Installation and Operation Manual

(Translated original)

Vibration Motors

Status 05.26

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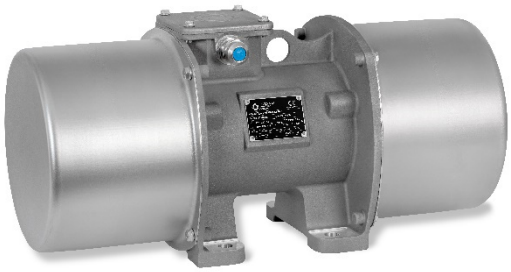
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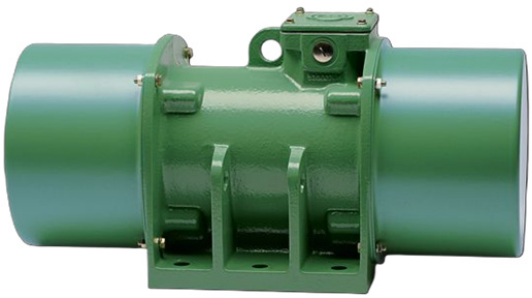
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1. Instructions for the use of this Technical Documentation

In order to improve the understanding of this technical documentation and, thus, to improve the use, please read the following pages.



Please always observe the following rule:
Before use, installation or commissioning, it is imperative to observe this technical documentation. Furthermore, adhere to the general and local accident prevention regulations.

1.1 Who must be Acquainted with the Technical Documentation

All persons working in the operation area of the vibrating machine with the vibration motor must read this technical documentation through and completely understand it, especially the safety regulations.

All tasks on the vibration motor must only be carried out by qualified specialists.



The electricians must be acquainted with the instructions for the electric connections.

The service personnel must be acquainted with the maintenance and repair instructions.

In general:
Every person who works on the vibration motor must be acquainted with the contents of this technical documentation. These personnel must be qualified and instructed. The operating company of this machine is obliged to instruct their staff accordingly.

This technical documentation is a part of the scope of delivery of the vibration motor and must always be available to the qualified persons.

The qualified persons must be trained in accordance with the safety regulations and must be familiar with the safety instructions.

1.2 What should be Specially Observed

Please note that this technical documentation ...

- in general, must not be separated or amended. Only VIMARC is permitted to amend the technical documentation.
- must be kept complete and near the vibratory machine. Missing pages, or complete technical documentation, can be requested from VIMARC at any time or downloaded from our website.
- must always be accessible to the operating personnel of the vibration motor / vibrating machine at all times.
- must be read and fully understood by the service personnel before they start maintenance and repair tasks on the vibration motor.
- conforms to the latest technology at the time of delivery of the vibration motor. Subsequent modifications must be adequately documented and added to the technical

documentation. This is also applicable to all other technical documentation delivered together with this vibration motor.

- is not part of any previous or existing covenant, agreement or legal relationship, or should amend this. All obligations of VIMARC towards the customer result from the purchase order, in which the full and sole valid warranty regulations are included. These contractual warranty provisions are neither extended nor limited by the technical documentation.

1.3 Explanation of the Pictograms used

The following pictograms are used to simplify using this technical documentation and to quickly find information.

Fundamentally, impart all warning instructions to other users of the vibrating device.



Information
General information and recommendations from VIMARC. The adjacent paragraph promotes understanding, or simplifies your work. It is not necessary to read this paragraph. Non-observance will not result in an immediate risk or impairment.



Testing and checking
Information for the necessity of regular checks relating to the connection cable and bolted connections. Non-observance of this symbol can cause a hazard or damage can occur.



Prevent material damage
Reference to the increased risk of damage to the vibration motor, e.g. by using the incorrect tools, incorrect grease, penetration of debris into the drive units, incorrect assembly sequence, inappropriate transportation. The adjacent paragraph must be read and understood. Non-observance of this symbol can cause a hazard or damage can occur.



Special tools
Reference to the necessity of using a special tool.



Please read
Reference to standards and documents which should be read and understood.



General warning
This pictogram depicts a general warning. This indicates hazards, possible malfunctions, non-intended use or other things that concern occupational safety. It is imperative to read and understand the adjacent paragraph. Non-observance of this symbol can cause a hazard or damage can occur.



Warning of risk of injury
This pictogram warns of a possible risk of injury. This indicates hazards, non-intended use or other things that concern occupational safety Special attention should be paid to this topic and the appropriate precautionary measures taken. It is imperative to read and understand the adjacent paragraph. Non-observance of this symbol can cause a hazard or damage can occur.



Warning of voltage
This pictogram warns of electrical voltage and the resulting dangers. Take suitable precautionary measures against these. It is imperative to read and understand the adjacent paragraph. Non-observance of this symbol can cause a hazard or damage can occur.



Warning during transportation
This pictogram warns of the increased hazards that could occur during transportation of the vibration motor. It is imperative to read and understand the adjacent paragraph. Non-observance of this symbol can cause a hazard or damage can occur.



Important recommendation
This pictogram indicates an important recommendation or explanation. The adjacent paragraph should be read and understood. Non-observance will not result in an immediate risk, but it can impair the function of the machine.

2. General

2.1 Fields of Application for Vibration Motors

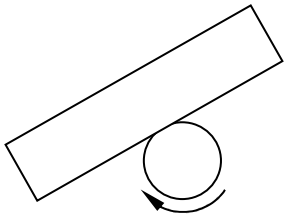
Vibration motors are provided and are suitable for driving vibrating systems, such as e.g.: vibrating conveyor chutes, vibrating pipes, screen conveyors, screening machines, spiral conveyors, automatic sorting machines, knock-out grates, vibrating trestles, resonance conveyors, vibrating mills and fluid-bed dryers, bin vibrating machines, etc.

Any other use, or a use above and beyond, is deemed to be non-intended. VIMARC will accept no claim for damages resulting from this.

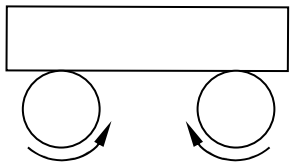
Intended use also includes observance of the Operation Manual, especially the inspection and maintenance instructions.

For the technical information of our motors, such as type, speed, operating torque, as well as centrifugal force and the electrical values, refer to the vibration motors leaflet or motor datasheet.

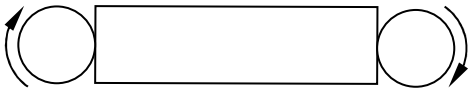
2.1.1 Motor arrangement and direction of rotation



1 motor = circular vibration



2 motors counterrotating = linear vibration



2 motors synchronous = torsional vibration

2.2. Intended Use



The vibration motor is not an autonomous functioning machine, it is designed to operate only with another machine. Commissioning is prohibited until it is determined that the functional machine conforms to the provisions of the machine directive.
The vibration motors are designed exclusively to drive a vibrating device.
The vibrating device must be designed for the demands generated by the vibration motor.
Vibration motors must not be operated without flyweights.
The intended use also includes observation of the Operation Manual.

3. Safety Instructions



The vibration motor must only be started when it has been assembled to the relevant machine, with all safety devices



Attention: When operating, or working on the vibration motor, the flyweights of the vibration motor may rotate unexpectedly. Risk of impact or crushing.

- Comprehensive personal protection can only be ensured when the vibration motors are fully enclosed.
- The vibration motor must not be operated without protective covers over the flyweights.
- The electrical connection of the vibration motor must be appropriately fused.
- There is a risk to life by electric shock if there is damaged insulation of the connection cable and missing cover on the terminal box! Immediately rectify such defects.
- Only explosion-proof vibration motors may be used in areas subject to explosion hazard. Here, use our Atex motors.
- Only carry out maintenance and adjustment tasks on the vibration motor when it is not in operation. Before commencing these tasks, make sure that the vibration motor cannot be switched on inadvertently, or by unauthorized persons.

4. Transportation



In order to prevent risks to persons and damage to the vibration motor, transportation of the vibration motor must be carried out with the appropriate care! In addition to the following instructions, also observe the general and valid local safety and accident prevention regulations.

In particular, observe the following:



- For deliveries overseas, or under special delivery conditions, e.g. transportation on poor or unmade roads, or transport by ship or rail, the flyweights must be secured or removed to prevent damage at the bearings from transport shocks. In this case, the flyweights will be set to "nil" by VIMARC. If the flyweights are secured, reference to the security is by an appropriate sticker on the motor.
- Make sure that the correct transportation and lifting devices are used.
- When transporting the vibration motors on pallets, secure them against tilting.
- Use the integrally cast eyebolts to lift the vibration motor. Only attach ropes, shackles, etc. to these eyebolts.
- The lifting devices must be approved, undamaged and suitable for the transportation.
- No additional weight must be attached to the motor, because the lifting lugs are only designed for the tare weight of the motor.
- There are no eyebolts on the smallest vibration motors. Place a rope around the housing to transport these.
- For safety reasons, the lifting devices used to lift the vibration motor must have a permitted load-carrying capacity of twice the weight of the vibration motor.
- Only place the vibration motor on its feet.
- Report all transport damage to the manufacturer. Particularly make sure that there is no damage to the contact surfaces and protective cover.



