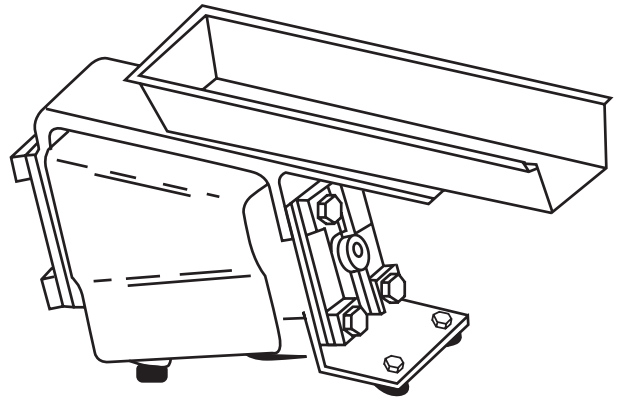


Item	Description	Qty	Riley part no.
A	Back Plate	1	29660-788-2
AA	Hex Hd Capscrew 3/8"-16 x 1"	As req.	-
B	BF2-HS Magnet Assembly 230v/50Hz (160176-BL) BF2-HS Magnet Assembly 110v/50Hz (160176-BK)	1 1	29600-501-6 29655-530-0
BB	Hex Hd Capscrew 5/16"-18 x 5/8"	As req.	-
C	Backplate Gasket (use food safe silicon sealant)	1	29660-600-0
D	Nameplate	1	UNN40491
E	Base Casting and Armature assembly	1	LF1853
F	Belleville Spring Washer	3	24201-124-1
G	Trough Mounting Bracket	1	29660-502-2
H	Air Gap Adjustment Screw s.s. Plain Washer 1/2"	1 1	23008-164-8 24193-043-6
J, K	Hex Hd Capscrew (3/8"-16 x 1.1/2")	As req.	-
M	Front Spring Clamp	As req.	27187-527-2
N	Front Leaf Spring (various sizes, see etching on spring)	As req.	See etch or measure
P	Front Leaf Spring Spacer	As req.	27187-525-6
Q	Foot Mounting Bracket	1	29660-500-9
S	No.2 Sandwich M/F Isolation Mount	4	20022-029-9
T	Magnet assy earth - m/c round screw (10-32 x 3/8")	1	-
U	Cable Gland	1	29265-815-6

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SERVICE INSTRUCTIONS SYNTRON[®] VIBRATING FEEDER

MODEL: BF SERIES



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Riley Automation Ltd reserves the right to alter at any time, without notice and without liability or other obligation on its part, materials, equipment specifications and models. Riley Automation Ltd also reserves the right to discontinue the manufacture of models, parts and the components thereof.

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 takes 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 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 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 (3000 v.p.m. at 50 cycle power supply), this action produces a definite vibrating movement on the trough surface.

The "BF" Feeder requires the use of a separate controller which contains a rectifier, used to convert alternating current into a 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 being fed to the feeder coil). The coil is energised only by the portion of the sine wave shown as a heavy 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-energised.

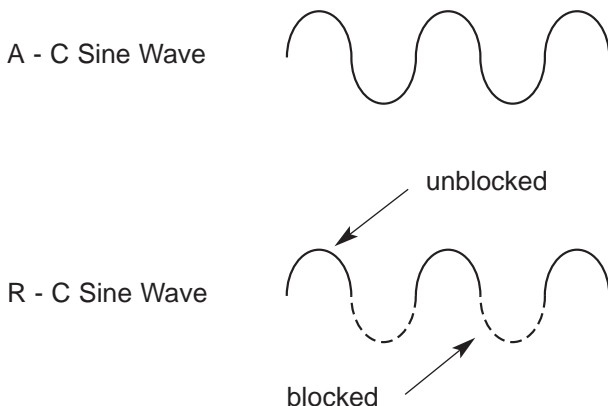


Figure 1 - The Rectified Sine Wave

When the coil is energised, the core becomes magnetised 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.

The unit is mechanically adjusted to limit the travel of the armature so that 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 in which the 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-energised. With the coil de-energised, the magnetic pull between 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, bracket and armature assembly are again pulled down and back. On the next no power half cycle, the trough, 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 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 travelling 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 towards the discharge.

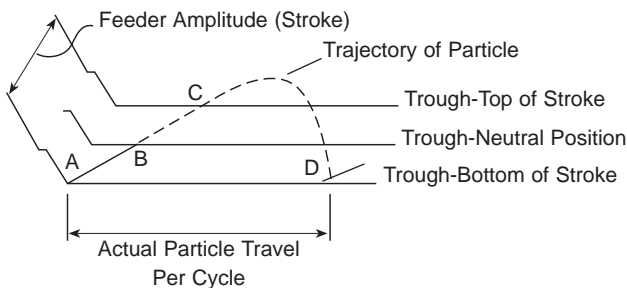


Figure 2 - Material Flow on Trough

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. 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 Riley Automation Ltd 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. Riley Automation Ltd 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



CAUTION: Do not lift the unit by the trough.

