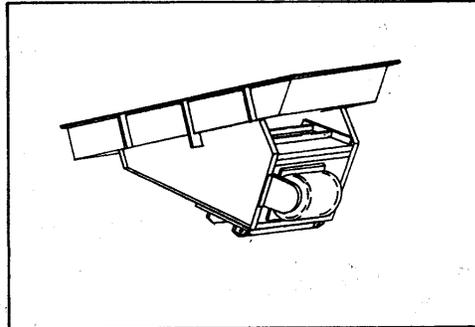


SERVICE INSTRUCTIONS

Syntron® Vibrating Feeder

RF Series



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INTRODUCTION

Syntron® Model “RF” Vibratory Feeders are electrical-powered units designed to provide a method of conveying and controlling the flow of bulk material. These feeder are dynamically balanced, two-mass units, consisting of a trough assembly, spring coupled to a vibratory drive (rotary exciter).

The vibratory drive utilizes an induction motor to drive an unbalanced rotating weight through a V-belt pulley. The vibratory forces developed by the unbalanced weight are magnified through the polymer springs to provide vibration on the trough assembly.

This force produces a constant, straight-line vibrating stroke of the feeder by driving the trough down and back, then up and forward. When the motion of the rotary exciter drives the trough down and back, the material is momentarily suspended in air. When the material falls to the trough surface, it lands at a new location further along toward the discharge end. The drive motion then drives the trough up and forward, carrying the material still further along the trough. This action, constantly repeated at high speed, sends the material smoothly along the surface of the trough toward the discharge end.

Flow capacities can be varied by (1) changing the depth of material discharging from the trough by means of the control rheostat, (2) varying the voltage input to the induction motor on units equipped with a control, or (3) changing the pitch of the variable speed sheave on the motor.

LONG-TERM STORAGE

If the feeder must be stored for an extended period, it is advisable to store it indoors. The drive springs, V-belt and cable assembly must be protected from extreme heat, sunlight, oil, grease or chemicals which deteriorate rubber compounds. If the feeder is stored outdoors, remove motor and controller to an inside storage area. Place feeder on sufficient cribbing to protect from water.



CAUTION: Do not support the weight of the unit by the trough assembly. This will distort and damage and the springs by placing undue strain on them. Apply oil or rust preventive to hardware and completely cover the unit with a waterproof covering.

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 the control box. Cover the controller and place in an area protected from extreme heat. Do not drop the controller; the force of the impact may damage the components.

INSTALLATION OF FEEDER

Handling the Feeder

When received, the equipment should be carefully uncrated. If the feeder assembly is shipped mounted on skids, the skids should remain attached to the feeder until installation. Remove all other packing bands, paper, etc. Check for loose hardware or loose or broken wiring. Check the controller components for protective shipping blocks, tape, etc. Give the equipment a thorough visual inspection to reveal any damage that may have occurred during shipment. If damage is found, notify the shipping carrier and Syntron Material Handling promptly.



CAUTION: Never make any alterations to the feeder without first contacting the Syntron Material Handling. Alterations, extensions or additions to the unit could reduce the capability of the feeder operation, or may result in serious damage to the unit. Syntron Material Handling will not assume responsibility for feeder performance as the result of any unauthorized alterations to the equipment.

The feeder must never come in contact with any rigid object or adjacent surface that could hamper its vibratory action.

MOUNTING THE FEEDER

Suspension-mounted units are furnished with hanger assemblies to which suspension cables are attached (cables and fittings by Syntron Material Handling). Syntron Material Handling recommends using the flexible steel cables provided. Mounting rods are not recommended. Table 1 indicates sizes and lengths of suspension cables required.

Table 2 indicates the size of the wire rope clip recommended for the suspension of RF Vibratory Feeders.

Lubricate suspension cables in the area of the thimble to prolong the life of the cables.

After final adjustment has been made to suspension cables, cut off excess cable and tape loose end to the supporting cable.

