

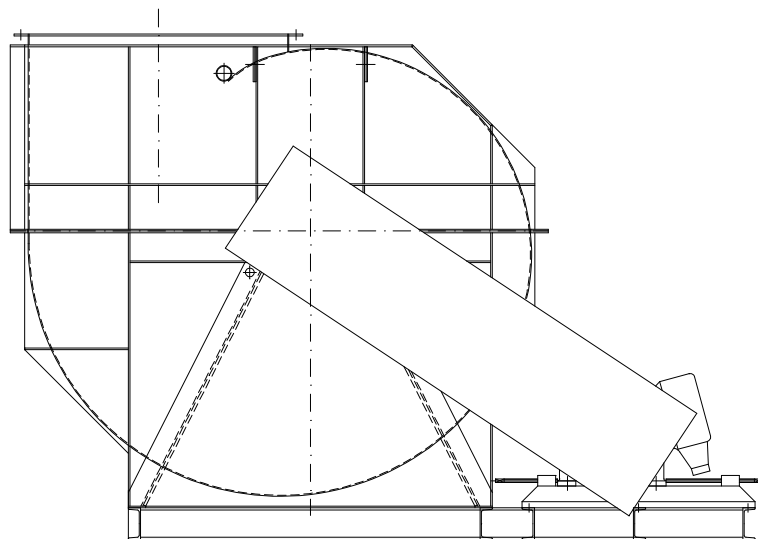


NAAYKENS'

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.**

TELEPHONE : +31 13 5425002



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

TECHNICAL FAN DATA

Ordernumber	:	
Year of manufacturing	:	
Design	:	
Type	:	
Class	:	
Arrangement	:	
Position	:	
Capacity	:	m ³ /h
Static Pressure	:	Pa at °C
Fanspeed _{nom.}	:	upm
Fanspeed _{max.}	:	upm
Powerconsumption at shaft	:	at operating temp.
Powerconsumption at shaft	:	at 20°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).

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

2

TELEPHONE : +31 13 5425002



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

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 SNL BEARINGBLOCS	7
REGREASING OF BEARINGBLOCS WITHOUT GREASEFITTINGS	8
REGREASING BEARINGBLOCS WITH GREASEFITTINGS	8
MOUNTING OF SKF TYPE SNL BEARINGBLOCS	9
MOUNTING FOLLOW-UP BEARINGPARTS OF SKF TYPE SNL 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

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

3

TELEPHONE : +31 13 5425002



NAAWKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

TRANSPORT AND INSTALLATION

The fans manufactured by NAAWKENS' 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 vibration dampers 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 build a cover over the shaft and bearing blocks to protect them as much as possible against dust and rainwater.

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

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 and inlet cone must be checked. Clearance must be equal over the entire circumference. Check that the impeller runs free. If it does not, loosen the bolts which tighten the inlet cone/ring, and adjust till the impeller runs free again, then tighten 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 bearing blocks or motor to adjust the clearance between impeller and inlet cone/ring.
- Check that the fan is properly mounted and make sure that all bolts and nuts are tightened. Check this periodically.
- Check whether the inside of the fan is clean and free from strange objects.
- Check the electrical connection of the motor and make sure that the voltage is the same as noted on the motor-identification plate.
- Check the rotating direction. This must compare with the arrow on the drive side of the fan housing.
- Ensure yourself that all safety precautions have been taken.

SECURITY MEASUREMENT

NAAWKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

4

TELEPHONE : +31 13 5425002



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

- The fan must be installed with an emergency switch.
- The vibration dampers 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 outlet screen.
When there is no in- or outlet screen, in- or outlet must be ducted with a minimum duct length 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.

Inspection or maintenance activities on the fan:

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

5

TELEPHONE : +31 13 5425002



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

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 operation switch is disconnected.

MAINTENANCE

A fan is one of the most important parts of your installation. Therefore it is necessary to include the fan in your maintenance- and inspection schedule.

The impeller should always be clean.

Pollution of the impeller will immediately cause unbalance and this will cause vibration of the fan. Vital parts such as bearings and shaft will wear very quickly and this will irrevocably 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 problems.

When the unbalance resists you can always contact our firm.

Tel: +31-13-5425002

IMPORTANT FOR SPARE FANS !

