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INTRODUCTION

This handbook describes how to install, operate and maintain electromagnetically driven Vibratory conveyors.

Carefully read this manual before using the machine to ensure correct installation and operation.

If there is any doubt about correct operation or maintenance please consult technical personnel for further advice.

Always specify the Serial Number of your machine.

SAFETY PRECAUTIONS:

A careful operator is the best operator. Most accidents can be avoided by observing certain precautions. Read and take the following precautions before operation or maintenance of this equipment to help prevent accidents. Operation and maintenance should be performed only by those who are responsible and are trained to do so.

1. Read this manual carefully before beginning any installation, operation or maintenance.

2. Never perform any maintenance on the equipment without the electrical power being ‘locked out’ on the main isolator.

3. Observe warning signs at all times.

4. All electrical connections should be made only by trained professionals.

5. Always check for proper voltage before applying power.
Principle of Feeding by Vibration

The tray of a feeder is driven at a predetermined angle depending upon the type of product being fed and its physical characteristics. To achieve maximum efficiency this angle is usually 20 degrees.

In operation the tray moves forward and upward and then returns to its original position. The product is propelled forward by the tray but, since the return stroke of the tray is faster than the gravitational pull on the product, the product falls ahead of the position it occupied at the start of the cycle. As the cycle is repeated, the product moves forward in a series of short hops although to the eye it appears as a continuous uniform motion.

The nature of the product flow can be varied by altering the amplitude and frequency of the vibration.

Vibratory Motion

The vibratory motion is obtained from an electrically driven coil box which passes impulses to the I piece fixed to the conveyor tray. The coil box transmits impulses to the feeder tray on the backstroke, the return stroke is obtained from the spring action of the fibre glass leaf springs.

Amplitude of Vibration

The feeder is designed to work at a predetermined maximum amplitude, which must not be exceeded. The maximum amplitude of the feeder can be found marked on the label attached to the side of reaction base.
GENERAL CONSTRUCTION OF VIBRATORY FEEDERS

Vibratory feeders comprise of the following elements:

1. Conveying Tray.
2. Fibre Glass Leaf Springs
3. Reaction Base.
5. Label
6. Amplitude Indicator
7. Drive Coil box
8. Vibration Controller
9. Sensor
10. Earth Strap

WARNING:

Under no circumstances should the conveyor be allowed to run above the maximum amplitude stated on the conveyor labels. Failure to prevent this will result in permanent damage to both the tray and the fibre glass leaf springs. When running too high an amplitude, very high stresses are developed in the fibre glass leaf springs causing fracture and amplitude loss. If the feeder is allowed to run above its maximum amplitude stated on the machine label permanent damage can occur.
General Description of operation and major parts

The tray is attached via fibre glass leaf springs to a heavy reaction mass.

The reaction mass itself is supported on rubber mountings so that the complete system represents a spring mass system with its own natural frequency of vibration.

The drive coil provides magnetic pull to the tray.

The control box controls the rate of impulses being sent to the coil box to vibrate the tray at its natural frequency.

1. Conveying Tray
   The conveying tray is made of either stainless steel. It is suitably stiffened by the addition of support brackets so that it will withstand the effect of continuous vibration.

2. Leaf Springs
   The tray is supported by leaf springs, which can maintain a constant spring rate thus keeping the flow rate consistent.

3. Reaction Base
   This is a live mass to which the tray can react against and also give first stage vibration isolation.

4. Anti-Vibration Mountings
   The reaction mass is supported on rubber mountings to isolate vibration from the floor or surrounding structure.

5. Label
   This shows serial number and maximum stroke the feeder can run.

6. Amplitude Indicator
   This is a disc marked off in 1mm divisions. As the conveying tray vibrates the two “V”s will appear to cross, where this occurs this is the amplitude of the feeder.

7. Drive Coil
   The drive coil is a fully potted and sealed wound copper coil, which drives the tray via signals from an electronic controller.

8. Vibration Controller
   The electronic control system controls the amplitude and frequency of the feeder. The control system is normally housed in a separate control box close to the conveyor, but it can be positioned in a main control panel.

9. Sensor
   This monitors vibration and provides feedback to ensure a constant flow.

10. Earth Strap
    This earths the tray to the reaction base to remove and static electricity built up by the product.
INSTALLATION

1. Prior to installation
   Check that all items are present and that no external damage is visible
   Report any damage immediately

2. Lifting
   This must be done by a qualified person
   Feeders are generally delivered assembled therefore installation usually consists of
   positioning feeder either on the floor or on a steel support structure.
   Lifting the feeder correctly is important and should never be lifted by the tray

3. Positioning and leveling
   When feeder is in position it must be leveled in both horizontal directions.
   If leveling is required the correct height packers must be placed below the feeder
   mounting frame.
   Ensure feeder is not in contact with any stationary equipment.
   The mounting frame can then be bolted down.
   Once bolted down electrical installation can commence.