When received, the feeder and controller should be carefully uncrated. 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 Riley Automation Ltd.

Note: When installing the feeder, consideration must be given to the area of support. Some of the heavier Model "BF" Feeders can weigh over 30 Kg's and a support must be selected that will safely carry the full weight of the unit under load conditions.

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

- (1) Standard rubber
- * (2) Rubber foot with 1/4" - 20 mounting stud
- * (3) Rubber foot with 1/4" - 20 tapped hole
- * (4) Metal enclosed foot with four 1/8" diameter mounting holes (available only with Model BF-T0)
- * These mounting feet are designed for bolting the unit directly to the mounting structure.



CAUTION: Feeder must not come into 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, 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, dry location, free from excessive vibration is recommended.



WARNING: Electrical power supply connection to the Riley Automation Ltd supplied controller must be made through a customer supplied safety disconnect switch which must be mounted next to 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 now ready for operation.

OPERATION



CAUTION: Unauthorised modification of feeder or the use of unauthorised replacement parts may damage the feeder.

Riley Automation Ltd will not assume responsibility for feeder performance as a result of any unauthorised alterations to the equipment. Consult Riley Automation Ltd Material Handling Equipment Division before modifying or repairing your feeder.



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

Before starting the equipment, rotate the control knob on the controller to a low anti-clockwise 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 6 for correcting striking condition.

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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 towards 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.

TROUBLE SHOOTING

Problem	Cause	Correction
Feeder operates too slow	Line voltage below designated current rating	Increase line voltage to that designated on name plate
	Unit in contact with rigid object or surface	Isolate unit
	Spring action may be hampered	Remove and clean spring assemblies, see separate instructions.
	Defective leaf springs	* Replace
	Worn or cracked trough	* Replace
Feeder operates too fast	Line voltage above designated current rating. High voltage will cause a "striking" condition.	Reduce line voltage to that as designated on name plate.

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 that 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 name plate.



CAUTION: Any signs of excessive heat or burned components are 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 (cont'd)

Problem	Cause	Correction
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 Module 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 Riley Automation Ltd.

SPRING REPLACEMENT

Replacement springs must be of the same size and thickness as those removed. Riley Automation Ltd 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 secure 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 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 that 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 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 reduced material feed.

The air gap is properly set at the factory, 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.

Adjustment Procedure for BF01 and BF-2:

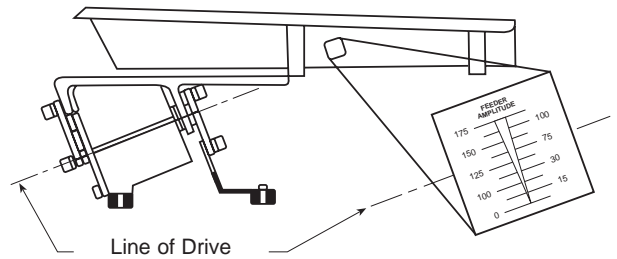
(Refer to the illustration in separate manual.)

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.

If feeder lacks power at 100% control setting, or draws excessive current, rotate screw in an **ANTI-CLOCKWISE** direction to decrease the air gap spacing. The limit of movements being established just before armature and core “strike” under full load condition.

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!

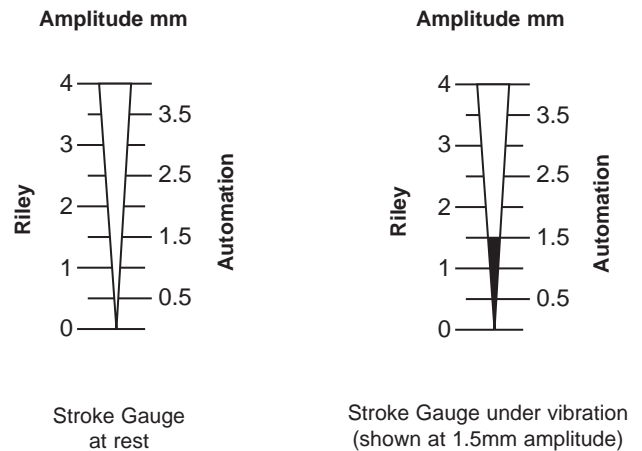


Figure 3 - Stroke Gauge

CHECKING FEEDER CURRENT

When checking feeder current with a tong meter, the meter reading must always be multiplied by a value of 1.7. A tong meter does not reveal the same current as that designated on the equipment name plate due to the waveform characteristics of the feeder, when operating. Therefore, the 1.7 multiplier must be used.

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 on the feeder trough. 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. Refer to Figure 3.

Feeder Model	Operating Amplitude Range
BF-T0	1.0 - 1.5mm
BF-T01	1.0 - 1.5mm
BF-01	1.0 - 1.5mm
BF-2	1.0 - 1.5mm

The logo for Riley Automation Ltd features a stylized black waveform on the left side. To the right of the waveform, the word "Riley" is written in a bold, sans-serif font. Below "Riley", the words "Automation Ltd" are written in a larger, bold, italicized sans-serif font.

Riley Automation Ltd

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