If the fan is to remain idle for an extended period, fans haft 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 oil rests and dirt from the V-belt sheaves, check specially the grooves on dirt and oil rests etc. and clean them thoroughly.

Bring the V-belt sheaves just in line; Wear on one side of the sheave is due to misalignment.

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

TENSIONING OF THE V-BELTS

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

6

TELEPHONE : +31 13 5425002



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

With small profile V-belts the following is applicable:

Take the centre-distance between the V-belt sheaves 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 to table :

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.
Re-check after some days and adjust if necessary.

LUBRICATION AND MAINTENANCE OF SKF TYPE SNL BEARINGBLOCKS

Unless otherwise noted the bearing blocks are filled with SKF grease type LGMT 2.
Bearing blocks equipped with grease fittings 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 grease lubricated bearings the regreasingperiod depends specifically on next factors;
Bearing type, dimension, speed, operating- temperature en the quality of the grease.
The regreasingperiod can approximately be calculated with the formula:

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

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

Where:

- t_f regreasingperiod in running hours.
- k a factor 1 for spherical roller bearings.
a factor 10 for self aligning ball bearings.
- n the operating speed in rpm.
- d the internal diameter of the bearing.

The regreasing-interval calculated with the formula are only applicable for no altered greases and bearing temperatures up till 70°C. (± 60°C measured on the highest point on the outside of the bearing block.)

For bearing temperatures above 70°C the regreasing-interval is divided by two for each 15°C of temperature rise.

REGREASING OF BEARINGBLOCKS WITHOUT GREASEFITTING

Dismount the upper half of the bearing block, remove the old grease as much as possible and refill bearing and housing with new grease, then reinstall upper half of the bearing block.

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

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

The bearings as well as the other bearing parts and the pillow block 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 pillow block 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 BEARINGBLOCKS WITH GREASEFITTINGS

The quantity of grease which should be pressed into the pillow-block 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 outer diameter of the bearing in mm.
- B width of bearing in mm.

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

8

TELEPHONE : +31 13 5425002



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

Surplus of grease will be deleted through hole in the underside of bearing block.
After several regreasings, but at least once a year, the bearing should be cleaned thoroughly.
At split pillow-blocks the upper block half must be dismantled and the grease be removed.
The bearings as well as the other bearing parts and the pillow block 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 pillow block 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 SNL BEARINGBLOCKS

