AViTEQ
Vibrationstechnik GmbH

Instructions for Use
for Unbalance Motors

Series fUV...

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Unless otherwise stated, the relevant state of engineering is that at the time of the combined delivery of the product and the Instructions for Use from AViTEQ Vibrationstechnik GmbH. Technical changes without prior notice are reserved, at which point any previous Instructions for Use lose validity.

The current version of the **general terms and conditions for domestic and foreign deliveries** of AViTEQ Vibrationstechnik GmbH shall apply.

Do you have any questions? Or problems during installation and commissioning? Give us a call! We will be happy to help!

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Hattersheim, 24th January 2019

Read the present Instructions for Use and observe the product safety labels on the unbalance drive before using this product. Failure to do so can result in serious injury or death.

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1 Intended use

The fUV-type AViTEQ unbalance motors described in these Instructions for Use are designed as single and double drives for normal areas and those at risk from **dust** explosions with the approval of:

Class II, Division 1, Groups: E, F, and G

for use in vibrating units (such as trough feeders, delivery tubes, vibrating screen, etc.) for the purposes of carrying, transporting, feeding, compacting, loosening, dosing, and/or screening heavy bulk materials.

⚠ DANGER Explosions can lead to fatal injuries and significant material damage! Do not use the fUV-series unbalance motor described in these Instructions for Use in environments at risk from gas explosions, as it is not designed or approved for use in these areas. It is also not permitted to operate the unit in areas at risk from explosion involving gases, steam, mist, and dust/air mixtures (i.e. hybrid mixtures).

INORMATION An accompanying approval certificate (CSA Certificate of Compliance, certificate number: 2593962) is also available in English. (CSA → Canadian Standards Association)

The unbalance motor is a three-phase AC induction motor suitable for use in 50 Hz or 60 Hz three-phase networks. Some unbalance motors are available in special versions that are designed and built for single-phase operation in 50 Hz or 60 Hz networks.

Please also take note of the further instructions on intended use outlined in Chapter 3.3.

INORMATION The fUV-series unbalance motor is designed and approved for the US and Canadian markets. The drives are not approved for use within the European Union.

AViTEQ Vibrationstechnik GmbH accepts no responsibility for any injuries or damage arising as a result of using or applying this product in a way that deviates from the specifications in the Instructions for Use.

2 Important Safety Information

These Instructions for Use use the following five symbols to designate safety information. The signal words are based on ANSI Z535.6-2011 guidelines and draw your attention to the respective level of the hazard:

⚠ DANGER This combination of symbol and signal word denotes a potential hazard, which – if disregarded – is very likely to result in an accident leading to death or serious injury.

⚠ WARNING This combination of symbol and signal word denotes a potential hazard, which – if disregarded – could possibly result in an accident leading to death or serious injury.

⚠ CAUTION This combination of symbol and signal word denotes a potential hazard, which – if disregarded – could possibly result in minor (slight) injury.

NOTICE This signal words refers to a potential hazard, which – if disregarded – could lead to material and/or environmental damage. There is no risk of harm to human health.

INORMATION This signal word refers to information on individual topics.

Read these Instructions for Use before you start installing and/or commissioning the unbalance motor. Carry out all work in accordance with the applicable regulations stipulated by the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor. All electrical installation work is only to be carried out by personnel with the appropriate qualifications in accordance with the applicable regulations of the NEC® (National Electrical Code) (NFPA® 70).

NEC® and NFPA® are registered trademarks of the National Fire Protection Association Inc.

Although the AViTEQ unbalance motors have been developed bearing all safety measures in mind for your protection, the potential for hazards cannot be completely excluded. Please observe the following safety information for your own safety and that of your colleagues:

⚠ DANGER Risk of electric shock! Touching live parts can be fatal! Once the mains voltage is connected, some of the parts inside the terminal box for the unbalance motor are live with potentially fatal voltages. Ensure that there is no possibility of coming into contact with live parts before switching on the mains! Close the terminal box cover. Check that all cable connectors and insulation are undamaged!

Risk of electric shock due to frayed connection cables! Connection cables must never come into contact with moving parts as this can damage the insulation. Route the cable in a way that eliminates this hazard and protect the drive with a motor circuit breaker!

Risk of injury due to coming into contact with rotating flyweights. Never operate the unbalance motor without its protective covers. Uncovered rotating flyweights can lead to fatal injuries if touched. Check whether the protective covers are properly installed before switching on the unit.

Risk of injury due to falling parts! Always ensure that the unbalance motor is securely attached to the vibrating unit! If it is not attached securely enough, the unbalance motor can fall off and cause fatal injuries! It is not permitted to stand under the unbalance motor!

Do not add any additional loads to the unbalance motor when transporting with lifting equipment or cranes as the lifting rings are only designed to support the weight of the motor and may tear! To provide a specific example, never lift the vibrating unit using the lifting rings for the unbalance motor! Also take note of the weight specifications for the motor when selecting the load attachment device!

⚠ DANGER Explosions can lead to fatal injuries and cause significant material damage!

Risk of ignition when discharging! Never open a terminal box cover in an area at risk of dust explosions while the terminals inside it are live. Failure to observe this warning can cause an explosive dust/air mixture to ignite! In addition, the IP66 protection class must not be lowered. If the seal on the terminal box cover is damaged, replace it immediately.

Risk of ignition due to frayed connection cables! Connection cables must never come into contact with moving parts as this can damage the insulation. Route the cable in a way that eliminates this hazard!

Risk of ignition due to impermissibly high surface temperatures on the unbalance motor. If you use the unbalance motor in an area at risk of dust explosions, then you must connect the PTC thermistor and monitor it to prevent impermissibly high surface temperatures from building up. Also protect the drive with a motor circuit breaker. The permitted service factor is 1.0!

Risk of ignition due to improper repairs! If you are using an unbalance motor in an area at risk of dust explosions (Class II), then you must not carry out your own repairs unless you can provide evidence that you are suitably qualified.

Risk of ignition when welding! Welding is only permitted if the area is not at risk of dust explosions. For this reason, check the environmental conditions before commencing any welding work. There should not be any evidence of a potentially explosive atmosphere (gas and/or dust/air mixture).

⚠ DANGER Explosions can lead to fatal injuries and cause significant material damage.

Risk of ignition due to colliding parts! Collisions between parts can be potential sources of ignition. Before switching the machine on for the first time, make sure that the vibrating unit can vibrate freely, it is not in a position to strike against adjacent parts, and also that all fixing bolts are tight. Before operating the unbalance motor, remove all parts from the vibrating unit that are loose or unsecure.

If the unbalance motor continues to run unchecked after it has been switched off, there is a risk that the natural frequency of the base support elements will start to move excessively. Ensure that the vibrating unit cannot spring out of the base support! Always operate the unbalance motor using a braking unit (control system) if the base support for the vibrating unit uses pressure or tension springs.

Risk of ignition due to improper surface coating! If you are using an unbalance motor in an area at risk of dust explosions (Class II), then you must not paint or coat it yourself. Unauthorized coatings can lead to an impermissible static charge. This can lead to sources of ignition being produced.

⚠ CAUTION Risk of hearing damage! The sound pressure level of the unbalance motor when it is ready for use can lie above 70 db(A) depending on the design of the vibrating unit and depending on the acoustic properties of the bulk material. The facility operator is responsible for ensuring that the permitted sound pressure level is complied with by the implementation of appropriate noise abatement measures.

Risk of skin burns or irritations! The surface of the motor heats up during the course of operation. Expect surface temperatures to exceed +130 °C (+266 °F).

Before carrying out any work, check whether the surface temperature of the unbalance motor is below +50 °C (+122 °F).

Risk of damage to health due to paint particles! If the unit is used within the food industry, it may be necessary to apply a special coating that is permitted for this sector. Please be aware of this to avoid health risks to others.

NOTICE Risk of damage to the motor due to excessive current draw! It is expressly prohibited for the current draw of the unbalance motor to exceed the nominal current value displayed on the type plate, as this results in excessive temperatures. The permitted service factor is 1.0!

Protect each unbalance motor with its own motor circuit breaker! It is not permitted to add the currents of several unbalance motors together and then manage them using a common motor circuit breaker! The motor circuit breaker must be adjusted to suit the nominal current of the unbalance motor as shown on the type plate!

Please note the following information: In the case of a double drive, the drives must be connected so that both drives shut down in the event that one unbalance motor fails. Single motor operation is not permitted in the case of two drives and may result in damage to the unbalance motors and/or the vibrating unit!

Risk of damage to the motor due to connecting an impermissible mains voltage and/or mains frequency! Unsuitable control systems (braking unit or frequency converter) or connections to an inappropriate mains voltage and/or mains frequency can result in damage to the unbalance motor and are therefore not permitted. Only put the unbalance motor into operation if the network voltage and network frequency correspond to the specifications on the type plate for the unbalance motor.

Risk of damage to the motor due to overheating! Please observe: If the PTC thermistor of the unbalance motor is not monitored, the maximum permitted switching frequency is 15 switching operations (ON/OFF) per hour.

You can protect the unbalance motor against overheating by monitoring the PTC thermistor. AViTEQ recommends monitoring the PTC thermistor even when this is not a specific requirement. This relates in particular to drive types fUVK, fUVN, and fUVP with pre-installed connection cables for the PTC thermistor!

Risk of damage to the motor when welding! All wiring connected to the unbalance motor (particularly the protective ground conductor) must be disconnected from the mains before carrying out welding work in the vicinity of the unbalance motor, as otherwise its winding and bearings may be damaged.

Risk of parasitic vibrations and damage to the vibrating unit due to irregular flyweight settings! Always set the same flyweight value (as a percentage) at the shaft ends of the unbalance motor.

3 Introduction

3.1 About these Instructions for Use

Who will be using them?

These Instructions for Use are intended for...

- Assembly technicians who install and/or commission the unbalance motor.
- Engineers who install the accompanying control system, the electrical connection to the AC mains network, and the connection to the unbalance motor.

All work on the unbalance motor must only be carried out by qualified, specialist personnel (an electrically qualified person).

Further documentation

Supplements to these Instructions for Use

- Terminal connection plan in the terminal box for the unbalance motor
- Information (label) on the unbalance motor
- Data sheet for the unbalance motor

INORMATION	These Instructions for Use refer exclusively to the unbalance motors in the fUV series!

Definitions

- Unbalance motor: An electric motor with imbalances for operating a vibrating unit
- Working unit: The actual supply unit itself (e.g., trough, tube, screen, etc.)
- Vibrating unit: A working unit with one or more unbalance motors installed
- Braking unit: The electronic control unit for connecting to the AC mains network. This is available separately and accompanies the unbalance motor

Document version

At the bottom of every right-hand page, you will find the version date on which these Instructions for Use were most recently updated.

Identification of aspects of these Instructions for Use

You should already have read above about how we identify safety information. We are always ready to answer your questions if you are still unclear about any aspects of safe handling of the unbalance motor.

We use the following symbols to help you find your way around the Instructions for Use:

- Bullet point for listings of characteristics and statuses
- 👍 Thumbs up means you need to check something
- ☞ Pointing finger for operations that you must perform yourself

3.2 Product liability and warranty

The drives conform to the latest state of the art and have been checked for all of their promised functions. AViTEQ Vibrationstechnik GmbH carries out product and market surveys for the purposes of further development and constant improvement. Please notify our Service department should malfunctions or faults occur despite all preventive measures! We assure you that appropriate measures to remedy the fault will be introduced immediately.

Warranty conditions

We guarantee that the product is free from defects in accordance with the technical product information published by AViTEQ Vibrationstechnik GmbH and the key specifications of these Instructions for Use. No product characteristics or features are promised beyond this. AViTEQ Vibrationstechnik GmbH is not liable for the profitability or proper functionality of the product when used for a purpose other than that defined in Chapter 1 (Intended use) on page 6.

The current version of the general terms and conditions for domestic and foreign deliveries of AViTEQ Vibrationstechnik GmbH shall apply.

