Instruction Manual

Multiblade Fan with Silencer Box

Sirocco Fan with Silencer Box – Model CLFII-U / CLFIII-U / CLF5-U

⚠ Warning

Do not carry out operation, inspection or maintenance of the fan until you read this manual and understand the content.

Keep this manual carefully at hand so that it can be consulted anytime when operating, inspecting or maintaining the fan.

For contractors who carry out equipment work:

Please be sure to deliver this manual to user(s) who will carry out operation, inspection and maintenance of the fan.

Teral Inc.

Limited warranties

1. In the event of failure or breakage under the proper use of the product during the warranty period, equipment supplied by Teral Inc. (hereinafter referred to as TERAL) will be repaired or replaced free of charge within the scope of the relevant part, provided that such failure or breakage is attributable to inadequacy of the design or workmanship of the equipment.
2. The warranty mentioned in the above clause shall be only the mechanical warranty of the defective part, and shall not cover any expenses or other damage arising from the failure or breakage.
3. In the event of the following failures and breakage, the costs of the repairs shall be for the account of the user.
   (1) Failures and breakage attributable to equipment that was not delivered by TERAL
   (2) Failures and breakage occurred after the expiration of the warranty period
   (3) Failures and breakage caused by disasters or force majeure, such as fire, acts of God or earthquakes
   (4) Failures and breakage resulting from repairs or modifications made without the consent of TERAL
   (5) Failures and breakage occurred when parts other than those designated by TERAL are used
4. TERAL shall not be liable for the damage caused by incorrect or reckless use of the fan. Cost and expenses incurred for sending engineer(s) in such a case shall be borne by the user.
5. If the cause of the failure is unclear, necessary actions shall be determined through mutual consultation.

Purpose of this manual

The purpose of this manual is to provide the user with detailed information necessary to properly operate, maintain and inspect the fan.

This manual contains the following information and is intended for persons experienced in the operation of fans, or for those who have been trained by such experienced persons. Only qualified personnel such as electrical engineers are allowed to carry out the electrical wiring work.

Contents

1. Safety precautions

1.1 Types and meanings of warning terms

This instruction manual divides precautions into the following four categories according to the level of hazards (or the severity of the accident).

Be sure to understand the meanings of the following terms and comply with the content (instructions) of the instruction manual.

Warning Term	Meaning
⚠ Danger	Indicates an imminently hazardous situation. Failure to observe the procedures or instructions will result in death or serious injury.
⚠ Warning	Indicates a potentially hazardous situation. Failure to observe the procedures or instructions may result in death or serious injury.
⚠ Caution	Indicates a potentially hazardous situation. Failure to observe the procedures or instructions will result in minor or moderate injury or cause damage to equipment or devices.
Note	Indicates information that is in particular to be noted or emphasized.

1.2 Safety precautions

1.2.1 Precautions for placement and installation

(1) Move and place the fan considering the center of gravity and weight.
(2) Install it according to the instruction manual.
(3) Do not install it anywhere exposed to direct flame or high temperature.
(4) Do not install it anywhere with high humidity, such as a bathroom.
(5) Do not install it in any places where toxic gases are produced from acids, alkalis, organic solvent, paint or other substances or where corrosive gases are produced, for example in machine shops or chemical plants.
(6) Install the outdoor air intake in a position far away from the exhaust vents of combustion gas, etc.
(7) Be sure to install a ground fault interrupter to the main power.
(8) Only qualified personnel such as electrical engineers are allowed to carry out the electrical wiring work. Before working, be sure to turn off the main power.
(9) Do not forcibly bend, pull, or pinch the motor connection cables. Failure to observe this may result in an electric shock.
(10) Do not expose the motor to water.
If it gets wet, the resulting short circuit and/or insulation degradation of the electric circuit may damage the fan.
(11) Install a protective wire mesh etc. to the open air intake.

1.2.2 Precautions for operation

(1) Before starting the fan, ensure that all the relevant workers are informed of the operation and that there are no workers in the dangerous zone.
(2) Only those who are authorized by the site manager are allowed to operate the fan.
(3) Ensure to apply the rated voltage to the fan.
(4) When the fan is running, never touch any parts of the unit unless it is absolutely necessary.

