

Assembly and operating manual

(Translated original)

Vibration motors

State 10.24

Increased safety „Ex e“

According to:

EN IEC 60079-0, EN IEC 60079-7, EN IEC 60079-31, EN IEC 60034-5

Zone 1 and 21 (G,D)

ATEX – Certificate: KEMA 03 ATEX 2233 X

KEMA IECEX: KEM10.0076 X

Flameproof enclosures „Ex d“ and Explosion Proof „DP“

According to:

EN IEC 60079-0, EN IEC 60079-1, EN IEC 60079-31, EN IEC 60034-5, FM 3615, FM 3600, FM3820, ANSI/NEMA250, CAN/CSA C22.2

ATEX – Certificate: KEMA 03 ATEX 2292X

KEMA IECEX: KEM 09.0047X



ATEX



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*

Regulation CAN/CSA

File n° LR55503

Class I Groups C and D

Class II Groups E, F and G

Temperature class: T4 (135°C)

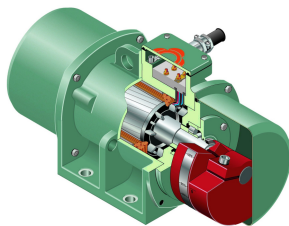
Certificate: 0M5A8.AE

Class I Division 1 Groups C and D

Class II Division 1 Groups E, F and G

Temperature class: T4 (135°C)

* Sales: Friedrich Schwingtechnik GmbH
Manufacturer: Vimarc Inc.



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1. Notes for the use of this technical documentation

In order to improve the understanding and therefore the use of this technical documentation, we kindly ask you to read the following pages.



Please always observe the following rule:

Prior to use, installation or start-up, this technical documentation must be observed in any case. Furthermore, the general as well as the local rules for the prevention of accidents must be followed.

1.1 Who should know this 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, the safety regulations first of all.

All the works on the vibration motor can be executed by qualified persons only.



The electricians must know the instructions for the electric connections.

The service staff must know the maintenance and repair instructions.

The following is applicable in general:

Each person working at the vibration motor must know the contents of this technical documentation. These personnel must be qualified and instructed. The user of this machine is obliged to instruct his staff accordingly.

This technical documentation belongs to the delivery of the vibration motor and must be always available to the qualified persons.

The qualified persons must be trained according to the safety considerations and must keep strictly the safety regulations.

1.2 What should be observed in particular

Please note that this technical documentation ...

- in general should not be separated or modified. Only FRIEDRICH Schwingtechnik GmbH is allowed to modify the technical documentation.
- must be deposited completely and close to the vibrating machine. Missing pages or complete technical documentation can be ordered at any time from FRIEDRICH Schwingtechnik.
- must be accessible for the operators of the vibration motor / vibrating machine at any time.
- must be read and understood completely by the service staff for maintenance and repair works before they work at the vibration motor.
- corresponds to the technical conditions of the vibration motor at the time of the delivery. Any subsequent modification must be documented properly and added to the technical documentation. This shall also be applicable to all further sets of the technical documentation supplied along with this vibration motor.
- is not part of any previous or existing admission, agreement or legal relationship or can change this. The purchase agreement which also includes the complete and sole valid warranty regulation, contains all obligations of FRIEDRICH Schwingtechnik towards the customer. These contractual warranty regulations are neither extended nor reduced by the technical documentation.

1.3 Explanation of the pictograms used

The following pictograms are intended to simplify work with this technical documentation and to facilitate finding of certain information.

In general, please pass on all warning hints and signs to the other operators of the vibrating device.



Information

General information of FRIEDRICH Schwingtechnik. The explanation beside this symbol improves the understanding or simplifies your job. It is not necessary to read this section in any case. Non-consideration will not result in any hazard or impairment.



Checking and supervision

Reference to the necessity of regular supervision with regard to oil level and screw connections. If this symbol is not taken into consideration, this may result in hazards or damage.



Avoidance of material damage

Reference to the increased risk of damage to the vibration motor, e.g. by the use of wrong tools, the wrong kind of oil, penetration of dirt into the drive elements, incorrect sequence of assembly, improper transport. The paragraph beside must be read and understood. If this symbol is not taken into consideration, this may result in hazards and damage.



Special tools

Reference to the necessity to use a special tool.



Please read

Reference to certain rules and documents, which should be read and understood.



General warning

This pictogram describes a general warning. It indicates hazards, possible malfunction and application for purposes other than the intended and other things which might affect working safety. The section beside shall be read and understood. If this symbol is not taken into account, a hazard or damage may occur.



Warning against the danger of injury

This pictogram warns against a possible danger of injury. It indicates hazards, possible malfunctions and application for purposes other than the intended and other things which might affect working safety. Special attention should be paid to this aspect and the corresponding precaution measures shall be taken. The section beside shall be read and understood. If this symbol is not taken into account, a hazard or damage may occur.



Warning against voltage

This pictogram warns against electrical voltage and resulting dangers. Proper precaution measures must be taken against these dangers. The section beside shall be read and understood. If this symbol is not taken into account, a hazard or damage may occur.



Warning against transport risk

This pictogram warns against increased risks, which might occur during the transport of the vibration motor. The section beside shall be read and understood. If this symbol is not taken into account, a hazard or damage may occur.



Important recommendation

This pictogram indicates an important recommendation or explanation. The section beside should be read and understood. No direct risk will occur, if this symbol is not taken into account, however, the machine function might be affected.

2. General

2.1 Fields of application of vibration motors

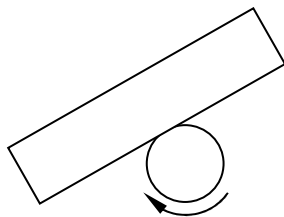
FRIEDRICH vibration motors are intended and suited to drive vibrating devices, like e.g.: vibrating conveyor chutes, vibrating pipes, screen conveyors, screening machines, spiral conveyors, automatic sorting machines, knock-out grates, vibrating trestles, resonance conveyors, vibrating mills and fluid-bed dryers, bin vibrating machines, etc.

Any other use or application beyond the specified shall be deemed application for purposes other than the intended. No claims will be accepted by FRIEDRICH Schwingtechnik for any damage resulting therefrom.

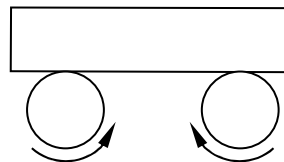
Application for the purpose intended shall also include compliance with the operating manual and, in particular, the inspection and maintenance regulations.

For the technical information of our motors, such as type, speed, working torque and centrifugal force and the electrical values please refer to the leaflet of vibration motors or the motor data sheet.

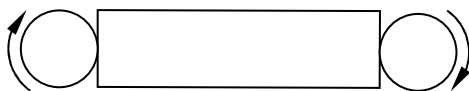
2.1.1 Motor arrangement and sense of rotation



1 motor = circular vibration



2 motors in opposite direction = linear vibration



2 motors in the same direction = torsional vibration

2.2 Intended use



The vibration motor is not an independently functional machine, it is destined for operation together with other machine only. Putting into operation is not allowed before the functional machine is stipulated to correspond to intended use according to the machine directives. The vibration motors are intended solely to drive vibrating devices.

The vibrating device must be dimensioned according to the requirements defined by the vibration motor.

It is not allowed to operate vibration motors without centrifugal weights.

Keeping hints contained in the Assembly and operating manual belongs also to the intended use.

2.3 Fields of application of vibration motors according to ATEX



Equipment groups:

Equipment group I = Mines and methane.

Equipment group II = Other areas subject to explosion due to gas or dust



Categories for group I:

M (mining):

Application not allowed!

Categories for group II:

1 = Always, long-term, frequently (safety particularly high)

G: Zone 0 and D: Zone 20:

Application not allowed!

2 = Occasionally (safety high)

G: Zone 1 and D: Zone 21:

**Application allowed with
EU prototype test**

The vibration motors are provided with an acceptance of equipment group II 2
with EU prototype test: KEMA 03 ATEX 2233 X

IECEX KEM 10.0076 X

KEMA 03 ATEX 2292 X

IECEX KEM 09.0047

Identification on the nameplate for acceptance for **gas Ex e**:

 II 2 G Ex e II T4*

Identification on the nameplate for acceptance for **gas Ex d**:


 II 2 G Ex d IIB T4

 II 2 G Ex d IIB T4 Gb

Identification on the nameplate for acceptance for **dust Ex e**:


 II 2 D Ex tD A21 IP66 T120°C

Identification on the nameplate for acceptance for **dust Ex d**:

 II 2 D Ex tb IIIC IP 66 T 120°C

 II 2 D Ex tb IIIC IP 66 T 120°C Db

You can find a combined identification on our nameplate for Ex e

 II 2 G D Ex e tD II T4* IP66 T 120°C

You can find a combined identification on our nameplate for Ex d

 II 2 G D Ex d IIB T4 Gb / Ex tb IIIC IP66 T120°C Db

* or T3, refer to the data sheet

3 = Rarely, short-term (safety normal)


G: Zone 2 and D: Zone 22:

**Application allowed with
EU declaration of conformity**

Identification on the nameplate for application for gas:

 II 3 G Ex nA IIA T4

Identification on the nameplate for application for dust:

 II 3 D Ex tD A22 IP66 T120°C

2.4 Fields of application of vibration motors according to FM and CSA *

* Sales: Friedrich Schwingtechnik GmbH, Manufacturer: Vimarc Inc.

Explosion Proof vibration motors are approved by FACTORY MUTUAL (FM) certificate:0M5A8.AE and CANADIAN STANDARDS ASSOCIATION (CSA) File n° LR55503 as follows:

- **Series ADP,BDP,CDP,DDP,EDP,FDP and GDP:**
with thermistor protection, Temperature Code T4 (135 °C) for:
FM: Class I Division 1, Groups C,D and Class II, Division 1, Groups E,F and G
CSA: Class I, Groups C and D, Class II, Groups E,F and G
- **Series ADP,BDP,CDP,DDP,EDP,FDP and GDP for:**
with or without thermistor protection, Temperature Code T3B (165 °C) for:
FM: Class I Division 1, Groups C,D and Class II, Division 1, Groups E,F and G
CSA: Class I, Groups C and D, Class II, Groups E,F and G
- **Series ADP,BDP,CDP and DDP:**
without thermistor protection, Temperature Code T3 (200 °C/392°F for:
FM: Class I Division 1, Groups C,D and Class II, Division 1, Groups E and F
CSA: Class I, Groups C and D, Class II, Groups E and F

The Explosion Proof and Ex e Zone 21 and 22- T4 vibration motors are equipped with a thermistor as standard.

The thermistor relays must also be certified, as e.g. ABB Custorapid Relay C 105.02 or C 106.02.

If two motors are connected to one motor contactor, thermistors of both the motors must be connected in serial in the thermistor relay, to cut off both the motors in case one of the motors becomes overheated. For connection refer to the Chapter 14, Wiring diagrams.

3. Safety notes



The vibration motor shall be started only, if mounted for the defined use with the corresponding machine and all protection devices.



Attention: In case of handling or work with the vibration motor the centrifugal weights of the vibration motor may rotate unexpectedly. Risk of injury or squeezing.

- Overall protection of persons is ensured only if the vibration motors are closed completely.
- The vibration motor is not allowed to be used without protective hoods of the centrifugal weights.
- The electrical connection of the vibration motor must be protected appropriately.
- A damaged insulation of the connection cable and a missing covering of the terminal box may result in danger to life due to electrical shock! Eliminate such defects immediately.
- Explosion proof vibration motors should be used in areas subject to explosion hazard. Identification of this motor can be found on a special Atex nameplate.
- Carry out any maintenance or setting work at the vibration motor only with the machine at standstill. Prior to the beginning of such work make sure that it is not possible to switch on the vibration motor by error or unauthorized persons.

4. Transport



In order to avoid risks for persons and damage to the vibration motor transport the latter with particular care. In addition to the following notes, follow the locally applicable safety regulations and accident prevention regulation.

