

AC Vibration Motors - Operator's Manual

Translation of the original Operators Manual

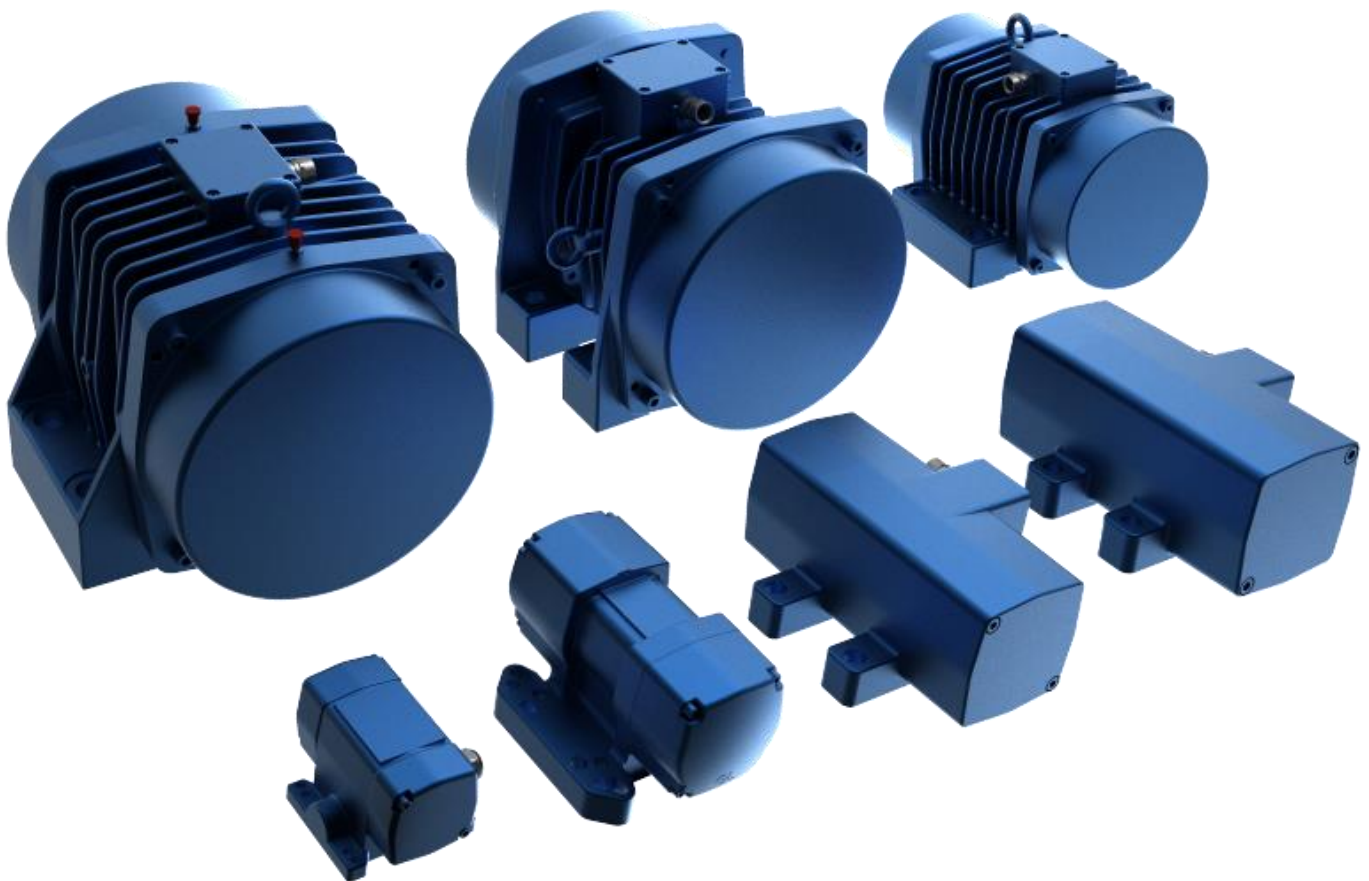


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Foreword

Publishing this operator's manual we set ourselves the goal, to give you the opportunity to familiarize with our vibration motors.

