

Service Instructions

Syntron® Light-Capacity Electromagnetic Vibrating Feeders

Models: F-T02

Contents	Page
Introduction	1
Theory of Operation	2
Long Term Storage	3
Installation.....	4
Operation	5
Maintenance	5
Trouble Shooting	6
Spring Replacement	7
Air Gap.....	7
Checking Feeder Current.....	8
Stroke Gauge.....	8
Illustration	8
Operating Specifications	9
Parts List.....	9
Instructions.....	11
Important.....	12
Spring Arrangements Chart.....	12

Syntron Material Handling, LLC. reserves the right to make changes at any time, without notice and without any liability or other obligation on its part, in material, equipment, specifications and model. Syntron Material Handling also reserves the right to discontinue the manufacture and sale of models, and the parts and components thereof.



Safety Instructions: Product safety labels must remain highly visible on the equipment. Should safety labels require replacement contact Riley Automation for an additional supply free of charge.

The instructions and data herein are vital to the proper installation and operation of this equipment. To avoid delays due to faulty installation or operation, please see that these instructions are read by the persons who will install, operate and maintain this equipment.

Supporting information, such as drawings, may be attached to this manual. The information contained therein take precedence over corresponding information printed in this manual.

INTRODUCTION

The F-T02 Feeder assembly is an electromagnetic unit, consisting of a dynamically balanced, two mass vibrating system. This system consists of a trough and trough connecting bracket coupled to an electromagnetic drive by means of leaf springs

NOTE: When supplied without a trough assembly, the drive unit (F-T02 Vibra-Drive) can be used with chutes, tracks, etc. (supplied by the customer).

The electromagnetic drive (a coil and core assembly) is located within the base housing. This assembly is connected directly to the rear of the drive unit housing. An armature, also included as part of the drive unit is located opposite the core and coil and is connected directly to the trough mounting bracket.

Leaf springs are located at the front of the drive unit housing. These springs are clamped at the bottom to the drive unit housing, and at the top to the trough mounting bracket. The trough, trough mounting bracket and armature become an assembly, joined to the drive unit through the springs.

THEORY OF OPERATION

Model F-T02 Feeder operation produces a vibrating stroke on the surface of the feeder trough. The stroke is obtained by the electromagnet pulling the trough sharply down and back and then allowing it to spring up and forward. Repeated at high speeds (3600 v.p.m. at 60 cycle or 3000 v.p.m. at 50 cycle power supply), this action produces a definite vibrating movement on the trough surface.

The F-T02 Feeder requires the use of a separate controller which contains a rectifier, used to convert alternating current into rectified current.

Figure 1 illustrates a typical a-c sine wave and a typical r-c sine wave (the type of pulsating current which is required to operate the feeder). The coil is energized only by the portion of the sine wave shown as a solid line of the r-c sine wave. The broken line represents the portion of the sine wave which is blocked by the rectifier. The blocked portion does not reach the feeder coil and during this time the feeder coil is de-energized.

When the coil is energized, the core becomes magnetized and attracts the armature assembly. This pulls the armature, trough mounting bracket and trough down and back towards the core. This pull is against the mid-point of the leaf spring stack, flexing the springs.

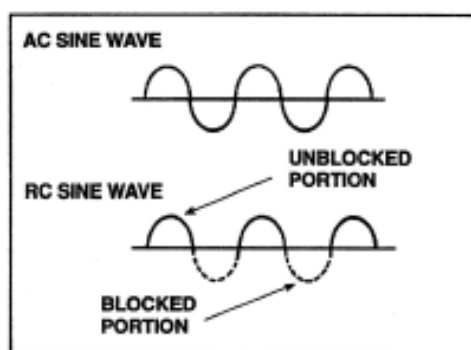


FIGURE 1—THE RECTIFIED SINE WAVE

Each power half cycle is followed by a half cycle of blocked current flow during this half cycle, power is not available to the coil and the coil becomes de-energized. With the coil de-energized, the magnetic pull between the core and armature is released and the leaf spring system is permitted to spring back to (and slightly through) its normal position. This pulls the trough, bracket and armature assembly up and forward.

On the next power half cycle, the trough, trough mounting bracket and armature are again pulled down and back. On the next no power half cycle, the trough, trough mounting bracket and armature assembly are again pulled up and forward. Thus, during operation, the trough is continually vibrating along a straight-line path.