Do not suspend the vibration motor by the hoods or flyweights.

Strong impacts, or dropping the motor, will result in damage to the bearing and reduce the service life of the motor. Do not use motors that are damaged.

5. Storage

The vibration motors should be stored until final installation, in accordance with the following specification.

- In closed dry rooms.
- At a maximum ambient temperature of 40°C (104°F).
- Free from vibration, to prevent damage to the bearing.
- The motor and, particularly the terminal box, must be closed.

If the vibration motor is stored in the open, cover it with an awning, open at the bottom, to protect it from moisture. The cover must be placed so that any condensation can run off. To prevent the influence of ground moisture, place the vibration motor on a suitable support or on a shelf.

If packed for transport by sea, the packaging of the vibration motor must not be damaged, or opened, during transportation and storage.

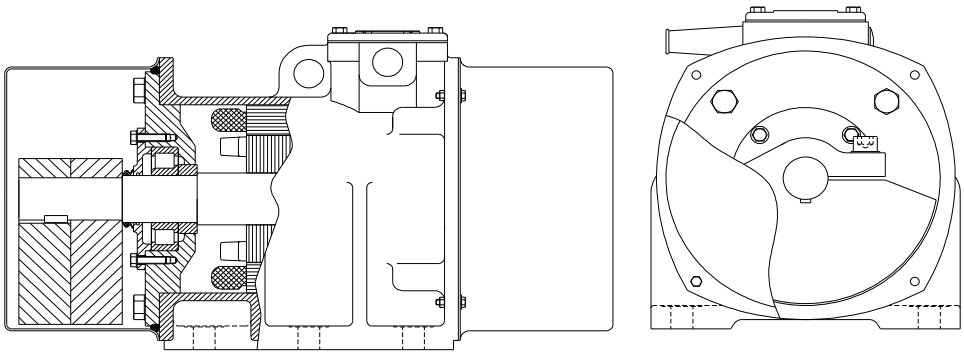


Attention: Only place the vibration motor on its feet!

6. Brief Description of the Motor Design

Completely enclosed, vibration-resistant housing, with wide feet and partially (depending on the motor type) with cast-on ribs for transmitting centrifugal forces. For easy and safe installation, integrally cast eyebolts are arranged in the center of gravity of the vibration motors, in order to install the motor in any arbitrary position. The stator, with winding, is pressed into the housing. The robust roller bearings are pressed into the solid bearing plates arranged at both sides. They have continuous lubrication and operate fully maintenance-free*. The sturdy dimensioned shaft, with the rotor shrunk on, runs in the roller bearings. The shaft passage is partially sealed (depending on the motor type) with grease grooves or grease gaps.
To generate the centrifugal force, flyweights are arranged on both sides at the ends of the shaft. The vibration motor is hermetically sealed using two protective hoods and toroidal rings. Ingress of dust and moisture is impossible. The ∞ terminal box is located on the housing and is hermetically sealed by a terminal-box cover.

*Not motors with lubrication, refer to Chapter 11.4

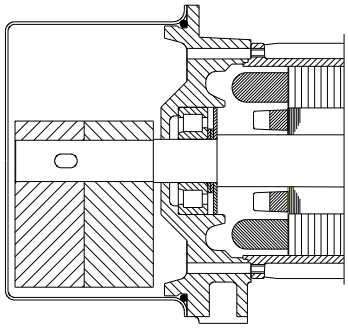


6.1 Different motor design of the FRIEDRICH size 1.0

The size 1.0 vibration motors are exclusively equipped with a stainless steel housing and grease washers instead of bearing caps.

6.2 Different motor design of the FRIEDRICH size 1.4

The size 1.4 vibration motors are equipped with an aluminum housing and two pedestal bearing housings, as well with grease discs.



7. Installation

The vibration motors are supplied ready for installation. During installation observe the following procedure.

- Check delivery for completeness, in accordance with Chapter 7.1 - Unpacking and Checking the Scope of Delivery.
- Transport the vibration motor to the installation site, in accordance with Chapter 4 - Transportation.
- Make sure of the dimensional accuracy and suitability of the installation site, in accordance with Chapter 7.2 - Installation Guidelines.
- Attachment to the vibrating machine, in accordance with Chapter 7.3 - Installation On Site.
- Adjusting the centrifugal force and operating torque, in accordance with Chapter 8.
- Electrical connection, in accordance with Chapter 9. For operation with two vibration motors on one machine, observe the additional instructions for the electrical installation.



Important: Before assembly of the contact surfaces of the vibration motor and the attachment surfaces of the vibrating machine, thoroughly remove all paint, corrosion, grease and oil.



Fundamentally, when installing the vibration motor, observe the local and national accident prevention regulations.



Attention: When setting the operating torque, the flyweights can suddenly rotate. Risk of impact or crushing.

7.1 Unpacking and Checking the Scope of Delivery

Unpack the vibration motor and check the scope of delivery according to the shipping document.

Dispose of the packaging materials in accordance with the valid local regulations for waste disposal.

7.2 Installation Guidelines

Requirements of the installation site.

The connection part, to which the vibration motor is attached, must be:

- level
- vibration-resistant
- free from paint, corrosion, grease and oil
- and machined flat

7.3 Installation On Site

Install the vibration motor as follows:

It is imperative to observe the installation guidelines, in accordance with Chapter 7.2.

- To install the vibration motors, a level vibration-resistant drive seat is required. In order to obtain a correct contact surface, this base must be machined.
- As standard, the vibration motors are attached using hexagon-headed bolts, DIN EN ISO 4014-8.8 or 4017-8.8 - (SAE J429 Grade 5) and self-locking hexagon nuts, in accordance with DIN EN ISO 7040-8 or 10511-8 - (SAE 995 Grade 8) . Never use spring washers, serrated washer or something like this. If washers are used, then only use high-strength washers, e.g. HV washers, in accordance with DIN EN 14399-6.
- All the attachment parts can only be used once.
- In order to attain a permanent pretension, the attachment screws require a certain minimum grip length. The minimum grip length should be 3 times the nominal diameter of the screw shank. The grip length is the distance between the underside of the bolt head and the nut.
- The required bolt protrusion is calculated according to DIN 13.
  Bolt protrusion v = Height of nut + 3 x thread pitch P

As applicable, before installation, remove the transportation safety devices or, if the flyweights were removed, install the flyweights and protective covers.

Install in the following sequence:

- Use the integrally cast eyebolts to align the vibration motor.
- Use the specified number and size of bolts to attach the vibration motor, in accordance with the leaflet or motor datasheet.



- Put the vibration motor in position and loosely tighten the bolts.
- **Use a torque wrench and tighten the bolts to the following torque, refer to Chapter 15, Table 15.1.**



- 15 to 20 minutes after starting up, the motors must be switched off and all motor mounting screws checked. This must be repeated after 2 to 3 hours, and again after one day.

- We recommend checking the attachment bolts every 8 weeks.

Attention: If inappropriate bolts and nuts are used, the vibration motor can become loose and cause serious damage.

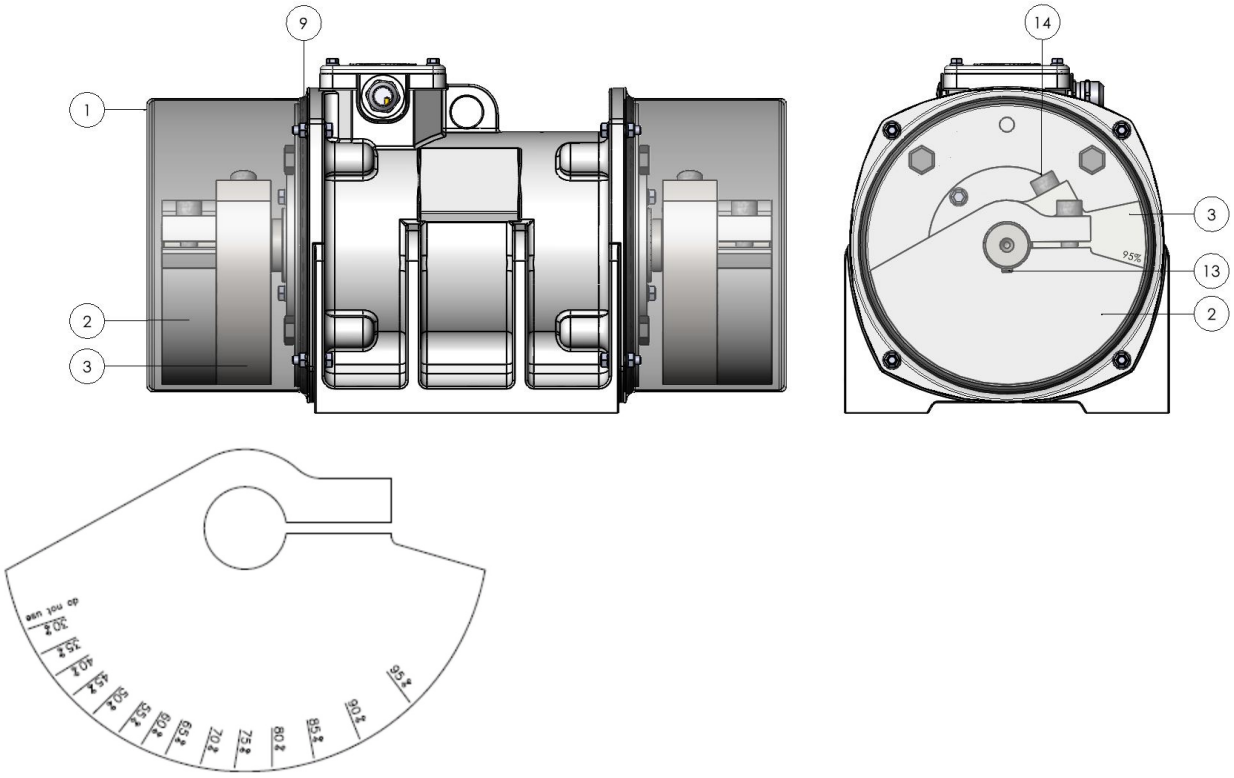
Attention: Please note that most of the malfunctions and failures are caused by incorrect or loose connections!