Exclusions from warranty

The customer or third parties may only interfere with the product or operate on it in any other way after particular consultation and prior written approval by AViTEQ Vibrationstechnik GmbH. Otherwise, the liability for damage to the equipment, personal injury and other consequential losses of any nature in the product and other objects of legal protection is excluded unless AViTEQ Vibrationstechnik GmbH can be shown to be jointly responsible. Any warranty is also invalidated by any intervention or other action.

Claims by the purchaser/orderer going beyond the warranty claims specified in AViTEQ Vibrationstechnik GmbH's general terms and conditions, in particular claims for compensation including lost profits or compensation for other asset losses by the purchaser/orderer, are excluded. This restriction on liability is not valid if the cause of the loss is a consequence of malice, aforethought, or gross negligence, and to the extent that there is legal liability due to impairment of life, health, or physical injury. Nor is it valid if the purchaser/orderer submits claims for compensation because of a fault in a promised characteristic or agreed quality. In the event of its responsibility for the infringement of essential obligations under the contract, AViTEQ Vibrationstechnik GmbH is also liable in the event of malice and gross negligence of non-managerial staff and also in the event of minor negligence, which is restricted to reasonably foreseeable losses typical for the contract.

Warranty claims are, in particular, excluded in cases in which units are used in environments, for uses, or connected to supply networks or control systems that are not suitable for the drives, are faulty, or do not comply with the usual state of the technology. In particular, no warranty is given for losses arising from unsuitable or incorrect use, faulty installation or commissioning by the purchaser/orderer or third parties, natural wear, faulty or negligent handling or unsuitable operating resources. The same shall apply for replacement parts and chemical, electrochemical, or electrical effects as long as they cannot be attributed to the responsibility of AViTEQ Vibrationstechnik GmbH and its staff. AViTEQ

Vibrationstechnik GmbH only accepts liability for claims for compensation for loss not caused on the object of the contract itself – known as consequential loss caused by a defect – on whatever legal grounds – in the event of malice, gross negligence of the proprietor/its bodies or management staff in the event of liable injury to life, body or health, in the case of faults that they have concealed deceitfully or the absence of which they have guaranteed, in the event of faults on the object supplied, to the extent that there is liability for personal injury and damage according to the product liability laws or other legislation.

Nor is any warranty accepted for damage to conveying and automation systems attributable to a malfunction of the product or missing content in the operating instructions. Warranty for losses that can be attributed to accessories not supplied or certified by AViTEQ Vibrationstechnik GmbH is excluded.

We note expressly that warranty claims for damage to the object of the contract and consequential damage to other objects of legal protection attributable to a failure to comply with safety rules and/or warning instructions are excluded.

The purchaser/orderer is obliged on conclusion of the contract to expressly indicate if the object of the contract is intended for private use and will principally be used by the purchaser/orderer for such purposes.

3.3 Areas of application

The AViTEQ unbalance motors in the fUV series described in these Instructions for Use may be used in normal areas and those at risk from dust explosions in accordance with the specifications in Chapter 1 (Intended use).

NOTICE Risk of damage to the motor due to an impermissible mains frequency. Do not operate the unbalance motor with an impermissible frequency, as this can result in premature damage to the motor. The unbalance motor may be operated with a frequency converter that has a constant torque within a bandwidth of 20 Hz to 50 Hz on a 50 Hz three-phase network or 60 Hz on a 60 Hz three-phase network! Please do not hesitate to ask if you have any questions!

When using the unbalance motor in an area at risk of dust explosions, the built-in PTC thermistor must be monitored by a PTC thermistor tripping unit. The PTC thermistor tripping unit must be approved for operating drives in areas at risk of explosion. Excessive surface temperatures must cause the unbalance motor to switch off.

Under no circumstances should the unit be used in the following situations:

- Do not use with mains voltages and mains frequencies that are not suitable for the unbalance motors according to the information on the type plate.
- Do not use in areas where ambient temperatures are below **-20 °C (-4 °F) and above +40 °C (+104 °F)**, or in tropical climatic conditions! The unbalance motors are designed for use in moderate climatic environments. Special designs for non-moderate climatic environments may be available on request.

- Do not use in areas where the air pressure is below 80 kPa (0.8 bar) or above 110 kPa (1.1 bar), or where the air oxygen content deviates from the standard value (typically 21% V/V).
- Do not use at altitudes of 1,000 m above sea level without consulting AViTEQ Vibrationstechnik GmbH.
- Do not use in areas at risk of gas explosions involving gases, steam, or mist/air mixtures.
- Do not use for handling explosives or chemically unstable substances (pyrophorous substances).

3.4 Installation and operating personnel

Anyone involved in the installation, commissioning, assembly or disassembly, adjustment, and maintenance must have read these Instructions for Use in full and understood it – especially the safety instructions. We will be pleased to help you should you have any questions!

⚠ DANGER Explosions can lead to fatal injuries and cause significant material damage! If you use the unbalance motor in an area at risk of dust explosions, then please note the following information:

- Qualified, specialist personnel must be responsible for selecting the drives and setting up the system in accordance with the applicable regulations of the National Electrical Code (NEC®).

All work on the unbalance motor must only be carried out by qualified, specialist personnel (an electrically qualified person).

3.5 Safety information for the point of operation

- The base supports and building must be designed to accommodate not only the static stresses associated with the unbalance motor, vibrating unit, and heavy bulk material, but also the dynamic stresses.
- We recommend setting up the unbalance motor and the working unit with a gap of 120 mm on all sides. Please also note the specifications of standards ISO 13854 and BS EN 349.
- Access to the unbalance motor must be available at all times for adjustment, inspection, and maintenance purposes.

3.6 Built-in safety systems

The unbalance motor is equipped with the following:

- Insulation class F up to 155 °C.
- A triple PTC thermistor (x1), which is installed in the three winding phases in the motor winding head for the purposes of monitoring the temperature.
- Protective covers: The unbalance motor is closed to ensure that no magnetic fields can escape. The rotating shaft ends are covered with protective covers.
- Flyweight fixings: The built-in flyweights are secured against slipping or coming loose with clamping bolts, additional lifting rings, or other appropriate form-fit/force-fit locking devices.
- Waterproof seals: The cable inlet has a seal to fit the appropriate cable diameter. The terminal box cover has either an O-ring seal or a molded seal. The feedthroughs between the terminal box and motor winding are sealed with a potting compound. The protective covers are sealed with rubber rings, and the bearings are protected by a narrow gap between the shaft and the end cap (under the protective covers), V-ring, and/or labyrinth seal.

The unbalance motor is connected via a four-conductor cable system which must include a separate protective ground conductor. A separate two-core cable is required for connecting the PTC thermistor. With a possible standstill heater we recommend to use a four-core cable for connecting both, the PTC thermistor and the standstill heater.

3.7 Safety measures and obligations on the facility operator

These Instructions for Use are a component of the unbalance motor and must be available to the specialist personnel at all times. The following requirements must be met:

- The appropriate tools and necessary testing equipment must be available to the specialist personnel.
- The specialist personnel must have the appropriate training in safe methods of working and be familiar with the safety information.
- The facility operator must obtain a local operating permit and observe the obligations associated with this.
- The applicable conditions in their respective latest version must be complied with! Particularly observe the regulations of NEC® (National Electrical Code), which apply for the electrical equipment of machines and drives in areas of risk of dust explosions (Class II) and which must be applied.
- Only operate the unbalance motor if it is in a normal, sound condition.

<u>Please also note the following</u>:

- The safety information given in the Instructions for Use must be observed for all work on the unbalance motor.
- You must prevent any method of working that compromises the safety of the unbalance motor. ⚠ **Do not disable or bypass any safety devices!**

- You must notify the facility operator immediately of any changes occurring in the unbalance motor that are likely to compromise safety.

4 Transport, packaging, and storage

The unbalance motor and any accessories are dispatched from AViTEQ in suitable packaging so that the unbalance motor reaches its destination undamaged.

INORMATION Please contact the courier should serious damage be noticed on the outer packaging giving rise to the suspicion of damage to the contents! Please comply with the courier's terms and conditions of sale in further procedures so as not to jeopardize a claim for compensation for losses by a technical error!

NOTICE Risk of damage to the motor due to inappropriate storage or transport. The unbalance motors can be permanently damaged if stored or transported under impermissible conditions. The damage may not be detectable from the outside. AViTEQ rejects any warranty claim under such circumstances and is not liable for the consequences.

Take particular care to ensure that the unbalance motor is protected against violent impacts, as these can cause the flyweights to exert impermissibly high forces on the motor bearing! This can lead to permanent damage.

Storage

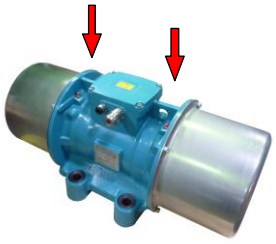
- ☞ Storage: Unless otherwise specially agreed in respect of packaging and storage, the unit shall be stored and transported under “normal” conditions, with or without packaging. This means only in closed rooms, at temperatures between +5 °C (+40 °F) and +65 °C (+150 °F), maximum relative humidity 60 % (no condensation), and protected against shock and vibration.
- ☞ Storage without packaging: Treat uncoated surfaces of the cast-iron housing (motor base supporting surfaces) with anticorrosion lubricant, which should be removed again later before assembly.
- ☞ Storage duration: The storage duration should not exceed three years, as the lubricant in the bearings should be replaced after no more than three years.

Transport

⚠ DANGER Risk of injury due to falling parts! Falling unbalance motors can cause fatal injuries.

Do not add any additional loads to the unbalance motor when transporting with lifting equipment or cranes as the lifting rings are only designed to support the weight of the motor and may tear! To provide a specific example, never lift the vibrating unit using the lifting rings for the unbalance motor! Also take note of the weight specifications for the motor when selecting the load attachment device!

It is not permitted to stand under suspended loads!



INORMATION The center of gravity is in the middle of the motor!

Please observe the following instructions to avoid damage when transporting the unbalance motor without packaging:

Only transport unbalance motors of size “fUVE” and above using the appropriate transport equipment, e.g., crane, forklift truck, etc.! In addition to the terminal box, the unbalance motor also has two lifting rings on the top, which can be used to secure the appropriate load attachment devices (chains).

- ☞ Always grab the unbalance motor from the bottom if you wish to carry it!
- ☞ Avoid contact with sharp (metal) objects that may scratch the paint!
- ☞ When setting down the unit, make sure that you have a loadbearing surface and that the unit is standing securely so that it cannot tip over and/or fall off!

If you would like to return the unit, please ensure that your chosen packaging and transportation methods are impact resistant.

4.1 Scope of delivery

After unpacking, check that all parts are present complete and undamaged as specified in the delivery note and the cover sheet for the accompanying documentation. These parts are as follows:

- Unbalance motor(s)
- Instructions for Use
- Terminal connection plan (information sheet in the terminal box)
- Foam framework to cushion vibrations for the connection cable in the terminal box
- Nuts (normal or self-locking) and washers for the cable connection (pouch in the terminal box or attached to the motor housing)

Compare the data on the type plate for the unbalance motor with the information on the delivery note and the order documents!

If necessary, check whether the unbalance motor is appropriate for the braking unit or the frequency converter supplied! Please do not hesitate to ask if you have any questions at all! We will be happy to help!

NOTICE Risk of damage to the unbalance motor and braking unit due to incorrect combination! The network voltage, network frequency, and vibration frequency must all correspond! The nominal current of the braking unit must be the same as or equal to the maximum current of the unbalance motor. Only connect corresponding units together!

4.2 Disposal of the packaging material

AViTEQ uses the following materials when dispatching unbalance motors, depending on the method of transport:

- Plastic film (PE) for protecting the unit
- Corrugated cardboard for inner and outer packaging
- Wooden crates for outer packaging
- Shredded paper for filler material
- Styrofoam (Flo-Pack) for filler and cushioning material

All packaging materials can be disposed of in accordance with the applicable disposal regulations in the region of delivery.

