

Installation and Operating Instructions

Electric Vibrators HVe/VFLe Series

(Translation of the Original Instruction Manual)



II 3G Ex nA II T3
II 3D Ex tD A22 IP65 T120°C

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1. General Information

Würges electric vibrators HVe/VFLe are designed and built to state-of-the-art standards and operate safely if used as intended.

They conform to the EC Machinery Directive 2006/42/EC, the Electromagnetic Compatibility Directive 2014/30/EU and the Low Voltage Directive 2014/35/EU and Category 2 for explosion hazardous areas of Dust Zone 22 and Gas Zone 2.

The provisions of EN 61241-1-2 have to be heeded, e.g. pertaining to temperatures and dust accumulations.

The Operating Instructions have to be read and understood by every person at the user's company who is assigned with assembly, setting up, start up, the maintenance and repair of electric vibrators. This also applies for additional instructions in case of modified devices.



The instruction manual must be read carefully and in full before using the vibrator motors.

2. Symbols Used

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



ATTENTION

Important information regarding operations or procedures to which particular attention is to be paid.



EXPLOSION HAZARD

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



HAZARD

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



WARNING

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



HOT SURFACE

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



DISCONNECT
MOTOR FROM MAINS

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



ENVIRONMENTALLY
COMPATIBLE DISPOSAL

Refers to the obligation to ensure environmentally compatible disposal.

3. Safety

3.1. Intended use

Electric vibrators are not independently functioning machines. They are used as the drives of vibrating machines such as vibratory conveyor troughs, conveyor pipes, screening machines, grading/sorting machines and knock-out grids.

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

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

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

The operator shall bear responsibility for the operation of vibration motors in explosion hazardous areas.

3.2. Skilled personnel qualifications

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

3.3. General safety instructions



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



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



Live parts can cause severe or fatal injuries.



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



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



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

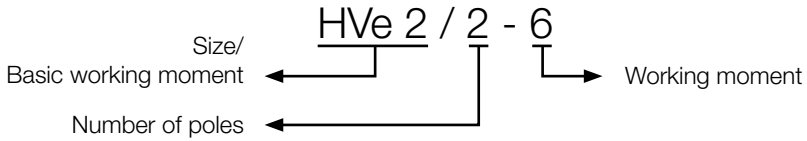


Vibrator motors of the HVe/VFLe series may be deployed in the explosion hazardous areas 2 and 22.

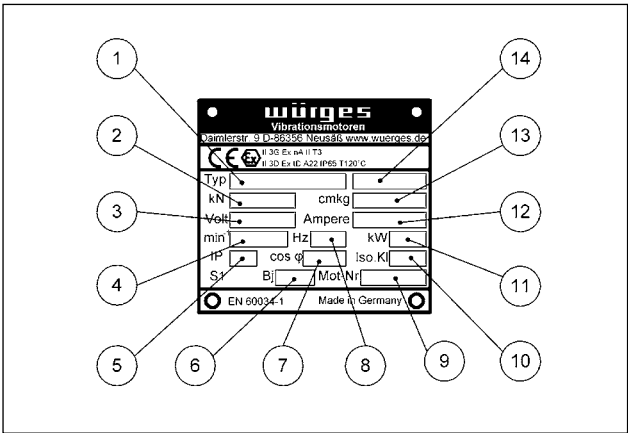
The permissible ambient temperature must be between -20 °C and +40 °C.

