



GEOVENT

INSTRUCTION MANUAL



FAN

**LEX/MEX 250 to 1000, LSX/MSX 146 to 250 and
MHFX 400 and 500**

ATEX zone 1 and 2 G, "G" for gas equipment and zone 22 D, "D" for støv

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1.0 Introduction

This manual is made and designed in order to facilitate the best and most secure interaction with the product. The manual is relevant for people involved in transportation, stocking, installation, using, maintaining and all other thinkable interaction with the product.

The manual must be read in full and understood before interacting with the product.

When the manual has been read and understood in full, the table of contents can be used to find the relevant information in each case.

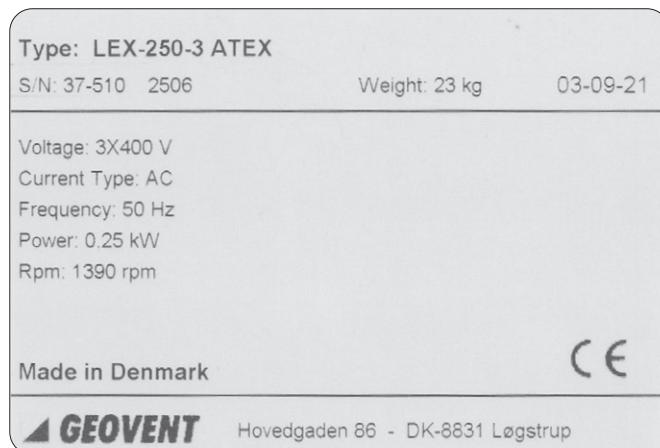
The product is manufactured by:

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DENMARK

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E-mail: salg@geovent.dk
www.geovent.com

This manual is to be used for all interactions with the product including: Transportation, stocking, installation, operation and maintenance.

This product is marked with: (example)



ATEX mærkning

Ex II 3G Ex h IIC T3 Gc/II 3D Ex h IIIB T120 Dc

Ex II 2G EX h IIC T3 Gb

Ex II 2G EX h IIC T4 Gb

2.0 Safety

2.1 General safety

Carefully read this manual before use and observe the safety instructions in order to avoid injuries! Keep this manual in a safe place!

Secure that all users of the product have read this manual and that they follow the instructions as described. Observe all instructions marked on the product! Observe the indications of the manufacturer. Never use the product if you are in doubt about how it works or what you should do.

When doing maintenance follow the instructions in chapter 7.0.

Do not modify the product or use spare parts from other suppliers than Geovent, as this may hamper the product and the function.

2.2 Danger

You must wear safety gloves when handling or using the product to protect your hands from scratches etc.

Be aware that the product may tilt when you move it. You must handle the product with care and tie it safely to the truck or the fork lift when it is in transport.

Follow the instructions in chapter 7.0 when the product is maintained.

When handling the product be sure that there is no risk for the installer, and secure that there are no people around the product, secure that the product cannot fall down risking to injure persons or subjects.

No speed control or frequency inverter or frequency inverter shall be used with the standard fan, as this always involves increased operating temperature of the motor. This will eventually result in an explosion. If speed control or use of a frequency inverter is desired, a special motor must be used and the frequency inverter must be outside the ATEX zone or be ATEX approved.

The ATEX label on the fan must not be removed or covered.

If vibration or noise is generated by the fan, the fan must be stopped immediately and the fault rectified.

If a repair is not possible you should dispose of the product. Please follow the instruction for disposal in chapter 10.0.

3.0 Machine overview

3.1. Description

Geovent fans LEX/MEX, LSX/MSX and MHFX are used for both process and comfort ventilation where there is a risk of explosive concentrations of dust or gas.

3.2 Intended use

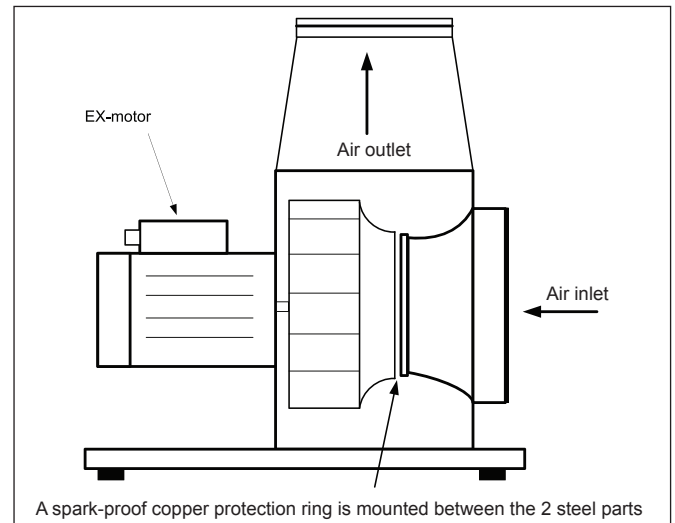
Geovent ATEX fan LEX/MEX, LSX/MSX and MHFX are used for both process- and comfort ventilation, where there is an explosion risk from concentrations of dust or gas. The fan can be used in zone 1 (G), zone 2 (G) and zone 22 (D).

Furthermore, the fan can be used where the extracted air is itself of no risk, but where the surroundings demand extra protection, such as gas ships, oil rigs etc. If highly aggressive gas or dust is extracted, the fan should be ordered as AISI 316.

When extracting large quantities of dusty air, the fan wheel may become unbalanced due to dirt that has stuck to the wheel. To avoid this, a filter must be used to minimise the dust coming through the fan.

3.3 Machine specifications

3.3.1 Design



Motor:

As standard for LEX / MEX used three-phase explosion-proof and ATEX certified motors. All motors are with B5 flange.

For gas applications zone 1 and 2:

EX II 2G Ex e II T3, CESI 07 ATEX 056X or equivalent is used. See the manufacturer's manual (attached).

For frequency regulated fan in ATEX zone 2-22:

II 3G Ex nA IIC T3 / II 3D Ex tc IIIB T120°

These can be controlled by a frequency inverter by using "PTC".

In ATEX zone 1 you should use an explosion proof motor e.g.: EX II2G Ex db eb IIC T4. Other motors can be ordered.

See operating conditions from the motor supplier in chapter 15.0.

Fan housing: Made of hot galvanized steel for optimal corrosion resistance. The body is joined by means of steel bolts with locking nuts and sealed with 3M Scotch-seal.

All fans are supplied with carrying feet and mounted with EPDM rubber vibration pads. The fan has a grounding connection.

Impeller LEX/MEX: B-wheel with backward curved in galvanized steel.

Impeller LSX/MSX

Forward curved sirocco wheel (F-wheel) in galvanised steel with galvanised steel hub. The wheel is not suitable for the extraction of very dusty air.

Inlet:

The inlet is made of galvanized steel and fitted with spark-proof copper protective edge. The inlet is provided with a safety net of galvanized mesh. The inlet is provided with EPDM rubber seal (Class C) that connects to ordinary spiro ducts.

Outlet:

The outlet is an integral part of the fan housing. The outlet is connected to a square return. The galvanized outlet flange (optional) can be mounted with clamps and sealed with 3M Scotch-seal.