Cardboard and paper packaging tapes can be recycled in accordance with the valid disposal and re-utilization rules. Where used, packaging films, binding tapes, and foam films are made from polyethylene (PE), while CFC-free padding is generally made from foamed polystyrene (PS). These packaging materials are pure hydrocarbons and can therefore be recycled.

In special circumstances, we use steel packaging straps and wooden boxes that have not been treated with chemicals.

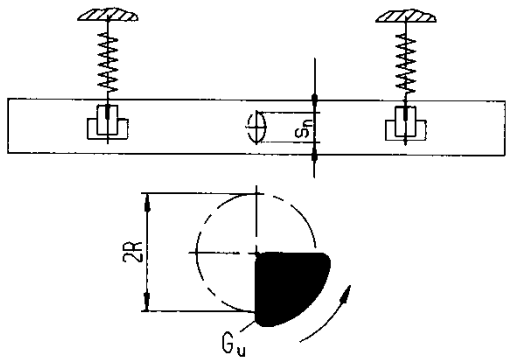
5 Description of the unit

5.1 Operating principle

AViTEQ unbalance motors are designed as single drives or double drives for use in vibrating units for the purposes of carrying, transporting, screening, shaking, loosening, or compacting heavy bulk materials.

INORMATION Heavy bulk materials are transported by means of systematic mechanical vibrations that are transmitted from the unbalance motor to the working unit.

The vibrational movements can be generated in an elliptical, circular, or linear form. The unbalance forces – and therefore also the flow rates – can be adjusted when the unit is at a standstill by twisting the unbalance weights.

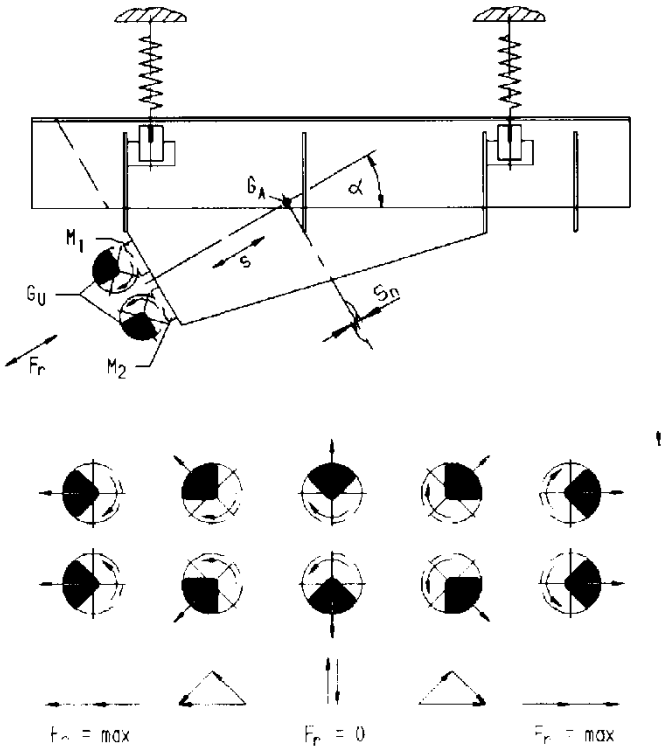


Operating principle for a single drive: circular, elliptical vibration

If a single drive is located at the center of gravity, it generates a circular vibrational movement; outside of this area, it generates an elliptical movement.

A double drive comprising two unbalance motors rotating in opposite directions generates a linear (straight) vibrational movement. The two asynchronous motors ultimately synchronize independently due to the mass forces and the resulting moments of inertia. The accompanying figure is displayed on the next page. The vibrational movement is based on the overall center of gravity of the working unit.

The vibrating unit can be designed as a trough, tube, screen, bunker, chute, table, or similar. A double drive comprising two unbalance motors rotating in the same direction – for example on circular conveyors or spiral conveyors with the thread on the inside or outside – generates a helical vibrational movement.

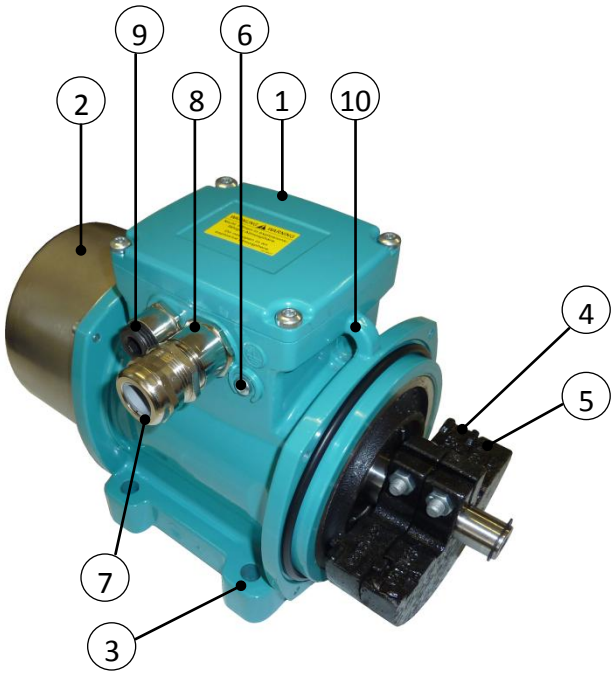


F_r = Resulting unbalance force
G_A = Weight of the working side (working unit)
G_U = Weight of the unbalance motors
M_1 = Unbalance motor 1
M_2 = Unbalance motor 2
s = Direction of vibration
sn = Working stroke of the working unit
α = Angle of impact

Operating principle for a double drive: linear vibrational movement

5.2 Structure

The two shaft ends of the three-phase AC induction unbalance motor are protected with protective covers. The terminal box is an integrated part of the motor housing.



1 Terminal box with cover
2 Protective cover (the cover on the right has been removed)
3 Mounting feet
4 Flyweight (fixed) or segmented disc(s)
5 Flyweight (adjustable) or segmented disc(s)
6 Grounding screw
7 Cable inlet (power supply)
8 Adapters
9 Sealing plug
10 Lifting rings (on both sides) depending on the size

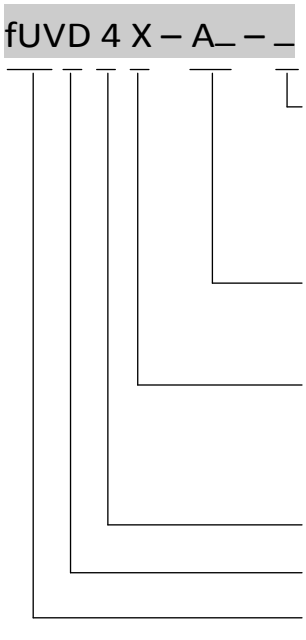
Structure of the unbalance motor using standard drive size “fUVD 4X” as an example

INORMATION The drive shown (fUVD 4X) is supplied without a connection cable as standard. If you would like to connect the PTC thermistor and a possible standstill heater, you must replace the sealing plug (1/2 NPT) with a cable inlet (see Chapter 6.2.4).

5.3 Sizes

5.3.1 Type designations

The AViTEQ unbalance motors are available for delivery in various sizes and designs. The type designation contains the following information:



Additional designation for options that are not standard for the size like …
"H" - standstill heater with 110 V ac operating voltage
"S" - standstill heater with 220 V ac operating voltage

Version number of the drive
(Example: Version: A1.1)

Number of pole pairs according to the table

Designation	Number of poles
Y	2
X	4
W	6
V	8

Centrifugal force in kN

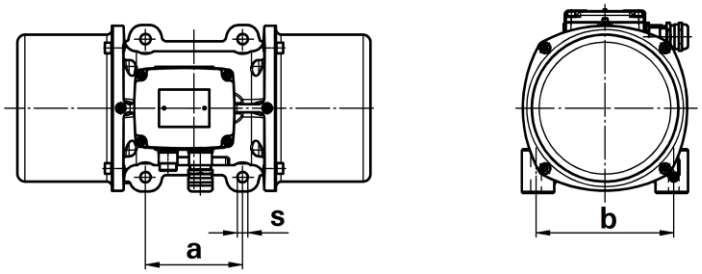
Foot dimensions (see next chapter)

Unbalance motors in the "fUV" series

5.3.2 Housing dimensions and mounting hole measurements

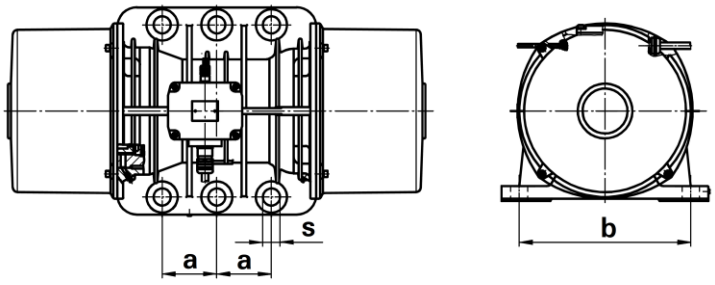
The dimensions of the unbalance motor can be found in the accompanying product datasheet, which is available separately for each drive.

The mounting hole measurements for the unbalance motors are provided on the following pages. Depending on the size, the unbalance motors are secured with 4 or 6 screws.



Designation fUV_...	a [mm]	b [mm]	s [mm]	Number of mounting holes
B	64-72	106	9	4 (M8)
C	90	125	13	4 (M12)
D	105	140	13	4 (M12)
E (1)	120	170	13	4 (M12)
E (2)			17	4 (M16)
F	125	210	17	4 (M16)
G	165	260	26	4 (M24)
H	280	290	26	4 (M24)
K	280	400	33	4 (M30)
L	200	320	28	4 (M27)

(1) fUV**E** 11Y-A2._, fUV**E** 10X-A2._, and fUV**E** 5W-A2._
(2) fUV**E** 7.7Y-A2._, fUV**E** 7X-A2._, and fUV**E** 3W-A2._



Designation fUV_...	a [mm]	b [mm]	s [mm]	Number of mounting holes
N	125	380	38	6 (M36)
P	140	440	44	6 (M42)

5.4 Sound pressure level

The unbalance motor generates a sound pressure level of less than 70 dB(A) without taking into consideration the working unit and the bulk material. The sound pressure level of the unbalance motor when it is ready for use can lie above 70 db(A) depending on the design of the working unit and the acoustic properties of the bulk material. The facility operator is responsible for ensuring that the permitted sound pressure level is complied with by the implementation of appropriate measures.

6 Installation

6.1 Mechanical installation

6.1.1 Safety information for the installation

⚠ DANGER Risk of injury due to falling parts! Always ensure that the unbalance motor is securely attached to the vibrating unit! If it is not attached securely enough, the unbalance motor can fall off and cause fatal injuries! It is not permitted to stand under the unbalance motor!

We recommend installing a steel safety rope to catch the unbalance motor if it breaks loose (see Chapter 6.1.3). Dimension the wire rope (in terms of thickness) so that it can catch the motor. The length of the safety rope should not exceed 6 inches. Secure the wire rope to one of the lifting rings using the appropriate shackles or clamping equipment.

NOTICE Risk of damage to the motor due to improper attachment! Unsuitable fixing bolts and/or insufficient evenness/thickness of the supporting surfaces can result in damage to the vibrating unit and the unbalance motor.

Only use fixing bolts with an adequate minimum property class! Ensure that the mounting surfaces are level and on an even plane as otherwise the mounting feet on the unbalance motor may break. The permitted flatness tolerance is 0.010 inches.

Welding work on the vibrating device can result in deformation of the mounting plate for the unbalance motor and should therefore be avoided.

In the area around the motor feet, the thickness of the mounting plate for the unbalance motor on the vibrating device must at least correspond to the diameter of the appropriate fixing bolts.