4. Technical Data

4.1. Type designation



4.2. Nameplate



- 1 Type designation
- 2 Centrifugal force
- 3 Mains voltage
- 4 Speed
- 5 IP-protection
- 6 Year built
- 7 Power factor cos φ
- 8 Mains frequency
- 9 Serial number
- 10 Thermal insulation F (155° C)
- 11 Power input
- 12 Nominal current
- 13 Working moment
- 14 Additional information
e.g. 2MV

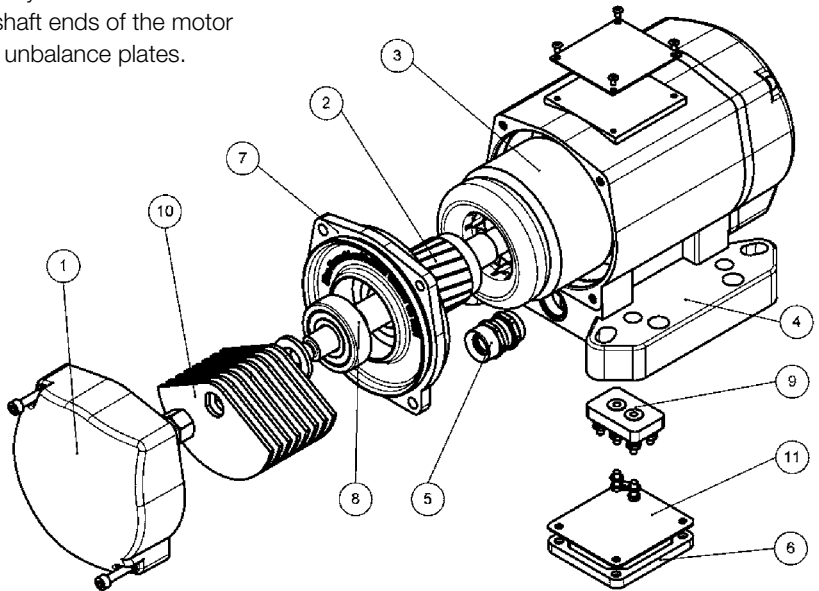
Please see the data sheet of the motor for additional technical specifications, or our catalogue.

4.3 Design and function (using example of HVe 6)

The electrical drive of the HVe/VFLe series is an asynchronous motor.

In the sizes HVe 1 and HVe 2 the stator is cast under vacuum and therefore forms an assembly permanently connected to the housing. On both shaft ends of the motor there are eccentric unbalance plates.

This means a rotating body, whose weight is not distributed rotationally symmetrical or dynamically balanced and therefore causes vibrations. The size of these vibrations can be controlled by weights and counterweights.



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

5. Transport and Storage

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



If the motor is visibly damaged it must not be started up. The vibratory motor must be examined and if necessary returned to the manufacturer for repair.

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

Vibrator motors must always be stood on their bases or footings!

Do not stack vibrator motors!



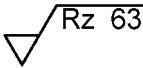
Do not lift up the motor by its installed connection cable.

Note and follow the local accident prevention regulations.

6. Installation and Startup

6.1. Assembly/Installation

Electric vibrators can be installed in any installation position. Vibrator motors may only be built on to machines with flat, oil, grease and paint-free and flexurally rigid mounting surfaces.

Surface quality 

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

Minimum tightening torque

M 5	M 8	M 10	M 12	M 16	M 20	M 24	M 27	M 36
8 Nm	30 Nm	55 Nm	90 Nm	150 Nm	280 Nm	450 Nm	1100 Nm	2500 Nm

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



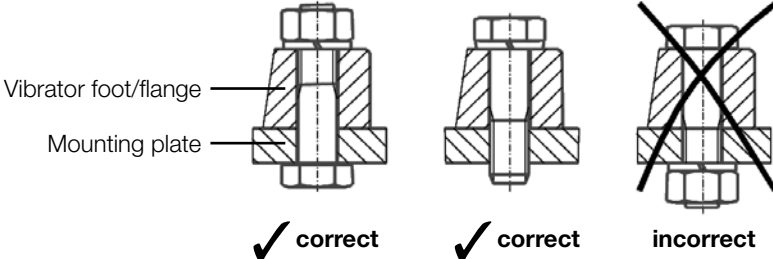
The fixing bolts must be checked for secure fit after approx. two operating hours and if necessary retightened. Other checks should be carried out daily!



Improper fixing results in the breakage of the feet of the vibrator motor.