The unit is mechanically adjusted to limit the travel of the armature so it does not strike against the face of the core. The space between the armature and core is called the "air gap". The size of the air gap is critical to good feeder operation. Instructions concerning the air gap are on page 8.

The magnetic pull between the armature and core exists during the time and current is passing through the unblocked, or power, half cycle.

Figure 2 illustrates the action of a single particle of material moving along the trough surface. During a vibration cycle, the trough surface travels between its lowest point (A) to its highest limit (C). The trough travels at its greatest velocity between (A) and (B), although still traveling up and forward, the trough decelerates between (B) and (C). On the upward stroke, the particle of material is in contact with the trough from (A) to (B). At point (B) the velocity of the particle becomes greater than the trough and the particle leaves the trough surface on a free flight trajectory from (B) to (D). The particle lands back on the trough surface at a position further forward (D). This completes one cycle. Each cycle imparts a forward and upward motion of the material and it lands further along the trough toward the discharge.

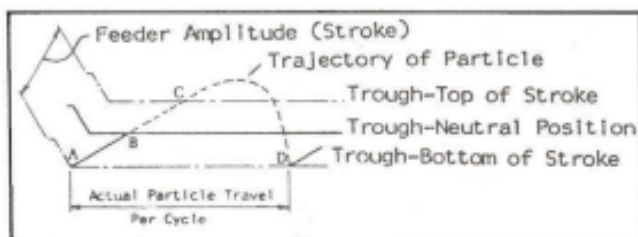


FIGURE 2 - MATERIAL FLOW ON TROUGH

The rate of feed is controlled by the intensity of the magnetic pull which is varied by the controller.

LONG TERM STORAGE

When received, the equipment should be carefully uncrated.

Give the equipment a thorough visual inspection to reveal any damage that may have occurred during shipment. If damage is found, contact RA and the shipping carrier at once.


If feeder is placed in storage, prior to installation, store the feeder in the shipping carton.



CAUTION: Do not support the weight of the unit by the trough assembly. This will distort and damage the springs.

When storing the controller, plug all openings in the control box to prevent dirt, rodents and insects from entering. Syntron Material Handling advises placing a corrosion preventive inside control box. Cover the controller and place it in an area protected from extreme heat. Do not drop controller. The force of the impact may damage the components.

INSTALLATION

 **CAUTION: Do not lift the unit by the trough.**


The feeder has been factory tuned for your specific application. Handling by the trough could cause damage to the feeder.

If you ordered the vibra-drive only, (without a trough), then see pages (12-13) for setting up a drive with your feeder trough.


When received the feeder and controller should be carefully unpacked. All packing bands, paper, etc., must be removed. Check the controller components for protective shipping blocks, tape etc.

Inspect all the equipment received and report any damage which may have occurred during shipment. If damage is found, notify Syntron Material Handling, Material Handling Solutions and the shipping carrier at once.


NOTE: When installing the feeder, consideration must be given to the area of support. Some of the heavier Model F-T02 Feeders can weigh over 43 pounds (19.5 kg) and a support must be selected that will safely carry the full weight of the unit under load conditions.

 **CAUTION: Feeder must not come in contact with any rigid object or adjacent surface that could hamper its vibrating action, a 1" clearance must be maintained. Any connections (such as dust seals) between the trough and adjacent objects must be flexible, preferable cloth or rubber.**

The separate control assembly should be installed as close to the feeder as possible. Installation on a wall in a clean, dry location, free from excessive vibration is recommended.

 **WARNING: Electrical power supply connection to the RA supplied controller must be made through a customer supplied safety disconnect switch which must be mounted next to the controller.**

If possible, install the controller at a location where it will receive adequate ventilation. This will insure prolonged component life.

 **CAUTION: The conductor between the feeder and controller must be of a size sufficient to carry the current and voltage as stamped on the equipment nameplate.**



WARNING: Be certain the equipment is properly grounded!!

OPERATION



CAUTION: Unauthorized modification of feeder or the use of unauthorized replacement parts may damage the feeder.

SMH will not assume responsibility for feeder performance as a result of any unauthorized alterations to the equipment. Consult Syntron Material Handling before modifying or repairing your feeder.



WARNING: Before operating feeder make sure controller is closed and secured.

