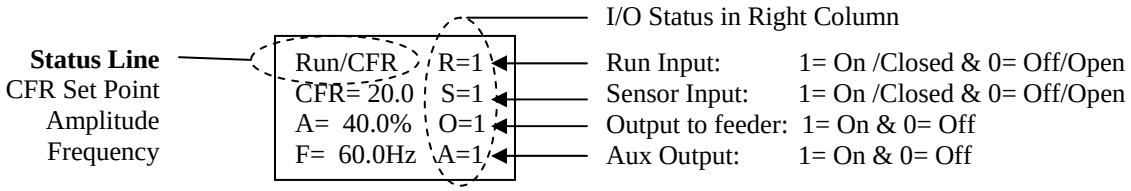
RODIX, INC.
VF Series Troubleshooting Guide

Control must be connected to a known GOOD LOAD (feeder) prior to testing

Status Line Messages on the LCD and the I/O status on the right column should identify most problems. The normal operating LCD layout is shown below:



LCD display shown above

The "**Status Line**" is located at the top of the normal operation display of the LCD. The Status line announces the state the control is operating in based on input signals and control settings. The highest priority message takes precedence over all other messages. The messages are listed below from highest to lowest priority.

Stop/Run - The 1/0 button has been pushed to disable control operation.
Override - The 1/0 button has been pushed and held so the control will feed, without interruption from the "Run" or "Sensor" inputs.
Run Input - The run jumper circuit has not been made. The controlling switch or relay is open or the PLC signal off.
Parts Sens - The parts sensor logic is telling the control to stay off.
Empty/jam - Empty bowl timer has timed out because parts did not pass by the parts sensor to reset the timer.Press 1/0
Analog - An external signal is in control of the speed input.
Low - Low Speed used when 2 speed has been selected and the sensor is not made.
Zero Speed - The output is off because the output is set to 0.0%.
Run – The feeder is running normally.
Run/CFR – Constant Feed Rate sensor is regulating the feed rate (Autotune®).

Problem:	**Possible Cause:**	**Solution:**
No output from the control	No AC voltage on circuit board at terminal block TB1. From the left: #1 is COM. #2 is HOT	Plug in control. Check /Replace blown fuse(s). Check /Replace Control Switch.
	If replacement fuses always blow, an output transistor or other device may be shorted.	A control with a shorted output should be returned to Rodix for repair. See IGBT test pg.3
	Status line on the LCD identifies a condition that prevents operation.	Satisfy the identified condition to make the control run. (See Status Line Messages)
	Sensor status line remains the same even thought the sensor changes states.	Check the sensor and/or sensor wiring. Sensor input under "I/O Settings" needs to be set to NPN or PNP in the programming menu.
	The amplitude changes but no vibration.	Frequency needs to be adjusted for the bowl.
	Max output setting adjusted too low.	Adjust the **Max** setting per the application note.
	4-20mA or 0-10VDC remote analog speed control signal is missing on TB2-11 and 12 or TB2-10 and 11 respectively.	Ensure that 4-20mA or 0-10VDC signal is coming to the board from the PLC.
	***Bad control board.	Replace control and/or return to Rodix for repair.
Control has power at TB1, but no backlight.	An internal power component has failed.	A control with a non-functioning internal power supply voltage should be returned for repair.
Feeder only hums or moves parts slowly	The frequency supplied by the control may not be adjusted to the vibration frequency of the feeder.	Manually adjust the frequency setting to find the right frequency, or do an Autoscan when a CFR sensor is used.
	Max setting is set too low.	Adjust setting per the control's application note
	Potential Feeder problem.	See Rodix Solution "Control, Feeder or Power Line Problem?"
	Electrical noise has disrupted the unit.	Download Rodix Solution "Good Wiring Practices" Turn the power switch off for 20 seconds and then on.