Always use new bolts, plain washers and nuts for fixing the unbalance motor. Use plain washers (for example in accordance with ISO 7092-___200HV) for all unbalance motors up to housing size 60 (fUV**F**…) when mounting the drive(s).

Also take note of the safety information at the start of these Instructions for Use and the information regarding the point of operation in Chapter 3.5!

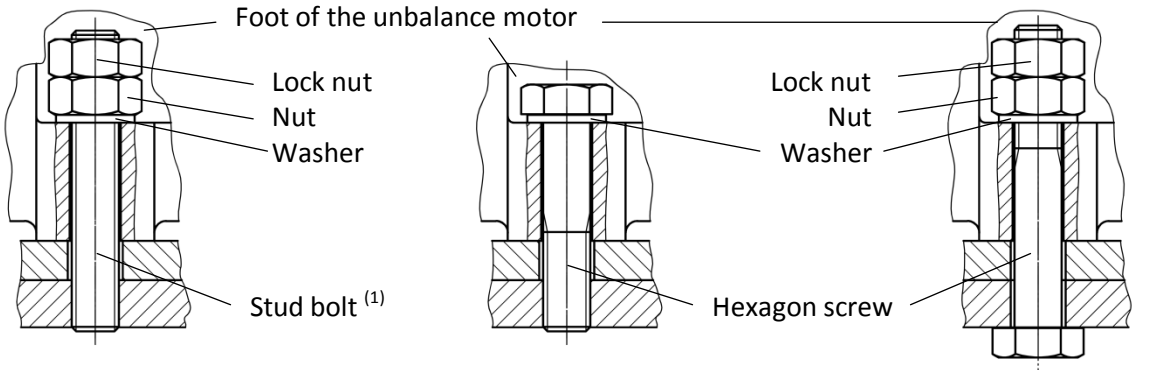
Carry out all work in accordance with the applicable regulations stipulated by the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor.

6.1.2 Fitting the unbalance motor

⚠WARNING Risk of injury due to crushing! Try to prevent the unbalance motor from coming out of the lifting equipment and falling down. Use suitable load attachment devices and lifting equipment.

The unbalance motors can be fitted in any position. However, the mounting surface must be completely level! Figure 6-1 shows the possible mounting options.

Mounting options



(1) Using stud bolts for fastening the drive is possible for special cases, although AViTEQ does not recommend this kind of fixing.

Figure 6-1 Fastening the drive

Proceed as follows:

1 Clean the mounting surfaces on the unbalance motor and vibrating unit to remove residual dirt, oil, and paint. The mounting surfaces must be level, burr-free, and firm. The allowed surface roughness Ra is 6.3 micrometer.
2 Use suitable lifting equipment to position the unbalance motor on the vibrating unit in such a way that the mounting holes on each device are aligned.
3 Use galvanized screws. Clean the screw threads to remove any oil residues.
4 Screw the unbalance motor to the working unit. Use plain washers (for example in accordance with ISO 7092-___200HV) for all unbalance motors up to housing size 60 (fUV**F**…) when mounting the drive(s). Tighten the fixing bolts in the following sequence as shown on the following page depending on the drive type:

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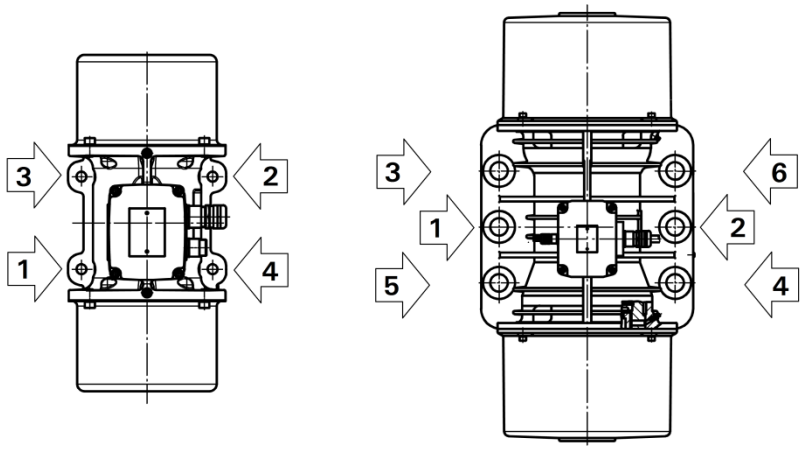


Use Table 6-a to establish the appropriate tightening torque for the bolts.

Designation (type) fUV_....	Metric		American	
	Screw size	Tightening torque (Strength class 8.8)	Screw size	Tightening torque (Grade 5)
B	M 8	25 Nm	5/16-18 UNC	155 in-lbs
C; **D** and **E** (1)	M12	85 Nm	1/2-13 UNC	56 ft-lbs
E (2) and **F**	M16	210 Nm	5/8-11 UNC	110 ft-lbs
G and **H**	M24	730 Nm	7/8-9 UNC	320 ft-lbs
L	M27	1,080 Nm	1-8 UNC	480 ft-lbs
K	M30	1,450 Nm	1 1/4-7 UNC	840 ft-lbs
N	M36	2,360 Nm	1 3/8-6 UNC	1,370 ft-lbs
P	M42	3,800 Nm	1 5/8-5 UNC	2,090 ft-lbs

Table 6-a Bolt tightening torques for galvanized bolts

(1) fUV**E** 11Y-A2._; …10X-A2._ and … 5W-A2._
(2) fUV**E** 7,7Y-A2._; … 7X-A2._ and … 3W-A2._

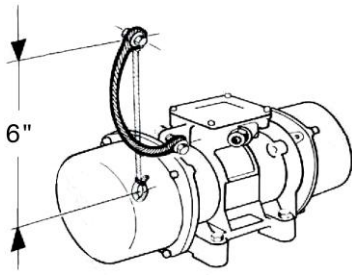
⚠ DANGER Risk of injury due to falling parts! If it is not attached securely enough, the unbalance motor can fall off and potentially cause fatal injuries! Carry out checks at regular intervals to establish whether the bolt tightening torques have reduced due to subsidence. If necessary, tighten the bolts to prevent the unbalance motor from coming loose.

INORMATION Empirical research has shown that the majority of faults and damage are caused due to the unbalance motor not being appropriately secured!

6.1.3 Catch mechanism

⚠ Install a catch mechanism if there is a risk of an unbalance motor falling and injuring someone.

We recommend installing a steel safety rope to catch the unbalance motor if it breaks loose (see figure). Dimension the wire rope (in terms of thickness) so that it can catch the motor. The length of the safety rope should not exceed 6 inches. Secure the wire rope to one of the lifting rings using the appropriate shackles or clamping equipment.



6.2 Electrical installation

6.2.1 Safety information for the electrical installation

⚠ DANGER Risk of electric shock during installation!

Avoid accidents by taking note of the regulations! Grounding, protective multiple grounding, and protection circuits are subject to the applicable regulations and directives of the relevant energy supply company! The electrical installation is only to be carried out by qualified, specialist personnel.

Disconnect the wiring and check that the system is no longer live! Ensure that there is no possibility of the system switching on accidentally.

If you operate the unbalance motor in an area at risk of dust explosions (Class II, etc.), you must take particular care with the electrical installation! Explosions can lead to fatal injuries and cause significant material damage!

Risk of ignition when discharging! Never open a terminal box cover in an area at risk of dust explosions while the terminals inside it are live. Failure to observe this warning can cause an explosive dust/air mixture to ignite. In addition, the IP66 protection class must not be lowered. If the seal on the terminal box cover is damaged, replace it immediately. Only original replacement seals supplied by AViTEQ are authorized for use.

Risk of ignition when discharging! Ground the housing for the unbalance motor with the adjacent construction. A suitable grounding screw is provided on the outside of the housing.

Risk of ignition due to impermissibly high surface temperatures on the unbalance motor. If you use the unbalance motor in an area at risk of dust explosions, then you must connect the PTC thermistor and monitor it to prevent impermissibly high surface temperatures from building up. Also protect the drive with a motor circuit breaker!

NOTICE Risk of damage to the motor due to excessive current draw! It is expressly prohibited for the current draw of the unbalance motor to exceed the nominal current value displayed on the type plate, as this results in excessive temperatures. The permitted service factor is 1.0!

Protect each unbalance motor with its own motor circuit breaker! It is not permitted to add the currents of several unbalance motors together and then manage them using a common motor circuit breaker! The motor circuit breaker must be adjusted to suit the nominal current of the unbalance motor as shown on the type plate!

Please note the following information: In the case of a double drive, the drives must be connected so that both drives shut down in the event that one unbalance motor fails. Single motor operation is not permitted in the case of two drives and may result in damage to the unbalance motors and/or the vibrating unit!

Risk of damage to the motor due to overheating! Please observe: If the PTC thermistor of the unbalance motor is not monitored, the maximum permitted switching frequency is 15 switching operations (ON/OFF) per hour.

You can protect the unbalance motor against overheating by monitoring the PTC thermistor. AViTEQ recommends monitoring the PTC thermistor even when this is not a specific requirement. This relates in particular to drive types fUVK, fUVN, and fUVP with pre-installed connection cables for the PTC thermistor!

Risk of damage to the motor due to faulty power supply! All unbalance motors must be connected to and operated using all three phases (with the exception of single-phase drives)! Two-phase operation is not permitted and expressly prohibited.

The safety information at the start of these Instructions for Use must also be observed!

All electrical installation work is only to be carried out by personnel with the appropriate qualifications in accordance with the applicable regulations of the NEC® (National Electrical Code) (NFPA® 70).

6.2.2 Overload protection

Unbalance motors are generally connected to the three-phase network via a braking unit or frequency converter. The overload protection must be designed in accordance with the applicable regulations. If you use the unbalance motor in an area at risk of dust explosions (Class II), then the overload protection must be designed in accordance with the applicable regulations for this type of area. You must observe the safety information in Chapter 6.2.1!

6.2.3 Connection cable

In the case of the following unbalance motor types:
- fUV**K**… (housing size: 95)
- fUV**N**… (housing size: 97)
- fUV**P**… (housing size: 100)

AViTEQ supplies each drive with a pre-installed connection cable (approx. 6.0 meters long each) for connecting the power supply, the PTC thermistor, and the standstill heater (optionally).

⚠ DANGER Risk of ignition when disassembling the pre-installed connection cable for the PTC thermistor, the standstill heater (optionally), or the power supply.

Unbalance motors with housing sizes 95 and above (fUVK, fUVN, and fUVP) are supplied with pre-installed connection cables. This is in accordance with the specifications of the accompanying approval document (CSA Certificate of Compliance, etc.).

It is therefore not permitted to remove or replace this connection cable. This also applies if you use the unbalance motor in a normal area with no risk of explosions.

For types fUVB to fUVL (housing sizes 00 to 90), it is the responsibility of the user to select an appropriate cable for use in either normal areas or those at risk of explosion and to connect this properly.

⚠ DANGER Risk of ignition and/or electric shock due to broken cables when operating with unauthorized connection cables (power supply).

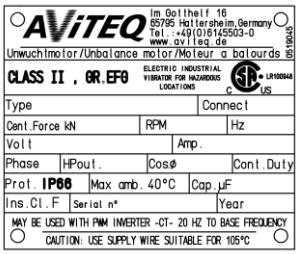
Up to housing size 90 (fUVL), the unbalance motors are supplied as standard without a connection cable. When using the device, select an authorized, flexible, connection cable that:

- corresponds to the applicable regulations (National Electrical Code)
- has sufficient dielectric strength
- is CSA approved
- has a suitable cable diameter for the cable inlet (see Table 6-b)
- is approved for temperatures of +105°C.

If you operate the unbalance motor in an area at risk of dust explosions (Class II, etc.), then select a connection cable (for the power supply and PTC thermistor) that is approved for this environment.

As a flexible connection cable (for the first 3 to 4 meters), we recommend the Royal Sovereign® 600V SOOW by Coleman Cable (www.colemancable.com).