Before starting the equipment rotate the control knob on the controller to a low counterclockwise position. Turn the switch to its “ON” position and the feeder will begin operating at a low rate of feed. While the feeder is running at this reduced rate, check all external bolts on the feeder assembly for tightness.



CAUTION: When operating normally, the feeder should perform with a smooth, even stroke. If a loud striking noise occurs, immediately turn off the unit.

Striking is the result of the faces of the armature and core making contact. Striking can result in serious damage to the unit! Refer to the air gap section on page 11 for correcting striking condition. With the feeder operating satisfactorily, load the trough with the material to be conveyed and adjust the control knob to the desired output. Clockwise rotation will increase feed rate. The material will flow along the trough surface in a smooth, controlled rate of feed toward the discharge end of the trough.

MAINTENANCE



WARNING: Before performing any maintenance work, the electrical power supply must be disconnected at the safety disconnect switch.

Some materials, due to their nature, adhere to the trough surfaces. These deposits increase the dead weight of the feeder pan and if permitted to build up excessively, will alter the natural frequency (tuning) of the feeder. Material build-up on the trough should be removed as a daily practice. Look for material build-up at the rear of the feeder trough, particularly around and under hopper openings. Wet or sticky material build-up can be prevented by using electrically heated liner plates.

In the event repairs are necessary, take immediate action to avoid possible injury to personnel and damage to feeder parts from faulty operation. When ordering replacement parts, include all information given on the nameplate.

⚠ CAUTION: Any signs of excessive heat or burned components is an indication of trouble. At first notice of an overheating condition, immediately investigate and correct the cause. This could eliminate a potential major component failure. Feeder coils, under normal operating conditions run warm but never too hot to touch.

Units are IP-66 rated and can be washed down with a low-pressure water jet. Do not use pressure washer.

TROUBLE SHOOTING

PROBLEM	CAUSE	CORRECTION
Feeder operates too slow	Line voltage below designated current rating. Spring arrangement not correct Unit in contact with rigid object or surface Spring action may be hampered Defective leaf springs Worn or cracked trough	Increase line voltage to that designated on nameplate See page (12-13) Isolate unit Remove and clean spring assemblies, see separate instructions *Replace *Replace
Feeder operates too fast	Line voltage above designated current rating. High voltage will cause a “striking” condition. Spring arrangement not correct	Reduce line voltage to that as designated on nameplate. See page (12-13)
Unit hums will not vibrate	Defective SCR within controller (Refer to controller Instructions).	*Replace

Unit fails to operate	No power to controller.	Check for broken or grounded lines.
	Defective switch or fuse.	*Replace
	Defective SCR within controller (Refer to controller Instructions).	*Replace
	Feeder coil may be burned out or grounded.	*Replace burned-out coil, repair grounded coil.
	Short circuit in wiring.	Repair
	Open winding on rheostat.	*Replace

*Replace parts only with those supplied or recommended by Syntron Material Handling.

SPRING REPLACEMENT



WARNING: Never oil the spring assembly. This destroys the clamping effect of the spring pads against one another.

Replacement springs must be of the same size and thickness as those removed. Syntron Material Handling recommends replacing all springs rather than just one. Due to minor variations in spring tolerance we recommend following the initial feeder setup instructions after replacing springs. See page (11) for more details.

AIR GAP

The air gap is the spacing that exists between the face of the armature and the face of the core assembly. Proper adjustment of this space is extremely important for good feeder operation.

If the air gap is adjusted so the armature and core are too close, the faces of these items will make contact during feeder operation. This is called “striking”.



CAUTION: If a loud striking noise occurs, immediately turn off the unit. When operating normally, the feeder should perform with a smooth, even stroke.

If the air gap is adjusted so that armature and core are too far apart, the feeder current may climb to a dangerous level. A high current condition will result in coil burn-out, failure of control components or reduced material feed.

The air gap is properly set at the factory, and readjustment should rarely be required. However, if high voltage is applied to the feeder or if the air gap has been moved due to the improper handling during shipment or installation, an adjustment may be in order.

NOTE: The air gap adjustment is a very delicate procedure and may require a little time to properly obtain the desired setting. The correct air gap spacing will be obtained when the armature and core faces are as close as possible without "striking" when maximum voltage is applied to the feeder magnet.

