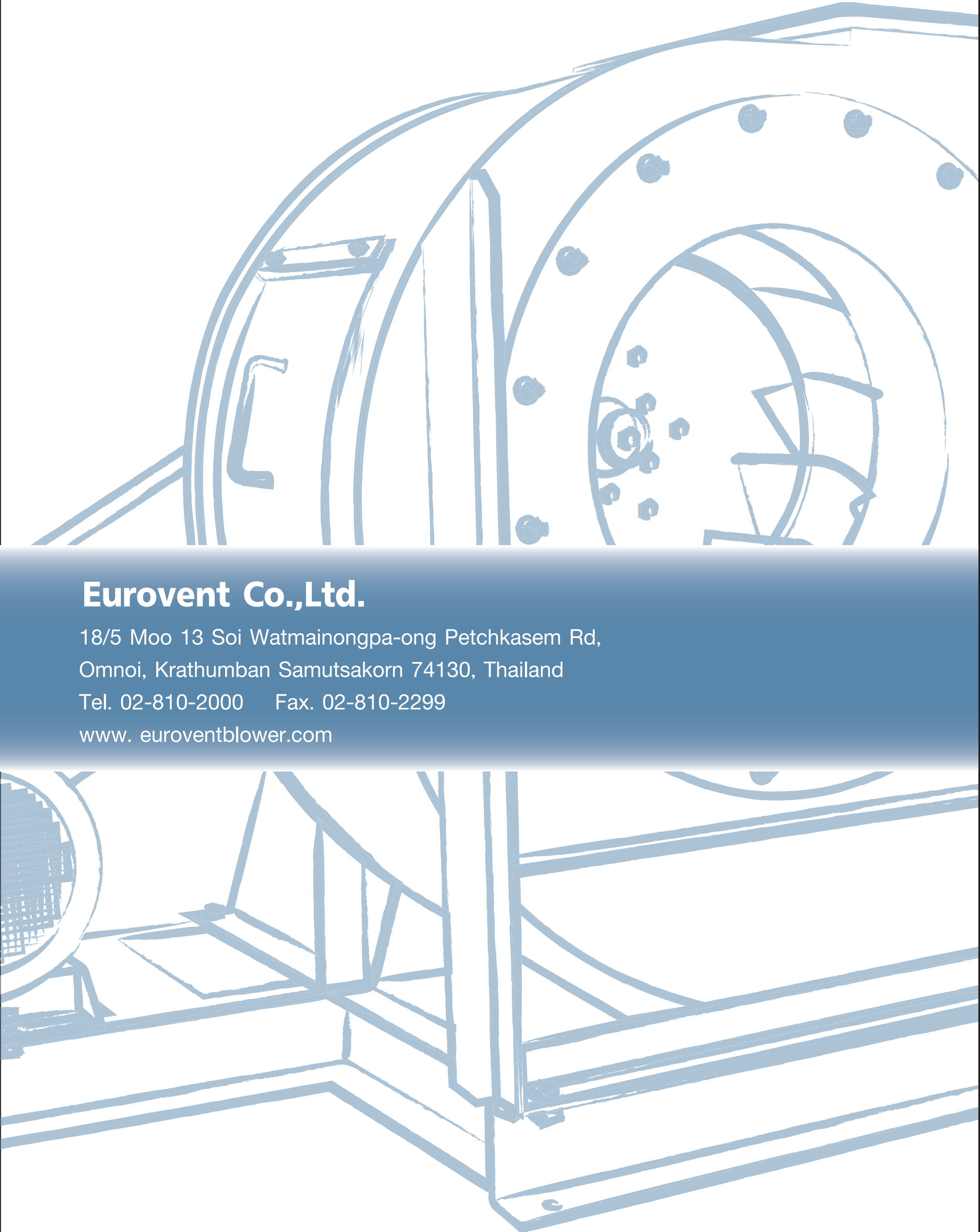

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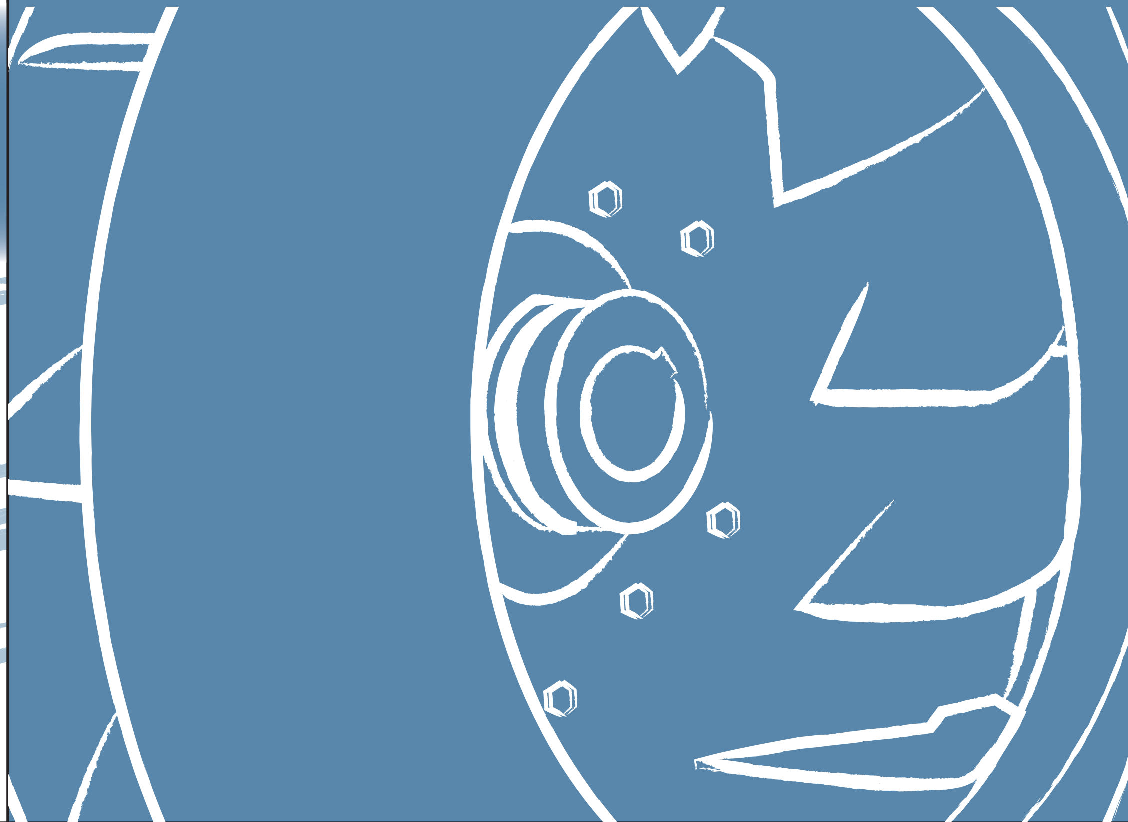
EuroVent

