

**enmm**

ELECTROMECHANICAL VIBRATORY FEEDER  
INSTRUCTION AND MAINTENANCE MANUAL



## INDEX

<b>1.0 Introduction</b>	<b>PAGE 3</b>
1.1 General	<b>PAGE 3</b>
1.2 Receiving goods	<b>PAGE 3</b>
1.3 Assembly	<b>PAGE 3</b>
1.4 Installation	<b>PAGE 3</b>
1.4.1 Base Mounted	<b>PAGE 3</b>
1.4.2 Suspended	<b>PAGE 3</b>
1.5 Electrical Connections	<b>PAGE 4</b>
1.6 Vibratory Motors	<b>PAGE 4</b>
1.7 Safety issues	<b>PAGE 4</b>
1.8 Starting procedures	<b>PAGE 5</b>
1.9 Operation	<b>PAGE 5</b>
1.10 Noise levels	<b>PAGE 5</b>
1.11 Regular maintenance	<b>PAGE 6</b>
1.12 Spare parts	<b>PAGE 6</b>
1.13 Drawings	<b>PAGE 6</b>
1.14 Component information	<b>PAGE 6</b>
1.15 After sales service	<b>PAGE 6</b>
<b>2.0 (EMF) ENMIN MOTOR FEEDER</b>	<b>PAGE 7</b>
<b>3.0 (ETC) ENMIN TUBE CONVEYOR</b>	<b>PAGE 7</b>
<b>4.0 (EHF) ENMIN HOPPER FEEDER</b>	<b>PAGE 7</b>
<b>5.0 (EMS) ENMIN MOTOR SCREENER</b>	<b>PAGE 8</b>
<b>6.0 (EVT) ENMIN VIBRATORY TABLE</b>	<b>PAGE 9</b>
<b>7.0 Trouble shooting</b>	<b>PAGE 10</b>
<b>8.0 Hardware Reference Guide</b>	<b>PAGE 11</b>



## 1.0 INTRODUCTION

Enmin's vibratory motor driven equipment have many applications throughout a wide variety of industry groups. They compliment our other designs offering reliability and efficiency in fulfilling their designated tasks. As with all our products, motor driven vibratory equipment is generally built to suit specific duties. These machines are found throughout industries ranging from the food and allied groups to mining and mineral processing as well as plastics, chemical and reclamation applications.

### 1.1 GENERAL

Each piece of equipment will be manufactured to reflect the dimensions and construction outlined on our drawings. All items are shop tested prior to crating and dispatch.

### 1.2 RECEIVING OF GOODS

On receipt of your goods you are recommended to immediately inspect them and if necessary report any issues with the equipment. The delivery documentation will list all major components and accessories.

### 1.3 ASSEMBLY

In the majority of cases the equipment will be shipped fully assembled and therefore the only requirement will be the locating and fixing of the machine. Where hoppers or gates for example are included all the necessary fixings will be provided. The general assembly drawing will clearly detail these inclusions. In cases where some assembly is required, for example a high support frame, the Vibrating Section will be supplied with the Isolating Springs fitted and therefore bolting is the only requirement. Occasionally the Motors are shipped separate; referring to the drawings will indicate the correct positioning. The fixing bolts are provided and must be tightened in accordance with the motor manufacturer's recommendations which are given on the drawings.

### 1.4 INSTALLATION

**1.4.1 Base Mounted** versions will be designed with a fabricated support frame that needs to be bolted to the floor or main supporting steel work.

Where the unit is located in an elevated position, care must be exercised so that the main supporting structure is sufficiently braced to accept the transmitted vibratory forces. Enmin vibratory equipment will incorporate isolating springs in the form of heavy duty coil springs, hollow rubber isolators, air bags or most common will be our exclusive torsion mounts. These isolating springs will be selected in accordance with the duty of the equipment but in all cases will be designed to give a high degree of isolation between the vibrating mass and the supporting structure. Thus their installation is critical with particular attention to the accuracy of the bolting or locating positions. Any misalignment will result in premature damage, poor operating results and a reduction in the level of isolation. We design to achieve some 98% plus isolation in our systems. Isolators should have a general allowance of +/- 1degree in both the horizontal and vertical planes. In the case of the Torsion Mounts they must also be aligned with the conveying direction to ensure optimum performance.

