

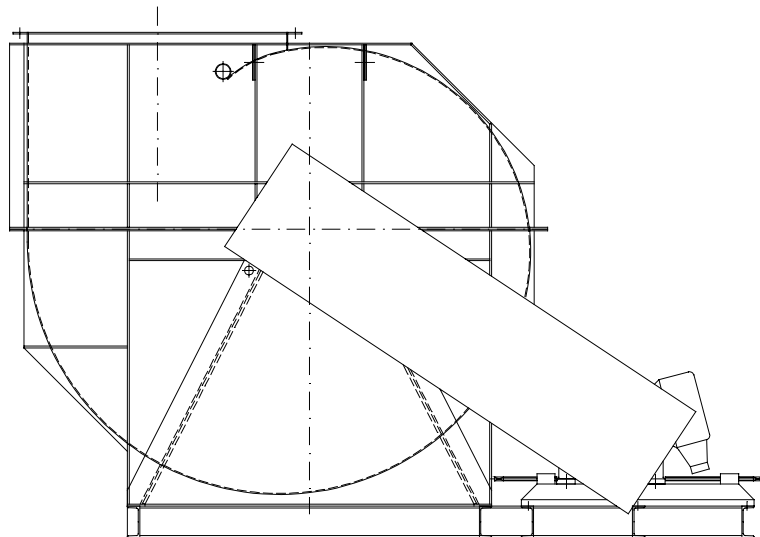


NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

LOVENSE KANAALDIJK 61, 5013 BJ TILBURG
POSTBUS 2233, 5001 CE TILBURG

**OPERATIONS- AND MAINTENANCE INSTRUCTIONS
FOR FANS**



**NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.**

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TECHNICAL FAN DATA

Ordernumber : _____
Year of manufacturing : _____
Design : _____
Type : _____
Class : _____
Arrangement : _____
Position : _____
Capacity : _____ m³/h
Static pressure : _____ Pa at _____ °C
Fanspeed nominal : _____ rpm
Fanspeed maximum : _____ rpm
Outlet velocity : _____ m/s
Powerconsumption at shaft : _____ kW at _____ °C
Powerconsumption at shaft : _____ kW at _____ °C
Total weight : _____ kg

NOISE LEVELS

Soundpressure level at a distance of 1 meter, based on the half free field environment, tolerance of 3 dB, including noise level motor.

With open in- or outlet : _____ dB(A).
Ducted on in- and outlet : _____ dB(A).

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2

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CONTENTS

TECHNICAL FANDATA	2
NOISE LEVELS	2
TRANSPORT AND INSTALLATION	4
STARTING UP	4
SECURITY MEASUREMENT	5
INLET SCREEN	5
LANDING PLACE	5
EXTREME TEMPERATURES	5
NOISE	5
VIBRATIONS	5
FOUNDATION	5
INSPECTION OR ACTIVITIES ON THE FAN	6
MAINTENANCE	6
MOUNTING OF V-BELTS	6
TENSIONING OF THE V-BELTS	7
TABEL V-BELTTENSION	7
LUBRICATION AND MAINTENANCE OF SKF TYPE SNH BEARINGBLOCS	7
REGREASING OF BEARINGBLOCS WITHOUT GREASEFITTINGS	8
REGREASING BEARINGBLOCS WITH GREASEFITTINGS	8
MOUNTING OF SKF TYPE SNH BEARINGBLOCS	9
MOUNTING FOLLOW-UP BEARINGPARTS OF SKF TYPE SNH BEARINGBLOCS FOR CHICAGO FANS	10
MOUNTING FOLLOW-UP BEARINGPARTS OF FANS WITH MEDIUMTEMPERATURES ABOVE 300°C	11
ALIGNING OF FLEXIBLE COUPLING	13
MOUNTING INSTRUCTIONS FOR SPRINGVIBRATIONDAMPERS	15
MOTORS	16

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3

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TRANSPORT AND INSTALLATION

The fans manufactured by NAAYKENS' under license of **CHICAGO BLOWER CORPORATION U.S.A.** are highly adjusted and balanced machines.