The manual contains necessary information for the safe operation and the safe maintenance of the Mooser pneumatic external vibrator. In the interest of your own safety, you should carefully and completely read through the operator's manual prior to operating the vibrator.

The safety information has to be observed all the time during operation

Your safety at work and at operating the vibrators was one of the most important aspects taken into consideration when this vibrator was designed. The vibrators are designed and built to state-of-the-art standards and they operate safely if used as intended. They conform to the EC Machinery Directive 2006/42/EC, the Electromagnetic Compatibility Directive 2004/108/EC and the Low-Voltage Directive 2006/95/EC. Nevertheless improper use or incorrect maintenance can pose risks for the operating personnel.

Defective machines or parts must not be operated and must be replaced immediately.
If you have any questions please contact Mooser-Schwingungstechnik, phone: +49 89 804348.

The following information and hazard symbols are used in this installation and operating instructions



ATTENTION: Important information regarding operations or procedures, to which particular attention has to be paid.



HAZARD: Refers to the possibility of fatal, severe or irreversible injuries caused by live parts.



EXPLOSION HAZARD: Refers to the possibility of fatal, severe or irreversible injuries caused by use of the product in an explosive atmosphere.



HOT SURFACE: Refers to the possibility of severe or irreversible injuries caused by touching hot surfaces.



WARNING: Refers to the possibility of fatal, severe or irreversible injuries caused by general hazards.



DISCONNECT MOTOR FROM MAINS: Refers to the fact that the motor must be disconnected from the electricity mains and secured against being switched on again before any work is carried out on the motor.



ENVIRONMENTALLY COMPATIBLE DISPOSAL: Refers to the obligation to ensure environmentally compatible disposal.

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1. Safety Information

1.1 Intended Use:

Electric vibrators are not independently functioning machines. They are used as the drives of vibrating machines such as vibrating through conveyors, pipe conveyors, screening machines, grading/sorting machines and knock-out grids.

These machines use vibrations to screen, convey, remove, compact and sort or grade. Any other use is deemed to be not as intended or misuse.

Electric vibrators are designed to generate forces that can be destructive.

The vibrating machine must be designed for the forces generated by the electric vibrators.

The owner is responsible for the operation of the electric vibrators.

1.2. Skilled Personnel Qualifications

The installation/assembly, startup/operation and maintenance may only be carried out by authorized and qualified skilled personnel.

1.3. General Safety Instructions



Electric vibrators generate vibrations. The owner of vibration machines must protect their employees against actual or possible risks to their health and safety caused by the effect of vibrations.



Mooser Schwingungstechnik GmbH refuses to accept the responsibility for any damage to property or personal injuries, if technical changes have been made to the product or the instructions and regulations in this instruction manual have not been noted and followed.



Live parts can cause severe or fatal injuries.



Electric vibrators must be safely disconnected from the electricity mains before any work is carried out on them. The required procedure is as follows:



1. Switch off the vibration motor
2. Secure it against being switched back on again
3. Test it for safe disconnection from the power supply
4. Allow the vibration motor to cool down



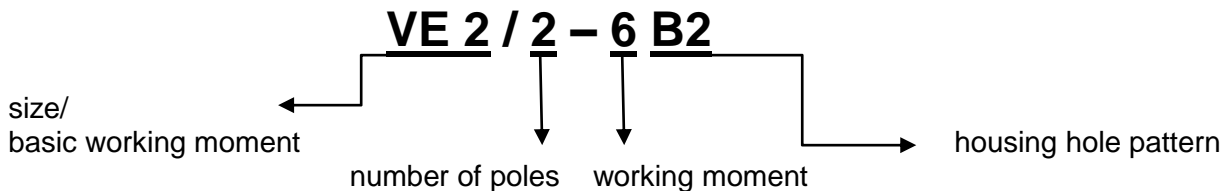
Do not touch the vibration motors while they are running or soon after switching them off. The surface temperature of the vibration motors can reach such high values during operation, that there is a risk to suffer burns.