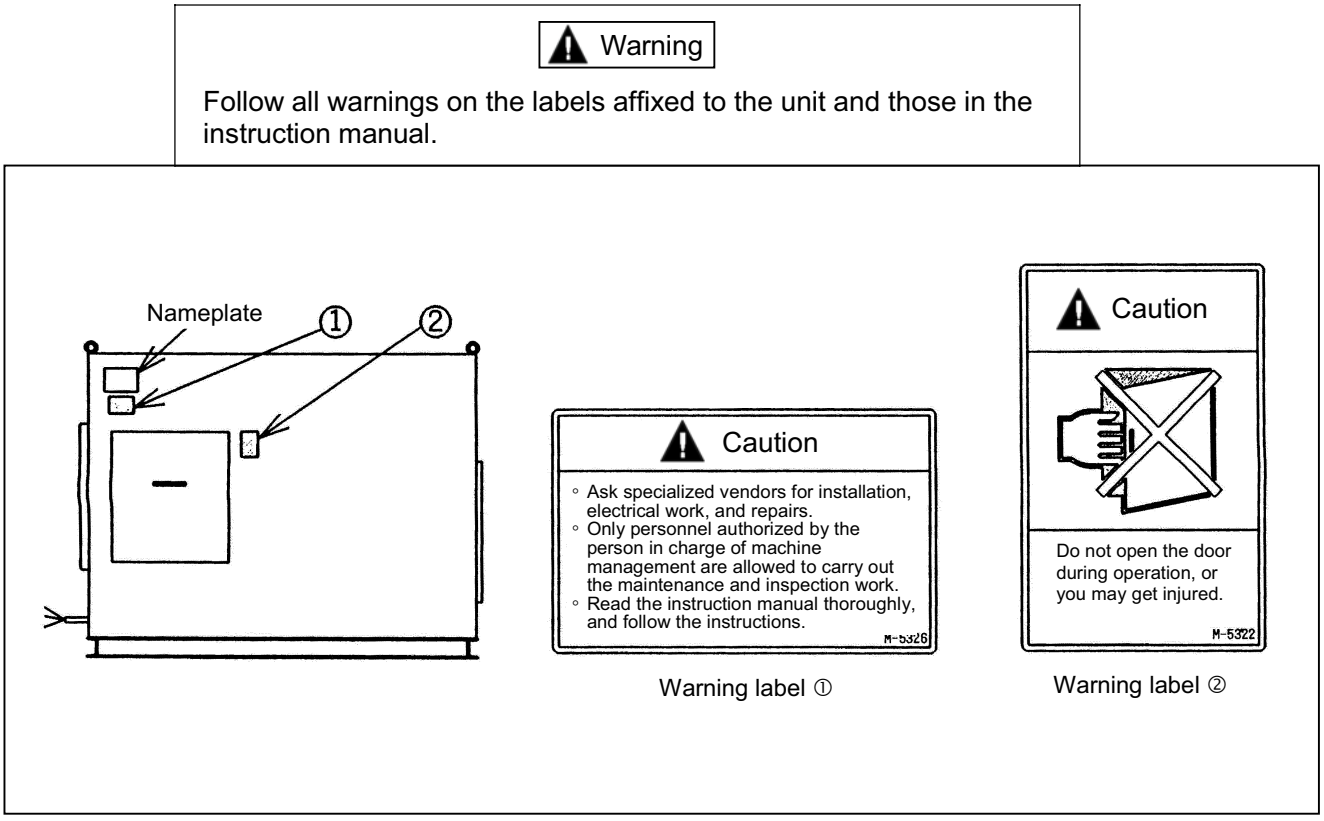
(5) Do not put your fingers or other objects into the air intake or exhaust vents.
(6) Do not put your fingers or other objects into the opening of the motor. Failure to observe this may cause an electric shock, injury, or fire.
(7) Do not place any objects around the air intake or exhaust vents of the fan.
(8) When the fan is running, do not open the inspection door of the silencer box.
(9) Remove any tools and other objects from the top of the fan before operation.
(10) Do not operate the fan if there are any defects or faulty parts.

1.2.3 Precautions for maintenance and inspection

(1) Maintenance and inspection must be carried out only by personnel who have been trained to handle the fan.
(2) Before starting maintenance or inspection, ensure to inform the relevant personnel of the operation.
(3) Before starting the maintenance or inspection work, ensure to stop the fan and turn off the main power on the operation panel.
If you carry out the maintenance or inspection work with the power on, you may suffer an electric shock and/or get injured by unexpected activation of the fan during the work.
(4) Consult Teral, Inc., or a service company before moving, repairing, or modifying the fan.

1.3 Location of the warning labels

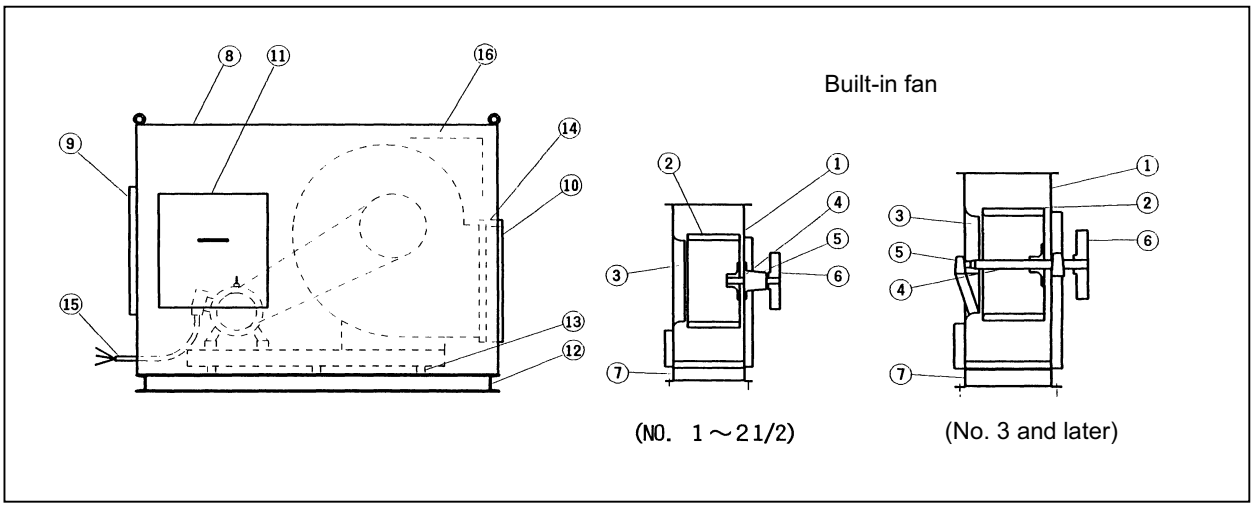
The figure below shows the locations to which each warning label should be affixed. If these labels become dirty and hard to read or if they are peeled off, replace with a new one.