3.3.2 Technical data

Dimensions

Sound pressure

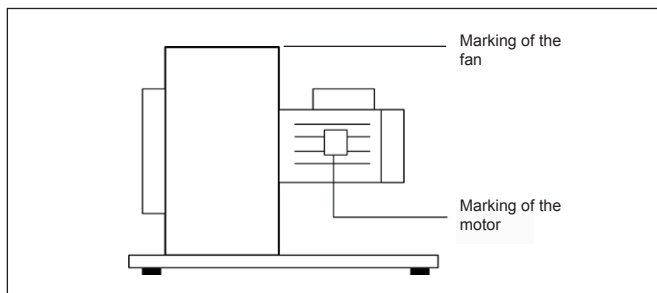
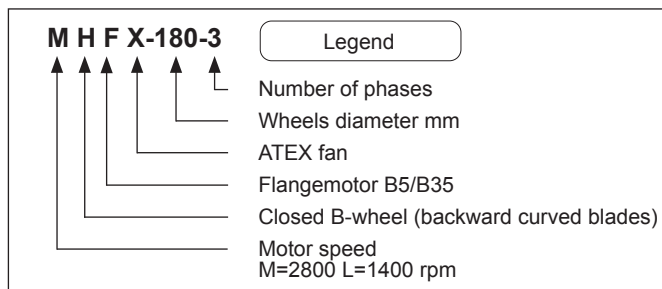
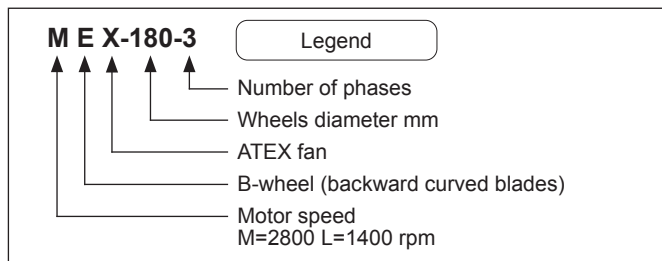
Overview- noise level (dB (A)) - indicative:

Type	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lp, dB(A)	Lp, 1m
LSX 146	46	47	48	46	45	41	35	51	45
LSX 180	54	57	53	50	47	42	36	56	50
LSX 200	61	62	58	57	50	45	40	61	55
LSX 225	62	63	59	58	54	51	45	63	57
LSX 250	66	67	64	63	60	54	46	67	61

Type	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lp, dB(A)	Lp, 1m
MSX 146	61	62	65	63	64	58	51	69	63
MSX 180	70	80	69	64	65	59	54	74	68
MSX 200	80	83	72	71	71	66	61	78	72
MSX 225	82	85	75	73	74	68	63	81	75
MSX 250	86	90	77	75	76	71	65	84	78

The noise level depends on several factors under different circumstances. For example, the position of the fan in the room, the size of the room, the temperature in the room, the echo of the room and the connection (hose/pipe) of the fan have an impact on the noise level.

Where the noise emission may cause a nuisance, the fan should be shielded, for example by placing it in a sound box. As a rule of thumb, a sound box could reduce the noise level by 50%.



The fan marking is located at the top left of the motor side of the fan housing and contains the type designation and production data.

Motor size (kW) and amperage consumption can be read on the motor marking.

Exhaust air temperature Max. 50°C
Ambient temperature Max. 40°C

For higher temperatures, special motors are used. Contact us for more information.

4.0 Transport, handling and storage

During transport in a truck or in another means of transportation the product must be securely packed in a box or a pallet and covered with a water proff material.

The product must be securely stowed in the truck so that it will neither tilt nor shift during transport.

During transport over a short distance e.g. in a stock or a factory, the product can be moved by means of a fork-lift or a stabeler.

When moved it must be secured that the product does not tilt or shift. And it must be secured that the limitations of the means of transportation is not exceeded.

Secure that there are no people around the product, when the product is moved.

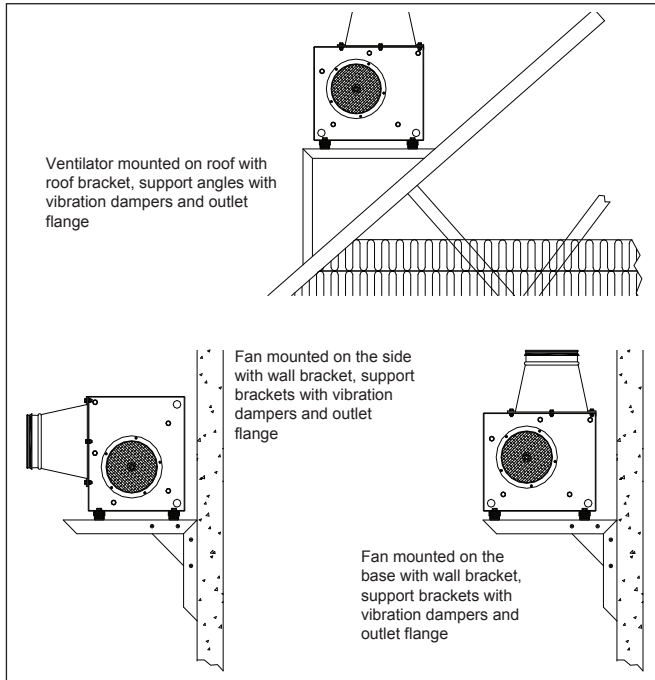
The product must be placed in a dry place and covered securely, in order to secure that moist, metal parts or other substances do not damage the product.

It is not allowed to place anything on top of the product.

5.0 Assembly, installation and start of operation

5.1 Location

The following installation should only be carried out by a trained fitter.



Procedure:

1. The fan is fixed to the roof/floor or to a ceiling bracket or wall bracket (see the illustrations above). The fan is fixed by attaching the vibration dampers with bolts. The fan is to be mounted in one of the ways shown in figure 1. Do not install the fan with the intake in vertical direction.
2. The piping is connected to the fan. On the inlet side, the pipe may be fastened by means of self cutting screws.
3. On the outlet side, the outlet flange (optional) is attached to the fan by means of the supplied clamps. Remember to seal the connection with filler!
4. The outlet flange is then attached to the piping on the outlet side by means of self-cutting screws.
5. For outdoor mounting, it is important to protect the fan from heavy rain and to seal the piping against leaks.
6. The pipe system is sealed.
7. Inlet/outlet must not load the fan with more than 25N.

5.2 Installation

5.2.1 Installation of the fan

The fan is delivered complete/assembled, ready for connection of piping and mains.

Before installation, the following should be considered:

- Location (indoor/outdoor)
- Space available for mounting and servicing the fan.
- Connection options for piping and automation.

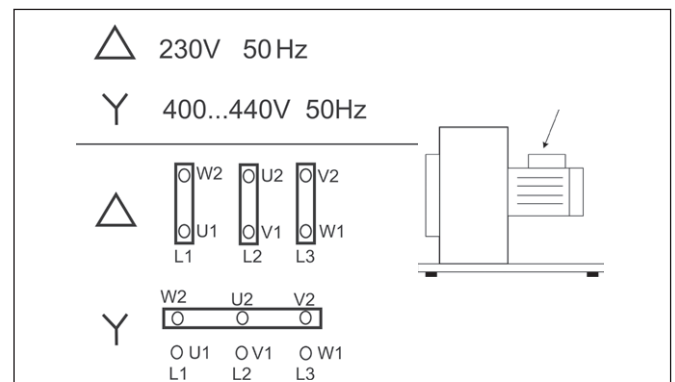
Important:

As far as possible avoid bends right before the inlet and after the outlet, as it will decrease the fan performance.