In particular, note the following:



- When delivering oversea or under special delivery conditions, e.g. transport on bad or earth roads, or transport by ship or rail, the centrifugal weights must be fastened down or dismantled not to damage bearings during the transport. In this case, the flywheels will be set to "nil" by FRIEDRICH Schwingtechnik. Fastening of the centrifugal weights is described on a sticker on the motor.
- Proper use of transport and lifting tackles shall be ensured.
- When transporting the vibration motor on a pallet, secure it against tilting.
- Use the cast-on suspension eyes to suspend the vibration motor. Ropes, shackles, etc. shall be fixed at these suspension eyes only.
- The lifting tackles shall be admitted, undamaged and suitable for transport.
- Do not mount any additional weight at the motor because the suspension eyes are designed only for the dead weight of the motor.
- The smallest vibration motors are not provided with suspension eyes. Lay a rope around the housing to transport such motors.
- The lifting tackles to lift the vibration motor shall have an admissible load-carrying capacity of the 2fold weight of the vibration motor for safety reasons.
- The vibration motor should be placed down only on its feet.
- Report any transport damage to the manufacturer. Check the undamaged state of the supporting areas and protective hoods.



Do not suspend the vibration motor at the hoods or centrifugal weights.

Excessive jerks or falling down of the motor will result in damage of the bearings and reduce lifetime of the motor. Do not use such a pre-damaged machine.

5. Storage

The vibration motors should be stored according to the following specification until mounted finally:

- In enclosed dry rooms
- At a maximum ambient temperature of 40 °C
- Free from vibration to avoid bearing damage
- The motor and particularly the terminal box must be closed.

If the vibration motor is stored in the open, cover it by tarpaulins (open at the bottom) to protect it from moisture. Provide the covering so that condensation water, if any, can flow off. Place the vibration motor on suitable support or in shelves to prevent effects of soil moisture.

If seaworthy packed, do not open or damage this packing of the vibration motor during transport or storage.



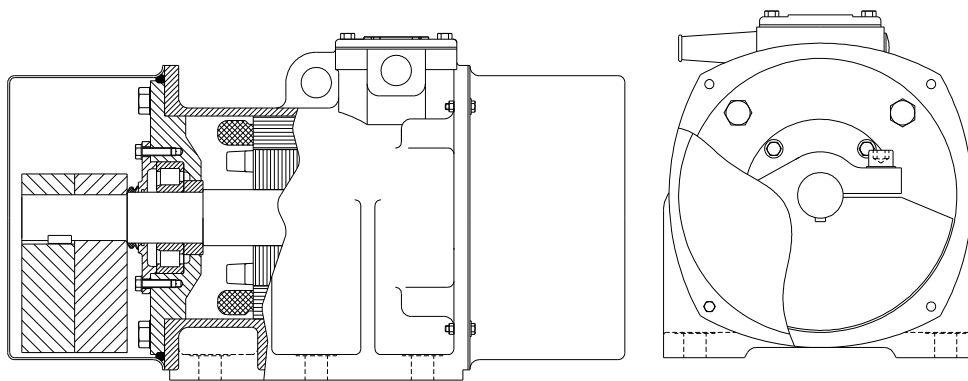
Caution: Place down the vibration motor only at its feet!

6. Short description of motor structure

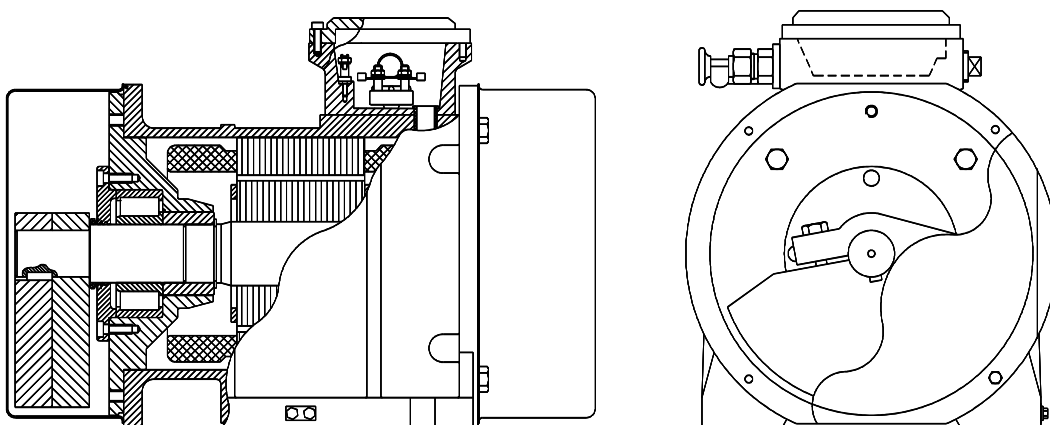
Completely closed vibration-stiff housing with wide feet and cast-on ribs to transmit the centrifugal forces. Cast-on suspension eyes are arranged in the centre of gravity of the vibration motors for easy and safety assembly in order to be able to attach the motor in any position. The stator with the winding are shrunk in the housing. The sturdy cylindrical roller bearings are pressed into the solid end shields which are arranged at both sides. They are permanently lubricated and work completely maintenance-free*. The strongly dimensioned shaft with the shrunk-on rotor runs in the cylindrical roller bearings. The shaft opening is sealed by grease grooves and V rings. Centrifugal weights which generate the centrifugal forces are arranged at the shaft ends at both sides. The vibration motor is closed tightly by two protective hoods and round cord rings to prevent dust and moisture from entering. The cast-on terminal box is arranged on the housing and is closed tightly by a terminal box cover.

*except of motors with additional greasing - refer to the Chapter 11.4

Ex e vibration motors



Ex d vibration motors



7. Installation

Vibration motors are supplied ready for installation. For the installation the following procedure should be complied with:

- Check the consignment for completeness according to Chapter 7.1 - Unpacking and checking the scope of supply.
- Transport the vibration motor according to Chapter 4 - Transport - to the place of installation.
- Ensure the dimensional accuracy and the suitability of the place of installation according to Chapter 7.2 - Installation guidelines.
- Attachment to the vibration machine according to Chapter 7.3 - Assembly at the place of installation.
- Setting of the centrifugal forces and/or the working torque according to Chapter 8.
- Electrical connection according to Chapter 9. When operating two vibration motors at one machine, follow the additional hints given for electrical installation.



Important: Prior to installation clean the bearing surfaces of the vibration motor as well as the screwed surfaces of the vibration machine from paint, grease and oil.



In general, observe the national and local regulations to prevent accidents when installing the vibration motor.



Caution: The centrifugal weights may rotate suddenly when setting the working torque. Risk of injury or squeezing.

7.1 Unpacking and checking the scope of supply

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

Dispose the packing materials according to the local regulations for waste disposal.

7.2 Installation guidelines

Requirements of the place of installation.

The connection component to which the vibration motor is attached should be:

- level
- vibration-stiff
- free from paint, rust, grease and oil
- and have a plane machined surface.

7.3 Assembly at the place of installation

Install the vibration motor as follows:

Follow the installation guidelines of Chapter 7.2 in any case.

- For mounting the vibration motors a level vibration-stiff drive seat must be used. The surface must be machined to ensure perfect mounting surface.
- The vibration motors are standardly fastened by means of hexagon-head screws according to DIN 931-8.8 or DIN 933-8.8 and self-locking hexagonal nuts according to DIN 982-8 or DIN 985-8. Never use spring washers, serrated lock washers or something like this. If washers should be used, use only high-strength washers, e.g. HV washers according to DIN 6916.
- All the mounting elements can be used only once.
- The fastening screws require a certain minimum grip length in order to achieve permanent preloading. The minimum grip length must be 3-fold of the nominal diameter. The grip length is distance between the bottom side of the screw head and the nut.
- The required overrun of the screw is calculated according to DIN 13.
Overrun of the screw $v = \text{height of nut} + 3 \times \text{thread pitch } P$

Before assembly it is necessary to remove a transport locking or, if the centrifugal weights have been dismantled, to mount again the protective hoods and centrifugal weights.

Install in the following sequence:

- Align the vibration motor by means of the cast-on suspension eyes.
- Mount the vibration motor by means of the number and size of screws specified in the leaflet or motor data sheet.



- Insert the vibration motor and tighten the screws loosely.
- Tighten the screws by means of a torque wrench and the specified torques - refer to Chapter 17, Table 17.1.



- Switch off the motor 15 to 20 minutes after start-up and re-tighten all motor mounting screws using a torque wrench (see above). Repeat this procedure after 2 to 3 hours and after one day.
- We recommend checking the mounting screws every 8 weeks.



Caution: If unsuitable screws and nuts are used, the vibration motor may become loose and cause serious damage.

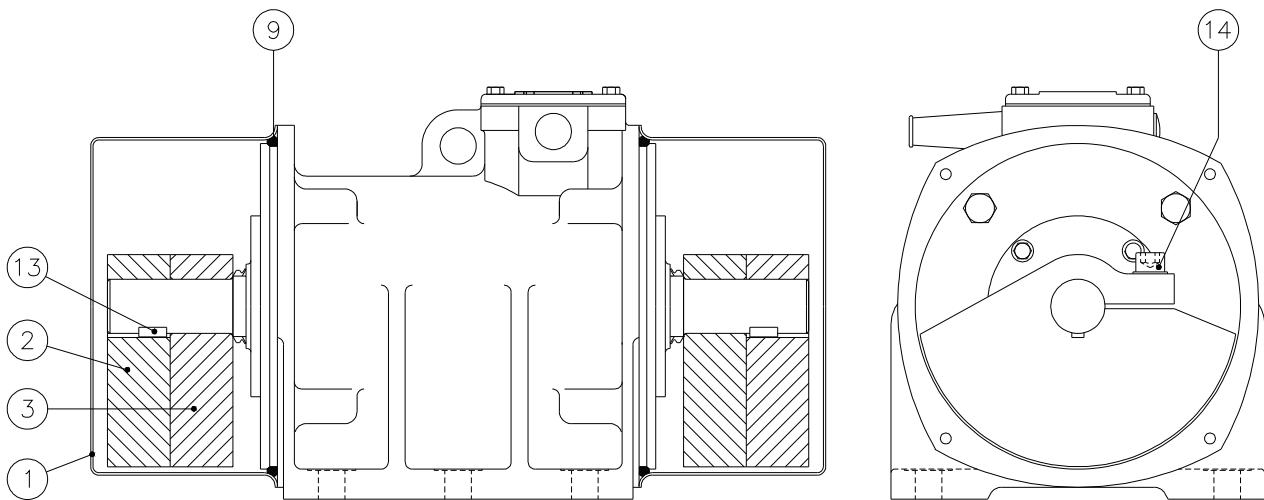


Caution: Please note that most of the failures and faults are caused by incorrect or loose screwed connections!

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. Setting the centrifugal force (riveted scale)



The vibration motors are supplied from the works with a 100 % centrifugal force setting as standard.

If requested by the customer, the motors are supplied from the works with another setting of the centrifugal forces.