Improper fastening leads to break of the vibrator motor feet.



6.2. Electrical connection/cable connection



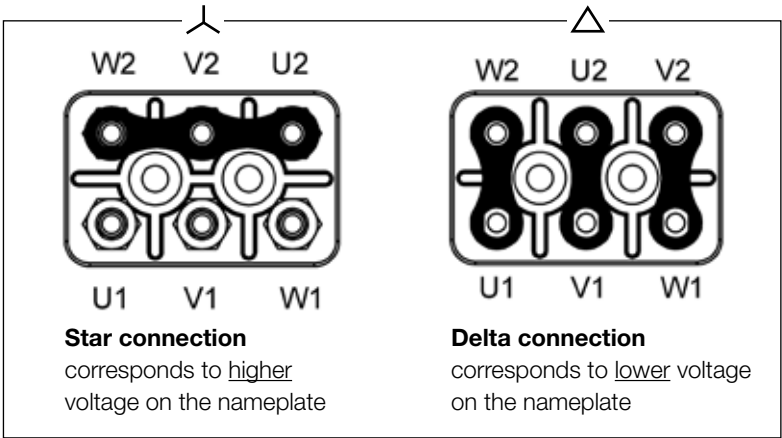
Electric vibrators must be safely disconnected from the electricity mains before work is carried out on them. The required procedure is as follows:



1. Switch off vibrator motor and secure against being switched back on again
2. Check for safe isolation from supply



3. Allow the motor to cool



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

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

Each motor must have its own upstream motor protection device as protection against possible overload; the nominal current of this protective device must be set according to the nameplate data (see circuit diagram, page 22).



Speed control

Speed control using frequency converters is prohibited!

6.3. Temperature monitoring

The permissible ambient temperature range is between -20 °C and $+40\text{ °C}$. Moreover, the temperature must not fall below or exceed this range by exposure to external source of heat or cold.

A motor circuit breaker with current-dependent delayed tripping has to be deployed against impermissible heating due to overload.

This protection device may correspond to trip Class 5 (10 A) at the most. The tripping and monitoring unit has to be set to the rated motor current.

Furthermore, the unit has to be selected in such a way that the motor is also thermally protected during a short circuit (i.e. in case of locked rotor). The motors may only be deployed for continuous operation (S1) and only for normal not frequently recurring starts during which no significant start-up warnings will occur.

In case the current input should be exceeded, the speed stated on the type plate is probably not being reached. Possible cause for this may be too high centrifugal force for the application or insufficiently rigid construction. The situation can be remedied by redacting the centrifugal force.

Cabel connection

Use only a flexible cable for connection. We recommend the following cable types:

ÖLFEX ROBUST FD C 4G1,5 H07 RN-F 4G1,5

Plastic cable is unsuitable.

Fit the wire end with cable eyes or crimp-type cable lugs. In no case solder cable eyes or cable lugs since the stranded wires might break near the solder joint.

Insert cable into the terminal box and connect it acc. to the circuit diagram above (see page 14).

Except for HVe 0,4 Connection to a lustre terminal is made here.

When tightening the union nut screw connection make sure that the cable sheath still is fully covered by the seal. If this is not followed, the cable is not clamped in place, not strain relieved and not waterproof.

Carefully close the terminal box with seal and screw lock.

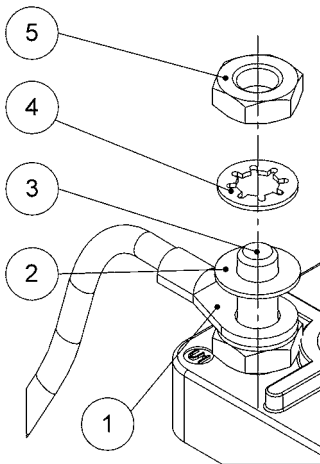
Use a conductor with a cross section of $4 \text{ mm}^2 \leq A \leq 6 \text{ mm}^2$ to connect the external equipotential equalisation.

