

RODIX, INC.
FC-90 Plus & CFR-90 Plus Series Troubleshooting Guide
for Circuit Board P/Ns 24-490 and 24-491

Control MUST be connected to a known GOOD LOAD prior to testing

<u>Problem:</u>	<u>Possible Cause:</u>	<u>Solution:</u>
No output from the control	No AC line voltage	Check power to control.
	No AC voltage on circuit board at terminal block TB1: 1, 2 & 3 are HOT 5, 6, 7 & 8 are COM	Check / Replace Fuse Check / Replace Control Switch
	Run Jumper is missing from TB2-8 & 9 or Run Contacts are not closed	Install Run Jumper or close Run Contacts "RUN" LED light lights up when made.
	60/120 Pulse switch is in the wrong position. (It gives the appearance of no output)	Change switch setting (If this does not work, reset the switch to its original setting). Measure output voltage with load connected
	**Bad parts sensor or incorrect parts sensor setup	Test: Turn ON delay counter-clockwise. Then, flip "INV/NORM" switch, if control runs, sensor setup is incorrect. Check "NPN" and "PNP" status LEDs.
	Max Pot on board turned fully counter-clockwise	Adjust Max Pot per the control's application note.
	*Damaged pot/cable assembly	Replace pot/cable assembly
	***Bad control board	Replace control board
Feeder only hums or moves parts slowly	60/120 pulse switch is in the wrong position	Change switch setting (If this does not work, reset the switch to its original setting)
	Max pot set incorrectly	Adjust Max pot per the control's application note
	Potential Feeder problem	Download Rodix Solution "Control or Feeder Problem?"
	Electrical noise has disrupted the unit	Download Rodix Solution "Good Wiring Practices"
	Electrical noise has disrupted the sensor/control signal	Turn the main pot fully counter-clockwise, and then turn the main pot up to the desired feed rate. Also, download Rodix Solution "Good Wiring Practices"
		*** Bad control board
Full output with no change in the output when the control knob is adjusted	Control is not connected to a known good load	Connect a load to the unit
	****The TRIAC on the unit is shorted	Replace TRIAC (P/N 115-32)
	Max pot set incorrectly, or MIN pos set incorrectly	Adjust Max Pot per the control's application note
	CFR Sensor detached from feeder	Re-attach the sensor to the feeder. Additional tape is available from Rodix
	***Bad control board	Replace control board
The output power is reduced automatically after the Main pot is increased.	The feeder vibration is near 25g of acceleration, and it is exceeding the range of the sensor.	Rotate the CFR sensor about 15 degrees so that its sensitive axis gets less vibration. (see unit's application note)

FC-90 Plus / CFR-90 Plus Series Control Troubleshooting Guide - *Continued*

<u>Problem:</u>	<u>Possible Cause:</u>	<u>Solution:</u>
Erratic output when adjusting main control knob	*Damaged control pot on main lid	Check or replace pot/cable assembly
	*** Bad control board	Replace control board
Erratic output when making no adjustment to the control.	Potential Feeder problem	Download Rodix Solution "Control or Feeder Problem?"
	Electrical noise has disrupted the unit	Download Rodix Solution "Good Wiring Practices"
	50Hz generator produces electrical noise transients (where used)	Use utility power when available
Output is not turning ON and OFF properly	Delay trimpots set wrong or input INV/NORM switch set wrong or both trimpots and switch set wrong	Turn the delay trimpots fully counter-clockwise and change switch setting (If changing switch setting does not work, reset the switch to its original setting)
	Sensor turns aboard LED on and off but the output remains either off or on.	Select NPN or PNP sensor type on S1. Check NPN/PNP status LEDs.
	**Bad sensor	Replace sensor
	***Bad board	Replace control board
Interlocked board does not turn off with the CFR-90 Plus board	Run jumper or paddle switch may not be across interlock terminals (where used)	See control's application note for to determine proper interlock connections
The CFR sensor is not regulating the feeder speed	CFR switch S1 is set to 4-20mA	Set S1 to CFR position to enable CFR
	Broken or detached CFR sensor cable.	Reconnect 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.
	Main pot is set to "10".	Adjust Max Pot per the control's application note.
	CFR control settings were changed (Max Pot, 60/120 switch, INV/NORM switch). Or the Main Pot was changed while the control was idle.	Readjust the Main Pot to the desired feed rate.
The Vibratory feeder oscillates by itself	The CFR control is overcompensating for changes in vibration. A small amount of oscillation shows that the feedback from the sensor is working.	Rotate the CFR sensor about 15 degrees so that its sensitive axis gets less vibration. (see unit's application note) If the part feed rate is acceptable and no part jams occur, a small amount of oscillation is acceptable.