The centrifugal forces can be set as follows to modify the output:

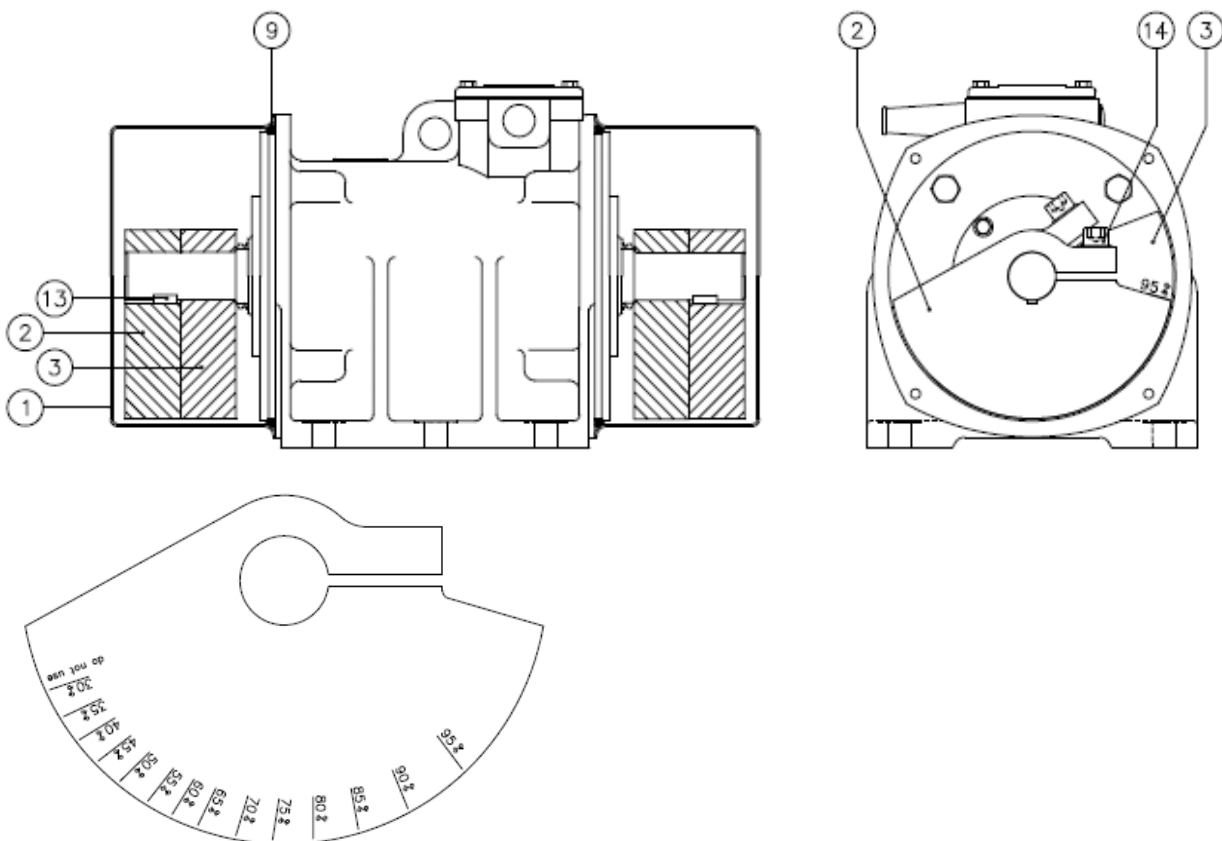
- 1) Remove the protective hoods (1) from both sides.
- 2) Loosen the clamping screws (14) of the inner centrifugal weights (3) and turn the discs in the same direction of 100 % (**refer to warning note**) to the desired position. The outer centrifugal weights (2) are held in position by two fitting keys. A mark is provided at the outer centrifugal weights. Graduation marks with corresponding percentages are engraved on a scale at the internal centrifugal weights. Each graduation mark corresponds to a certain percentage of the maximum centrifugal force and/or the working torque.

- 3) Re-tighten the clamping screws (14) of the internal centrifugal weights.

The torques for tightening the centrifugal weights - refer to the Chapter 17, Table 17.2.

- 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.

Setting the centrifugal force (lasered scale)



The vibration motors are supplied from the works with a 100 % centrifugal force setting as standard.

If requested by the customer, the motors are supplied from the works with another setting of the centrifugal forces.

The centrifugal forces can be set as follows to modify the output:

- 1) Remove the protective hoods (1) from both sides.
- 2) Loosen the clamping screws (14) of the inner centrifugal weights (3) and turn the discs in the same direction of 100 % (**refer to warning note**) 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) Re-tighten the clamping screws (14) of the internal centrifugal weights.

The torques for tightening the centrifugal weights - refer to the Chapter 17, Table 17.2.

- 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 internal centrifugal weights have to 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 centrifugal weights will generate excessive uncontrolled transverse forces which may result in destruction of the motor and the vibration machine.

This is not valid for approved use, e.g. in rotary sieving machines with vibrating movement.



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

9. Electrical connection



- The motor should be connected only by an authorized electrician.
- When connecting and operating the motor, follow the regulations of the relevant EVU.
- **Ensure the degree of protection IP 66 and NEMA Type 4 by carefully sealing the cable glands and cover of the terminal box.**
- **Use only original ATEX certified parts.**

Prior to connection, the following points should be observed:

- The DP motors are allowed to be used in the Zone 1 and 21 (ATEX) or in the Category 1 Division 1 (FM and CSA).
 - 1. Application in the Category 1 Division 1 (Explosion proof)**

Use there only a certified $\frac{3}{4}$ NPT cable gland.
Other inlets must be closed using an approved screw dummy plug.
Caution: Fix the screw dummy plug into the terminal box using the LOCTITE 243.
 - 2. Application in the Zone 1 and 21 (Exd -ATEX)**

Use there only a certified $\frac{3}{4}$ NPT- M 25x1.5 adapter and a certified M 25x1.5 cable gland or alternative $\frac{3}{4}$ NPT cable gland.
Caution: Fix the screw dummy plug into the terminal box using the LOCTITE 243.

9.1 Connection of the cable to the terminal board

The terminal board is placed inside the terminal box and can be star-connected or delta-connected.
Example for 230/400V:

To ensure explosion protection according to ATEX, the vibration motors are provided with a special ATEX-certified terminal board. To connect the cables, use only the cable terminal lugs according to DIN 46295, section 3 – size 7-2.5 and compression nuts according to DIN 46295, section 2 – size S7x0.8. These mounting parts are extremely sensitive to assembly. Based on our experience the compression nut can be used for max. three screw connections and must be changed after. The explosion protection is valid only with the mentioned original parts according to DIN.

Parts:

Cable terminal lugs according to DIN 46295, section 3 – size 7-2.5

Compression nuts according to DIN 46295, section 2 – size S7x0.8

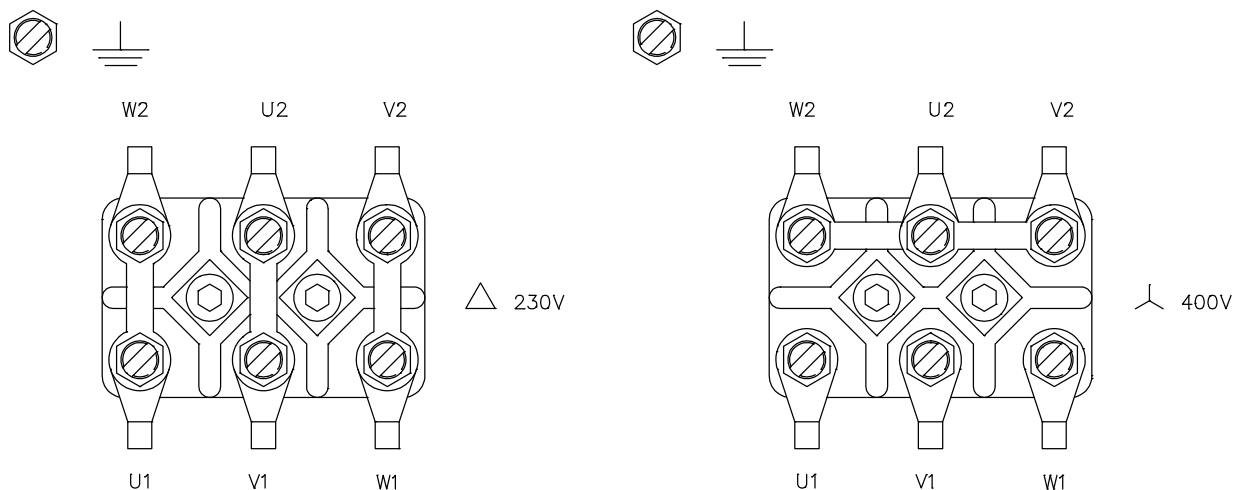


Assembly:

The connection wires are provided with the delivered terminal lugs. The terminal lug according to DIN 46295, section 3, fits precisely into the split of the bolt. Required protection against twisting is ensured this way. The mains connection wires must be properly attached/crimped to the terminal lugs. The terminal lug should be put into the split bolt of the terminal board and screwed firmly using the compression cup nut.

Max. cross-section of the mains wires (single wire) :4mm²

Max. tightening torque of the compression nut :5 Nm



Observe the following prior to connection:

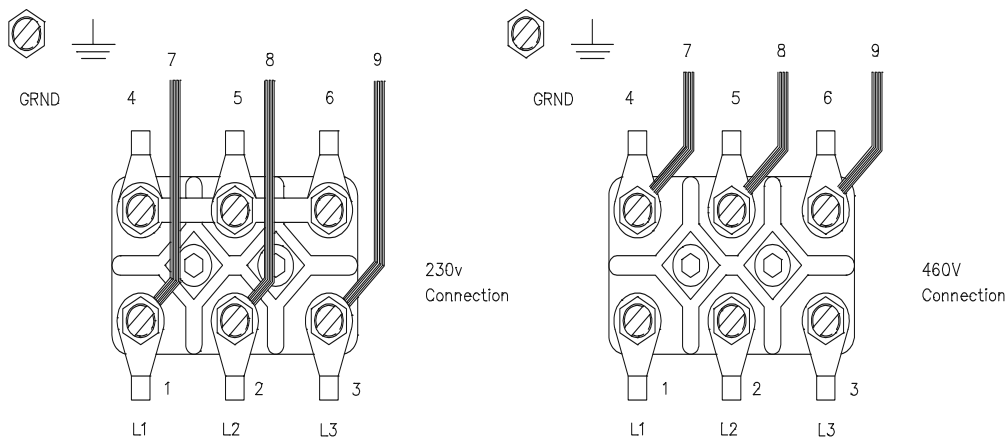
- The vibration motor is provided with a star circuit ready for connection. The vibration motor can also be operated with a delta circuit if the appropriate mains is provided.
- Connect each vibration motor individually via protective motor switches.
- During the acceleration period of the motor (approx. 3-5 s), the starting current is approx. the 9fold of the rated current. Exact values are indicated in the leaflet or in the data sheet. Thus select appropriate contactors and switches.
- **The ATEX vibration motors for the zones 21 and 22 and Explosion Proof Motors T4 must be provided with a thermistor cut-off device which protects the motor against overheating.**
- **When connecting 2 vibration motors, check them for contra-directional sense of rotation.**



Apply suitable measures to control rotational speed, not to allow to exceed maximum rotational speed in any case. Otherwise risk for machines and persons arises.

9.1.2 Dual voltage connection

The dual voltage motors are equipped with nine lines on the terminal board. The motors operate as standard for low voltage connection (refer to the drawing 230 V). If required to connect the motors to higher voltages, connection of the lines 7, 8 and 9 must be changed and the bridge removed (refer to the drawing 460 V).



Apply suitable measures to control rotational speed, not to allow to exceed maximum rotational speed in any case. Otherwise risk for machines and persons arises.



- **Do not use any defective mounting parts (if the bolt of the terminal board is broken, the entire terminal board must be changed at an authorized workshop or at FRIEDRICH Schwingtechnik.**
- **Danger of explosion occurs if the electrical connection is not correct. The motor does not correspond to the ATEX certification any more. No warranty or liability claim will be accepted by FRIEDRICH Schwingtechnik in this case.**

9.2 Installation of the connection cable



Voltage and frequency of the works mains must coincide with the data given at the nameplate of the motor. Connect the conductor at the terminal board. Please ensure that the motor is connected correctly in a star or delta circuit. Connection of the motor to three-phase current must be grounded.

Close the terminal box dustproof and waterproof. For this reason, the sealing faces of the terminal box and the cover must be clean.

Connect the vibration motor via a protective motor switch and in the zones 21 and 22 via a protective motor switch and a thermal relay.

Set the protective motor switch for continuous operation according to the rated current data given at the motor's nameplate.

Refer to the operating manual of the applied cable gland which is delivered together with the cable gland, Appendix - Cable gland.

Choose an appropriate operating manual according to the cable gland applied at your motor. The type is indicated on the cable gland.

Appendix - Cable gland: product of Agro, Ex e and Ex d.



- After connection of the cables, no foreign bodies can remain in the terminal box. Damage and even full destruction of the motor may result from short-circuits.
- Carefully install the cables and provide a sufficient reserve (cable loop) in order to prevent the cable from rubbing during vibration operation.



- For the **Ex e motors** use rubber-insulated flexible cables for severe mechanical loads only in accordance with VDE0282 part 4, e.g. type H07RN – F or A07RN - F or a high-grade cable.

Use a 7-core cable in the zones 21 and 22 because also the thermistor can be connected through this cable. In detail: 3x phase, 1x ground, 2x thermistor, 1x not used. For some motors you can eventually use a 4-core cable for the power lines and another thermistor cable which comes through another cable gland. Consult it at FRIEDRICH Schwingtechnik.

ATEX cable glands and ATEX dummy plugs are mounted on the terminal box of the motor. For mounting the cable use only these certified parts. An undamaged O-ring must be used.

- For the **Ex d and Explosion Proof motors** use only a temperature resistant cable (min. 85 °C), type SIFH. Select a cable 7x1.5² or 7x2.5² according the type of the motor.