CHECKING FEEDER CURRENT

When using an analog clamp on meter to read the current of the feeder, the meter reading must always be multiplied by a value of 1.7 due to the wave characteristics of the feeder when operating. When using a true RMS meter, the current is as indicated. All current readings must be taken at the control.

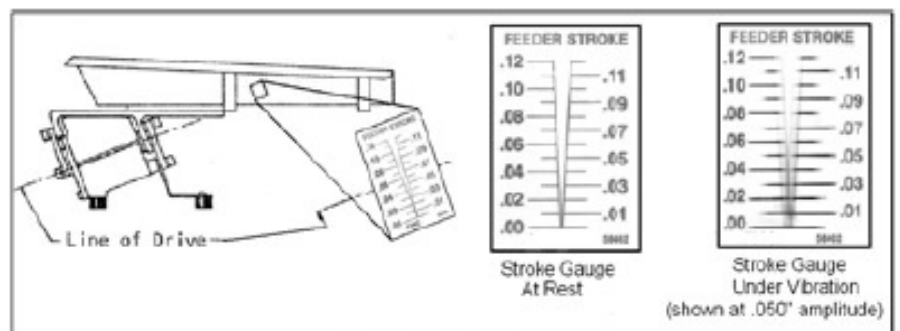
STROKE GAUGE

Feeder stroke is the distance the trough travels in one complete cycle of vibration. This is measured from the forward upward limit of the vibrating stroke to the downward backward limit of the vibrating stroke.

This stroke can be measured by applying a stroke gauge to the feeder trough. Be certain the graduated lines on the gauge are parallel with the line of drive. The gauge can be applied at any point on the side of the trough, as close to the centerline of the drive as possible.

Under vibration, a black "V" will appear on the gauge. The amplitude of the unit can be read at the apex of this black "V". The lines should appear solid black; if fuzzy and gray, the graduated lines of the gauge are not parallel to the line of the drive.