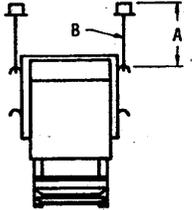
	MODEL	A		B
		MIN.	MAX.	DIA.
	RF-20	18"	32"	3/16"
RF-40	18"	36"	1/4"	
RF-80	24"	49"	1/4"	
RF-120	24"	51"	5/16"	

TABLE 1 - RECOMMENDED CABLES

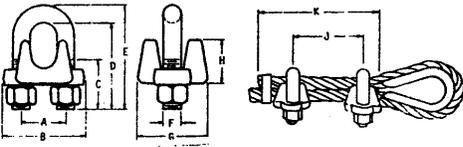
												
ROPE SIZE	A	B	C	D	E	F	G	H	J	K	QTY. OF CLIPS	U-BOLT NO.
INCHES												
3/16"	19/32	1-3/32	5/8	31/32	1-3/16	1/4	15/16	1/2	1-1/8	8	2	69
1/4"	11/16	1-7/16	7/8	1-7/32	1-1/2	5/16	1-1/8	11/16	1-1/2	8	2	70
5/16"	7/8	1-11/16	1	1-5/8	1-31/32	3/8	1-5/16	3/4	1-7/8	10	2	71

TABLE 2 - RECOMMENDED WIRE ROPE CLIPS

INSTALLATION OF CONTROLLER

A service manual for the controller is supplied with each controller.

The controller assembly should be installed as close to the feeder as possible, at a location where it is easily seen and accessible to the operator. If at all possible, install the controller where it will receive good ventilation (ambient temperature below 104° F), preferably on a wall in a clean dry location, free of vibration.

NOTE: For multiple feeder installations, each controller is designed for a particular feeder. It is very important that the proper controller is installed with its matching feeder. Unless the proper controller is wired by its proper feeder, the required performance will not be obtained!! The controllers are marked with a number decal on the inside panel, and the feeder is marked with a corresponding number decal adjacent to the nameplate on the feeder wing plate.

CAUTION: The conductor between the feeder and controller must be of a size sufficient to carry the current and voltage as designated on the equipment nameplate. The voltage drop through a conductor of insufficient size for the required distance could result in a lack of feeder stroke during operation.

All electrical cables coming from the drive unit should have a minimum 15" vibration loop between the feeder and nearest external junction location. This prevents these cables from being pulled tight.

WARNING: Syntron recommends the installation of a safety switch located between the power supply and the control box. Aside from the hazard of electrical shock, if the drive unit should be accidentally energized, the rotating weight could cause severe physical harm to the personnel and damage to the exciter unit itself.

Important: When energized, the rotation of the motor must be in the direction as indicated by the arrow located on the sheave cover guard. (Refer to Figure 1). To reverse the direction of the motor, reverse any two of the motor leads where connections are made at the motor.

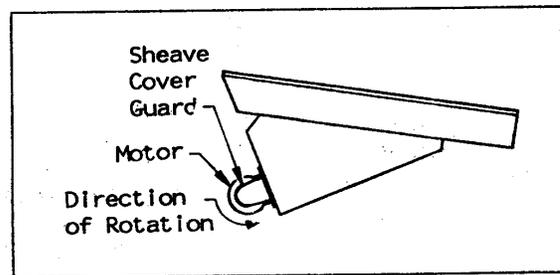


FIGURE 1 – DIRECTION OF MOTOR ROTATION

OPERATING PROCEDURE

With the feeder and controller properly installed and all wiring completed, the equipment is ready for operation.

The operating procedure for RF Feeders relate directly to the model controller used. For specific operating procedure, refer to the service manual supplied with the controller.

MAINTENANCE

The “RF” Feeder requires little maintenance. However, the following points should be given careful consideration:

1. Lubrication – All models of the “RF” Feeders utilize sealed bearings, eliminating the need for lubrication. The bearings used in the induction motors for Models RF-20 and RF-40 are factory sealed and do not require lubrication. Feeder Models RF-80 and RF-120 use an unsealed motor bearing. Refer to the motor manufacturer’s instructions for lubrication requirements.
2. Some materials tend to adhere to the trough surface. These deposits increase the dead weight of the feeder pan and, if permitted to build excessively, will alter the performance of the feeder. Material build-up should be removed as a daily practice. Look for build-up at the rear of the trough, particularly around and under the hopper openings. Wet or sticky material build-up can be prevented by proper hopper design, increase in feeder downslope (within limits), or a trough liner. All details of the feeder should be kept clean. Clean, dry air is recommended for general cleaning of these units. The use of water is not recommended, as it may result in the shorting of electrical components.



CAUTION: Never oil the bolts securing the spring assemblies to the exciter unit!!

3. Keep the drive motor lubricated in accordance with the motor manufacturer’s instructions. Do not over lubricate!!
4. Belt tension is checked by placing force on the belt midway between the center of the sheaves and measuring the amount of deflection. Refer to Table 3. Check tension twice during the first day of operation, afterwards periodically.