7.4 Replacement of Vibration Motors

- When using the vibration motors in pairs at one machine, use two identical vibration motors only. The same centrifugal forces must be set in both the motors.
-

8. Adjusting the Centrifugal Force

8.1 Lasered Scale



As standard, the vibration motors are delivered ex works with the centrifugal force set at 100%.
At the customer's request, delivery ex works can be made with another centrifugal force setting.

To adjust the centrifugal force for changing the performance, proceed as follows:

1. Remove the protective hoods (1) from both sides.

2. Loosen the terminal screws (14) of the inner flyweights (3) and turn the discs in the same direction from 100 % **(see warning notice)** to the required centrifugal force setting. Each of the external flyweights (2) is held in place by a key. Keep turning the inner flyweights with the desired setting (on the sketch 95 %) until they are lined up with the scale line on the edge of the external flyweight. Each scale line corresponds to a certain percentage of the maximum centrifugal force and operating torque.

3. Tighten the terminal screws (14) of the inner flyweights.

   When tightening the flyweights, apply the torques in accordance with Chapter 15, Table 15.2.

4. Attach both the protective hoods (1) and tighten them cross-wise. Make sure that the two cord gaskets (9) for the protective hoods contact properly, do not jam and have not been damaged when demounting.

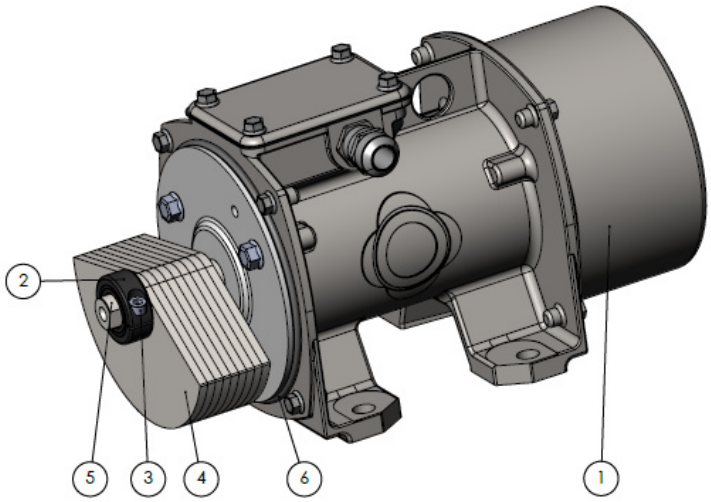


Please note carefully, that the inner flyweight must be set to the same value and/or graduation mark at both sides of the vibration motors.
When using the vibration motors in pairs, the same centrifugal forces must be set in both the motors.
Unequal setting of the flyweights will generate excessive uncontrolled transverse forces which may result in destruction of the motor and the vibration machine.



In addition, persons standing nearby may be injured or damaged otherwise.

8.2 for Size 1.0



The centrifugal force adjustment for changing the power output is performed as follows:

1. Remove the protective covers (1) on both sides.

2. Loosen the clamping screw (3) of the shaft clamping ring (2) and remove the shaft clamping ring (2).

3. The operating torque of the motor is adjusted by the number of centrifugal weights (4) according to Figures 2 and 3 and Tables 1 to 4.

4. Mount the shaft clamping ring (2) onto the shaft (5) and press it against the flyweights (4) with slight pressure. Tighten the clamping screw (3) of the shaft clamping ring (2) to a torque of 16 Nm.

5. Replace the two protective covers (1) and tighten them crosswise, ensuring that the two O-rings (6) for the protective covers (1) are properly seated, not binding, and how no signs of damage from disassembly.



All stainless steel screws and threads must be lightly coated with a suitable (food-grade) assembly paste before installation. This prevents thread seizing and facilitates later disassembly. A commercially available technical paste of this type (e.g., Interflon Paste HT1200) is sufficient for this purpose.



Please ensure that the centrifugal weight setting/-number on both sides of the vibration motors is identical.
If two vibration motors are present, the flyweights setting/number on both motors must be the same.
Unequal flyweights settings will generate large, uncontrollable lateral forces, which can lead to the destruction of the motor and the vibratory machine.



Furthermore, people standing nearby could be injured or otherwise harmed.

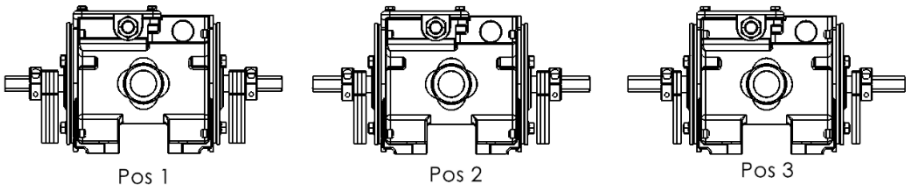


Figure 2: Overview of centrifugal weight settings for size 1.0-RVS, 2-pole

Table 1: 2-pole, size 1.0-RVS

Pos.	Number of centrifugal weight	Setting [%]	Working moment [kgcm]	Centrifugal force at 50Hz [N]	Centrifugal force at 60Hz [N]
1	8	100	16	7900	-
2	6	75	12	5930	-
3	4	50	8	3950	5690

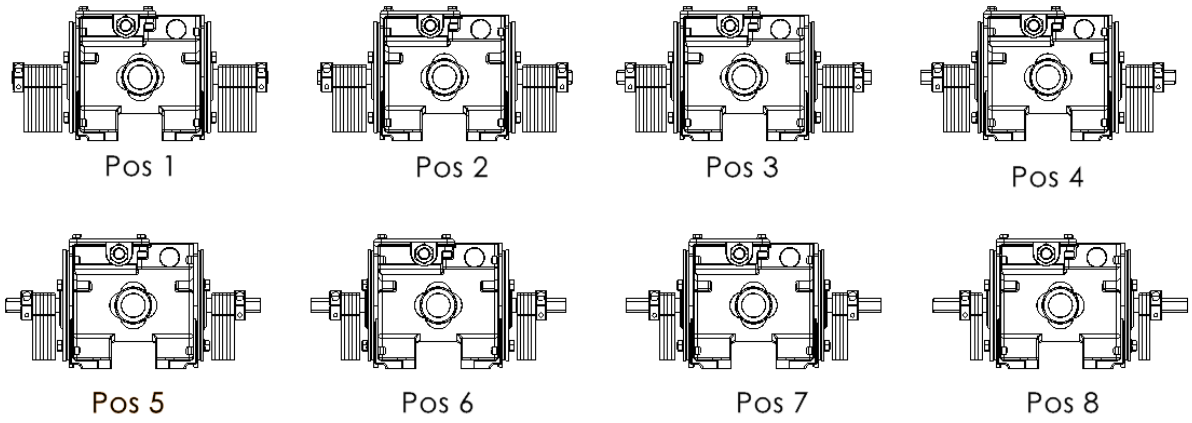


Figure 3: Overview of centrifugal weight settings for size 1.0-RVS, 4-, 6- and 8-pole

Table 2: 4-pole, size 1.0-RVS

Pos.	Number of centrifugal weight	Setting [%]	Working moment [kgcm]	Centrifugal force at 50Hz [N]	Centrifugal force at 60Hz [N]
1	20	100%	40	4940	-
2	18	90%	36	4450	6400
3	16	80%	32	3950	5690
4	14	70%	28	3460	4980
5	12	60%	24	2970	4270
6	10	50%	20	2470	3560
7	8	40%	16	1980	2850
8	6	30%	12	1490	2140

