



ELECTRIC VIBRATOR MOTORS

FOOT MOUNTED – STANDARD AND EXPLOSIONPROOF

INSTALLATION OPERATION AND MAINTENANCE MANUAL

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This Installation, Operation and Maintenance Manual is for all operators of VIMARC vibrator motors. These instructions are sent to accompany each vibrator sold by DF-Vimarc Corporation and should be available throughout the lifetime of the VIMARC vibrator motor.

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1. General Safety Rules and Precautions

VIMARC vibrator motors are used to energize industrial vibrating equipment, such as vibrating screens, feeders and chutes, shakeouts, compacting tables, deburring and finishing drums, resonant vibrating chutes, sorting machines, etc.

The successful and safe operation of all industrial machinery, including VIMARC vibrator motors, depends upon proper handling, installation, operation, and maintenance. Failure to follow certain fundamental installation and maintenance requirements may lead to personal injury, failure or loss of the machine, as well as damage to other property.

Only **qualified persons** should be involved in the installation, operation and maintenance procedure. All plant safety procedures must be observed.

A qualified person is one who is familiar with the construction, installation, maintenance and operation of industrial machinery, and any hazards involved. In addition, the person has the following qualifications:

- a. Is trained and authorized to energize, de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices;
- b. Is trained in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices;
- c. Is trained in rendering first aid.

Any motor/generator should be installed and grounded per local and national codes.

It is not safe to put the vibrator motor into service without the weight covers. The terminal box cover must be fitted in the proper way to assure a complete seal.

To avoid serious injury and/or equipment damage, before any adjustments, servicing, wiring, parts replacement, or any other acts requiring physical contact with the electrical or mechanical working components of this equipment are performed, all equipment must be de-energized, disconnected and isolated to prevent accidental contact with live or rotating parts.

2. Design and Construction

VIMARC vibrator motors are specially designed non-synchronous, AC electric motors. The stator with its coils is mounted vibration-proof inside a sturdy cast iron housing. The shaft has the rotor shrunk on it and is supported by two heavy-duty cylindrical roller bearings (ball bearings are used for "A" and smaller models). These bearings are mounted, one at each end, in bearing housings with bearing covers. The bearings are pre-greased for continuous service for the normal B-10 life of the bearing on most models, which therefore, do not even have grease fittings, unless specifically desired by the customer. On some models, grease fittings are provided for periodic greasing. On both ends of the shaft, two centrifugal weights are fitted. Two weight covers are mounted on the stator housing for safety and protection.

The high starting torque of the VIMARC vibrator motor ensures a quick run-up to operating speed. The motors have been designed with ample dimensions from both electrical and mechanical points of view. Working temperatures remain at low level even after months of continuous duty. Under normal operating conditions, expected surface temperatures of the motor can range from 60 – 70° C (140 – 160° F).

The recommended minimum and maximum ambient temperatures are –25° C (-15° F) and 40° C (104° F), respectively, for normal operations. The VIMARC vibrator motor can be furnished with modifications for abnormal and extreme climate conditions.

These design features described above contribute to the long life, which characterizes the vibrator motors manufactured by VIMARC.

3. Transport and Storage

3.1 Transport

VIMARC vibrator motors are provided with a min. of 2 “eyes” or crane hooks. When hoisting the motor a min. of 2 crane hooks must be used. Extra loads may not be attached to the motor since the crane hooks are designed to support the weight of the motor only. Motors may not be stacked; because the standard package used to ship motors cannot support such weight.

The adjustable centrifugal weights should be positioned at 0% (see section 6) for transporting motors.

CAUTION! Dropping or jarring any vibrator motor may cause damage to the bearings and should be avoided.

3.2 Storage

VIMARC vibrator motors should be stored indoors in a room, which should answer the following demands:

- Clean and dry atmosphere.
- Vibration and shock free, in order to prevent damaging the bearings.
- Ambient temperature not to exceed 40° C (104° F).
- No high fluctuations of temperature in a short time that could cause condensation that could corrode the motor. When the fluctuations of temperature are greater than 20° C (36° F), storage in an acclimatised space is recommended.

3.3 Transport and storage of complete machinery

If VIMARC vibrator motors are stored – whether by themselves or already placed on a machine - for an extended time, we recommend setting the adjustable weights to 0% (see section 6). When storing complete machinery, it is not necessary to remove the vibrator motors from the machinery; the motors can be stored as recommended above.

After an extended period of storage, over six months, it is recommended to have the insulation resistance of the windings measured by meggering, to ensure no moisture has developed within the motor during the storage period.