The transportation and lifting of these fans must therefore be carried out very carefully.

The fan must be placed on a proper supporting foundation and be adjusted to level.

Ducting mounted on in- or outlet must be properly supported before connecting.

When the fan is placed on vibrationdampers the ducting must be mounted by means of a flexible connection.

Forces which can reach the fan from the outside, such as shocks and vibrations, must be avoided as they can damage the bearings.

When the fan is placed in dusty environment or outside, it is recommended to built a cover over the shaft and bearingblocs to protect them as much as possible against dust and rainwater.

If the fan is to remain idle for an extended period, fanshaft must be rotated periodically to prevent bearingdamage.

STARTING UP

Before the fan is started up the following must be regarded.

- During transportation the inlet cone\ring may be displaced, therefore the clearance between impeller must be checked. Clearance must be equal over the entire circumference. Check whether the impeller runs free. If it does not, loosen the bolts which thighten the inletcone/ring, and adjust till the impeller runs free again, than thighten the bolts!
In very severe cases it will be necessary to loosen the bolts of the pillow-blocks or, when the fan is direct driven, the motor mounting bolts, then shift the shaft with the bearingblocs or motor to adjust the clearance between impeller and inletcone/ring.
- Check whether the fan is properly mounted and make sure that all bolts and nuts are thightened.
Check this periodically.
- Check whether the inside of the fan is clean and free from strange objects.
- Check the electrical connention of the motor and make sure that the voltage is the same as noted on the motor-identificationplate.
- Check the rotating direction. This must compare with the arrow on the driveside of the fanhousing.
- Ensure yourself that all safety precautions have been taken.

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SECURITY MEASUREMENT

- The fan must be installed with an emergency switch.
- The vibrationdampers of the fan shall be installed, in such a way that the vibrations are not passed through to the environment.

Inlet screen:

You have to protect the fan with an open in- or outlet with an in- or outletscreen. When there is no in- or outletscreen, in- or outlet must be ducted with a minimum ductlength of 2 meters.

Landing place:

The fan must be installed, in such a way, that it can be properly accessed for inspection or maintenance activities.

Extreme temperatures:

The fan has to be protected, in a way that nobody can be hurt directly, by touching, or reaching to the fan, which has a very high or low temperature.

Noise:

The fan has to be protected with noise insulation, if the noise of the fan is dangerous for the hearing mechanism of men.

Vibrations:

The wheel and bearings of the fan have to be controlled fully once a month for unbalance and vibrations.

If the unbalance level is higher than 7.1 mm/s, the fan should be stopped immediately.

Foundation:

When using a concrete-foundation, the weight of it, will be at least 3 times the weight of the fan-assembly.

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Inspection or maintenance activities on the fan:

Switch off the fan first, before opening the inspection door, or working on the fan. The energy-facility shall be disconnected in a way, no one else can start the fan, as long as you are working on the fan or as long as the inspection door is open.
Before approaching the fan, wait until the wheel has stopped turning.
This takes a few minutes after the operationswitch is disconnected.

MAINTENANCE

A fan is one of the most important parts of your installation. Therefore it is necessary to take up the fan in your maintenance- and inspectionschedule.

The impeller should always be clean.

Pollution of the impeller will immediately cause unbalance and this will cause vibration of the fan. Vitale parts such as bearings and shaft will wear very quickly and this will inrevocably lead to fan breakdown.

Impeller and hub must therefore periodically be checked for pollution and eventually be cleaned.

Most of the time this will eliminate the unbalance.

When the unbalance resists you can always contact our firm.

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IMPORTANT FOR SPAREFANS !

If the fan is to remain idle for an extended period, fanshaft must be rotated periodically to prevent bearing damage.

MOUNTING OF V-BELTS

Always take a set of V-belts with the same identification code.

