



**RODIX INC.**  
**FEEDER CUBE®**  
**FC-90 *Plus Series***  
**GENERAL PURPOSE**



**MODEL - FC-92 *Plus***  
**P/N 121-000-8450**

**Including Models**

**FC-92-4 *Plus* P/N 121-000-8460**

**FC-92-5 *Plus* P/N 121-000-8470**

**CFR-92 *Plus* P/N 121-100-8450**

**CFR-92-4 *Plus* P/N 121-100-8460**

**CFR-92-5 *Plus* P/N 121-100-8470**



**Listed, File No. E183233**

**Input: 120 VAC**  
**50/60 HZ.**

**Output: 0-120 VAC**  
**Double Unit Fuse Sizes:**  
**Unit A 10 AMPS and**  
**Unit B 5 AMPS**

**80% Duty Cycle at Rated AMPS**

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## ADJUSTMENTS AND SET UP FOR UNIT A

### 1. SELECTING 60 OR 120 PULSE OPERATION

A. For 60 pulse output - Set switch (S1) to 60 on the P.C. card (No. 24-476).

B. For 120 pulse output - Set switch (S1) to 120 on the P.C. card.

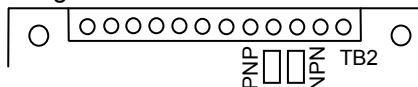
**Note: Readjust MAX pot after changing pulse switch setting.**

### 2. INSTALLING THE PART SENSOR (Photo-sensor or Proximity Switch)

A. Connect a three wire, current-sinking (NPN) or current-sourcing (PNP) sensor as shown on the enclosed wiring diagram. The sensor must be able to operate on 12VDC and be capable of switching at least 3.0 mA.

B. Set switch (S2) for the proper logic. When the switch is in the "NORM" position, the control will run only when the sensor signal is present. The "NORM" position is used with Light-Operate Photoeyes (through beam). When switch (S2) is in the "INV" position, the control runs only when the sensor signal is not present. The "INV" switch position is used with Dark-Operate (reflective) Photoeyes and with Proximity Sensors.

Troubleshooting Tip: On new sensor installations if the sensor LED turns ON and OFF, but the control's output does not turn ON and OFF, turn the time delays all the way down, counter-clockwise. If this problem persists, the sensor may have an internal pull-up or pull-down resistor that is incompatible with the universal sensor input on the control. Dedicate the control's part sensor input to match the sensor's output type. Remove the resistor labeled "R4" and "NPN" when using a NPN sensor. For a PNP sensor remove the resistor labeled "R3" and "PNP." The resistors are located near TB2-4. Use needle-nose pliers to twist and snap the resistor off. Removing the resistor does not void the warranty.



### 3. LIMITING THE MAXIMUM OUTPUT OF CONTROL

The **MAX** Output trimpot can be adjusted to keep the vibratory feeder from hammering when the control is turned up to full power.

When setting up the **MAX** output of the feeder control, the output to feeder must be connected and the control set for the proper output frequency (60 or 120 pulse) setting. The Run Contact input must be closed, and the Part Sensor must be calling for parts.

- Power input should be **OFF** or disconnected.
- Open cover to allow access to printed circuit card.
- Adjust the **MAX** Output trimpot counter-clockwise to its minimum setting.
- Using **CAUTION**, turn power **ON** (no output should be present).
- Rotate the **MAIN CONTROL DIAL** on front cover to its highest setting.
- Adjust the **MAX** Output trimpot so that the output to the feeder reaches its desired maximum level when the **MAIN CONTROL DIAL** is turned fully clockwise. Turning the **MAX** Output trimpot clockwise increases the maximum output level.

### 4. MAIN CONTROL DIAL

The output power is controlled by the **MAIN CONTROL DIAL**. A special logarithmic-tapered power out curve (non-linear) spreads the power broadly across the **MAIN CONTROL DIAL** to help give maximum "Fine Control" over the output speed of the vibratory feeder.

### 5. RUN JUMPER INPUT

The Run Jumper comes installed across TB2-7&8. The Run input may also be controlled by a relay contact, switch, or an NPN type of PLC output. Replace the factory-installed jumper with the "Run Signal" at terminals 7(-) and 8(+) of TB2 (small terminal strip). A contact must be able to switch 12VDC at 3.0 mA. The control will then run only when the contact is closed and the part sensor is calling for parts. The PLC's PNP output may be used if it is isolated from the internal power supply. To isolate it remove R24&25 located on the bottom side of the circuit board near TB2-5. Isolation for an NPN PLC output is optional.