* To test if the Main control pot is functioning correctly, use the following method: un-plug the three-pin, pot-wire connector. Using an Ohmmeter, measure the resistance from the center lead of the Pot to one of the outside leads. The resistance should vary smoothly from 0 to 100K Ohms as the main control knob is turned. Repeat from the center wire to the other lead.

*** To determine if the problem is in the feeder or the control: down load Rodix Solution "Control, Feeder or Power Line Solution."

Note: Malfunctioning controls and/or circuit boards 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., 2303 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 22.

RODIX, INC.
FC-40 Plus Series Control
Troubleshooting Guide for Circuit Board P/Ns 24-480 and 24-481

Control must be connected to a known GOOD LOAD prior to testing

<u>Problem:</u>	<u>Possible Cause:</u>	<u>Solution:</u>
No output from the control	No AC line voltage	Plug in control.
	No AC voltage on circuit board at terminal block TB1: 1, 2 & 3 are HOT 5, 6 & 7 are COM	Check / Replace Fuse Check / Replace Control Switch
	Run Jumper is missing or Run Contacts are not closed across TB2-5 & 6 <u>OR</u> TB2-6 & 7	Install Run Jumper or close Run Contacts (See the application note for the control's interlock connections)
	60/120 Pulse switch is in the wrong position. (It gives the appearance of no output)	Change switch setting (If this does not work, reset the switch to its original setting)
	RTV on pins of Main pot connector J1 (boards manufactured before 1/2000)	Clean J1 pins
	Max Pot on board turned fully counter-clockwise	Adjust Max Pot per the control's application note
	Damaged pot/cable assembly **Bad control board	Replace pot/cable assembly Replace control board
Feeder only hums or moves parts slowly	60/120 pulse switch is in the wrong position	Change switch setting (If this does not work, reset the switch to its original setting)
	Max pot set incorrectly	Adjust Max pot 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"
	** Bad control board	Replace control board
Full output with no change in the output when the control knob is adjusted	Control is not connected to a known good load	Connect a load to the unit
	***The TRIAC on the unit is shorted	Replace TRIAC (P/N 115-32)
	Max pot set incorrectly	Adjust Max Pot per the control's application note
	**Bad control board	Replace control board
Erratic output when adjusting main control knob	*Damaged control pot on main lid	Check or replace pot/cable assembly
	** Bad control board	Replace control board

FC-40 Plus Series Control Troubleshooting Guide-Continued

<u>Problem:</u>	<u>Possible Cause:</u>	<u>Solution:</u>
Erratic output when making no adjustment to the control.	Potential Feeder problem	Download Rodix Solution "Control or Feeder Problem?"
	Electrical noise has disrupted the unit	Download Rodix Solution "Good Wiring Practices"
	50Hz generator produces electrical noise transients (where used)	Use utility power when available
Feeder changes speed by itself	Bowl is overloaded or underloaded	Maintain correct depth of parts in bowl or use a Constant Feed Rate control
	Line voltage fluctuations	See Rodix Solution "Control, Feeder or Power Line Problem?"
	Potential Feeder problem	See Rodix Solution "Control, Feeder or Power Line Problem?"
Interlocked board does not turn ON and OFF with the FC-90 Plus board	Run jumper or paddle switch may not be across interlock terminals TB2-5 & 6	See the application note for the control's interlock connections
	Paddle switch contacts may not be making contact.	Adjust switch position or Replace switch contacts
	No +12VDC across TB2-11(-) & 12(+)	FC-90 Plus control is not feeding parts. Or interlock wiring may be missing or wrong.
	** Bad control board	Replace control board
Interlocked board does not turn ON or OFF with a PLC	Run jumper or paddle switch may not be across interlock terminals (TB2-5 & 6)	See the application note for the control's interlock connections
	Interlock signal voltage may be missing or wired incorrectly. +5-30VDC at TB2-11(-) & 12(+) OR 105-250VAC at TB2-10 & 12	See the application note for the control's interlock connections
Problems Interlocking two FC-40 Plus controls together	FC-40 Plus control does not have an interlock output	Use an FC-90 Plus control to provide an interlock output for interlocking to an FC-40 Plus control

* To test if the Main control pot is functioning correctly, use the following method: un-plug the three-pin, pot-wire connector. Using an Ohmmeter, measure the resistance from the center lead of the Pot to one of the outside leads. The resistance should vary smoothly from 0 to 100K Ohms as the main control knob is turned. Repeat from the center wire to the other lead.