INSTALLATION / OPERATION / MAINTENANCE MANUAL



STARTING

1. GENERAL CHECK

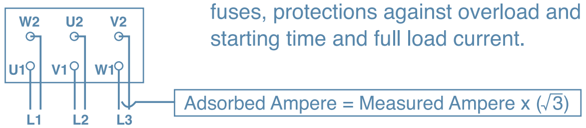
Before starting the fan , check that the bearings are correctly lubricated and all bolts are tightened.
Rotate the shaft by the hand and check that all components turn freely.
Check that the direction of rotation of the impeller corresponds to that indicated by the arrow on the plate.
Before connecting the motor to the feeder line , check that the connection between motor terminals is adequate to the line voltage. Connect the screw on the terminal board and the motor foot or flange by/to the earth plate.

CONNECTION TO THE MOTOR TERMINAL BOARD.

MOTOR VOLTAGE ***220/380V*** *MOTOR VOLTAGE* ***380/660V***

Connection Δ 220V **Connection Y 380V** **Connection Δ 380V** **Connection Y 660V**

Connection YΔ



To the commutation YΔ

NOTE: The electric equipment should include the following components:

fuses, protections against overload and voltage fall suitable for the real starting time and full load current.

2. AFTER THE STARTING CHECK THE FOLLOWING POINTS :

2.1 The direction of rotation should correspond to that indicated by the arrow.
2.2 The absorbed current should not exceed that indicated by the motor plate.
2.3 The fan should not show excessive vibrations.
2.4 The bearing temperature should be constant (a temporary temperature increase and successive decrease is considered to be normal). The temperature to be checked is the working temperature , i.e. the temperature that tends to be constant.
2.5 After some functioning hours , check the bolt tightening and the belt stretch and adjust it , if necessary.

IMPORTANT

When starting the fan , it is advisable to keep the flap or the delivery regulator completely closed. The starting time is thus lowered avoiding overload. For the same reason , unless indicated otherwise , successive starting of the motor should be avoided. The motor should be cooled after each starting according to the instructions in the motor order.
Measure the electrical input on one of the three line wires (L1, L2, L3). In the connection Y the reading should be carried out before the commutator ; if this is impossible , measure the phase current on one of the 6 terminal board wires and multiply the value by 1.73 (√3).

MAINTENANCE

It is important to perform regular maintenance according the right plan for the long life expectancy and the safe operation. Although basic maintenance items are the lubrication and cleaning of the bearing , and regular vibration checking, frequent measurement of the discharge pressure , air temperature, current and etc. can prevent the accidents in advance , since the operation of the fan in worse conditions than the specified conditions can causes the accidents. Since the operating conditions or surroundings other than designed specifications can affect the performance of the fan , adjust the operating conditions and perform the regular check-up as early as possible after the first operation.

Daily check-up

Before the regular operation status , the following items should be checked , measured , and recorded regularly. Checking procedure for the test operation is the same.

1. HOUSING - NOZZLES

Periodically clean inner parts and remove possible foreign bodies.

2. IMPELLER

Remove dirt and deposits that can cause unbalance. In case of abrasive powder suction, vibrations can depend on wear. Replace the impeller as soon as possible.
Check the weldings.
Do not separate hub and impeller, since it may endanger the balance:

3. PULLEYS

Check the alignment and adjust it, if necessary.
Clean the races accurately.

4. BELTS

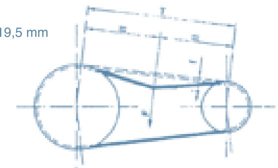
Clean each side.
Check the tension and adjust it, if necessary.
Clean the races.