## 6. SETTING THE TIME DELAYS

The sensor time delays can be set for independent OFF delay and ON delay periods. The time delay trimpots can be adjusted to provide the best individual response for the feeder (0 to 12 seconds). By rotating the adjustment clockwise, the delay will become longer.

## 7. SETTING THE SOFT-START

The start-up of the control output can be adjusted to ramp up to the desired output level instead of starting abruptly. Soft-start keeps parts from falling off the tooling, reduces spring shock, and hammering when the control turns ON. Turn the **SOFT** Start trimpot clockwise for the gentlest start (about a 5 sec. ramp up to full output). Turn the trimpot fully counter-clockwise for no soft start.

## 8. FEEDER BOWL/HOPPER INTERLOCK OUTPUT

The Feeder Bowl/Hopper Interlock feature (terminals 2 & 3 of TB2) can be connected to a Rodix FC-40 All-Purpose Series control when control of a bulk material hopper is needed. The control interlock will prevent the hopper from operating anytime the bowl is turned OFF or in "STAND BY" mode. The Interlock output is 12 VDC (70 mA). The 12 VDC output is capable of switching 500 mA if an external power supply is used. Download the FC-90 Plus Advanced Application note for more details. The Interlock output can also be used to drive a solid state relay. The solid state relay is then used to operate any auxiliary equipment such as air valves. Two FC-90 *Plus* controls can also be interlocked, download the FC-90-2 Application Note for the wiring information.

## 9. POWER SUPPLY

At the rated line voltage, the power supply is capable of providing a combined total current of 100 mA at 12 VDC. The total current includes the sensor and any auxiliary output accessories that are connected to the Bowl/Hopper Interlock terminals.

## 10. REMOTE SPEED CONTROL

Remote control of the power level can be

accomplished by the following methods:

- A. 4-20mA signal from a PLC can be used to remotely vary the output of the control instead of the Main Control Dial. This feature is automatically turned ON whenever a 4-20mA signal is applied to the control (terminals 11 & 12 of TB2). The Main Control dial setting is ignored whenever there is a 4-20mA signal. The 4-20mA input is transformer isolated from the power line.
- B. 0-5VDC Analog input signal may be applied in place of the Main Control Dial. For further information download (or request from RODIX) an FC-90 *Plus* **Series** Advanced Application Note.
- C. Remote control of the output power level can be accomplished by using an optional **Step Up/Down Remote Speed Interface P/N 123-148**.

## 11. LINE VOLTAGE COMPENSATION

Fluctuations in the line Voltage can cause a feeder bowl to vary its feed rate. The line voltage compensation feature adjusts the control's output to help compensate for fluctuations in the supply voltage. If it becomes necessary to disable this feature, cut through the circuit board trace labeled J8 using side cutter pliers or a knife.

## 12. SUPPLEMENTARY FEATURES

Special supplementary software features can be enabled on the 24-476/24-477 circuit boards with software versions ADV5.0 or greater. The features include: *Constant Feed Rate* regulation (CFR vibration feedback sensor required), *Constant On*, *High/Low Track* level control, *60 pulse polarity reversal*, *low pulse rate*, *power conservation mode*, *MIN. power trimpot*, and *two speed pots*. See the FC-90 *Plus* Advanced Application Note for details. The control comes from the factory configured with the "standard program". A different program may be in operation if any of the letters on the chip label are circled: "J8", "H", "POL", "CO" and "CFR".

## WARNING:

**Fuses should be replaced with Littelfuse 3AB "Fast Acting" type or equivalent of manufacturer's original value.**

**Mounting this control on a vibrating surface will void the warranty.**

## WARRANTY

**Rodix Control Products are Warranted to be free from defects in material and workmanship under normal use for a period of two years from date of shipment.** For the full description of the warranty, terms, and software license, please contact the factory.

For assistance installing or operating your Rodix Control please call the factory or visit our web site. Technical help is available to answer your questions and Fax any needed information. To return a control for IN or OUT of Warranty Service, please ship it prepaid to:

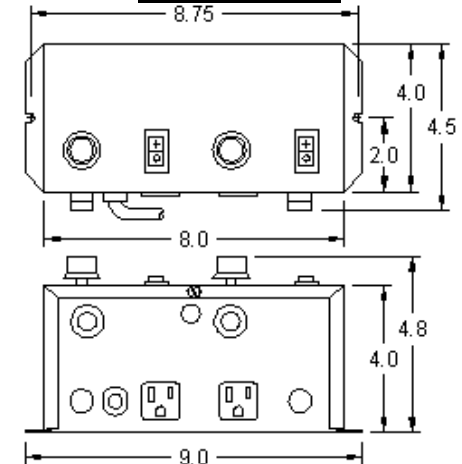
### **Rodix Inc., ATTN: Repair Department**

If under Warranty, Rodix will repair or replace your control at no charge; If out of Warranty, we will repair it and you will be billed for the repair charges (Time and Material) plus the return freight. Quotes for repairs are available upon request. A brief note describing the symptoms helps our technicians address the issue.