For the **Explosion Proof motors** use only a certified 3/4 NPT cable gland. Other inlets must be closed using an approved screw dummy plug.

CAUTION: Fix the screw dummy plug into the terminal box using the Loctite 243.

For the **Ex d motors** use only a certified 3/4 NPT – M 25x1.5 adapter and a certified M 25x1.5 cable gland or alternative 3/4 NPT cable gland. **CAUTION.** Fix the screw dummy plug into the terminal box using the Loctite 243.

- The connection wires must be properly soldered to the terminal lugs. Press or clamp connections are not allowed.



The motor must be connected by means of safety switch and a thermal safeguard (thermistor) in the zones 21 and 22 and Explosion Proof T 4.

The thermistor must be connected to a separate ATEX checked (approved) circuit.

A voltage regulator is not allowed.

A value of current indicated on the nameplate must not be exceeded during continual operation.

All the Ex e motors are provided with a thermistor of a cut-off temperature T=120°C as standard.



Grounding

The connection of the motor at the mains must be grounded:

- 1) inside the terminal box
- 2) by a grounding terminal at the motor body.

9.3 Specific installation regulations according to ATEX



Gas – Use of the motor in an atmosphere subject to explosion hazard due to gas.

- The required type of protection of at least IP 6X according to EN60529 can be ensured only if a approved and tested cable gland and also closing elements (plugs) is used for the electrical connection. The latter must be suitable for connection and mounted correctly.
- The motor must be fused by an over-load protection for all 3 phases. This over-load protection shall not only monitor the motor but also disconnect the motor from the mains, by locked rotor within the period t_E given in Chapter 15.
- The motor can be used in continuous operation only. In particular, easy, fast acceleration shall be ensured in order to prevent the motor from excessive heating.

The ATEX motors are provided with a 120°C PTC thermistor according to DIN 44081 or DIN 44082 as standard. We recommend to connect a thermistor also in the zones 1 and 2 to let the motor switch off and disconnect it from the mains immediately in case of activation (overheating).



Dust – Use of the motor in an atmosphere subject to explosion hazard due to inflammable dusts.




- The cable gland and closing elements (plugs), if any, at the terminal box which are not used must be certified, approved and tested suitable for the application and installed correctly. The minimum type of protection IP 6X according to EN60529 shall be ensured.
- The motor must be protected by an overload protection for all 3 phases. The overload protection should not only observe the motor current, but it must also disconnect it from mains, by locked rotor within time t_E mentioned in the Chapter 15.
- The motor is equipped with a 120°C PTC thermistor according to DIN 44081 or DIN 44082. The thermistor is incorporated in the motor winding. It is a must, that the thermistor is connected to a certified safeguard suitable for monitoring and installed correctly in the circuit so that the motor switches off at once and is separated from the mains as soon as the thermistor releases (in case of overheating).
- The motor can be used in continuous operation only. In particular, easy, fast acceleration shall be ensured in order to prevent the motor from excessive heating.

10. Start-up







The vibration motors are identified by a serial number which is engraved on the nameplate.

Nameplate

ATEX

 FRIEDRICH SCHWINGTECHNIK GmbH Vimarc Am Höfgen 24 D-42781 Haan		VIBRATOR MOTOR 3 ~ Motor:	
Type:	Volt	ΔY	
Fabr.No.:	Amp.		
Max.CF:	N	kW.	Hz
RPM	min ⁻¹	Cosφ	Ins.cl.
Brg.No.:	IP	Ia/In	
Lubr.:	Weight:	kg	
Cert.Nr.KEMA	tE	s	
IEC Ex KEM	 2809 Made in Germany		
			

FM and CSA

 Vimarc 10 757 Cutton Rd 5, Houston, TX USA		(Weatherproof)	
		NEMA	
		CSA Encl.	
Model.	Serial No.		
Class I-Division 1 Groups		C and D	
Class II Division 1 Groups			
Temperature Rating	Max. Ambient		
Caution: Open all circuits before removing cover. Warning: More than one live circuit. See diagram. Attention: Ouvrir tous les circuits d'enlever le couvercle. Avertissement: Cet équipement renferme circuits sous tension. Voir le schéma.			
 FM APPROVED		EXPLOSION PROOF 	

Caution! Serial numbers of both the nameplates must be the same.



For the electrical data please also refer to the Appendix.

The vibration motors meet the following technical requirements:

- Type of protection IP 66 according to EN 60529
- Insulation class F (155°C) according to DIN EN 60034-1
- Serial tropicalized design of insulation
- Ambient temperatures for application from -20°C to +40° (Exe) and +50°C (Exd)
- Noise and/or noise level $\leq 70\text{dB(A)}$ according to 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, with windings as good as new, the level should reach > 10MΩ.

The critical insulating level is 1MΩ (IEC60204-1)

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



Maximum acceptable surface temperature of the motor according to ATEX is 135°C.

During continuous operation the operational temperature measured on the surface of the stator body must not be higher than 80°C. This is important by reason to maintain the grease lubrication in the bearing and to achieve the full lifetime cycle.



Application of the motor as a self-contained unit is not allowed.

A vibration motor is always a firmly mounted component of a machine. This machine has been designed vibration-stiff and separated from the environment by a vibration insulation (e.g. springs, rubber buffers).

10.1 Frequency converter and 60Hz – Ex e and Ex d operation



Operation of the vibration motors at a frequency higher than 50 Hz is not allowed. Higher frequencies and related higher rotation speeds will result in warming-up the motor. Protection against explosion according to ATEX cannot be ensured any more in this case.

Operation of ATEX vibration motors Ex e (increased safety) using a frequency converter is only permitted for Groups II, Category 3GD (Zone 22) in conjunction with a frequency converter from the manufacturer Loher, Series Dynavert T and can be operated in accordance with the facility designations DIN EN 60079-14 (VDE 0165-1):

- in a frequency range of 25Hz up to the maximum frequency indicated on the type plate
- if installed PTC thermistors are used in conjunction with a trip device authorized by the testing body
- if the voltage peak occurring in the cable of the system converter in the electrical machine does not exceed double the value of the intermediate circuit voltage(<2kV)

For operation of ATEX vibration motors Ex e (increased safety) with frequency converters in Zone 22 with other frequency converters, such as the above mentioned, or for operation in Zone 21, special EC type approval certificates are required, in which operation on the converter is explicitly authorized. This acceptance must, of course, be carried out by a notified body.

The operation of ATEX vibration motors Ex d (Flameproof encapsulated) is possible with a freely chosen frequency converter, as long as it has an Atex approval and all motor protection devices are connected and monitored.

The protective devices must automatically switch off the motor when the permissible temperature is exceeded.

Here the installation regulations according to DIN EN 60079-14 (VDE0165-1) mentioned above must also be observed.

For Exe as well as for Exd motors, the ratings and data given on the name plate refer to the rated operation (without a power supply via converter) and are only applicable as reference values for supply through the converter.

**The ATEX vibration motors must be connected to all protection devices.
For this, use a screened connection cable**

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

10.2 Synchronization



One of the most common application of 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 any way, otherwise the motors are not able to achieve full synchronization.

Disturbations of the frequency, which do not enable the motors to achieve full synchronization, can be caused by:

- too high natural frequency of the machine (too stiff springs)
- too plastic, not enough stiff traverse
- insufficiently stiff components of the machine
- damaged 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 the synchronization of two motors is not achieved, it is not possible to achieve nominal rotation speed. The motor will require higher current and this will lead to a premature failure of the motor. Furthermore the vibration machine can be damaged or destroyed.

11. Replacement of bearings

To keep the ATEX certificate, the motors can be repaired only at Atex-certified workshops. We recommend to repair the ATEX motors only at FRIEDRICH Schwingtechnik.

We recommend always replacing both bearings of a motor when replacing the bearings even if one bearing only is defective. A defective bearing will always damage the other bearing, too. The second bearing would fail within a very short period of time.



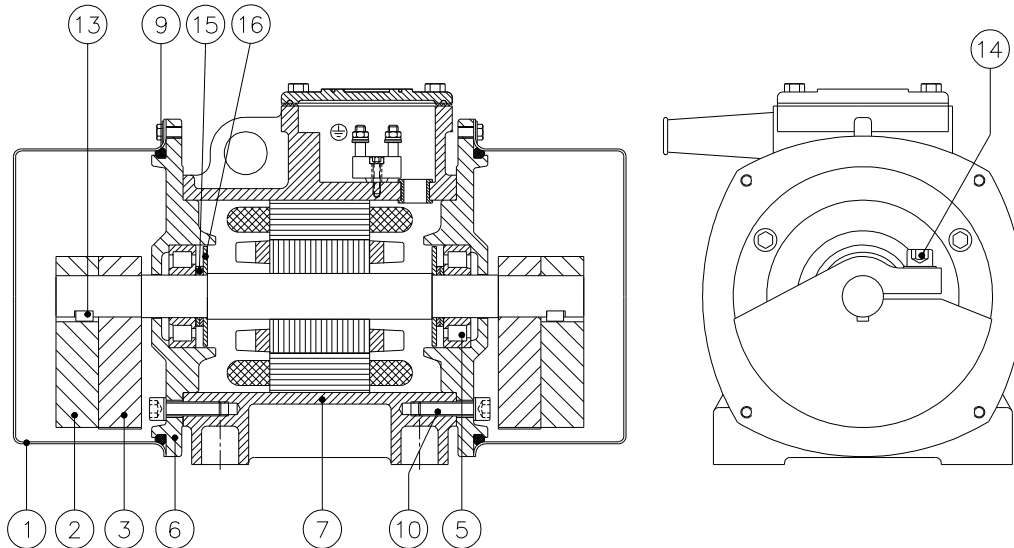
The bearing housings must also be replaced every 2nd time that the bearings are replaced.

11.1 Demounting the roller bearings



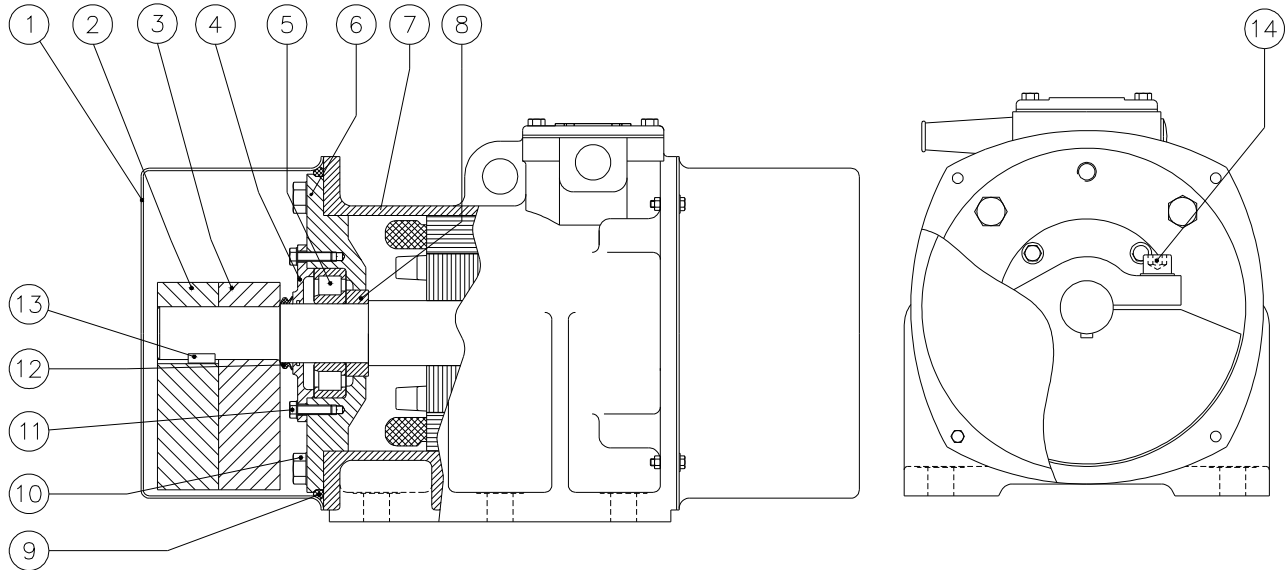
For size of the bearing please refer to the nameplate of the vibration motor. You can buy these special bearings together with a special grease in FRIEDRICH Schwingtechnik. Attention, we do not use common standard stocks.

