

# **Belt driven centrifugal fan MAXI-F Installation 3**

## **Operating and Maintenance Instructions**

# Belt driven centrifugal fan MAXI-F

Operating and Maintenance Instructions Version 1.2 06-11

## Belt driven centrifugal fan MAXI-F Installation 3

These instructions must always be available for the production personnel. Carefully read through the instructions before installing and connecting the fan. By following the instructions you will be guaranteed trouble-free operation for many years.

*Subject to alteration.*

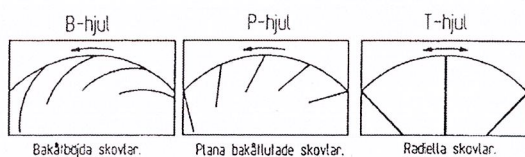
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### A Technical data

Centrifugal fans work with flows of up to approx. 50 m<sup>3</sup>/s and with a pressure of up to approx. 20 kPa. They are available with different types of impellers; fans with impellers of the B, P and T types are available for all applications from the transport of clean air to the transport of flue gases at high temperatures. We work with several different materials, which means that we can adapt the fan to the specific requirements, e.g. for corrosive gases.

Impeller with backward curved blades (type B).



Used for transport of air and clean gases. Efficiency up to 86%.

Impeller with flat, backward blades (type P). Used for transport of clean gases or gases with low dust content.

Impeller with straight, radial blades (type T). For transport of gas containing dust.

The fans have been tested and test-run prior to delivery. The fans are balanced to 6.3mm/s.

The belt driven centrifugal fan MAXI-F is manufactured in sheet steel that has been primed and painted, and the impeller is manufactured in sheet steel that has been primed.

The temperature of the transported gas must not exceed +100° C (+350° C with a cooling disc fitted) or fall below -20° C. The ambient temperature must not exceed +40° C or fall below -20° C.

The fan must not be installed in environments where there is a risk of explosions or corrosion.

The fan must not be modified in any way.

The transported gas must not contain explosive, toxic or corrosive gases or dust.


The fan's bearing arrangement consists of two divisible steel bearing houses from SKF of the SNL type. The standard design for the bearing arrangement is with grease lubricated bearings.

The design criteria the fan has been designed for shall be indicated in the order acknowledgement. Any changes to the design criteria must be approved by Dantherm Filtration AB.

*Special variants for other applications than those described above can be offered on request.*

### Rating plate

Machine	<input type="text"/>		
No./year	<input type="text"/>	Dim. temp.	<input type="text"/> °C
Weight	<input type="text"/> kg	Dim. speed	<input type="text"/> r/min
Power	<input type="text"/>		

  
Dantherm®  
Filtration

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www.danthermfiltration.com

### Special variant

*Alternative designs can be obtained on request.*

*The design criteria the fan has been designed for shall be indicated in the order acknowledgement!*

### B Warranty

The warranty is valid in accordance with the general delivery regulations (NL01), unless otherwise agreed and only if these instructions are carefully followed.



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## C Safety

To avoid personal injury and damage to peripheral equipment, as well as damage to the actual product, these safety instructions must be carefully followed.

### 1 Dust/powder and gas

Note that the dust, powder and gas transported by the fan can be hazardous to health! Protective equipment must be used in accordance with the applicable standards when working with the fan.

### 2 Suction power

The fan has a very large suction capacity. Objects, garments and hair can easily be sucked in towards the intake and cause personal injury. The fan must have a net fitted on the suction side to provide protection from personal injury and damage to the fan. It is possible to make a duct arrangement with a low speed or vertical uptake to limit the possibility of transporting heavier objects to the fan.

### 3 Powerful pressure in the exhaust outlet

A powerful airflow comes from the fan's exhaust outlet. Any objects that have been sucked into the fan can therefore be thrown out at high speed and can cause personal injury. A guard is required on the outlet side or on the inlet side, or alternatively the outlet can be positioned where it is not considered to be dangerous.

### 4 Temperature

During its operation the fan assumes the temperature of the transported air. If this exceeds +50° C the surfaces on the unit must be protected from direct contact to prevent burn injuries. The external temperature of the electric motor can exceed +50°C.