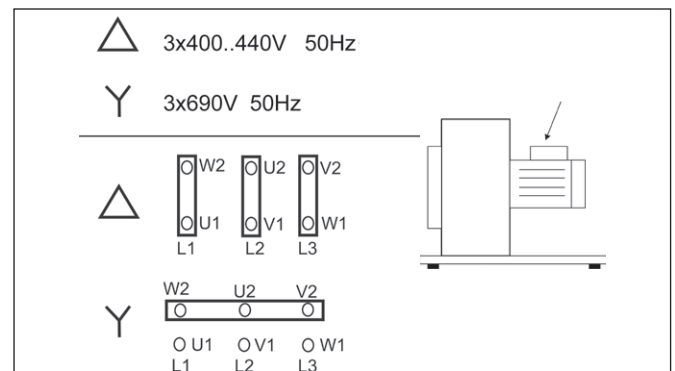
For outdoor installation, be aware of noise. It is also important to ensure that the fan is protected against heavy rain, and to seal the pipe system against leaks.

Note: The wiring diagrams below are indicative.

For motors below 4.0 kW:



For motors of 4.0 kW and up:



Connecting the fan

1. The fan may only be connected by an authorised electrician who is familiar with DS/EN 60079-14:2014, and a fuse and circuit breaker or similar must always be used.
2. In category 1 or 2, interconnections shall be limited to fans with a motor power not exceeding 5,5 kW. For higher motor power, or if the friction velocity exceeds 40 m/s, vibration monitoring is required.
3. Potential equalisation shall be connected to the fan housing.
Main equalisation: minimum 6 mm²
Additional equalisation: minimum 4 mm²
4. Potential equalisation shall be provided between the individual parts of the system and the overall system shall be potential equalised in relation to the surrounding buildings and installations. Potential equalisation between the individual elements of the system can be ensured by using conductive or dissipative materials. The maximum measured potential difference between units in the installation, or between the installation and the ground, shall not exceed 1 MΩ. However, it is recommended that an improved equalisation of 1 KΩ is made. Regular inspections shall ensure that the potential equalisation is intact.
5. The 3-phase ATEX motors are configured for 3x400V - 50Hz. If the motor is stamped with another voltage, use the data on the motor marking. Further the voltage is shown on the order confirmation/invoice. The motor is normally configured at the factory and the supplied metal bridges must be fitted in the terminal box depending on the voltage.

Always double check the marking on the motor and inside side of cover (diagram) for current configuration.

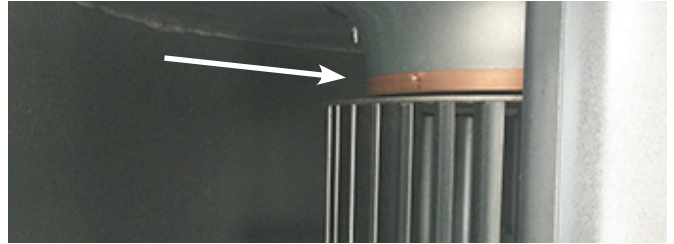
In rare cases 1-phase ATEX motor can be supplied.

Ground connection



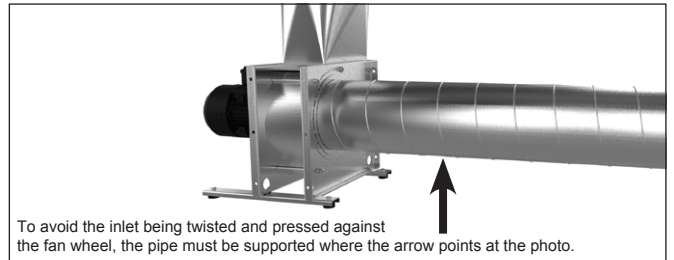
Connect the ground cable to the fan

Copper ring



Example of spark protection of the fan (Copper ring)

Support



The inlet/outlet must not load the fan with more than 25N.

No speed control of any kind shall be carried out unless the motor is approved for this purpose, as it always implies increased operating temperature of the motor, and could eventually result in explosion.

5.2.2 Installation of optional equipment

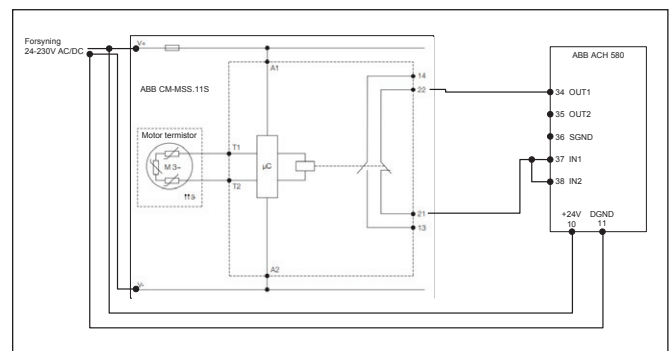
Regulated motor

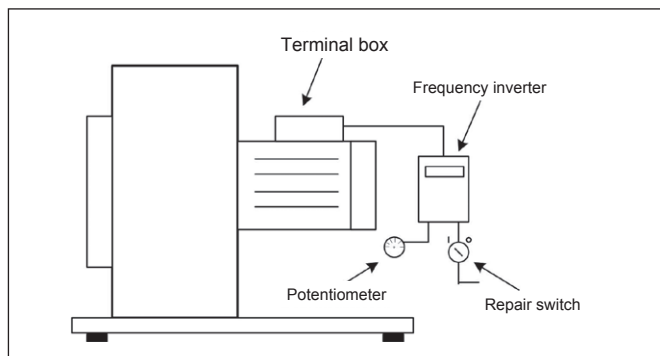
Regulation requires a special motor.
See section 3.3.

Speed control or frequency inverter

For frequency inverter operation, a specific motor must be used for the task and the motor marking must be stamped with the frequency range. Typically, a explosion proof motor is used for the task. (Ex d or Ex de II A-C) Also see section 3.3. A controller or other electronics must be located outside the ATEX zone, or approved for that ATEX zone. See operating conditions from motor supplier in chapter 15.0.

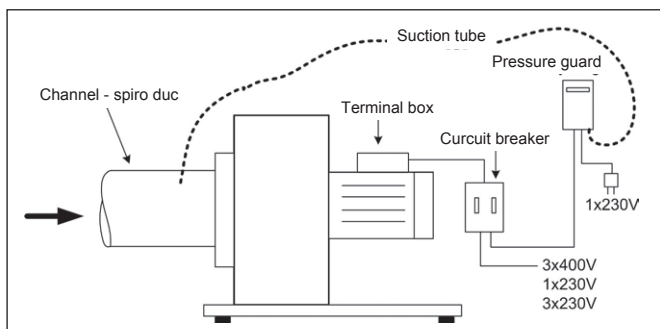
Principle diagram for installation with a frequency inverter





Mounting with potentiometer

Potentiometer and repair switch are connected to the frequency converter. Potentiometer and repair switch must be placed outside the ATEX zone or be approved for that zone.



Installation of circuit breaker and pressure guard

Ordinary circuit breakers must be placed outside the ATEX zone or be approved for that zone.

The above drawing shows the principle of the standard installation.

In Denmark, all fans for process extraction must be fitted with a control device (pressure guard) for checking correct suction in accordance with the Danish regulatives. See separate installation instructions for the pressure guard.

Contact us for a suitable pressure guard (Airbox).

Note: The control device (pressure guard) must be placed outside the ATEX zone, or be approved for that zone.

5.3 Control and test of the security system

After the installation has been completed, please check whether there are any vibrations in the fan.

We recommend checking whether the fan supplies the correct volume of air, for which the equipment has been dimensioned. I.e. control the volume of air and make sure that it does not exceed the ampere capacity of the motor. See operating conditions from the motor supplier in chapter 15.0.