4. Electrical installation
   This must be done by a qualified person
   If the feeder has a control box fixed to main frame and is pre wired the only
   connections required are main power input and remote enable if required.
   If the feeder has a separate control box it must first be mounted in a suitable
   position preferably not more than 3 metres away from feeder.
   Once control box is fixed, connect coil box and sensor cable ensuring it is not in
   contact with any vibrating parts, followed by any remote enable or PEC signal
   cables and main supply.
   Feeder can now be switched on by main switch on front panel of control box.
**OPERATION**

Once the vibratory conveyor is in the correct position, electrically installed and fixed down, it is ready to start. Prior to starting check the following:-

1) That there is nothing to interfere with the free movement of the vibrating tray.
2) Ensure there is at least 10mm clearance between the vibrating tray and the infeed/discharge equipment.
3) Fixing down bolts are tight
4) Any remote stop/start signal is enabled

With the above checked, the vibratory conveyor can be started and brought up to speed via the amplitude control code 002 until the amplitude reaches the stated level as indicated on specification sheet enclosed.

The vibrating conveyor, running at its designed amplitude and frequency should now be running smoothly and with virtually no transmitted vibration being passed through the support structure.

As this conveyor is a natural frequency conveyor the frequency and amplitude are important for the correct running of the conveyor.

The conveyor operates at a pre determined frequency (see specification sheet)

Consult the factory if any speed adjustments are required.
MAINTENANCE

After installation and commissioning the conveyor will give a problem free life provided it is correctly maintained and used, the following list is a guide to ensuring this:

1. Daily inspection
   a) Check amplitude.
   b) Check that any bolt on parts (such as screens and diverters) are not loose.
   c) Check noise levels (excessive noise indicates a possible fault).

2. Weekly inspection
   a) Check vibrating tray and parts for damage.
   b) Check leaf springs for wear or damage.
   c) Check wiring to ensure cables are not rubbing against vibrating parts or damaged.
   d) Check terminal box and control box to ensure no product or water has entered.
   e) Check air gap between coil box and I piece
   f) Check frequency of vibration (via controller)

3. Monthly inspection
   a) Check leaf springs fixing bolts are tightened to correct torque (58 Nm)
   b) Check condition of Anti-Vibration mounts.
   c) Check coil box fixing bolts are tightened to correct torque (58 Nm)
   d) Check sensor fixing bolts

4. Six monthly inspection
   a) Check condition of Anti-Vibration mounts.
   b) Tighten and torque all leaf springs fixing bolts
   c) Tighten and torque all coil box fixing bolts
Fault Finding

Feeder does not vibrate:

Check
1) Power On (green indicator switch)
   When illuminated this indicates that the control box is powered up.
2) System is being called by remote stop/start or direct link across 5/6
3) Controller is not in overload mode—press “P” on front panel to reset
4) Any other overloads or MCB’S are not tripped including E STOPS
5) The drive coil box is working.
   Check cables for resistance and that coil is not going to earth
6) That the sensor is connected and there is no damage to cable
7) That controller settings are correct (see specification section and controller manual)

Feeder vibrates too much:
1) Reduce amplitude via control box

Feeder does not vibrate enough:
1) Increase amplitude via control box
2) Check that additional parts have not been added to tray
3) Check coil box gap (it should be a minimum of 1.5mm, maximum of 2mm)
4) Check that the leaf springs are not damaged.
5) Check that the leaf spring fixing bolts are at the correct tightening torque.
6) Check the coil box fixing bolts
7) Check that the tray is not worn or cracked

Feeder is noisy:

CAUTION: If the feeder is noisy due to a mechanical fault as described below then this should be corrected immediately to prevent damage to the conveyor.
1) Check that the coilbox air gap is a minimum of 1.5mm
   A gap of less than 1.5mm may allow the coilbox to touch the I piece resulting in a loud metallic hammering noise.
2) Check the conveyor tray is not touching any other item.
3) Check the conveyor reaction base is not touching any obstruction.
4) Check for loose nuts and bolts.
5) Check for any loose bolted on parts.
6) Check the tuning of the conveyor. (VIA CONTROL BOX)
REPLACING PARTS