11.1.1 for size FE...-1.2, FE...-2.2



1. Remove both protective hoods (1). Mark or record the position of the turning internal centrifugal weights (3). Loosen the mounting screws (14) of the centrifugal weights.
2. Withdraw the outer centrifugal weights (2). In case of difficulty: insert a chisel or a strong screwdriver into the clamping slot to widen the clamping slot.
3. Remove the fitting key (13).
4. Withdraw internal centrifugal weights (3).
5. Unscrew the mounting screws (11) for the end shield (6). Blow out the end shield (6) from the housing (7) by slightly blowing using a rubber hammer. Make sure not to jam the end shield.
6. Press the cylindrical roller bearing (5) out of the shield (6).
7. Withdraw the grease disk (16) and supporting disks (15) together with the internal ring of the cylindrical roller bearing (5) from the shaft.
8. All the components, which will be used again, should be cleaned and degreased.
9. Neither screws nor washers are allowed to be used again.

**11.1.2 for size FE...-2.1, FE...-2.3, FE...-3.1, FE...-3.4,
FE...-4.0, FE...-4.1, FE...-4.2, FE...-4.3, FE...-7.0, FE...-7.1,
ADP to GDP**



1. Remove both protective hoods (1). Mark or record the position of the turning internal centrifugal weights (3). Loosen the mounting screws (14) of the centrifugal weights.
2. Withdraw the outer centrifugal weights (2). In case of difficulty: insert a chisel or a strong screwdriver into the clamping slot to widen the clamping slot.
3. Remove the fitting key (13).
4. Withdraw internal centrifugal weights (3).
5. Remove the V ring (12).
6. Unscrew the mounting screws (10) for the end shield (6) and screw into the threaded holes of the end shield and use these to press out the end shield (6) together with the cylindrical roller bearing (5). Make sure not to jam the end shield.
7. Unscrew the screws (11) of the bearing cover (4) and remove the bearing cover.
8. Press the cylindrical roller bearing (5) out of the end shield (6).
9. Withdraw the spacer ring (8) together with the internal ring of the cylindrical roller bearing (5) from the shaft.
10. All the components, which will be used again, should be cleaned and degreased.
11. Neither screws nor washers are allowed to be used again.

11.2 Installation of roller bearings



The bearings destined for change are delivered with an appropriate grease from FRIEDRICH Schwingtechnik.

11.2.1 for size FE...-1.2, FE...-2.2



1. Push the grease disk (16) and then the supporting disks (15) onto the shaft as far as it goes.
 2. Heat up the internal ring of the new cylindrical roller bearing (5) to approx. 80°C to 100°C (oil bath or heating plate) and push them onto the shaft as far as it goes (grease ring).
 3. Let the internal ring cool down so that it is firmly positioned at the shaft.
 4. Clean the bore of the end shield (6) and apply a thin LOCTITE 270 film. Press the outer ring of the cylindrical roller bearing (5) into the bore of the end shield (6). Make sure that the outer ring is not canted.
 5. Fill the prescribed grease into the roller body of the cylindrical roller bearing. Fill two thirds of the grease spaces of the end shield (6), use the specified grease.
 6. Withdraw the shaft for approx. 30 mm and then insert the end shield (6) together with the installed cylindrical roller bearing (5) onto the internal ring of the bearing in order to provide centering.
 7. Then push the end shield together with the shaft up to the chamfer of the housing.
 8. Now screw all mounting screws (11) and continue to turn them uniformly.
 9. Turn the shaft butt by hand in both directions during installation in order to prevent the roller bodies of the cylindrical roller bearing from canting at the internal ring; otherwise premature bearing damage may occur.
 10. Uniformly screw in the end shield as far as it goes.
 11. Install the internal centrifugal weights (3) with the scale in correct position.
 12. Mount the fitting key (13).
 13. Install the outer centrifugal weights (2) in correct position and mount the mounting screws immediately.
 14. Now set and tighten the internal centrifugal weights according to the position marked or recorded before.
- Torques for tightening the mounting screws for centrifugal weights according to Chapter 17, Table 17.1.



The clamping slots of all 4 centrifugal weights must show in the same direction:



15. Place round cord rings (9) around the flange of the end shield (6) and glue it at some points, if necessary.
16. Mount the protective hoods (1).



If several motors are repaired at the same time, make sure not to exchange the components of the individual motors.

11.2.2 for size FE...-2.1, FE...-2.3, FE...-3.1, FE...-3.4, FE...-4.0, FE...-4.1, FE...-4.2, FE...-4.3, FE...-7.0, FE...-7.1, ADP to GDP



1. Heat up the internal ring of the new cylindrical roller bearing (5) and the spacer ring (8) to approx. 80°C to 100°C (oil bath or heating plate) and push them onto the shaft as far as it goes.
2. Let the internal ring and the spacer ring cool down so that they are firmly positioned at the shaft.
3. Clean the bore of the end shield (6) and apply a thin LOCTITE 270 film. Press the outer ring of the cylindrical roller bearing (5) into the bore of the end shield (6). Make sure that the outer ring is not canted.
4. Fill the prescribed grease into the roller body of the cylindrical roller bearing. Fill two thirds of the grease spaces of the end shield (6) and the bearing cover (4), use the specified grease.
5. Mount the bearing cover (4) at the end shield, use the mounting screws (11).
6. Withdraw the shaft for approx. 30 mm and then insert the end shield (6) together with the installed cylindrical roller bearing (5) onto the internal ring of the bearing in order to provide centering.
7. Then push the end shield together with the shaft up to the chamfer of the housing.
8. Now screw all mounting screws (10) and continue to turn them uniformly.
9. Turn the shaft butt by hand in both directions during installation in order to prevent the roller bodies of the cylindrical roller bearing from canting at the internal ring; otherwise premature bearing damage may occur.
10. Uniformly screw in the end shield as far as it goes.
11. Push on a new V ring (12), if necessary. Apply grease also to the sealing lips of the V ring.
12. Install the internal centrifugal weights (3) with the scale in correct position.
13. Mount the fitting key (13).
14. Install the outer centrifugal weights (2) in correct position and mount the mounting screws (14).
15. Now set and tighten the internal centrifugal weights according to the position marked or recorded before.
16. Torques for tightening the mounting screws for centrifugal weights according to Chapter 17, Table 17.1.



The clamping slots of all 4 centrifugal weights must show in the same direction:



17. Place round cord rings (9) around the flange of the end shield (6) and glue it at some points, if necessary.
18. Mount the protective hoods (1).



If several motors are repaired at the same time, make sure not to exchange the components of the individual motors. This is important for the axial clearance.

11.3 Grease



Preferably use the following greases grades:

Exxon Mobil Mobilith SHC 220

11.4 Additional greasing



Some types can be equipped on request with a re-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

Use only original spare parts from FRIEDRICH or spare parts in conformity with the standards.

Ordering spare parts

In order to ensure the supply of the correct spare parts, these must be identified precisely in consultation with the operating manual and the relevant spare parts list in order to avoid unnecessary delays in time, incorrect deliveries and questions by FRIEDRICH Schwingtechnik.

Contact:



Phone: +49 (0)2129 3790-0



Fax: +49 (0)2129 3790-37



E-Mail: info@friedrich-schwingtechnik.de

When placing the order indicate the following:

- Type and number of the vibration motor. This information can be taken from the nameplate.
- The name of the part in the spare parts list
- **Important!** Please do not forget to indicate the number or the quantity of the spare parts to be supplied.

12.2 Repairs



- Please have repair the motors for application in areas subject to explosion and dust hazards by a workshop authorized by a national admission authority.
- In case of doubt, please have the motor repair by the manufacturer FRIEDRICH - Schwingtechnik.
- Make sure that original spare parts are used if the motor is repaired by an external workshop; otherwise the admission for application in areas subjected to hazards may become null and avoid. No warranty or liability claim will be accepted by FRIEDRICH-Schwingtechnik for the functioning of the motor for the purpose intended.
- Operations which influence the flashpoint are not allowed. If necessary, contact FRIEDRICH Schwingtechnik. For applicable instructions refer to the page 3 of the IECEx protocole.

13. Warranty



FRIEDRICH grants a guarantee period of 1 year for all new vibration motors as from the date of delivery.

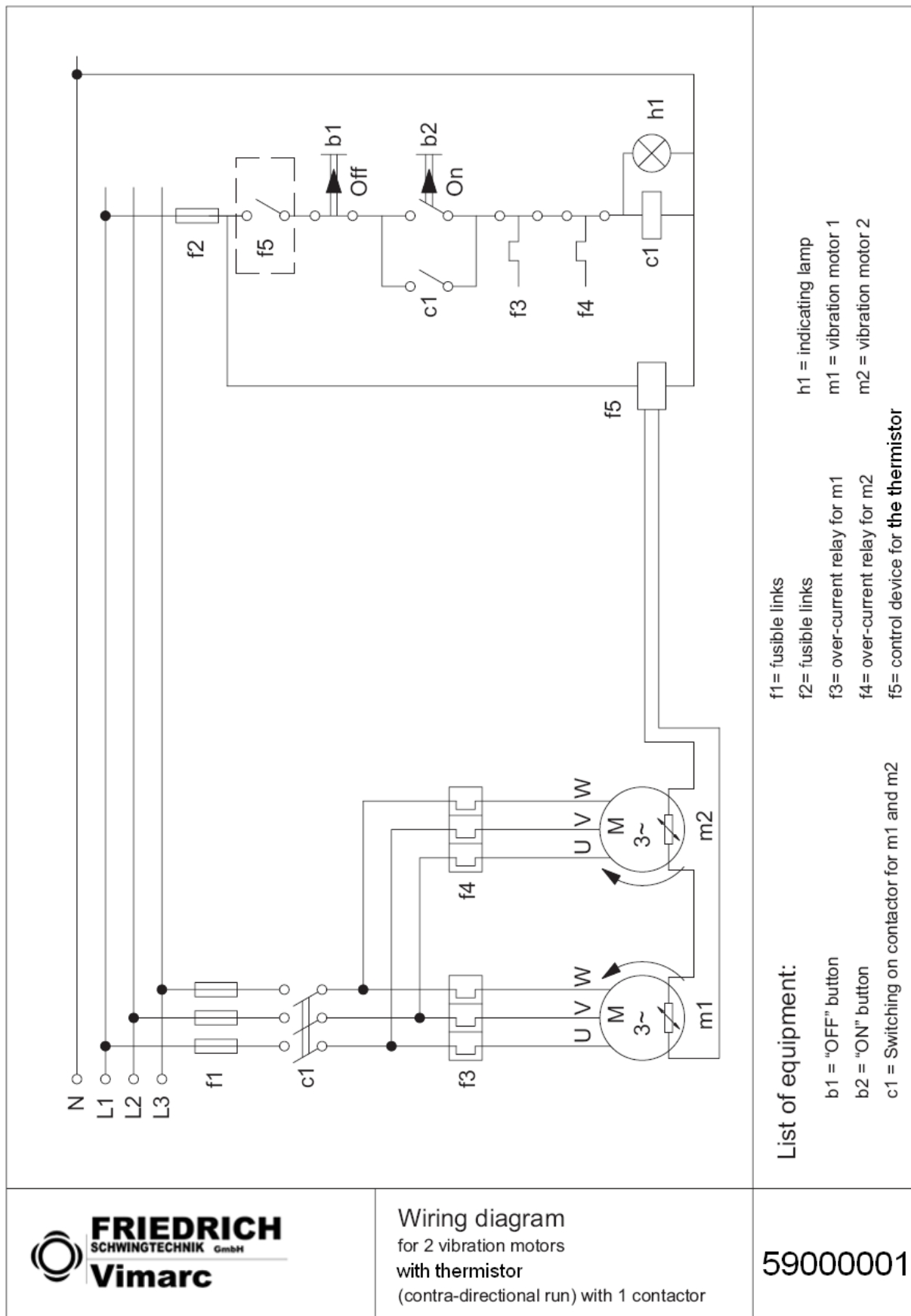
The guarantee will expire if:


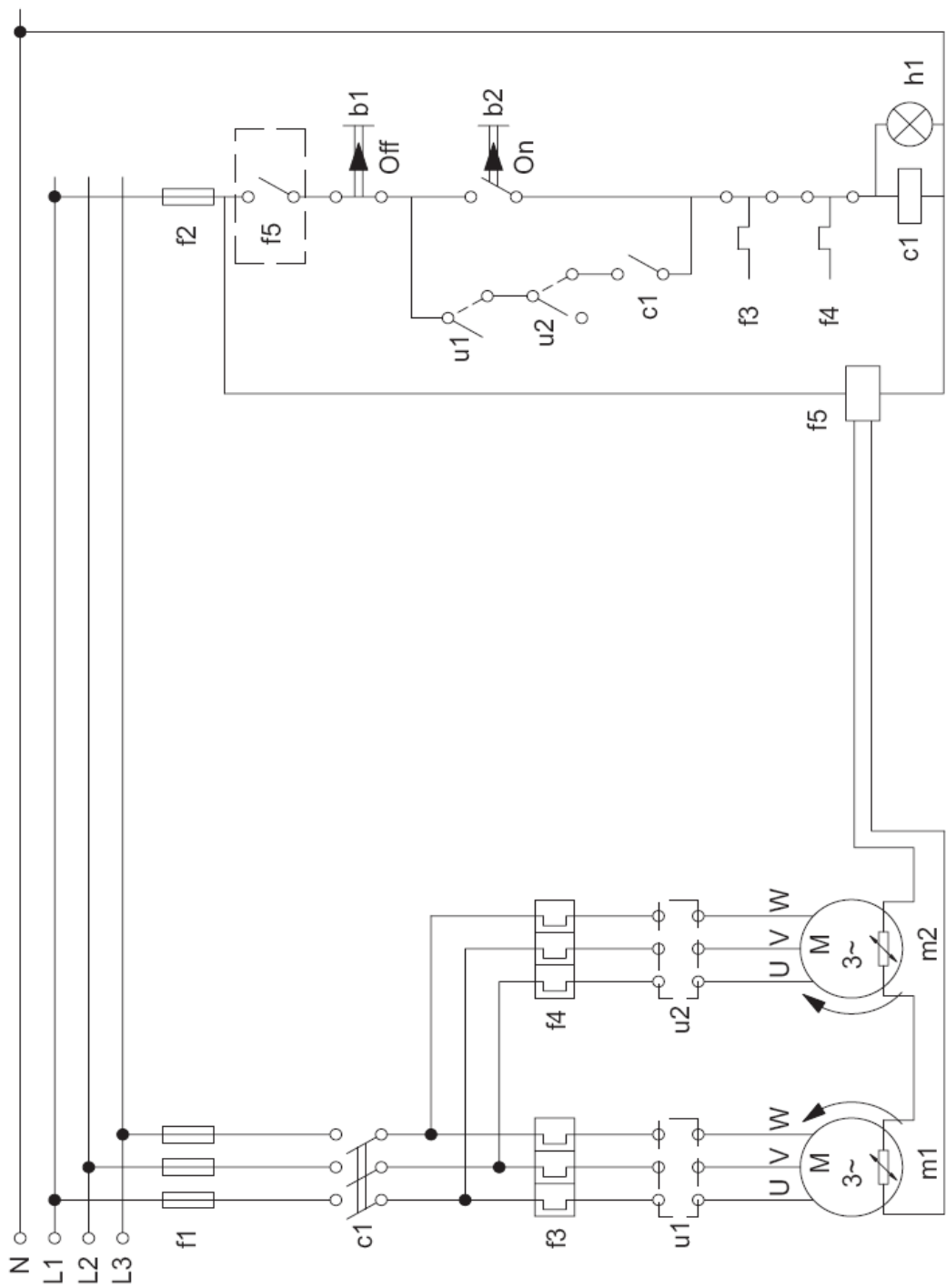
- The motor is used for purposes other than the intended.
- The motor is operated at a defective machine.
- The motor has been connected improperly or with the incorrect voltage.
- The motor is damaged due to an incorrect or missing protection.
- The motor was operated with a frequency converter, not respecting protection measures according to the Chapter 9.1.
- Modifications have been made at the motor resulting in possible motor performance changes.
- The motor is operated without the centrifugal weights.
- Damage occurred during transport.
- The motor has not been mounted in accordance with the hints given in Chapter 7.
- The motor is operated with open cover of the terminal box, the screwed hoods do not seal, the cable is wrong or the cable gland does not seal.



In case of doubt, please have the motor repaired by the manufacturer FRIEDRICH-Schwingtechnik.

14. Wiring diagrams



	<p>Wiring diagram for 2 vibration motors with thermistor (contra-directional run) with one contactor and two strand break relays</p>	<p>59000002</p>
	<p> 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 m1 u2 = strand break relay for m2 </p>	<p> List of equipment: b1 = "OFF" button b2 = "ON" button c1 = Switching on contactor for m1 and m2 </p>

15. Technical data of Ex e motors

Technical data of Ex e vibration motors "increased safety"

The type indicates the size. The sizes cover various working moments according to the leaflet.

For all FE sizes: ATEX certificate: KEMA 03 ATEX 2233 X, IECEx KEM 10.0076 X

4-pole, 400V, 50 Hz								
Type	Temp. class	RPM min ⁻¹	Output power kW	Nominal current I	Power factor cos φ	Efficiency η	Ia/In	t _E (s)
FE...-4 -1.2	T4	1405	0,25	0,7	0,76	0,68	4,4	23
FE...-4 -2.2	T4	1425	0,45	1,13	0,76	0,76	4,9	17
FE...-4 -2.1	T4	1440	0,70	1,57	0,82	0,70	6,6	16
FE...-4 -2.3	T4	1440	0,70	1,57	0,82	0,79	6,6	16
FE...-4 -4.0	T4	1450	1,70	3,32	0,87	0,85	6,8	10
FE...-4 -4.3	T4	1450	1,70	3,32	0,87	0,85	6,8	10
FE...-4 -4.1	T3	1450	2,50	4,97	0,87	0,85	7,8	16
FE...-4 -4.2	T3	1450	2,50	4,97	0,85	0,83	7,8	16

6-pole, 400V, 50 Hz								
Type	Temp. class	RPM min ⁻¹	Output power kW	Nominal current I	Power factor cos φ	Efficiency η	Ia/In	t _E (s)
FE...-6 -1.2	T4	935	0,20	0,78	0,62	0,63	3,6	24
FE...-6 -2.2	T4	940	0,30	0,95	0,70	0,70	4,2	26
FE...-6 -2.1	T4	955	0,60	1,65	0,75	0,75	5,4	12
FE...-6 -2.3	T4	955	0,60	1,65	0,75	0,75	5,3	12
FE...-6 -3.1	T4	950	1,10	2,59	0,77	0,80	5,3	18
FE...-6 -3.4	T4	950	1,10	2,59	0,77	0,80	5,3	18
FE...-6 -4.0	T4	960	1,80	4,27	0,74	0,81	5,8	7
FE...-6 -4.3	T4	960	1,80	4,27	0,74	0,81	5,8	7
FE...-6 -4.1	T4	960	2,20	4,68	0,80	0,83	6,6	7
FE...-6 -4.2	T4	960	2,20	4,68	0,80	0,83	6,6	7
FE...-6 -7.0	T4	970	3,00	6,08	0,84	0,85	7,5	7
FE...-6 -7.1	T4	970	3,00	6,08	0,84	0,85	7,5	7

8-pole, 400V, 50 Hz								
Type	Temp. class	RPM min ⁻¹	Output power kW	Nominal current I	Power factor cos φ	Efficiency η	Ia/In	t _E (s)
FE...-8 -4.0	T3	728	1,20	4,56	0,50	0,77	5,3	23
FE...-8 -7.0	T4	726	2,30	6,18	0,64	0,84	5,6	14
FE...-8 -7.1	T4	726	2,30	6,18	0,64	0,84	5,6	14

4-pole, 460V, 60 Hz								
Type	Temp. class	RPM min ⁻¹	Output power kW	Nominal current I	Power factor cos φ	Efficiency η	Ia/In	t _E (s)
FE...-4 -2.2	T4	1725	0,45	1,12	0,76	0,75	5,0	17

16. Technical data of DP motors

Technical data of DP vibration motors " Flameproof encapsulated " and Explosion Proof

The type indicates the size. The sizes cover various working moments according to the leaflet.

ATEX Certificate: KEMA 03 ATEX 2292X, IECEX KEM 09.0047X

CSA File n°: LR55503 *

FM Certificate: 0M5A8.AE *

*Sales: Friedrich Schwingtechnik GmbH, Manufacturer: Vimarc Inc.

2-pole, 2870 rpm, 400V, 50 Hz

Type:	Temp. class	Output power	Nominal current	Power factor	Efficiency		
	°C	kW	A	cos φ	η%	Ia/In	Ma/Mn
ADP ... - 2V	T4	0.30	0.95	0.83	55	9.4	4.2
BDP ... - 2V	T4	0.30	0.95	0.83	55	9.4	4.2

4-pole, 1460 rpm, 400V, 50 Hz

Type:	Temp. class	Output power	Nominal current	Power factor	Efficiency		
	°C	kW	A	cos φ	η%	Ia/In	Ma/Mn
ADP ... - 4V	T4	0.42	1.30	0.69	71	6.2	3.5
BDP ... - 4V	T4	0.42	1.30	0.69	71	6.2	3.5
CDP ... - 4V	T4	0.96	2.30	0.79	80	7.6	2.8
DDP ... - 4V	T4	1.70	3.60	0.84	86	7.8	3.1
EDP ... - 4V	T4	2.20	4.40	0.84	84	7.2	2.9
FDP ... - 4V	T4	3.30	6.50	0.82	91	8.5	2.8
GDP ... - 4V	T4	3.60	7.30	0.83	86	8.3	3.0

6-pole, 980 rpm, 400V, 50 Hz

Type:	Temp. class	Output power	Nominal current	Power factor	Efficiency		
	°C	kW	A	cos φ	η%	Ia/In	Ma/Mn
ADP ... - 6V	T4	0.46	1.36	0.78	63	2.5	2.0
BDP ... - 6V	T4	0.46	1.43	0.78	63	2.5	2.0
CDP ... - 6V	T4	0.55	1.85	0.61	74	6.2	3.1
DDP ... - 6V	T4	1.70	4.00	0.78	84	5.4	1.6
EDP... - 6V	T4	2.20	5.00	0.74	85	8.4	2.7
FDP ... - 6V	T4	3.00	6.80	0.75	88	9.7	3.4
GDP ... - 6V	T4	3.70	8.70	0.76	85	9.8	3.6

8-pole, 740 rpm, 400V, 50 Hz

Type:	Temp. class	Output power	Nominal current	Power factor	Efficiency		
	°C	kW	A	cos φ	η%	Ia/In	Ma/Mn
BDP ... - 8V	v	0.40	1.60	0.64	59	8.3	2.3
CDP ... - 8V	T4/T3	1.00	3,10	0.71	69	3.6	1.5
DDP .. - 8V	T4/T3	1.50	4,10	0.78	71	4.1	2.1
EDP ... - 8V	T4/T3	2.50	6.70	0.68	78	5.5	2.7
FDP ... - 8V	T4/T3	3.00	6.70	0.81	85	8.4	2.8
GDP .. - 8V	T4/T3	3.70	9,40	0.72	83	7.2	2.9

2-pole, 3450 rpm, 460V, 60 Hz

Type:	Temp. class	Output power	Nominal current	Power factor	Efficiency		
	°C	kW	A /460V	cos φ	η%	Ia/In	Ma/Mn

ADP ...-2	T4	0.30	0.82	0.83	55	10.3	4.4
BDP ...-2	T4	0.30	0.82	0.83	55	10.3	4.4

4-pole, 1750 rpm, 460V, 60 Hz

Type:	Temp. class	Output power	Nominal current	Power factor	Efficiency		
	⁰ C	kW	A /460V	cos φ	η%	Ia/In	Ma/Mn
ADP ...-4	T4	0.42	1.07	0.69	71	6.8	3.5
BDP ...-4	T4	0.42	1.07	0.69	71	6.8	3.5
CDP ...-4	T4	0.96	1.91	0.79	80	8.3	2.8
DDP ...-4	T4	1.70	2.95	0.84	86	8.5	3.1
EDP ...-4	T4	2.20	3.85	0.84	84	7.9	2.8
FDP ...-4	T4	3.32	5.60	0.82	86	9.1	2.8
GDP ...-4	T4	3.60	6.40	0.83	86	9.1	3.0

6-pole, 1175 rpm, 460V, 60 Hz

Type:	Temp. class	Output power	Nominal current	Power factor	Efficiency		
	⁰ C	kW	A /460V	cos φ	η%	Ia/In	Ma/Mn
ADP ...-6	T4	0.46	1.18	0.78	63	2.7	2.0
BDP ...-6	T4	0.46	1.18	0.78	63	2.7	2.0
CDP ...-6	T4	0.55	1.53	0.61	74	6.8	3.1
DDP ...-6	T4	1.70	3.30	0.78	84	5.9	1.6
EDP ...-6	T4	2.20	4.40	0.74	85	9.2	2.7
FDP ...-6	T4	3.00	5.60	0.75	88	10.6	3.5
GDP ...-6	T4	3.70	7.20	0.76	85	10.7	3.6

8-pole, 855 rpm, 460V, 60 Hz

Type:	Temp. class	Output power	Nominal current	Power factor	Efficiency		
	⁰ C	kW	A /460V	cos φ	η%	Ia/In	Ma/Mn
BDP ...-8	T4	0.40	1.32	0.64	59	9.1	2.3
CDP ...-8	T4	1.00	2.55	0.71	69	3.9	1.5
DDP ...-8	T4	1.50	3.40	0.78	71	4.5	2.1
EDP ...-8	T4	2.50	5.90	0.68	78	6.0	2.7
FDP ...-8	T4	3.00	5.50	0.81	85	9.2	2.8
GDP ...-8	T4	3.70	7.80	0.72	83	7.9	2.9

Catalogue designation

Example : BDP 201-6

B size
DP Ex d (Explosion proof)
V 50 Hz
201 working moment
6 number of poles

Protection class: IP 66
Temperature class: F tropicalized insulation

17. Technical data

1. Tightening torques for screws of quality 8.8 (motor feet)

(The screws must be free of grease and oil!!)