4. Installation

The vibrator motor must be mounted upon a flat, machined, rigid base. The motor should be secured on this base with bolts SAE grade 8 or Metric property class 8.8 DIN 931 or 933 with accompanying locknuts of compatible and comparable qualities and hardened steel washers. The nuts must be tightened using a torque wrench up to the following recommended torque values:

<u>Motor Type</u>	<u>Mounting Holes</u>	<u>Metric PC 8.8 Bolt & Torque</u>	<u>SAE Gr. 8 Bolt & Torque</u>
A, B	18 mm/ .709 in	M 16 : 200 NM or 148 ft-lb	5/8 : 145 ft-lb
C, D, E	21 mm/ .827 in	M 20 : 390 NM or 288 ft-lb	3/4 : 275 ft-lb
F, G, H	26 mm/1.024 in	M 24 : 670 NM or 494 ft-lb	7/8 : 455 ft-lb
K	32 mm/1.260 in	M 30 :1350 NM or 996 ft-lb	1 1/8 : 945 ft-lb

After approximately twenty minutes of operation the unit should be switched off and all mounting bolts checked and retightened with a torque wrench to the above-specified values. After two or three hours of operation this tightening procedure should be repeated. It is suggested that this checking and tightening procedure is repeated at 3 to 4 hour intervals for at least two days. Thereafter, the checking and tightening should be performed at intervals of 4 to 6 weeks, always following the aforementioned procedure.

NOTE: THE IMPORTANCE OF TIGHTENING THE BOLTS TO THE PROPER TORQUE AND CHECKING THE TORQUE PERIODICALLY CAN HARDLY BE STRESSED ENOUGH. ANY VIMARC MOTOR FAILURE IS PRACTICALLY ALWAYS DUE TO INADEQUATE TORQUE OR LOOSENING OF BOLTS.

4.1. Additional torque values of metric property class 8.8 bolts installed on the vibrator motor:

M 8 :	25 NM or 18 ft-lb
M 10 :	47 NM or 35 ft-lb
M 12 :	82 NM or 60 ft-lb
M 16 :	200 NM or 148 ft-lb

5. Electrical connection

Only qualified personnel may connect the motor. The motor must be connected according to local and national codes. A flexible electrical power cable, which is adequate to meet all national and local code regulations and requirements, should be used. An ample loop is indispensable because of the continuous motion and must be kept free from interference or rubbing.

The voltage and frequency of the power source must be in accordance with that stated on the motor rating plate. The connection terminal board inside the terminal box provides for alternative connection arrangements. Please consult motor rating plate for the motor's voltage and the immediately following sections 5.1 and 5.2 to determine the correct arrangement. The terminal box cover must be fitted in the proper way to assure a complete seal against dust or moisture.

In the case of two and four pole (high speed) motors, it is suggested that after making the connections to the terminal block, the terminal box be packed with vermiculite or some other insulating material so that the high vibrations do not cause the wires to rub and result in shorting.

A suitable and adequate disconnect switch and protective motor starter is required.

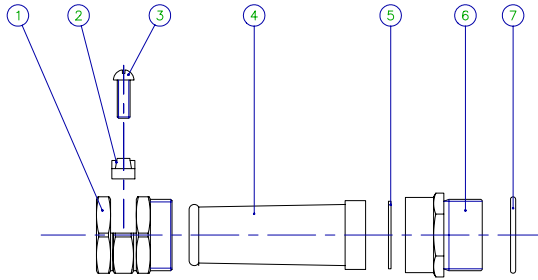
Explosionproof Models

Connect the cable with a certified cable gland (not provided). The thread in the terminal box is 3/4 NPT. The wires inside the terminal box must also be kept free from interference or rubbing. Make sure that the cable gland seals the cable waterproof.

Standard Models

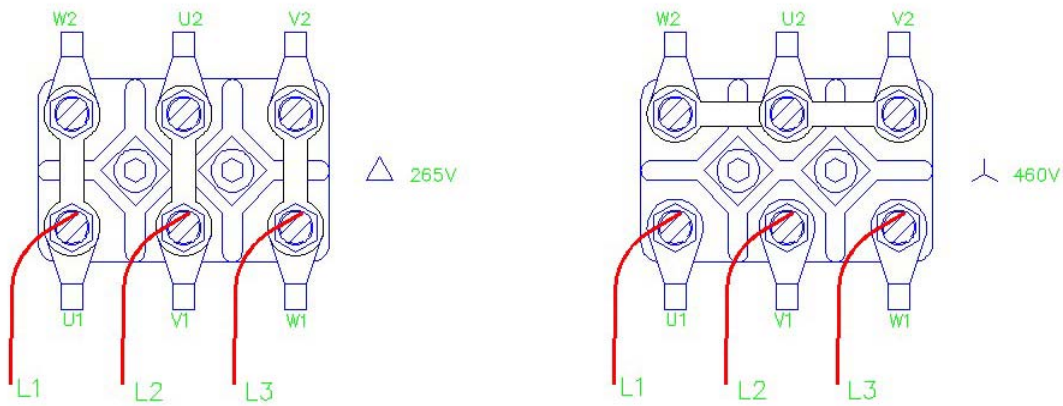
A cable inlet sleeve is provided to lead the cable into the terminal box. The cable should be run through the inlet sleeve to the terminal board inside the terminal box per instructions below.