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## DIMENSIONS



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# ADJUST AND SET UP FOR UNIT B

## 1. SELECTING 60 OR 120 PULSE OPERATION

- A. For 60 pulse output - Set switch (S1) to 60 on the P.C. card (No. 24-480).
- B. For 120 pulse output - Set switch (S1) to 120 on the P.C. card.

**Note:** Readjust **MAX** pot after changing pulse switch setting.

## 2. LIMITING THE MAXIMUM OUTPUT OF CONTROL

Adjust the **MAX** Output trimpot so that the output to the feeder reaches its desired maximum level when the **MAIN CONTROL DIAL** is turned fully clockwise. The **MAX** Output trimpot should be adjusted to keep the vibratory feeder from hammering when the control is turned up to full power.

**NOTE:** Output to feeder must be connected and the control set for proper output frequency (60 or 120 pulse) setting. The Run Jumper must be connected as shown on the wiring diagram.

- A. Power input should be **OFF** or disconnected.
- B. Rotate **MAIN CONTROL DIAL** on front cover to 0 or its minimum setting.
- C. Open cover to allow access to printed circuit card.
- D. Using **CAUTION**, turn power **ON** (no output should be present).
- E. Rotate the **MAIN CONTROL DIAL** on front cover slowly to its highest setting.
- F. Adjust the **MAX** output trimpot so that the output to the feeder reaches its desired maximum level when the **MAIN CONTROL DIAL** is turned fully clockwise. Turning the **MAX** output trimpot clockwise increases the maximum output level.

## 3. SETTING THE MINIMUM OUTPUT LEVEL OF CONTROL

When the vibratory feeder is nearly empty, turn the

**MAIN CONTROL DIAL** fully counter-clockwise and adjust the **MIN** trimpot to just below the slowest speed that provides the proper feed rate.

This trimpot is only installed on Rev. D boards.

## 4. REMOTE OFF/ON CONTROL

A Run Jumper has been installed at the factory as shown on the enclosed wiring diagram.

Note: TB2 terminals 5-7 are connected to the line voltage circuit. Therefore any switch or contact must be isolated from other circuits.

Remote OFF/ON operation of the FC-40 *Plus Series* Feeder Cube® control can be configured to operate in one of the following ways.

A. A low current switch such as a paddle switch can replace the factory-installed Run Jumper "J1." The "Run Contact" connects to terminals 6 and 7. The contact must be able to switch 5VDC and 2mA. The control will then run only when the contact is closed. Refer to Section A of the OFF/ON CONTROL GUIDE.

B. Feeder Bowl/Hopper Interlock allows the Hopper control to operate only when the Bowl is running and the paddle switch contact is closed. The **interlock input** on terminals 11 and 12 of TB2 is controlled by the **interlock output** of a "Parts Sensing Feeder Bowl Control" such as an FC-90 *Plus*.

Remove jumper "J1" of this control from terminals 6 and 7. Connect the Hopper Paddle switch to alternate terminals 5 and 6. Connect TB2 terminals 11 and 12 of this control to the "Parts Sensing Control". Refer to Section B of the OFF/ON CONTROL GUIDE. Check specific instructions for the "Parts Sensing Control" wiring.

Note: Only use Bowl/Hopper Interlock with a FC-90 and FC-40 Series control. Two FC-40 Series controls will not interlock to each other since neither one has an **interlock output**.

C. Low Voltage DC can be used to turn the control **ON** and **OFF**. Move jumper "J1" from terminal 7, to terminal 5, (6 remains the same). Then connect the positive signal (+5 to 30VDC @ 10mA) to terminal 12 and the negative to terminal 11 of TB2.

The control will now turn **ON** when the DC signal is present at terminals 11 and 12 of TB2. This input is optically isolated. Refer to Section C of the OFF/ON CONTROL GUIDE.