Check that all pipe connections are tight so that gas / dust is not leaking.

6.0 Commissioning

In a standard installation without automatic control, frequency inverter etc., the fan is started by pressing the start button on the circuit breaker.

The fan does not work according to the purposes, if ...

- unauthorised parts have been mounted on the fan (e.g. unauthorised wheel).
- the wheel runs in the wrong direction. It will still work, but the capacity will be reduced to a third of the normal capacity.
- no circuit breaker is used.

6.1 After installation

Check the installation according to chapter 5.3.

7.0 Control, test and maintenance

7.1 Control

Check the installation according to chapter 5.3.

7.2 Maintenance

Periodic maintenance

Wheels and housing

- The wheel and the fan housing should be cleaned every year or according to requirement. The wheel and the housing may be cleaned by means of a brush and dishwashing water. Remember to disconnect the power before the washing and to wipe the parts afterwards with a dry cloth. This operation results in a longer life of the fan.

Motor

- Maintenance of the motor must only be carried out according to the motor manufacturer's instructions.
- Important: If necessary and at least once a year, the potential equalisation of the fan must be checked and repaired if necessary. It must be a maximum of 1kΩ.

See operating conditions of the motor supplier in chapter 15.0.

At least once a year, the entire exhaust system must be checked and serviced by an authorised installer.

8.0 Cleaning

The outside of the product is cleaned with a vacuum cleaner or a cloth.

Wheels and housing

Wheels and housing can be cleaned with a brush and dishwashing water.

Motor

See operating conditions of the motor supplier in chapter 15.0.

9.0 Troubleshooting

Remember always to use a circuit breaker with a fuse!
Always use adjustment damper!

In case of problems with the fan, the following items may be reviewed in order to check whether:

The volume of air or the pressure is below the stated level:

- Wrong direction of operation of the wheel. It may be due to wrong electrical installation. Please double-check the direction of rotation. Swop two phases if necessary.
- Leaky channel system.
- Poor inlet/outlet possibilities near the fan may reduce the yield (e.g. 90° bend before the inlet).
- Damaged wheel.
- The rotation speed has been set lower.
- If the temperature deviates substantially from the lab measurements, where the temperature was 20°C with an atmospheric pressure of 101.4 kPa.
- The dampers have not been correctly adjusted.
- The central lid on the sound box is turned the wrong way and thus blocks the air.
- The suction net has been blocked by a cloth or the like.

Vibrations and noise

- The base is not level/stable.
- Elements coming from the outside are stuck in the fan.
- Damaged wheel or motor.
- The wheel is loose.
- The wheel may have become unstable, for instance as a result of dirt on the impellers.
- The wheel is rotating in the wrong direction.
- The fan supplies more air than for which the equipment has been dimensioned. Use adjustment damper.
- Loose bolts or screws.

The motor is Overloaded

- The cabling of the motor is not correct.
- The shaft has been bent.
- The fan has over-capacity in relation to the resistance in the system. Use adjustment damper.
- The speed of the motor is too high.
- Defective motor – please contact your dealer!

10.0 Dismantling, disabling and scrapping

Deactive the product by disconnection the electrical mains.

Dismantle compressed air pipes and other pipes or wires etc. Dispose of it according to local regulations.

The inside of the product must be cleaned by means of a vacuum cleaner with a filter which suits the purpose.

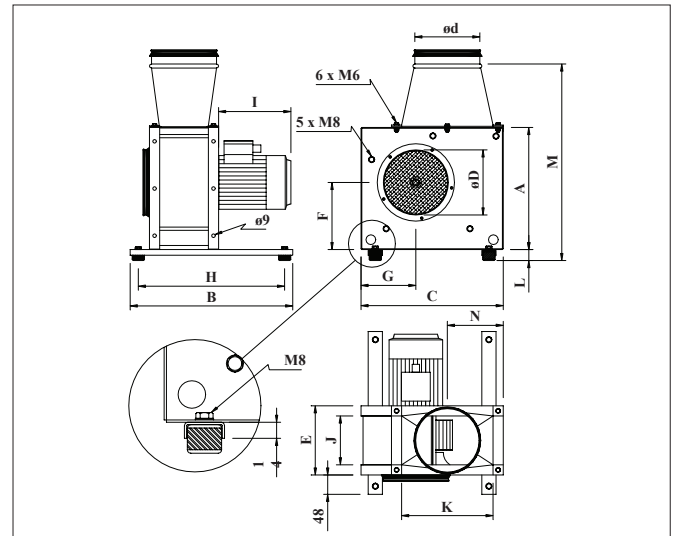
Dismantle the metallic parts by unscrewing screws and bolts. Afterwards cut the larger pieces into smaller pieces and dispose of it according to local regulation.

Dismantle plastic parts and dispose of it according to local regulations.

The packing material must be sorted according to local regulations in order to be able to reuse the material.

11.0 Dimensions

Fan LSX/MSX and LEX/MEX



Dimensions LSX/MSX 146 - 250

Type	146	180	200	225	250
A	245	300	350	370	410
B	400	400	400	500	500
C	295	350	400	450	500
D	160	160	200	250	250
E	145	168	180	195	215
F	134	165	205	210	230
G	113	135	165	190	210
H	360	360	360	460	460
I	178	178	205	219	300
J	95	120	130	145	170
K	185	225	250	280	320
L	27	27	27	27	27
M	402	527	577	597	637
N	118	138	150	165	185
Weight	12 kg*	14 kg*	18 kg*	24 kg*	38 kg*

* The weight may vary depending on the selected motor size.

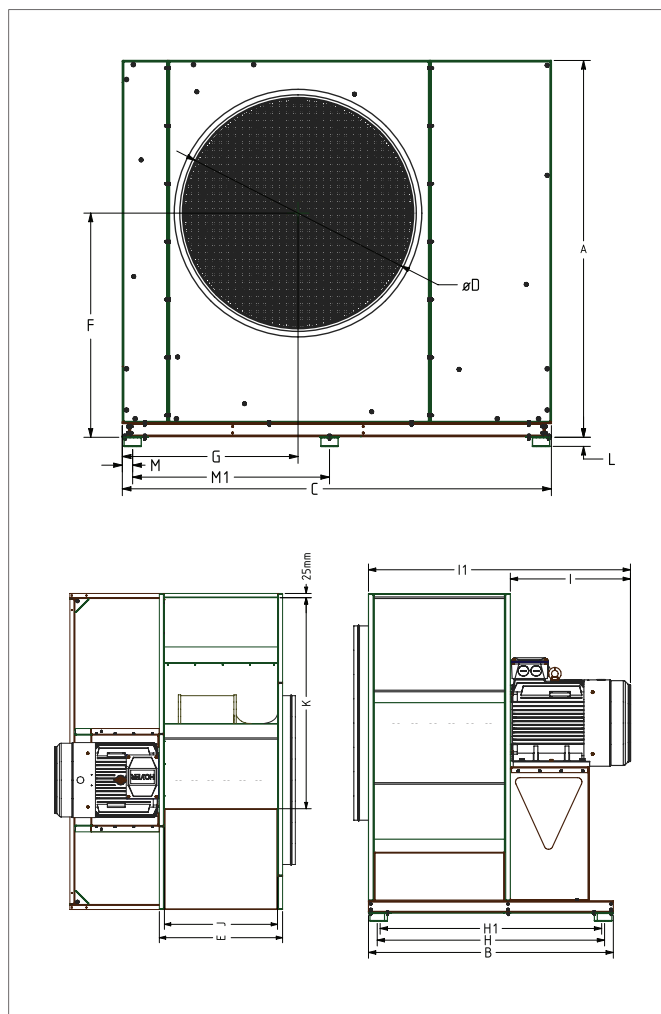
Dimensions LEX/MEX 250 - 630								
TYPE	250	315	355	400	450	500	560	630
A	410	510	570	648	715	758	907	989
B	500	700	700	800	800	800	800	800
C	500	600	680	756	850	871	1070	1175
øD	250	315	400	400	500	500	630	630
ød	***	***	***	***	***	***	***	***
E	215	260	284	308	340	345	425	446
F	230	290	329	370	408	421	523	563
G	210	240	272	304	340	362	440	467
H	460	660	660	760	760	760	760	760
I	**	**	**	**	**	**	**	**
J	170	210	234	260	290	295	375	400
K	320	400	450	500	560	510	709	800
M	637	720	797	965	1045	1065	1340	1340
N	185	225	250	275	305	263	380	425
Weight	38*	43*	48*	56*	71*	81*	125*	135*