Remove oilrests and dirt from the V-beltsheaves, check specially the grooves on dirt and oilrests etc. and clean them thoroughly.

Bring the V-beltsheaves just in line; Wear on one side of the sheave is due to misallignment.

Reduce the centre-distance of the V-beltsheaves for easy mounting of the V-belts in the grooves.

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TENSIONING OF THE V-BELTS

With small profile V-belts the following is applicable:

Take the centre-distance between the V-beltsheaves in meters. For each meter of centre-distance the push-through of the V-belts is 16mm when the belt is loaded in the middle between the sheaves with a force P according tabel :

TABEL V-BELTTENSION

Deflectionforce needed for 16 mm deflection per V-belt per 1000 mm. centre-distance.		P (N)
V-belt type	Ø Smallest pulley	
SPZ	67-95	10-15
	100-150	15-20
SPA	100-132	20-27
	140-200	27-35
SPB	160-224	35-50
	236-315	50-60
SPC	224-355	60-90
	375-560	90-120

With new V-belts it is recommended to take the maximum values.
Recheck after some days and adjust if necessary.

LUBRICATION AND MAINTENANCE OF SKF TYPE SNH BEARINGBLOCS

Unless otherwise noted the bearingblocs are filled with SKF grease type LGMT 2.
Bearingblocs equipped with greasefittings must be greased within one hour after initial operation with 3 times the quantity of G. (Calculate G with the formula on page 8)
This must be repeated after 24 hours of operation.
Afterwards the regreasingperiod can be calculated with the formula below.

Regreaseperiod:

With greaselubricated bearings the regreasing-period depents specifically on next factors;
Bearingtype, dimension, speed, operating- temperature en the quality of the grease.
The regreasingperiod can approximately be calculated with the formula:

$$t_f = k \left(\frac{14}{n} \times \frac{10^6}{\sqrt{d}} - 4d \right)$$

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Where:

- t_f regreasingperiod in runninghours.
 k a factor 1 for spherical roller bearings.
a factor 10 for selfaligning ballbearings.
 n the operatingspeed in rpm.
 d the internal diameter of the bearing.

The regreasinginterval calculated with the formula are only applicable for nonaltered greases and bearingtemperatures up till 70°C. ($\pm 60^\circ\text{C}$ measured on the highest point on the outside of the bearingbloc.)

For bearingtemperatures above 70°C the regreasinginterval is divided by two for each 15°C temperaturerise.

REGREASING OF BEARINGBLOCS WITHOUT GREASEFITTING

Dismount the upperhalf of the bearingbloc, remove the old grease as much as possible and refill bearing and housing with new grease, then reinstall upperhalf of the bearingbloc.

After several regreasings, but at least once a year, the bearing should be cleaned thoroughly.

At split pillow-blocs the upper block half must be dismounted and the grease be removed.

The bearings as well as the other bearingparts and the pillowbloc must be thoroughly cleaned with gasoline or an other appropriate cleaning product.

After cleaning refill the bearing complete with new grease.

The free space in the pillowbloc must be filled for minimum of 1/3 and maximum of 2/3 with new grease.

For mounting of bearings and seals see pages 9 to 12.

REGREASING BEARINGBLOCS WITH GREASEFITTINGS

The quantity of grease which should be pressed into the pillow-bloc with a grease squirt can be determined with the next formula:

$$G=0,005.D.B$$

Where:

- G weight of grease required in grams.
 D outerdiameter of the bearing in mm.
 B width of bearing in mm.

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Surplus of grease will be deleted through hole in the underside of bearingbloc.
After several regreasings, but at least once a year, the bearing should be cleaned thoroughly.
At split pillow-blocs the upper block half must be dismantled and the grease be removed.
The bearings as well as the other bearingparts and the pillowbloc must be thoroughly cleaned with gasoline or an other appropriate cleaning product.
After cleaning refill the bearing complete with new grease.
The free space in the pillowbloc must be filled for minimum of 1/3 and maximum of 2/3 with new grease.