The motor connection line has to be securely fastened approx. 0.5 m after leaving the motor. The first line attachment point and the motor shall not be moveable against each other. The connecting cable has to be laid in such a way

that natural vibrations are being avoided and there will be no tensile load.

Check the current input when the motor is operated for the first time. It should be greater than the value stated on the type plate, remedy the situation by decreasing the centrifugal force (see Chapter 7).

Check the line for chafe marks from time to time and eliminate the cause for this where applicable.



- 1 Cable lug DIN 46237
- 2 Brass shim DIN EN ISO 7090
- 3 Terminal board bolt
- 4 Lock washer DIN 6737/DIN 7980
- 5 Hexagon nut DIN EN ISO 4032

Maximum tightening torque terminal board nuts

M 4	M 5	M 6
1,2 Nm	2,0 Nm	3,0 Nm

7. Centrifugal Force Setting



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

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

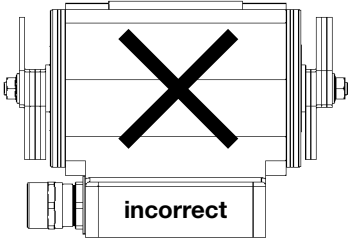
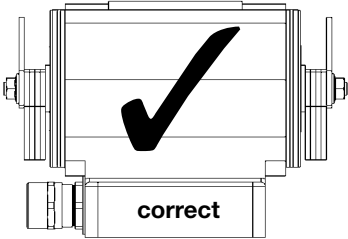
The centrifugal force has a direct effect on the vibration amplitude of the machine and the power input of the motor.

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

HVe 0,4 – HVe 15, HVe 30/2 and HVe 55/2

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

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



The number of plates changed rotated through 180° must be the same at both ends of the shaft, i.e. they must be symmetrical (see Fig.). The unbalance plates can also be removed for fine adjustment, they must then be replaced by spacer discs.

Maximum tightening torque of nuts/screws at the shaft end

HV 0,4/2	M 5	4 Nm
HV 1	M 5	4 Nm
HV 2	M 8	15 Nm
from HV 6	M 10	20 Nm

Centrifugal force adjustment by means of push-on unbalance plates

The centrifugal force of the motor reduces as follows if the push-on unbalance plates are rotated through 180° or removed:

Speed **2-pole**, 3000 min⁻¹

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

Speed **4-pole**, 1500 min⁻¹

Motor	Centrifugal force	
	rotated through 180°	removed
HVe 1/4	25 N	12,5 N
HVe 2/4	55 N	27,5 N
HVe 6/4	95 N	47,5 N
HVe 12/4-30	187,5 N	93,75 N
HVe 12/4-42	350 N	175 N

Speed **6-pole**, 1000 min⁻¹

Motor	Centrifugal force	
	rotated through 180°	removed
HVe 6/6	42,5 N	21,25 N
HVe 12/6-42	148,67 N	74,34 N

Speed **8-pole**, 750 min⁻¹

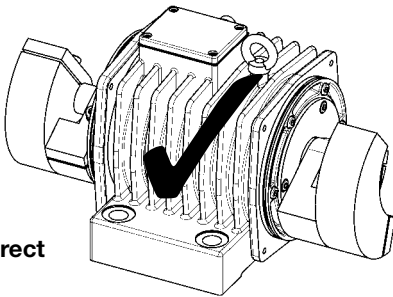
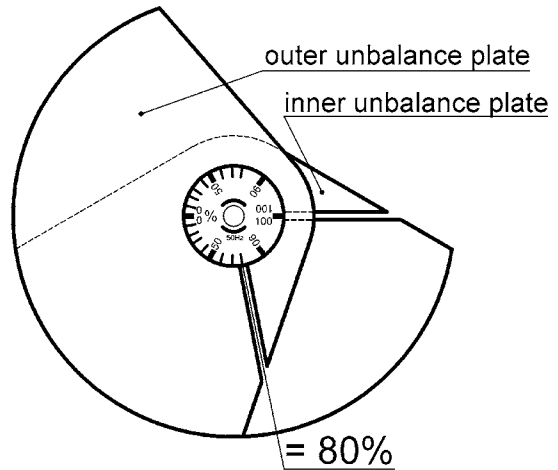
Motor	Centrifugal force	
	rotated through 180°	removed
HVe 6/8	23,75 N	11,88 N
HVe 12/8-42	87,33 N	43,67 N