M12		M16		M20		M24		M30		M36	
[Nm]	[ft-lb]	[Nm]	[ft-lb]	[Nm]	[ft-lb]	[Nm]	[ft-lb]	[Nm]	[ft-lb]	[Nm]	[ft-lb]
80	64	210	168	410	328	710	568	1350	1080	2530	2024

Table 17.1

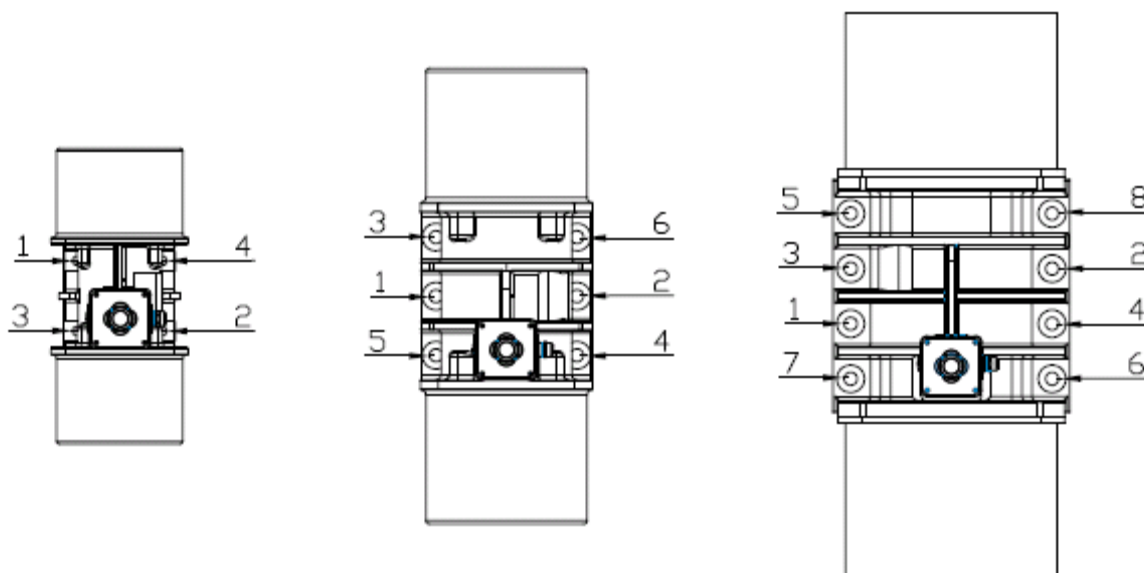
2. Tightening torques for screws of quality 8.8 (centrifugal weights, bearing shields, bearing covers)

(The screws must be free of grease and oil!!)

Screws	Quality 8.8	Quality 8.8
M 8	20 Nm	15 ft-lb
M 10	40 Nm	30 ft-lb
M 12	50 Nm	37 ft-lb
M 16	140 Nm	103 ft-lb
M 20	280 Nm	206 ft-lb
M 24	560 Nm	412 ft-lb

Table 17.2

Tightening sequence Fixing screws



Appendix - Cable gland 1 Exe: product of Agro (Hugro) (Type: Progress-M/ZE-EX, M.. x1,5, for cable cross-section 12,5 to 20,5 mm)

Kabelverschraubungen Progress EX Montage-, Betriebs- und Wartungsanleitung

1. Sicherheitshinweise

Kabelverschraubungen Progress EX dürfen innerhalb explosionsgefährdeter Bereiche zur Einführung von Kabeln und Leitungen in Schränke, Kästen oder sonstige Gehäuse, die in der Zündschutzart erhöhte Sicherheit "e" ausgeführt sind, verwendet werden. Sie dürfen nur von qualifizierten Fachkräften montiert, in Betrieb genommen und gewartet werden.

Verwenden Sie die Kabelverschraubung bestimmungsgemäß in unbeschädigtem und sauberem Zustand. Es dürfen keine Werkzeuge, Schraubendreher, etc. in das Gehäuse eingebracht werden, da dies die Dichtheitsfunktion beeinträchtigen kann. Insbesondere das Ersetzen des serienmäßigen Dichtelementes durch eine andere Größe ist nicht zulässig.



Beachten Sie bei allen Arbeiten mit den Kabelverschraubungen Progress EX die nationalen Installations-, Sicherheits- und Unfallverhütungsvorschriften und die zugehörigen Bedienungsanleitungen in dieser Betriebsanleitung, die wie dieser Text in Kurzschrift gedruckt sind!

2. Normenkonformität

Die Kabelverschraubungen Progress EX entsprechen den Anforderungen der IEC/EN 60079-0, IEC/EN 60079-7 und IEC/EN 60079-31. Sie entsprechen dem Stand der Technik und sind nach ISO 9001:EN 29001 entwickelt, gefertigt und geprüft.

3. Technische Daten

	Progress GFK ... EX	Progress ... EX
Werkstoff Gehäuse	Polyamid PA6 GF30	Messing vernickelt, Stahl A2 oder A4
Werkstoff Dichtelement / O-Ring	TPE / -	TPE / FKM
Farbe Dichtelement / O-Ring	schwarz / -	schwarz / grün
Zündschutzart	II 2 G Ex eh IIC Dg II 2 D Ex tb IIC Dg	II 2 G Ex eh IIC Dg II 2 D Ex tb IIC Dg
EG-Baumusterprüfbescheinigung	SEV 15 ATEX 0151 SEV 15 ATEX 0152X	SEV 15 ATEX 0151 SEV 15 ATEX 0152X
IECEx Zulassung	IECEx SEV 15.0018 IECEx SEV 15.0019X	IECEx SEV 15.0018 IECEx SEV 15.0019X
Zulässige Umgebung- und Anwendungstemperatur T _a	-20°C bis +85°C	-60°C bis +100°C

4. Installation



Für das Errichten und Betreiben sind die Vorschriften gemäss IEC/EN 60079-14, die nationalen Installations-, Sicherheits- und Unfallverhütungsvorschriften und diese Betriebsanleitung maßgebend. Damit der geforderte IP-Schutzgrad gemäss IEC/EN 60529 erreicht wird, müssen die Verschraubungen sachgerecht im elektrischen Betriebsmittel eingebaut werden.

Die Daten der Kabelverschraubungen unter Punkt 3 sind beim Einbau zu berücksichtigen. Es dürfen nur runde und feste, mit extrudiertem Ertelungsmaterial zwischen den Ärmeln verspannte Kabel verwendet werden. Die auf der rückseitigen Tabelle für die jeweiligen Größen angegebenen Anzugsdrehmomente für die Druckmutter und die Klemmbacken-Schrauben sowie die ergänzenden Hinweise sind zu beachten.

Typen mit einem nachstehenden X in der Prüfbescheinigungsnummer bzw. der IECEx Zulassung sind nur für den Einsatz mit festverlegten Kabeln geeignet und/oder müssen gegen mechanische Schlägenwirkung geschützt eingebaut sein. Der Betreiber muss eine entsprechende Zugentlastung gewährleisten. Diese besonderen Bedingungen sind der EG-Baumusterprüfbescheinigung bzw. dem IECEx Test Report zu entnehmen, die unter www.agro.ch verfügbar sind.

5. Instandhaltung



Die für Wartung, Instandhaltung und Prüfung geltenden Bestimmungen der IEC/EN 60079-14 sind einzuhalten. Im Rahmen der Wartung sind vor allem die für die Zündschutzart maßgebenden Teile zu prüfen.

Progress EX cable glands Mounting, operating and maintenance instructions

1. Safety information

Progress EX cable glands may be used inside areas where there is a risk of explosion for entry of cables and lines into cabinets, boxes or other housings which are in accordance to protection level increased safety "e". They may be mounted, put into operation and maintained only by qualified specialists. Use cable glands properly in the undamaged and clean state. The cable gland must not be modified in any way which is not expressly mentioned in these operation instructions. In particular, replacement of the standard sealing insert by different size is not permissible.



During all work with Progress EX cable glands, observe the national installation, safety and accident prevention regulations and the following safety information in these operating instructions, which appear in italics like this text!

2. Conformity with standards

The Progress EX cable glands meet the requirements of IEC/EN 60079-0, IEC/EN 60079-7 and IEC/EN 60079-31. They correspond to the state of the art and have been developed, manufactured and tested in accordance with ISO 9001:EN 29001.

3. Technical Data

	Progress GFK ... EX	Progress ... EX
Housing material	Polyamide PA6 GF30	Nickel plated brass, Steel A2 or A4
Sealing insert / O-ring material	TPE / -	TPE / FKM
Sealing insert / O-ring color	black / -	black / green
Explosion protection	II 2 G Ex eh IIC Dg II 2 D Ex tb IIC Dg	II 2 G Ex eh IIC Dg II 2 D Ex tb IIC Dg
EC type examination certificate	SEV 15 ATEX 0151 SEV 15 ATEX 0152X	SEV 15 ATEX 0151 SEV 15 ATEX 0152X
IECEx certificate	IECEx SEV 15.0018 IECEx SEV 15.0019X	IECEx SEV 15.0018 IECEx SEV 15.0019X
Permissible ambient and application temperature T _a	-20°C to +85°C	-60°C to +100°C

4. Installation



The regulations according to IEC/EN 60079-14, the equipment safety law, the general safety regulations and the national installation, safety and accident prevention regulations are applicable for installation and operation. In order to ensure the required IP protection category according to IEC/EN 60529 is achieved, the cable glands must be properly installed in the electrical operating equipment.

The data for the cable gland under Section 3 must be taken into account on installation. Only round and firm cables equipped with extruded bedding between the leads may be used. When used in plastic housings, the cable glands must be installed in accordance with the instructions for use. The cable glands must be checked for the respective sizes of lock nuts and clamps and the additional information must be taken into account.

Types with test certificate numbers ending with the letter X are only suitable for application with fixed cables, and/or they must be installed with suitable impact protection. The operating company must ensure an appropriate strain relief. These special conditions are specified in the EC-Type-Examination Certificate respectively the IECEx Test Report available from www.agro.ch.

5. Maintenance



The provisions of IEC/EN 60079-14 which are applicable for service, maintenance and testing must be complied with. During maintenance, in particular the parts critical for the ignition protection category must be tested.

Presse-étoupes Progress EX Instruction de montage, de maintenance et mode d'emploi

1. Remarques de sécurité

Les presse-étoupes Progress EX peuvent être utilisés dans les zones soumises aux risques d'explosion pour insérer les câbles et les conduites dans les armoires, les coffrets ou autres boîtiers qui sont conçus dans la mode de protection sécurité augmentée "e". Le montage, la mise en service et la maintenance des presse-étoupes à vis est réservée uniquement aux ouvriers spécialisés et qualifiés.

