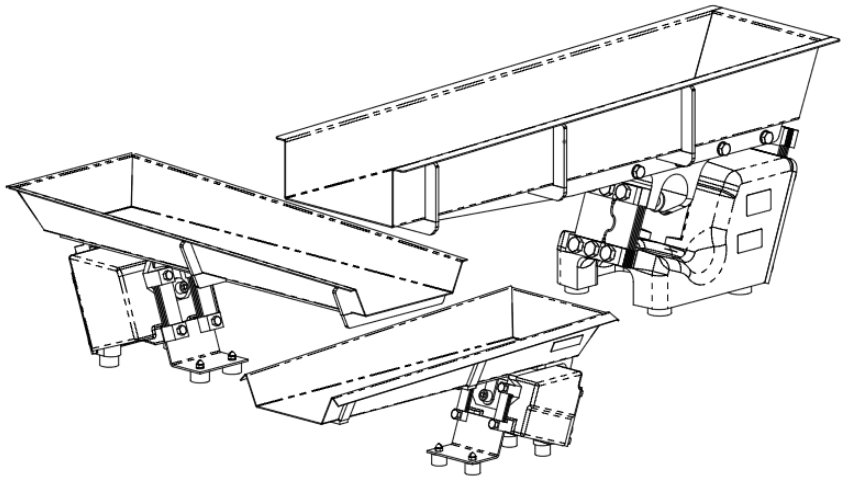
Syntron Material Handling

Service Instructions

Syntron®
Vibrating Feeder
Model: BF Series



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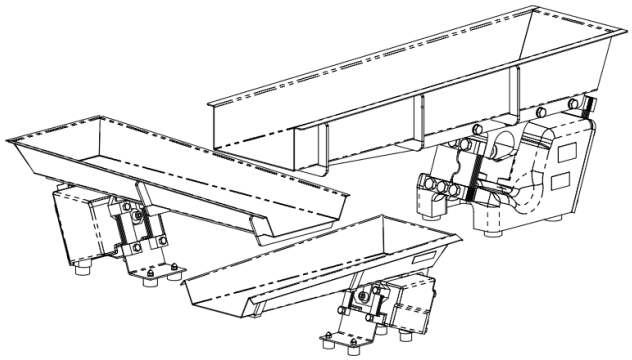

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The instructions and data herein are vital to the proper installation and operation of this equipment. In order to avoid delays due to faulty installation or operation, please see that these instructions are read by the persons who will install, operate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

This manual applies to general instructions for BF Model Feeders. Instructions for spring replacement and magnet replacement, a parts list and operating specifications for specific models are furnished in separate instructions.

NOTE: 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 “BF” 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.

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 assembly, 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 and rear of the drive unit housing. These springs are clamped at the bottom to the drive unit housing, at the top to the trough mounting bracket. The trough, trough connecting bracket and armature become an assembly, joined to the drive unit through the spring assemblies.

THEORY OF OPERATION

Model “BF” 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 power supply), this action produces a definite vibrating movement on the trough surface.

The “BF” Feeder requires the use of 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.

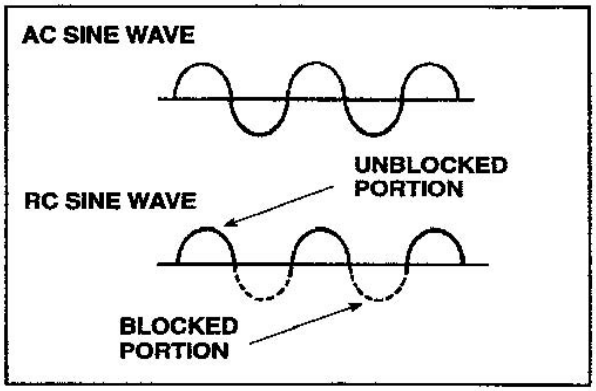


FIGURE 1 – THE RECTIFIED SINE WAVE

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” and its setting is critical to good feeder operation. Instructions concerning the air gap are on page 6.