**1.4.2 Suspended Versions** will require four flexible cables which may be stainless steel or high tension giving at least a safety factor of 4 on each cable. The machine will be supplied with four special suspension kits comprising of rubber or wire springs, eye bolts and support cups. The positioning and tensioning of the cables is most important as any unevenness will also result in poor conveying and early failure of the components. The drawings will indicate the recommended cable angles for the best results.



## 1.5 ELECTRICAL CONNECTIONS

With the exception of EVT Equipment all other units will be fitted with twin Vibratory Motors. Some models in the EVT range have a single vibratory motor. For twin or single motor designs the wiring diagram in the appendices should be referred to, and which will indicate the recommended procedure.

*Thermal Overloads* are required for each motor and should be set at 10% above the rated amps draw as per the rating plate on the motor. A *common contactor* will ensure that both motors start at the same time and therefore synchronize to provide the linear feed. Refer to appendices for the operational explanation of twin vibratory motors.

In some cases the use of VFD ( variable frequency device ) will be recommended. This must also be operated via twin thermal overloads and must be selected with the correct level of protection for starting KW and current. VFD units will provide a 4 to 20 Ma input signal as well as excellent braking facilities.

## 1.6 VIBRATORY MOTOR

In the vast majority of cases the Vibratory Motors will be supplied and fitted and therefore only electrical connections are required. Where motors have to be fitted the correct tightening values must be adhered to as per the manufacturer's recommendations and they are also provided on the assembly drawings. The principle of the motor's operation is given in the appendices. Electrical connection must ensure that the motors operate in opposite direction to each other.

This is easily checked by removing one end cover from each motor and applying power to the unit for a couple of seconds only. The spinning weights can be observed. The weights on the motors are factory set and will not require adjustment unless operating conditions dictate otherwise. Adjustment of the weights must be made in strict accordance with the manufacturer's instructions. This will be found in the accompanying motor manual. It is necessary to have electrical cables between the motors and the junction box left flexible. No hard wiring in this section is possible to avoid damage to the motors or cause electrical faults.

## 1.7 SAFETY ISSUES

Since the vibratory unit is a moving piece of equipment check that it cannot come into contact with adjacent items especially during start up and stopping where maximum amplitudes are experienced. The possibility of injury to personnel is quite remote with these machines. However some simple rules need to be adhered to.

- Never operate the equipment with the motor covers removed
- Never remove any warning or information labels from the equipment
- Employ a start up signal to alert personnel of automatic starting and stopping of the machine
- Ensure electrical covers are intact
- Avoid wash down with high pressure water jets
- Apply general factory safety practices for machinery

In the case of suspended installations, care should be exercised in the case of personnel having access to the underneath of the machine during normal duties. Safety warning labels should be used and protection covers installed where considered necessary. Consultation with in-house OHAS officers should be considered



## 1.8 STARTING PROCEDURES

Prior to starting any vibrating equipment for the first time the following check list should be consulted :

- Motor Covers should be secure
- Fixing Bolts
- Covers in place and secure
- Flexible sleeves connected and sealed
- Discharge chutes attached correctly
- No loose bolts
- Check motor bolts
- No adjacent equipment in contact
- Electrical connections are correct
- Personnel are aware of start up

## 1.9 OPERATION

After starting the machine complete a visual check for smooth operation and that no abnormal vibrations are present. That the machine is vibrating in a straight line.  
No excessive vibrations are being transmitted to the support frame or through the cables in the case of a suspended model.

Allow the machine to run **without material** for one hour.

After that time switch off.

Check the motor fixing bolts as some bedding in may take place.

Use a torque wrench to set the recommended values.

Check all other fixings.

The motors should be reasonably warm to touch.

Restart the machine and place in production

## 1.10 NOISE LEVELS

The noise level from the machine when operating without product or application duty should be registering around 70 to 75 Dba at 1 metre and be in the requirements for standard factory noise requirements.

Circumstances that will effect these noise levels are :

- Metal components being conveyed
- Metal on metal as on the compaction tables
- Noisy metal spring
- Machine coming in contact with adjacent equipment
- Faulty bearing in a motor
- Loose cover or component
- Motors not running in opposite directions
- Broken weld or a crack in the metal work
- Supporting structure not bolted down or not sufficiently braced
- Certain materials such as powders can have a beneficial effect by absorbing sound.



### 1.11 REGULAR MAINTENANCE

As with any piece of moving equipment some maintenance is required and although our vibratory machines do require very little attention, regular inspection will ensure trouble free operation. The most important item is the motors. Refer to the manufacturers hand book for detailed instructions. We suggest every month the following routine checks should be made.