It can therefore be difficult to protect all hot surfaces with enclosure protection, and it is therefore advisable to set up a warning text to show that there are hot surfaces.

If there is a risk of slipping, tripping or falling on a fan with hot surfaces a guard must be put up to prevent anyone coming into contact with the fan.

### 5 Electrical connection

Warning! Electrical connections must only be carried out by an authorised electrician. The electric motor must be provided with a protective motor switch before the unit is taken into use. A working switch must be fitted before the electric motor and the control unit. Electrical data for the

fan is included in the order acknowledgement and on the electric motor's rating plate. The electric motor's rating plate must always be checked before connecting the power.

### 6 Permitted applications

The fan is designed for air that is not explosive, toxic or corrosive, and with a maximum temperature of 100/350°C and a minimum temperature of -20°C.

*Special variants for other applications than those described above can be offered on request.*

### 7 Contact

Make sure that the fan's inlet and outlet are provided with enclosure protection, or alternatively that the fan is connected to a duct so that it cannot cause injury when put in operation.

Ducts <315 mm connected to the fan must be at least 1 m long, and for ducts >315 mm the risk of an unauthorised person creeping into the duct must be taken into consideration.

### 8 Noise level

The noise level is not the same within the full working area of the fan. Noise suppression measures need to be taken in the event of adverse applications. We recommend the user to measure the noise level in the particular installation.

Ear protectors must be worn when working in the immediate vicinity of a fan.

### 9 Inspection

All the inspection openings can only be opened with tools.

### 10 Warning signs

The inspection panel is provided with a warning sign for rotating impeller.

**It is important that the impeller has stopped rotating before inspection is carried out. Note that a natural thermal draught can also cause the impeller to rotate.**





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## D Installation

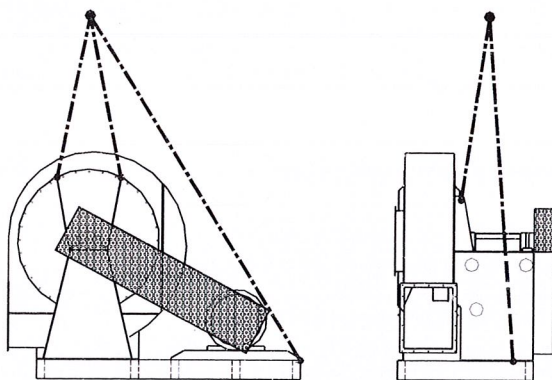
### 1 Transport

The fan must only be lifted in the lifting eyes on the motor plate. Note that the electric motor's top eye must not be used as a lifting point for the entire fan, but only to create balance when lifting.

**NOTE. The position of the centre of gravity is not defined in advance.**

Information on the total weight, including the motor, can be found on the rating plate.

If the fan cover is fitted or removed it must be lifted in the lifting eyes intended for this purpose on the top. **NOTE.** These eyes must not be used



when lifting the complete fan.

When fitting or removing the impeller a special plate lifting glove is used to lift the impeller. The plate lifting glove is fastened in the impeller disc. It may be necessary to have a plate lifting glove fastened in the inlet disc to balance the lifting.

The impeller is removed (pulled off the shaft) by means of an extractor with two claws, which are fastened with two screws in the hub.

Attach all lifting devices with great care. Only use lifting devices with sufficient strength.

The fan must be protected from moisture, and must not be stored outdoors unprotected.

Before installing and using the fan you need to check that the components have not been damaged in transport, and that the impeller rotates freely.

### 2 Storage

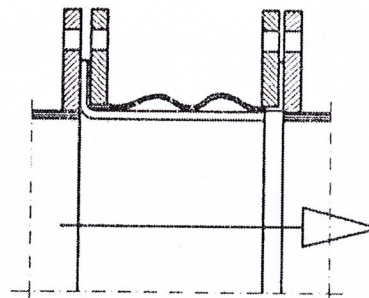
The fan must be stored in a dry area. If the fan has been stored outdoors the fan motor must be insulation tested before it is connected to the mains. The motor shaft must be rotated by hand once a month. If the fan is stored for more than one month the belt tension in the belt transmission should be released. If the fan is stored for longer than three months the fan bearings should also be checked to make sure that no moisture has penetrated into the bearing housings.