For mounting of bearings and seals see pages 9 to 12.

MOUNTING OF SKF TYPE SNH BEARINGBLOCS

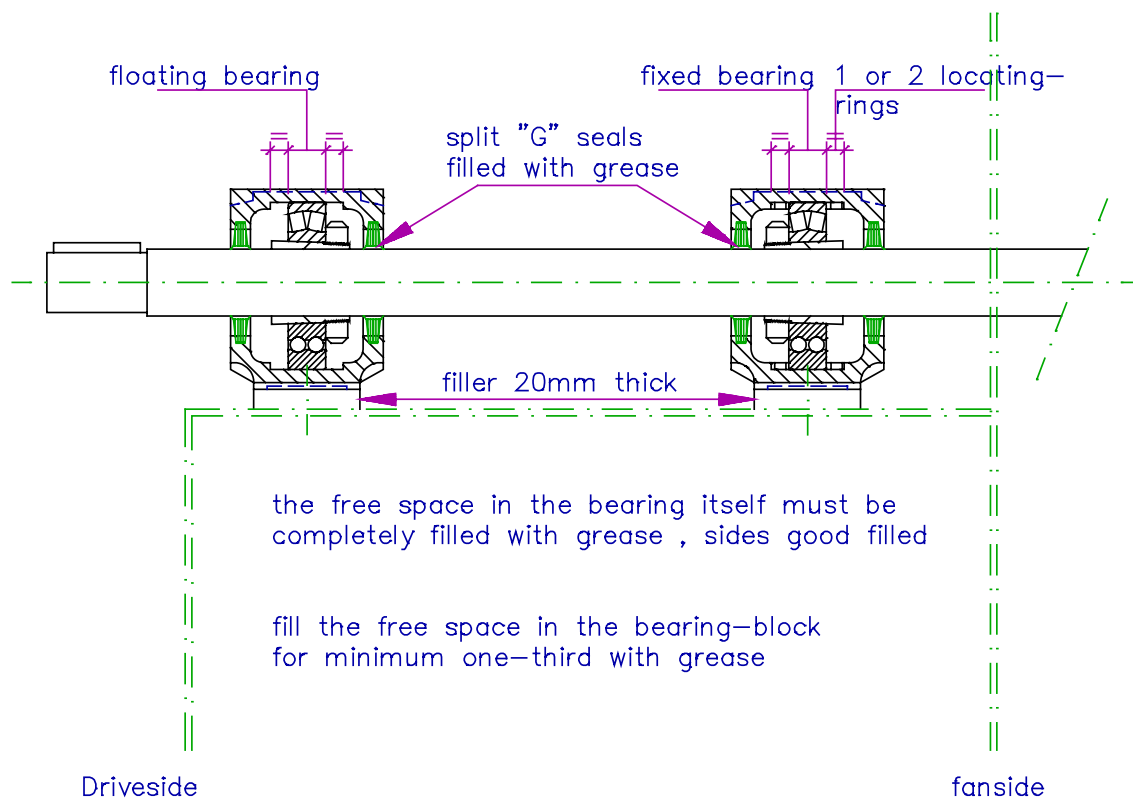


Diagram 1

At single inlet fans the locating ring(s) are mounted in bearingbloc on fanside, and at double inlet fans in bearingbloc on driveside.
Mount nuts of the bushings always facing inside.