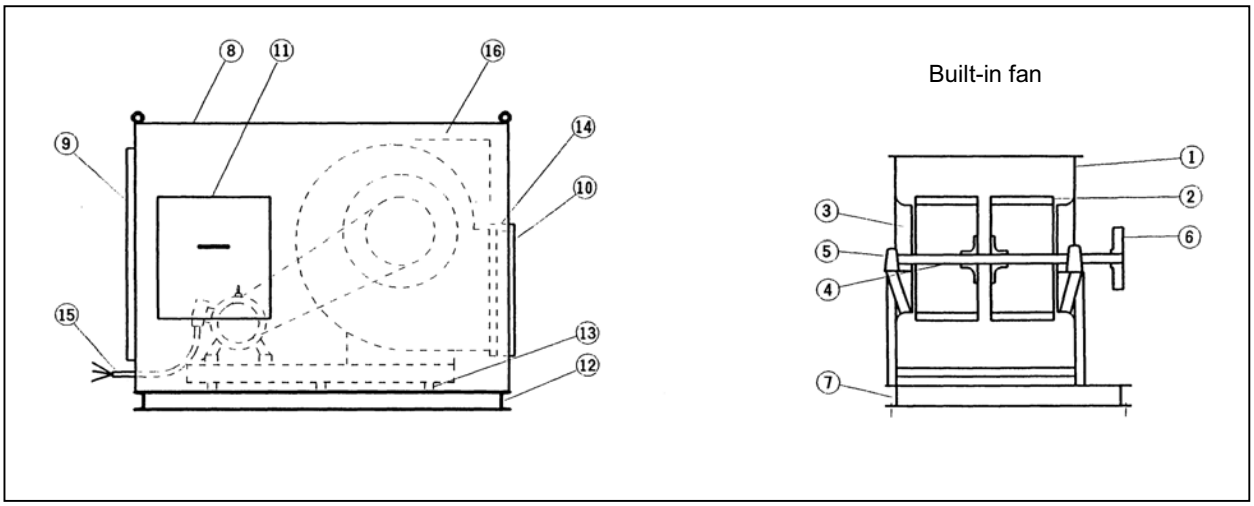
2. Configuration and overview of the fan

2.1 Structure and part names of the fan

(1) Model CLFIII-U-RS and CLF5-U-RS



(2) Model CLFII-U-RD



No.	Part name	No.	Part name
①	Fan casing	⑨	Intake companion flange
②	Impeller	⑩	Discharge companion flange
③	Air intake	⑪	Inspection opening
④	Main shaft	⑫	Silencer box base
⑤	Bearing case	⑬	Vibration-proof rubber
⑥	V-belt pulley	⑭	Packing
⑦	Common base	⑮	Cable
⑧	Silencer box	⑯	Sound absorbing material

2.2 Specifications and accessories of the fan

If you purchased a standard product, refer to the standard specifications in the following table. For a custom-made product with special specifications, refer to the specifications including the external dimensions drawing.

> **⚠ Caution**
>
> Do not use this product under any conditions other than those provided in the specifications. Failure to observe this may cause an electric shock, fire, and/or product failure.

(1) Standard specifications and special specifications

Standard specifications	Air		Clean air
			0°C to 40°C
	Installation location		Indoor (ambient temperature: 0°C to 40°C)
	Installation method		Floor-mounting / Ceiling-mounting
	Motor	Type	Totally enclosed type (0.4 kW and lower)
			Drip proof type (0.75 kW and higher)
		Phase, voltage	50Hz, 3 phases, 200V
			60Hz, 3 phases, 200/220V
	Painting		Prime coating and interior coating: Anti-corrosive coating
			Finish coating: Acrylic alkyd resin paint (Munsell 7.5BG5/1.5)
Special specifications	Structural change		Position of inspection opening changed
			Position of air intake changed
	Motor modifications		Totally-enclosed-fan-cooled type
			Different voltage
	Paint changes		Paint color specified

(2) Standard and special accessories

Standard accessories	Special accessories
Companion flange	Foundation bolt
Common base	Intake mesh
Vibration-proof rubber	Intake damper
V-belt pulley on the fan side	Discharge damper
V-belt pulley on the motor side	Intake filter
V-belt	Connecting pipe
	Expansion joint

3. Placement and installation

3.1 Before using the fan

When you receive the fan, check the following points first.
If there are any problems, contact the sales agent you purchased the product from.
Handle the motor according to the instruction manual of the motor.
Incorrect handling may result in an accident or failure.

(1) Check the nameplate to verify that the unit is the one you ordered.

(2) Check that the discharge direction, rotation direction, and power transmission methods are as ordered.

(3) No part of the product is damaged during transportation.

(4) All fastening parts including bolts and nuts are securely tightened.

(5) All the accessories that you ordered have been delivered.

3.2 Precautions during transportation and storage

3.2.1 Precautions for transportation

⚠ Warning

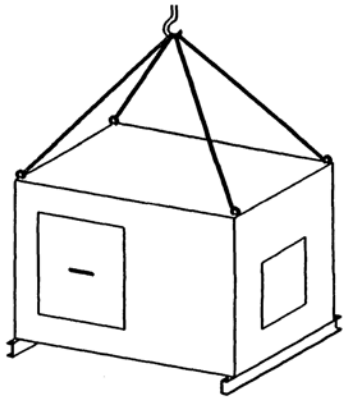
- Do not get under the suspended fan. The fan may fall onto you.
- Ask a specialist company to move and place the fan in consideration of the center of gravity and weight.
- Before hoisting the unit, refer to the catalogue or external dimensions drawing etc. to confirm that the weight of the fan does not exceed the load limit of the hoisting equipment.

⚠ Caution

Pay special attention to nails especially when opening a wooden box that contains the unit, or you may get injured.

(1) To lift the fan, use the lifting eyes on the top of the silencer box.

(2) Use as long ropes and wires as possible so that the fan can be lifted at an angle of 90° or less, which prevents the fan from being deformed/damaged by the lifting load.