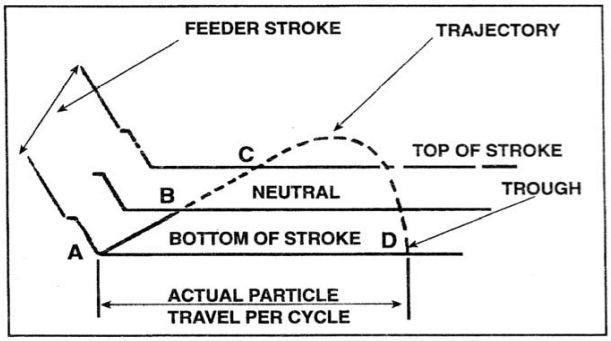
The magnetic pull between the armature and core exists during the time that current is passing through the unblocked, or power, half cycle.

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 following explanation will provide a general description of material flow and how it is achieved by the vibrating stroke of the trough.

Figure 2 illustrates the action of a single particle of the 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. The rate of feed is controlled by the intensity of the magnetic pull which is varied by the controller.

FIGURE 2 – MATERIAL FLOW ON TROUGH

LONG TERM STORAGE

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

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

INSTALLATION

⚠ CAUTION: Do not lift the unit by the 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 the shipping carrier and Syntron Material Handling Material Handling Solutions.

NOTE: When installing the feeder, consideration must be given to the area of support. Some of the heavier Model “BF” feeders can weigh over 65 pounds and a support must be selected that will safely carry the full weight of the unit under loaded operating conditions.

Most Model “BF” Feeders can be furnished with a choice of mounting feet:

(1) Standard rubber
(2) * Rubber foot with mounting stud (1/4-20 for BF-01 & BF-2, 5/16-18 for BF-3)
(3) * Rubber foot with tapped hole (1/4-20 for BF-01 & BF-2, 5/16-18 for BF-3)

* These mounting feet are designed for bolting the unit directly to the mounting structure.

CAUTION: The feeder must not come in contact with any rigid object or adjacent surface that could hamper its vibrating action. A 1” (25 mm) clearance must be maintained. Any connections (such as dust seals) between the trough and adjacent objects must be flexible, preferably cloth or rubber.

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

WARNING: The electrical power supply connection to the SMH 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 name plate.

WARNING: Be certain the equipment is properly grounded

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

OPERATION

CAUTION: Unauthorized modification of the feeder or 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 your feeder.

WARNING: Before operating the feeder make sure the 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 core and armature making contact. Striking can result in serious damage to the unit! Refer to the Air Gap section on page 6 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 the 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 dead weight to 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 buildup can be prevented by using factory installed electrically heated liner plates.

A clean, dry compressed air supply is recommended for general cleaning of these units. Water is not recommended.

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

In the event repairs are necessary, take immediate action to avoid possible injury to personnel and damage to the 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.

TROUBLE SHOOTING

PROBLEM	CAUSE	CORRECTION
Feeder operates too slow	Line voltage below designated rating	Increase line voltage as designated on the name plate
	Unit in contact with rigid object or surface	Isolate unit
	Spring action may be hampered	Clean spring assemblies
	Defective leaf springs	*Replace
	Worn or cracked trough	*Replace
Feeder operates too fast	Line voltage above designated rating. High voltage will cause a "striking" condition.	Reduce line voltage as designated on the nameplate
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 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

Replacement springs must be of the same size and thickness as those removed. SMH recommends replacing all springs rather than just one.

Before replacing springs, disconnect the feeder from the power supply. Work on one spring assembly at a time (first the rear spring stack). Make a note of the location and arrangement of each spring, spacer and clamp. Remove the bolts which secures the leaf springs to the base, then the bolts which hold the springs to the trough mounting bracket.