Bearinggrease: SKF LGMT2

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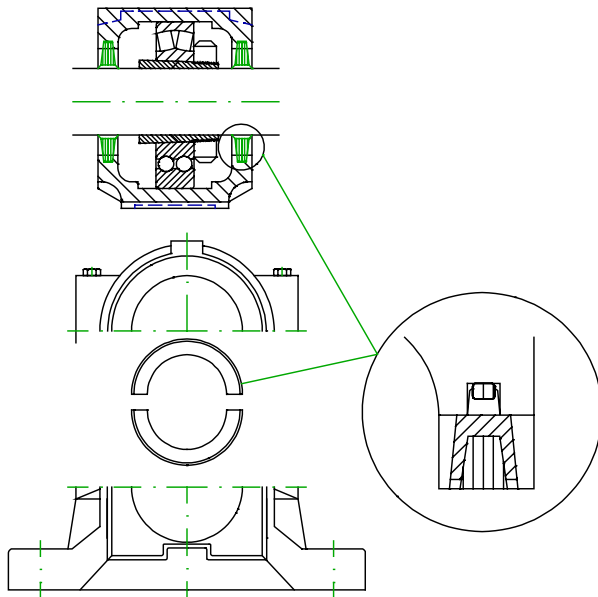
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MOUNTING FOLLOW-UP BEARINGPARTS OF SKF TYPE SNH BEARINGBLOCS FOR CHICAGO FANS

Fasten the bearingbloc with help of the mountingbolts handtight.
Place one half of each seal on both sides of the bearingbloc in the designed savings.
Fill free space between sealinglips with grease.



Clean the shaft thoroughly and mount bearingparts as indicated on page 9.

Place the shaft with bearings in lowerhalf of bearingbloc.
Mount locatingring(s) in the appropriate bearingbloc, and fill free space for approximately 1/3 with grease.

IMPORTANT !

Fill free space in bearing itself completely with grease and smear the sides roomy.
Align both bearingblocs carefully and tighten mountingbolts.

Place the remaining halves of the sealrings in upperhalf of bearingblocs and fill free space between sealinglips with grease.
Put upperhalf in place and tighten well.

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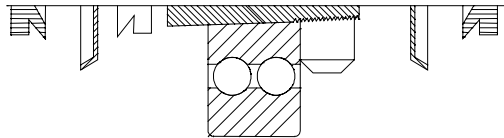
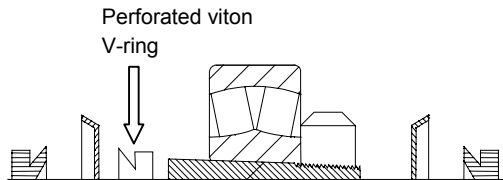


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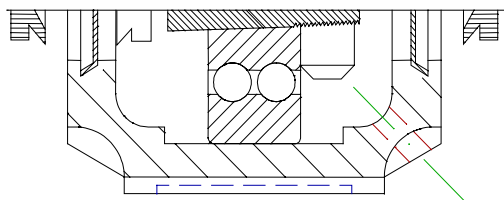
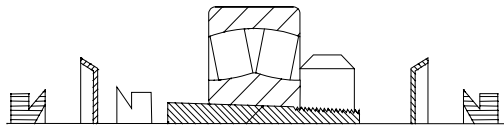
MOUNTING FOLLOW-UP BEARINGPARTS OF FANS WITH MEDIUMTEMPERATURES ABOVE 300°C



Clean shaft thoroughly.

Mount seal- and bearingparts as indicated on page 9.

Place shaft with seal- and bearingparts in lowerhalf of bearingbloc.



Mount locatingrings in the appropriate bloc, see page 9, and fill free space in bearingbloc for approximately 1/3 with grease.

IMPORTANT !

Fill free space in bearing itself completely with grease and smear sides roomy.