3.2.2 Precautions for storage

(1) Protect the unit so that rust does not form during storage before installation or assembly. In particular, take measures to protect the silencer box against the entry of rainwater and dust, for example by covering them with a vinyl sheet.

(2) Protect the motor connecting cables, electric components such as motors for indoor use, and other parts against moisture.

3.3 Precautions for the location of installation

Install the fan in a place where the following conditions are satisfied:

(1) This fan is intended for indoor use. Install the fan in a place not exposed to the wind, rain, etc. Furthermore, ensure to prevent rainwater from being sucked into the fan.

(2) Well-ventilated place with minimum exposure to dust or moisture

(3) Place with an ambient temperature of 0°C to 40°C

(4) Do not use the fan in a way that may cause condensation inside the machine at the temperature and humidity of intake air on site.

(5) Place that is not accessible by unauthorized persons or that is impossible for them to operate the fan at.
Take measures to prevent unauthorized persons from having access to the fan, for example by installing a barrier.

(6) Place where the fan can be easily and safely inspected and repaired.
Ensure that there is enough space for assembly, disassembly, repairs and other operations of the fan.

(7) If you install the fan indoors, ensure that the room has doors that are wide enough to allow the fan to pass through.

3.4 Foundation

(1) The foundation must be strong enough to withstand the weight of the fan as well as the vibration and load during its rotation.

(2) Ensure to maintain the levelness of the foundation concrete without any ground subsidence. If the ground is soft, reinforce it by driving piles or through other methods.

(3) The weight of the foundation needs to be 2 to 4 times the total weight of the fan including the motor.

(4) To prevent the transmission of vibrations, isolate the machine foundation from the posts and floor of the building.

(5) To prevent the transmission of vibrations between two or more foundations, isolate each foundation.

(6) In principle, make “boxed-out” holes in the foundation concrete, and fix the foundation bolts into the holes during the installation of the fan. For the positions of the foundation bolt holes, refer to the external dimensions drawing.

(7) To lay down a foundation on the second or higher floors—for example for installing building equipment, locate the foundation as close to wall(s) as possible while aligning the foundation with a beam.

3.5 Installation

3.5.1 Floor-mounting type

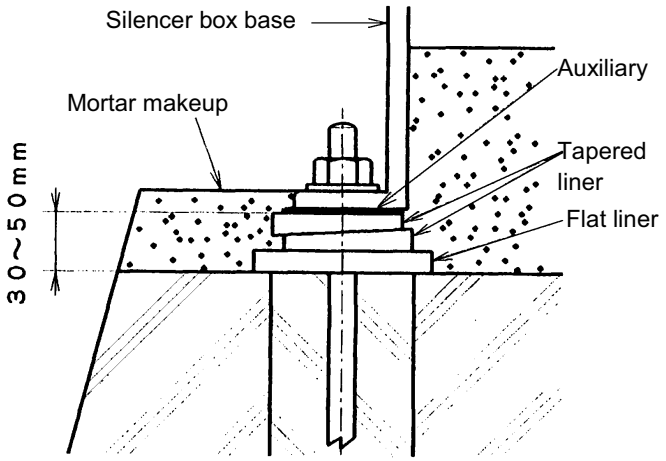
Carry out the following steps to install the fan using the foundation bolts (“boxed-out” method). (Select appropriate steps according to each case, for example where foundation bolts are set in place before installation.)

(1) Clean the surface of the foundation concrete, and check the levelness. Chipping may be needed in some cases.

(2) Clean the foundation bolt holes and remove any dust or debris.
Although the foundation bolt holes need to be wet, they may not collect any water. Thoroughly discharge water from the holes.

(3) As shown in the figure, place one flat liner and two tapered liners onto each foundation bolt hole of the fan.
Use an auxiliary liner (3 mm or thicker) as needed.
If the distance between foundation bolts exceeds 1 m, install an additional liner.

(4) Put the silencer box base on the liners. Then pass each foundation bolt through the foundation bolt hole of the silencer box base to allow the bolt to enter the “boxed-out” hole.
To make the fan earthquake-resistant, weld each foundation bolt to reinforcing bars of the foundation concrete.



(5) Adjust the position and height of the fan using the tapered liners.
The levelness of the shaft should be 0.1 mm per 1 m, as a guide.

(6) After sufficiently roughening the inner surface of each foundation bolt hole, fill the hole with non-shrinkage mortar.
At that time, ensure that the foundation bolt is at right angles to the center of the hole.

(7) After the mortar has fully hardened, securely tighten the nut of each foundation bolt.
Be careful not to tighten the nuts unevenly.
Weld the liners to prevent them from shifting during operation.

(8) Fill the gap between the silencer box base and the foundation concrete with an adequate amount of mortar to form a concrete structure.

(9) Check the mortar for shrinkage, cracks, or any other defects.

(10) To install vibration-proof springs, place them equally around the center of gravity of the fan assembly unit.

(11) When the fan is installed and the ducts are connected, carry out the alignment work described in the upcoming section 3.6.

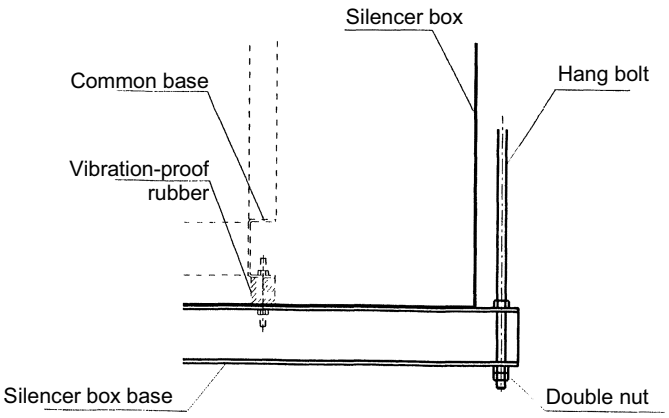
3.5.2 Ceiling-mounting type

(1) Horizontally install the silencer box base onto the hang bolts mounted in the ceiling. Ensure that the load is evenly distributed among all the bolts.

