

Operating Instructions
Vibration Feeding Unit „VZ“



VZ 15

VZ 20

VZ 30

VZ 40

VZ 55

VZ 70

FB.-No.: _____

Customer: _____

Date: _____

Operating Instructions Vibration Feeding Unit

Contents

	Page
1. Safety Instructions	
1.1 General	1
1.2 Danger from the machine	2
1.3 Noise emission	2
1.4 Applications Authorized	2
2. Transport and Storage	
2.1 Transport	3
2.2 Storage	3
3. Installing and Starting up	
3.1 Installing	4
3.2 Starting up	4
4. Technical Data	
4.1 Basic units	5
4.2 Sorting bowls	5
4.3 Protective systems	5
5. Description of Machine	
5.1 Lay out	6
5.2 Side view	6
5.3 Operating principle	7
6. Maintenance	8
7. Adjustments	
7.1 Conveying speed, sorting	9-10
7.2 Adjustment of the air gap	10
8. Malfunction	11
9. Accessories	
9.1 Mechanical accessories	12
9.2 Electronic accessories	12
10. Spare Parts	13
Declaration of Incorporation	14

Operating Instructions Vibration Feeding Unit

1. Safety Instructions

1.1 General

This section contains information necessary for the correct use of the products described. It is directed at technically qualified personnel.

Qualified personnel are persons who on account of their education, experience and training as well as their knowledge of appropriate norms, regulations, rules concerning accident prevention and conditions prevailing at the place of work who have been authorized by those responsible for the safety of the equipment to carry out the particular operation required and thereby are able to recognize and avoid possible dangers (definition from IEC 364 of skilled personnel).

Danger Warnings

The following notes relate not only to the operator's personal safety but also to the protection of the products described and the equipment involved.



ATTENTION!

Nonobservance can lead to personal injury or material damage to the device.



WARNING!

Dangerous voltage.

Nonobservance can lead to death or serious bodily injury.



NOTE:

Here, tips for use and important information about how to work with the device are given.

Disconnect the power supply before installation or dismantling.

Observe the valid accident prevention and safety regulations for your specific application.

Before commissioning, check whether the nominal voltage of the device agrees with the local mains voltage.

EMERGENCY STOP mechanisms must remain active in all operating modes. Unlocking the EMERGENCY STOP mechanism must not result in uncontrolled reactivation.

Existing protective equipment must not be removed.

Carefully read through the operating instructions before commissioning and follow these.

1. Safety Instructions

1.2 Danger from the machine

Mechanical:

No danger is to be expected from a machine that is in its original condition.

Electrical:

No danger is to be expected from a machine that is in its original condition, the electrical equipment of which is technically in perfect order.

Contact with liquids may cause an electrical shock.

Ensure that the ground connections are in good order.

Never operate the unit without the protective cover in place.

1.3 Noise emission

The level of noise generated by the VZ depends on the articles to be sorted and the construction of the sorting bowl. The noise level according to the EU directive „Machines“ can therefore only be ascertained on site under actual working conditions.

If the sound intensity level exceeds the authorized noise level, suitable noise protection measures must be taken.

1.4 Authorized applications

The vibration feeding units must not be used in explosive areas!

The VZ may only be used for sorting and conveying correctly positioned mass produced parts or for measured feeding of bulk material.

Any other application of the VZ which varies from these uses are not authorized.



WarningDANGER:

Improper use can lead to damage to the unit.

2. Transport and Storage

2.1 Transport

The smaller vibration feeding units (VZ 15 and VZ 20) can be moved manually on account of their light weight.

Models VZ 30 to VZ 70 are supplied with eye bolts for transporting. Additionally for model VZ 55 and VZ 70, a transportation bar is also supplied. By using these aids with suitable lifting gear the VZ may be moved around at the place of work.

Proceed as follows:

- VZ 30 and VZ 40:

Release the sorting bowl by loosening the central fastening, remove the sorting bowl and screw the eye bolt into the now free thread in the mounting plate.

- VZ 55 (with central fastening of the sorting bowl):

Release the sorting bowl by loosening the central fastening, remove the sorting bowl and screw the eye bolt into the now free thread in the mounting plate.