Royal Sovereign® is a trademark of Coleman Cable Inc., Waukegan, Illinois.



Dimension the connection cable according to the nominal current (see type plate). The outer diameter of the cable must fit the cable feedthrough on the terminal box.

Motor protection

The unbalance motor is supplied with a triple PTC thermistor. If you would like to operate the unbalance motor without a PTC thermistor, a four-core cable will suffice. When using the triple PTC thermistor, you will also require a two-core cable for the PTC thermistor. With a possible standstill heater we recommend to use a four-core cable for connecting both, the PTC thermistor and the standstill heater.

INORMATION If you would like to connect the PTC thermistor and a possible standstill heater, you must replace the sealing plug (1/2 NPT) with a cable inlet (see Chapter 6.2.4).

Specific installation information

To avoid damage to the cables, the wiring should be fixed except for the last 0.5 m leading to the unbalance motor. This part of the cables must sag freely to prevent any tensile loads caused by the vibration movements.

⚠ DANGER Risk of short-circuit, electric shock and ignition due to frayed connection cables! Connection cables must never come into contact with moving parts as this can damage the insulation. Route the cable in a way that eliminates this hazard!

NOTICE Risk of cables breaking due to cable resonance! Change the lengths of the cables if the connection cable starts to swing as a result of going into resonance during operation. Changing the length (whether shortening or lengthening) changes the resonance so that the cable remains still.

6.2.4 Cable inlets, adapters, and sealing plugs

⚠ DANGER Explosions can lead to fatal injuries and cause significant material damage! If you use the unbalance motor in an area at risk of dust explosions, then please note the following information:

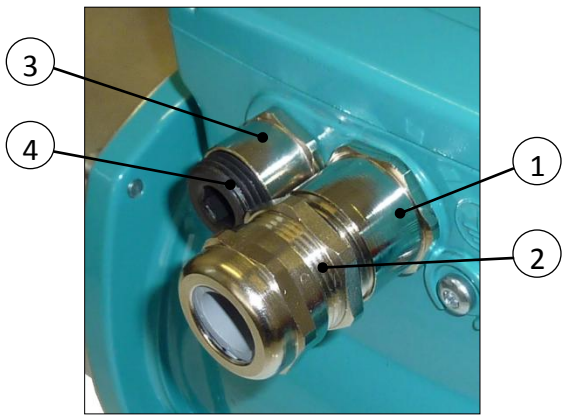
- AViTEQ supplies the unbalance motors with a cable inlet attached as standard for the power supply cable (NPT thread). If the cable connector is missing or damaged, then use an appropriate cable inlet with a temperature resistance of at least +100 °C. The cable inlet must also meet the requirements for areas at risk of dust explosions (Class II, etc.), be CSA approved, and conform to protection class IP66 at least.
- If you replace the sealing plugs with a cable inlet (1/2" NPT thread), then use an appropriate cable inlet with a temperature resistance of at least +100 °C. The cable inlet must also meet the requirements for areas at risk of dust explosions (Class II, etc.), be CSA approved, and conform to protection class IP66 at least.

Risk of dust explosions due to failure to observe this information! Before commissioning the device, check whether all adapters, cable inlet(s), and the sealing plug (if it has not been replaced with a cable inlet) are available and appropriately secured! Tighten all loose adapters, cable inlets, and the sealing plug to ensure that no dust can enter the terminal box.

INORMATION **If you would like to connect the PTC thermistor and a possible standstill heater, you must replace the sealing plug (1/2 NPT) with a cable inlet (see Table 6-b, position ⑤).**

All necessary cable inlets, adaptors, and sealing plugs can be obtained from AViTEQ as required. You can find more detailed information in Table 6-b.

Designation (type) fUV_....	Order numbers (AViTEQ)				
	Adapter ①	Cable inlet (mains) ②	Adapter ③	Sealing plug ④	Cable inlet (PTC thermistor) ⑤
B and **C**	70844	70841 1/2” NPT	70844	70847 1/2” NPT	70841 1/2” NPT
D	70844	70842 3/4” NPT	70844	70847 1/2” NPT	70841 1/2” NPT
E	70845	70842 3/4” NPT	70851	70847 1/2” NPT	70841 1/2” NPT
F and **G**	70845	70842 3/4” NPT	70844	70847 1/2” NPT	70841 1/2” NPT
H and **L**	70846	70843 1” NPT	70844	70847 1/2” NPT	70841 1/2” NPT
K; **N** and **P**	70846	70843 1” NPT	70844	70847 1/2” NPT	70841 1/2” NPT



Cable inlet	Cable diameter
1/2” NPT	6 to 12 mm
3/4” NPT	9 to 16 mm
1” NPT	13 to 20 mm

Table 6-b Cable inlets, adapters, and sealing plugs

6.2.5 Wiring diagrams

The AViTEQ unbalance motors are designed for continuous operation (S1 mode).

When operating without a braking unit or frequency converter, the unbalance motors with a double drive must be connected and protected as shown in Figure 6.2 or 6.3 (information on terminal connections can be found in the following chapter – 6.2.6).

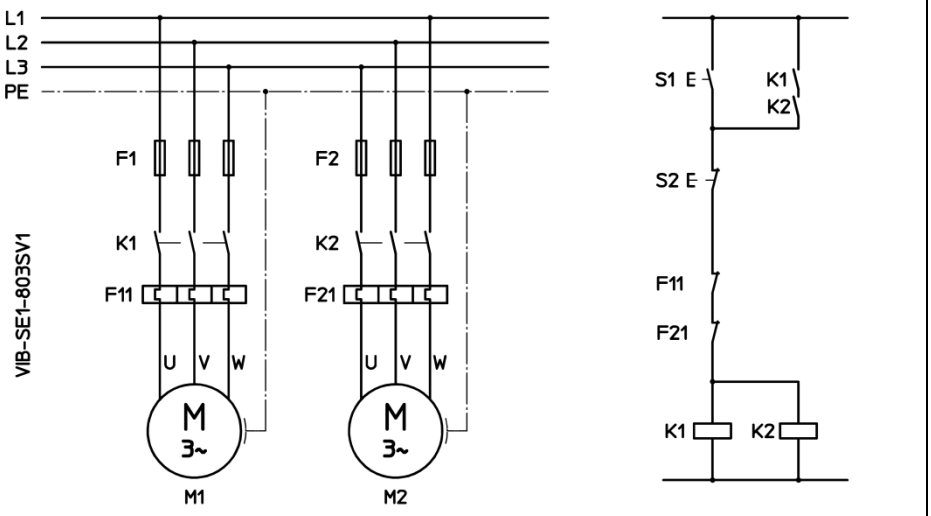


Figure 6.2 Wiring diagram for direct operation with two interlocking unbalance motors **without** monitoring the PTC thermistors

⚠ DANGER If you operate the unbalance motor in an area at risk of dust explosions (Class II, etc.), you must take particular care with the electrical installation! Explosions can lead to fatal injuries and cause significant material damage!

Risk of ignition due to impermissibly high surface temperatures on the unbalance motor. If you use the unbalance motor in an area at risk of dust explosions, then you must connect the PTC thermistor and monitor it to prevent impermissibly high surface temperatures from building up. Also protect the drive with a motor circuit breaker!

INORMATION As a thermistor motor protection monitoring relay, we recommend the ABB type: CM-MMS.23S (order number: 1SVR730700R2200 (www.abb.com/us).

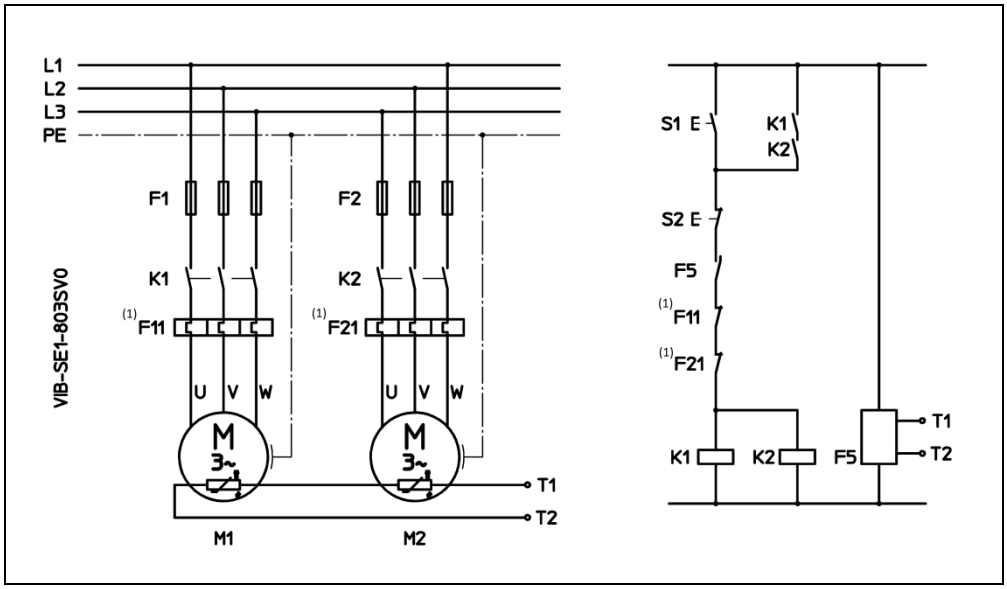


Figure 6.3 Wiring diagram for direct operation with two interlocking unbalance motors **with** monitoring the PTC thermistors

(1) If the unbalance motors are protected by monitoring the PTC thermistors, motor circuit breakers are not a must but often additionally recommended.

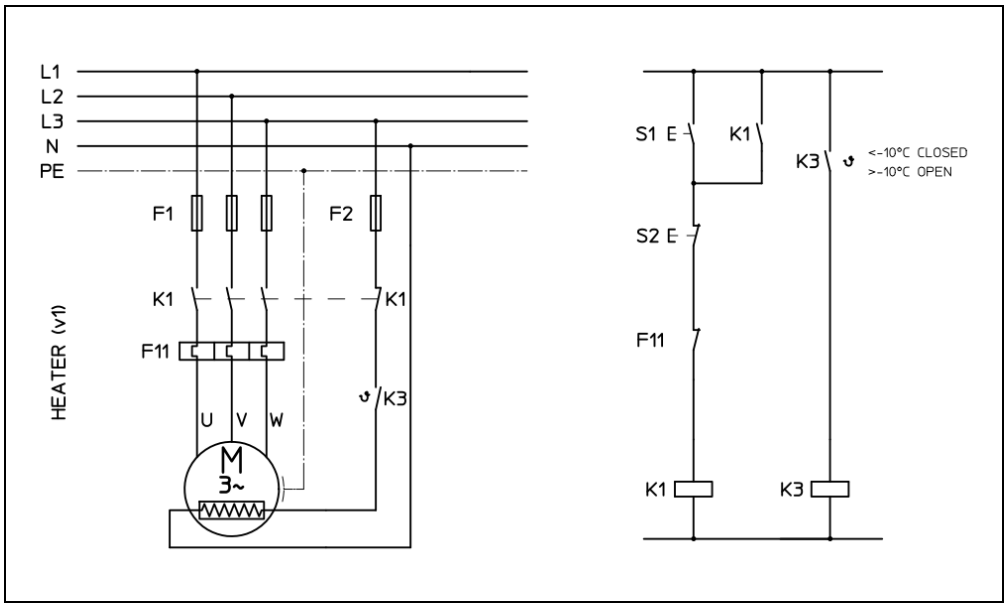


Figure 6.4 Wiring diagram for connecting a standstill heater

NOTICE Risk of damage to the drive due to overheating! The allowed temperature range for switching ON the standstill heater is -40 °C (-40 °F) to -10 °C (+14 °C).

INORMATION The allowed temperature range for operating an unbalance motor with a standstill heater is -40 °C (-40 °F) to +40 °C (+104 °C).