Table 3: 6-pole, size 1.0-RVS

Pos.	Number of centrifugal weight	Setting [%]	Working moment [kgcm]	Centrifugal force at 50Hz [N]	Centrifugal force at 60Hz [N]
1	20	100%	40	2200	3160
2	18	90%	36	1980	2850
3	16	80%	32	1760	2530
4	14	70%	28	1540	2220
5	12	60%	24	1320	1900
6	10	50%	20	1100	1580
7	8	40%	16	880	1270
8	6	30%	12	660	950

Table 4: 8-pole, size 1.0-RVS

Pos.	Number of centrifugal weight	Setting [%]	Working moment [kgcm]	Centrifugal force at 50Hz [N]	Centrifugal force at 60Hz [N]
1	20	100%	40	1240	1780
2	18	90%	36	1120	1600
3	16	80%	32	990	1430
4	14	70%	28	870	1250
5	12	60%	24	750	1070
6	10	50%	20	620	890
7	8	40%	16	500	720
8	6	30%	12	380	540

9. Electrical Connection

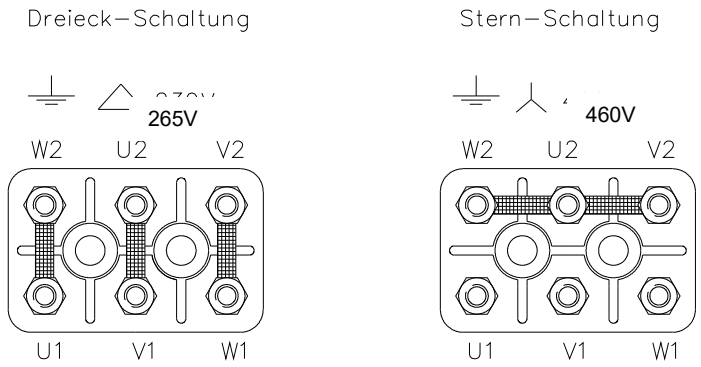


- The motor must only be connected by an authorized electrician.
- Observe the relevant Electricity Board regulations for connecting and operating the motor.
- **Ensure IP xx (as noted on the nameplate) protection by thoroughly sealing the cable connections, blanking plugs and terminal box cover. When selecting a cable gland, the IP protection class must be taken into account. It is important that the outer diameter of the connecting cable is within the permissible clamping range of the cable gland.**

9.1 Connection

In the terminal box, connect the terminal board as a star or delta connection as follows. Example for 265/460 Volts:

Delta connection Star connection



Before connecting, observe the following points:

- The vibration motor is installed ready-to-connect, star connection. With the appropriate mains voltage, the vibration motor can also be operated as a delta connection.
- Torque for hexagon nut at terminal board 2Nm (1,5ft-lb)
- Connect each vibration motor individually through a motor circuit breaker.
- During the motor run-up time (approx. 3-5 s), a starting current flows that is approx. 9-fold the rated current. Exact values are indicated in the leaflet or in the data sheet. Select the contactors and switches accordingly.
- If the vibration motor is exposed to high thermal loads, by frequent switching on and off or because of the ambient conditions, a PTC resistor cutout should be installed on the motor to protect it.
- **When connecting 2 vibration motors, check them for contra-directional sense of rotation**.



Use appropriate measures to make sure that the maximum speed is never exceeded. Otherwise there is a risk to the machine and persons.



Voltage and frequency of the plant mains must agree with the data on the motor rating plate. Connect the conductor to the terminal board. Make sure that the motor is connected correctly, star or delta connection. The three-phase connection of the motor must be earthed.
Close the terminal box dust and moisture tight. The sealing surfaces of the terminal box and the cover must be clean.
Connect the vibration motor through a circuit breaker and thermal relay.
Adjust the circuit breaker for continuous operation, in accordance with the rated current data on the motor rating plate.

9.2 Installation of the Connection Cable

Refer to the operating instructions from the manufacturer of the supplied or self-installed cable gland and cable.
The type designation is printed on the cable gland and the cable.

The IPxx protection rating specified on the nameplate is only achieved by selecting the correct cable and cable gland.

For CSA motors, use a CSA/UL-approved cable gland in accordance with the IPxx protection rating specified on the nameplate. The cable must be an SO or SE CSA/UL-approved cable (according to the certificate).

When using an EMC cable gland, also ensure that the IPxx protection rating specified on the nameplate is met and use a shielded cable.



- After the cable is connected, no debris must remain in the terminal box. Damage to the motor could occur, caused by a possible short-circuit and could result in total destruction.
- Take particular care when laying the cables and, to prevent the cable chafing when vibrating in operation, provide sufficient reserve (cable loop).



- For severe mechanical demands, only use rubber cables in accordance with DIN EN 50525-2-21 (VDE 0285) Type H07RN – F or A07RN - F.
  For CSA motors, use a CSA/UL approved cable.
  According to certificate type SE or SO, cable 16 to 14 AWG 600 V max. 90°C.

  When using frequency converters, a shielded cable and an EMC cable gland are recommended. Furthermore, we advise that the connection be made with a shielded cable along its entire length (without interruptions).

  Connections using terminal blocks or similar are not recommended, as these do not meet certain safety requirements and therefore pose an increased risk of damage. This leads to increased contact resistance, heat, and short circuits. Additionally, the insulation can be damaged during installation, resulting in increased leakage currents.



- Connect the motor through a safety switch and thermal protection.
  It is important to connect the thermal protection (PTC resistor) separately. Connection must be through a certified switch (not through a voltage regulator).
  During continuous operation, the current must not exceed the value given on the nameplate.



Earthing

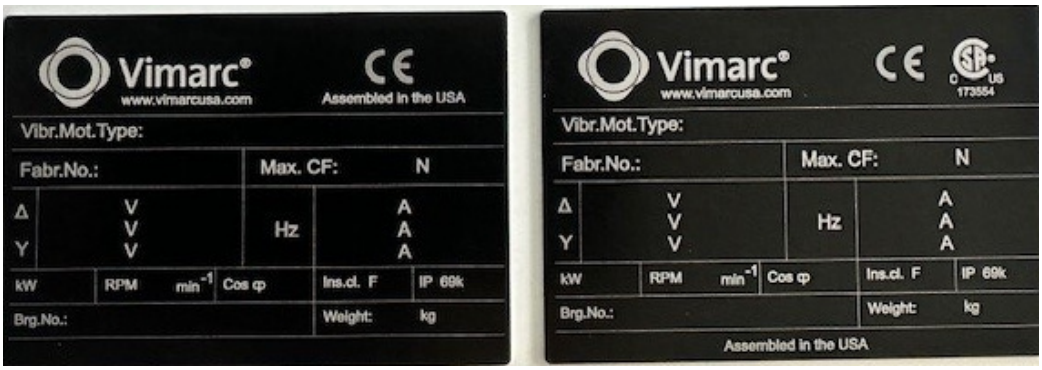
- The motor connection at the mains must be earthed.
  The earth can be connected inside the terminal box or, through an earthing terminal, on the foot of the motor. The grounding connection at the motor base is not a standard feature.

  After connection, the terminal box cover must be carefully closed.

10. Commissioning

The vibration motors are identified by a serial number quoted on the nameplate.

Nameplate VIMARC vibration motors



The vibration motors conform to the following technical requirements:

Protection Class IP 65 for Vimarc X-series
- with casted terminal box
- with IP65 cable glands
- with closed hoods

Protection Class IP 66 for F / FP / N -series
- with casted terminal box
- with IP66 cable glands (e.g. Cable gland with kink protection or angle, all ATEX motors)
- with flange, split hoods

Protection Class IP 69k for F / FP / N -series
- with casted terminal box
- with IP69k cable glands
- closed hoods

Protection class IP 54 for all series
- Terminal box cast
- with coupled engines
- with perforated hoods
- with ventilated hoods
- - without hoods

in accordance with IEC 60529

- Insulation Class F (155°C/311°F), in accordance with IEC 60034-1
- Insulation for tropics, standard
- Ambient temperatures for use, from -20°C to +40°C (-4°F to +104°F)
- Volume or noise level ≤70dB(A), in accordance with IEC

Before commissioning the motors (especially following an extended period of storage/shutdown) it is recommended that insulating resistance be measured before starting the motors.
Here it must be additionally noted that after an extended period of operation, also the minimum insulating resistance of the winding can drop to the critical minimum insulating level.

The insulating resistance is measured to ground at a voltage of 500V DC. Here the measuring voltage is applied continuously until the read levels do not fluctuate anymore.
At a local/winding temperature of 25 °C (77°F), with windings as good as new, the level should reach > 10MOhm.
The critical insulating level is 1MOhm (IEC 60204-1)
The motor can continue to be operated as long as it does not fall short of the critical insulating resistance.
If the value drops below the critical level, the motor must be shut down; if necessary the winding must be properly dried or the motor repaired.