- VZ 55 (with 3-point bearing area of the sorting bowl):

Release the sorting bowl by loosening the 3 attachment bolts and remove the sorting bowl. The eye bolt can now be screwed into the now free thread in the mounting plate.

Should the sorting bowl be left at the VZ, remove the filler plug (Ø21) in the center of the sorting bowl, screw together the eye bolt and the transportation bar and screw them into the now free thread in the mounting plate.

- VZ 70:

Release the sorting bowl by loosening the 5 attachment bolts and remove the sorting bowl. The eye bolt can now be screwed into the now free thread in the base plate.

Should the sorting bowl be left at the VZ, remove the filler plug (Ø21) in the center of the sorting bowl, screw together the eye bolt and the transportation bar and screw them into the now free thread in the base plate.



NOTE:

Remove the aids to transportation before starting up the VZ.



Warning DANGER:

- The vibration feeding unit must not be lifted or carried by the sorting equipment.
- Check the maximum permitted loading of the lifting gear before transporting. The weight of the _____ VZ can be found in the Technical Data (Chapter 4).

-- During transportation no person may stand underneath the vibration feeding unit.

2.2 Storage

If the vibration feeding unit is stored for a long period of time it must be protected from damp and aggressive agents.

Excessive variations in temperature should be avoided.

3. Installation and Starting up

3.1 Installation

The vibration feeding unit must be located on a sufficiently stable base (check for stability under load). It must not pass on vibrations coming from the VZ.

The unit is fitted during manufacture with rubber-metal buffers. These have on their underside internal screw threads by which the VZ may be secured to the base. The hole circles and diameter of the necessary borings can be found in the Technical Data (Chapter 4).



NOTE:

During operation the vibration feeding unit and any connected elements must not come into contact with other machines or equipment.

3.2 Starting up

After the VZ has been securely fixed at its location of operation, the aids to transport must be removed from the unit.

On units VZ 30, VZ 40, VZ 55 and VZ 70 the sorting bowl must be re-assembled.

On units VZ 55 and VZ 70 the filler plug must be replaced.



NOTE:

- Ensure that the sorting bowl is securely screwed to the unit itself.
- Check that the unit is standing free of other objects.
- Make sure that the unit's mains cable is in good condition.
- Compare the available power supply voltage and frequency with the figures given for the VZ in the Technical Data.

Attention:

The mounting plates of the vibration feeding units VZ 15 ... VZ 55 are provided with a central thread (for fixing a sorting bowl) and with holes to adjust the air gap between magnet and anchor (only models VZ 40 and VZ 55). These threads are sealed with a screw (not on VZ 70). On the VZ 40 and VZ 55 the boreholes in the mounting plate are sealed with plastic stoppers.

With vibration feeding units supplied with sorting bowls, these parts are enclosed separately.

Before a VZ without a sorting bowl is brought into operation, the screw and, where appropriate, the stoppers must be fitted to the unit, as otherwise the „IP“ protective system (see Chapter 4: Technical Data) will not be operative.

If the VZ 70 without a sorting bowl is brought into operation, the protective system changes to IP 00.

Connection to the electric mains is effected exclusively via a suitable control device. The connecting loads may be found in the Technical Data (Chapter 4).



NOTE:

When connecting the VZ 55 and VZ 70 to the electric mains, the control unit must be adjusted on half-wave (oscillation frequency: 3000 min⁻¹).

The connection to the power supply may only be made by a qualified electrician.

After the power supply has been connected, the unit's operational behavior must be checked.

- Complete VZ's have already been set by the manufacturer to their optimal values. These are shown on the scales of the control units supplied.

- VZ's with sorting bowls but without order elements are roughly set during manufacture. The unit can be more accurately set once the sorting bowl has been completely adjusted in operation to the parts to be sorted.

How to set the unit is described in Chapter 7.