VF Series Troubleshooting Guide – *Continued*

Problem:	**Possible Cause:**	**Solution:**
Control hammers during an Autoscan	Most other feeders require a higher vibration level to produce a good tuning signal.	Reduce Resonant Threshold setting down to 140 or as necessary, and do another Autoscan.
Control displays a "Course Scan Error" after an Autoscan	The resonant threshold level is set too low so the feeder does not vibrate hard enough.	Set the resonant threshold to a higher level to get more vibration to produce a good CFR signal.
Control's output changes both amplitude and frequency rhythmically when using CFR sensor.	The feeder is unstable at the present feed rate, so the control responds by changing the frequency too soon.	Increase the "Auto Track Deadband" setting. This decreases the sensitivity of the frequency compensation. Raising the setting from 20 to 80 may be a good place to start. Change the frequency mode to "Manual" and operate 2Hz below the below the resonate frequency.
Control's CFR amplitude regulation output is unstable	The control raises and lowers the output past the CFR set point making the amplitude unstable.	Lower the CFR Positive gain. A likely value would be 5 to 10. Lower the CFR Negative gain. A likely value would be 2. Change feeder's speed to avoid the instability.
Full output with no change in the output when the power setting is adjusted	Electrical noise has disrupted the unit.	Download Rodix Solution "Good Wiring Practices". Turn the power switch off for 20 seconds and then on.
Output is not turning on and off properly	Control is not connected to a known good load.	Connect a load to the unit. (Not just a voltmeter)
	The time delay settings are set too long	Adjust the time delay settings to a lower value.
	The sensor is being blocked and unblocked within a fraction of a second.	Check sensor alignment and parts position.
	**Bad sensor.	Replace sensor. See "Troubleshooting Guide for Three Wire DC sensors."
	***Bad control board.	Replace control and/or return to Rodix for repair.
Interlocked board does not turn off with the VF-9	Run jumper or paddle switch may not be across interlock terminals (where used).	See the application note for the control to be interlocked to determine the proper connections.
Erratic output when making no adjustment to the control	Electrical noise has disrupted the unit.	Download Rodix Solution "Good Wiring Practices" Turn the power switch off for 20 seconds and then on. Reconnect CFR sensor cable.
	***Bad control board.	Replace control and/or return to Rodix for repair.

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VF Series Troubleshooting Guide – *Continued*

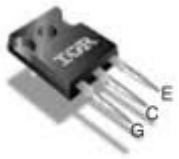
Problem:	**Possible Cause:**	**Solution:**
The CFR sensor is not regulating the feeder speed (where CFR sensor is used)	Wrong CFR sensor orientation.	Correct CFR sensor orientation. The sensitive axis of the CFR sensor should be perpendicular to the (flat) springs. See the controls application note for further information. Additional tape is available from Rodix.
	Incorrect CFR sensor wiring	Check the sensor wiring: Brown to "ACCEL +" and Blue to "ACCEL -"
	Disconnected or broken CFR sensor cable.	Re-connect the CFR sensor cable.
	CFR Sensor is no longer attached to the vibratory feeder.	Re-attach the sensor to the feeder. Additional tape is available from Rodix
	The Amplitude is set to "A=100.0%".	The control cannot increase the power above 100.0% so speed variations may occur.
No LCD display read-out, but the control runs	Electrical noise has disrupted the unit	Download Rodix Solution "Good Wiring Practices." Turn the power switch off for 20 seconds and then on.
	*Damaged LCD on main lid	Check LCD connector at the board, replace control or return for repair.
	*** Bad control board(s)	Replace control and/or return to Rodix for repair.
The buttons have no effect on the control.	Electrical noise has disrupted the unit	Turn the power switch off for 20 seconds and then on.
	The keypad connector has come loose	Re-attach the keypad connector to the board.
	The keypad cable has been torn	Replace control and/or return to Rodix for repair.
Not enough vibration and the coils are over heating on the vibratory feeder.	One IGBT output transistor has probably failed in a short circuit condition.	Replace control and/or return to Rodix for repair. Verify shorted IGBT with the "IGBT Test" below.

IGBT Test:

Disconnect power from the VF control and wait one minute before opening the cover.

1. Use an ohm meter to measure the resistance between the Collector (C) and Emitter (E) of Q1. Q1 is located on the heatsink. (See the TO-247AC pinout diagram below). Set the ohm meter to its lowest scale.
2. Swap the ohm meter leads at the meter to reverse the lead polarity and record the ohms between the Collector and Emitter of Q1.
3. Repeat the procedure for Q2.

A bad IGBT will measure less than 200 ohms. A good IGBT will read greater than 200 ohms.
If the IGBT is bad, the VF control must be returned to Rodix for repair.



TO-247AC

** To test if the parts sensor is functionally correctly, see accompanying Part Sensor Test Sheet.

*** To determine if the problem is in the feeder or control: see the accompanying solution guide "Control or Feeder Problem."