(2) The hang bolts and their mounting condition must be strong enough to sustain the load.

(3) After installation, install a locknut to each hang bolt to prevent them from loosening.

(4) To make the fan earthquake-resistant, securely install the fan onto a shaped steel frame fixed to a building structure.



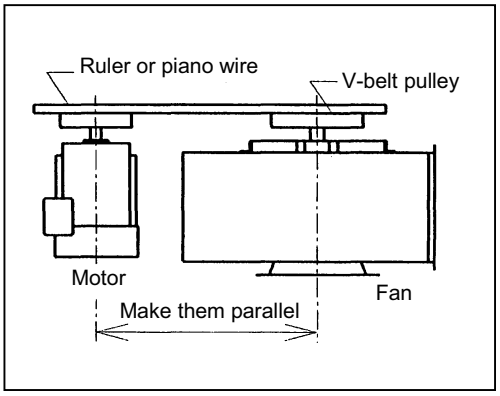
3.6 Alignment

The fan is aligned at the factory before shipping, but should be realigned after installation.

> **⚠ Warning**
>
> To carry out this alignment work, the inspection door of the silencer box must be opened. However, be sure to close the door before starting the fan.
>
> If you run the fan with the door open, the door may close suddenly or part of your body may get sucked in the machinery, thus causing injury.

> **⚠ Caution**
>
> Incorrect alignment may damage the equipment, or cause vibrations and noise. Align the fan correctly.

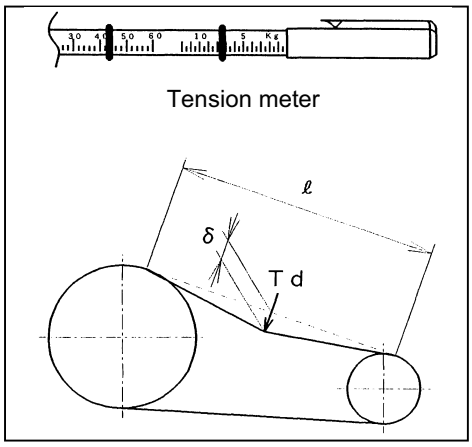
(1) Place a ruler or a piano wire onto the outer surfaces of the V-belt pulleys on both the fan and motor sides, and check and adjust it so that the surfaces of the pulleys are on a straight line (i.e. the axes of the pulleys are in parallel to each other).



(2) Since V-belts tend to stretch at the early stages of its use, ensure to readjust it in several days of use. Use the slide base of the motor to adjust the tension of the V-belt.
[Procedure]
- Determine the standard deflection δ: 0.016ℓ.
  (ℓ: Distance between pulleys)
- Then use a tension meter to give the standard deflection (δ mm) in the middle of the V-belt. Re-tension the belt (or adjust the tension) so that the deflection load at that time becomes the corresponding value in the following table.

Note

A too loose V-belt may slip or come off.
A too tight V-belt may reduce the service life of the bearings of the fan and motor.



Deflection load Td for each V-belt type and small pulley OD			
V-belt type	Range of small pulley outside diameter (mm)	Deflection load of new belt N/belt (kgf/belt)	Deflection load after re-tension N/belt (kgf/belt)
A	65 - 80	9.8 (1.0)	7.8 (0.8)
	81 - 90	11.8 (1.2)	8.8 (0.9)
	91 - 105	13.7 (1.4)	10.8 (1.1)
	106 -	15.7 (1.6)	11.8 (1.2)
B	115 - 135	17.7 (1.8)	13.7 (1.4)
	136 - 160	22.6 (2.3)	17.7 (1.8)
	161 -	24.5 (2.5)	18.6 (1.9)
C	175 - 205	35.3 (3.6)	27.5 (2.8)
	206 - 255	42.2 (4.3)	32.4 (3.3)
	256 -	50.0 (5.1)	38.2 (3.9)
3V	67 - 90	21.6 (2.2)	17.7 (1.8)
	91 - 115	25.5 (2.6)	19.6 (2.0)
	116 - 150	29.4 (3.0)	22.6 (2.3)
	151 - 300	33.3 (3.4)	25.5 (2.6)
5V	180 - 230	74.5 (7.6)	57.9 (5.9)
	231 - 310	90.2 (9.2)	69.6 (7.1)
	311 - 400	105.9 (10.8)	82.4 (8.4)

The values in ( ) are expressed in the traditional unit system and shown for reference only.

3.7 Precautions for connecting the ducts

> **⚠ Caution**
>
> Ensure to prevent any load of the ducts from acting on the fan.
> Failure to observe this may cause a failure, damage, and/or vibration.

(1) In order to prevent transmission of vibration and noise to the outside, connect the fan's flange and the duct using an expansion joint. Note that giving too much deflection to the expansion joint may cause pressure loss.

(2) Before connecting the ducts, check inside the ducts and fan, and remove any foreign matter, such as waste cloth and tools.

(3) In general, unexpected pressure loss may occur due to the connection to (a) ducts that are much smaller than the port diameter of the fan, (b) ducts with a series of bends, or (c) ducts with bends just before or after the connection to the fan.

(4) If the opening area just in front of the air intake of the silencer box is significantly reduced—for example by blocking the area with an iron plate, the air flow rate around the air intake rises, which may cause damage to the sound absorbing material lined inside.