4. Technical Data

4.1 Basic units

model		VZ 15	VZ 20	VZ 30	VZ 40	VZ 55	VZ 70
basic unit							
diameter x height	[mm]	165 x 90	213 x 90	305 x 120	418 x 172	570 x 200	700 x 200
weight	[kg]	6	9	25	80	100	183
unit fastening							
hole circle diameter	[mm]	110	167	230	320	420	560
hole circle angle	[°]	3 x 120	4 x 90	4 x 90	4 x 90	4 x 90	4 x 90
rubber buffer thread		M6	M6	M6	M8	M10	M10
spring dimension - length x width	[mm]	68 x 12	68 x 12	90 x 20	106 x 35	140 x 40	140 x 40
- thickness	[mm]	0.5/1/1.25	0.5/1/1.25	1.5/2.0	2.0/2.5	2.0/2.5	2.0/2.5
springs (standard) → number of spring assemblies with quantity of springs; thickness specified in () .		<u>3x</u> 2 (1.25) + 1 (1.0)	<u>4x</u> 2 (1.25) + 1 (1.0)	<u>2x</u> 3 (2.0) <u>2x</u> 4 (2.0)	<u>2x</u> 8 (2.0) <u>2x</u> 9 (2.0)	<u>4x</u> 8 (2.0) + 1 (2,5)	<u>4x</u> 8 (2.0)
quality of the spring fixing screws		10.9	10.9	10.9	10.9	10.9	10.9
tightening moment of the spring fixing screws	[Nm]	15	15	35	100	120	120
oscillating magnet		WS 5 B/19	OAC 005.501601 OAC 005.501621	OAC 007.509002 OAC 007.509003	OAC 009.508790	OAC 009.508140	OAC 009.508140 OAC 009.508150
voltage *	[V]	230	230	230	230	230	230
mains frequency *	[Hz]	50	50	50	50	25	25
oscillation frequency	[1/min]	6000	6000	6000	6000	3000	3000
power requirement	[VA]	60	120	350	900	1120	1120
air gap (max.)	[mm]	0.7	0.7	0.7	1.0	2.5	2.5

* if required the units are also available with 115 V and 60 Hz

4.2 Sorting bowls

model		VZ 15	VZ 20	VZ 30	VZ 40	VZ 55	VZ 70
steel cylinder sorting bowl							
diameter x height (# 1)	[mm]	158 x 70	200 x 100	300 x 120	410 x 150	590 x 250	720 x 280
diameter x height (# 2)	[mm]	--	--	--	480 x 150	--	--
steel cone sorting bowl							
diameter x height (# 1)	[mm]	210 x 70	300 x 100	430 x 120	580 x 150	790 x 250	916 x 255
diameter x height (# 2)	[mm]	--	--	--	680 x 170	--	--
polyamide cone sorting bowl							
diameter x height (# 1)	[mm]	200 x 55	250 x 80	400 x 120	500 x 160	--	--
diameter x height (# 2)	[mm]	--	300 x 95	--	--	--	--
alu-stepped-sorting bowl							
diameter x height (# 1)	[mm]	--	335 x 105	440 x 135	575 x 170	--	920 x 225
diameter x height (# 2)	[mm]	--	--	--	690 x 210	--	--
steel-stepped-sorting bowl							
diameter x height	[mm]	special models - dimensions defined depending on workpiece.					

4.3 Protective systems

The protective systems listed below are only effective if the sheet steel cover ist correctly fitted.

basic unit	VZ 15	VZ 20	VZ 30	VZ 40	VZ 55	VZ 70
protective	IP 42	P 42	IP 42	IP 42	IP 42	IP 42 (in combination with sorting bowl) IP 00 (without sorting bowl)