### 3 Assembly and installation

It is very important to assess the risks incurred if the fan transports dust, powder, toxic gas or air/gas at a high temperature in connection with the fan outlet, and where appropriate any leakage. The user is responsible to ensure compliance with the relevant standards.

The fans are normally delivered mounted on a joist frame. The fan is mounted on a vibration damper and attached to the floor. Alternatively it is possible to mount the fan on a vibration dampened concrete base. If the fan is mounted on a concrete base, the fan must stand securely on all the attachment points before the fan base is screwed to the concrete base.

Ducts are normally connected with a flexible sleeve coupling to avoid vibrations in the duct system, but the connected ducts must not expose the fan cover to stress. If the fan is mounted on a vibration damper the inlet and



outlet ducts must be connected with a flexible sleeve coupling.

Install the fan so that service and maintenance work can be carried out in a safe way.

Provide the fan the requisite enclosure protection. Make sure that the electric motor has adequate ventilation. The maximum permitted ambient temperature is 40°C and the minimum is -20°C.

### 4 Electrical connection

**NOTE.** Refer to the separate installation instructions for the fan motor. Electrical connections must only be carried out by an authorised electrician.

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## 5 Check before starting that:

- The motor is insulation tested if it has been stored for a long period or outdoors.
- The motor is connected to all phases and that the correct voltage and frequency are used.
- The ducts are correctly fitted and seal to the fan without exposing the fan cover to stress.
- Flexible sleeve couplings are correctly fitted.
- The requisite guards are fitted.
- **There are no loose objects in the fan or in any connected ducts.**

- The belt tension is correct.

## 6 Checking the direction of rotation

Start the fan for a short moment and check the direction of rotation. The direction of rotation of the impeller must correspond with the arrow on the fan housing. If this is not the case, you need to change the phases L1 and L3 (applies to three-phase operation). If the direction of rotation is incorrect this will reduce the fan capacity.

## 7 Check after starting:

- That the fan does not emit any abnormal noise.
- That the vibration level is acceptable.

## E Operation

<b>Vibrations in the fan</b>	Incorrect direction of rotation on the impeller	Change two of the phases
	Dirt on the impeller	Clean the impeller
	Wobble in the pulley	Replace with new
	The impeller has been damaged	Replace with new impeller
	The fan is not securely installed	Secure the fan
	The fan is installed so that tensions are carried over in the fan	Reinstall the fan with a spacer between the joist frame and foundation
	Damaged/defective bearing	Install new bearing
<b>Abnormal noise from inlet</b>	Impeller touches the inlet	Adjust the clearance, align fan shaft
<b>Abnormal noise from belt drive</b>	Poorly aligned pulleys	Align pulleys
	Incorrectly tensioned belt drive	Adjust belt tension as per instructions



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<b>Abnormal noise (metallic) from a bearing</b>	Inadequate lubrication of bearing	Replenish as per instructions
<b>Abnormal noise from a bearing</b>	Damaged/defective bearing	Install new bearing
<b>Abnormal rise of temperature in a bearing</b>	Too much lubrication	Lubricate the bearing as per instructions
	Bearing lubricated with incorrect lubricant	Lubricate with specified grease
	Incorrect bearing tolerance	Install bearing with correct tolerance
	Belt drive too tight	Check and adjust belt tension
<b>Defective motor, "burned"</b>	Defective or incorrect protective motor switch	Adjust or replace protective motor switch
<b>Power consumption too high</b>	The fan is working with too little resistance.	Ease down the fan or adjust in the system
	The fan is incorrectly connected $\Delta / Y$	See electric motor's rating plate
	Phase loss	Check the fuses and protective motor switch
<b>Low capacity</b>	The impeller is going in the wrong direction	Change two of the phases
	Blockage in duct system	Remove blockage
<b>Low oil level</b>	Noticeable oil leakage Directly after start of the fan will the oil level go down to "minimum". After some ours the oil level will stabilised.	Seal the plummer housing according to the instructions

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## **F Maintenance and repairs**

Make sure that the working switch is disconnected during service, cleaning or repairs to the fan.