- 1) Tighten the spacer (6) and screw it into the terminal box tapped hole. Check the rubber seal (7) for a proper seal.
- 2) Insert the cable through the clamping bracket (1), the inlet trumpet (4) and the ring (5) spacer (6) and seal (7) into the terminal box.
- 3) Tighten the clamping bracket (1) firmly. The rubber inlet trumpet will be compressed and seal off the cable entry.
- 4) Attach the clamping bracket (2) with the screw (3) and tighten the screw.
- 5) Connect the wires to the terminal board according to the motor's voltage rating. Please consult motor rating plate for correct arrangement. The motor must be grounded.
- 6) In the case of high speed motors (2-pole & 4-pole), it is recommended that after the wires are connected to the terminal block, the terminal box should be packed with vermiculite or some other appropriate insulation material so that the vibrations do not cause loose wire connections to break and short the motor.
- 7) Close the terminal box in the proper way to assure a complete seal against dust or moisture.



5.1 Single Voltage

The terminal board inside the terminal box provides for two connection arrangements. Motors are delivered with terminals properly connected for the specified voltage on the motor rating plate. However, alternating between "delta connection" and "star connection", by rearranging the terminal jumpers, a different line voltage can be applied to the motor. Example for connection 265/460 Volt motor:

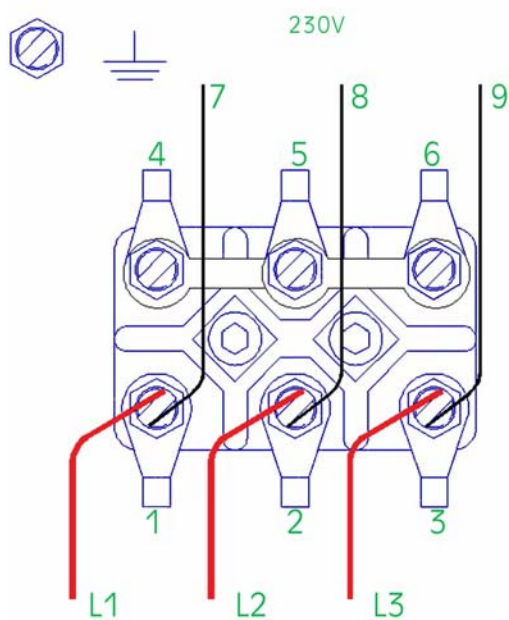


"Delta" connection

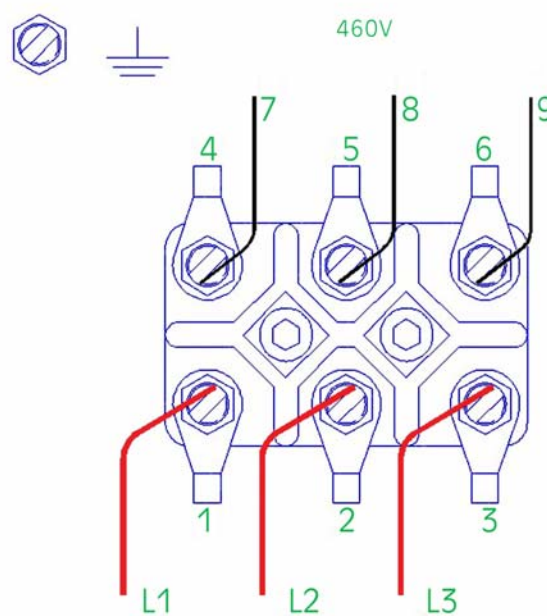
"Star" connection

5.2 Dual Voltage Connection

Dual voltage VIMARC vibrator motors are delivered with a terminal box containing nine leads, and they are connected for the lower voltage (230 V). For the higher voltage (460 V), rearrange the leads as shown in the figure below. Notice that terminal jumpers are omitted in that arrangement!



