



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



Model - FC-90 Plus
P/N 121-8200

Including Models
FC-90-4 Plus P/N 121-8390
FC-90-5 Plus P/N 121-8400



Listed, File No. E183233

Input: 120 VAC
50/60 HZ.

Output: 0-120 VAC
Single Unit Fuse Size: 15 AMPS
80% Duty Cycle at Rated AMPS

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ADJUSTMENTS AND SET UP

1. SELECTING 60 OR 120 PULSE OPERATION

- A. For 60 pulse output - Set switch (S1) to 60 on the 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. Some customers report the sensor LED glows dimly instead of turning OFF. Dedicate the control's part sensor input to the sensor. Remove resistor R4 when using a NPN sensor. For a PNP sensor remove R3. The resistors are located near TB2-4; use needle-nose pliers to twist and snap the resistor off.

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.

- 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.

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 OR CONTACT

A Run Jumper is factory installed as shown on the enclosed wiring diagram.

If this Feeder Cube® is to be controlled by a relay contact, switch, or other device, replace the factory-installed jumper with the controlling "Run Contact" at terminals 7 and 8 of TB2 (small terminal strip). The contact must be able to switch 12VDC and 3.0 mA. The control will then run only when the contact is closed and the part sensor is calling for parts.

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.

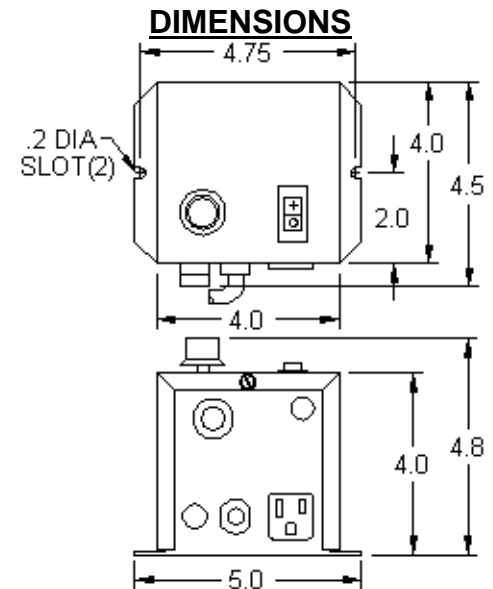
For assistance installing or operating your Rodix Control please call the factory or visit our web site. Technical help is available to answer your questions and Fax any needed information. To return a control for IN or OUT of Warranty Service, please ship it prepaid to:

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.