TENSIONING METHOD

Good functioning of the belt transmission depends on a correct tension. Carry out the following operations by operating on the idler:
1. Measure the free lenght T.
2. For each belt, apply, in the middle of T, a perpendicular force F by a dynamometer. The force applied should produce an arrow f of 1.5 mm for each 100 mm of T.
3. Compare the F value supplied by the dynamometer with the F’ and F” values indicated in the table.

es:
T = 1300 mm

$f = \frac{1300}{100} * 1,5 = 19,5$ mm

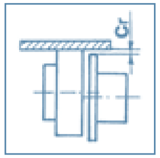


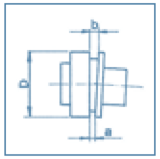
Belt section	Minor pulley external diameter	RPM minor pulley	F’ min. Newton	F” max. Newton
SPZ	50 - 90	1200 - 5000	10	15
	100 - 150	900 - 1800	20	30
	155 - 180	600 - 1200	25	35
SPA	90 - 145	900 - 1800	25	35
	150 - 195	600 - 1200	30	45
	200 - 250	400 - 900	35	50
SPB	170 - 235	900 - 1800	35	45
	250 - 320	600 - 1500	40	60
	330 - 400	400 - 900	45	65
SPC	250 - 320	900 - 1800	70	100
	330 - 400	600 - 1200	80	115
	440 - 520	400 - 900	90	130

NOTE: 1) The table referres to transmissions showing ratios from 2 to 4. If F < F’, the belt should be further tensioned. If F > F”, the belt is too tensioned.
2) During the transmission running-in period, the tension decreases rapidly. Therefore, the belts should be tensioned so that the force F, producing the arrow f, is 1.3 times higher than the force indicated in the table. The belt tension should be checked frequently.

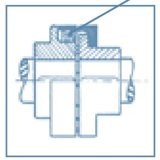
5. COUPLING

Check the correct alignment as regards both parallelism and centering. Carry out the following operations:
RADIAL ALIGNMENT - Measure the Cr dimension and adjust it within the limits indicated in the table by shimming the motor feet by sheets.
ANGULAR ALIGNMENT - Measure the a and b dimensions at least in 4 points and calculate the maximum variation b-a. Adjust the dimension within the limits indicated in the table.





RUBBER BLOCKS



Dimensions D	C_r mm	(b-a) mm
80	0,4	0,7
100	0,4	0,8
125	0,4	0,9
140	0,5	1
160	0,6	1,2
180	0,6	1,4
200	0,7	1,4
225	0,8	1,6
250	0,8	1,8
315	1	2,2
350	1	2,4
400	1,2	2,8

Periodically check the wear of the rubber blocks and replace them, if necessary.

6. BEARING

6.1 Bearing temperature

Bearing temperature in the fan should not exceed 40°C over the surroundings air temperature. And , the maximum bearing temperature (surrounding temperature + temperature rise) is 80°C

6.2 Bearing vibration

Vibration measurement should be performed at the 3 point of the bearing housing ‘s central part in the upper /lower , left/right , and axial directions. It is desirable to operate the fan below “ excellent ” range if possible , even though the allowable vibration value is below “ good ” range. When the amplitude recorded , specify whether it is partial amplitude or the whole amplitude.

Our factory test records are recorded in terms of the whole amplitude.

6.3 Checking the bearing induced sound

Check the bearing induced sound by microphone rod , and whether it is normal or abnormal.

6.4 Checking current value

Check that the electric current of the operating fan is constant , and make sure that there is no overloading.

Regular check-up
Regular check – ups should be performed as follows during stopping the fan operation.

Item	Description	Period		Cleaning	Repair	Exchange
		6 months	12 months			
SHAFT	(1) Loosened bolts		O		O	
	(2) Rust		O	O	O	O
	(3) Shaft bending		O		O	O
COUPLING	(1) Loosened bolts		O		O	
INLET DAMPER	(1) Corrosion and wear		O		O	
	(2) Dust attachment		O	O		
	(3) Ease of open / close operation		O	O		
SILENCER	(1) Corrosion and wear		O	O	O	
	(2) Dust attachment		O	O	O	
CASING	(1) Foreign substance	O		O		
	(2) Corrosion and wear		O	O	O	
	(3) Stagnant drainage	O		O	O	
	(4) Loosened bolts		O		O	
	(5) Damaged packings		O		O	
IMPELLER	(1) Dust attachment	O		O		
	(2) Corrosion and wear		O		O	O
	(3) Deformation and side plate cone contact		O		O	O
	(4) Loosened bolts & nuts for the attachment.		O		O	
	(5) Unbalance	O		O	O	
BEARING & BEARING HOUSING	(1) Abnormal sound	O			O	O
	(2) Foreign substance (water or trash)	O		O	O	O
	(3) Rust on the bearing mainbody		O	O	O	O
	(4) Flaw and wear	O				O
	(5) Oil leakage	O			O	O
	(6) Loosened bolts shaft		O		O	O

Note : Refer to Disassembling and repair, troubleshooting for the exchage and maintenance methods.

Storage

If the fan is not operated for a long period of time, it should be stored as follows

	Device Name	Operation and checking period during storage	Storage method	Checking item
1	Fan	About 10 minute monthly operation without load	(1) Close all inlets and outlets (2) Open the drain pipechecking item (3) Supply lubricants to shaft and the bearing (4) Cover with waterproof cover at dusty and humid place (5) Repaint rust resisting paint	Rust and Foreign substance
2	Reserve supply	Change the wrapping paper annually	Install in a closed wooden case after wrapping with VPI paper	Rust and Ageing

GENERAL FUNCTIONING INFORMATION

1. INFORMATION ABOUT RADIAL FANS

Radial fans equipped with impellers with radial or forward – curved blades should always be connected to tubing or devices, which limit the fan delivery a resistance.
If the fan would work without resistance (with free inlet) , the motor could burn , since the fan produces the maximum delivery and overloads the motor.
a) If the circuit supplies the calculated resistance , the fan shows the calculated delivery and the motor electrical input corresponds to that indicated in the table
b) If the circuit resistance is higher than calculated , the fan shows a lower delivery and the motor electrical input is lower.
c) If the circuit resistance is lower than calculated, the fan shows a higher delivery and the motor electrical input is higher. Therefore, it is advisable to install a flap on the circuit to be adjusted when starting the installation.