The test measurements may only be carried out by authorized persons.
After carrying out the measurements, the winding is to be discharged to ground, to rule out a voltage surge.



After being stored away/shut down for 2 years, the motor grease must be replaced before beginning to use the motor.
The only greases which may be used see Chapter 11.3



During continuous operation of the motor, the operating temperature on the surface of the stator housing must not be higher than 80°C/176°F.
This is a design requirement, in order to maintain grease lubrication in the bearing and to attain the full service life.



It is not permitted to use the motor as an independently functioning unit.
A vibration motor is always a firmly attached part of a machine. This machine is designed as vibration-resistant and detached from the surrounding area using vibration insulation (e.g. springs, rubber buffers).

10.1 Operation at 50 Hz



The mains frequency determines the speed of the motor.
The vibration motors, designed for operation at 50 Hz, must not be operated at a frequency 60 Hz or, using a frequency converter, at a frequency of more than 50 Hz.
Operation of the motor at a frequency of more than 50 Hz will result in a substantial reduction in the service life of the bearings. Premature failure of the bearings and motor could occur. Furthermore, damage to, or destruction of, the vibrating machine can occur.
The centrifugal force increases by 44% for a motor operated at 60 Hz, compared to a motor operated at 50 Hz and unchanged flyweight setting.

For operation at 60 Hz – Use our motors appropriate for 60 Hz.

10.2 Operation at 60 Hz



The mains frequency determines the speed of the motor.
Vibration motors designed for operation at 60 Hz must not be operated using a frequency converter of more than 60 Hz.
Operation of the motor at a frequency of more than 60 Hz will result in a substantial reduction in the service life of the bearings. Premature failure of the bearings and motor could occur. Furthermore, damage to, or destruction of, the vibrating machine can occur.

10.3 Operation with a Frequency Converter



Application guide DIN CLC IEC/TS 30034-25 (December 2024) Preliminary Standard
This application guide aims to explain, as comprehensively as possible, the influence of individual components on the design of the electrical machine and its operating characteristics.
The specifications and implementation recommendations in this document must be observed by the **drive system designer**.

If a frequency converter manufacturer provides specific recommendations, these take precedence over the recommendations in this document.



Technical specifications from the frequency converter manufacturer
The relevant technical specifications from the manufacturer of the frequency converter used must be observed and implemented. This applies in particular to the permissible cable lengths and the necessary protective filters, such as dV/dt or sine wave filters (always the higher-grade filter must be used), which protect against winding damage.



Stress on Machine Insulation
In principle, the electrical stress on the machine insulation must be checked and complied with by the **drive system designer** (Application Guide DIN CLC IEC/TS 60034-25 Section 7).

Installation and Grounding
The primary goal of grounding is electrical safety.
However, for motor operation with a frequency converter, extensive measures are necessary to ensure that the grounding is effective even at high frequencies.



The specifications in Application Guide DIN CLC IEC/TS 60034-25 Section 9 must be observed.
When installing the cable between the converter and the motor, ensure that the shield is connected to the converter or the machine housing at **both ends** via EMC cable glands.
The shield connections must be fitted with a 360° connection on both sides to achieve low impedance across a frequency range.
Suitable EMC cable glands can be ordered from Friedrich Schwingtechnik/Vimarc Inc.



Maximum Speed/Frequency
The motors may only be operated at the rated frequency of the vibration motor (see nameplate).
Higher frequencies or speeds are not permitted.

Sizing the Frequency Converter

The frequency converters must be sized with sufficient power to ensure adequate current is available for the corresponding number of connected motors. The increased starting current of the motors must be taken into account.
Further product information, such as the nameplate, datasheet, and brochures, must be observed.

Motor Protection Devices

Motor protection devices such as PTC/thermistors, protective earth conductors, etc., must be installed on the frequency converter and integrated into the installation.

Commissioning

Before commissioning each motor, an insulation resistance test (500 Ω DC) must be performed, documented, and submitted to the motor manufacturer upon request.

10.4 Synchronization

One of the most common applications for vibration motors is operation of two vibration motors rotating in opposite directions and generating linear vibrations.
Because the motors are not coupled mechanically, the free synchronization is ensured only by means of frequencies of the motors. After start-up, the motors are not synchronized at first. Full synchronization is achieved during operation at equal frequencies.
During this procedure, the driving frequency must not be disturbed in any way, otherwise the motors are not able to achieve full synchronization.
Disturbances of the frequency, which do not enable the motors to achieve full synchronization, can be caused by:

- too high natural frequency of the machine (springs too stiff)
- too plastic, not enough stiff traverse
- insufficient braced components on the machine
- defective machine (broken springs, cracks in the body or in the traverse)
- the machine does not vibrate freely or it is blocked by firm mounting parts (sealing rubbers, etc.)

If two motors do not synchronize, the vibrating machine will be damaged or destroyed, the desired machine performance will not be achieved, and the motors will fail prematurely due to bearing or winding damage.

11. Replace the Bearing

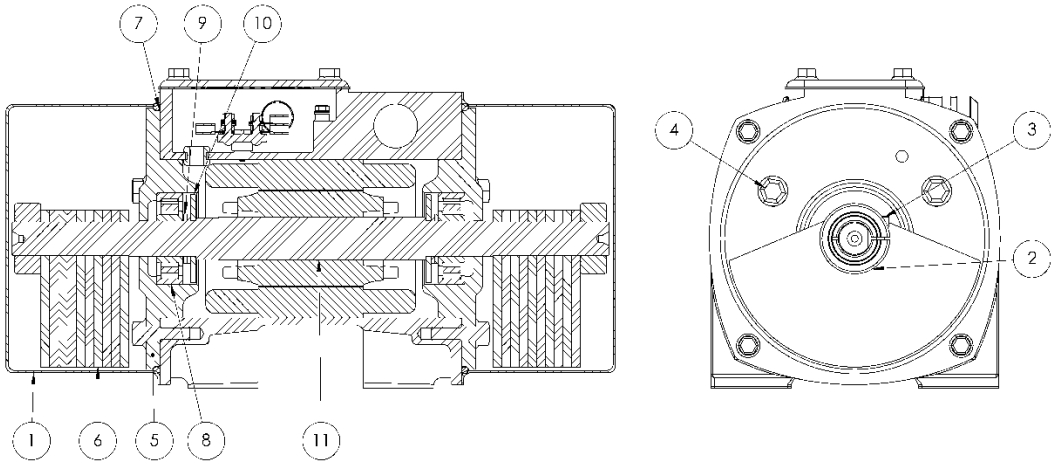
When replacing a bearing, we recommend to replace both bearings of a motor, even if only one bearing should be defective. A defective bearing will also always cause damage to the other bearing. The second bearing will fail after a short time.

The bearing housings must also be replaced every 2nd time that the bearings are replaced.

11.1 Remove the Roller Bearing

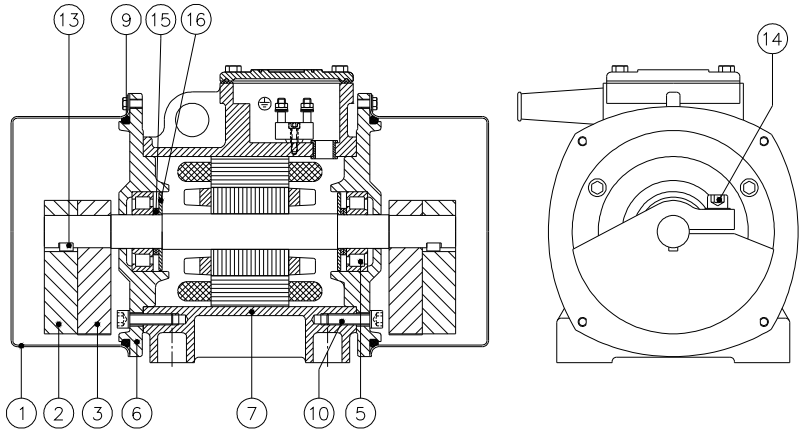
For the size of the bearing, refer to the rating plate on the vibration motor. You can purchase the special bearing, including the special grease from VIMARC.
Attention, we do not use commercially available standard bearings.