Utiliser le presse-étoupe conformément aux dispositions et seulement s'il n'est ni endommagé, ni sale. Il est interdit d'effectuer des modifications sur le presse-étoupe si celui-ci n'est pas expressément mentionné dans l'instruction de montage, de maintenance et de mode d'emploi. En particulier, le remplacement du joint en série par un joint d'un autre taille n'est pas permis.



Observez, pendant tous les travaux avec les presse-étoupes Progress EX, les réglementations nationales en matière de sécurité, de prévention d'accident et d'installation figurant dans le présent mode d'emploi, ainsi que les remarques de sécurité suivantes qui sont rédigées en italique comme ce texte.

2. Conformité aux normes

Les presse-étoupes Progress EX satisfont aux exigences des normes IEC/EN 60079-0, IEC/EN 60079-7 et IEC/EN 60079-31. Ils correspondent à l'état de la technique et sont conçus, fabriqués et contrôlés conformément à la norme ISO 9001:EN 29001.

3. Données techniques

	Progress GFK ... EX	Progress ... EX
Matériau du boîtier	Polyamide PA6 GF30	Laiton nickelé, Acier A2 ou A4
Matériau du joint / O-ring	TPE / -	TPE / FKM
Couleur du joint / O-ring	noir / -	noir / vert
Protection antiéclaboture	II 2 G Ex eh IIC Dg II 2 D Ex tb IIC Dg	II 2 G Ex eh IIC Dg II 2 D Ex tb IIC Dg
Attestation d'examen CE de type	SEV 15 ATEX 0151 SEV 15 ATEX 0152X	SEV 15 ATEX 0151 SEV 15 ATEX 0152X
Certificat IECEx	IECEx SEV 15.0018 IECEx SEV 15.0019X	IECEx SEV 15.0018 IECEx SEV 15.0019X
Température admissible dans l'environnement pour l'application T _a	-20°C à +85°C	-60°C à +100°C

4. Installation



Les réglementations conformément à la norme IEC/EN 60079-14, la loi sur la sécurité des appareils, les règles techniques généralement reconnues ainsi que le mode d'emploi sont décisifs pour la mise en place et l'exploitation. Afin d'atteindre le type de protection IP requis, conformément à la norme IEC/EN 60529, il est impératif de monter correctement les presse-étoupes dans les dispositifs électriques.

Tenir compte des données des presse-étoupes mentionnées au paragraphe 3. Seuls des câbles ronds et solides, munis de matériel d'enclassement entre ses conducteurs à cosses métalliques peuvent être utilisés. Lors du montage dans un boîtier en plastique, les presse-étoupes doivent être intégrés dans la compensation du potentiel. Respectez les couples de serrage indiqués dans le tableau au verso pour les diamètres respectifs et destinés aux écrous de pression et aux mâchoires de serrage, ainsi que les remarques complémentaires.

Les types dont le numéro de certificat de contrôle comporte le suffixe X sont exclusivement prévus pour une utilisation avec des câbles posés rigide, et/ou à monter avec une protection contre les chocs mécaniques. L'exploitant doit prévoir une décharge de traction adéquate. Ces conditions particulières sont spécifiées dans l'attestation d'examen CE de type respectivement le certificat IECEx, disponible à l'adresse www.agro.ch.

5. Réparation



Respectez les réglementations en vigueur de la norme IEC/EN 60079-14, en ce qui concerne la maintenance, la réparation et le contrôle. En particulier, vérifiez les pièces décisives pour le type de protection dans le cadre de la maintenance.

Premistoppe Progress EX

Istruzioni per il montaggio, l'uso e la manutenzione

1. Avvertenze di sicurezza

Le premistoppe Progress EX possono essere impiegati nelle zone esplosive, per far passare cavi e conduttori in altri contenitori in modo di protezione a sicurezza aumentata "e". Possono essere montati, messi in servizio e sottoposti a manutenzione esclusivamente da parte di specialisti qualificati.

Utilizzate le premistoppe esclusivamente per lo scopo previsto, accertandovi che siano puliti e non presentino danni visibili. Non è permesso apportare alla premistoppa nessuna modifica che non sia indicata espressamente nelle presenti istruzioni. In particolare non è permesso sostituire la guarnizione di serie con un'altra di dimensione diversa.



Nell'eseguire qualsiasi lavoro con le premistoppe Progress EX bisogna rispettare le prescrizioni nazionali vigenti in materia di sicurezza e prevenzione degli infortuni, nonché le avvertenze di sicurezza contenute nelle presenti istruzioni stampate in corsivo come questo testo!

2. Conformità alle norme

Le premistoppe Progress EX sono conformi alle norme IEC/EN 60079-0, IEC/EN 60079-7 e IEC/EN 60079-31. Essi sono inoltre allo stato della tecnica e sono stati sviluppati, fabbricati e collaudati conformemente alla norma ISO 9001/EN 29001.

3. Dati tecnici

	Progress GFK ... EX	Progress ... EX
Materiale corpo premistoppa	Poliamide PA6 GF30	Olio nichelato, Acciaio A2 o A4
Materiale guarnizione / O-ring	TPE / -	TPE / FKM
Colore guarnizione / O-ring	nero / -	nero / verde
Protezione antideflagrante	II 2 G Ex tb IIC Db II 2 D Ex tb IIC Db	II 2 G Ex tb IIC Db II 2 D Ex tb IIC Db
Certificato di esame CE del tipo	SEV 15 ATEX 0182X SEV 15 ATEX 0151	SEV 15 ATEX 0151 SEV 15 ATEX 0182X
Certificato ECEx	IECEx SEV 15.0019X IECEx SEV 15.0019K	IECEx SEV 15.0018 IECEx SEV 15.0019K
Temperatura ambiente e di applicazione ammessa T _a	-20°C a +45°C	-40°C a +100°C

4. Installazione

Per il montaggio e l'uso fanno stato le prescrizioni dell'anorma IEC/EN 60079-14, la legge federale sulla sicurezza delle installazioni e degli apparecchi tecnici, le regole della tecnica generalmente riconosciute e le presenti istruzioni per l'uso. Per raggiungere il grado di protezione IP richiesto ai sensi della norma IEC/EN 60529, le premistoppe devono essere montate correttamente negli elementi elettrici.



Nel montaggio bisogna tener conto dei dati della premistoppa specificati alle cifre 3. Utilizzare solo cavi e solidi previsti dal materiale di inglobamento escluso tra i fili. Se vengono impiegati in corpi di placcatura, le premistoppe devono essere connesse al collegamento equipotenziale. Vanno rispettate le avvertenze e le precauzioni riportate nelle presenti istruzioni. Le coppie di serraggio indicate nella tabella a fianco per ogni dimensione di condotto e di vite serravano.

I modelli che riportano una X dopo il numero del certificato di prova sono destinati all'impiego solo con cavi statici e oppure devono essere installati con una protezione contro gli urti. Il gestore deve prendere in considerazione l'eventuale presenza di urti. Consultare il certificato di attestato di esame CE del tipo rispettivamente I certificato ECEx, disponibile nel sito www.agro.ch.

5. Manutenzione



Vanno rispettate le disposizioni della norma IEC/EN 60079-14 vigenti per la manutenzione, la riparazione e il controllo. Nel quadro della manutenzione vanno controllati soprattutto i componenti determinanti per il tipo di protezione antideflagrante.

Progress EX

Anzugsdrehmomente – torques – couples de serrage – coppia di serraggio

	M8	M10	M12	M16	M20	M25	M32	Pg29	M40	Pg36	M50	Pg48	M63
	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)	DM (Nm)
Seriesbezeichnung Series designation Désignation de série Indicazione di serie													
Progress MS ... EX	2.5	2.5	3	6	8	11	15	15	20	28	30	40	44
Progress MS EMV ... EX	2.5	2.5	3	6	8	11	15	15	20	28	30	40	44
Progress GFK ... EX				3	4	9	10	12	16	20	24	34	36
Progress MS KB EX		3	20	6	40	8	15	80	15	80	20	100	44
Progress MS EMV KB EX		3	20	6	40	8	15	80	15	80	20	100	44
Progress S2 KB EX		3	20	6	40	8	15	80	15	80	20	100	44
Progress MS T+KB EX				6	40	8	15	80	15	80	20	100	44
Progress Verschlusschrauben													
Progress Locking plugs Progress Vis de fermeture Progress Tappo di chiusura	1.5	2	2	4	4	4	6	6	10	10	10	10	10

Obige Drehmomente für die Druckmutter sind Maximalwerte bei größtem Kabel in normaler Umgebung und gelten auch für Zwischenstutzen (Verschraubungsunterteile). Reduktionen, Erweiterungen und Gegenmutter. Um eine korrekte Montage bei davon abweichenden Bedingungen zu gewährleisten, soll diese beendet werden, wenn der Dichtensatz einen leicht über die Druckmutter vorstehenden Wulst bildet, selbst wenn das Drehmoment nach Tabelle noch nicht erreicht sein sollte.

The above torques for the compression cap nuts are maximum values in the case of the largest cable in a normal environment and also apply for lower parts, reduction flanges, extensions and lock nuts. In order to ensure correct mounting under conditions differing from this, mounting should be terminated if the sealing insert forms a bead projecting slightly above the lock nut, even if the torque shown in the table has not yet been reached.

Les couples de serrage susmentionnés pour les écrous de pression sont des valeurs maximales pour le plus gros câble dans un environnement normal et sont également valables pour des parties inférieure, raccords de réduction, extensions et des contre-écrous. Pour garantir le montage correct lorsque les conditions varient de la normale, il faut cesser de serrer dès que le joint forme un léger bourrelet qui dépasse de l'écrou de pression, même si le couple de serrage figurant dans le tableau n'est pas encore atteint.

Le coppie sopra indicate per i dadi di pressione sono valori massimi, validi per il cavo più grande in ambiente normale e sono anche validi per la parte inferiore, flange di riduzione, estensione e controddadi. Per garantire un montaggio corretto in caso di condizioni differenti, il serraggio deve cessare quando la guarnizione forma un leggero collare sporgente sopra al dado, anche se la coppia indicata in tabella non fosse ancora stata raggiunta.

Legende – Legend – désignation – designazione :

DM = Druckmutter – compression cap nut – écrou de pression – dado di pressione
KB = Klemmbachschraube – clamps – mâchoires de serrage – vite serracavo

Premistoppe tipo 18... 26/27 e tappe di chiusura tipo 8710 Istruzioni per il montaggio, l'uso e la manutenzione

1. Avvertenze di sicurezza

Le premistoppe tipo 18... 26/27 e le tappe di chiusura tipo 8710 possono essere impiegate nelle zone a rischio di esplosione solo se sono stati installati e mantenuti in conformità con le avvertenze di sicurezza contenute nelle presenti istruzioni. Possono essere montati, messi in servizio e sottoposti a manutenzione esclusivamente da parte di specialisti qualificati.

Utilizzate le premistoppe esclusivamente per lo scopo previsto, accertandovi che siano puliti e non presentino danni visibili. Non è permesso apportare alle premistoppe nessuna modifica che non sia indicata espressamente nelle presenti istruzioni. In particolare non è permesso sostituire la guarnizione di serie con un'altra di dimensione diversa.



Nell'eseguire qualsiasi lavoro con le premistoppe tipo 18... 26/27 e le tappe di chiusura tipo 8710 bisogna rispettare le prescrizioni nazionali vigenti in materia di sicurezza e prevenzione degli infortuni, nonché le avvertenze di sicurezza contenute nelle presenti istruzioni, stampate in corsivo come questo testo!

2. Conformità alle norme

Le premistoppe tipo 18... 26/27 e le tappe di chiusura tipo 8710 sono conformi alle norme IEC/EN 60079-1, IEC/EN 60079-31. Essi sono inoltre allo stato della tecnica e sono stati sviluppati, fabbricati e collaudati conformemente alla norma ISO 9001/EN 29001.

3. Dati tecnici

Protezione antideflagrante: II 2 G Ex dI dIc

Certificato di esame CE del tipo: PTB 00 ATEX 1089

Temperatura ambiente e di applicazione ammessa (T_A): IECEx PTB 12.0056

(nessun deviazioni di temperatura dagli contenitori e dagli conduttori) -40°C / +100°C

Data della premistoppe / tappo di chiusura, tipo codici:

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