Inspect the motors for unusual rise in temperature of the casing. That the motors are running in synchronizing. The machine is running with no signs of fluctuations. Covers are secure and not leaking dust. Inspect the isolators for wear or uneven support of the machine. Where Torsion Mounts are used each is tagged with a ' Saturation Height' decal. Once the static loaded height of the isolator falls below this value it should be replaced. We recommend that a pair of isolators are replaced at one time either the forward or rear ones Inspect the welds and structure for any cracks

### 1.12 SPARE PARTS

The following are recommended

- Production
- Vibratory Motors
- Set of Isolators
- Screen panel or Cloth
- Flexible sleeves
- Rail capping
- Cover seals
- Each machine will be quoted with recommended set of spares.

### 1.13 DRAWINGS

Enmin designs all its equipment using the latest 3d C.A.D. modeling.

Hard copy of drawings are available or we can supply the necessary information in electronic form.

Drawings will reflect the manufactured machine and therefore all design dimensions will be correct. Information contained on the drawings should be read in conjunction with these operating instructions.

### 1.14 COMPONENT INFORMATION

Your specific machine will have manufacturer's information covering their particular supply and should be referred to for detailed instructions in maintenance and operation.

- Vibratory Out of Balance Motors
- Variable Frequency Drives
- Electrical Control Panels
- Certification where required for special steels

### 1.15 AFTER SALES SERVICE

We will endeavor to support our equipment through all reasonable avenues.  
For After Sales Assistance Enmin can be contacted

Telephone	03 9800 6777	during business hours
Fax	03 9800 2211	"
Email	<a href="mailto:enmin@enmin.com.au">enmin@enmin.com.au</a>	
Web site	<a href="http://www.enmin.com.au">www.enmin.com.au</a>	



## **2.0 MODEL EMF ( Enmin Motor Feeder )**

These are the most common type of Vibratory Feeder in our range and will be installed in both base mounted and suspended models. Base mounted types will have a supporting frame and generally operate in the horizontal plane. Where they are fed from an overhead hopper the gating arrangement is most critical to ensure correct material flow across the feeder.

The data sheet in the appendices outlines the recommended procedure for gates. Some feeders will be fitted with replaceable plastic or metal liners where abrasive products are encountered. Rubber is also used to reduce noise, for example with metal parts. It is always recommended to provide a reasonably uniform feed to the unit the action of the feeder will spread the product and deliver a constant material flow. The Motor Feeder will accept high head loads unlike Electromagnetic types of feeders which are more susceptible. Suspended model are designed to operate usually at a decline between 5 and 10 degrees and can be easily adjusted on the suspended cables. In both versions the feeder pan must be located parallel to the base or the ground using a spirit level. Any unevenness will cause material to flow to one side.

***Unless incorporated in the design do not add extra sides to the feeder nor additions to the discharge without consulting Enmin Engineers***

## **3.0 MODEL ETC ( Enmin Tube Conveyor )**

Enmin Vibratory Tube Conveyors offer dust free handling over distances up to 7 meters. Like EMF Models they are provided in both base mounted and suspended versions. Two types are offered one is our standard fixed drive model the other is our **Varicon** design. The same rules apply regarding the set up as per the EMF design.

ETC conveyors are generally supplied with two quick release inspection ports which allow operators to clean the inside of the tube as well as regular inspection for material build up or corrosion of the tube. Flexible sleeves need to be sufficiently long to avoid interfering with the operation of the machine. A screw type band is usually employed to seal the sleeves. Dust extraction ports need also to use flexible sleeves.

The ETC is designed to operate with some 60% to 80% cross section of material in the tube. By stopping the machine and removing one of the end covers this can be verified. The Varicon design offers a drive system that is clamped into place and has a flanged and bolted inlet and outlet sections. Varicon types are employed where very abrasive materials are encountered and thus the tube can be turned through 90 degree increments as wear takes place. Like wise the inlet can be exchanged for the outlet and vice versa. To join two ETC machines a special flexible is employed which would be described in the general arrangement drawings. A separate data sheet is available for this item.

## **4.0 MODEL EHF ( Enmin Hopper Feeder )**

Hopper Feeders are a combination of an EMF and a large hopper fitted with a control discharge gate. They will always be offered as a base mounted machine. The capacity of the hopper will be designed to suit the type of material and the volume. Do not add extra walls as this will result in overloading the machine and reducing the feed rates.