HVe 12/4-60 and larger

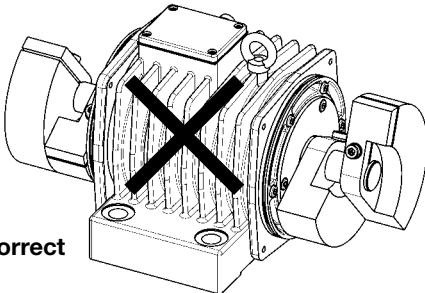
From size HVe 12/4-60 (except HVe 30/2 and HVe 55/2) the centrifugal force is adjusted by turning the two outer unbalance plates. The percentage centrifugal force can be read off from the scale on the shaft. The adjustment made must be symmetrical.

For tightening torques

of the bolts see page 11



correct



incorrect



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



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

8. Servicing and Maintenance



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



1. Switch off vibrator motor
2. Secure against being switched back on again
3. Test for safe disconnection from the power supply



4. Allow the vibratory motor to cool

Maintenance work to be carried out regularly

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



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

Lubrication

The bearings of the vibratory motors serie HVe are lubricated for life. It is not normally necessary to carry out maintenance work on the bearings of these motors.

We recommend the following lubrication intervals:

Motor type	f = 50 Hz	f = 60 Hz
HVe 0,4/2	>100000 h	>100000 h
HVe 0,4/2-1	>100000 h	40000 h
HVe 1/2	>100000 h	>100000 h
HVe 2/2	>100000 h	>100000 h
HVe 2/2-2	65000 h	65000 h
HVe 2/2-4	30000 h	20000 h
HVe 2/2-6	7500 h	5500 h
HVe 6/2	6000 h	4000 h
HVe 15/2	12500 h	3000 h
HVe 15/2-20	50000 h	11000 h
HVe 15/2-25	17500 h	6500 h
HVe 30/2	3500 h	1500 h
HVe 55/2	3500 h	2000 h
HVe 1/4	>100000 h	>100000 h
HVe 2/4	>100000 h	>100000 h
HVe 2/4-2	>100000 h	>100000 h
HVe 2/4-4	>100000 h	>100000 h
HVe 2/4-6	>100000 h	>100000 h

HVe 2/4-9	>100000 h	>100000 h
HVe 6/4-11	>100000 h	>100000 h
HVe 6/4-18	54000 h	45000 h
HVe 12/4-18	>100000 h	>100000 h
HVe 12/4-30	64000 h	27600 h
HVe 12/4-42	23500 h	11600 h
HVe 12/4-60	>100000 h	>100000 h
HVe 30/4-75	40000 h	33000 h
HVe 55/4-120	17500 h	14500 h
HVe 55/4-150	9500 h	7900 h

In case of signs of bearings wear the motors should be switched off immediately and the special bearings replaced.

We recommend that you send the motors to the manufacturer for repair (including if other types of damage occur). This is the only way to ensure proper repair.

HVe 6/6	>100000 h	>100000 h
HVe 6/6-18	>100000 h	>100000 h
HVe 12/6-30	>100000 h	>100000 h
HVe 12/6-42	>100000 h	>100000 h
HVe 12/6-60	>100000 h	>100000 h
HVe 30/6-75	>100000 h	>100000 h
HVe 55/6-120	>100000 h	>100000 h
HVe 55/6-150	>100000 h	80000 h

HVe 6/8	>100000 h	>100000 h
HVe 6/8-18	>100000 h	>100000 h
HVe 12/8-42	>100000 h	>100000 h
HVe 12/8-42	>100000 h	>100000 h
HVe 12/8-60	>100000 h	>100000 h
HVe 30/8-75	>100000 h	>100000 h
HVe 55/8-120	>100000 h	>100000 h
HVe 55/8-150	>100000 h	>100000 h

9. Spare Parts

To order spare parts, please refer to the drawing on page 9.