Vibration motors of the VE- series may not be used in hazardous areas (potentially explosive atmospheres)

2. Technical Data

2.1 Type Designation:

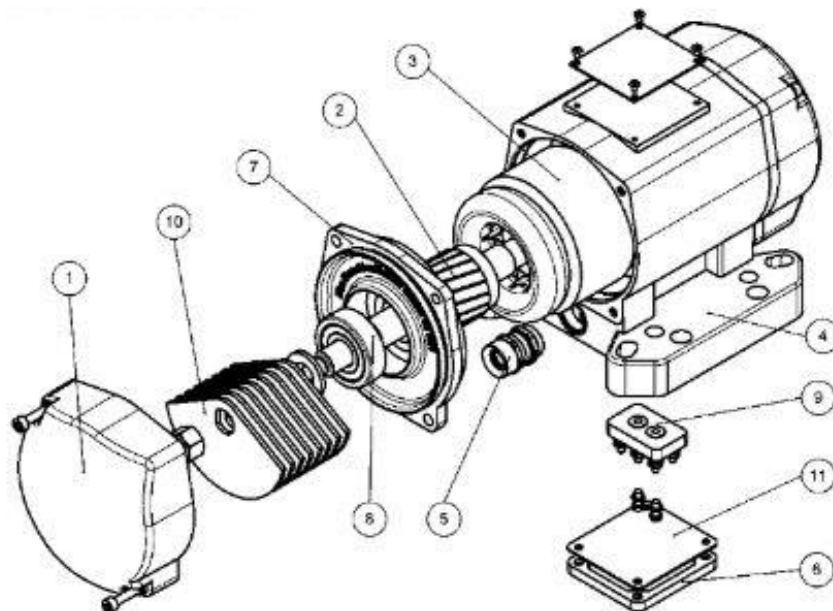


2.2 Design and Function (using example of VE 6)

The electrical drive of the VE series is an asynchronous motor.

An exception is the type VE2 GL, which has a direct current motor as a drive.


In the sizes VE 1 and VE 2, the stator is cast under vacuum and therefore forms an assembly permanently connected to the housing. On both shaft ends of the motor there are eccentric unbalance plates. This means a rotating body, whose weight is not symmetrically distributed around the rotor or is not dynamically balanced and therefore causes vibrations. The size of these vibrations can be controlled by weights and counterweights.



- | | | |
|--------------------|----------------------|----------------------|
| 1 Protective cover | 5 Cable gland | 9 Terminal board |
| 2 Armature | 6 Terminal box cover | 10 Unbalance plates |
| 3 Stator | 7 Bearing end shield | 11 Terminal box seal |
| 4 Housing | 8 Rolling bearing | |


3. Transport and Storage

When the vibrators are delivered, the motors must be checked for visible transport damage!

 If the motor is visibly damaged, it must not be started up (operated). The vibration motor must be examined and if necessary returned to the manufacturer for repair.

Until they are installed, the electric vibrators should be stored in enclosed, dry rooms at a maximum ambient temperature of 40° C

Vibration motors must always be stored and installed by placing them on their bases or footings!
Do not stack any vibration motors!

 Do not lift up the motor by its installed connection cable.

The eyebolt of the size VE 65 and VE 85 is solely intended for lifting the vibration motor.

Note and follow the local accident prevention regulations.

4. Installation and Startup

4.1 Installation

Electric vibrators can be installed in any installation position. Vibration motors may only be installed onto machines with flat, oil, grease, paint-free and flexurally rigid mounting plates.