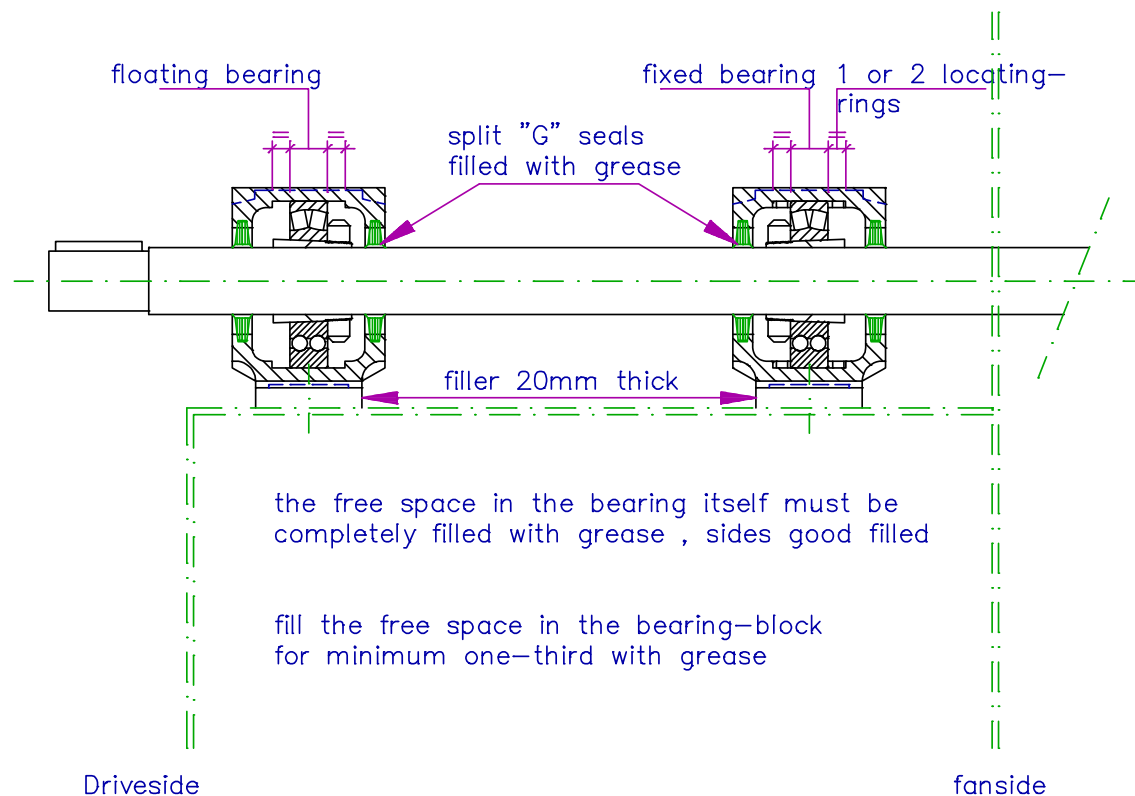


Diagram 1

At single inlet fans the locating ring(s) are mounted in the bearing block on fan side, and at double inlet fans in bearing block on drive side.
Mount nuts of the bushings always facing inside.

Bearinggrease: SKF LGMT2

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

TELEPHONE : +31 13 5425002



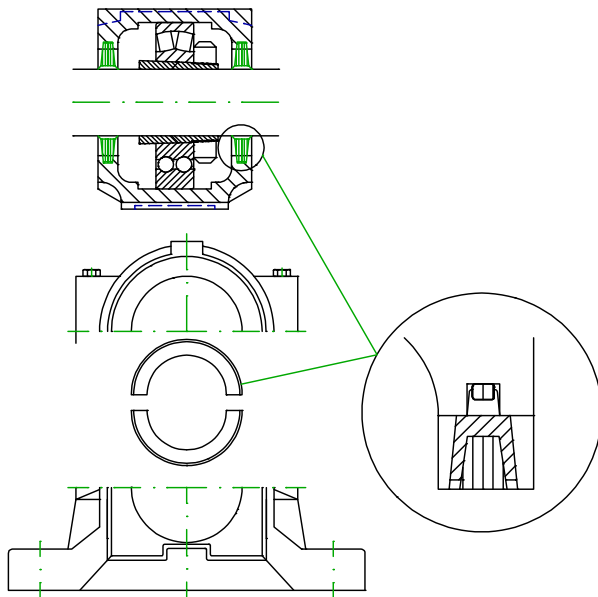
NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

MOUNTING FOLLOW-UP BEARINGPARTS OF SKF TYPE SNL BEARINGBLOCKS FOR CHICAGO FANS

Fasten the bearing block with help of the mounting bolts hand tight.
Place one half of each seal on both sides of the bearing block in the designed savings.
Fill free space between sealing lips with grease.



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

Place the shaft with bearings in lower half of bearing block.
Mount locating ring(s) in the appropriate bearing block, 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 bearing blocks carefully and tighten mounting bolts.

Place the remaining halves of the seal rings in upper half of bearing blocks and fill free space between sealing lips with grease.
Put upper half in place and tighten well.

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

TELEPHONE : +31 13 5425002

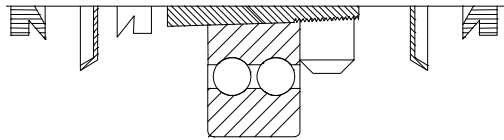
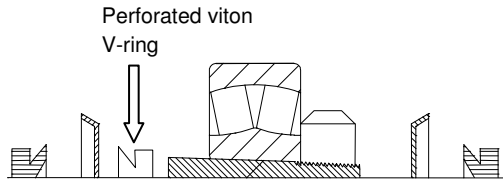


NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

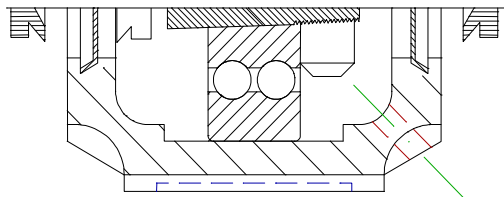
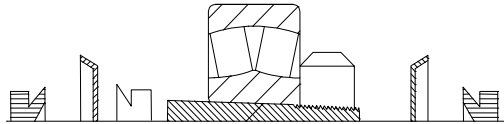
MOUNTING FOLLOW-UP BEARINGPARTS OF FANS WITH MEDIUMTEMPERATURES ABOVE 300°C



Clean shaft thoroughly.