6.2.6 Power supply

- ☞ Open the terminal box cover by removing the 4 appropriate screws, and remove the foam framework that serves to cushion the cables from swinging within the terminal box (some motor models may only include one piece of foam).
- ☞ Remove the accompanying nuts (x6), jumpers (x3), lock washers (x6), and discs (x6) from the pouch. These are required to secure the cable lugs. The terminal box also contains an information sheet that shows the different options for connecting the terminals.

The terminal connections depend on the motor type and whether a PTC thermistor is required. The option is also available to choose between a star connection (high voltage) and delta connection (low voltage).

Read the "Connect" line on the motor type plate to ascertain the appropriate connection designator. If you cannot find the information sheet inside the terminal box, please observe the specifications in Figures 6.5 and 6.6, which illustrate the four most common terminal connections.

NOTICE Risk of damage to the motor due to faulty power supply! All unbalance motors must be connected to and operated using all three phases (with the exception of single-phase drives)! Two-phase operation is not permitted and expressly prohibited.

INORMATION The winding ends are always connected in the same direction within the field of rotation. This makes it easier to connect the cable for selecting the direction of rotation.

- ☞ Find the appropriate diagram amongst the drawings displayed and complete the wiring as shown in the relevant diagram. Always use cable ends that have ring lugs. The necessary nuts, jumpers, and discs can be found loose in the terminal box.

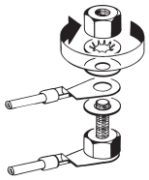


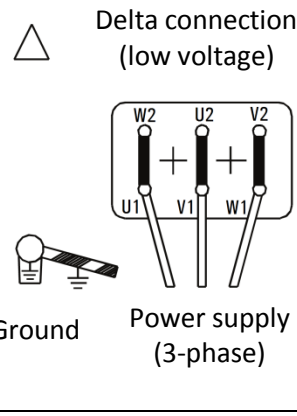
Diagram **2A**	

Figure 6.5 Connection diagrams for terminal box wiring (Diagram 2A)

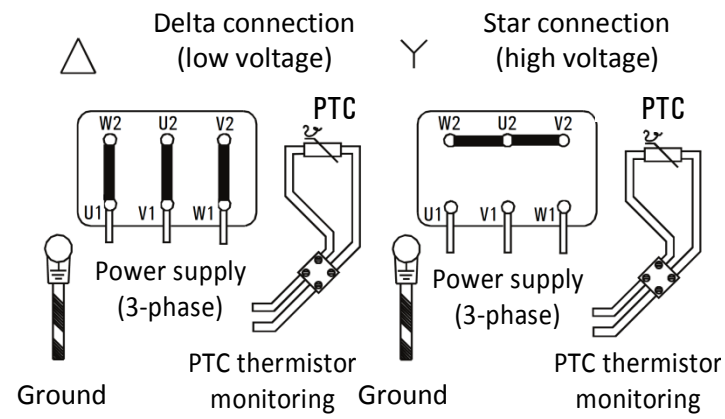
Diagram **5A**	

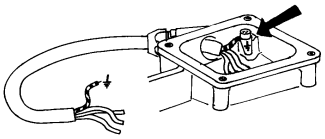
Figure 6.6 Connection diagrams for terminal box wiring (Diagram 5A)

When tightening the nuts in the terminal box, you must observe the respective nut tightening torques as shown in Table 6-c below.

Thread size	Bolt tightening torque [Nm]	Bolt tightening torque [ft lbs]
M 4	1.2	0.88
M 5	2.0	1.48
M 6	3.0	2.20
M 8	6.5	4.80

Table 6-c Nut tightening torques

Optionally the unbalance motor can be built with a standstill heater with an operation voltage of 110 V ac or 220 V ac. If a standstill heater exists, study Chapter 6.2.8.



☞ Always ground the housing via the additional protective ground connection located inside the terminal box.

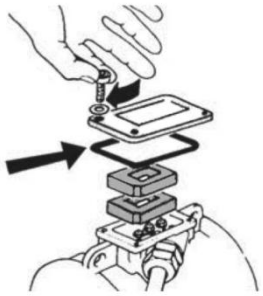
⚠ DANGER Explosions can lead to fatal injuries and cause significant material damage!

Risk of ignition when discharging! Before closing the terminal box, check whether the seal is in place and undamaged. If this seal is missing or damaged then it is possible for dust to find its way into the terminal box, which can cause an explosive dust/air mixture to ignite. Be aware of this potential risk and only fit the terminal box cover if the seal is in place and undamaged.

NOTICE Risk of cable damage due to crossed individual wires in the terminal box! Route the individual wires in the terminal box so that they do not touch or cross over.

INORMATION The supporting surface of the terminal box seal on the terminal box itself (the casting) is coated with a thin layer of silicone lubricant. This allows the terminal box cover to be removed at a later stage without damaging the accompanying seal. With this in mind, always make sure that there is a thin layer of silicone lubricant when installing the terminal box cover.

- ☞ Position the foam framework around the terminal block.
- ☞ Seal the terminal box by screwing down the cover, making sure that the seal is in the correct position beneath the cover! Tighten the fixing bolts for the terminal box lid crosswise, making sure to observe the following bolt tightening torques in Table 6-d below.



Designation (type) fUV_....	Thread size	Bolt tightening torque [Nm]	Bolt tightening torque [ft lbs]
B; **C**; **D**; **E**; **F** and **G**	M 6	10	7.4
H; **K**; **L**; **N** and **P**	M 8	22	16.5

Table 6-d Bolt tightening torques (terminal box cover)

6.2.7 Single-phase operation

Some unbalance motors are designed and built for single-phase operation. You can ascertain this information from the specification in the “Phase” field on the type plate.

AViTEQ supplies the unbalance motors **without** an accompanying capacitor.

You can find the capacitor value in the “Cap µF” field on the type plate. If 20 is listed then a 20 µF capacitor is required. If 30/10 is listed then a 30 µF capacitor is required to start the drive as well as a 10 µF capacitor to operate it.

NOTICE Risk of damage to the motor due to incorrect installation! Install the accompanying capacitor in an area free from vibrations. The capacitor must never be attached directly to the unbalance motor. Be aware of this information to prevent any damage to the capacitor.

6.2.8 Standstill heater

With an unbalance motor that is equipped with a standstill heater you should find the following label on the housing of the drive.

There are two possible supply voltages for the standstill heater: 110 V ac or 220 V ac. To find out about the present supply voltage, please observe the type label of the drive. A supply voltage of 110 V ac is marked with the letter “H” in the designation (for example fUV…-A1.1-**H**), a supply voltage of 220 V ac with the letter “S”.

Please observe figure 6-4 that gives you further information about connecting the standstill heater.

⚠ DANGER Explosions can lead to fatal injuries and cause significant material damage!

Risk of ignition caused by an excessive heating of the drive! Never operate the unbalance motor with a switched on standstill heater that is available as an option. With an installed standstill heater it is mandatory to connect and monitor the PTC thermistor of the drive. Observe this to avoid an excessive heating of the drive and thus a possible ignition source.

⚠ DANGER Risk of electric shock! Touching live parts can be fatal! Please observe: If the unbalance motor is equipped with a standstill heater that is connected to the mains, the standstill heater must be protected against short circuit (see figure 6-4).

A standstill heater for a mains voltage of 110 V has a current consumption of some 0.3 amps. A standstill heater for a mains voltage of 220 V has a current consumption of some 0.15 amps.

NOTICE Risk of damage to the drive due to overheating! The allowed temperature range for switching ON the standstill heater is -40°C (-40°F) to -10°C (+14°C).

INORMATION The allowed temperature range for operating an unbalance motor with a standstill heater is -40 °C (-40 °F) to +40 °C (+104 °C). For further information, please observe figure 6-4.

You can shorten the two (normally black wires) of the standstill heater inside the terminal box, if required and connect the heater cables with butt and parallel connectors or alternative connectors.

7 Commissioning

NOTICE Risk of damage to the motor due to connecting an impermissible mains voltage and/or mains frequency! Unsuitable control systems (braking unit or frequency converter) or connections to an inappropriate mains voltage and/or mains frequency can result in damage to the unbalance motor and are therefore not permitted. Only put the unbalance motor into operation if the network voltage and network frequency correspond to the specifications on the type plate for the unbalance motor.

7.1 Adjusting the centrifugal force

⚠ DANGER Risk of injury due to coming into contact with rotating flyweights! If the protective cover has been removed, there is a risk of coming into contact with rotating flyweights and suffering potentially fatal injuries! Before opening the protective covers, switch off the unbalance motor and secure it so that it cannot be switched on again accidentally. Check that the system is no longer live!

⚠ CAUTION Crushing hazard! Handling the flyweights presents a crushing hazard for your fingers! The flyweights should be easy to rotate and point downwards along the center of gravity!

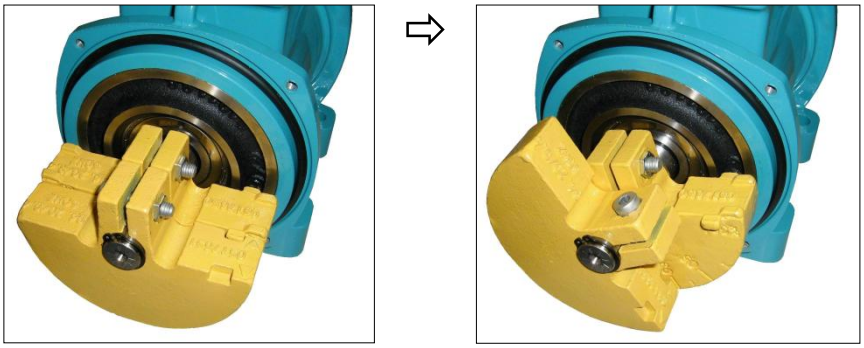
NOTICE Risk of premature failure of the unbalance motor in the event of insufficient centrifugal force! Avoid flyweight settings of below 50 percent. If the centrifugal force is too low, this reduces the radial contact pressure on the shaft bearings, which can cause premature bearing failure (motor damage).

When planning flyweight settings of below 50 percent, check whether you may be able to reduce the size of the motor. Please do not hesitate to ask if you have any questions.

Risk of parasitic vibrations and damage to the vibrating unit due to irregular flyweight settings! Always set the same flyweight value (as a percentage) at the shaft ends of the unbalance motor.

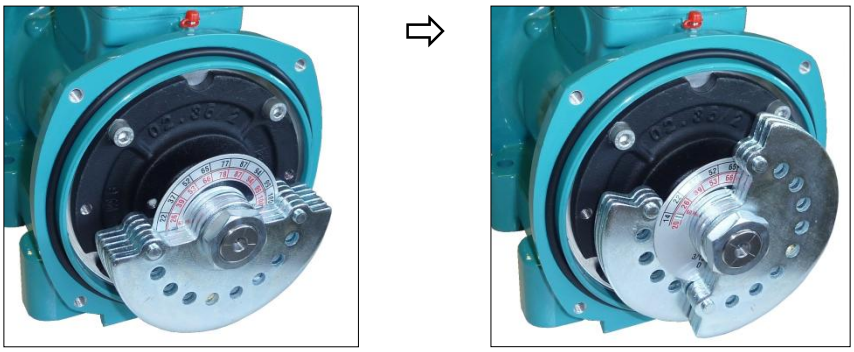
Various flyweight models and adjustments are used depending on the size and vibration frequency required. Familiarize yourself with the following images and proceed as follows:

☞ First remove the two protective covers. To do this, unscrew the appropriate fixing bolts.