Lower voltage



Higher voltage

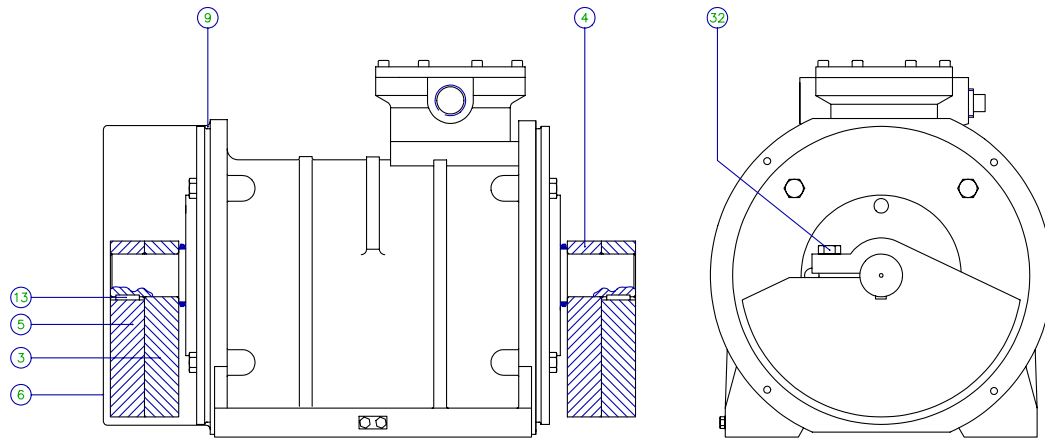
5.3 Grounding

The motor must always be grounded in two places:

- 1) In the terminal box, the power cable to the ground safety bolt.
- 2) On the mounting foot, the grounding plate to the machinery.

Important! The diameter of these ground leads must be according to national and local codes.

6. Adjustment of Centrifugal Force Output



VIMARC vibrator motors leave the factory with the adjustable centrifugal weights positioned at 0% to minimize the possibility of damaging the bearings while in transport. The procedure to adjust the centrifugal force output is the same for explosionproof (as pictured above) and standard models. The centrifugal weights of the VIMARC vibrator motor can be reset to any percentage in order to obtain the working moment and centrifugal force to produce the required amplitude or stroke of the machine by the following procedure:

- 1) Detach and remove both weight covers (6).
- 2) Loosen both clamping bolts (32) to release the inner centrifugal weights and rotate each inner weight (3 and 4) equally, relative to outer weights, in the same direction (**see warning**). Outer weights (5) are keyed on the shaft and thus fixed. These outer weights are provided with a marking line and the inner weights have a scale. If a marking line is not visible, utilize the edge of the outer weight. The scale on the inner weights represents a percentage value of the total maximum centrifugal force available.
- 3) Retighten the clamping bolts (32). Retighten the clamping bolts to the proper torque values as shown in section 4.
- 4) Refit and secure both weight covers (6). Make sure that the o-ring seal (9) of the weight covers are in a "like new" condition.

WARNING! EXCEPT FOR SPECIAL APPLICATIONS, IT IS ESSENTIAL THAT THE WEIGHTS AT BOTH ENDS OF THE MOTOR SHAFT ARE SET AT PRECISELY THE SAME PERCENTAGE VALUE. ANY UNEQUAL SETTING OF THESE WEIGHTS WILL GENERATE TREMENDOUS TRANSVERSE FORCES, WHICH MAY RESULT IN INJURY OR DESTRUCTION OF YOUR VIBRATING EQUIPMENT.

7. Relubrication

Of the standard (non-hazardous locations) VIMARC motors, only two pole models, series C up to and including F, and also **all** G, H, and K motors are delivered with grease fittings. Any model not fitted by the manufacturer with grease fittings does not require regreasing for the B-10 life of its bearing. However, grease fittings may be ordered even for such models and then the procedure for regreasing should be followed.

Note: None of the explosion proof (hazardous locations) motors are fitted with grease fittings, except for the "G" series.

Relubricate using a lithium hydroxystearate grease, such as Shell Alvania R3 or equal, after the first 500 operating hours, and every 1000 operating hours thereafter in the following quantities:

<u>Model</u>	<u>Grams per Grease Fitting</u>
A and B	3
C and D	5 – 10
E and F	10 – 15
G	15 – 20
K	20 – 30
H	20 – 30 (IF equipped with NJ 2319 bearings)*
H	30 – 40 (IF equipped with NJ 2322 bearings)*

* see motor rating plate

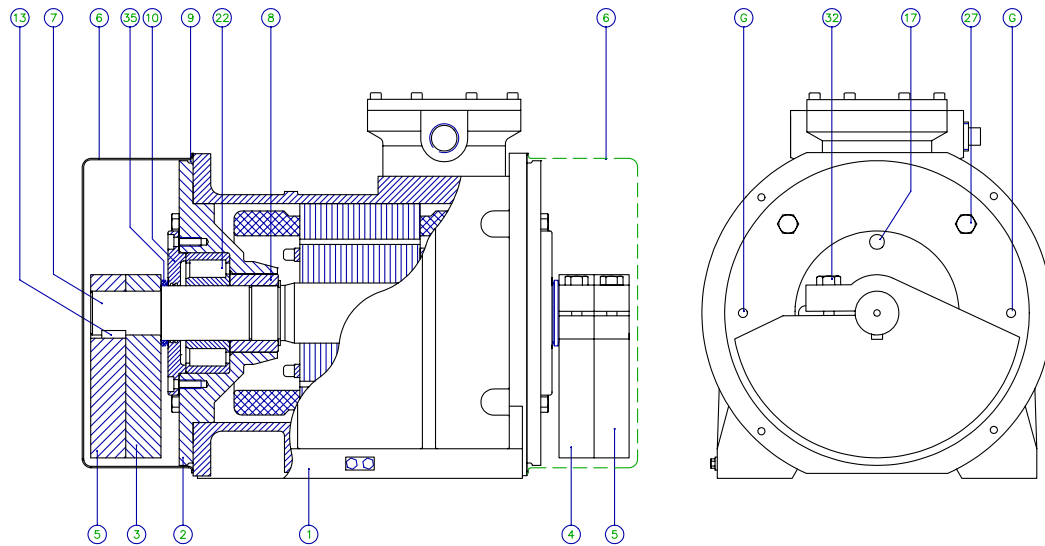
Lubrication above the recommended quantities can be harmful to the bearing life of the motor.