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11

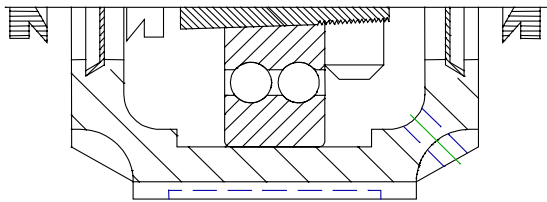
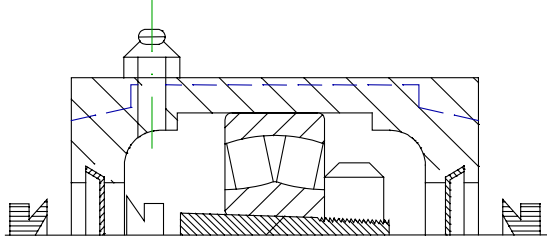
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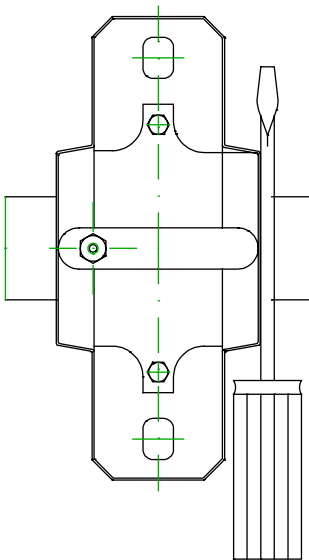
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Smear sealingsurface of sheetsteel disc with grease. At bearingblocs with greasefitting, thread 1/8" G, press the perforated viton V-ring smoothly against the sealingdisc. Mount upperhalf of bearingbloc and fasten well.



The outer V-rings must be pressed in one sphere with the side of the bearingbloc. This can best be done with a screwdriver whilst turning the shaft slowly.

ATTENTION!!! Grease: SKF LGHT 3

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ALIGNING OF FLEXIBLE COUPLING

The best tools for obtaining a perfect alignment are a couple of dial gauges fitted as shown in diagram 2.

They are each placed on a different couplinghalf. One for axial- and one for radial measurement.

By slowly rotating the shaft and at the same time read the deflections, one can obtain whether any adjustments should be made in the axial- or in the radial alignment.

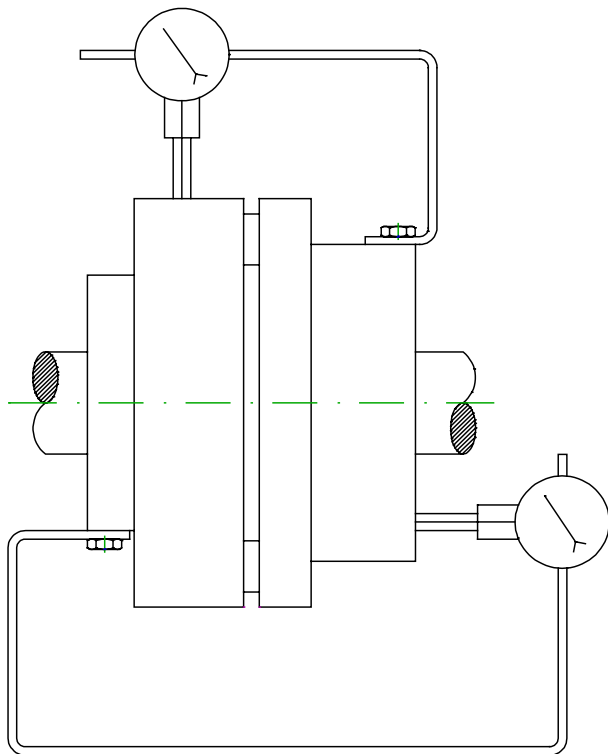


Diagram 2

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In case you don't have a set of dial gauges, aligning can also be done the next way.

Measure distance between the both couplinghalves with a feelergauge at one point on the circumference and mark this spot. See diagram 3.

Turn shaft 90° and measure again on the marked spot.

Repeat at 180° and 270° rotation of the shaft.

The difference between the largest and smallest measured distance must not exceed 0,05-0,10 mm.