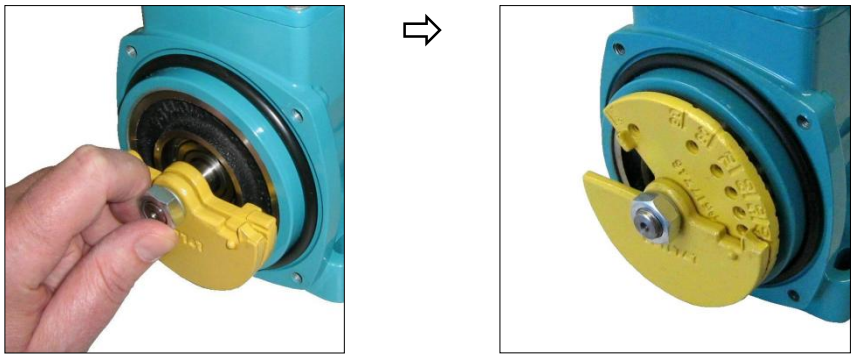
- ☞ Loosen the clamping bolts for the respective outer flyweights (only the outer weights)
- ☞ Rotate the respective flyweight disc until you reach the required percentage mark for the centrifugal force!
- ☞ Retighten the clamping bolts on the flyweights. The appropriate bolt tightening torque (strength class 12.9) can be found in Table 7-a.

Figure 7.1 Adjusting the flyweights (using the fUVD 4X as an example)



- ☞ Loosen the shaft nuts and unscrew them until you are able to rotate the disc pack in front of the scale against the discs behind the scale.
- ☞ Rotate the respective disc pack until you reach the required percentage mark for the centrifugal force with the upper edge of the weight and the weight is suitably locked into place.
- ☞ Retighten the appropriate shaft nuts. The appropriate bolt tightening torque can be found in Table 7-a.
- ☞ Please note: The scale is only valid for the entire outer disc packet (not for the individual discs within it)!

Figure 7.2 Adjusting the flyweights (using the fUVE 11Y as an example)



- ☞ Loosen the shaft nuts and unscrew them until you are able to rotate the front flyweight disc against the rear disc with the scale.
- ☞ Rotate the respective flyweight disc until you reach the required percentage mark for the centrifugal force and the weight is suitably locked into place.
- ☞ Retighten the appropriate shaft nuts. The appropriate bolt tightening torque can be found in Table 7-a.

Figure 7.3 Adjusting the flyweights (using the fUVB 1Y as an example)

Clamping bolts			**Shaft nuts**		
Screw size	Tightening torque (Strength class 12.9)		Screw thread	Tightening torque	
	[Nm]	[ft lbs]		[Nm]	[ft lbs]
M 8	38	28	M13x1.0	30	22
M10	74	54	M15x1.0	48	36
M12	125	92	M20x1.0	98	72
M14	200	148	M25x1.5	170	124
M16	320	236	M30x1.5	340	250

Table 7-a Bolt tightening torques for clamping bolts and shaft nuts

- ☞ Check the sealing surfaces as well as the seals on the protective covers. These must not show any signs of damage.
- ☞ Slide the protective covers back on and screw them in place. The appropriate bolt tightening torque can be found in Table 7-b on the following page.

Designation (type) fUV_....	Thread size	Bolt tightening torque [Nm]	Bolt tightening torque [ft lbs]
B; **C** and **D**	M 6	10	7.4
E; **F**; **G** and **H**	M 8	22	16.5
K; **L**; **N** and **P**	M10	48	36.0

Table 7-b Bolt tightening torques (protective covers)

7.2 Initial commissioning

⚠ DANGER Explosions can lead to fatal injuries and cause significant material damage.

Risk of ignition due to colliding parts! Collisions between parts can be potential sources of ignition. Before switching the machine on for the first time, make sure that the vibrating unit can vibrate freely, it is not in a position to strike against adjacent parts, and also that all fixing bolts are tight. Before operating the unbalance motor, remove all parts from the vibrating unit that are loose or unsecure.

Before commissioning for the first time, check whether all motor fixing bolts have been tightened to the appropriate torque and that all installation work is complete.

⚠ DANGER Risk of injury due to falling parts! Always ensure that the unbalance motor is securely attached to the vibrating unit! If it is not attached securely enough, the unbalance motor can fall off and cause fatal injuries! It is not permitted to stand under the unbalance motor.

Check the electrical wiring to the unbalance motor once again and ensure that the motor is only being operated with the current, voltage, and frequency values specified on the type plate.

7.2.1 Single drive

In a single drive, the direction of rotation for the unbalance motor can be freely selected.

7.2.2 Double drive

If unbalance motors are installed in pairs, the direction of rotation must be set according to the required form of vibration. For linear vibrations, the motors must rotate in opposite directions. For torsional vibrations (helical vibrations), the motors must rotate in the same direction.

Check the rotational direction of the drives by briefly switching them on (for a maximum of 2 seconds) and removing the upper protective cover on the unbalance motor in the process.

To check the direction of rotation, simply switch the unit on then quickly switch it back off again.

⚠ DANGER Risk of injury due to coming into contact with rotating flyweights! If the protective cover has been removed, there is a risk of coming into contact with rotating flyweights and suffering potentially fatal injuries! Ensure that you and others keep your distance and that no objects can enter the area surrounding the flyweights!

Changing the direction of rotation

☞ If the direction of rotation for an unbalance motor is incorrect, switch two or three phases on the motor connection cable.

⚠ DANGER Risk of electric shock! Touching live parts can be fatal! Once the mains voltage is connected, some of the parts inside the terminal box for the unbalance motor are live with potentially fatal voltages.

Before switching the phases, switch off the unbalance motor and secure it so that it cannot be switched on again accidentally. Check that the system is no longer live before reconnecting it!

NOTICE Risk of parasitic vibrations and damage to the vibrating unit due to incorrect direction of rotation! Always ensure that both unbalance motors are rotating in the correct direction as even short-term operation in the wrong direction can result in significant damage to the vibrating unit.

7.2.3 Final checks

- To finish the commissioning process, please check that all protective covers are attached appropriately, all fixing bolts for the protective covers have been tightened, and that each terminal box is sealed correctly.
- Check the functions of the vibrating unit. If necessary, you may need to readjust the settings for the flyweights.
- Ensure that both unbalance motors are rotating in the correct direction in the case of a double drive!
- Ensure that there are no loose parts that could come into contact with the unbalance motor or vibrating unit. This could otherwise lead to malfunctions, noise, damage, and/or sources of ignition being produced.
- Check the current draw for all unbalance motors. If the current exceeds the value specified on the type plate, you must reduce the centrifugal force by changing the flyweight settings. Please contact AViTEQ. After making any changes, check once again whether the current draw is smaller or equal to the value on the type plate.

⚠ DANGER Risk of short-circuit and/or electric shock while measuring! Take note of the applicable regulations when measuring live parts! Take appropriate measures to prevent coming into contact with live parts!

NOTICE Risk of damage to the motor due to excessive current draw! It is expressly prohibited for the current draw of the unbalance motor to exceed the nominal current value displayed on the type plate, as this results in excessive temperatures. The permitted service factor is 1.0!

8 Maintenance

8.1 Safety information for maintenance

⚠ DANGER Risk of injury during maintenance work due to electric shock or unexpected activation of the drives! Disconnect the wiring and check that the system is no longer live. Ensure that there is no possibility of the system switching back on accidentally.

⚠ CAUTION Risk of burns or skin irritations! Before carrying out any work, check whether the surface temperature of the unbalance motor is below +50°C (+122°F) to prevent the possibility of burns or skin irritations.

8.2 Regular inspections

We recommend carrying out the following inspections under consideration of the relevant intervals:

Inspection intervals	Inspections
2 operating hours after the initial commissioning process	- Check bolted connections (working unit/drive) - Check that connection cable does not swing - Check connection cable for damages - Check noise development
24 operating hours after the initial commissioning process	- Check bolted connections (working unit/drive) - Check that connection cable does not swing - Check connection cable for damages - Check noise development - Check condition of the protective covers and the terminal box cover
Every day	- Check noise development
Every week	- Check that connection cable does not swing - Check connection cable for damages
Every month	- Check bolted connections (working unit/drive)
Every six months	- Check condition of the protective covers and the terminal box cover

Table 8-a Regular inspections

8.3 Replacing the seals

⚠ DANGER Risk of injury due to coming into contact with rotating flyweights! If the protective cover has been removed, there is a risk of coming into contact with rotating flyweights and suffering potentially fatal injuries! Before opening the protective covers, switch off the unbalance motor and secure it so that it cannot be switched on again accidentally. Check that the system is no longer live!

To replace the seals, remove the terminal box cover and the two protective covers on the unbalance motor. Replace the relevant seals if these are damaged. Then replace the terminal box cover and the protective covers.

Observe the relevant bolt tightening torques in Table 6-d and Table 7-b.

⚠ DANGER Explosions can lead to fatal injuries and cause significant material damage!

Only use original seals provided by AViTEQ. We recommend using a little silicone lubricant to provide better adhesion between the O-ring seals and the terminal box lid/protective covers.

8.4 Lubricating the bearings

The motor bearings are lubricated for life. For unbalance motors of size fUVE and above that are fitted with a lubricating nipple, the bearings can be relubricated. The relevant lubricating nipples (type: DIN 71412-AM) can be found on the outer housing and are generally protected with plastic caps.

Systematic relubrication increases the service life of the bearings in the unbalance motor. You can find the required volume of lubricant for the relubrication process – along with the recommended lubricant type used by AViTEQ – in the following tables.

Unbalance motor type	Bearing type	New volume of lubricant per bearing	Bearing replacement interval without relubrication (**60** Hz mains)	Relubrication interval	Permitted number of relubrications	Volume of lubricant for relubrication per	Type of lubricant	Bearing replacement interval with relubrication (**60** Hz mains)
fUVB 1 Y-A1	6302	-	5,625 h	-	Lubrication not	-	-	-
fUVB 0.3 X-A1	2ZR.C3	-	100,000 h	-	possible			-
fUVB 1.9 Y-A1	6302	-	2,875 h	-	Lubrication not	-	-	-
fUVB 0.7 X-A1	2ZR.C3	-	100,000 h	-	possible	-		-
fUVC 3 Y-A1	6304	-	3,250 h	-	Lubrication not	-	-	-
fUVC 1.5 X-A1	2ZR.C3	-	50,000 h	-	possible	-		-
fUVC 2.1 X-A1		-	20,000 h	-		-		-
fUVD 5 Y-A1	6306	-	4,375 h	-	Lubrication not	-	-	-
fUVD 4 X-A1	2ZR.C3	-	13,375 h	-	possible	-		-
fUVD 5.4 X-A1		-	4,500 h	-		-		-
fUVE 7.7 Y-A2	6309	-	7,060 h	-	Lubrication not	-	-	-
fUVE 7 X-A2	2Z C4 WT	-	12,200 h	-	possible	-		-
fUVE 3 W-A2		-	100,000 h	-		-		-
fUVE 11 Y-A2	NJ306E-	12 g	-	2,000 h	3	6 g	ISOFLEX NBU 15	6,150 h
fUVE 10 X-A2	TVP2.C4.BL	12 g		5,000 h	3	6 g	STABURAGS NBU 8EP	15,940 h
fUVE 5 W-A2	6308 2Z C3	-	10,150 h	-	Lubrication not possible	-	-	-
fUVF 20 Y-A2	NJ2308E-	30 g	-	2,500 h	5	16 g	ISOFLEX NBU 15	13,950 h
fUVF 18 X-A2	TVP2.C4.BL	30 g		6,000 h	5	16 g	STABURAGS NBU 8EP	32,000 h
fUVF 11 W-A2	6311	-	14,000 h	-	Lubrication not	-	-	-
fUVF 6 V-A2	2Z C3	-	100,000 h	-	possible	-		-
fUVF 24 X-A2	NJ2309E- TVP2.C4.BL	35 g	-	3,500 h	6	18 g	STABURAGS NBU 8EP	21,800 h
fUVF 16W-A2	6313	-	45,600 h	-	Lubrication not	-	-	-
fUVF 9 V-A2	2Z C3	-	100,000 h	-	possible	-		-

Table 8-b (Part 1) Relubrication intervals and volumes of lubricant for relubrication during operation within permitted, normal operating conditions (flyweight setting: 100%)