11.1.1 For FRIEDRICH size 1.0



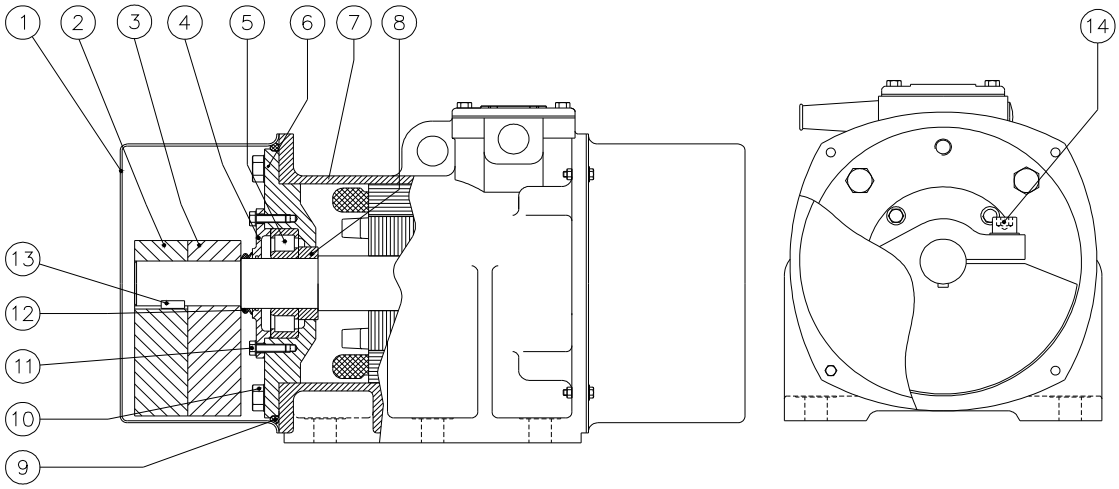
1. Remove the protective hoods (1) on both sides and remove the O-rings (7).
2. Note the number of flyweights(6).
3. Loosen the clamping screw (3) of the shaft clamping ring (2) and remove the shaft clamping ring (2).
4. Unscrew the mounting screws (4) for the bearing housings (5) and screw them into the threaded holes of the bearing housing (5). Use these screws to press out the bearing housing (5) together with the cylindrical roller bearing (8).
   Take care that the bearing housing does not become misaligned.
5. Press the cylindrical roller bearing (8) out of the bearing housing (5).
6. Remove the grease washer (10) and support washer (9), if present, as well as any shims,
7. along with the inner ring of the cylindrical roller bearing (8), from the shaft (11). Note the number of shims.
8. All parts to be reused must be cleaned and free of grease.
9. All screws and locking washers must not be reused.
10. All stainless steel screws and threads must be lightly coated with a suitable (food-grade) assembly paste before assembly.

11.1.2 For FRIEDRICH size 1.4



1. Remove both protective hoods (1) on both sides and remove the O-rings (9). Mark or record the position of the rotating inner flyweights (3). Release the flyweight attachment screws (14).
2. Remove the outer flyweights (2). If there is a problem: Insert a chisel or strong screwdriver into the clamping slot to widen it.
3. Remove the key (13).
4. Remove the inner flyweights (3).
5. Unscrew the attaching screws (11) of the bearing housing (6). Use a rubber hammer to gently hit out the bearing housing (6) from the stator housing (7). Make sure not to wedge the bearing housing.
6. Press out the cylindrical roller bearing (5) from the bearing housing (6).
7. Withdraw the grease washer (16) and support washer (15), together with the inner ring of the cylindrical roller bearing (5), from the shaft.
8. All components to be used again must be cleaned and degreased.
9. It is not permitted to reuse bolts and locking washers.

11.1.3 For VIMARC sizes AX – GX, AFP – DFP, EN, FN, GN, GL, HN, KN and FRIEDRICH sizes 1.2, 2.2, 2.3, 2.4, 3.4, 4.0, 4.1, 4.2, 4.7, 7.0, 7.1, 7.8, 8.0, 8.9, 9.0, 10.1



1. Remove both protective hoods (1). Mark or record the position of the rotating inner flyweights (3). Release the flyweight attachment screws (14).
2. Remove the outer flyweights (2). If there is a problem: Insert a chisel or strong screwdriver into the clamping slot to widen it.
3. Remove the key (13).
4. Remove the inner flyweights (3).
5. If available remove the V-ring (12).
6. Remove the attachment bolts (10) for the bearing housing (6) and install them into the threaded holes in the bearing housing. Use these to press out the bearing housing (6), together with the cylindrical roller bearing (5). Make sure not to wedge the bearing housing.
7. Remove the bolts (11) and bearing cover (4).
8. Press out the cylindrical roller bearing (5) from the bearing housing (6).
9. Remove the spacer (8) from the shaft, together with the inner ring of the cylindrical roller bearing (5).
10. All components to be used again must be cleaned and degreased.
11. It is not permitted to reuse bolts and locking washers.

11.2 Install the Roller Bearing



The replacement bearings from VIMARC are supplied with the appropriate grease.

11.2.1 For FRIEDRICH size 1.0

1. Slide the grease washer (10), support washer (9) and, if present, the correct number of shims onto the shaft until they stop.
2. Heat the inner ring of the new cylindrical roller bearing (5) to approx. 80°C to 100°C /176°F to 212°F (oil bath or hotplate) and push them onto the shaft up to the stop.
3. Allow the inner ring to cool down so that they sit firmly on the shaft.
4. Clean the bore of the bearing housing (5) and apply a thin layer of LOCTITE 270. Press the outer ring of the cylindrical roller bearing (8) into the bore of the bearing housing (5). Make sure that the outer ring does not wedge.
5. Fill the specified grease into the rollers of the cylindrical roller bearing (8). Use the specified grease and fill two thirds of the space in the bearing housing (5).
6. Pull out the shaft (11) approx. 30 mm and then push the bearing housing (5), with the installed cylindrical roller bearing (8), onto the inner ring of the bearing, so that it is centered.
7. Subsequently, push the bearing housing (5), together with the shaft (11), to the chamfer on the housing.
8. Install all of the attachment bolts (4) and uniformly tighten.
9. During installation, in order to prevent the rollers of the cylindrical roller bearing wedging on the inner race, continually rotate the stub shaft in both directions by hand. Otherwise, premature damage to the bearing can occur.
10. Uniformly tighten the bearing housing (5) as far as it will go.
11. Slide flyweights (6), noted number, onto shaft (11).
12. Mount the shaft clamping ring (2) onto the shaft (11) and press it against the flyweights (6) with slight pressure. Tighten the clamping screw (3) of the shaft clamping ring (2) to a tightening torque of 16 Nm.
13. Place the O-rings (7) around the flange of the bearing housing (5).
14. Fit the two protective hoods (1) and tighten them crosswise, ensuring that the two O-rings (7) for the protective hoods (1) fit snugly, are not jammed, and show no signs of damage from disassembly.
15. All stainless steel screws and threads must be lightly coated with a suitable (food-grade) assembly paste before assembly.



If several motors are repaired simultaneously, make sure that the components of the individual motors are not exchanged.

11.2.2 For FRIEDRICH size 1.4

1. Slide the grease washer (16), and then the support washer (15) onto the shaft until they stop
2. Heat the inner ring of the new cylindrical roller bearing (5) to approx. 80°C to 100°C /176°F to 212°F (oil bath or hotplate) and push them onto the shaft up to the stop.
3. Allow the inner ring to cool down so that they sit firmly on the shaft.
4. Clean the bore of the bearing housing (6) and apply a thin layer of LOCTITE 270. Press the outer ring of the cylindrical roller bearing (5) into the bore of the bearing housing (6). Make sure that the outer ring does not wedge.
5. Fill the specified grease into the rollers of the cylindrical roller bearing (5). Use the specified grease and fill two thirds of the space in the bearing housing (6).
6. Pull out the shaft approx. 30 mm and then push the bearing housing (6), with the installed cylindrical roller bearing (5), onto the inner ring of the bearing, so that it is centered.
7. Subsequently, push the bearing housing (6), together with the shaft (11), to the chamfer on the housing.
8. Install all of the attachment bolts (11) and uniformly tighten.
9. During installation, in order to prevent the rollers of the cylindrical roller bearing wedging on the inner race, continually rotate the stub shaft in both directions by hand. Otherwise, premature damage to the bearing can occur.
10. Uniformly tighten the bearing housing (6) as far as it will go.
11. Install the inner flyweights (3), the scale must be in the correct position.
12. Install the key (13).
13. Install the outer flyweights (2) in the correct position and tighten the attachment bolts (14).
14. Set the inner flyweights according to the position marked or recorded previously, install and fully tighten the bolts.
    Use the torque wrench and torque tighten the attachment bolts, in accordance with Chapter 15, Table 15.2.



The terminal slots of all 4 flyweights must show in the same direction.

16 Place the O-rings (9) around the flange of the bearing housing (6).

17 Fit the two protective hoods (1) and tighten them crosswise, ensuring that the two O-rings (9) for the protective hoods (1) fit snugly, are not jammed, and show no signs of damage from disassembly.



If several motors are repaired simultaneously, make sure that the components of the individual motors are not exchanged.