> **⚠ Warning**
>
> If the air intake of the silencer box is open, be sure to install a protective wire mesh on it.

(5) To prevent foreign matter from being sucked into each place, install a protective wire mesh to the duct inlet or the air intake of fan where air is sucked directly.
If dust or water is expected to get inside the fan or the silencer box, install a filter to protect against it.

(6) If necessary, provide a damper for air volume control.
Do not install the damper close to the air intake of the silencer box.

Note

The gap between the air intake of the silencer box and the wall should be equal to or larger than the long side of the air intake of the silencer box.

3.8 Precautions for wiring work

> **⚠ Warning**
>
> Use high-quality wiring equipment and devices, and carry out wiring work safely and securely according to the technical standards for electrical facilities, as well as the indoor wiring regulations.
>
> Only qualified personnel such as licensed electrical engineers are allowed to carry out electrical wiring work.
>
> Unqualified persons are prohibited by law from performing wiring work and it is very dangerous.

(1) Be sure to install a ground fault interrupter and an overload protection device on the primary power side of the fan.

(2) Be sure to install a ground wire to prevent an electric shock.

- Do not connect the ground wire to gas pipes, water pipes, lightening arresters, or ground wires for telephone.

> **⚠ Warning**
>
> It is prohibited by law to perform incomplete wiring work, which exposes personnel to a great danger.

(3) The cable has been connected to the terminal in the motor terminal box, and drawn out of the silencer box.
Standard connections are direct-start for 7.5kW or smaller motors and Star-Delta starting for 11kW or larger motors.
Connect the cable and power supply according to the instruction manual of the motor.

> **⚠ Warning**
>
> Do not forcibly bend the motor connecting cable, run it into the fan, or pull it. Failure to observe this may result in an electric shock.

(4) Control the fluctuation of the voltage within ±10% of the rated voltage, and the frequency within ±5% of the rated frequency. If the product is not used within the range, it may break down.

(5) Before running the fan, check the following points again:

① An appropriate fuse (ground fault interrupter) is installed.
② Wiring is correct.
③ The product is securely connected to a ground.
④ None of the three terminals of the motor has come loose or is disconnected.
Keep in mind that running with connection of only 2 terminals results in open-phase operation, which may cause motor burnout.

4. Preparation for operation

4.1 Points to be checked before test running

4.1.1 Checking the electrical system

(1) Check that the fan is correctly wired.
(2) Check that the terminals are securely connected.
(3) Check that the equipment is securely grounded.
(4) Check that the settings of the overload protection device match the rated current value of the motor being used. The rated current value is indicated on the motor nameplate.

4.1.2 Checking the fan system

(1) Check that no water collects in the silencer box or the fan and that no foreign objects or materials such as tools are left inside.
(2) Check that all the connections on the foundation bolts, fan, accessories and pipe joints are securely tightened.
(3) Check that the dampers and valves can fully open and close, and that they operate normally.
(4) Check the alignment of V-belt pulleys and the tension of V-belt.

> ⚠ Warning
>
> Always turn OFF the main power before rotating the fan by hand.

(5) Rotate the fan by hand or by inching a motor to check that it can rotate smoothly without any internal obstructions.
(6) Place an operator in advance so that the fan can be turned OFF immediately after the instructions of the person in charge of the operation.

> ⚠ Warning
>
> Do not operate the fan if it is not running properly, for example if it is making a strange noise. Contact a specialist company or the service company designated by the manufacturer.

5. Operation

5.1 Precautions when starting the fan

> ⚠ Warning
>
> Be sure to close the inspection door of the silencer box before operating the fan.

(1) Close the damper and turn the unit ON and OFF once or twice to confirm that the unit is operating normally without any unusual noise or vibrations. Moreover, check the rotation direction of the fan at that time.
If the fan rotates in the reverse direction, swap two of the three wires of the power cable.

> ⚠ Warning
>
> Be sure to turn off the main power before changing the wiring of the fan.

(2) Turn on the power, and watch the unit closely until it reaches full speed.
At that time, carefully check for unusual noise, vibrations, current, or any other abnormal condition.

(3) Start the continuous operation, and gradually open the damper.
In order to check the condition of each part, keep the fan running at a low flow rate (light load) for 20 to 30 minutes.
At that time, ensure that the fan does not run at a rate where surging may occur.

(4) Gradually open the damper until the fan reaches the full load operation.
Keep it running under the condition for 1 to 3 hours, and check the temperature, vibrations and noise at each section of the fan.
In addition, check that the motor current value is normal.
Note that the (electrical) current value becomes higher when the temperature of flowing air is lower than the room temperature.
The bearing temperature may become slightly higher than usual for about one to two hours after the start of operation. If there are no errors in the machine, however, the temperature stabilizes afterwards.

5.2 Precautions during the operation

(1) Frequently starting and stopping the fan quickly damages it. Use the following values as a guide for the frequency of starting the fan.

Motor output	Startup frequency
7.5kW or less	Up to 6 times an hour
11kW to 22kW	Up to 4 times an hour

> ⚠ Warning
>
> In the event of a power failure, be sure to turn off the main power. Otherwise, when the power is restored, the fan suddenly starts, and it is dangerous.

5.3 Precautions when stopping the fan

(1) To stop the fan, gradually close the damper to the full and then turn OFF the power switch.

5.4 Precautions when stopping the use

> **⚠ Warning**
>
> When you leave the fan unused for a long period of time, be sure to turn off the main power.

(1) When you leave the fan unused for a long period of time, apply appropriate anti-corrosive agent to the areas prone to rust.

(2) Protect the motor and other electrical devices against moisture.

(3) Remove the V-belt before storing the fan.

(4) Cover the bearing with a vinyl sheet or other material to prevent contact with outside air and entry of dust.