It is important that the impeller has stopped rotating before inspection is carried out. Note that a natural thermal draught can also cause the impeller to rotate.

The bearings on the electric motor must be maintained in accordance with the instructions from the supplier.

### **Regular inspection consists of:**

#### Wear and the need for cleaning

Inspect the fan housing internally  
6 months / 1,000 h  
Inspect the impeller (A1) 3 months / 500 h  
Externally Fan and motor 1 month /  
or when necessary

#### Maintenance "follow-up lubrication"

##### Of grease lubricated bearings

Fan shaft bearing (A3) As per curve

**Electric motor:** According to the instructions of the supplier.

#### Maintenance "new grease"

##### Of grease lubricated bearings

Fan shaft bearing (A3) 12 months /  
When the bearing housing is filled

#### Maintenance "follow-up lubrication"

##### Of oil lubricated bearings

Fan shaft bearing (A4) 1 month

#### Maintenance "new oil"

##### Of oil lubricated bearings

Fan shaft bearing (A4) 24 months /  
5,000 h

#### Inspect and replace when necessary:

Flexible connection 3 months / 500 h  
V-belt drive (A2) 3 months / 1,000 h

#### General:

Inspect the fan to make sure  
that nothing has come loose on the fan  
6 months / 1,000 h

#### **Abnormal vibrations**

See instructions under "Operation".

#### **Abnormal noise**

See instructions under "Operation".

#### **(A1) Inspect the impeller**

Check that there is no damage to the material in impeller from abrasive material or corrosion.

Check that there are no cracks in the impeller.

A damaged impeller must be replaced.

**Repairs of the impeller must only be carried out by Dantherm Filtration AB. NOTE. The impeller must always be balanced after a repair.**

The need for inspection must be assessed from one installation to the next.

Damaged impellers must be replaced.

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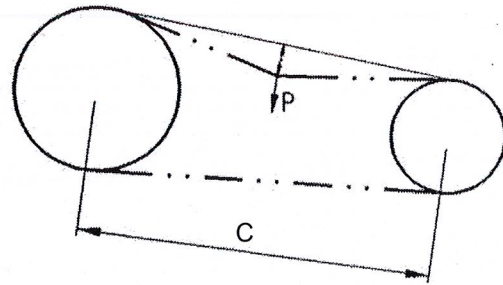
## (A2) V-belt drive

### Replacing the belts

When replacing the belts all the belts must be replaced at the same time.

The belt tension must be reduced so that the belts can be taken off and put on the pulleys.

**The new belt drive needs to be aligned and tensioned according to the instructions.**



### Alignment

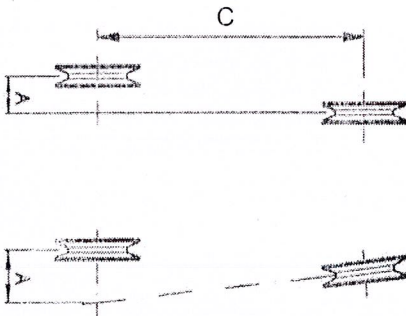
The belt drive pulleys must be fitted so that the interacting pulleys are on the same plane. The deviation (A), as per the figure, must be less than the specified values.

Centre distance (C)	Deviation (A)
< 600 mm	1 mm
600 mm – 900 mm	2 mm
> 900 mm	3 mm

Belt profile	Small pulley $\phi$ (mm)	Depression force P	
		Normal (N)	Max (N)
SPZ	67-85	15	20
	90-	20	30
SPA	100-160	25	33
	180-	33	44
SPB	180-229	40	60
	235-	50	80
SPC	224-	70	120

### Belt tension

- Measure the distance between the shafts.
- Measure which force (P) is required to achieve press in a belt **16 mm**; calculate per metre of the distance between the shafts, at right angles to the belt and at the mid point between the pulleys.
- Increase the belt tension if the force is less than the normal value for P in the table, and reduce it if the force is more than in the table.