* The weight will vary and is depending on which size of motor is chosen for the selected fan

** Depends on the motor size

*** Depends on the selected outlet flange

The table above are the same for fan LEX/MEX 250 - 630.

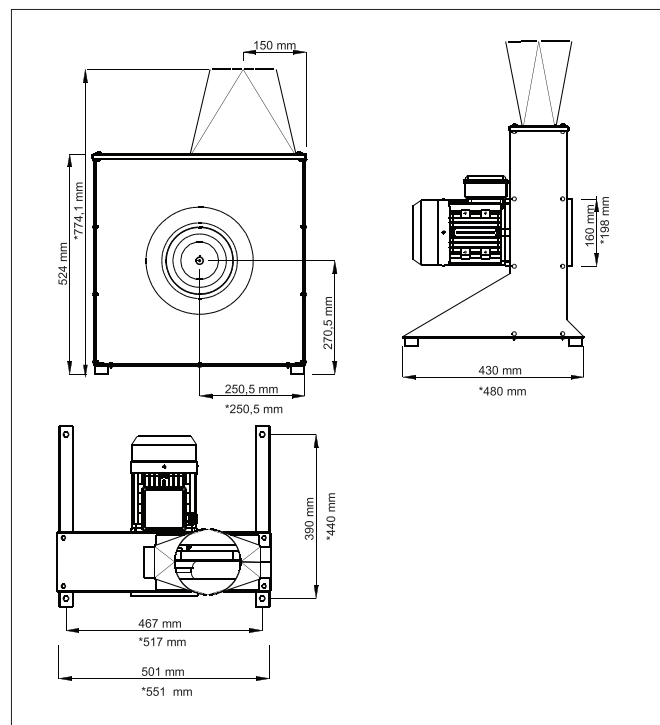


Dimensions LEX 800-1000			
Type	800	900	1000
H1	877	995	1140
H	907	1020	1170
B	997	1110	1260
I1	1200	1253	1350
I	610	593	620
K	998	1120	1250
E	590	660	730
J	530	600	670
G	616	690	766
M	45	45	45
M1	708	800	859
C	1507	1690	1872
L	40	40	40
F	801	889	978
A	1339	1491	1644
øD	800	1000	1000

Note: The above data is valid for standard LEX 800, 900 and 1000 fans. Specifications of any modifications are shown on the order confirmation/invoice.

Fan MHFX

Dimensional drawing MHFX 400 and * = MHFX 500



12.0 Liability

Warranty

Geovent A/S grants a warranty for products, which are defective, when it can be proved that the defects are due to poor manufacture or materials on the part of Geovent. The warranty comprises remedial action (reparation or exchange) until one year after the date of shipment.

No claims can be made against Geovent A/S in relation to loss of earnings or consequential loss as a result of defects on products from Geovent.

Wear on parts such as filter cartridges and hose is not included in the warranty.

User liability

In order for Geovent to be capable of granting the declared warranty, the user/fitter must follow this instruction manual in all respects.

Under no circumstances may the products be changed in any way, without prior written agreement with Geovent A/S.

Please refer to the current sales and delivery conditions at www.geovent.com

13.0 Declaration of conformity

The manufacturer: GEOVENT A/S
HOVEDGADEN 86
DK-8831 LØGSTRUP

Hereby declares that:

The product: Fan
Model: LEX/MEX 250 - 1000
LSX/MSX 146 - 250
MHFX 400 - 500

Complies with the relevant parts of the following directives and standards:

Directive 2006/42 / EC of the European Parliament and of the Council of 17 May 2006 on machines and amending directives 95/16 / EC.

This declaration is no more valid if changes are made to the product by others than the manufacturer.

Authorized to collect the technical file:

Lise Cramer

Date: 28.08.2024

Position: Director
Name: Thomas Molsen

Signature:



14.0 Spare part list

Parts must be replaced in accordance with the ATEX Directive.

15.0 Special conditions applicable to different motors

Busck & Co.

Zone 2/22 and zone 1: (All 3 types of fans)

Maintenance

Only to be carried out by qualified persons in accordance with standard EN 60079-17 or national standards (latest edition).

Qualified persons must have knowledge of electrical equipment for explosive atmospheres and electrical installations in hazardous areas.

- Every 3,000 hours of operation, check and, if necessary, re-grease the radial seals (V-rings); check at regular intervals (depending on environment and operation):
- Cleanliness of the motor (absence of oil, dust, dirt and machining residues) and free passage of cooling water.
- Correct tightening of electrical connections and fixing screws.
- Free running of the motor with low vibration ($v_{eff} < 3,5$ mm/s for $P_n < 15$ KW $v_{eff} < 4,5$ mm/s for $P_n > 15$ KW) and absence of abnormal noise; if there is high vibration and/or noise, check the motor mountings, the balancing of the machine and that the bearings are in good condition.

Repair

To be carried out in accordance with the rules of EN 60079-19.

These repairs may only be carried out under the supervision and with the authorisation of ELPROM or of a certified repair workshop.

When the repair is carried out by a certified repair shop, they must respect all the original characteristics of the motor and use only original spare parts.

In addition, they must affix an additional type plate to the motor with a symbol written on it identifying the repair, the company name and certification, the repair operation number and date.

Nothing concerning the type of protection may be changed.

If all these rules are not respected, the engine loses all its characteristics, i.e. certification.

Frequency inverter

Electrical connection

The connection diagram is shown on the leaflet enclosed with the motor terminal box or on the diagram in the terminal box cover. The cables used must be capable of carrying the full load current of the motor (see motor nameplate) without overheating or undue voltage drop.

Cable terminations

a) EEx d motors - with fireproof terminal boxes:

This motor type can have terminal pins with bushings or a terminal plate. Terminal screws and/or nuts must be tightened, but avoid excessive torque on the terminals as this may cause damage to them.

Installation

b) EEx de-motors - with increased safety terminal boxes: these motors are equipped with increased safety terminal boxes consisting of either slotted terminal pins, non-rotating terminal boxes and screw fixing or a terminal plate.

Permanently attached cables shall be adequately protected against mechanical damage and terminated in a terminal or connection facility suitable for the application conditions.

Wiring shall be carried out or checked by a qualified electrician and the equipment shall be earthed in accordance with applicable regulations.