2. RADIAL FAN WITH IMPELLER WITH BACKWARD – CURVED BLADES

These fans can work also with circuits showing lower resistances without running the risk of burning the motor , since they cause a slight delivery increase with decreasing circuit resistance.
These fans show the maximum power adsorption near the maximum efficiency point.
Therefore , the observations at a), b), c) fit also for there fans , except for power adsorption.

NOTE : Important : The impeller direction of rotation is indicated by the arrow on the housing side. If the impeller turns in the opposite direction, reverse the connections of two phases of the feeder line (Three phase Motor).

2. GENERAL INFORMATION

a) Noise

The fan noise mainly depends on the anchorage to the base plate and on the connections to the suction and delivery tubes.
It is suggested to install the fan on a vibration-damping plate in order to reduce vibration propagation to the base plate.
Interrupt the metal connection between fan and pipings by using vibration -damping cloth joints.

b) Electric motor protection

The intensity of the current absorbed by the motor at steady state should not exceed the value indicated on the plate.
If the current exceeds the value indicated on the plate , the absorbed current should be adjusted by decreasing the fan delivery by partially closing the flap (**For radial fans**).

To protect the motor , it is advisable to install an automatic switch equipped with thermo-magnetic components. Check the switch contacts periodically.

c) Protection from contact by casual stand-byers

All fans are equipped with protections against contact risks according to UNI 9219.
Before starting the plant , installator and user should check that all protections , especially the case protecting the transmission and the cooling impeller , are correctly assembled.
It is strictly forbidden to start the machine without these protections.
Moreover , it is strictly forbidden to open the cleaning door when the fan is in motion.
The door should be assembled when the machine is standing still.

NOTE: The risks due to foreign bodies and dangerous gas (explosive, flammable, toxic etc.) inlet should also be considered.
Moreover, maintenance operations (cleaning, balancing, lubrication, door opening) should be carried out under SECURITY conditions. Therefore, it is necessary to insulate the fan from the main engine before starting maintenance operations.

d) Spark-proof execution

The fans are spark-proof according to table NV 105 of ANIMA-COAER in order to suck explosive and flammable gases. The suction nozzle end and the shaft ring are made of nonferrous marterial.

DISASSEMBLY AND ASSEMBLY

1. SUCTION NOZZLE

Remove the nuts that fasten the nozzle to the fan side.

2. HOUSING

The housing of adjustable fans is fastened to the chair disk by bolts. loosen the corresponding nuts to disassemble the housing.
For big fans the housing is welded directly on the fan base plate. In this case, the housing cannot be disassembled.

3. IMPELLER (single inlet)

Disassembly: (fig. 1)
Remove the suction nozzle and the housing, if possible. Remove then the screw and the washer that fasten the impeller to the shaft. Place a sheet protection washer on the shaft end.
Remove then the impeller from the shaft by the extractor.
It is advisable to hook heavy impellers to a tackle until they are completely removed.

Assembly: (fig. 2)
Place the impeller in front of the shaft, then tighten the nut on the screw in order to push the impeller against the shoulder.

3.1 IMPELLER (double inlet; exec. 3D - 11D - 14D)
Loosen the screw couplings and disassemble the transmission belts. Remove the support bolts and the nuts that fasten the nozzles on the housing. Remove then impeller, shaft and supports.
To disassemble the impeller from the shaft, remove the supports and the impeller ring nut.

Fig. 1

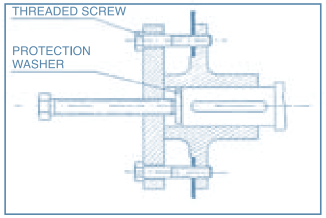
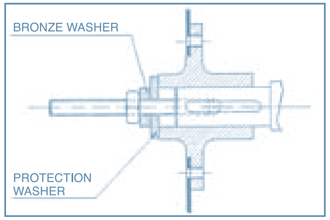


Fig. 2



4. PULLEYS (fig. 1-4)

Carry out the following opertions to disassemble the pulleys (usually equipped with conical bush):
- Remove the two fastening screws, insert a screw into the extraction hole and tighten until it is released.
- During the assembly operations, place the bush and the pulley so that the screw holes correspond. Insert the screws and tighten them alternately.

Before fastening the pulleys definitively, check the parallelism between motor shafts and fan by the ruler on the pulley side.

1°) Mount the bush on the shaft	2°) Place the pulley on the bush	3°) Tighten the screws	4°) For the release remove the two screws, insert a screw and tighten it until it is released

5. BLOCK SUPPORT

Loosen the grub screw and remove the cooling fan from the shaft, if installed.
Loosen the cap fastening screws and remove the shaft with the two bearings from the housing.
Disassemble the bearings from the shaft by the extractor.
In case of bearing replacement, assemble them correctly to avoid damages.
To assemble the bearings, heat them on an electrical plate up to about 80°C. Then lubricate them by using the suggested oil type and quantity

6. SEPARATED SUPPORTS

Loosen the grub screw and removed the cooling fan from the shaft, if installed.
Loosen the screws and remove the upper and lower support covers and the two bearing stop rings.
Unscrew the ring nut after strainghtening the security washer tooth.
Remove the traction bush and the bearing from the shaft by the hydraulic ring nut.
During the assembly operation, fasten the traction bush by the ring nut by using the percussion spanner or better the hydraulic ring nut.

THE MALFUNCTIONING OF AN AEROHYDRAULIC INSTALLATION MAY DEPEND ON DIFFERENT CAUSES, WHICH SHOULD BE DETECTED AND REMOVED.