5. Maintenance and service of the exciter motor must be performed to the motor manufacturer's specifications.
6. Lubricate suspension cables in the area of the thimble to prolong the life of the cables.
7. Periodically check hardware on suspension assemblies to see that the bolts are tightened to the recommended torque.

Feeder model	Deflection	Force, Lbs. Used Belt	Force, Lbs. New Belt
RF-20	.14"	2.4	3.24
RF-40	.14"	2.4	3.24
RF-80	.18"	4.8	6.48
RF-120	.19"	4.8	6.48

TABLE 3 – BELT TENSION

TROUBLESHOOTING

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Motor stops	Low Voltage Blown Fuse Defective wiring or line switch Defective stator in motor	Check rating of power supply *Replace *Repair or Replace Contact the Service Department, FMC Technologies Material Handling Solutions Division, for additional information
Motor runs, feeder does not vibrate	Loose or defective drive belt Feeder in contact with rigid object or adjacent surface Low Voltage	*Replace Isolate feeder with 1" clearance Check rating of power supply
Excessive Noise	Defective bearings	*Replace (Syntron Material Handling recommends replacing both bearings rather than just one)
Motor runs at constant speed, no control	Loose powerstat knob ** Defective powerstat	Tighten set screw to shaft *Replace

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

** Check the operation of the powerstat by connecting a voltmeter across any two leads from the motor at the main terminal block. Rotate the knob and observe the voltage. The voltage should change from a present minimum value up to a maximum value equal to the line voltage. Voltage must be present at all three phases (between any two of the three terminals).

REMOVING EXCITER ASSEMBLY

The following procedure is for removing the exciter assembly from its feeder mounting. Be sure you read and understand each step before attempting any work.



WARNING: Do not attempt to manually handle the exciter! The exciter assembly is heavy. Caution must be used. Refer to Table 4 for exciter weights.

Feeder model	Approx. weight
RF-20	150 LBS.
RF-40	250 LBS
RF-80	450 LBS
RF-120	700 LBS

TABLE 4 – EXCITER WEIGHTS

1. De-energize and lockout the power supply. Remove cover from junction box and mark all leads before disconnecting. Mark the sheave side of the exciter and the adjacent wing plate of the feeder. This will be important when replacing the exciter into the feeder mounting.
2. Remove sheave guard.
3. Using the two lugs located on the bottom compression plate, support the exciter assembly in its operating position until the cap screws are removed. Provide support under the front of the exciter to keep it at an approximate 10° angle. Remove the cap screws securing the top compression plate to the feeder wing plates, then remove the cap screws securing the bottom compression plate to the flanges of the wing plates. Remove the support from under the front of the exciter; the exciter will now tilt forward, pivoting at the lugs on the bottom compression plate. Move the exciter to a suitable work surface.

DISASSEMBLY OF EXCITER

Bearing replacement should be the only reason for disassembly of the exciter unit. It is an easy procedure if the following steps are used as a guide. (Refer to the separate instructions for the various Model “RF” Feeders).

1. With the drive assembly setting with a compression plate in the up position, remove the cap screws which secure the springs to exciter housing and remove springs and compression plate as a single unit.
2. Turn the exciter so remaining springs and compression plate are in the up position, and remove cap screws which secure the springs to the exciter housing. Lift springs and compression plate as a single unit.
3. Loosen (but do not remove) the cap screws which secure the motor mounting bracket to the exciter housing and remove belt from motor and excite sheaves.
4. Position the exciter so the sheave side is in the up position, remove cap screw and washer which holds the sheave to the exciter, remove the sheave and key.
5. Remove cap screws which hold the bearing adaptor to the exciter housing. Slowly remove the bearing adaptor and bearing; these items should come out as a single unit.
6. To remove the shaft, pull straight upward. Do not move shaft from side to side, as it may cause damage to the bearing and bearing adaptor on opposite end of shaft.
7. Turn exciter so the sheave side is down and carefully remove cap screws, bearing adaptor, and bearing. These parts should come as a single unit.
8. There is a loose to tight press fit between bearings and bearing adaptors; it may be necessary to use a press to remove the bearings from the bearing adaptors.

Before replacing the exciter assembly, Syntron Material Handling recommends inspection of the spring assemblies for defect and wear. If it is necessary to replace springs, refer to Spring Replacement Section of this manual.