Where the motor is supplied with plastic plugs fitted in the cable entry holes, these plugs must be removed before commissioning and a suitable certified entry inserted. Cable entries must not be left open and therefore if there are unused or redundant holes, they must be plugged with a suitable certified and correctly inserted plug (plugs must only be removed using a tool). Alternatively, a replacement plate or clamp box should be obtained from Brook Crompton. All cable glands/pipes/plugs etc. must have at least the same IP rating and hazardous area certification as the motor, ensuring that the motor certification and protection is not compromised.

Note - operating temperatures at the pipe or cable entry may exceed 70°C and at the junction of the conductors may exceed 80°C under rated conditions.

If aluminium cables are used, they must be terminated in such a way as to ensure protection against corrosion due to dissimilar metals. The motor must always be earthed, both on the motor frame and inside the terminal box, to eliminate the risk of electrostatic discharges from the motor.

Sealing the terminal box area

To maintain the design degree of protection:

a) EEx d motors - with fireproof terminal boxes:

Motors are supplied with terminal box cover and insert plate (where required), with sealing of joint faces with a non-hardening sealant. When installing or reinstalling after cable installation, these surfaces must be cleaned and resealed with a non-hardening sealant.

Note - all joint surfaces must be undamaged and clean before sealant is applied.

b) EEx de-motors - with terminal boxes with increased safety:

Gaskets are fitted between the terminal cover and the terminal box, the terminal box and the cover and be-

tween the ball plate and the box. All gaskets must be fixed to the terminal box with Bostick No.2 or equivalent (see drawing on page 4 of the motor manual supplied). If a drain plug is fitted to the box, it must, when removed and subsequently refitted, be resealed with a suitable approved non hardening sealant.

Re-lubrication table		
Frame size	Grease	Type
89/315	Esso	Lithium complex
	Unirex N3	
	NSK EA6	Polyurea

Note: Lithium complex type greases are not compatible with Polyurea type greases.

Standard regreasing facility	
Frame size	Facility
89 & 90	Sealed for life bearings
100/180	On request
200/315	Regrease facility as standard

Tenant

Ball bearings and roller bearings are delivered from the factory completely filled with grease. Shielded bearings have sufficient grease for a life of at least two years at normal ambient temperatures, provided there is little or no grease leakage.

On motors with relubrication facilities a compatible grease should be topped up, but care should be taken not to overfill the bearing housings. It should be noted that over-lubrication poses a far greater risk to trouble-free operation than under-lubrication, but careful attention is a mandatory requirement. Bearings without the possibility of relubrication will eventually have to be replaced.

Fitting of sprockets, pulleys and couplings
These must be drilled to fit the diameter of the shaft.

Warning

If the motor shaft is tapped with a hammer, the bearings may be damaged. This results in increased noise from the bearings and a significant shortening of the bearing life.

Lubrication

Recommended relubrication intervals are available on request as they are load dependent. When refilling, use a type compatible with the grease specified on the motor nameplate.

Frequency converters

When installed for use with frequency converters, special application conditions apply with regard to base frequency limitation, thermal protection and surface temperatures. Contact Brook Crompton for confirmation of use. Total harmonic distortion limits may apply.

Thermal Protection

When thermal protectors (e.g. thermistors, thermostats) are located in the stator windings, they must be connected to an appropriate control circuit so that the motor is disconnected from the mains supply at a predetermined temperature. If thermal protection devices are not used, the certification will be invalidated.

Maintenance

Warning

Disconnect power to the motor before commencing routine cleaning or maintenance.

Cleaning the routing

Remove cover on rear of motor and make sure all air intake holes are completely clear. Clean any dust or debris and obstructions behind the fan and along the frame ribs.

Do not allow dust to accumulate on the outside of the motor. It must be removed at intervals (as determined by the user) so that it does not cover the motor in a layer thick enough to impede cooling.

Periodic maintenance

- As routine cleaning first.
- Remove the fan cover and fan. Loosen and remove screws for bearing caps and screws/bolts for end shield. The end shields should then be loosened from their tips and removed.
- The rotor can now be carefully pulled out of the stator - taking care not to damage the stator bore, stator winding and rotor.
- Once the motor has been removed, maintenance can be carried out to remove any debris. For this purpose it is best to use an air line supplying dry compressed air at relatively low pressure, as a high velocity air flow can force dirt into the spaces between the windings and insulation etc. Grease-removing solvents should be used only very sparingly to avoid damage to impregnating varnish or insulation.
- For details on lubrication refer to previous 'Installation' section.
- The motors should be reassembled in the reverse order from disassembly, remembering to ease the end shields into the bearings and spigots. No force should be used. Assemblies must be resealed, where appropriate, with an approved sealant to maintain the IP rating of the enclosure.
- Before starting, check that the rotor turns freely. Check that the electrical connections are correct and that the terminal screws are tight (see section - 'Electrical Connection').
- Refit any pulleys, clutches, sprockets etc. that have been removed - taking particular care to ensure correct alignment with the driven part as incorrect alignment will lead to ultimate bearing problems and shaft failure.
- When replacing bolts and screws, ensure that only bolts and screws of the quality and tensile strength recommended by the manufacturer are used. A grade of at

least 8.8 is required for all fastener screws, except internal head screws, which must be a grade of at least 12.9. These must also have the same thread form and screw/bolt length. A slightly longer bolt screwed into a blind hole may "bottom out" and prevent proper closure of a flame path connection, leading to a potentially dangerous explosion. Brook Crompton does not recommend re-threading holes by counter-drilling and installing proprietary inserts.

When inspecting components and treating corrosion during maintenance, follow the practices outlined in IEC 60079-14 and the AEMT/BEAMA Repair Code. It should be noted that regardless of the gas group indicated on the nameplate for sizes 200-315, the minimum length and maximum spacing of the flame path from the shaft to the bearing caps must comply with the Group IIC dimensions.

Spare parts and repairs

When ordering spare parts, it is important to quote the engine serial number to ensure that the correct spare parts are supplied.

Notes:

a) Fastening bolts, nuts, studs, screws, spacers or washers are not included with these parts and, if required, must be clearly indicated on the order in addition to the part description number. The fastener obligation and part description reference number for which they are required shall also be clearly indicated.

(b) Bearings ordered directly from bearing manufacturers shall be specified as follows: 'ISO CN, ISO C3', indicating the bearing size. (Bearing alignment to be as per original engine drawing). The validity of the certification after repair work or installation of spare parts is the responsibility of the user. Such repairs should be carried out by competent technicians fully trained in working with hazardous area equipment.

Spare parts for our certified engine series are offered/delivered on the condition that the user or the accredited repairer is responsible for the subsequent validity or certification of repair work* and/or installation of spare parts and replacement parts. This is a case where:

1) Either: a) The personnel have attended a course adapted to the codes of practice and standards of the country where the engine is installed. This will normally be a course recognised by the national trade association, health and safety inspectorate or certifying authority (e.g. in the UK the AEMT course "Repair and Overhaul of Ex Electrical Apparatus").

Or: (b) Personnel have attended Brook Crompton's Hazardous Atmosphere Motor Repair Course.)

2) The workshop is approved by Brook Crompton's Authorised Liaison Officer for Repair Agents or is otherwise appropriately accredited by a nationally recognised competent authority.

3) Brook Crompton's repair manual for hazardous atmospheres is in possession of and strictly adhered to. If the engine has been originally repaired as indicated by the symbol "R" in accordance with the Code*, or IEC 60079-19, details of the repair must be obtained from

the user/repairer before proceeding with the repair. Alternatively, Brook Crompton may be contacted.