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## (A3) Lubrication interval for fan shaft bearing

**NOTE.** Always wipe the bearing housing's grease nipples before lubricating so that dirt does not get into the bearing housing.

### Bearing and follow-up lubrication

The fans are supplied with ball or roller bearings, which are fitted on the shaft with a conical clamping sleeve. The bearings are fitted in a bearing housing of the SNL type, with lubricating nipple and seal.

On delivery the bearings are filled with grease of the **SKF** type: **LGMT-2**. When the bearings are re-lubricated (periodically) it is recommended to use a grease of the same or an equivalent type. Information on the number of operating hours for the follow-up lubrication intervals can be read from the curve "lubrication intervals", and the correct amount of grease is specified in the table. The bearing housing for ball and roller bearings is the same. A grease nipple is placed on the side of the bearing and the greases passes through the bearing.

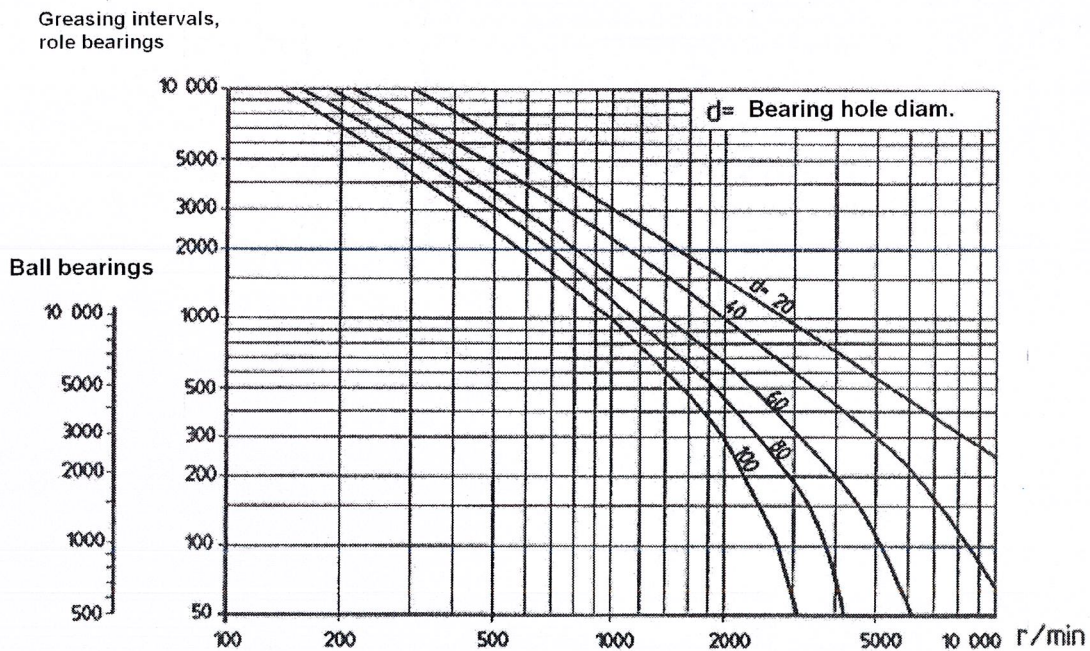
The diagram is applicable for a maximum bearing temperature of +70°C. For each increase of 15°C the lubrication interval is shortened by half. The maximum permitted temperature for the bearing arrangement must not be exceeded:

### Maximum temperature +100°C

In the event of a bearing temperature over +100°C, contact Dantherm Filtration AB.