Required Surface Quality:



Only bolts in quality class 8.8 > EN ISO 4014 (DIN 931); EN ISO 4017 (DIN 933) and nuts in quality class 6 > 8.8 EN ISO 4032 (DIN 934) may be used for mounting.

The bolts must be secured against mechanical loosening by means of spring lock washers DIN 127 Form A, DIN 7980 or Schnorr washers.



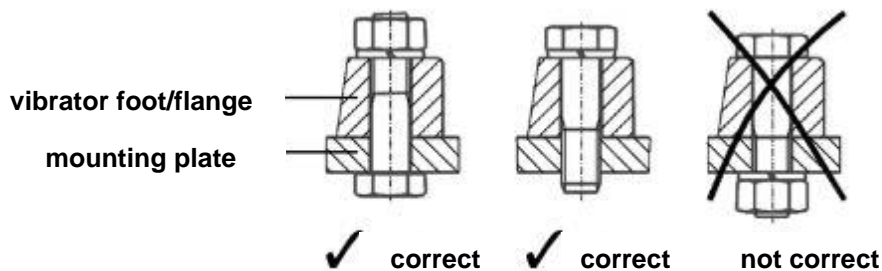
The fixing bolts must be checked for secure fit after approx. two operating hours and if necessary they have to be retightened. Other checks should be carried out daily!



Improper mounting results in the breakage of the feet of the vibration motor.

Minimum tightening torque:

M5	M8	M10	M12	M16	M20	M24
8 Nm	30 Nm	55 Nm	90 Nm	150 Nm	280 Nm	450 Nm



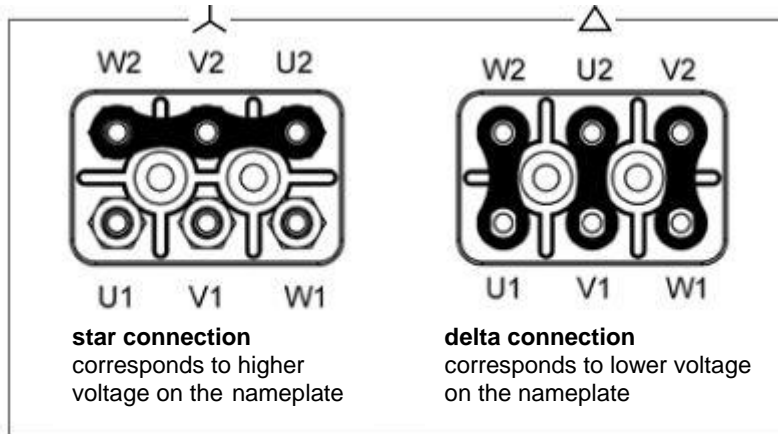
4.2 Electrical Connection

Electric vibrators must be safely disconnected from the electricity mains before work is carried out on them. The required procedure is as follows



1. Switch off the vibration motor and secure it against being switched on again.
2. Check for safe isolation from the power supply
3. Allow the motor to cool down.

4. Installation and Startup



The electrical connection may only be made by a qualified electrician or person who has received the necessary electrical instruction in accordance with EN-60204-1.

The mains voltage and frequency must correspond to the nameplate data. The motor must only be connected to an electricity system that conforms to the VDE provisions.

Each motor must have its own upstream motor protection device as protection against possible overload; the nominal current of this protective device must be set according to the nameplate data.

If two counter-rotating motors are installed, it is necessary to ensure, that if one motor fails both motors are switched off.

4.3 Frequency Control

The frequency of our three-phase current vibration motors can be controlled by using standard electronic frequency converters.

Please ask about the maximum allowable final frequency for each motor type!