*See AEMT/BEAMA Publication No. 300 - "Code of Practice for Repair and Overhaul of Electrical Apparatus".

Training Videos Brook Crompton has produced a set of videos covering the theory, design, construction and repair of electric motors for use in hazardous areas. These are available from Brook Crompton's marketing department or can be purchased online at our website: www.brookcrompton.com

Hoyer

Flameproof Ex de (Zone 1) (ConC̈ar)

For operation of frequency inverter

When using drives where the motor is supplied via the static frequency converter (speed controller), the recommendations of the IEC 60034-17 standard are applied, so taking these into account, care must be taken when selecting the speed controller. For motor supply, it is desirable to use the frequency converter (speed regulator) equipped with dU/dt filter in order to obtain a higher lifetime of the motor windings. For such a supply, it is useful to contact the motor manufacturer regarding the motor characteristics and regulation range.

If the motor has built-in anti-condensation heaters, they must be connected according to the enclosed connection instructions and activated while the motor is at standstill.

Maintenance

The motors are designed for easy and simple maintenance.

They should be cleaned regularly externally and if operating in an environment where contaminants may block the fan cover vents or fill the spaces between the cooling fins, such contaminants should be blown out with compressed air or swept off with a brush.

Any deviation from the motor ratings or irregular motor operation shall be carefully investigated for possible causes (e.g. increased motor current, temperature rise above the permissible value for the specified insulation class, increased vibration, strange noises, presence of specific insulation odours, activated motor protection devices or similar). If this is due to the motor, repair work must be carried out only by authorised and trained personnel.

For spare parts, contact the manufacturer with the exact aftermined engine type mark and code number from the engine nameplate (please note the attached ordering instructions).

Standard bearing mounting is with single tube deep groove ball bearings (ZZ or 2RS), with clearance C3 as shown in the table below. The bearings are greased for life.

Replacement of the bearings in case of breakdown, noise or at regular service intervals should be done with appropriate tools without using excessive force and punching. If bearings with regression capability are fitted, the intervals between relubrication are as shown in the attached diagram. When repairing such bearings, they should be removed from the shaft in the proper manner, washed well in gasoline, dried, fitted to the shaft in the proper manner and lubricated with suitable grease in such a manner that approximately 2/3 of the free space in the bearings is filled with grease. Alternatively, relubrication can be carried out while the engine is running, via relubrication nipples on the bearing shields using the hand pump for uniform grease. Depending on the engine size (mostly 132-280), approximately 20-40

grams of grease should be squeezed in at each relubrication. Recommended grease brands are SKF, SHELL ALVANIA G3, ESSO UNIREX N3 or any other lithium soap based grease brands with a dripping temperature of 180°C - 200°C and for use in a temperature range from -20°C to +150°C.

Bearings and lubrication

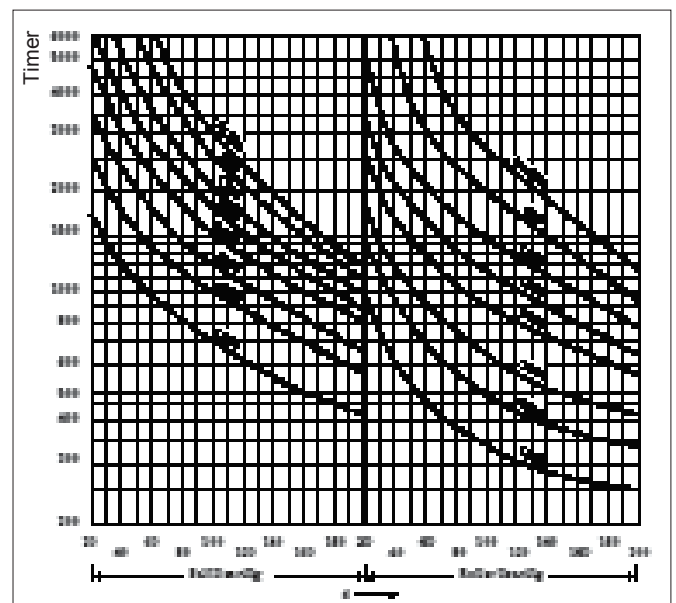
IEC-motorram- mestørrelse	Serie 5AT/7AT	
	DEEP GROOVE BALL BEARINGLAGER Lagertype på DE/NDE	Olietætningstype på DE/NDE
56	6201 - 2RS (C3)	A12 x 22 x 6
63	6202 - 2RS (C3)	A15 x 25 x 5
71	6203 - 2RS (C3)	A17 x 28 x 7
80	6204 - 2RS (C3)	A20 x 35 x 7
90	6205 - 2RS (C3)	A25 x 37 x 7
100	6206 - 2RS (C3)	A30 x 47 x 7
112	6306 - 2RS (C3)	A30 x 47 x 7
132	6208 - 2RSC3	A40 x 55 x 7
160	6309 - 2RSC3	A45 x 60 x 7
180	6310 - 2RSC3	A50 x 65 x 8
200	6312 - 2RSC3	A60 x 80 x 10
225	6313 - 2RSC3	A65 x 85 x 10
250	6314 - 2RSC3	A70 x 90 x 10
280	6316 - C3	A80 x 115 x 12
315	6319 - C3	A85 x 115 x 13

On request, motors in frame size 132-315 can also be fitted with NU series single roller bearings.

Notes: the table applies to all polarities of single and multi-stage motors and to all mounting arrangements according to IEC 60034-7 (EN60034-7)

- The rated life of the bearings under rated working conditions is at least 40.000 working hours for 4-, 6- and 8-pole motors and at least 20.000 working hours for 2-pole motors connected to 50 Hz power supply mains.

Diagram for determining the bearing relubrication interval:



Example: ball bearing with deep grooves with an inner slide. of 40 mm and a rotation speed of 1500 rpm must be relubricated approximately every 6000 working hours (interpolation).

- Inner bearing diameter (mm) n - rpm (min⁻¹) t_f - relubrication interval (working hours) During each disassembly of the motor, we recommend the installation of new shaft seals and gaskets to ensure the motor protection index.

Hoyer

Zone 2 / 22 - 2 - Ex ec and tc motors

The information below is a special note for Ex ec and tc motors. The designation of motors is in accordance with the EN/IEC standard: II 3D Ex tc IIIB T120°C Dc and II 3G Ex ec IIC T3 Gc. The motors must only be connected to certified Ex relays. The hazardous 3-phase asynchronous motors comply with EU Directive 2014/34/EU and the international standards EN/IEC 60079-0 Ed 7, EN/IEC 60079-7 Ed 5 and EN/IEC 60079-31 Ed 2. Only one electrical installation may be installed in one specified area (zone). For Ex the ec parameter Time E shall be taken into account.

For operation of frequency inverter

When using inverter, PTC shall be connected and only for quadratic torque application, in frequency range 20-60 Hz, coupling frequency ≥ 2000 Hz and inverter output $du/dt \leq 1350V/0,8\mu s$ at amplified winding $du/du \leq 1560V/0,5\mu s$.

Special conditions of use

- The inputs of the equipment shall be fitted with certified cable glands or shielding elements with compatible protection methods compatible with the intended application.
- All accessories associated with the motor to ensure trouble-free operation and safety must be provided with a recognised protection type suitable for the specific application.
- Where venting and drainage devices are to be used, they must be certified for the intended application.
- The user shall ensure good bearing conditions on a regular basis and shall not exceed the service life defined by the manufacturer's instructions for plastic seals and o-rings.
- When required to minimise the risk of hazards caused by electrostatic charges, the motor shall only be cleaned with a wet cloth or in a frictionless manner.
- The associated nominal values for tasks S2 to S9 shall be adjusted to ensure a temperature rise in the winding equal to or lower than the temperature rise for the specific function S1.