Unbalance motor type	Bearing type	New volume of lubricant per bearing	Bearing replacement interval without relubrication (**60** Hz mains)	Relubrication interval	Permitted number of relubrications	Volume of lubricant for relubrication per	Type of lubricant	Bearing replacement interval with relubrication (**60** Hz mains)
fUVG 21W-A2	NJ 311 E C4	32 g	-	3,000 h	6	18 g	STABURAGS NBU 8EP	20,400 h
fUVG 14 V-A1		32 g	-	10,000 h	6	18 g	STABURAGS NBU 8EP	65,750 h
fUVG 32 Y-A1	NJ2311E-	40 g	-	2,500 h	6	26 g	ISOFLEX NBU 15	16,800 h
fUVG 38 X-A1	TVP2.C4.BL	40 g	-	3,000 h	6	26 g	STABURAGS NBU 8EP	18,200 h
fUVG 30W-A1		32 g	-	6,000 h	8	18 g	STABURAGS NBU 8EP	49,850 h
fUVH 38W-A1	NJ313E-	60 g	-	3,000 h	6	24 g	STABURAGS NBU 8EP	18,700 h
fUVH 21 V-A1	TVP2.C4.BL	60 g	-	8,000 h	6	24 g	STABURAGS NBU 8EP	50,500 h
fUVH 49 X-A1	NJ2313E-	80 g	-	2,200 h	6	40 g	STABURAGS NBU 8EP	14,400 h
fUVH 46W-A1	TVP2.C4.BL	80 g	-	4,000 h	6	40 g	STABURAGS NBU 8EP	26,350 h
fUVH 26 V-A1		80 g	-	10,000 h	6	40 g	STABURAGS NBU 8EP	68,200 h
fUVL 62 Y-A1	NJ2315E-	120 g	-	920 h	8	60 g	ISOFLEX NBU 15	7,800 h
fUVL 64 X-A1	TVP2.C4.BL	120 g	-	1,650 h	8	60 g	STABURAGS NBU 8EP	14,200 h
fUVL 64W-A1		120 g	-	2,600 h	8	60 g	STABURAGS NBU 8EP	22,100 h
fUVL 36 V-A1		120 g	-	7,000 h	8	60 g	STABURAGS NBU 8EP	59,550 h
fUVK 79W-A1	NJ2317E-	150 g	-	2,400 h	8	80 g	STABURAGS NBU 8EP	20,500 h
fUVK 44 V-A1	M1A.C4.BL	150 g	-	6,500 h	8	80 g	STABURAGS NBU 8EP	54,000 h
fUVN 83 X-A1	NJ2318E-	180 g	-	1,500 h	8	90 g	STABURAGS NBU 8EP	13,000 h
fUVN 95W-A1	M1A.C4.BL	180 g	-	2,150 h	8	90 g	STABURAGS NBU 8EP	18,150 h
fUVN 76 V-A1		180 g	-	2,150 h	8	90 g	STABURAGS NBU 8EP	18,150 h
fUVP 112 X-A1	NJ2320E-	260 g	-	1,750 h	8	130 g	STABURAGS NBU 8EP	14,900 h
fUVP 119W-A1	M1A.C4.BL	260 g		2,150 h	8	130 g	STABURAGS NBU 8EP	18,500 h
fUVP 85 V-A1		260 g		3,750 h	8	130 g	STABURAGS NBU 8EP	31,950 h

Table 8-b (Part 2) Relubrication intervals and volumes of lubricant for relubrication during operation within permitted, normal operating conditions (flyweight setting: 100%)

NOTICE Risk of premature failure of the unbalance motor in the event of improper relubrication!

Observe the lubricant specifications that apply for ambient temperatures of up to +40°C (+104°F)! If you would like to use a lubricant type produced by another manufacturer, check whether it corresponds to the type used by AViTEQ. Take particular care not to mix mineral and synthetic lubricant types, as this can result in premature bearing failure.

Also avoid over-lubrication of the bearings! This can lead to premature degradation of the lubricant and overheating of the bearings. When relubricating the bearings, we recommend applying the lubricant in 2 individual stages at an interval of 8 operating hours.

After the relubrication process, you may notice a temporary increase in the heat of the motor and a higher current draw until the lubricant has distributed evenly in the bearing.

Regardless of the number of operating hours involved, AViTEQ recommends relubricating the bearings after 3 years at the latest if no relubrication has been carried out in the meantime. This is due to the aging process of the lubricant.

Once you have reached the specified number of relubrications, you must send the unbalance motor to AViTEQ, 65795 Hattersheim, Germany, or a service center to replace the bearings. On-site relubrication can damage the bearings as a result of overfilling the bearings and/or using old, set lubricant.

INORMATION STABURAGS NBU 8EP and ISOFLEX NBU 15 are types of lubricant manufactured by Kuebler Lubrication (www.klueber.com). If you would like to use a lubricant produced by another manufacturer, we recommend that you contact the relevant lubricant supplier directly.

The recommended intervals for replacing the bearings apply to flyweight settings of 100%. These intervals become less frequent if the flyweight settings are reduced. Please do not hesitate to ask if you have any questions.

The number of permitted relubrications and relubrication intervals provided by AViTEQ are to be interpreted as recommendations only. It can be appropriate to increase the relubrication intervals in the case of harsh operating conditions (for example, where ambient temperatures are above +40°C).

NOTICE Risk of environmental damage! Dispose of the bearing lubricant according to the specifications of the lubricant manufacturer and the applicable local environmental regulations. If necessary, ask the relevant manufacturer for information on the composition of the bearing lubricant.

8.5 Cleaning

⚠CAUTION Risk of damage to health due to peeling paint particles and contamination of the bulk material as a result of improper cleaning! Do not use any aggressive cleaning agents that dissolve and damage the paint. Only permitted cleaning agents and solvents may be used in the food industry.

In addition, do not use any cleaning agents that may affect the plastics in the cable insulations and cable inlets!

The degree of soiling on the unbalance motor and – above all – on the working unit depends on the material properties of the bulk material and the ambient conditions. Check the degree of soiling at regular intervals – initially once a week and then at defined intervals to suit your requirements.

Cleaning is required if the soiling is so significant that it is already having an impact on the output, or if there is a layer of soiling over 5 mm thick on the unbalance motor. Besides the mechanical cleaning methods (hand brushes, etc.), compressed air and water with or without the addition of chemical agents are permitted as cleaning agents.

Proceed as follows:

- ☞ Switch off all drives before every cleaning process!
- ☞ Select a suitable method! If applicable, follow the guidelines for the use of compressed air, water, and cleaning solvents that apply to the area that you wish to clean. Also take note of the protection class (IP66)!
- ☞ Only use cleaning solvents with a PH value that is equal to or greater than 7!
- ☞ Do not use cleaning solvents containing chlorine!
- ☞ When cleaning with compressed air, make sure that you comply with your company's internal regulations governing the dispersal of dust.
- ☞ After the cleaning process, remove all residue of cleaning agents!

8.6 Repairs

⚠WARNING Risk of injury when repairing the unbalance motors! Do not attempt to carry out any repairs yourself if you do not possess the appropriate training or qualifications. Specific tools are required to carry out repairs!

⚠ DANGER Explosions can lead to fatal injuries and cause significant material damage!

Risk of ignition due to improper repairs! If you are using an unbalance motor in an area at risk of dust explosions (Class II), then you must not carry out your own repairs unless you can provide evidence that you are suitably qualified.

In the event of damage, send the defective unbalance motor for repair to AViTEQ, 65795 Hattersheim, Germany, or to an approved AViTEQ service point. We will be happy to repair the device or replace it as quickly as possible.

9 Troubleshooting

Possible faults and their possible cause(s) are listed in the table below with the remedial action required.

	Fault	Cause(s)	Remedy
①	Drive does not work	There is no mains voltage to the drive	Check that the fuses are sound and that no wires have broken. Check wiring
		Unbalance motor defective	Send drive to AViTEQ for repair or replace it
②	Excessive build-up of heat in the unbalance motor – PTC thermistor responds	Current draw excessively high – see point ④	Establish the cause
		Defective bearing	Send drive to AViTEQ for repair or replace it
③	Response from the motor circuit breaker	Incorrect settings in the motor circuit breaker	Read off the current value from the type plate on the unbalance motor and adjust it on the motor circuit breaker
		Current draw for the unbalance motor excessively high	See point ④
④	Current draw for the unbalance motor excessively high	Defective winding	Send drive to AViTEQ for repair or replace it
		Over-lubrication of the bearings	Possible for a short time after relubrication. Let the drive run for 10 minutes, then allow it to cool down. Repeat 4 to 5 times
⑤	Increased noise development in the unbalance motor	Defective bearing	Send drive to AViTEQ for repair or replace it
		Fixing bolt(s) loose	Tighten fixing bolts to the correct tightening torque according to Table 6-a.
		Loose parts are hitting the unbalance motor and/or vibrating unit	Remove or secure the loose parts immediately
⑥	No synchronous operation for the double drive	Failure of an unbalance motor	Check the power supply, establish the cause, and eliminate it
		Two-phase operation	Check mains fuses and wiring, establish the cause of the phase failure and eliminate it, potentially contact AViTEQ if necessary
		Motors are rotating in the same direction	Reverse the phases
		An unbalance motor shaft is running sluggishly	Send drive to AViTEQ Vibrationstechnik GmbH for repair or replace it
⑦	Motor base broken	Fixing bolts have come loose	Send drive to AViTEQ for repair or replace it
		Uneven supporting surface on the motor base (manufacturing or design fault)	Send drive to AViTEQ for repair or replace it; ensure that the supporting surface is flat
		Foreign bodies (lubricant, paint) between the supporting surfaces on the motor base	Send drive to AViTEQ for repair or replace it; ensure that the supporting surface is flat, smooth and metallic

Table 9-a Causes of faults and remedies

INORMATION Before working through the remedial measures, always consult AViTEQ (Germany) to prevent the risk of potential accidents or damage.

The faults relate predominantly to the unbalance motor. Refer to the corresponding Instructions for Use for information about other possible faults caused by the control system.

10 Disassembly and disposal

10.1 Disassembly

⚠ DANGER Risk of electric shock! Touching live parts can be fatal! Once the mains voltage is connected, some of the parts inside the terminal box for the unbalance motor are live with potentially fatal voltages. Before disassembling the unit, disconnect the wiring and check that the system is no longer live. Permanently disconnect the drives from the mains and remove the connection cable.

Risk of injury due to falling parts! Falling unbalance motors can cause fatal injuries.

Secure the drive against the possibility of falling. Use suitable tools and load attachment devices to disassemble the unit. Take note of the weight specifications for the motor when selecting the load attachment device.

It is not permitted to stand under suspended loads!

INORMATION The center of gravity is in the middle of the motor!

Permanently disconnect the drive from the mains. Then loosen the fixing bolts for the drive and remove the drive.

10.2 Disposal

10.2.1 Returning the device

AViTEQ Vibrationstechnik GmbH will take back fUV-series unbalance motors supplied from 2014 at no cost if shipped to AViTEQ Vibrationstechnik GmbH, 65795 Hattersheim, Germany.

AViTEQ guarantees professional disposal. The prerequisite is that the units are delivered clean: The drives must not contain any product residue or harmful substances. AViTEQ is justified in refusing to accept the drive if this requirement is not complied with.

10.2.2 Disposal

When disposing of the unit, please comply with local waste treatment and disposal regulations. AViTEQ accepts no liability for units and their components that are not disposed of properly.

NOTICE Risk of environmental damage! Dispose of the bearing lubricant according to the specifications of the lubricant manufacturer and the applicable local environmental regulations. If necessary, ask the relevant manufacturer for information on the composition of the bearing lubricant.

INORMATION Detailed information regarding the materials used may be requested from AViTEQ necessary. In the event of any doubt, please make use of our disposal facilities.

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