Mount seal- and bearing parts as indicated on page 9.

Place shaft with seal- and bearing parts in lower half of bearing block.



Mount locating rings in the appropriate block, see page 9, and fill free space in bearing block for approximately 1/3 with grease.

IMPORTANT !

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

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

11

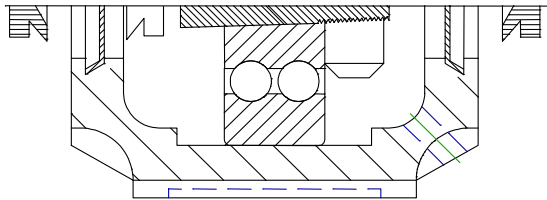
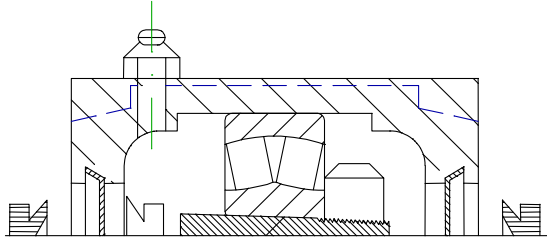
TELEPHONE : +31 13 5425002



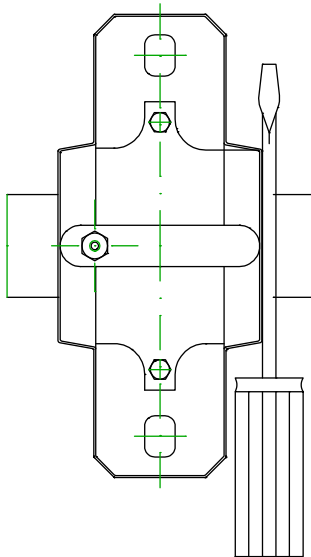
NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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



Smear sealing surface of sheet steel disc with grease. At bearing blocks with grease fitting, thread 1/8" G, press the perforated viton V-ring smoothly against the sealing disc. Mount upper half of bearing block and fasten well.



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

ATTENTION!!! Grease: SKF LGHP 2

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

12

TELEPHONE : +31 13 5425002



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

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 coupling half. One for axial- and one for radial measurement.

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

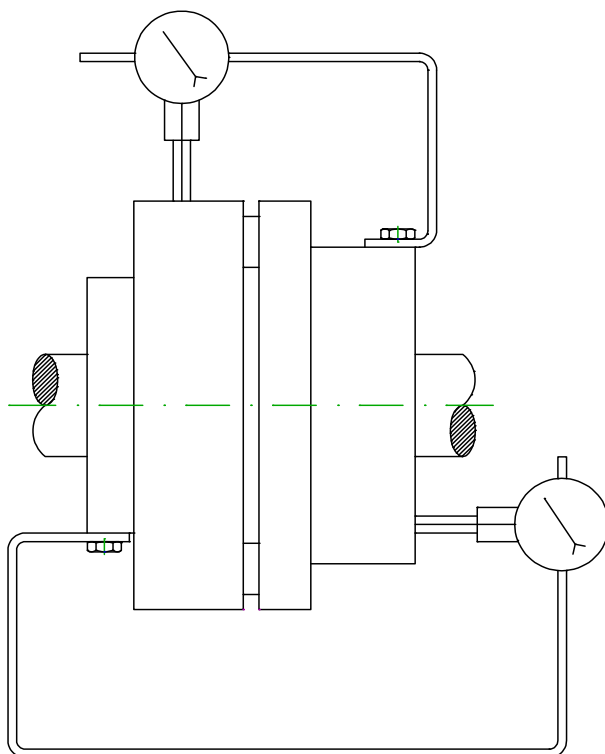


Diagram 2

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

TELEPHONE : +31 13 5425002



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

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

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

Measure distance between the both couplinghalfs with a feeler gauge at one point on the circumference and mark this spot.

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.