Maintenance and spare parts

The user is responsible for the replacement of parts in accordance with the life of the type, in particular: bearings, grease and lubrication of shaft seals.

Installation, maintenance, repair and replacement of parts in this motor type shall only be carried out by qualified specialists according to EU Directive 99/92, EN/IEC 60079-14, EN/IEC 60079-17 and EN/IEC 60079-19.

It is recommended that the IEC standard is followed according to temperature and dust on the motor surface. Dust on the surface must not cause an increase in the motor temperature. Regular cleaning is recommended. The radial shaft seal is part of the EX certification. It is important that the sealing rings are intact. The shaft seal must be checked regularly and if it is dry, it must be lubri-

cated. The engine must be relubricated regularly.

When replacing sealing rings, original rings must be used. Replacing the bearings also means replacing the seals.

All motors must be inspected regularly for mechanical damage.

R. Frimodt

Zones 1, 2 and 22 (VEM and Cemp)

Maintenance

Refer to the safety instructions, in particular for isolation, protection against reconnection and checking that all components connected to a voltage source are in the dead state. If it is necessary to disconnect the motor from the mains in order to carry out maintenance work, particular attention must be paid to disconnecting any auxiliary circuits (e.g. condensation heaters, forcing valves, brakes) from the mains as well.

If the motor has to be dismantled for maintenance work, the sealing compound on the centering shoulders must be removed. When reassembling the motor, these must be sealed again with a suitable motor sealant. Existing copper sealing washers must always be refitted.

Careful and regular maintenance, inspection and overhauls are necessary to detect and eliminate faults in time before consequential damage occurs. Since individual operating conditions cannot be defined for all applications, the conditions listed are a general guide for undisturbed operation. Individual local conditions (pollution level, load, etc.) must be taken into account when adjusting these conditions.

Cleaning

In order not to disturb the action of the cooling air, all parts of the engine shall be cleaned at regular intervals. In most cases, it is sufficient to clean the motor and fan with compressed air free of water and oil. In particular, the air vents and the spaces between the ribs must be kept clean. Dust resulting from natural wear and deposited in the motor interior or in the grinding ring compartment must be removed at regular intervals. It is recommended to include the electric motors in the regular routine inspections of the driven machine.

Zone 1 (Frequency converter)

Electric Motor Series J-K

Frequency converter driven motors

Motors with enclosures in protection type “d”, “de” are designed for variable speed.

Pay attention to the electrical data of the Ex d and Ex de motors under different working conditions.

Special type approvals are required for motors with protection type Ex e, while motors with protection type Ex nA are subject to strict restrictions in certain countries. restrictions.

When using an Ex d motor with a squirrel-cage coupling with a frequency converter, the following points must be taken into account in addition to the general selection criteria:

- The voltage (or current) supplied by the frequency converter is not purely sinusoidal. As a result, it may increase motor losses, vibration and noise. In addition, a change in the loss distribution may affect the tem-

perature balance of the motor. In all cases, the motor must be correctly sized according to the instructions supplied with the selected frequency converter and according to our technical data.

- In a frequency converter drive, the actual operating speed of the motor may differ significantly from its rated speed.

At higher speeds, it must be ensured that the maximum permissible speed of the motor or the critical speed of the entire equipment is not exceeded. In addition, special attention must be paid to the lubrication of the bearings and any noise reduction measures by ventilation.

- The torque values given in the motor manufacturer's catalogue for motors with constant torque at frequencies above 60 Hz can only be supplied stably if the motor has a delta connection. For example, to obtain these values stably from a 230/400 V 50 Hz winding motor with a 400 V 50 Hz mains voltage, the motor must have a delta connection and the inverter must therefore be configured to supply a voltage of 230 V at 50 Hz. Conversely, the values indicated with a star can only be supplied for very short periods.
 - Operating periods at speeds above 3600 rpm must never exceed 10% of the total motor duty cycle to ensure that the bearings hold accordingly.
 - If the rated voltage is 500 V or if there is a long supply cable between the motor and the frequency converter, the motor insulation must be reinforced due to the voltage peaks occurring
- Proper grounding of the motor and the driven equipment is also important to avoid currents and voltages from the bearings.

Maintenance

Any operation on the motor must be carried out with the machine stopped and disconnected from the power supply (including auxiliary circuits, in particular the anti-condensation heaters). Maintenance of the original characteristics of electrical machines over time must be ensured by means of a schedule of inspection, maintenance and adjustment managed by qualified technicians. The type and frequency of maintenance depends on environmental and working conditions. As a rule, it is recommended that the first inspection be carried out after approximately 500 operating hours (or within 1 year), while subsequent inspections should follow the schedules established for lubrication and general inspection.

Lubrication

Permanently lubricated bearings

Motors with shielded or sealed bearings (type ZZ or 2RS) do not require lubrication. Therefore, they do not require maintenance if the motor and fan are used correctly.

Bearings with lubricator

Motors with unshielded bearings are equipped with lubricators. The interval between lubrications depends on the grease type, the ambient temperature (possibly too

high working temperature) and the type of operation the motor performs. Table C shows the intervals for 70°C as working temperature for the bearings under normal operating conditions. It is recommended to use a good quality lithium based grease with high penetrability and high dropping point such as (e.g. SKF LGHP 2, SKF LGWA 2). If the speed is different from the indicated in the table, the ranges must be changed in inverse proportion.

E.g. bearing 6314 at 1800 rpm

$$1 = \frac{1.500}{1.800} \times 3.550 \text{ h} = 2950 \text{ h}$$

Regardless of the number of hours worked, the grease must be renewed after 1 or 2 years or at the time of a complete overhaul.

When the engine is fitted with a lubrication plate, refer to the dates indicated on it.

Personnel qualifications - authorised repairers

Inspections and repairs must be carried out by trained personnel who guarantee that the engine is returned to its original condition. We recommend that you contact an authorised repairer.

For further information please contact us.

Table C. Interval in hours between lubrication of bearings

Bearings	Amount of Grease "in Grammes"	3000 RPM	1500 RPM	1000 RPM	750 RPM
6 205	4	4500	9500	10000	10000
6 206	5	4000	8500	10000	10000
6 306	6.5	3750	8000	10000	10000
6 208	10	2800	6000	9000	10000
6 308	10	2800	6000	9000	10000
6 309 / NU 309	12	5500	8250	11000	11000
6 310 / NU 310	12	2000	-	-	-
6 310 / NU 310	15	-	6000	7000	7000
6 311	17	1800	4500	7500	10000
NU 311	17	950	2350	3750	5000
6 312 / NU 312	12	2100	-	-	-
6 312 / NU 312	15	-	5000	7000	7000
6 313 / NU 313	15	2000	-	-	-
6 313 / NU 313	18	-	4500	5600	6400
6 314 / NU 314	20	-	4100	5300	6200
6 316 / NU 316	33	2900	4300	4600	4800
7316	33	900	3150	5600	8000
3 316	58	-	3150	5600	8000
6 317 / NU 317	37	-	7800	7800	13600
3318 / 7318	41	-	2650	5000	7100
3 318	70	-	2650	5000	7100
NU 318	41	-	1400	2650	3550
6320/ 7320	51	-	2360	4500	6300
3 320	90	-	2360	4500	6300
NU 320	51	-	1180	2360	3350



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