D. AC Voltage may be used to turn the control **ON** and **OFF**. This requires a 105-250VAC signal, with 2mA maximum off-state leakage. Set up the control by moving the jumper "J1" from terminal 7, to terminal 5, (6 remains the same). Connect the 105-250VAC Signal to terminal 12 (L1) and the common (L2) to terminal 10 of TB2. The FC-40 control will now turn **ON** whenever the AC signal is applied to terminals 10 and 12 of TB2. This input is optically isolated. Refer to Section D of the OFF/ON CONTROL GUIDE.

## 5. MAIN CONTROL DIAL

The output power is controlled by the **MAIN CONTROL DIAL**. A special logarithmic-tapered power-out curve (non-linear) spreads the power broadly across the **MAIN CONTROL DIAL** to help give maximum "Fine Control" over the output speed of the vibratory feeder. When very precise adjustment of the **MAIN CONTROL DIAL** is needed, increase the MIN trimpot setting and/or decrease the MAX trimpot setting. Use of an external analog signal in place of the control potentiometer is not recommended.

## 6. SETTING THE SOFT-START

The start-up of the control output can be adjusted to ramp up to the desired output level instead of starting abruptly. This keeps parts from falling off the tooling of a vibratory feeder when it turns on; it can reduce hammering during turn on; it can also simulate a paddle switch ON delay. Adjust the **SOFT** Start trimpot clockwise for the gentlest start (about a 10-second ramp up to full output). Turn the trimpot fully counter-clockwise for no soft start.

## 7. ADVANCED FEATURE PROGRAMS

Advanced features are available for specialized applications. These features can be enabled by the end user: 60 pulse waveform reversal; Main Control Dial follows a fixed curve; Control output turns off when the Main Control Dial is at 0; MIN pot disable, Power conservation mode; High speed/low speed/off operation; and Low pulse rates of 30, 20, 15, 10. For a full description of these features, please download the FC-40 Plus Advanced Application Note.



## 1. INSTALLING THE CFR SENSOR

**Note:** Failure to adequately prepare the feeder's surface properly may result in a Constant Feed Rate (CFR) sensor that will not bond to the feeder. The sensor should not be mounted until step C-6.

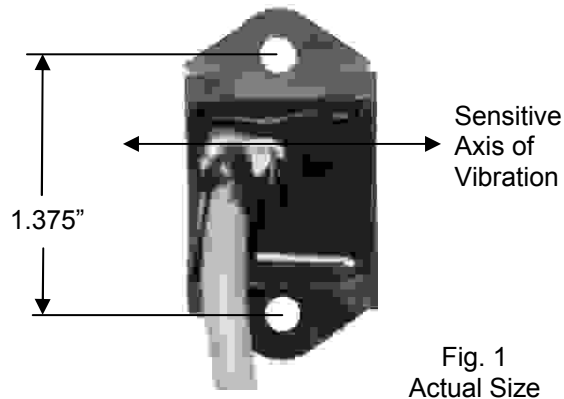


Fig. 1  
Actual Size

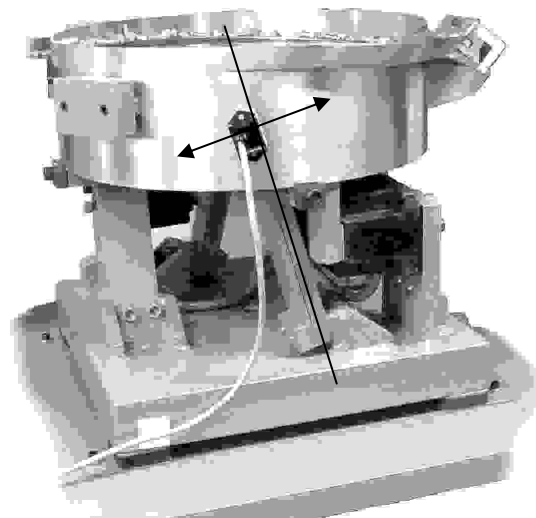


Fig. 2 The arrow shows the direction of vibration which is at a right angle to the spring pack.

**A. ORIENT THE SENSOR** so that its sensitive axis is in the same direction as the vibration of the

feeder. The double-ended arrow in figure 1 shows the sensor's sensitive axis. Align the sensitive axis of the sensor in the same direction as the vibration (see figure 2). The sensor must be oriented correctly for proper operation.

**B. CHOOSE A LOCATION** for mounting the sensor on the feeder that is smooth and that will allow the adhesive on the sensor to bond. Avoid mounting the sensor over ridges and bumps which can reduce the ability of the adhesive to stick to the feeder. The correct location will also have enough space for the sensor's cable to hang straight down without touching anything else.