Note: Malfunctioning controls can be sent back to Rodix Inc. for repair or to be updated to the latest revision. Please send in the product to Rodix Inc., 2316 23rd Avenue, Rockford IL 61104, Attention Repair Department. Please include your address, telephone number, name of person to contact and a description of the symptoms of the control problem. For further assistance visit www.rodix.com or call us at 800-562-1868 extension 322.

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CONTROL PRODUCTS FOR INDUSTRY

How to Troubleshoot a Vibratory Parts Feeder Bowl, Feeder Control and Power Line Problems

Problems with vibratory feeder systems generally fall into four categories: mechanical feeder problems, feeder control problems, parts in the feeder, and power line fluctuation problems. Any of the four problems can make a feeder vary its feed rate or slow down; therefore, careful attention needs to be given to find the root cause of the problem. Find the closest matching problem description from the problem index below and go to that troubleshooting section.

Problem Index:

No vibration
Not enough vibration and gradually reduced vibration (feed rate)
Sudden decrease in feed rate
Feed rate fluctuations
Too much vibration with no speed control or hammering (striking)
Dead spots in the bowl
The parts bounce more than they feed
Hot Coils

Note 1: Click this link for information on "How to Tune a Vibratory Parts Feeder Bowl."
Note 2: Application notes and troubleshooting guides for specific controls are available from www.rodix.com.

No vibration: Find out if the feeder control has voltage on its output: Connect a voltmeter to the output of the feeder control. On some models this can be accomplished by backing the plug out of the outlet just a little so that the voltmeter leads can touch the blades of the plug. Always leave the load connected; otherwise, the meter readings will be incorrect due to the leakage current of the TRIAC.

The control must be in running in order to test the output. Monitor the meter while adjusting the main control pot up and down. The output voltage should adjust smoothly up and down. If there is a voltage output, go to the section entitled "hot enough vibration and gradually reduced vibrations". If there is no voltage present, check the items below, or follow the recommendations given in the troubleshooting guide for the control model at www.rodix.com.

The Feeder control is unplugged or the power switch is off.
The fuse is blown (the red rocker-switch light will still be lit).
The Run jumper or Run contact is open (not closed).
The PLC controlling the feeder control is off or keeping the control off.
The parts sensor is telling the control to stay off.
No signal is coming from the interlocking control (The bowl must be feeding for the hopper to run).
The feeder's power cord may be unplugged, a bad connection to the coils, or open (bad) coil(s).

Not enough vibration and gradually reduced vibration:

Parts Problems:

1) Oil on parts causes the parts to stick together and stick to the feeder.
2) Residue build-up on feeder needs to be cleaned. (Consult the bowl builder for the proper cleaner).
3) Too many parts in the bowl. There should only be 2 to 3 layers of parts in the bottom of the bowl. To keep a steady amount of parts in the bowl, add a Rodix storage hopper to the feed system.

Control Problems: The control should be capable of producing full output voltage at the proper pulse mode. To check the control, connect a volt meter to the output of the control, and watch the meter while turning the main control pot clockwise. For controls set to 120 Pulse, the output should increase to within 2VAC of the incoming voltage. For controls set to 60 Pulse, the voltage measured depends on the inductance of the feeder coils. The output voltage should increase to 80 - 110 volts with a 120VAC supply line or 160 - 220 volts with a 240VAC utility. If these values are not obtained, see the application note for setting the Max pot (where applicable). If the control is set up properly and it will not supply the correct output voltage, then the control is likely malfunctioning. Follow the troubleshooting guide's recommendations for repair.

If full output voltage from the control is achieved, but there is not enough vibration, check the 60/120 pulse switch set up. The control's 60/120 pulse switch may be in the wrong position. (For variable frequency controls (VF), adjust the frequency for the best vibration.) If the feeder only hums and does not feed parts, turn the power off, and flip the 60/120 switch on the circuit card (note: the Max pot may need re-adjustment. See the control's application note for adjustment details). If it still does not feed parts, turn the power off, and flip the 60/120 switch on the circuit card back to the original position. For an explanation of 60/120 pulse selection, download the Rodix Solution "60/120 Pulses Output Selection." Note: the line frequency must be correct for the feeder used, see feeder problems section 9.