A frequency reduction is easily possible for each type. In case of frequency increase above the values given on the nameplate there is a risk of accidents caused by impermissibly high centrifugal forces

4.4 Cable Connection

Only use flexible cables for the connection. We recommend the following cable types:

VE 0,4 to VE 30	H07 RN-F	4G 1,5*
from type VE 30	NSHTÖU-J	4G 1,5
VE 2 GL	H07 BQ-F	2x 2,5

or superior quality*

Plastic cables are unsuitable.

4. Installation and Startup

Attach the cable lugs or crimp-type cable sockets to the wire ends. Never solder the cable lugs or sockets on, because the wire strands near the solder point can break under the influence of vibration. Feed the cables into the terminal box and connect them as shown in the circuit diagram below (see page 9). Exceptions: VE 0.4 and VE 0.8. These are connected to an insulating screw joint.

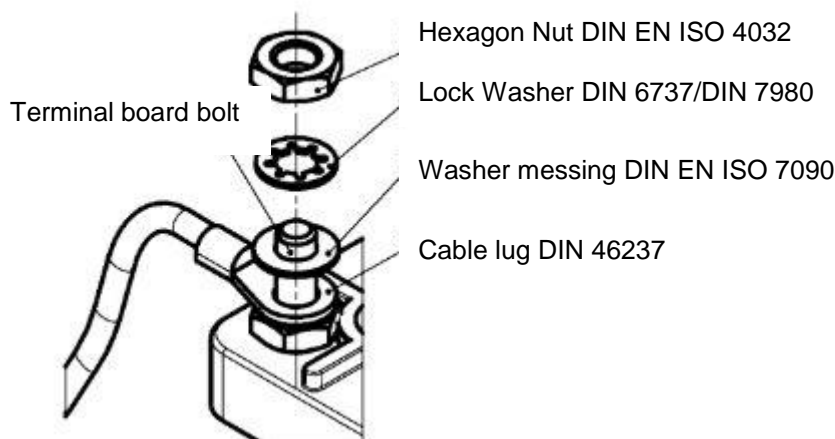
When tightening the gland nut of the cable, please ensure that the cable sheath is still fully covered by the seal. If not, the cable will not be securely installed in place; it will not be strain-relieved and will not be watertight.

Re-close the terminal box with the seal and bolt adhesive.

The motor connection cable must be fixed installed for approx. 0.5m after it exits from the motor. The first installation point of the cable and the motor must not be able to move against each other during operation. The connection cable must be fixed installed, so that natural oscillations are avoided and that there is no tensile loading on the cable.

The power input must be checked during the initial startup. If it is larger than the value given on the nameplate this can be remedied by lowering the centrifugal force (see chapter 7).


The cable must be checked occasionally for any damage or chafe marks and if necessary the cause must be removed.



Maximum tightening torque of the terminal board nuts

M4	M5
1,2 Nm	2,0 Nm

5. Centrifugal Force Settings

 **Crushing hazard when setting the centrifugal force. Ensure that the armature is fixed. Note and follow the safety instructions on page 6!**

If no special centrifugal force setting has been ordered, the motor is set to maximum centrifugal force in the factory.

The centrifugal force has a direct effect on the vibration amplitude of the machine and the power input of the motor.

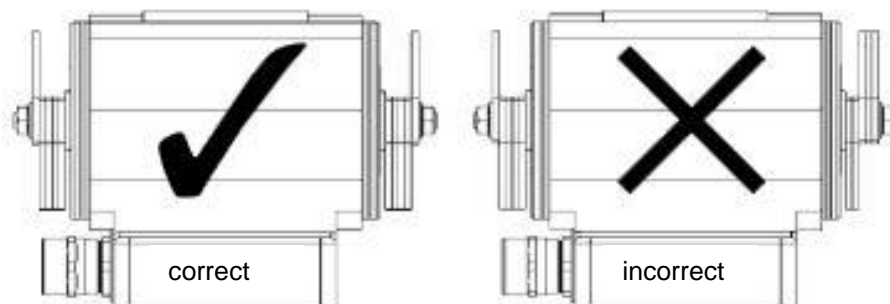
The centrifugal force is reduced by turning the unbalance plates by 180° at both ends.