**C. SURFACE PREPARATION** of the feeder is crucial for proper bonding between the sensor and the feeder. Please follow these steps completely.

- 1) The feeder should be kept between 70° and 100° F for ideal tape application.
- 2) Clean a three and one-half inch circular area with a solvent like isopropyl alcohol that will not leave a residue. As a rule of thumb, the area can be considered clean when after cleaning the area with a solvent-saturated, white paper-towel, the towel is as clean as it was before wiping.
- 3) Using a good amount of pressure, polish the cleaned, circular area of the feeder using a scratch pad or steel wool. Repeat step 2, and then go to step 4.
- 4) Wipe the cleaned surface with an alcohol wipe or with a 50/50 isopropyl alcohol/water combination.
- 5) Dry the surface thoroughly using a low lint cloth or a clean paper towel.
- 6) Remove the vibration sensor from its protective packaging. Remove the liner from the adhesive backing. Avoid touching the tape. Align the sensor as shown in figures 1 and 2. Apply the vibration sensor to the prepared area of the feeder. Press the sensor very firmly onto the feeder surface for at least 10 seconds.
- 7) Allow the vibration sensor at least 20 minutes to cure before operation. Note: It takes 72 hours for the adhesive to fully cure at 70° F.

Alternatively, #8 or M4 screws can be used to mount the sensor to the feeder. The hole centers are 1.375" apart.

**D. ROUTE THE SENSOR CABLE** to protect it from strain due to vibration. The cable that attaches to the sensor will not break from normal vibration; however, some care should be used when routing the sensor cable from the sensor to the control. The cable should hang straight down from the sensor without touching

the feeder bowl or anything else. Then, the sensor cable should curve towards the power control with a bend radius larger than 3 inches.

Use a cable tie and an adhesive-backed mount to attach the sensor cable to the side of the drive base. See Figure 2. Clean the mounting area before applying the adhesive-backed mount.

**E. CONNECT THE SENSOR** to the control. The sensor's brown wire connects to +12VDC at TB2-9. The blue wire connects to the signal input at TB2-12.

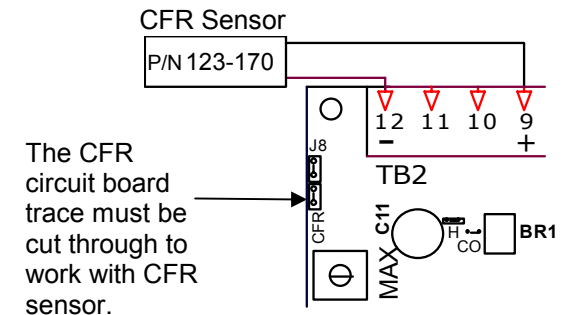


Fig. 3

## 2. CFR Software Program

The FC-90 Plus, P/N 24-476/24-477 circuit boards share the same circuitry as the CFR-90 Plus, 24-502/24-503 circuit boards. The difference for Revision B.1 and higher boards is the fact that the CFR program has been enabled to operate by cutting the CFR jumper on the Board. The CFR circuit board trace is shown in figure 3. It must be cut in order for the CFR sensor, P/N 123-170 to differentiate it from a 4-20mA signal. When converting a FC-90 Plus to enable the CFR function, cut through the CFR trace with a sharp knife. Then circle the CFR designation on the IC's label to show that the CFR software feature has been enabled. If some of the software features have been circled already, download the [FC-90 Plus Advanced Application Note](#) from [www.rodix.com](http://www.rodix.com) to find out more of the software installation details.