7. AEROHYDRAULIC DEFECTS may depend on the following causes:

- insufficient delivery
- excessive delivery
- excessive power adsorption
- wrong starting
- air pulses, noise and vibrations

8. INSUFFICIENT AIR DELIVERY

For radial fans, especially with forward-curved or radial blades, insufficient air delivery is combined with power decrease.
For radial fans with backward-curved blades power adsorption does not show considerable changes. For some special applications it shows a slight increase.

This is true also for some axial fans. Carry out the following operations:
8.1 Check the direction of rotation.
A radial fan turning backwards blows anyway air into the circuit.
If few millimeters of the shaft are visible, let a ruler end fall on the shaft. The direction in which the ruler falls indicates the direction of rotation.

8.2 Check the direction of rotation of the impeller.
8.3 Check the rotation speed and that the belt do not slide.
8.4 Choose a straight air tube segment, preferably before the fan, and measure the air delivery at that moment by the Pitot tube.
8.5 Measure the static pressure during suction and delivery.
The algebraic difference indicates the fan static pressure.
8.6 Compare the results obtained for 8.4 and 8.5 with the project data.
8.7 If the value obtained for 8.4 is low and that obtained for 8.5 is equal to or lower than the project value, the defect probably depends on the circuit and not on the fan.
Check the circuit sections to detect too high flow resistances by checking the static and total pressure in the main points of the circuit.
Apart from estimation errors, flow resistance can depend on the following causes:
8.8 Improper flap adjustment.
8.9 There are two or more curves, cloggings or very close section changes.
8.10 A suction or diffusion grid is too close-meshed for example because of an air delivery decrease through sharp edge openings. A punched or expanded metal protection placed on an opening can provide a free area 30% or more lower than the measurable passage area.
8.11 There is an overloaded filter.
8.12 There is a foreigh body accumulation.
8.13 There is a turbolence (usually after an axial fan without rectifier or centrifugal dust separator)
8.14 There is a turbolence depending on a Venturi.
8.15 The length of the air outlet straight duct is 2.5 times lower than the diameter. To avoid the defects indicated at 8.13 and 8.14 equip the installation with rectifiers.
8.16 If both values obtained for 8.4 and 8.5 are low, the main defect is probably in the fan or its connections although circuit errors can also cause a failure. Check the following points besides those indicated in 8.2 and 8.3
8.17 Check if foreign substances can be detected in the impeller.
8.18 Check the suction and delivery connections and flexible joints to detect possible duct cloggings.
8.19 The effective delivery (and test hole loss) is decreased by leaks or blown-by between measuring points and fan.
8.20 Delivery and pressure are decreased by a vortical current during suction in the same sense of rotation of the impeller.

NOTE: TO REMOVE THE DEFECT CARRY OUT THE FOLLOWING OPERATION:
Install an antiturbulence device. For example an air dividing sheet in the suction hood avoids vorticity. Moreover, the direction blades improve the aerohydraulic feeding and, as a consequence, the fan performances.
8.21 The fan is equipped with a suction nozzle, if required by its installation category. For example, an axial fan with tubular casing shows the best performances with free suction if it is equipped with a conical nozzle.
8.22 Any suction obstacle, such as curves or sharp deviations, should be avoided.
8.23 Any delivery obstacle, such as sudden widenings, curves or other obstructions that do not allow a normal recovery of the delivery dynamic pressure as that obtained in the test circuit of a canalized delivery fan, should be avoided.
8.24 The fan is designed according to the volume of air to be transported. A fan, which has been designed for transporting cold air at sea level produces a lower pressure at higher altitudes or when sucking hot gases.

9. EXCESSIVE AIR DELIVERY

For radial fans with forward-curved blades, an excessive air delivery causes an excessive consumption at rated rotation speed.
Radial blade fans and fans with backward-curved blades also show a high power absorption.
A slight power decrease can be observed for axial or radial fan with backward-curved blades.
Carry out the following operations:
9.1 Check the direction of rotation of the impeller. A radial impeller with Backward-curved or plane blades turning in the opposite sense of rotation works as if the blades were forward-curved. As a consequence, the fan delivers too much air and absorbs too much pressure.
9.2 The rotation speed is too high? (the pulleys are the wrong size or have been replaced?).
9.3 Choose a straight air tube segment, preferably before the fan, and measure the air delivery at that moment by the Pitot tube. Compare the value with the project value. The cxcessive delivery value gives information about the cause. For example, a value exceeding the project value by about 10% can be referred to the cause described at 9.8
A considerably higher difference may indicate an error in the circuit.
Carry out systematic checks.
9.4 Flaps or registers are not positioned correctly or circuit components have not been installed.
9.5 There are air leaks beyond the test points (for example opened inlet doors, wrong construction or installation of ducts or components) or beyond the masonry ducts.
9.6 The bypass flaps are not perfectly closed (for example in a boiler installation).
9.7 Unbalance between parallel-working fans. Contact the constructor.
9.8 Excessive estimation of the circuit flow resistance.
Decrease the fan rotation speed (or close the flaps) until reaching the required performance.

10. EXCESSIVE POWER ADSORPTION

it may depend on the following causes:

10.1 A radial fan with forward-curved or radial blades delivers too much air.

10.2 A radial fan with backward-curved blades turns in the opposite direction or an impeller with wrong direction of rotation turns correctly.

10.3 There is an air prerotation during suction in the opposite direction with respect to the sense of direction of the fan.

Check the suction hood.

10.4 There is an short pitch axial fan or an axial fan working with an excessive pressure.

10.5 An alternating current motor turns at a lower rotation speed because of a defective winding or starting or because of a low feeding voltage.