8. Replacement of bearings

The bearing type is specified on the rating plate of your VIMARC motor. It is usually a cylindrical roller bearing. The inner and the outer race of the bearing have raised collars, providing a lateral bearing surface for the rollers to take up the axial load on the bearing. As long as your VIMARC motor is properly installed and maintained as specified in this Manual, the bearing life will not be affected by normal thrust loads during operation.

Warning! VIMARC **Explosionproof** models conform to code FM 3615, that makes high demands upon the tolerances of the fittings between bearing housing and stator housing, and between the bearing housing and the spacers, which are shrunk on the shaft. When changing bearings on the explosion proof models, the above-mentioned fittings must be checked to ensure they are still in accordance with the code to maintain the explosion proof certification.

Note: The following procedure for replacement of bearings is the same for explosionproof and standard models.



8.1. Removing the Cylindrical Roller Bearings

- 1) Detach and remove both weight covers (6) and O-ring seal (9) from either side of the motor.
- 2) Either mark or record the angular setting of the inner centrifugal weights (3 and 4).
- 3) Loosen the clamping bolts (32) of the outer centrifugal weights (5) and pull off the weights and remove the keys (13).
- 4) Loosen the clamping bolts (32) of the inner weights (3 and 4) and pull off the weights.
- 5) Remove the V-rings (35).
- 6) Loosen and remove the screws (17) and remove bearing covers (10).
- 7) Loosen and remove the bolts (27).
- 8) Insert two bolts (27) into the threaded holes (G) and continue turning them in order to push the end plates (2) out of the motor housing (1).
- 9) Draw the end plates (2) outward carrying the outer races of the roller bearings (22).
- 10) Using an extractor tool, draw from the shaft the inner race of the roller bearing (22) and the spacers (8). Pay attention to protect the shoulder from being damaged. In case of motor type A & B, only the inner race.
- 11) Push the outer race of the roller bearing by means of the inner race out of the end plates (2).
- 12) On models K and H, remove the three screws located on the bearing housing and insert three bolts (27) into these holes and push the bearing out of the bearing housing.
- 13) Thoroughly degrease and clean and check all parts.

8.2. Installing the Cylindrical Roller Bearings

When ordering replacement bearings, make sure to order the same make, type and model number as the ones you are replacing. They are identified on the rating plate of your VIMARC motor. Pay particular attention to the C-4 fit. Use only the lubricant grease that is specified on the rating plate.

- 1) Heat both the inner races of new bearings and the spacers (8) to approx. 100° C (212° F). Next push them over the shaft until against the shoulder and let them cool off.
- 2) Grease-pack both roller bearings (22) with recommended grease lubricant (Shell-Alvania R 3 or equivalent) and press them into their bearing houses (2).
- 3) Pack the recesses 2/3 full of grease.
- 4) Assemble the bearing covers (10) and attach with appropriate screws (17).
- 5) Use Loctite 549 for the cylindrical gap between bearing housing and stator housing. Assemble the bearing housings; use Loctite 242 for the bolts.

Important! Make sure that the lubrication channel (if any) is placed in the right position.

- 6) Assemble the V-rings (35) on the shaft with the V facing the end of the shaft.
- 7) Push the inner centrifugal weights (3 and 4) on the shaft until against the shoulders.
- 8) Put the keys (13) into their recesses and push the outer weights (5) back on the shaft in the original position as marked and recorded, and tighten the clamping bolts (32).
- 9) Locate the inner centrifugal weights (3 and 4) in the exact angular position as marked or recorded and tighten the clamping bolts (32).

Caution: Except for special applications, it is essential that the inner weights at both ends be set exactly at the same value. Failure to have identical values at both ends will create dangerous transverse forces, which may cause injury and destroy your equipment.

- 10) After being completely assembled, the rotor shaft must have axial play of 0.4 to 1 mm, or .0158 to .0394 inches.
- 11) Refit the weight covers (6) and secure them with the appropriate screws. Make sure that the O-rings (9) are still serviceable and are properly re-positioned before the weight covers are secured.