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

- Motor type
- Motor number
- Description, item and position number of the part
- Required quantity

We will send you spare part lists on request.

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

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

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

10. Disposal and Recycling

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

Steel:

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

Aluminium:

Housing, protective covers, terminal box cover and nameplate

PE:

Seals/gaskets

Copper and synthetic resin:

Winding



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

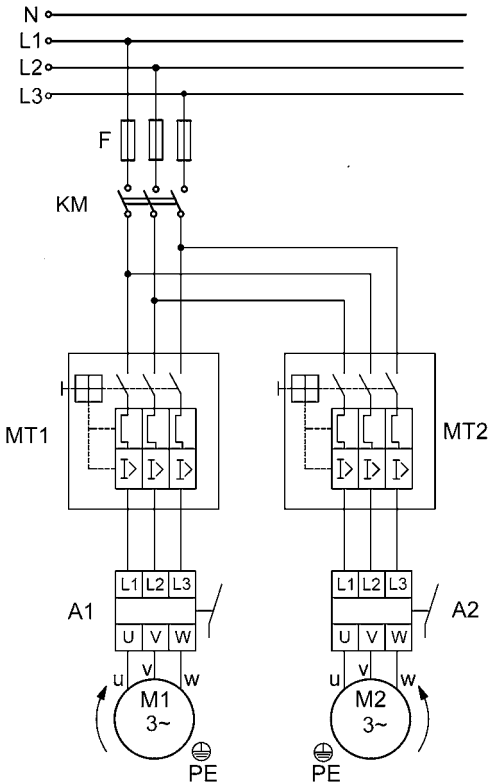
11. Warranty

Würges provides warranty for 1 year, beginning with delivery, for all new vibrating motors.

Warranty expires when:

- the motor is connected wrong, or connected with wrong voltage,
- the motor fails because of missing or wrong electric protection,
- there were changes made to the motor,
- the motor was damaged during transport,
- the motor was not installed as shown in chapter 6,
- the motor was connected with wrong cable,
- there is misuse/not intended use,
- the instructions of the manual are not followed.

Circuit Diagram



- MT1 Motor protection switch motor 1
- MT2 Motor protection switch motor 2
- A1 Strand break relais motor 1
- A2 Strand break relais motor 2
- KM Main switch
- F Fuse

EU Declaration of Conformity

In the sense of Directive 2014/34/EU (ATEX)
and Declaration of Incorporation

In the sense of EC Machinery Directive 2006/42/EG, Annex II 1 A

Würges Vibrationstechnik GmbH hereby declares

that the explosion-proof vibration motors of the series:

HVe / VFLe

are in conformity with the provisions of the above-mentioned directives.

- Conformity to the provisions of following further Directives is given:
Directive 2014/35/EU (low voltage)
Directive 2014/30/EU (EMC)
- Following harmonised standards were applied:
EN ISO 12100 / 2011 EN 60079-0 / 2007
EN 60034-1 / 2015 EN 61241-0 / 2007
EN 61000-6-2 / 2011 EN 61241-1 / 2005
EN 61000-6-4 / 2011 EN 13463-1 / 2004
EN 13463-5 / 2003
- Name of the authorised documentation representative Philipp Würges
Address of the authorised documentation representative: see manufacturer's address
- Commissioning is prohibited until it has been determined that the machine(s) stated overleaf into which the incomplete machine(s) will be installed conform to the provisions of the Machine Directive.

Neusäß, 20.04.2016



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