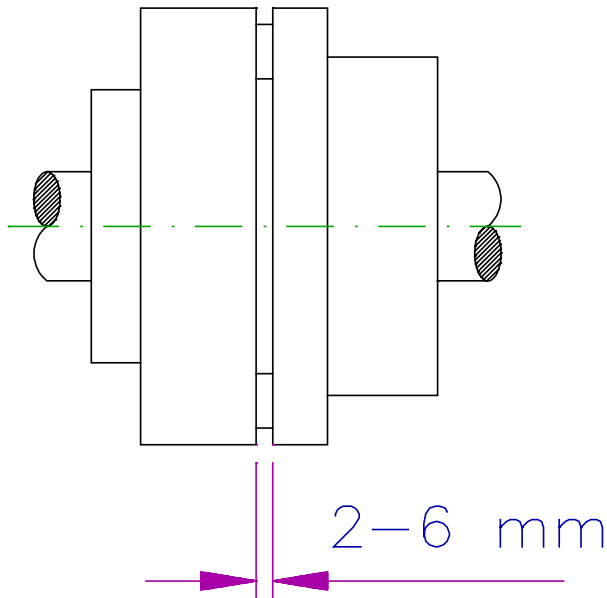


Diagram 3

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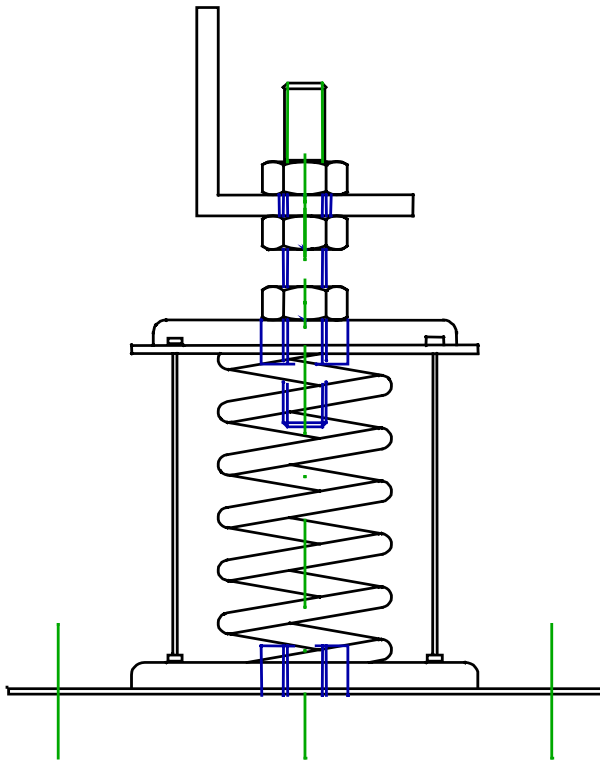
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MOUNTING INSTRUCTIONS FOR SPRINGVIBRATION-DAMPERS

Mounting follow-up:

- 1) Jack up the fan and place a vibrationdamper underneath each fixinghole in the base.
- 2) Screw the levellingbolts in the threaded upperparts of the vibrationdampers.
Tighten locknuts. Place fan on the vibrationdampers. (Between two levellingnuts.)
- 3) Check level of fan and adjust levellingnuts if necessary. Tighten levellingnuts well.
- 4) If vibrationdampers are situated between base and counterbase they are blocked up for transport.
Remove the locking clamps after erection.



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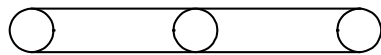
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MOTORS

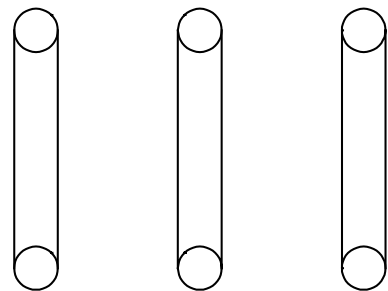
Direction of rotating:

The motor can be used either direction of rotation. (Low noise motors only in the indicated direction.)

The sense of rotation can be changed by mutually interchanging any two feeders of the line.



STAR



DELTA

Mounting place:

Take care of a place as dry, cool and clean as possible and make sure that the coolingfan can induce enough coolingair.

Maintenance:

The motors require very few attention.

Only a little cleaning is necessary for a good cooling. The bearings are greased with Shell Alvania R3.

They have a normal life-time and don't need to be regreased.

(Unless stated otherwise.)

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