Note: Additional torque values are found in section 4 for tightening the bearing covers, bearing housings, weights and the weight covers.

Note: During the first operating hours the motor will run warmer than usual. The excess lubricating grease will be pushed out. Thereafter the motor should run at normal operating temperature.

9. Repairs and Spare Parts

Repairs

Thousands of VIMARC vibrator motors have been shipped to all parts of the world and are giving trouble-free, long life, in all manner of applications, in all sorts of climatic and other conditions.

Eventually, a bearing will wear out, as all moving parts do. That is normal, and this manual lists what needs to be done to replace bearings. In case of burnout of a motor, requiring rewinding, or any other abnormal repairs, which are beyond the scope of this manual, contact DF-Vimarc Corporation for referral to a qualified motor repair facility.

Spare Parts

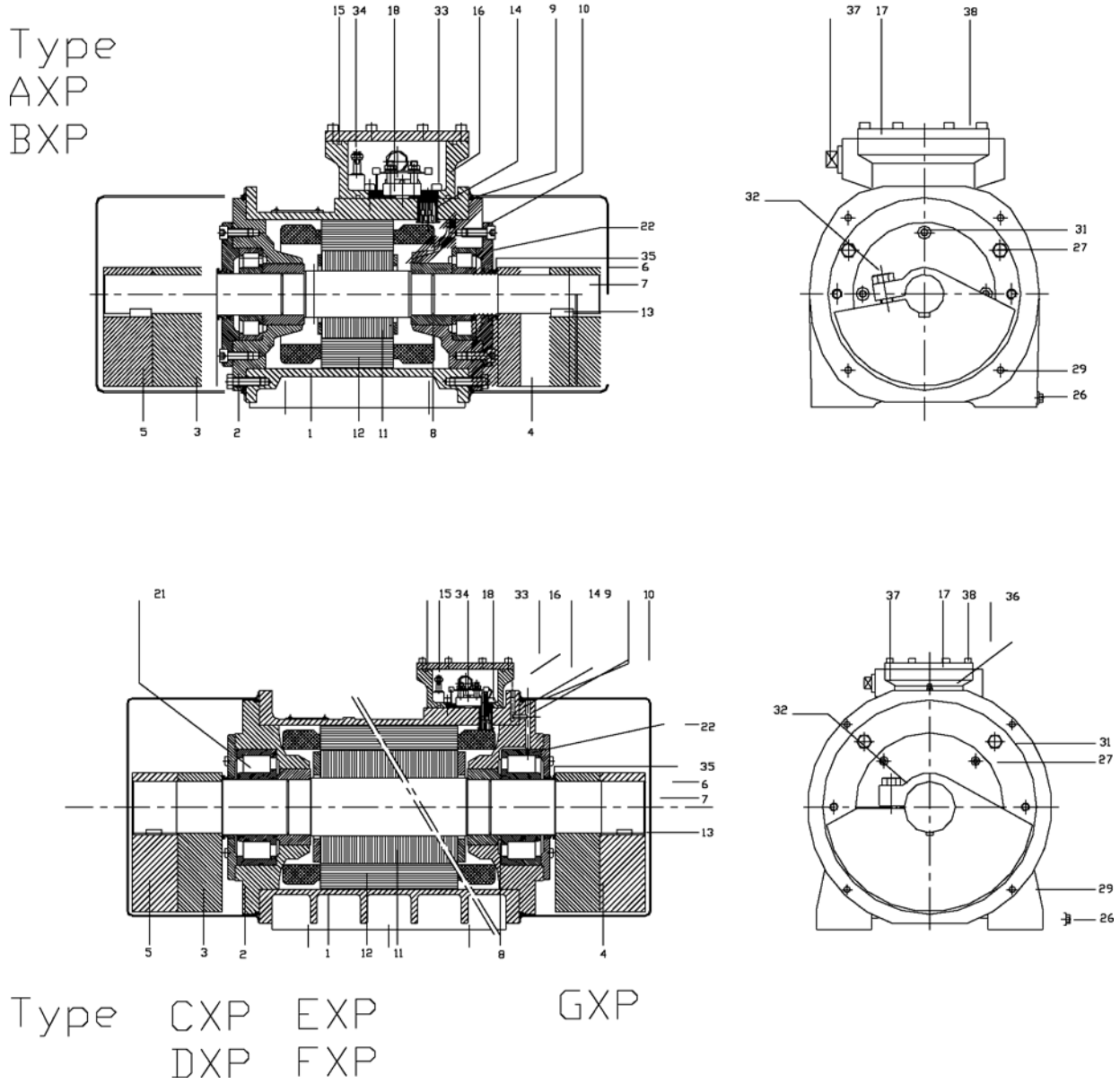
Spare parts for VIMARC vibrator motors can be ordered through DF-Vimarc Corporation. When ordering spare parts please provide the information as stated below, all of which can be found on the motor rating plate next to the terminal box. Please refer to the item number associated with the diagram on the next pages.