(5) Before you run the fan after a long time of nonuse, inspect each part, and refill the bearing with grease or replace the bearing. (Refer to 6.2.1 "Refilling bearings with grease and replacing bearings.")

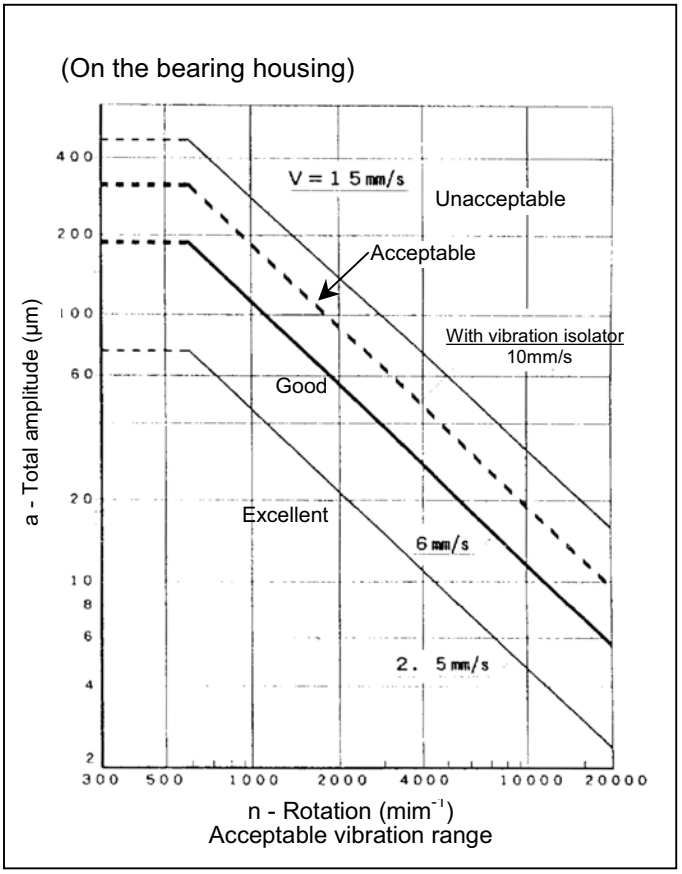
6. Maintenance and inspection

6.1 Daily inspection

(1) Check the vibration, noise, current value, etc. of the fan.
If there is any unusual condition, it may be a sign of failure; therefore, take the appropriate measures as soon as possible.
For this purpose, it is recommended to keep an operation log.

> **Warning**
>
> The main shaft, V-belt pulley, and V-belt are rotating during operation. Be extra careful not to get your clothes etc. caught in these parts.

(2) If strong vibrations occur, stop the operation and inspect the V-belt alignment, duct connections, tightening of the installation bolts and foundation bolts, and check for accumulation of dust on the impeller and damage to the bearings.
If the vibration is within the range specified as "Good" in JIS B 8330, it is considered normal (see the figure on the right).
If a vibration-proof device is installed on the fan, vibration of the fan itself becomes slightly stronger although the vibration is not transmitted to the foundation. In such a case, a vibration lower than the broken line is considered normal.



(3) In addition to vibrations, noise is an important factor in judging the operating condition.
If you hear a metallic sound possibly made by contact with the rotor, stop the operation immediately.
Continuous noise of air flowing inside the casing (such as “Goooo”, “Zaaaa”) is normal; however, discontinuous noise (such as “ZaaZaa”, “WonWon”) is caused by surging. An appropriate measure is required in the latter case, for example by changing the damper opening.

(4) Bearings generate noise even in normal condition.
Although it is difficult to identify an abnormal noise because bearings produce complicated noise, learn about the noises thoroughly to prevent an accident.

Normal noise produced at bearings

Type of noise	Normal noise
Race noise	It is a continuous noise without any sudden change. This noise is generated when a ball rolls on the race surface.
Roller dropping noise	It is a cyclic noise. When load applies in the radial direction (which is mostly the case), a ball is restricted by the load applied, and then released to be free, repeatedly. This noise is generated when the ball comes to the boundary. It occurs mostly with low speed bearings, but is harmless.
Retainer noise	A retainer maintains the relative position of the ball. There is a small clearance between the retainer and the outer ring, which allows the retainer to rotate; however, a continuous noise is generated when the retainer contacts the outer ring occasionally. It is a slightly annoying noise, but cannot be eliminated easily. It occurs mostly with low speed bearings, but is harmless.

Abnormal noise produced at bearings

Type of noise	Abnormal noise
Contaminant noise	Dust may get inside a bearing due to careless handling of grease or for other reasons. In such a case, the bearing makes an irregular grinding noise. Replace the old grease with new grease.
Damage noise	Any damage on the ball may generate a discontinuous irregular noise. Any damage on the race surface of the inner or outer ring may generate a continuous noise. If the noise is faint or insignificant, the bearing may still be used after being refilled with grease. If the nose becomes serious, replace the bearing.
Rust noise	The same problem described in the damage noise occurs. If the noise becomes serious, replace with a new bearing.
Scraping noise	It is a scraping noise without a regular cycle. This noise is generated when sliding occurs or lubrication is not effective between the ball and ring or between the ball and retainer. Replace the grease with high-quality grease.

6.2 Periodic inspection

⚠ Warning

Before carrying out the inspection of the fan, be sure to turn off the main power. Otherwise the fan may suddenly start up during automatic operation etc., exposing personnel to great danger.

Carry out the periodic inspection at least once a year.

The periodic inspection items include the following points, in addition to the daily inspection items.