Fan type / Size		Bearing hole $\varnothing$	Bearing pulley		Bearing fan housing	
MFS x	MFB x	"d" (mm)	Bearing type	Grease (g)	Bearing type	Grease (g)
010	012	35	Ball	8	Ball	8
	016	35	Ball	8	Ball	8
012	020	35	Roller	9	Ball	8
016	025	35	Roller	9	Ball	8
020		35	Roller	9	Ball	8
025	031	40	Roller	10	Ball	9
031	040	50	Roller	11	Ball (1)	11
040	050	60	Roller	16	Roller	16
050		75	Roller	21	Roller	21
	071	75	Roller	21	Roller	21
063	080	80	Roller	24	Roller	24
		80	Roller	24	Roller	24
071	090	80	Roller	24	Ball	24
080	100	90	Roller	32	Ball	31
090	112	90	Roller	32	Ball	31
Belt driven fans on "inclined motor block"						
080	090	100	Roller	53 (2)	Roller	53 (2)
090	112	100	Roller	53 (2)	Roller	53 (2)

1. A fan with a T-impeller is provided with roller bearings at the fan housing.
2. Delivered as standard with bearing housing for grease lubrication. These fans can also be delivered with bearing housings for





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Avoid overfilling the bearings with grease. Excess grease that has passed through the bearing needs to be removed before the bearing housing has become full.

When the bearing housing has become full the bearing can be provided with new grease:

- Dismantle the upper half of the bearing housing and remove all the excess grease.
- Fit the upper half on the bearing housing.
- Fill the bearing housing with grease via the grease nipple and allow the new grease to press out the old from the bearing.
- Dismantle the upper half of the bearing housing and remove the old grease that has been pressed out from the bearing.
- Spread the grease evenly round the bearing and fill to approx 30% round the bearing.

Important! When replacing the seal the lower half of the inner lip on the seal must be fitted diagonally to the lubrication nipple and cut up to approx. 10 mm.

Automatic lubrication of **SKF** type: **System 24** must be filled with grease of the LGWA-2 type.

## Replacing the bearings

Bearings must only be replaced by a person who has the requisite competence to do this.

## (A4) Lubrication interval for fan shaft bearing

### Bearing and follow-up lubrication

The fans with oil lubricated bearing housings of the SONL type are fitted with a spherical roller bearing next to the fan and a guide bearing and CARB bearing next to the flexible coupling.

The bearings are filled with oil on delivery.

**The oil should be hydraulic oil, ISO VG 100.**

**Maximum bearing temperature 80°C**

Shell: Tellus 100

Mobile: DET 18M

Or equivalent.

If The bearing temperature get higher than 80°C, recommended oil ISO VG 100.

Shell: Corea oil P100

Mobile: RARUS 827

Or equivalent.

**If the maximum bearing temperature of 90°C is exceeded, contact Dantherm Filtration AB.**

When starting it is very important to carefully monitor the fan in order to identify at an early stage any oil leakage.

**The surfaces between the two parts of the Plummer bearing should be sealed with Loctite 510 equivalent. Pipe details should be sealed with Loctite 577.**

If there is a low oil level, oil must be filled in the bearing housing.

**Directly after start of the fan will the oil level go down to "minimum". After some ours the oil level will stabilised.**

When the old oil is to be completely replaced with new oil it is pumped out from the bearing housing, and new oil is poured in until the level glass on the bearing housing indicates the correct level.

## **G List of spare parts**

When ordering spare parts you should specify the order number given on the rating plate, and well as which parts the order refers



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## **H EC declaration of the manufacturer**

Clause 4.2 in accordance with the Machinery Directive 98/37/EEC, Appendix 2B:

**Manufacturer: DANThERM FILTRATION AB**

The manufacturer guarantees that the following fan is in compliance with the above mentioned directive, harmonising standards and specifications.

**Description of the machine:** Belt driven centrifugal fan MAXI-F.

**Permissible applications for the fan:** The use and loading of the fan must be in accordance with the specifications in this document and in accordance with the specifications in the order acknowledgement.

**The fan is manufactured in accordance with:**

- Machinery Directive 98/37/EEC
- Low Voltage Directive LVD 73/23/EEC (supplement 93/68/EEC)
- Electromagnetic Compatibility Directive EMC 89/336/EEC (supplement 92/31/EEC, 93/68/EEC)

The fan must not be taken into use before the system, or the machine, in which it is to constitute a part has been declared to comply with the relevant health and safety requirements in Machinery Directive 98/37/EEC.

Place: Malmö

Date: 01-11-2006

The undersigned declares that the above information is valid.



Paul Nord

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