- Serial number of the vibrator motor
- Motor type
- Voltage and frequency
- Position number of the spare parts
- Quantity

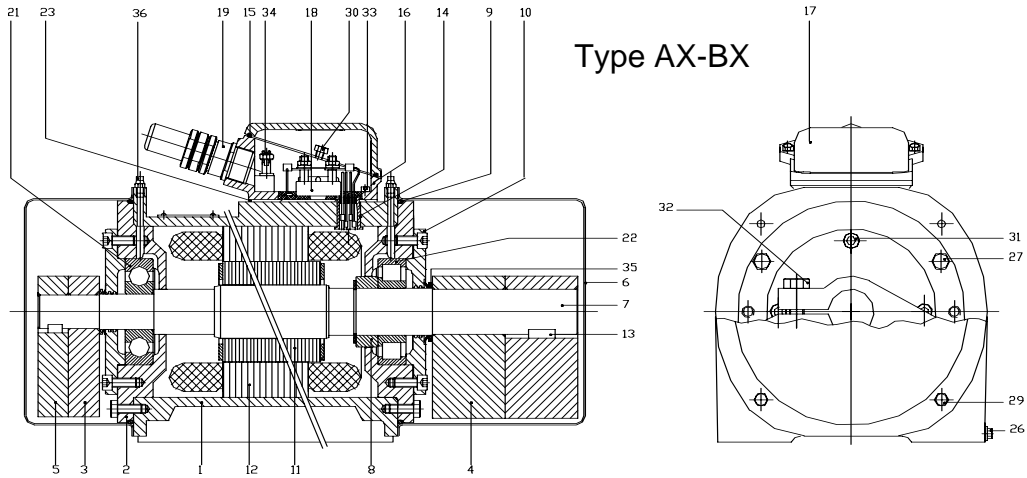
Lists of spare parts are available on demand. (Numbers 20, 24, 25 & 28 are intentionally omitted)

<u>Item No.</u>	<u>Description</u>	<u>Pieces Required</u>
1	Stator Housing	1
2	Bearing Housing	2
3	Centrifugal Weight Inner Left	1
4	Centrifugal Weight Inner Right	1
5	Centrifugal Weight Outer	2
6	Weight Cover	2
7	Motor Shaft	1
8	Distance Ring	2
9	Seal (Weight Cover O-Ring)	2
10	Bearing Cover	2
11	Rotor	1
12	Stator	1
13	Weight Key	2
14	Transit Sleeve	1
15	Sealing Cord (Terminal Box O-Ring)	1
16	Terminal Box Housing	1
17	Terminal Box Cover	1
18	Terminal Board	1
19	Cable Gland	1
21	Ball Bearing (only on A Motors)	2
22	Roller Bearing	2
23	Gasket	1
26	Ground Safety Plate	1
27	Hexagon Screw	8
29	Hexagon Screw	8
30	Hexagon Screw	2
31	Hexagon Socket Head Screw	8
32	Hexagon Screw	4
33	Hexagon Socket Head Screw	4
34	Ground Safety Bolt	1
35	V-Ring	2
36	Grease Nipple	2
37	Plug	1
38	Hexagon Socket Head Screw	8