** To determine if the problem is in the feeder or control: see accompanying Rodix Solution "Control, Feeder or Power Line Problem."

*** To test if the TRIAC is functioning correctly, down load Rodix Solution "TRIAC Troubleshooting Guide."

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RODIX, INC.

Troubleshooting Guide for Three-Wire DC sensors

Control must be connected to a known GOOD LOAD prior to testing

*NOTE: RODIX *Plus* Series controls work with three-wire DC sensors with either an NPN or PNP output.

Always check for proper wiring of the sensor to the Rodix control. Check the sensor's application note and the Rodix control's application note to determine what the correct sensor wiring should be. (Do not use a two-wire DC sensor)

Most proximity switches and fiber-optic sensors have a red LED mounted in the back of the sensor which lights up whenever it is sensing. If this is operational then the sensor is typically good. Occasionally the vibration movement of a track can interrupt the beam of an optic sensor causing ON/OFF delay problems.

Most fiber-optic sensors, such as the Banner sensors, have a Light/Dark operate switch and a sensing-distance (gain) adjustment in the rear of the sensor. Turn the gain Pot fully clockwise for maximum sensing distance. If the sensor is turning On and Off at the desired sensing distance, but not in the correct sequence (OFF when supposed to be ON, ect.), then flip the "INV/NORM" switch inside the Rodix control.

The parts sensor's output may be either **NPN** or **PNP**. The **NPN/PNP** switch on the control must be set to match the type of sensor being used, NPN or PNP.

<u>Problem:</u>	<u>Possible Cause:</u>	<u>Solution:</u>
LED will not light	End of cables covered with dirt, grease or oil	Clean cable ends Increase Gain adjustment Clean sensor head with cotton swab
	Cracked or broken cables	Increase Gain adjustment Replace broken cables
		<u>Test each cable:</u> Plug both ends of one cable into sensor, LED should light when cable is good.
	Poor alignment of cable ends across the track	Correct alignment: use a drill rod to verify correct alignment
	Incorrect sensor wiring	Correct the wiring: see the application notes for the control and the sensor
	Optic cables not fully inserted into sensor	Insert cables fully into sensor
	Sensor bad	Replace sensor
LED is always ON	Light is bouncing around the parts	Decrease the Gain adjustment. Mount the optics at a 45° angle to the track and not a 90° angle. This way the beam gets blocked by 2-3 parts.
	Cable not fully seated in the sensor head of the Banner sensor	Loosen screw and push cable ends further in.

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RODIX, INC.

TRIAC Troubleshooting Guide

Use an Ohmmeter to test the TRIAC across the terminals described below (see the TRIAC Reference Guide below for terminal locations).

Set the Ohmmeter to the highest Meg. Ohm scale for the following resistance measurements. The resistance noted below is generally greater than 1Meg. Ohm. A good TRIAC will match the conditions shown in the chart below.

Red Meter Lead	Black Meter Lead	Correct Result
Anode 1	Anode 2	High resistance in both directions
Anode 2	Anode 1	

Measure the resistance between the terminals indicated by the following chart. The resistance noted below is generally greater than 1Meg. Ohm. A good TRIAC will match the conditions shown in the chart below.

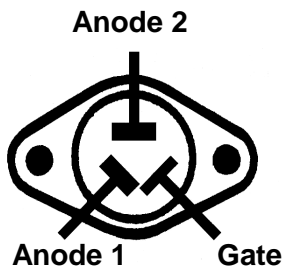
Red Meter Lead	Black Meter Lead	Correct Result
Gate	Anode 2	High resistance in both directions
Anode 2	Gate	

Set the Ohm meter to the 1K Ohm resistance scale. Measure the resistance between the terminals indicated by the following chart. The resistance noted below is generally 1K Ohm or less. A good TRIAC will match the conditions shown in the chart below.

Red Meter Lead	Black Meter Lead	Correct Result
Gate	Anode 1	Low resistance in both directions
Anode 1	Gate	

If the resistance measurements match all of the above conditions, then the TRIAC is good.
If any measurements do not match all of the above conditions, replace the TRIAC.