5. Description of Machine

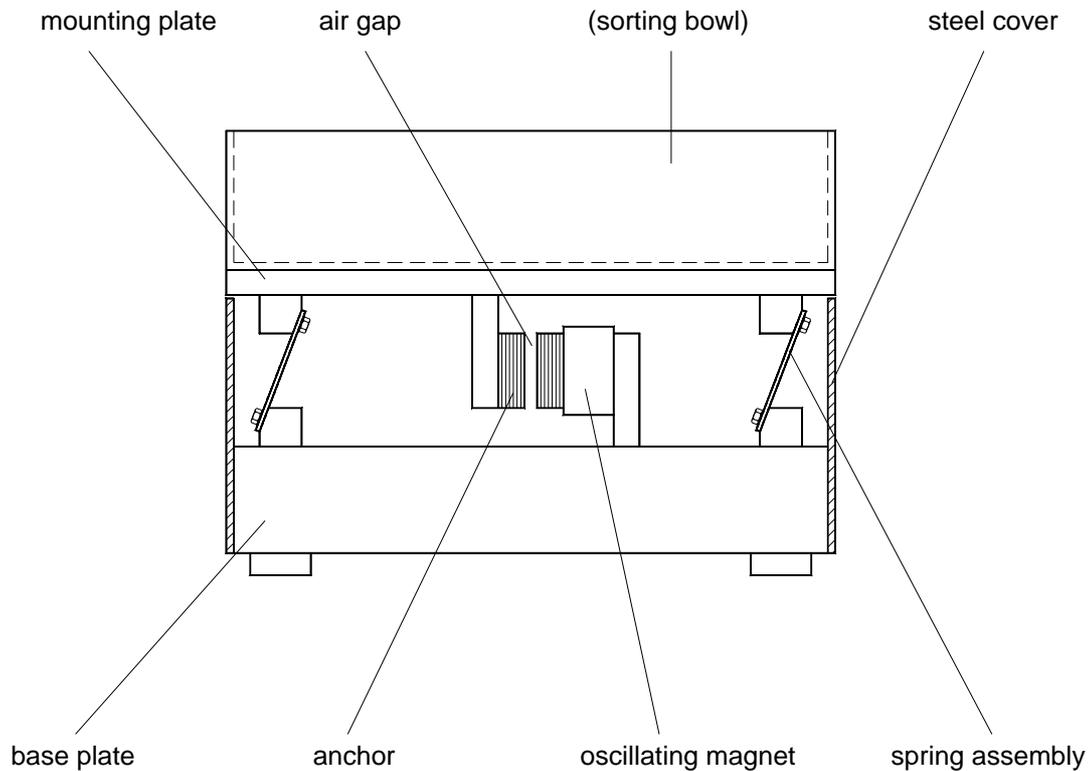
5.1 Lay out

The vibration feeding unit consists of the following components:

- base plate
- mounting plate
- oscillating magnet with anchor
- spring assembly
- sheet steel cover
- (sorting bowls of steel or stainless steel, aluminum or polyamide - cylinder, cone or stepped model)

The vibration feeding unit can be delivered as either a right-hand or left-hand model.

5.2 Side view



5. Description of Machine

5.3 Operating principle

The vibration feeding unit operates on a double-mass oscillation system whereby the active mass (mounting plate, oscillating bowl and the material to be conveyed) is brought into contact with the counter mass (base plate with mountings and covering) via the spring assembly. This spring mass system has a certain proper frequency with which the system after initial activation - depending on the absorption being employed - reverberates for a certain period.

When alternating current passes through the oscillating magnet, it exercises on the active mass which is connected to the anchor, a sinusoidal force. As a result the system is compelled to respond by oscillating, the frequency from which diverges from the proper frequency. This frequency is described as the oscillating frequency.

Because the bowl which is connected to the mounting plate is vibrating, it causes the material being sorted to make small jumping movements. The direction of the jump is dictated by the spring assembly setting and will be at right angles to the spring assembly plane.

The vibrations and therefore the jumping movements made by the material being sorted will be all the greater, the nearer the proper frequency approaches the oscillating frequency. The strongest vibrations occur at the resonance point where the proper and oscillating frequencies match. Resonance operation is not however worthwhile with vibration feeding units, as on the one hand every change in absorption (eg from uneven bulk material) causes changes to the vibrations, and on the other hand, it would be necessary to set a wide air gap between the oscillating magnet and anchor, in order to prevent them striking. In the latter case constant propulsion from the oscillating magnet would no longer be present, as magnetic attraction decreases in inverse proportion to the square of the air gap. In practice therefore a difference is made between two operating modes:

(a) Divergent operation:

Here the oscillating frequency exceeds the proper frequency.

The result of working in this mode - as with resonance operation - is that the vibrations and therefore the speed of conveyance become dependent on the character of the material being sorted. Additionally, electricity consumption can drastically increase, because the vibration movements and the force created run approximately in opposition of phase, and it can therefore occur that the widest air gap coincides with maximum electric current.