11. DANGEROUS STARTING

It may depend on an excessive power adsorption (see 10.) or on the following causes:

11.1 The feeding voltage is too low.

11.2 The starting voltage on the autotransformer is too low.

11.3 The maximum relay is not suitable for the starting conditions.

11.4 There is a defect in the motor causing a static characteristic decrease.

11.5 The evaluation of the moment of inertia of the fan rotating parts, with respect to the selected motor and its starting type, is wrong.

When starting radial fan, it is possible to restrict the load by closing the flaps completely until reaching full speed.

This is not true for most axial fans.

12. AIR PULSES (PUMPING), NOISE OR VIBRATIONS

Air pulses are caused by delivery unsteadyness and may depend on the following cause:

12.1 An axial fan works within the initial area of its functioning characteristics under stall conditions.

12.2 Most fans working near to zero delivery conditions may cause air pulses.

12.3 There are fan fluctuations in the parallel arrangement.

12.4 The suction has been connected improperly or is obstructed thus causing unsteady air inlet conditions (ex : vortex).

12.5 The flow alternately touches or is detached from divergent duct walls.

12.6 **Noise**

Generally, all fans produce noise that should be reduced only if is unacceptable. Noise may be caused by air, mechanical components, electrical hum or a combination of them. Noise produced by air may increase because of obstructions near the fan suction and delivery. Noise id commonly due to a wrong fan choise. In this case, replace the fan by a noiseless one (generally having a larger diameter and a lower speed) or aplly sound-proof devices.

a noiseless one (generally having a larger diameter and a lower speed) or aplly sound-proof devices.

12.7 **Mechanical noise**

The mechanical noise may depend on friction of moving parts, wrong bearing choice, sheet vibrations etc. Generally, the causes can be detected easily but it may be useful to apply the stethoscope to detect noise in bearings or in the electric motor.

12.8 **Electrical noise**

The electrical noise may depend on eccentricity between rotor and stator, defects or porosity in the rotor die-casting, winding vibrations etc.

Some single-phase motors often show these defects.Noise may considerably increase or decrease according to the motor assembly method.

12.9 **Vibrations**

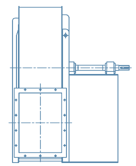
Unacceptable vibrations may depend on unbalances, inadequate support structure or a combination of both causes.

When the natural frequency of a support structure is near to that corresponding to the fan rotation speed it is impossible to avoid vibrations.

The structure can be reinforced or its resonance natural frequency can be changed (ex. : by adding weights).

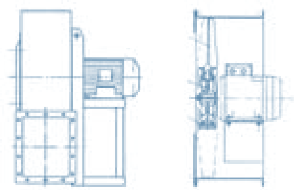
In case of excessive unbalance, contact the fan constructor or a vibration specialist.

Fans constructive executions in conformity with eurovent international rules.



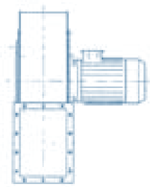
EXECUTION 1

For belt drive. Wheel keyed overhung. Supports mounted on a base outside the air stream. Max air temperature 90°C without cooling fan; 350°C when fitted with cooling fan.



EXECUTION 4

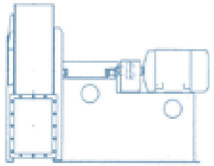
For direc drive. Wheel keyed to motorshaft. Motor is supported by the base. Max air temperature 80°C; when fitted with cooling fan 50°C (elicoidal fans max air temperature 70°C).



EXECUTION 5

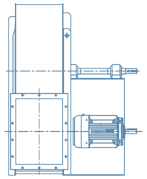
For direc drive. Wheel keyed to motor shaft. Motor is supported by the case. Max air temperature: 80°C

Fans constructive executions in conformity with eurovent international rules.



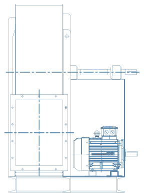
EXECUTION 8

Direct coupling by means of an elastic joint. Protecting keyed fan wheel. Support assembled on a base out of the air circuit. Temperature of the air 90°C without cooling fan: 350°C with fan. Only one base for fa-support-motor.



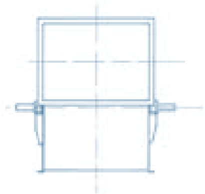
EXECUTION 9

For belt drive. Same as arrangement 1 with motor supported by the side wall of base. Max air temperature:90°C without cooling fan; 350°C when fitted with cooling fan (elicoidal fans: max air temperature 70°C).



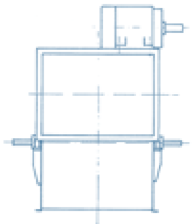
EXECUTION 12

For belt drive. Same as arrangement 1 with both fan and motor supported by the foundation frame. Max air temperature: 90°C without cooling fan; 350°C when fitted with cooling fan (elicoidal fan: max air temperature 70°C



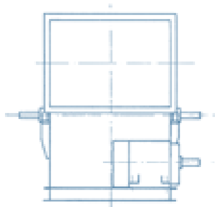
ARRANGEMENT 3D

For belt drive. Wheel keyed between the supports mounted inside the air stream. Max. air temperature 40°C; with bearings C3 max. 80°C



ARRANGEMENT 14D

For belt drive. Same as arrangement 3D with motor mounted on a base supported by the casing. Max. air temperature 40°C, with bearings C3 max. 80°C

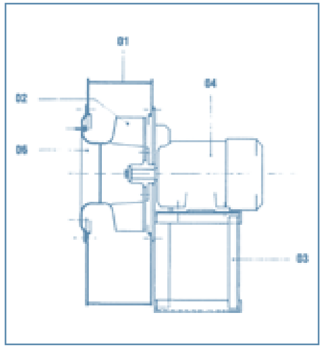


ARRANGEMENT 11D

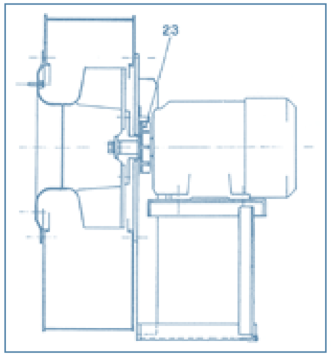
For belt drive. Same as arrangement 3D with both fan and motor supported by the foundation frame. Max. air temperature 40°C, with bearings C3 max. 80°C.