These machines are nearly always located on the ground and should be bolted down. The adjustable gate will control the volume of material passing from the hopper along the feeding pan. Care should be taken to have this at a maximum tolerated setting to avoid build up inside the hopper. The machine should be operated on a continuous basis with material being dumped whilst the unit is working.



## **5.0 MODEL EMS ( Enmin Motor Screener )**

Screeners are offered in a variety of configurations depending on the application. In essence they are EMF units with one or more screen decks and differing discharges. The same set up rules apply.

Screeners will provide the very best results if they are uniformly loaded. Overloading of the screen deck will result in poor screening since the material will not have time to be correctly presented to the screen apertures. This can lead to blinding of the screen deck or simply carry over of the fine materials.

Adjustment for change in operation will be by the motor weight settings to change the thrust values, declining the machine, or in some cases operating the unit in an inclined plane.

There are numerous conditions that could present themselves should an issue arise; it is recommended you refer the matter to Enmin Engineers who will have experience with almost all possible scenarios.

The EMS will be designed and tested with your specific material in almost all cases and therefore adjustments to the machine will be minimal.

### **Screen Decks can be:**

- Punched Plate
- Tensioned Wire
- Wedge Wire Panels
- Fabricated grids

Screen decks will be bolted into place and therefore easily removed, woven wire types may be in bolt in pretension panels or longitudinally tensioned. In all our designs the screen decks can be quickly removed for cleaning or changing.

For our longitudinally tensioned screeners refer to the specific data sheet in the appendices for the correct procedure.

Covers when supplied will be for dust or contamination reasons and it is important that operators are familiar with the correct removal and replacement of the covers. A dust seal will be incorporated and care should be exercised to avoid damage otherwise dust will be released. In replacing the cover this should be done preferably with two operators.

No tools are required since hand clamps are employed. The cover must be uniformly clamped to provide a good seal without distorting the cover itself. We recommend this be commenced with a uniform clamp to all positions, then starting in the middle and on opposite sides tighten the clamps progressively towards the ends. ( Repeat for the opposite direction ). Finally check on all clamps before starting the machine

Flexible sleeves ( where fitted to the inlet and discharge ) should have sufficient length to avoid any interference with the operation of the machine. A clamping screw type band is usually fitted to seal the sleeve.





## **6.0 MODEL EVT ( Enmin Vibrator Table )**

Each table has a specific application. With the exception of the FT and the OB designs the others will always have a twin motor system. Most motors will be low frequency selected on the application and type of compaction needed. For high strength concrete or refractory materials our high frequency motors will be used and operated from a frequency inverter. A separate manual for the frequency inverter will be provided. Where a single motor is used the direction of the motor is irrelevant. We recommend that all EVT units are bolted to the floor. Table tops should be level in both directions.

### **FT ( Flat Top )**

Tables will usually have hollow rubber or coil springs. Adjustment will be simply by the weights on the motors.

### **GT ( Grid Top )**

Grid Top tables have the grid section raised and lowered by the use of Air Bags. These will be centrally plumbed and controlled by a solenoid operated three way valve. An air supply of some 2 bar is all that is need and the solenoid valve will usually be 240 volt 50 Hz supply. The sequencing of the operation of the grid is interlocked with the feed onto and off the table and/or the filling process. We recommend that the Vibratory Motors operate continuously during a normal production run. In the case of our high frequency motors the frequency inverter will accept a variety of input signals and can be used to adjust the motor speed from 50 to 100hz with the same weight settings. It is recommended that these motors are operated at a weight setting of 50 to 70% maximum to ensure longer bearing life otherwise larger motors should be selected. Because the grid top is moving sufficient warnings should be employed for operator safety.

### **OB ( Outboard )**

Outboard Tables are no different to flat top they are simply a lower profile. Guarding will be incorporated into the design to avoid damage from fork lift trucks

### **BT ( Belt Top )**

Belt Top Tables incorporate a flat belt conveyor with a vibrating section. Usually a single motor is used therefore the control is by the weight settings. Belt Top Tables are usually used to compact and shape 20 kg plus bags of material as well impacting cartons prior to sealing. As it is a conveyor, sufficient guarding must be in place and warning sign for belt conveyors displayed for operator safety. The belt conveyor can operate on an incline or decline. Different grade of belt material may be used depending on the application. The speed of the conveyor is important since sufficient time must be allowed over the vibratory section to give time for the compaction to take place.