(1) Refill the bearings with grease.
(2) Inspect the alignment and V-belt.
Inspect the V-belt for wear or damage, and check the tension. If necessary, replace or re-tension the V-belt.
(3) Inspect the play at the connection between the impeller boss and the main shaft.
(4) Inspect the impeller and the main shaft for corrosion and wear.
(5) Clean the inside of the fan, and apply anti-corrosive agent or otherwise make repairs.

6.2.1 Refilling bearings with grease or replacing bearings

(1) If your fan is fitted with the pillow block, you can use the fan without lubrication. For longer use, however, it is recommended to refill grease during periodic inspection.

(2) The following tables show the intervals and quantities of refilling grease. Be careful not to overfill. Overfilling may cause an accident related to bearings. Use Shell Alvania Grease No. 3. Do not mix in or apply any other type of grease.

(3) Avoid using the fan in a dusty place. If such use is unavoidable, refill grease more often than the specified intervals.

(4) While rotating the main shaft by hand, apply grease through the grease nipple using the grease pump.

(5) The structure of some fans may not allow grease to be refilled. In such a case, after using bearings for the duration of their service life, replace them with new ones.

Grease refilling interval of pillow block

Environment	Bearing temperature (°C)	Refilling interval
Clean	Max. 50°C	1 to 12 months
Dusty	Max. 70°C	1 to 4 months
Humid		1 week

Grease refilling quantity of pillow block

Bearing No.	Refilling quantity (g)	Bearing No.	Refilling quantity (g)	Bearing No.	Refilling quantity (g)
UCP204	1.2	UCP214	13.6	UCP314	31.5
UCP205	1.4	UCP216	18.8	UCP315	38
UCP206	2.2	UCP306	3.8	UCP316	41
UCP207	3.2	UCP307	5.7	UCP317	52
UCP208	3.9	UCP308	7.8	UCP318	62
UCP209	5	UCP309	9.4	UCP319	73
UCP210	5.4	UCP310	12.8	UCP320	92

6.2.2 Consumables

> **⚠ Caution**
>
> For replacement of parts, repairs, etc., ask a specialist company or the service center specified by the manufacturer.
>
> Incorrect work may cause a failure or an accident.

Refer to the table below for intervals to replace consumables.

Consumable	Condition of replacement (as a guide)	Cycle to replace (as a guide)
Pillow block	Abnormal noise	Once every 2 to 3 years
V-belt	Deterioration or wear	Once every 1 to 2 years

There are slight differences in length even between V-belts of the same size.
Use a V-belt of the same matched set for a single unit of the fan.
Do not use a combination of new and old belts.

7. Troubleshooting

7.1 Troubleshooting

Even if the same failure occurs, the cause and action may be different. In addition, there may be two or more causes.
If the cause and action cannot be determined using the following table, stop the operation immediately and contact a specialist company or the service center specified by the manufacturer.

Failure	Cause	Action
The bearing temperature is high.	Excess or lack of grease	Adjust it to the proper amount.
	Poor fit between the bearing inner ring and the main shaft	Replace the main shaft.
	Poor connection between the outer ring and bearing case of the bearing	Replace the bearing.
	Deterioration of grease, or entry of moisture	Change the grease. Replace the bearing.
	Excessive tension of the V-belt	Readjust the V-belt tension.
Strong vibration	Corrosion or wear in the impeller, or foreign matter on the impeller	Remove the foreign matter adhered to the impeller. Correct the balance of the impeller.
	Poor connection between the impeller boss and the main shaft	Replace the impeller or the main shaft.
	Unbalance of the V-belt pulley	Replace the V-belt pulley, or correct the balance of the pulley.
	Bend of the main shaft	Replace the main shaft.
	Contact between the rotor and casing	Reassemble the casing.
	Resonance caused by insecure foundations	Reinforce the foundations.
	Insufficient tightening of the mounting bolt	Retighten the bolt and nut.
	Damage to the bearing	Replace the bearing.
Abnormal noise	Damage to the bearing	Replace the bearing.
	Intake of foreign matter	Inspect the inside of the casing.
	Contact between the rotor and casing	Avoid the contact between the rotor, casing, and air intake.
	Contact with the belt guard	Readjust the V-belt tension,
Low performance	Decrease in rotational speed or frequency	Regulate the power supply.
	Reverse rotation	Swap the wires of the motor.
	Corrosion or wear in the impeller, or foreign matter on the impeller	Clean, repair, or replace the impeller.
	Clogging of the intake filter	Clean the intake filter.
	Failure in opening/closing of the damper	Repair the damper.
	Dust deposited inside the casing and duct	Clean the place.
	Excessive resistance	Consider installing a booster fan, or replace the V-belt pulley.
	Errors in calculating the specific weight of gas	Measure the specific weight, or perform a gas analysis.
Motor overload	Insufficient resistance	Adjust it with the damper.
	Excessive rotation	Replace the V-belt pulley.
	Errors in calculating the specific weight of gas	Reduce the rotational speed.

8. Special accessories

8.1 Damper

(1) Refer to the external dimensions drawing (supplied separately), and install the dampers in place paying attention to the direction of the air flow.
(2) Open and close the damper to check that the vane does not come into contact with the casing or ducts.
(3) If the damper is of an electric or air cylinder type, carefully read the instruction manual of the actuator before use.

8.2 Expansion joint

For the face-to-face dimension of the expansion joint, follow the external dimensions drawing. Do not expand or compress the joint. Do not use the expansion joint to correct the misalignment between the fan and duct.

8.3 Filter

Careful consideration must be given to the installation of the filter so that the fan can be disassembled easily, for example by using short ducts.
Before installing the filter, thoroughly clean the inside of the fan and ducts. The filter tends to clog easily immediately after the start of operation. Therefore, inspect the filter earlier than usual. After that, periodically remove the filter element and wash it.

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