Section

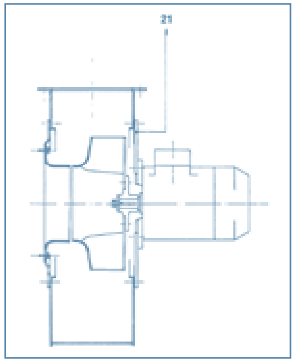
Esec. 4



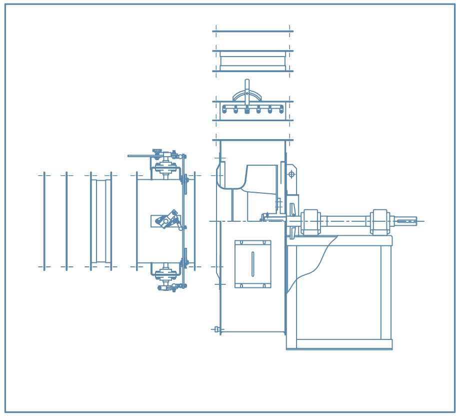
Esec. 4 (with cooling impeller)



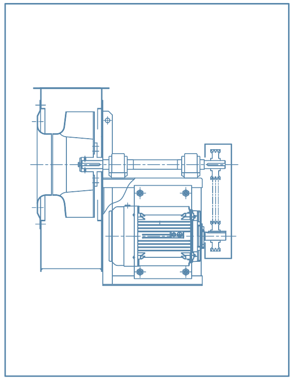
Esec. 5



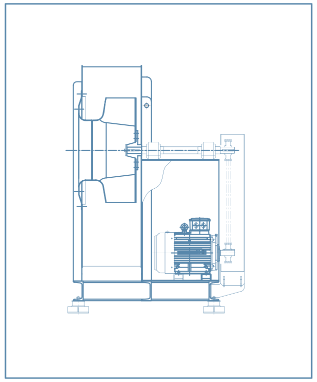
Esec. 1



Esec. 9

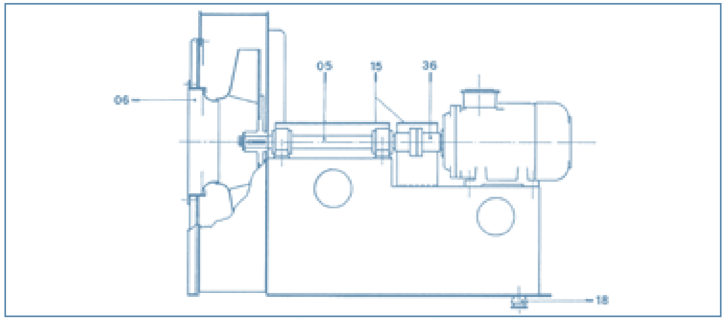


Esec. 12

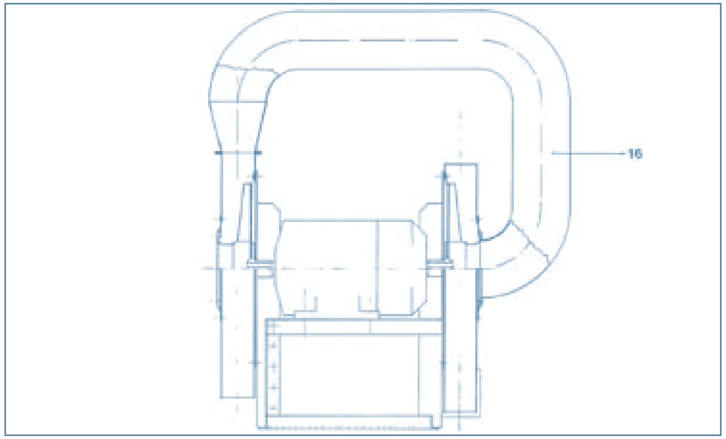


Section

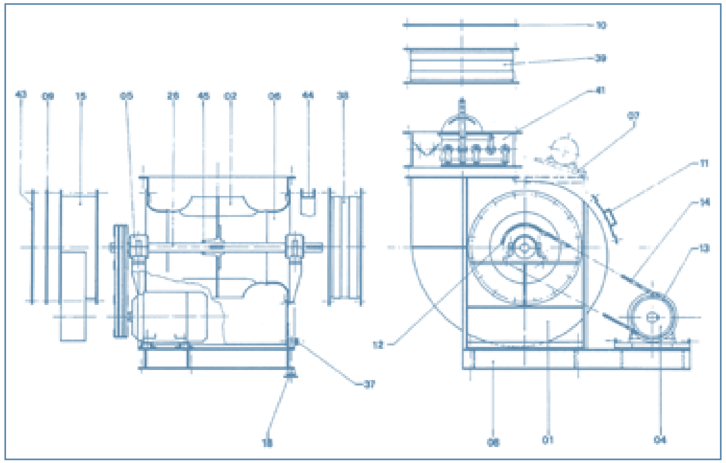
Esec. 8



Esec. 4



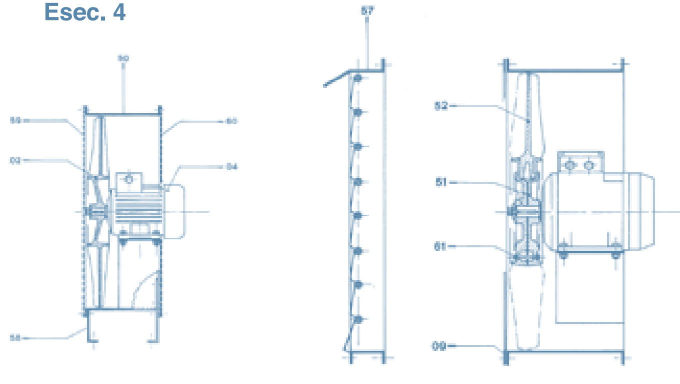
Esec. 3D
11D
14D



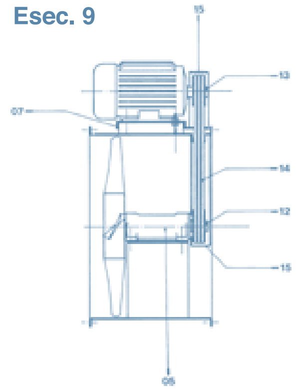
EuroVent

Section

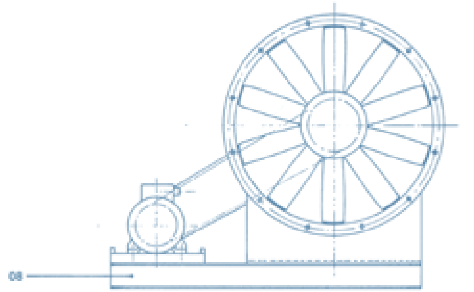
Esec. 4

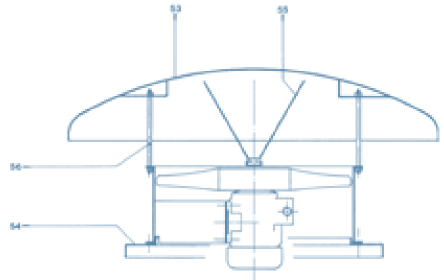


Esec. 9

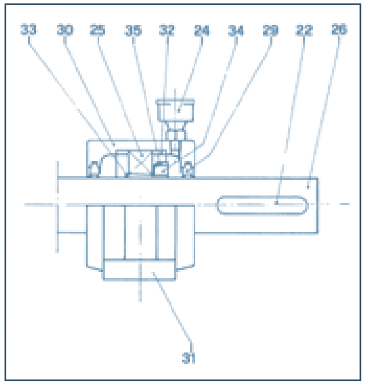


Esec. 12





Support



TROUBLE SHOOTING

The following table lists the most frequently occurring problem and its treatment. If the cause of the problem is unknown, consult the manufacturer. When consulting the manufacturer, inform the manufacturing no. and model written on the nameplate of the fan, specification, status of use, period of use, and problem in detail.

Cause		Large vibration	Overheating of bearing	Abnormal sound	Excessive operation time	Frequent overload operation	Frequent unload operation	Overheating of Casing	Lack of air capacity and pressure	Deformation and damage of impeller	Solution
Base	Bad base	O									Rework
	Deformation due to concrete hardening		O								
Installation	Bad installation	O	O								
	Bad connection	O	O		O						
Bearing	Bad connection between shaft and bearing	O	O		O	O					Modification or exchange
	Use wrong oil		O								Exchange
	Excessive or too little oil		O	O							Adjustment
	Lack of oil or inlet of foreign matter		O								Cleaning or exchange
	Bad bolt tightening	O	O								Modification
	Damage of the no retation washer	O	O	O							Repair or exchange
Impeller	Wear or corrosion	O					O		O	O	Repair or exchange