REASSEMBLY OF EXCITER

In reverse order, follow the eight steps provided in the disassembly procedure to reassemble the exciter.

Important: When assembling the bearing to the bearing adaptor, apply primer and Loctite Bearing Mount to the outer race of the bearing.

REPLACING EXCITER ASSEMBLY

1. After the exciter has been reassembled, tighten the cap screws which hold the springs and compression plates to the exciter housing.

NOTE: Be sure to reassemble compression plates to same side of exciter housing as they were removed from.

2. Using a support as described in Step 3 of removal procedure, raise exciter to its mounting position. Be careful that the marked side of the exciter is on the same side as the marked wing plate of the feeder. This has been noted in Step 1 of the instructions for removing the exciter.
3. Install cap screws, lock washers, and hex nuts to secure exciter to feeder unit.
4. The sheaves of the motor must be in alignment. Install belt onto the sheaves.
5. Replace four cap screws which hold motor mounting plate to exciter housing. Do not tighten these screws until after the belt tension is adjusted. Refer to Table 3 for the proper belt tension.
6. Replace sheave guard using two cap screws and Lockwasher.
7. Connect all leads to the motor and repack junction box with suitable material to prevent connections from being vibrated loose and replace cover.

This completes installation of exciter assembly. The unit is now ready for further operation.

SPRING REPLACEMENT

Springs are a critical part of the drive system, serving to transmit and magnify the exciter force from the drive unit to the feeder trough. To replace the springs, work only one side of the exciter at a time. Follow the procedure outlined below:

1. For ease of working, it is necessary to remove the exciter from its feeder mounting. Follow the procedure previously outlined for exciter removal.
2. With the exciter setting with a compression plate in an up position, remove the compression plate by removing the two cap screws and hex nuts which hold the compression plate to the springs.
3. Remove the two hex head cap screws which secure each spring to the exciter housing.
4. Remove spring and replace with a new spring of the same size and design as those originally supplied on the equipment (part number of spring is stamped on mounting plate). This is important in maintaining satisfactory performance of the feeder.
5. After springs have been replaced on one side, secure compression plate to the springs and tighten cap screws.
6. Turn exciter assembly to permit work on the other springs and repeat Steps 3 through 6 to replace the remaining springs.
7. After all springs have been replaced, check to be certain all hardware is tight. Replace exciter into its feeder mounting by following the instructions previously outlined in this manual.

NOTE: Due to differences in the spring rate from one set of springs to another, it may be necessary to readjust trough stroke. Refer to stroke adjustment section of this manual.

FEEDER STROKE

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

The stroke can be read by applying a stroke gauge to the exciter motor and to the side of the wing plate. When applying the stroke gauge, the graduated lines of the gauge must be perpendicular to the spring masses of the drive unit. Refer to Figure 2 for the location of the stroke gauge.

Under vibration, a black “V” will appear on the gauge. The stroke of the unit can be read at the apex of this black “V”. The lines should appear solid black. If the lines are fuzzy and grey, the gauge is incorrectly positioned. (Refer to Figure 2).

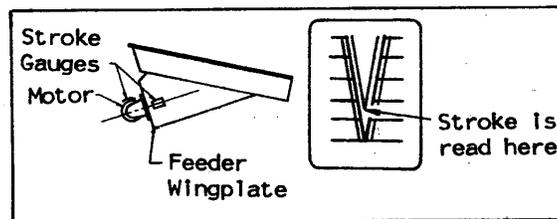


FIGURE 2 - STROKE GAUGE

Total stroke is the combined sum of the trough stroke and exciter stroke. The total stroke of the RF Feeder should not exceed .5” (Example: .23” on the exciter and .27” on the trough). Normally capacities will be attained at a lesser total stroke.

CAUTION: Stroke adjustment is a critical setting and an improper change can severely damage the unit!! It is suggested that the stroke not be increased without first contacting the Syntron Material Handling. Stroke may be decreased if capacities are excessive.

An adjustment of the variable speed sheave will alter the speed and stroke of the feeder. Increasing pitch increases speed and stroke, while decreasing pitch decreases speed and stroke. Syntron Material Handling does not recommend the adjustment to exceed a ½ turn (180° turn of movable flange).

To adjust the variable speed sheave, loosen setscrew on outside perimeter of the outside collar. By turning the movable flange in a clockwise direction, pitch is increased, and in a counterclockwise direction the pitch is decreased. After adjustments have been made, tighten setscrews securely into collar.

Notes :

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