Install the new spring assembly in reverse order of that removed. Replace cap screws and

torque as specified in the separate instructions pertaining to specific Model “BF” Feeders.

AIR GAP

The air gap is the spacing that exists between the face of the armature and core assemblies. 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 the unit off.

When operating normally, the feeder should perform with a smooth even stroke.

If the air gap is adjusted so the 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 a reduced material feed.

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

Adjustment Procedure for BF-01, BF-2, and BF-3:

(Refer to the illustration in separate manual.)

Locate the air gap adjusting screw at the front of the feeder base. With the feeder running empty, set the control knob at maximum feed rate (extreme clockwise position).
If armature and core are “striking”, rotate cap screw in a CLOCKWISE direction to increase the air gap spacing.

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 current is applied to the feeder magnet.

⚠ CAUTION: If the air gap adjusting screw is rotated to an extreme position, the tension disc springs may be relieved of any pressure. This will be evident as a “jingling” sound caused by the disc springs vibrating against one another. Adjusting screws should never be rotated to this extreme!

CHECKING FEEDER CURRENT

When using a digital in-line or 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 an analog “iron vane” in-line 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 read from the stroke gauge attached to the feeder trough. Under vibration, a “V” will appear on the gauge. The stroke of the unit can be read at the apex of this “V”. The lines should appear solid. Refer to Figure 3 (page 8).

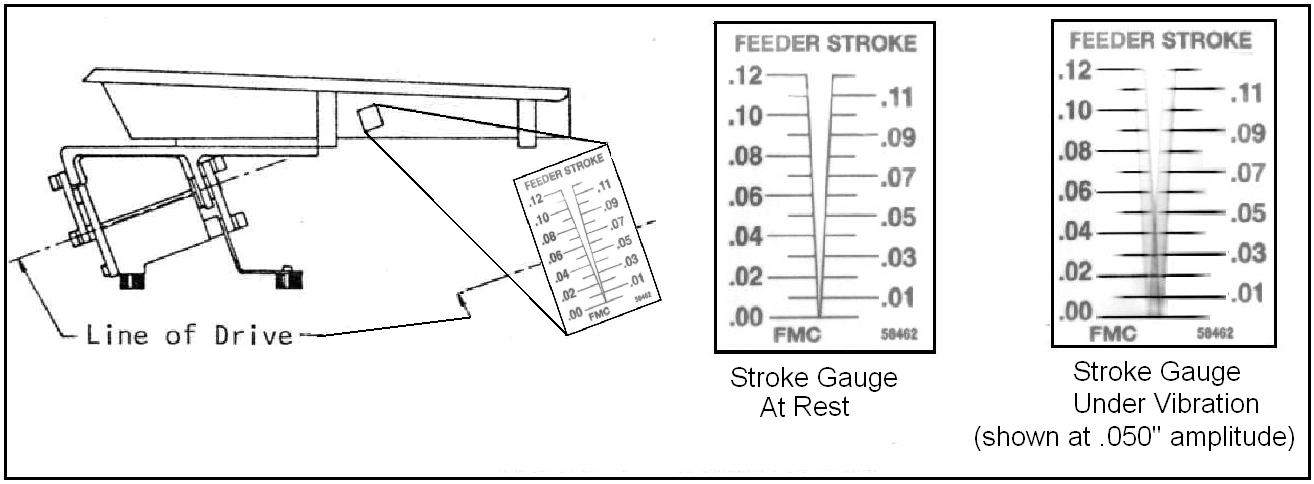


FIGURE 3 – STROKE GAUGE

TABLE 1 – OPERATING AMPLITUDE

FEEDER MODEL	OPERATING AMPLITUDE RANGE
BF-01	.055” - .060”
BF-2	.055” -.060”
BF-3	.080” - .090”

Important

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Your satisfaction is very important to us. Please direct any comments, questions, or concerns to our Marketing Communications Department.

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