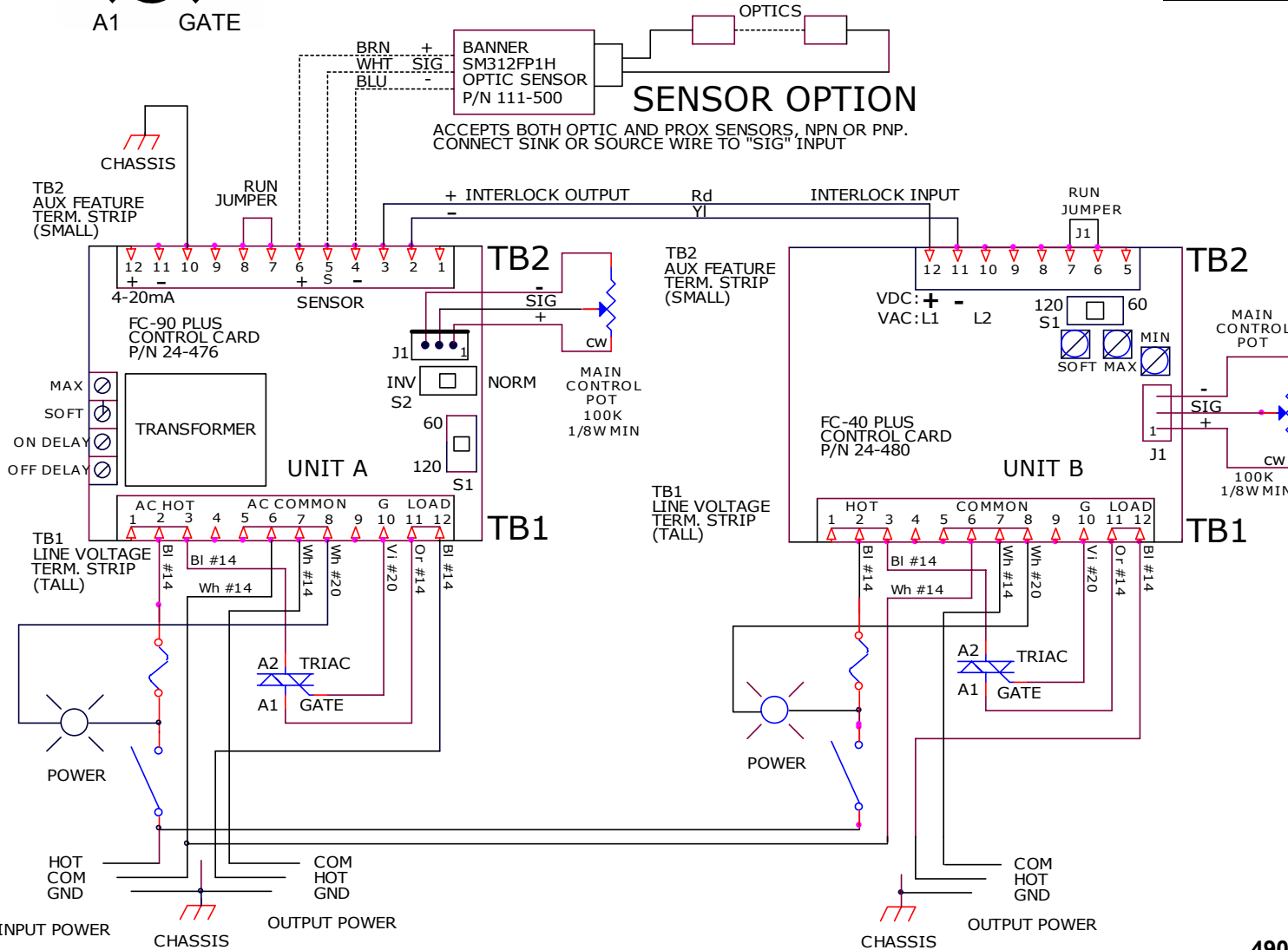
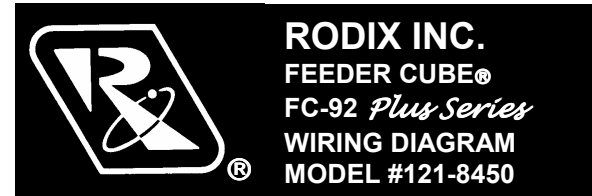
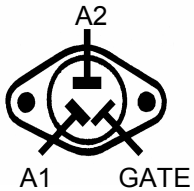
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TRIAC REFERENCE GUIDE



**SENSOR OPTION**  
 ACCEPTS BOTH OPTIC AND PROX SENSORS, NPN OR PNP.  
 CONNECT SINK OR SOURCE WIRE TO "SIG" INPUT

**OFF/ON CONTROL GUIDE**

See section 4 of the Application Note for more details.

- A) **LOW CURRENT SWITCH**
- B) **FEEDER BOWL/HOPPER INTERLOCK**
- C) **LOW VOLTAGE INPUT SWITCHING (DC Voltage from PLC or FC-90 Plus)**
- D) **AC VOLTAGE INPUT SWITCHING (105-250 VAC INPUT VOLTAGE OFF/ON CONTROL)**

**MODEL FC-92 PLUS      INPUT VAC 120 VAC      AMPS 10/5A      OUTPUT 0-120**

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