VE 0,4 – VE 15, VE 30/2 and VE 55/2

In the case of size VE 0.4 to VE 15, VE 30/2 and VE 55/2 motors, the centrifugal force is adjusted in steps by means of push-on unbalance plates.

The number of plates changed by 180° rotation must be the same at both ends of the shaft, i.e. they must be symmetrical. (See Fig.) The unbalance plates can also be removed for fine adjustment, but in this case they must be replaced by spacer discs.

To adjust the centrifugal force, dismantle both protective covers and undo the unbalance fixing.



Maximum tightening torque of the nuts at the shaft end

VE 0,4/2	M 5	3 Nm
VE 1	M 5	3 Nm

5. Centrifugal Force Settings

Centrifugal force adjustment by means of push-on unbalance plates

The centrifugal force of the motor is reduced as follows, if the unbalance plates of the motor are rotated by 180° or removed:

rotational speed **2-poles**, 3000 rpm

motor	centrifugal force rotated by 180°	removed
VE 0,4/2	50 N	25 N
VE 0,8/2	100 N	50 N
VE 1/2	100 N	50 N
VE 2/2	220 N	110 N
VE 6/2	380 N	170 N
VE 8/2	380 N	170 N
VE 12/2	750 N	375 N
VE 15/2	750 N	375 N
VE 15/2-20	750 N	375 N
VE 15/2-25	1260 N	630 N
VE 30/2	1260 N	630 N
VE 55/2	2100 N	1050 N

rotational speed: **4-poles**, 1500 rpm

motor	centrifugal force rotated by 180°	removed
VE 1/4	50 N	25 N
VE 2/4	100 N	50 N
VE 6/4	100 N	50 N
VE 12/4-30	220 N	110 N
VE 12/4-42	380 N	170 N

rotational speed **6-poles**, 1000 rpm

motor	Fliehkraft rotated by 180°	removed
VE 6/6	42,5 N	21,25 N
VE 12/6-42	148,67 N	74,34 N

rotational speed **8-poles**, 750 rpm


motor	centrifugal force rotated by 180°	removed
VE 6/8	23,75 N	11,88 N
VE 12/8-42	87,33 N	43,67 N


5. Centrifugal Force Settings

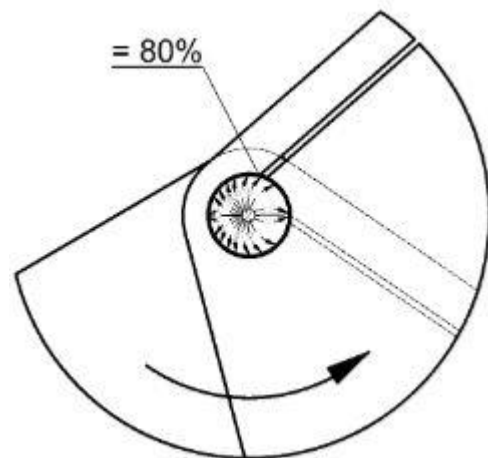
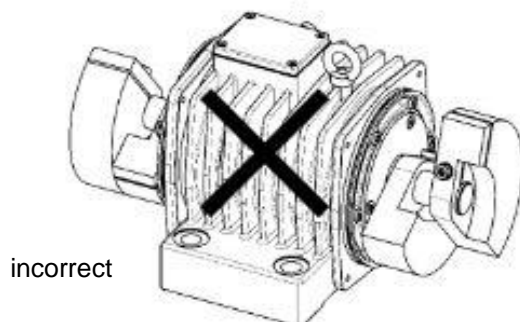
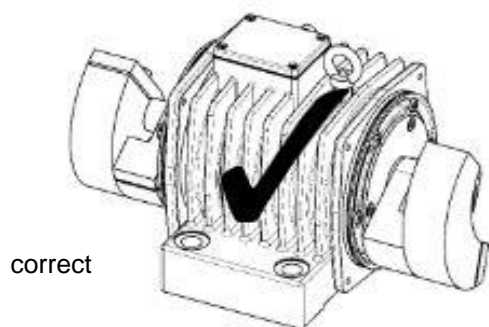
VE 30/4-75 – VE 85