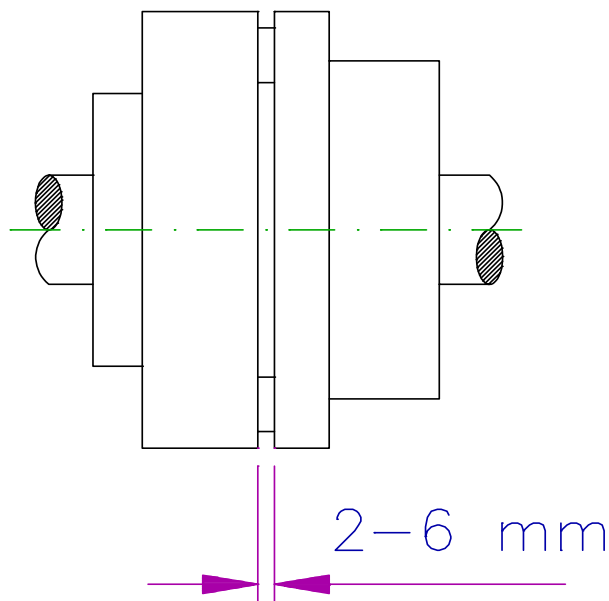


Diagram 3

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

TELEPHONE : +31 13 5425002



NAAYKENS'

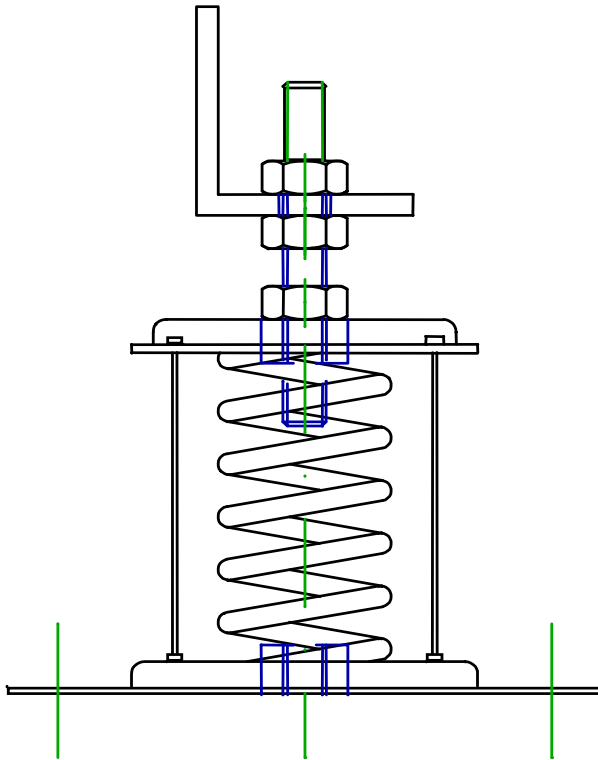
LUCHTTECHNISCHE APPARATENBOUW B.V.

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

MOUNTING INSTRUCTIONS FOR SPRING VIBRATION-DAMPERS

Mounting follow-up:

- 1) Jack up the fan and place a vibration damper underneath each fixing hole in the base.
- 2) Screw the leveling bolts in the threaded upperparts of the vibration dampers.
Tighten locknuts. Place fan on the vibration dampers. (Between two levellingnuts.)
- 3) Check level of fan and adjust leveling nuts if necessary. Tighten leveling nuts well.
- 4) If vibration dampers are situated between base and counter base they are blocked up for transport.
Remove the locking clamps after erection.



NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

15

TELEPHONE : +31 13 5425002



NAAYKENS'

LUCHTTECHNISCHE APPARATENBOUW B.V.

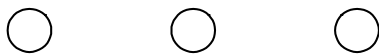
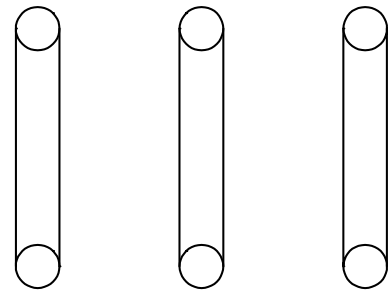
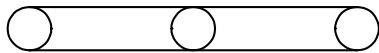
LOVENSE KANAALDIJK 61, 5013 BJ TILBURG
POSTBUS 2233, 5001 CE TILBURG

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 cooling fan can induce enough cooling air.

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.)

NAAYKENS'
LUCHTTECHNISCHE APPARATENBOUW B.V.

16

TELEPHONE : +31 13 5425002