Changing a coilbox:-

a) Isolate the power supply and disconnect the wires within control box.
b) Remove the old coilbox which is fixed with four M10 bolts.
c) Reposition the new COIL BOX having first checked that it is the same type
d) Set the air gap to 1.5mm using a suitable spacer.
e) Tighten the four M10 bolts.
f) Set the amplitude adjustment to minimum.
g) Re-connect as per old coilbox, switch ON power.
h) Increase the amplitude to 4mm check that coil box is not hammering against I-piece.
i) If hammering occurs check magnet gap

**NOTE** if air gap is to large conveyor will draw more current which could cause coil box to burn out and controller to trip

Check that additional parts have not been added to tray

Changing a control box:

a) Isolate the power to the control box.
b) Disconnect the electrical connections having first noted their respective terminal numbers.
c) Remove the control box.
d) Fit the new control box having first checked if it is the same or an interchangeable type.
e) Refix the control box.
f) Re-connect all the cables.
g) Switch ON power.
h) Check settings match setting up sheet supplied with feeder
i) Check that coil box is not hammering against the I piece on the tray.
j) If hammering occurs reduce the power setting of the controller(set controller manual)
k) Set the amplitude to give the correct conveying speed (Code C002).

Changing a leaf spring:

a) Remove the clamping bolts and nuts holding the leaf spring assembly in position.
b) Remove the leaf spring from the assembly.
c) Ensure that the tufnol spacers are in good condition.(replace if required)
d) Fit the new leaf spring in reverse order to dis-assembly
e) Always use a leaf spring of equal thickness to the original unless re-tuning.
f) Always use new Bolts and Nyloc nuts if possible.
g) Tighten the clamping bolts and nuts(M10) to 58Nm.
h) After six hours running of the conveyor all the nuts should be re-torqued to 58Nm.

RE TUNING CONVEYOR

On despatch the feeder has been tuned its natural frequency but with use or if the tray mass/leaf spring ratio is changed a reduction in stroke and increase in current drawn by drive coil could occur.
Re-tuning the tray mass/leaf spring ratio can be achieved by adjusting the frequency via the electronic controller.(see controller manual)
SPECIFICATIONS AND PARTS LIST

Every vibratory conveyor is tested and inspected upon completion, the charts below show the set up and parts used prior to despatch.

**Set up**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Amplitude (mm)</td>
<td>4</td>
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<tr>
<td>Frequency</td>
<td>27hz</td>
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<td>Power setting (%)</td>
<td>30</td>
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<tr>
<td>No of leaf springs</td>
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</tr>
</tbody>
</table>

**Parts List**

See figure 1 for pictorial identification of parts

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Part No</th>
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<tbody>
<tr>
<td>1</td>
<td>Vibrating tray</td>
<td>1011T</td>
<td>1</td>
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<tr>
<td>2</td>
<td>Reaction base</td>
<td>1011B</td>
<td>1</td>
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<tr>
<td>3</td>
<td>Anti-vibration mounts</td>
<td>MWS200A</td>
<td>4</td>
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<tr>
<td>4</td>
<td>Electronic drive controller</td>
<td>MWS268/12A IP54</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Electronic Feedback Sensor</td>
<td>MWS11</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Leaf spring spacer</td>
<td>MWS1007</td>
<td>40</td>
</tr>
<tr>
<td>7</td>
<td>Leaf spring clamp plate</td>
<td>1011S</td>
<td>20</td>
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<tr>
<td>8</td>
<td>Leaf spring bolt assy</td>
<td>1011BA</td>
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<tr>
<td>9</td>
<td>Amplitude indicator</td>
<td>MWS1014</td>
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<tr>
<td>10</td>
<td>Leaf spring</td>
<td>MWS1027/19</td>
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<td>11</td>
<td>Earth Strap</td>
<td>MWS140</td>
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<td>12</td>
<td>Coil box</td>
<td>MWS1050</td>
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## RECOMMENDED SPARES

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<td>MWS268/12A IP54</td>
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<tr>
<td>2</td>
<td>Electronic Feedback Sensor</td>
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<tr>
<td>3</td>
<td>Leaf spring</td>
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<td>4</td>
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<td>Amplitude indicator</td>
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<td>7</td>
<td>Earth Strap</td>
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<tr>
<td>8</td>
<td>Coil box</td>
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</table>

The information contained in this booklet is issued as a guide and is not intended to be definitive. No legal liability shall attach to the supplier in connection with the use of this Guide.

Users of the machine are reminded that all work must comply with existing regulations imposed by statute or by regulatory authorities and it is the user responsibility to ensure compliance with such Regulations.