From size VE 12/4-60 (except VE 30/2 and VE 55/2) the centrifugal force is adjusted by turning the two outer unbalance plates. The percentage centrifugal force can be read off from the scale on the shaft. The adjustment made must be symmetrical.

Minimum tightening torque of the bolts see page 7.

 After the centrifugal force has been adjusted the loosened bolts and nuts must be retightened and the protective covers must be refitted. Otherwise there is a risk of accidents! To ensure water tightness ensure that the seals are intact when dismantling and installing the protective covers. Damaged seals must be replaced.

 Never operate the motors without unbalance plates. This causes damage to the bearings.



6. Maintenance



The electric vibrator must always be disconnected from the electricity mains before any work is carried out on it!



1. Switch off the vibration motor
2. Secure it against being switched on again
3. Test it for safe disconnection from the power supply
4. Allow the vibration motor to cool down.



6.1 Maintenance work to be carried out regularly

- The surfaces of the motors must be kept free from dirt deposits, in order to ensure adequate cooling.
- Check the connection cable for chafe marks and if applicable, remove whatever is causing them.
- Check fixing bolts for secure fit and if necessary retighten them.
- Check the seals



The fixing bolts must be retightened after approx. two operating hours (following startup). Other checks should be carried out daily.

6.2 Lubrication

The bearings of the vibration motors up to size VE 65 are lubricated for life. Usually it is not necessary to carry out maintenance work on the bearings of these motors.

We recommend the following lubrication intervals for size VE 85 and larger:

Motor type	lubrication interval in hours	grease quantity in grams
VE 15/2	1000	3
VE 30/2	800	4
VE 55/2	500	5
VE 85/2	300	4
VE 85/4	600	3

The lubrication intervals apply to 50 Hz operation. In case of 60 Hz operation we recommend to halve the lubrication intervals and the quantity of grease.

We recommend the following long-life grease: **MOBILE UNIREX N3**

For especially high loads, various motors, as special designs, are equipped with lubrication nipples DIN 71412 for regreasing:

Motor type	lubrication interval in hours	grease quantity in grams
VE 15/2	1000	3
VE 30/2	800	4
VE 55/2	500	5

6. Maintenance

In case that the bearings show signs of wear, the motors should be switched off immediately and the special bearings must be replaced. We recommend that you send the motors to the manufacturer for repair (including other types of damage that may occur). This is the only way to ensure proper repair.

6.3 Allowable operating temperature

The temperature on the outside of the housing must not exceed 80°C.

This limit can be exceeded, if the power input is too high and if the speed mentioned on the name-plate is not reached. As a reason, the winding of the vibration motor can burn through.

Another possible cause is, that the centrifugal force is too high for the specific application or that the design is insufficiently flexurally rigid.

One remedy is, to reset the centrifugal force or to use a motor with stronger electrical drive.

7. Spare Parts

To order spare parts, please refer to the spare parts list of the respective motor.

Please always give the following information with each order for spare parts:

- Motor type
- Motor number
- description, position and item number of the part
- required quantity

For further information, please refer to the exploded views given in the spare parts list.

We only provide warranty for the original spare parts supplied by us.

We expressly point out, that spare parts and accessories that are not original parts supplied by us have not been tested and approved by us. Installing and/or using such products can therefore cause negative changes to the specified design properties and therefore impair active and/or passive safety.

Mooser does not accept any liability whatsoever or provide any warranty for damage caused by the use of non-original spare parts and accessories

8. Disposal and Recycling

Packaging materials and motor components must be disposed of in an environmentally compatible way.