11.2.3 For VIMARC sizes AX – GX, AFP – DFP, EN, FN, GN, GL, HN, KN and FRIEDRICH sizes 1.2, 2.2, 2.3, 2.4, 3.4, 4.0, 4.1, 4.2, 4.7, 7.0, 7.1, 7.8, 8.0, 8.9, 9.0, 10.1

1. Heat the inner ring of the new cylindrical roller bearing (5) and spacer (8) to approx. 80°C to 100°C /176°F to 212°F (oil bath or hotplate) and push them onto the shaft up to the stop.
2. Allow the inner ring and spacer to cool down so that they sit firmly on the shaft.
3. Clean the bore of the bearing housing (6) and apply a thin layer of LOCTITE 270. Press the outer ring of the cylindrical roller bearing (5) into the bore of the bearing housing (6). Make sure that the outer ring does not wedge.
4. Fill the specified grease into the rollers of the cylindrical roller bearing (5). Use the specified grease and fill two thirds of the space in the bearing housing (6) and bearing cover (4).
5. Attach the bearing cover (4) to the bearing housing (6), using the fastening screws (11).
6. Pull out the shaft approx. 30 mm and then push the bearing housing (6), with the installed cylindrical roller bearing (5), onto the inner ring of the bearing, so that it is centered.
7. Subsequently, push the bearing housing (6), together with the shaft, to the chamfer on the housing.
8. Install all of the attachment bolts (10) and uniformly tighten.
9. During installation, in order to prevent the rollers of the cylindrical roller bearing wedging on the inner ring, continually rotate the stub shaft in both directions by hand. Otherwise, premature damage to the bearing can occur.
10. Uniformly tighten the bearing housing (6) as far as it will go.
11. If needed, install a new V-ring (12). Apply grease also to the sealing lips of the V-ring.
12. Install the inner flyweights (3), the scale must be in the correct position.
13. Install the key (13).
14. Install the outer flyweights (2) in the correct position and tighten the attachment bolts (14).
15. Set the inner flyweights according to the position marked or recorded previously, install and fully tighten the bolts.
    Use the torque wrench and torque tighten the attachment bolts, in accordance with Chapter 15, Table 15.2.



The terminal slots of all 4 flyweights must show in the same direction.

16. Place the O-rings (9) around the flange of the bearing housing (6).
17. Fit the two protective hoods (1) and tighten them crosswise, ensuring that the two O-rings (9) for the protective hoods (1) fit snugly, are not jammed, and show no signs of damage from disassembly



If several motors are repaired simultaneously, make sure that the components of the individual motors are not exchanged.

11.3 Grease

It is preferred to use the following greases:

A) Exxon Mobil Mobilith SHC 220
B) Special cold grease is used where special vibration motors are in continuous operation in refrigeration plants at ambient temperatures of down to –68°C (-90,4°F).

11.4 Lubrication

Some motor types can also be equipped with lubrication.

These motors must only be lubricated using the grease that is indicated on the regreasing plate

12. Spare Parts and Repairs

12.1 Spare Parts

Only use original spare parts or spare parts that conform to the appropriate standards.

Spare parts ordering
In order to make sure that the correct spare part is delivered, before ordering, this must be correctly identified using the Operation Manual. Thus, unnecessary delays, incorrect deliveries and enquiries from VIMARC can be prevented.

Contact:

Phone: +1 (0)281 440-0028

E-Mail: info@vimarcusa.com

When ordering, include the following:

- The type and serial number of the vibration motor. For this information, refer to the nameplate.
- The name of the part in the spare parts list
- **Important!** Please do not forget to indicate the number or quantity of spare parts required.

12.2 Repairs



- Have your motor repaired by the manufacturer, VIMARC.
- Make sure that original spare parts are used if a third party carries out repairs. In this case, no warranty or liability of the motor function for the intended use will be accepted by VIMARC.

13. Warranty



From the date of delivery of all new vibration motors, VIMARC provides a warranty period of 1 year.

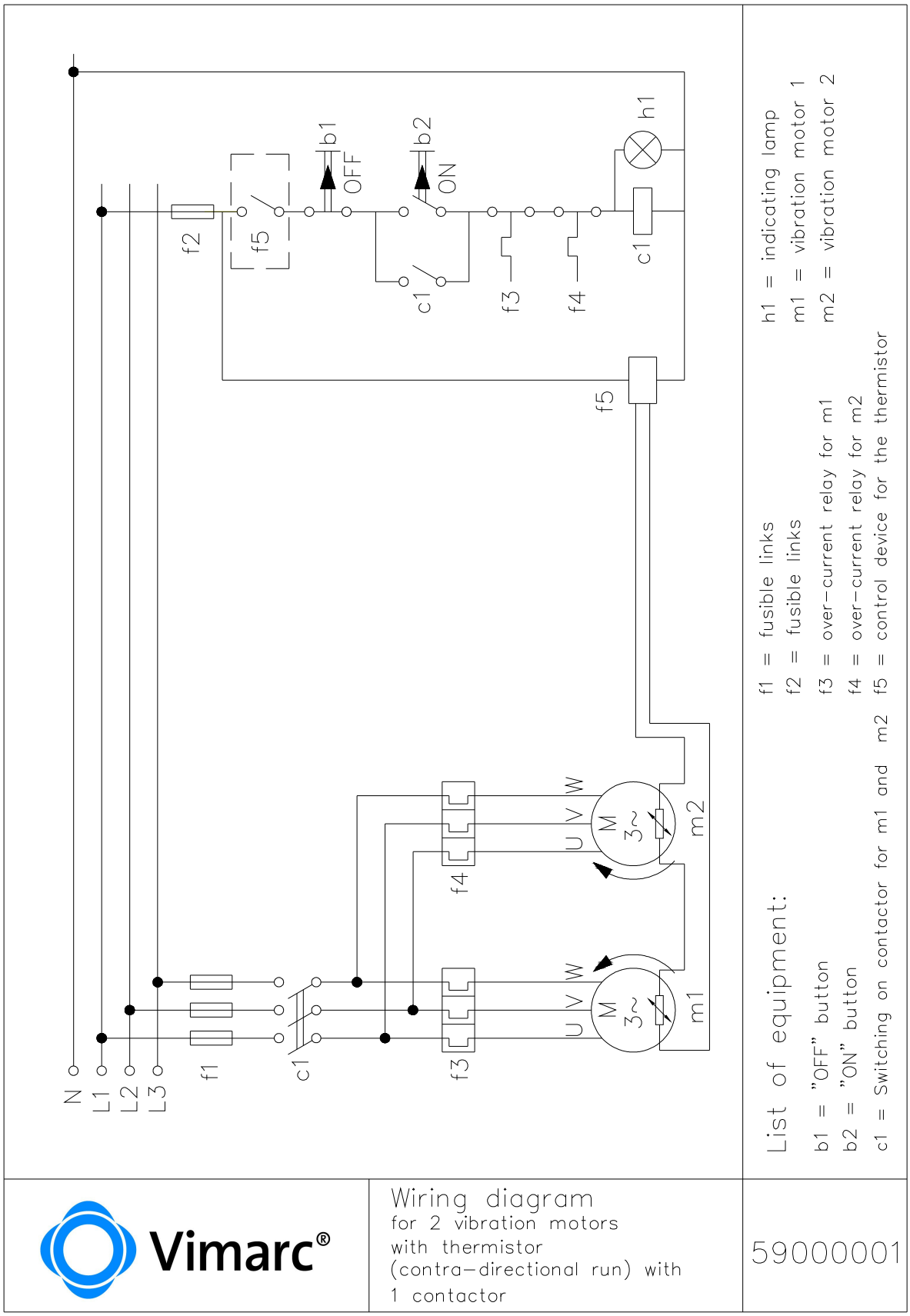
The warranty becomes invalid if:

