abnormal discharge temperature: refrigerant permeating into the sub unit →E36 ■ Main unit: No. 1 compressor in poor condition: oil permeation into the sub unit.
8	System		Is the length of the refrigerant piping within the specified limit?	■ Confirmation is a must.	P.342	
9			Is the height difference between the indoor unit and the outdoor unit within the specified limit?	■ Confirmation is a must.	P.342	
10	Indoor	Drain Piping	Does the drain piping incline downward during the construction?	■ Appropriate gradient = 1/50 - 1/100	P.255, 263,268 274, 283, 298, 303, 317, 320	■ If the drain piping is not kept inclined, back-flow and water leakage may occur.
11			Are "water return pipes" installed in the drain piping?	■ No water return pipe should be installed in units having an exterior static pressure of 0Pa.		■ If return pipes are installed, the water won't flow smoothly and water contained in the drain pan of the unit may spill over (leak).
12			Is the main drain pipe connected to the top of the main pipe?			■ When the indoor unit stops, water may back flow from the general piping.
13			Does the drain piping of the units using drain pumps (built-in or optional) have a suitable vertical height?	■ 600 - 750mm(calculated from under the ceiling or the unit)		■ If the height limit is exceeded, drainage will become impossible and water leakage will happen. ■ In addition, back-flow may result in spillage of the drain pan.
14			Are the attached standard drain hoses used in the units using the drain pump?	■ Standard hoses must be used.		■ If the drain piping on site is directly connected to the units instead of using the standard hoses, the connection will be very difficult (due to no margin specified in the dimension).
15			Are the attached straps used for fixing the typically supplied hoses?	■ No adhesives are permitted.		■ Adhesives, a solvent in nature, will dissolve the hoses and form holes and voids on the hoses.
16			Is the site drain piping of the units using drain pumps adjacent to the units?	■ Between 295 and 325mm.		■ If the limits are exceeded, drainage failure or back-flow will occur when the drain pump stops running and water spillage (leakage) will be caused in the drain pans as a result.
17			Does the drain piping absorb any peculiar smell?			