TRIAC Reference Guide



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CONTROL, FEEDER OR POWER LINE PROBLEM?

Problems with vibratory feed systems generally fall into three categories: mechanical feeder, power line fluctuations and control problems. To complicate things, any of the three problems can make a feeder vary its parts rate or slow down; therefore, careful attention needs to be given to find the root cause of the problem. Let's determine if the problem is with the control, with the feeder's mechanical tuning or with power line fluctuations.

TEST SET UP FOR TROUBLESHOOTING

The control must be in the "run" mode in order to test the output. If additional information is needed, the application note and troubleshooting guide for your control is available from our web site.

Important: When checking the output voltage of a feeder control with a volt meter, always have a known good load connected to the output so that the meter does not give false readings due to TRIAC leakage current.

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 flat blades of the plug. Always leave the load connected; otherwise, the meter readings will be incorrect.

HOW TO USE THIS GUIDE

The typical symptoms for an existing feed system are no vibration, low vibration, gradually decreasing feed rate, fluctuating feed rate and too much vibration with no control. To use this guide, match the vibratory feeder's symptom to the corresponding problem listed in bold letters.

No vibration: Connect a volt meter to the output of the control and monitor the meter while adjusting the main control pot up and down. If there is no voltage present, follow the recommendation given in the troubleshooting guide for your control model. If there is a voltage output, follow the procedure below.

Not enough vibration and gradually reduced vibration: Connect a volt meter to the output of your control and monitor 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 power. 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 malfunctioning. Follow the troubleshooting guide's recommendations.

If full output voltage is achieved and 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. If the feeder only hums and does not feed parts, turn the power off, and flip the 60/120 switch on the circuit card. 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 electro-mechanical tuning problems part 7.

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, disconnect the wires going to the vibratory feeder, and use an ohmmeter to measure their resistance. Use the lowest Ohms scale on the meter.

The wiring and feeder coil resistance should measure well below 200 Ohms. If the resistance is greater than 200 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 model. A shorted TRIAC provides full power in the 120 pulse mode. If the vibratory feeder is tuned for 60 pulse, it will not vibrate.

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. Contact the manufacturer of the vibratory feeder for assistance with solving mechanical problems.

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

1) Loose bolts, loose toe clamps, a missing bolt at the center of the feeder bowl, etc. 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 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 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 ring.

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 gradually over a long period of time until there is no more power available from the control.

4) A broken weld on the vibratory feeder 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 must be securely fastened to the floor to avoid any movement of the drive base.

6) A bad coil(s) can reduce the vibration to a hum. Check for magnetism at the air gap along side of each 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) If the vibratory feeder is being set up after importation from a foreign country, it may be tuned for the wrong power line frequency.

Too much vibration, with no control: The TRIAC has probably 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.

Feed rate fluctuations: The feed rate of a vibratory feeder can fluctuate due to one of several possible causes. The common causes are listed here: 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. Also, electricity produced by a motor-generator can 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 output of the feeder control. First, monitor the meter while the vibratory feeder is operating ("run" mode). Record the output voltage readings when the bowl

is running its fastest and slowest. Also, record what time the readings were taken. Find the difference (in volts) between the readings by subtracting the low voltage reading from the high voltage reading.

Secondly, monitor the incoming line voltage to the control where the feeder control power cord is connected to the power line. Record the voltage reading when the bowl is running the fastest and the slowest, also record what time the readings were taken. Find the difference (in volts) between the readings by subtracting the low-voltage reading from the high voltage reading.

Next compare the voltage difference values from step 1 and step 2. 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 in the control. If neither input nor output fluctuates, but the feed rate fluctuates, then there is a mechanical problem in the vibratory feeder system. 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; too many loads (including the feeder control) are supplied by a long extension cord; the utility supplied voltage to the plant varies at different times of the day; 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.

No Voltmeter Available?

If there is no voltmeter available, a quick function check of the feeder control can be made with a light bulb (incandescent) such as a garage trouble light. Substitute the light bulb for the vibratory feeder. A good control will act like a light dimmer. A bad control will not be adjustable, or it will not light the light bulb when it is supposed to. For a bad control, follow the recommendation given in the troubleshooting guide for the control model.

Troubleshooting guides & Application Notes

Rodix has troubleshooting guides available at www.rodix.com, or call for technical support at 1-800-562-1868 extension 22.

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