Steel:

Unbalance plates, armature and rotor, bolts, nuts and bearing, housing (from VE 130 onwards)

Aluminium:

Housing, protective covers, terminal box cover and nameplate

PE:

Seals and gaskets

Copper and Synthetic resin:

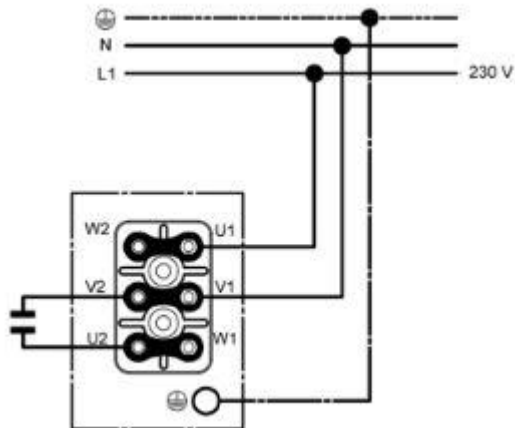
winding



You can return the motors to us for proper disposal!
They must be delivered to us carriage paid.

9. Operating vibrators with capacitors

9. Operating vibrators with capacitors (3~ 230/400 V 50 Hz)



Operating capacitors with 230 V

Three phase vibration motors with (3~ 230/400V / 50 Hz) to be supplied with 1~ AC 230 V / 50 Hz

The motor has to be connected to Δ 230 V.
 Exception: VE 0,4/2 and VE 0,8/2

vibrator	capacitor (μ F)	remarks
VE 0,4/2	2	continuous duty 100% ED
VE 0,8/2	2	continuous duty 100% ED
VE 1/2	4	continuous duty 100% ED
VE 2/2	12	intermittend duty max 40% ED
VE 2/2-2	12	intermittend duty max 40% ED
VE 2/2-4	12	intermittend duty max 40% ED
VE 6/2	30	intermittend duty max 40% ED
VE 8/2	30	intermittend duty max 40% ED
VE 8/2-11	25	intermittend duty for use on silos only
VE 1/4	4	continuous duty 100% ED
VE 2/4-4	10	continuous duty 100% ED

Declaration of Incorporation

...for partly completed machinery DIRECTIVE 2006/42/EC, Annex II, part 1 B

We hereby declare that below mentioned vibration motors and spares and/or assemblies of parts or components mentioned overleaf (on the Delivery Note) are designed for installation in a machine. Commissioning is only permitted once it has been determined that this machine corresponds to the terms of the following EC guidelines: 2006/42/EC.

product: vibration motors: series VE

We declare that the vibration motors comply with essential requirements of above mentioned Directives:

EG- Directive 2006/42/EC, Annex I, article 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4, 1.3.7 and 1.5.1.

The relevant technical documentation in accordance with part B of Annex VII has been compiled

The conformity with the provisions of the following additional Directives has been established:

2006/95/EC (electrical equipment with low voltage rating)

2004/108/EC (EMC)

The following harmonized Standards have been applied and are fulfilled:

EN ISO 12100-1 / 2004

EN ISO 12100-2 / 2004

EN 60034-1 / 2005

EN 61000-6-2 / 2006

EN 61000-6-4 / 2007

The manufacturer undertakes to transmit electronically, in response to a request by the national authorities, relevant information on the partly completed machinery.

The partly completed piece/s of machinery mentioned overleaf must not be put into service until the final machinery into which it is/they are to be incorporated has been declared in conformity with the provisions of the Directive on machinery, where appropriate.

Authorized person for technical documents:

Anja Mooser

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Lindberghstr. 3

D- 82178 Puchheim

Distributor:

Mooser-Schwingungstechnik GmbH

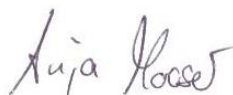
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