### **WT ( Weigh Top )**

Weigh Top Tables are for use with a floor mounted platform scale. The table will be an OB design and designed for the platform scale. Bolting down of the scale is necessary and the procedure should be referred to in the manufacturer's instructions. Once installation is complete the scale will need to be calibrated.

In some cases air bag type isolators are used and therefore a constant air supply will be needed.



## 8.0 TROUBLE SHOOTING

Motors, if a problem arises some of the symptoms in noise levels or regular maintenance will be evident :

- **Motors will fail due to**

- Overheating
- Bearings
- Loose bolts
- Elevated ambient Temperatures
- Not synchronizing with each other
- Incorrectly rewound motor
- Wrong bearings being used in maintenance overhaul
- Motors running at 100 % continually

- **Isolators will fail due to**

- Overloading
- Misalignment
- Rubber being exposed to elevated temperatures or oils and fats in atmosphere
- Not replacing a set of isolators

- **Machine reduces in performance**

- Welding or cracks in the metal work
- Machine out of balance
- Isolator failure
- Motor failing or out of synchronizing
- Overloading of material

- **Machine will not start**

- Check electrical connections and components
- Power supply
- Overloads

- **Machine feeds to one side**

- One motor failed
- Motor not synchronizing
- Uneven loading
- Isolator failure

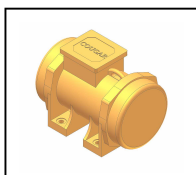
- **Screening Problems**

- Screen Blinding
- Screen aperture incorrect
- Broken screen mesh
- Change in material sizing
- Moisture
- Chute blockage
- Screen overloaded



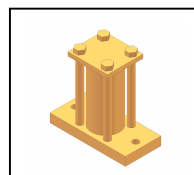
## 9.0 HARDWARE REFERENCE GUIDE

The following examples are what Enmin consider to be the most common hardware components used in conjunction with our range of Electromechanical Vibratory Equipment. Enmin will always Endeavour to source the best possible products to compliment our equipment and thus ensuring the quality, reliability and workmanship remain at the highest possible standards.



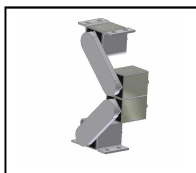
### VIBRATORY MOTOR

All vibratory motors are adjustable from 0-100%, they are the drive that enables the equipment to vibrate. Most commonly two units will be used, in some circumstances a single motor will be found.



### PISTON VIBRATOR

Pneumatically operated piston vibrators are used when consideration must be given to explosive or high risk areas. Single installation will be the most common found.



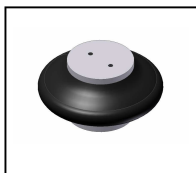
### TORSION MOUNT

Torsion mounts are what we use as first choice, they provide a more stable platform for the vibratory feeder to operate from thus resulting in better performance and longevity of the equipment.



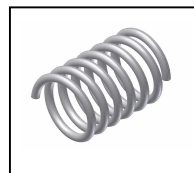
### HOLLOW RUBBER MOUNT

Hollow rubber mounts are very effective when quick access is required to the equipment through removable. They are also commonly used in explosive or high risk areas.



### AIRBAG MOUNT

When 100 % isolation or vertical lift is needed pneumatic airbags will be employed. Most commonly used on vibratory tables



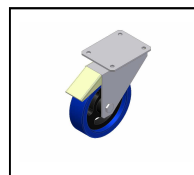
### COIL SPRING MOUNT

When a robust mount is need for heavy loads the coil spring available in mild steel or stainless steel prove to be durable and effective in reduce the transfer of Vibration.



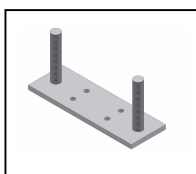
### ARTICULATED FOOT

Adjustment due to unevenness in floor levels will usually be taken up by an articulated foot. Bolt down options are also available when a permanent installation is required.



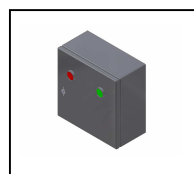
### CASTOR

Lockable and adjustable castors are available in food and non-food grade standards. Castors are often used when the equipment is used in multiply locations or for ease of removal.



### ADJUSTMENT PAD

The adjustment pad is used exclusively on our equipment and has been designed in conjunction with the torsion mount for final adjustment in the overall level of the equipment.



### CONTROL BOX

Control boxes are built to meet the highest safety standards world wide. Boxes are available in mild steel powder coated or stainless steel finish, functions range from variable speed to PLC.