(b) Subcritical operation:

Here the operating frequency is less than the proper frequency.

In this operating mode the vibrations and therefore the speed of conveyance are to a great extent independent of the character of the material being sorted. Also, because the vibration movements and the force created almost run in phase, the narrowest air gap coincides with minimum electric current.

6. Maintenance

Vibration feeding units are in the main maintenance free. We do however recommend that a thorough cleaning is carried out if the unit comes into contact with liquids or becomes dirty.



WARNING!

The unit must be disconnected from the power supply before commencing maintenance work.

- first remove the sheet steel cover.
- remove accumulations of dirt in the air gap between the oscillation magnet and anchor.
- replace the sheet steel cover. Take care that the cover does not touch either the mounting plate or the sorting bowl.
- re-connect the power supply.

7. Adjustments



WARNING!

The unit must be disconnected from the power supply before commencing adjustments work.

7.1 Conveying speed, sorting

In order to reach an optimal relationship between sorting and conveying for vibration feeding units without a fitted sorting bowl, it is necessary to carry out fine adjustments on site. This is made either by removing or applying plate springs and the necessary spacers, or fixing counterweights.

After you have installed the unit - as described in Chapter 3 - and have fitted the sorting bowl with the necessary ordering elements, proceed as follows:

1. remove the sheet steel cover.
2. tighten all fixing screws.
3. check the air gap between the magnet and the anchor and if necessary reset according to the values listed in Chapter 4 and Chapter 7.2.
4. fill the unit with material for sorting.
5. adjust the control unit set value to about 80%.
6. loosen on one spring assembly the lower fixing screw.

Loosening the fixing screw brings about a change in conveying speed:

- *if the speed reduces*, fit to this spring assembly an additional spring and spacer. Now loosen the lower fixing screw on another spring assembly. If the conveying speed again reduces, similarly fit here also a spring with spacer. Repeat this procedure so often as is necessary to achieve the required conveying speed.

Note that if too many springs are fitted, the system cannot vibrate at its optimal rate.

- *if the speed increases* remove from this spring assembly a spring together with its accompanying spacer and re-tighten the fixing screw. Next loosen the lower fixing screw on another spring assembly. If the conveying speed again increases, remove a spring again with its accompanying spacer. Again tighten the fixing screw. Repeat this procedure as often as it is necessary to achieve the required conveying speed.

Note that if there are too few springs, the magnets strike.



NOTE:

- the sheet steel cover on the basic unit changes the unit's oscillations. As adjustments are made with the cover removed, it may be necessary to fit or remove further springs.
- when adjusting the unit ensure that the number of springs per spring assembly is as evenly distributed as possible (maximum difference of 2 springs).

7. mount the sheet steel cover.

7. Adjustments

If an *irregular conveying speed* is noticeable within the sorting bowl, this can be corrected by attaching a counterweight to the outside of the sorting bowl.

Proceed as follows:

1. find the place which has the lowest conveying speed.
2. attach a counterweight to the opposite side.

If it is not possible to fix a counterweight, an even conveying speed can also be achieved by removing a spring from the place of slowest speed or by fitting an additional spring at the place of highest conveying speed.



NOTE:

Ensure here as well that the number of springs per spring assembly is distributed as evenly as possible (maximum difference of 2 springs).

7.2 Adjustment of the air gap

For adjusting the air gap between oscillating magnet and anchor, proceed as follows:

1. unplug the power supply connector from the control unit.
2. remove the sheet steel cover. On type Vz 15 to VZ 55 loosen the buckle fixed at the sheet steel cover. On type VZ 70 loosen the screws at the bottom of the sheet steel cover.
3. adjust the air gap on types VZ 15, VZ 20, VZ 30 and VZ 70 by moving either the anchor or the oscillating magnet. On type VZ 40 and VZ 55 only move the oscillating magnet.
 - on types VZ 15, VZ 20, VZ 30 and VZ 70, the fixing screws of the oscillating magnet are accessible from the side.
On type VZ 40 and VZ 55, the hexagonal socket head bolts of the oscillating magnet are accessible by holes in the mounting plate.
 - on type VZ 70, the anchors can be loosen on from the side. On types VZ 15, VZ 20 and VZ 30, the hexagonal socket head bolts of the anchors are accessible by holes in the base plate.
4. for adjusting the air gap user a feeler gauge. You ca find the correct data in Chapter 4.
5. tighten all fixing screws an control again the air gap.
6. mount the sheet steel cover.
7. connect the VZ with the control unit.