For no vibration or low vibration at full output voltage, check the following: In rare cases a bad coil or a bad connection can cause the vibratory feeder to stop vibrating, even though the output of the feeder control is at full voltage. To test for this condition, a steel screwdriver may be placed along side of each coil. The magnetic attraction should be felt at each coil. Another way to check the coils is to disconnect the wires going to the vibratory feeder, and use an ohmmeter to measure the coil(s) resistance. Use the lowest Ohms scale on the meter. The wiring and feeder coil resistance should measure between 0.5 and 100 Ohms. Each coil should have the same amount of resistance. If the resistance is greater than 100 Ohms, check for bad connections. Then check with the manufacturer, or replace open (bad) coils.

If the coils check good, the TRIAC may be short circuited. Follow the recommendation given in the troubleshooting guide for your control model. A shorted TRIAC provides full output voltage in the 120 pulse mode, but the amplitude cannot be adjusted by the main control pot. (The feeder must be plugged to avoid measuring leakage currents.) If the vibratory feeder is tuned for 60 pulse, there may be a feeling of vibration or humming without feeding.

If there is still not enough vibration and the 60/120 pulse switch and Max pot are set correctly, the problem may be a mechanical tuning problem. See the feeder problems section below, or contact the vibratory feeder's manufacture for assistance with solving mechanical problems.

Feeder Problems:

The following is list of some common electro-mechanical tuning problems:

1) Loose bolt(s) on toe clamps, spring packs, center bolt, counterweights, mounting feet and coils will cause a loss in vibration. When tightening the bolts on the springs and large toe clamps, use a three-foot-long cheater bar over the Allen wrench.

2) Cracked or broken springs will cause a loss of vibration. To check for a bad spring while the feeder is operating, lightly grasp a spring while holding the outside edges of the spring between your thumb and fingers. A bad spring will move from side to side and feel different than a good spring. Repeat this for every spring.

Another test for a cracked or broken spring is to remove the springs from the feeder. Lightly grasp a spring while holding the outside edges of the spring between your thumb and fingers. Tap each end of the spring with a hammer. A good spring will ring like a bell. A bad spring will not.

3) Spring fatigue is a gradual degradation in spring performance that happens over a period of months or years. Spring fatigue will cause the operator to turn the control up by small amounts over a long period of time until there is no more power available from the control. Springs may need to be added to the feeder or a variable frequency control can power the feeder at its resonate frequency.

4) A broken weld on the vibratory feeder bowl, cross arm or drive base will cause a loss in vibration. Visually inspect and touch each welded joint. The vibration on both sides of the joint should feel the same. If it feels different, the weld may be cracked.

5) The feeder/machine table must have properly adjusted mounting feet to avoid any loss of power. The table must be extremely rigid; otherwise, energy will be spent vibrating the table instead of the parts in the feeder.

6) A bad coil(s) can reduce the vibration to a hum. Check for magnetism along the air gap between the coil and its pole face. Use the metal shaft of a screwdriver to feel the magnetic pull. Alternately, a clamp-on Amp meter can read the current for each coil. If a coil has no pull or current flowing through it, it may have a bad connection, or it may be damaged internally.

7) Debris or foreign matter in the coil gap can interfere with the motion of the feeder.

8) Anything touching the feeder can reduce its vibration.

9) If the vibratory feeder is being set up after importation from another country, it may be tuned for the wrong power line frequency. A feeder may be tuned to resonate at 60Hz in the US and sent where the power line frequency is 50Hz. The bowl may not be able to resonate at 50Hz. The bowl needs to be re-tuned for the country's power line frequency or a VF (variable frequency) control from Rodix can supply the frequency the bowl is tuned for.

10) The feeder's surface has worn smooth so that the bowl does not have traction to feed the parts.

11) The coil's air gap is too large. The air gap should be set between .030" and .040" for 120 Pulse bowls. For 60 Pulse bowls the air gap should be set to .080" but not more than .090". Measure and record the coil gap before making any changes.

12) The bowl does not make rate because the bowl's tooling is not adjusted properly. Too many parts are rejected because of the improper tooling adjustment.

13) The drive base's rubber mounting feet must not be cracked, cut or broken.

Power Line Problems:
The power line in some cases starts out at one voltage level in the morning, but as more air conditioners and other devices increase the demand, the power line voltage can "sag". The feeders gradually slow down during the day, but feed faster in the morning at high line voltage. See "Feed rate fluctuations" below for more information. A Rodix control with line voltage compensation can help reduce problems with line voltage fluctuations. A Rodix control with a constant feed rate (CFR) sensor uses feedback to regulate the vibration to keep it constant.