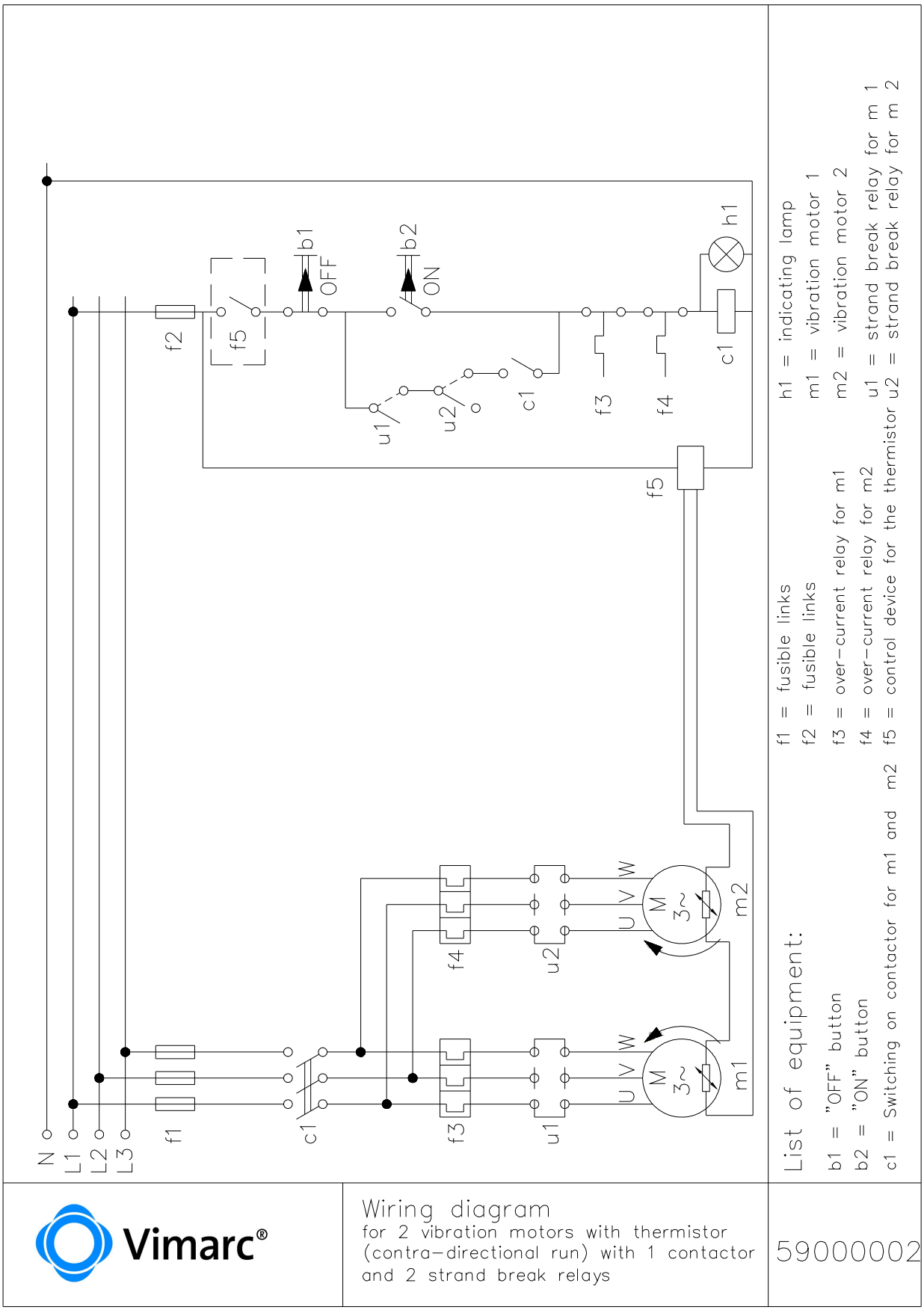
- The motor is used for purposes other than the intended use.
- The motor is operated on a defective machine.
- The motor is incorrectly connected or connected to the incorrect voltage.
- Damage to the motor occurs because of incorrect, or missing, electrical protection.
- The motor was operated on the frequency converter and protection was not observed in accordance with Section 9.1.
- Modifications have been made to the motor that could influence the efficiency of the motor.
- The motor was operated without flyweights.
- Damage occurred during transportation.
- The motor has not been installed in accordance with the instructions in Section 7.
- The motor is operated with the terminal box cover open, unsealed protective covers, an incorrect cable or the cable connection is not sealed.



- Therefore, if in doubt, have your motor repaired by the manufacturer, VIMARC

14. Circuit Diagrams




Vimarc®
Wiring diagram
for 2 vibration motors with thermistor
(contra-directional run) with 1 contactor
and 2 strand break relays
59000002
List of equipment:
b1 = "OFF" button
b2 = "ON" button
c1 = Switching on contactor for m1 and m2
f1 = fusible links
f2 = fusible links
f3 = over-current relay for m1
f4 = over-current relay for m2
f5 = control device for the thermistor
h1 = indicating lamp
m1 = vibration motor 1
m2 = vibration motor 2
u1 = strand break relay for m 1
u2 = strand break relay for m 2
N
L1
L2
L3
f1
f2
f3
f4
f5
b1
OFF
b2
ON
h1
c1
u1
u2
M
3~
U
V
W
m1
m2

15. Technical Data

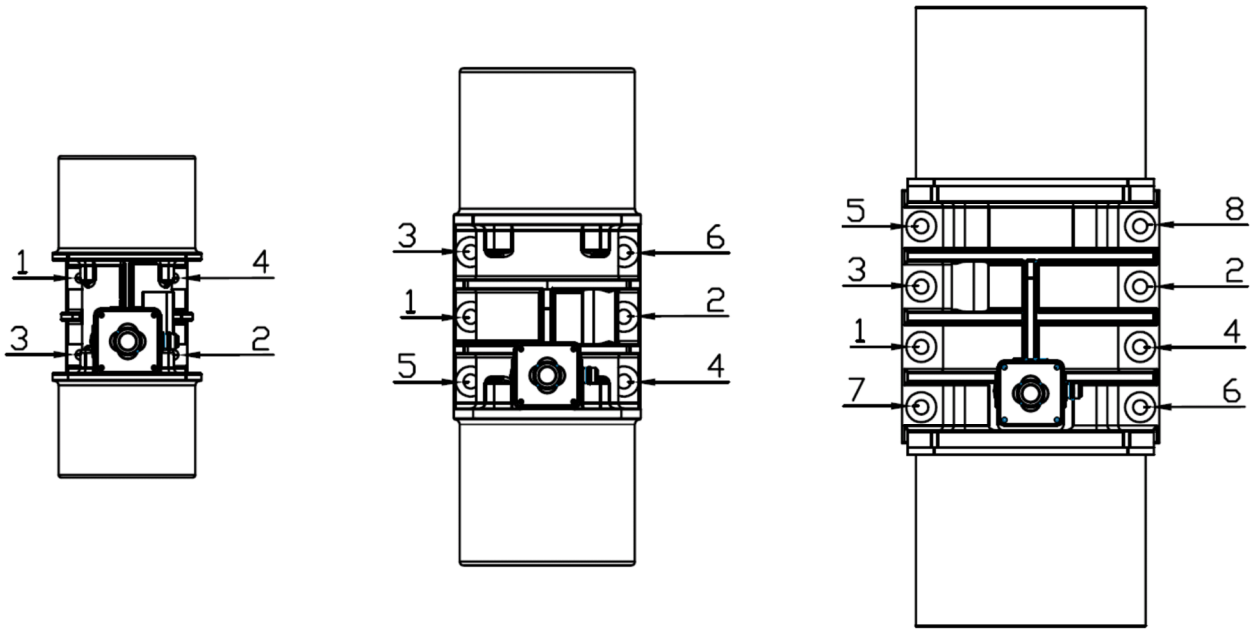
1. Torques for bolts, grade 8.8 – grade 5 (motor feet)

(Bolts must be grease and oil-free !!)

M12		M16		M20		M22		M24		M30		M36		M42	
[Nm]	[ft-lb]	[Nm]	[ft-lb]	Nm]	[ft-lb]	Nm]	[ft-lb]	Nm]	[ft-lb]	Nm]	[ft-lb]	Nm]	[ft-lb]	Nm]	[ft-lb]
80	64	210	168	410	328	558	412	710	568	1350	1080	2530	2024	3991	2944
7/16“-14		**5/8“-11**		**¾“-10**		**7/8“**		**1“-8**		**1-1/4“-7**		**1-1/2“-16**		**1-5/8 -8**	
	42		128		227		365		547		952		1657		2425

Table 15.1

Torque sequence



2. Torques for bolts, grade 8.8 – grade 5 (flyweights, bearing housing, bearing cover, TBC, hood-guard)

(Bolts must be grease and oil-free !!)

Bolt	[Nm]	[ft-lb]
M 6	4	3
M 8	20	15
M 10	40	30
M 12	50	37
M 16	140	103
M 20	280	206
M 24	560	412

Table 15.2

16. Declaration of incorporation

Pattern

Vimarc®

within the meaning of EU Machines Directives (2006/42/EC Article 6 Paragraph (2) ; Annex ll 1.B)
for installable machines, amended by Directive 2006/42/EC with special reference to Annex I.

Herewith declares the manufacturer

Company/Name/Address: Vimarc Inc.
12256 Cutten Rd.
Houston, TX, 77066
USA

of the incomplete machine

Product/Type: Vimarc vibrator motor
Type:
Serial-no.:

that this has been developed, built and manufactured in conformity with the following directive:

Machine Directive (2006/42/EG)

and meet the following basic requirements of the directive:

Annex I, Articles 1.1.2, 1.1.5, 1.3.2, 1.3.3, 1.3.7, 1.5.1, 1.7.3

The following harmonised standards have been applied:

DIN EN ISO 12100 Safety of Machines
DIN EN 60204.1, Electrical Equipment for Industrial Machines

For this product the special technical documents were prepared in accordance with annex VII Part B.
Complete technical documentation exists. Upon justifiable request, these documents from individual national location can be send by post, email or fax.
Operating-/installation instructions are available.
The safety instructions provided in the operating-/installation instructions must be observed.

Authorised representative to assemble and transmission of the technical documents:
Bernd Daus, Friedrich Schwingtechnik GmbH, Am Höfgen 24, D-42781 Haan

It is forbidden to start up this machine/this machine part until it has been established that the machine in which the vibrator motor is to be installed complies with the regulations of the directive (2006/42/EG).