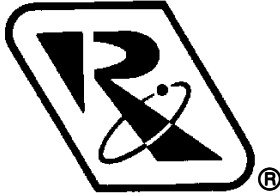
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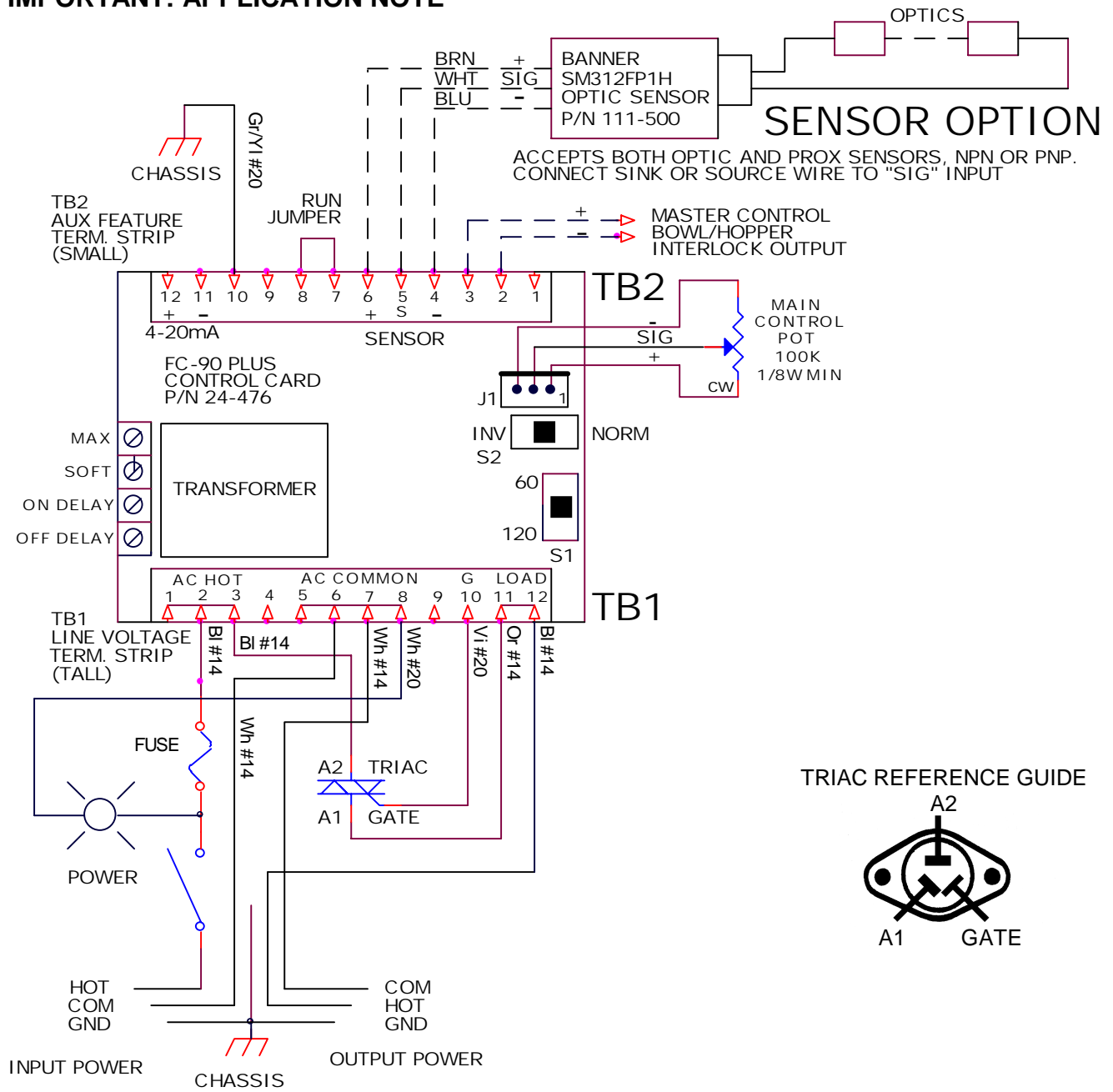
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FEEDER CUBE®
FC-90 Plus PARTS SENSING
GENERAL PURPOSE MODEL
IMPORTANT: APPLICATION NOTE

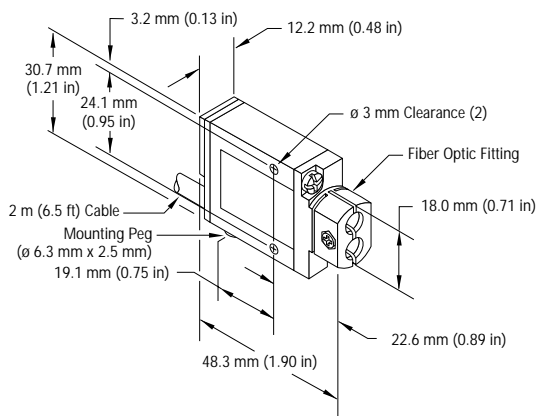


MODEL	INPUT VAC	AMPS	OUTPUT
FC-90 Plus	120VAC	15A	0-120



MINI-BEAM[®] SM312FP1H RODIX P/N 111-500

Self-contained DC-operated Visible-red Fiber Optic Sensor



RODIX INC.
Since 1971

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MINI-BEAM DC Fiber Optic Sensor Specifications