Sudden decrease in feed rate: A sudden decrease in feed rate can have any of the symptoms as the previous section entitled "Not enough vibration and gradually reduced vibration". The typical symptoms are loose bolts, cracked springs and broken welds. The difference is that spring fatigue can usually be ruled out because of the sudden change rather than a gradual change caused by fatiguing springs.

Feed rate fluctuations: The feed rate of a vibratory feeder can fluctuate due to one of several possible causes. The common causes are loose or broken springs, a bad potentiometer, fluctuating weight of the parts in the feeder bowl, bad DIAC for controls models FC-30 through FC-90 Series (excluding ***Plus*** series controls) and fluctuations in the power line voltage. Electricity produced by a motor–generator can also produce variations in voltage and frequency.

Power Line problem test: When the output voltage changes by a few volts, the feed rate of the vibratory feeder will also change. To test for power line problems, connect a voltmeter to the feeder control. Monitor the meter while the vibratory feeder is operating ("run" mode). Record the input line voltage and the output (feeder) voltage when the bowl is running fast and when it is running slow. Find the difference (in volts) between the readings by subtracting the input low voltage reading from the input high voltage reading. Then, find the difference (in volts) between the readings by subtracting the output low voltage reading from the high voltage reading.

Next compare the input voltage difference to the output voltage difference. If they are about the same, then the problem is with the incoming power line. If the incoming power line voltage does not fluctuate, but the output voltage does, then the problem is with the control. If neither input nor output fluctuates, but the feed rate fluctuates, then there is a mechanical problem in the vibratory feeder system or too many parts are dumped into the bowl at one time. See the list of electro-mechanical tuning problems on the previous page.

Power line fluctuations can be caused by many different factors such as too many loads being connected to a power panel branch circuit, a heavy momentary load like a machine nearby starting up, a long extension cord supplying the feeder, the utility line voltage to the plant varies at different times of the day, or a bad or loose-fitting power outlet or connection.

Line Voltage fluctuations can be overcome by using a control that has a line-voltage-compensation feature. The FC-40-PLC Plus, FC-90 Plus, CFR-90 Plus series, and VF-9 controls adjust the control's output voltage to compensate for power line fluctuations. In addition the CFR-90 Plus series and VF-9 controls use a sensor that attaches to the feeder to maintain a constant vibration level providing a Constant Feed Rate to the machine process.

Too much vibration with no control and hammering: The TRIAC may have short circuited causing the vibratory feeder to operate only at full power, regardless of the Main Pot setting. Please refer to the TRIAC troubleshooting guide and the troubleshooting guide for your control.

If the problem "Too much vibration with no control" goes away when the power switch is turned on and off, a bad component on the circuit board or electrical noise may be disrupting the circuit board. See "Good Wiring Practices" for information on electrical noise.

The coil gap may be set too small or some small object may be in the coil gap.

The feeder may be turned up higher than the manufacturer's specified feed rate. Controls equipped with a Max pot can adjust the maximum vibration level.

Dead spots in the bowl: Dead spots are caused by a weight imbalance in the feeder. Dead spots are seen as a place in the bowl where the parts move at a slower rate than in the rest of the bowl. Dead spots can be corrected by adding a counter-weight, or adjusting the springs. Counter-weights mount on the opposite side of the feeder than the dead spot. Check for a missing counter-weight, or see if some tooling was added or modified on the bowl to cause a dead spot. A broken spring can be a possibility.

The parts bounce more than they feed

If the part bounce too much with respect to the feed rate, the feeder may be over-tuned (over-sprung). Check the feeder's tuning. If it is not the tuning, the desired feed rate may be higher than the bowl was rated for at run-off.

Hot Coils: The coils may overheat if the coil gap is too large, if the feed rate is much higher than the feed rate at run-off, if the control has to be turned up because too many parts are in the bowl or if the control gradually gets turned up because the springs have fatigued causing the bowl to be out of tune (Add springs).

Click this link for information on "How to Tune a Vibratory Parts Feeder Bowl."

Troubleshooting guides & Application Notes

Rodix has troubleshooting guides and application notes available at **www.rodix.com** under Technical Documents, or call for technical support at 1-800-562-1868 extension 322.