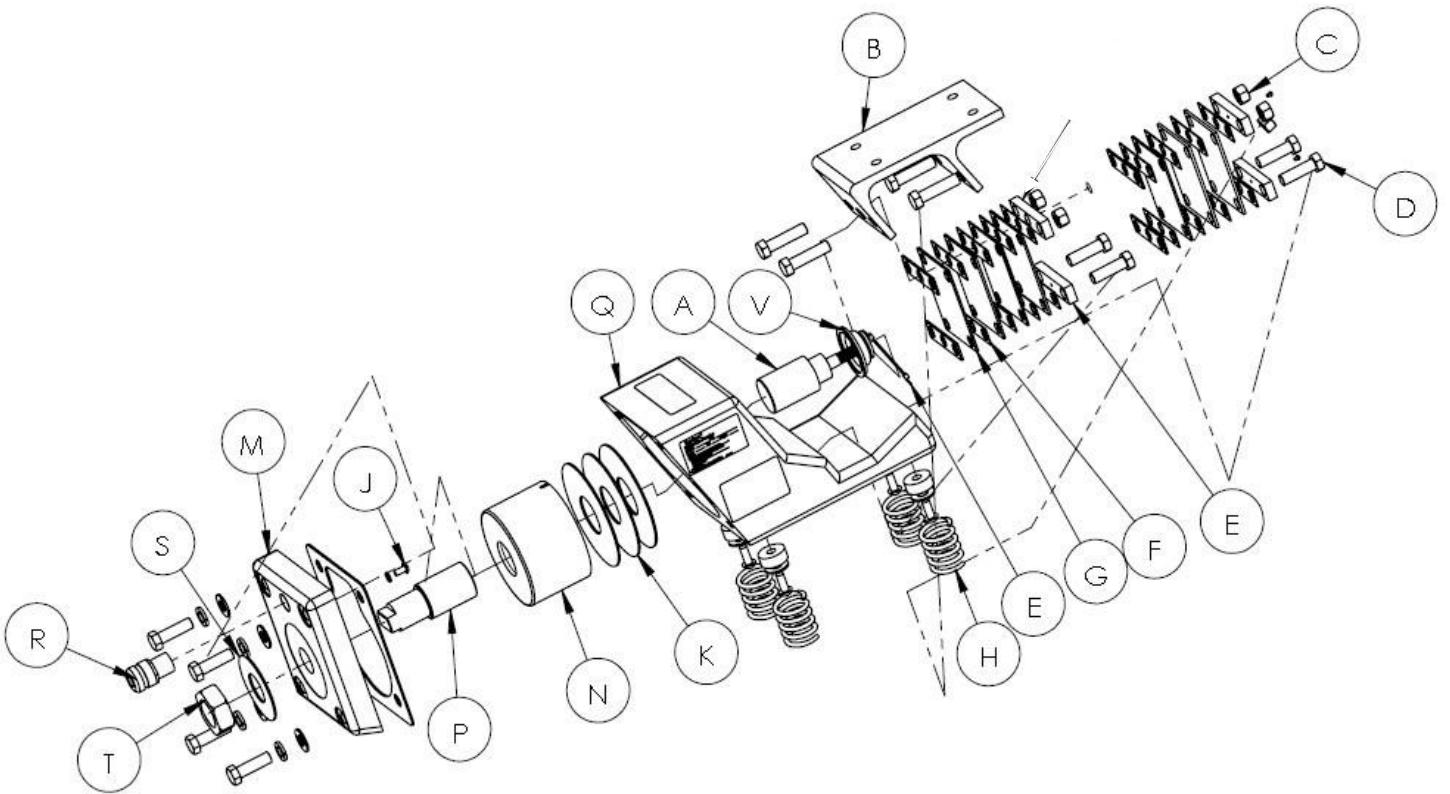
FIGURE 2 – STROKE GAUGE



Operating Specifications

Operating Instructions	
Maximum Trough Weight	4.1kg
Maximum Trough Amplitude (up to 3.2kg trough weight)	2.2mm
Maximum Trough Amplitude (up to 4kg trough weight)	1.5mm
Operating Voltage	110/230v/60Hz
Minimum Natural Frequency (50Hz)	3150VPM
Maximum Current Rating (110v) Maximum Current Rating (230v)	1.5A 0.75A

Torque Specifications	
Item no.	Torque Value (dry)
C, D	47NM (34.66ft/lbs)



FT02 Parts List

Item	Description	Qty	Riley part no.
A	Armature	1	LF1748
B	Trough Mounting Bracket	1	FVTA20072
C	M10 Nut – leaf springs	4	-
D	Hex Hd Set Screw (M10 x 40 or 45)	As req.	-
E	Spring Clamping Bar (+1x earth strap per vib unit)	4	FVTA20092
E*	Spring Seat	4	FVTA20087
F	Leaf Spring Spacer	As req.	FVTA20085
G	Leaf Springs (see table below)	As req.	See table below
H	Rubber Isolation Mount	4	20022-044-5
J	M4 x 10 PSDV Pan Hd Brass Screw (earth)	1	-
K	Coil Washer (1.5 or 1.0mm)	As req.	LF17531 or LF17532
M	Backplate	1	LF1637
N	Encapsulated Coil 230v	1	29303-658-1
P	Core	1	LF18611
Q	Base Casting	1	LF1636
R	Cable Gland (M16)	1	29265-164-3
S	Backplate Nut Washer	1	LF18621
T	Backplate Nut	1	LF18631
V	Rubber Dust Seal	1	LF1749

If you are unsure which part you require, please have the serial number of the drive unit to hand and contact Riley Automation on 01332 275850. If the nameplate has been removed, the internal coil will have a label on it that specifies the voltage. The backplate will need to be removed to find it through this method.

Riley p/no.	Description	Thickness (mm)
FVTA2011/4	FT02 HiFlex Leaf Spring 5ply (red)	1.25
FVTA2011/5	FT02 HiFlex Leaf Spring 7ply (blue)	1.75
FVTA2011/6	FT02 HiFlex Leaf Spring 9ply (green)	2.25
FVTA2011/7	FT02 HiFlex Leaf Spring 11ply (black)	2.75
FVTA2011/9	FT02 HiFlex Leaf Spring 6ply (white)	1.50
LF0973/1	FT02 Carbon Fibre Leaf Spring 5ply	1.20
LF0973/2	FT02 Carbon Fibre Leaf Spring 4ply	0.90
LF0973/3	FT02 Carbon Fibre Leaf Spring 4.5ply	1.00
LF0973/4	FT02 Carbon Fibre Leaf Spring	0.75