NOTE:

Pay attention, that the gap between oscillating magnet and anchor is adjusted parallel.

8. Malfunctioning



WARNING!

The control unit and the terminal box may only be opened by a qualified electrician. Before opening the unit must be disconnected from the power supply.

malfunction	Possible cause	remedy
unit fails to start when switched on	control unit mains plug not inserted connecting lead between VZ and control unit not plugged in fuse in control unit defective control unit mains lead defective connecting lead between VZ and control unit defective	plug in mains plug plug in connecting lead replace fuse replace mains lead replace connecting lead
VZ vibrates weakly	control unit setting too low incorrect voltage	set control unit to 80% check power supply rating
after long periods of operation conveying capacity diminishes	air gap between magnet and anchor has altered sorting bowl fixing screws loose spring assembly fixing screws loose plate spring broken	reset air gap tighten screws tighten screws replace plate spring
unusually loud noise	foreign body in air gap between magnet and anchor sheet steel cover fixing screws loose	remove foreign body and check air gap setting tighten screws

9. Accessories

9.1 Mechanical accessories

The vibration feeding unit may be secured in four ways:

- a) the rubber-metal buffers may be directly screwed to the base (see Chapter 3.1).
- b) if the fastenings have to remain accessible from above, **clamping plates ASP** may be used.
- c) the height of the VZ can be adjusted ± 15 mm with the **fastening system BSV** (only for models VZ-15 ... VZ 40).
- d) if it is necessary to fix the VZ to the ground in a bigger vertical distance, the **variable mounting system VAS** may be used (only for models VZ-15 ... VZ 40). Similarly to the BSV, the height of the VZ can be adjusted ± 15 mm.

If the unit's noise level exceeds the prescribed level, a **noise guard cover** will reduce the noise emission.

9.2 Electronic accessories

Connection to the electric mains is effected exclusively via a suitable **control device**. For this purpose we offer several equipment.

10. Spare Parts

or the models described in this operating instruction, the following components are available:

- * oscillating magnet
- * anchor
- * plate spring
- * spacer (between the plate springs)
- * chucking plate (between plate springs and fixing screws)
- * rubber-metal buffer
- * connector (STAS 20)

In order to guarantee a quick and correct processing of your order, please always indicate the type of unit (see type plate) and the year of production of your vibration feeding unit, the necessary number of pieces and the exact designation of the spare part.



declaration of incorporation

The vibration feeding unit

Designation: VZ 15 VZ 20 VZ 30 VZ 40 VZ 55 VZ 70

Year of construction: starting from 10 / 2014

Has been developed, designed and manufactured in accordance with the above mentioned EU guidelines by:

Manufacturer: fimotec - fischer GmbH & Co. KG
Friedhofstraße 13
78588 Denkingen
Tel.: 0 74 24 / 884-0

Person responsible for documentation:
Edgar Nagel

Hereby we declare, that the incomplete machine comply with the requirements of the machine guidelines (2006/42/EG) attachment II 1 B.

The following harmonized norms have been adopted:

- DIN EN ISO 12100: 2011-03 (D) Safety of machinery- General principles for design - Risk assessment and risk reduction (ISO 12100: 2010)
- EN 60204-1: 2006 Safety of machinery- Electrical equipment of machines - Part 1: General requirements

The specified technical documents of the product according attachment VII part B were compiled. The manufacturer obligates himself, to offer those special technical documents to state departments on demand.

This machine may not be brought into operation until it has been ensured that the equipment into which it is to be incorporated accords with the conditions of the EU guidelines.

Denkingen 12.01.2015 Ralf Fischer, Geschäftsleitung

Place Date Identification of signatory Signature