	Inlet or attachment of foreign matter	O		O	O	O	O		O	O	Cleaning
	Contact	O	O	O	O	O		O		O	Modification or adjusting installation
	Deformation	O							O	O	Modification
	Damage	O		O					O	O	Repair or exchange
	Unbalance	O	O	O							Modification or adjusting balance
	Opposite installation				O				O		Modification or exchange
	Bad hub connection	O		O						O	Exchange
Shaft	Flaw of bearing		O								Repair or exchange

Cause		Large vibration	Overheating of bearing	Abnormal sound	Excessive operation time	Frequent overload operation	Frequent unload operation	Overheating of Casing	Lack of air capacity and pressure	Deformation and damage of impeller	Solution
Shaft	Bending	O	O								Repair or exchange
	Bad connection	O		O							Repair or exchange
	Contact	O		O	O	O					Modification
	Bad shaft nuts tightening	O		O							Modification
	Terminal velocity operation	O		O		O					Change of operation velocity or modification
Coupling	umbalance	O									Modification
Casing	inlet of foreign matter			O	O		O		O		Modification
	wear or foreign matter attachment			O				O	O		Modification
	deformation	O		O						O	Modification
	overtightness of packing	O			O	O					Modification
Bed	deformation	O	O								Modification
General	Excessive no. of revolution	O	O	O	O	O				O	Modification or investigation
	Too few no. of revolution						O		O		Modification or investigation
	Reverse revolution		O						O		Modification
	High inlet temperature					O	O	O	O	O	Impeller modification or exchange
	Low inlet temperature			O	O						
	Closed damper during operation		O			O	O	O			Change of operation point or open damper
	Surging operation	O	O	O		O	O				Change of operation point or open damper
	Wrong operation of air capacity control				O	O	O		O		Adjust inter lock
	Malfunction of air capacity control				O	O	O		O		Modification
	Inlet of foreign matter into drain pipe	O		O				O	O	O	Drain