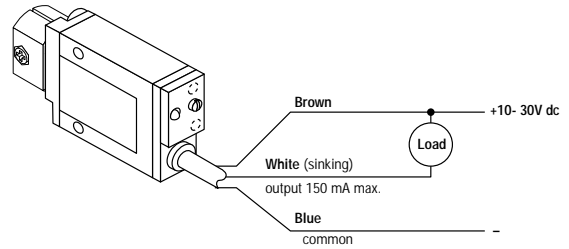
Supply Voltage and Current	10 to 30V dc (10% maximum ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Rating	150mA maximum each output at 25°C, derated to 100 mA at 70°C (derate ≈1 mA per °C) Off-state leakage current less than 1 microamp Output saturation voltage (PNP output) less than 1 volt at 10 mA and less than 2 volts at 150 mA Output saturation voltage (NPN output) less than 200 millivolts at 10 mA and less than 1 volt at 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	Sensors will respond to either a "light" or a "dark" signal of 1 millisecond or longer duration, 500 Hz max. 0.3 millisecond response modification is available. See note below. 100 millisecond delay on power-up; outputs do not conduct during this time.
Repeatability	0.3 milliseconds. Response time and repeatability specifications are independent of signal strength.
Adjustments	Light/Dark Operate select switch, and 15-turn slotted brass screw Gain (sensitivity) adjustment potentiometer (clutched at both ends of travel). Both controls are located on rear panel of sensor and protected by a gasketed, clear acrylic cover.
Indicators	Exclusive, patented Alignment Indicating Device system (AID™, US patent #4356393) lights a rear-panel mounted red LED indicator whenever the sensor sees a "light" condition, with a superimposed pulse rate proportional to the light signal strength (the stronger the signal, the faster the pulse rate).
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12, and 13; IEC IP67
Connections	PVC-jacketed 4-conductor 2 m (6.5') or 9 m (30') cables, 4-pin Euro-style quick-disconnect (QD) fitting or 150 mm (6") pigtail are available. QD cables are ordered separately. See page 5.
Operating Conditions	Temperature: -20° to +70°C (-4° to +158°F) Maximum relative humidity: 90% at 50°C (non-condensing)
Application Notes	The NPN (current sinking) output of dc MINI-BEAM sensors is directly compatible as an input to Banner logic modules, including all non-amplified MAXI-AMP and MICRO-AMP modules. MINI-BEAMs are TTL compatible.
Certifications	

MINI-BEAM® SM312FP1H RODIX P/N 111-500

Hookup to a dc Relay or Solenoid (sinking)

The diagram to the right shows hookup of a dc MINI-BEAM to a dc load using the sensor's sinking output, which is rated at 150 mA maximum. The BLACK wire is not used.

Note: maximum load capacity of each output is 150 mA at 25°C, derated to 100 mA at 70°C (see Specifications).



MINI-BEAM Operation

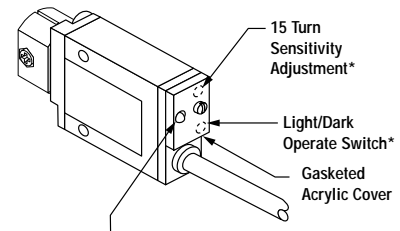
The sensor's Gain adjustment and Light/Dark Operate switch are located under the gasketed acrylic cover. Loosen the screw to access these adjustments and use a small screwdriver to adjust.

Gain adjustment:

Turn clockwise to increase gain (sensitivity); 15-turn Gain potentiometer is clutched at both ends of travel.

Light/Dark operate selection:

- Turn switch *fully* clockwise for light operate (sensor outputs conduct when light is sensed)
- Turn switch *fully* counterclockwise for dark operate (sensor outputs conduct when no light is sensed)



"AID" Indicator LED Lights when the sensor sees its own modulated light and pulses at a rate proportional to the strength of the received light signal.

*Under acrylic cover

BANNER® Fiber Optic Sensor
RODIX P/N 111-500

To Apply to RODIX Feeder Cube®

Blue (-V)	White (Sig/Load)
Brown (+V)	Black (Not Used)



WARNING . . . Not To Be Used for Personnel Protection

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.