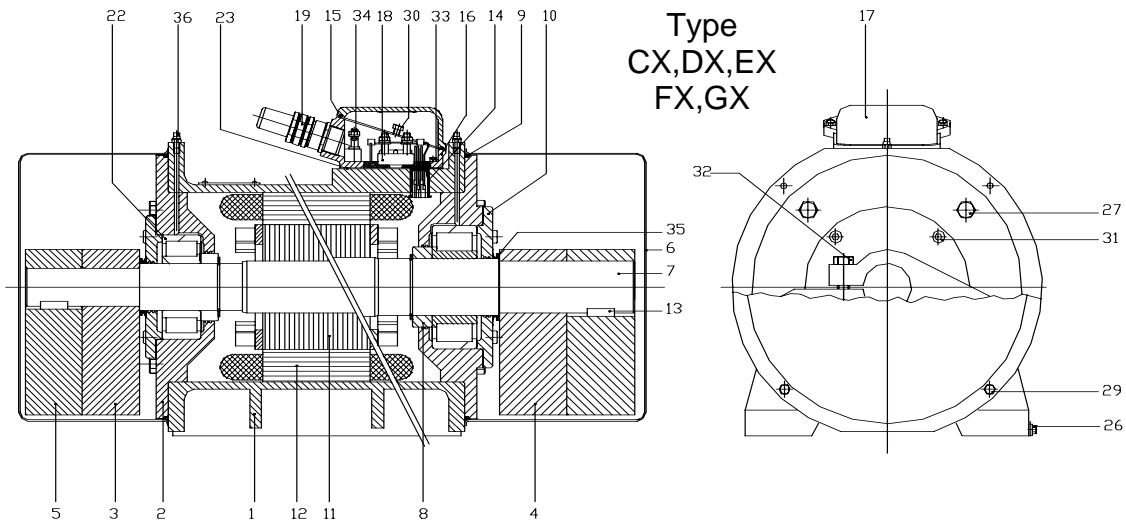
9.1 Explosionproof Motor Diagrams



9.2 Standard Motor Diagrams



Type AX-BX



Type
CX,DX,EX
FX,GX

10. Explosionproof Certification

Your VIMARC explosion proof vibrator motor is virtually the same in application and maintenance as the standard VIMARC vibrator motor of equivalent size. Consequently the foregoing instructions are equally applicable, except as specially noted. The following additional instructions are particular for explosion proof motors and for your added protection. None of the explosionproof motors are fitted with grease fittings except for the "G" series.

VIMARC explosion proof vibrator motors are certified as follows by: FACTORY MUTUAL (FM) and CANADIAN STANDARDS ASSOCIATION (CSA)

- Series AXP, BXP, CXP, DXP, EXP, FXP and GXP:
with a thermistor control, at Temperature Code T4 (135° C or 275° F) for:
 FM Class I and Class II, Division 1, Groups C, D, E, F and G
 CSA Class I, Groups C and D, Class II, Groups E, F and G
- Series EXP, FXP and GXP:
with or without a thermistor control, at Temperature Code T3B (165° C or 329° F) for:
 FM Class I and Class II, Division 1, Groups C, D, E, F and G
 CSA Class I, Groups C and D, Class II, Groups E, F and G
- Series AXP, BXP, CXP and DXP:
without a thermistor control, at Temperature Code T3 (200° C or 392° F) for:
 FM Class I and Class II, Division 1, Groups C, D, E, F and G
 CSA Class I, Groups C and D, Class II, Groups E and F

Each VIMARC explosion proof vibrator motor comes with thermistors embedded in its windings, which account for the two free wires you will see coming out of the motor housing into the terminal box. If thermistor controls are needed for the application, they can be furnished by DF-Vimarc Corporation or by the customer. These thermistor controls must be certified. Technical details will gladly be provided on request.

A good quality, approved, all-metal fitting must be provided to seal the threaded opening from the terminal box, which accommodates the power supply cable. Such fittings are readily available from your electrical supplier. Take care that the cable is approved for the application, is flexible, adequate in length, and hangs totally free of all surfaces so that it will not be damaged or chafed by motion of the motor while it is running.

After all motor connections are completed and before securing the terminal box cover, it is recommended to stuff the void within the terminal box with a type of insulating material. This will insure all connections and thermistor leads are free from chafing which could cause a short circuit.

In instances where a single starter controls two motors, the wiring is exactly the same. Make sure that the thermistors are wired in series with the thermistor control, if one is used. This offers the added protection of a system where, if one motor becomes overheated, both motors will be stopped.

IMPORTANT!

Starters, controls and connecting materials used with Explosionproof Motors must conform to National Electrical Code (NEC) and to applicable State, municipal or local codes. For use in Canada, they must conform to the Canadian Electrical Code (CEC) and have been approved by CSA.

11. Warranty

DF-Vimarc Corporation for VIMARC warrants and agrees with respect to VIMARC motors manufactured by it:

- 1) that each VIMARC vibrator motor is specifically and exclusively designed as a vibrator motor for vibratory purposes.
- 2) that each VIMARC vibrator motor is free from defects in material and workmanship under applicable use and service.
- 3) that their obligation under this warranty shall be limited to authorizing or causing necessary repairs or corrections or, at their option, supplying replacement parts free of charge, with respect to defects in workmanship and/or materials claimed to have arisen within one year of service.

Any claims for breach of this warranty, in order to be recognized, must be presented to DF-Vimarc Corporation's Washington office in writing within thirty days of failure. The following information to be supplied with every claim: serial and model number of motor, date of receipt, description of application, and description of any obvious reason for failure.

DF-Vimarc Corporation disclaims any warranty if:

- The motor has been connected to the wrong voltage or frequency.
- Unnecessary damage of the motor is caused by incorrect or no electrical safety at all.
- Changes have been made which affect the working of the vibrator motor.
- The motor is damaged during transportation.
- The motor is not installed and maintained in strict accordance with this Manual.

No motor may be returned for any reason except on written authorization from DF-Vimarc Corporation, which authorization will include complete shipping instruction

The foregoing is in lieu of all other warranties, express or implied and, specifically, no responsibility of downtime or other consequential damages is or will be accepted.

On any occasion when you may have questions about parts, service, or any other pertinent factors about VIMARC vibrator motors, please do not hesitate to call, for prompt attention and advice.

Imported and Distributed in North America exclusively by

DF-VIMARC CORPORATION

**P.O. Box 9993
WASHINGTON, D.C. 20016**

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