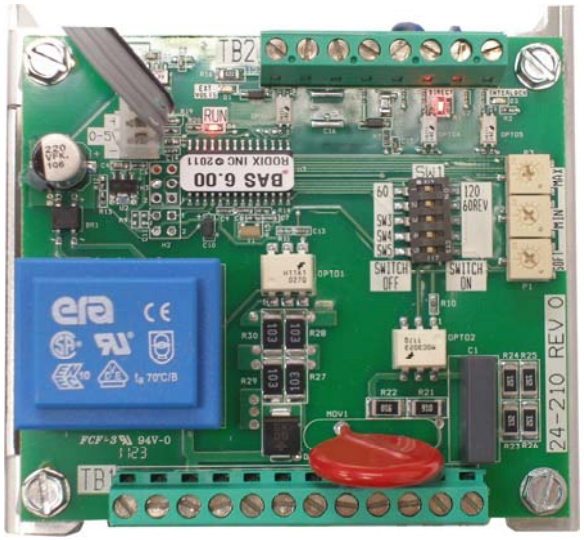
RODIX INC.
FEEDER CUBE®
FC-40 *Plus Series*
Advanced Application Note

FC-40 *Plus* Advanced Application Note



PCB P/N 24-210
Input: 120 VAC, 50/60 HZ.
(Operating range 90-130 VAC)
Single Unit Fuse Size: 15 AMPS
Output: 0-120 VAC

PCB P/N 24-211
Input: 240 VAC, 50/60 HZ.
(Operating range 180-250 VAC)
Single Unit Fuse Size: 8 AMPS
Output: 0-240 VAC

© 2000, 2012 RODIX INC.

OVERVIEW: The **FC-40** ***Plus Series*** feeder controls incorporate the circuit boards, P/N 24-210 and 24-211. The optional program features should be chosen based on the customer application.

PROGRAMMING: By using the correct S1 DIP switch combination, it is possible to run a desired program instead of the "standard program". The different program variations and their descriptions are listed below:

S1 Programming Chart			
Program Description	**S1 Switch Positions**		
	SW3	**SW4**	**SW5**
Standard Program	0	0	0
Linear Pot Taper	1	0	0
0-20mA option	0	1	0
Empty Bowl Timer	1	1	0
Disable LVC	0	0	1
2-Speed Operation	1	0	1
30/40 Pulse Operation	0	1	1
Low Amplitude at "1"	1	1	1

PROGRAM FEATURE DESCRIPTIONS:

Linear Pot Taper: When the Linear Pot Taper feature is enabled, the Main Control Dial follows a linear power increase. This feature can be useful when lower amplitude levels are needed.

The standard non-linear curve increases the voltage to the feeder rapidly for the lower dial numbers. The curve increases gradually through the upper numbers.

With the standard program, a special logarithmic-tapered power out curve (non-linear) makes it easier to have "Fine Control" over the output speed of the vibratory feeder. Also, the Max trimpot setting alters the slope of the non-linear curve.

When the Linear Pot Taper feature is enabled, the Main Control Dial follows a fixed power increase instead of the standard non-linear curve. This feature is used when lower amplitude levels are needed.

See the "S1 Programming Chart" for programming details.

"60 Pulse Polarity Reversal": Normally in the 60 Pulse (half-wave rectified) mode, the output voltage is turned on only during the bottom half of the sine wave. However with the 60 Pulse Polarity Reversal software feature, the top half of the sine wave is used instead of the bottom half.

Use this feature to reduce mechanical interaction between two vibratory feeders. Interaction occurs when both feeders use the 60 Pulse mode and they share the same machine base. This can cause the vibration from one feeder to effect the other feeder. A typical symptom of this is when turning one feeder's vibration up causes the vibration to decrease on the other one, and vice versa. To solve this problem more mass can be added to the machine base or use the Polarity Reversal feature to alter the timing on one feeder so that each feeder is pushing against the machine base at a different time. To enable this feature, set dip switch (S1) to the "60REV" switch On position, and set the 60/120 switch to "60".
A second reason for reversing the polarity of the 60 pulse waveform is to reduce the apparent power when two or more feeders are connected to the same branch of an electrical power distribution circuit. For example, on a vibratory feeder system where each unit is set to 60 pulse mode, if there is one hopper feeding at 1.5 Amps, one bowl feeding at 5 Amps, and one inline feeding at 1 Amp, then the measured current of the branch would be 7.5 Amps. But if the 60 pulse waveform were reversed on the bowl, then the apparent current of the branch would be reduced some because the current flows in both directions instead of only one. This would cause the branch step down transformer to operate a little cooler and the measured wattage at the utility meter would also decrease.

"0-20mA option":
A 4-20mA or a 0-20mA signal from a PLC can be used to remotely vary the output of the control instead of the Main Control Dial. The "S1 Programming Chart" shows how change to 0-20mA speed control instead of using the default of 4-20mA. Note: When the 0-20mA signal is at 0mA, the 0mA signal is ignored and the Main Control dial is used to control the output. The mA signal is applied to terminals TB2-8 (-) & 9 (+). The mA input is transformer isolated from the power line. In an environment with high electrical noise, use a shielded cable for the mA signal.

"Empty Bowl Timer": Use this in applications where an interlock output or a relay contact is used to frequently turn off the output of the control. When the vibratory feeder is turned on continuously longer than the time delay set by the MIN trimpot, a problem exists such as a parts jam, or the vibratory feeder is out of parts. Since a problem exists, the output is turned off after a time delay to conserve power or to prevent parts/feeder wear. When this feature is used, the MIN trimpot function is converted to the "power conservation timer." The MIN trimpot is used as a variable time delay of 5 – 115 seconds. To restart the control, cycle it OFF and then back ON again at either a RUN input (J1 at terminals TB2-6&7 or 5&6), or the Auxiliary input (TB2-11&12). See the "S1 Programming Chart" for programming details.

"Disable LVC":
Fluctuations in the line voltage can cause a feeder bowl to vary its feed rate. The LVC (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, apply "Disable LVC" per the S1 programming chart.

"Two-Speed Pot operation": Some vibratory feeder applications need to operate at two different speeds. For example: Nail feeders operate at low speed while starting up the machine, and then switch to high speed for normal operation. Packaging machines operate at high speed while filling the package, when the package is nearly full they switch to low speed to accurately finish filling it.

For the two-speed operation, the Main Pot becomes the Normal speed pot, and the MIN trimpot becomes the Low speed pot. When this feature is used, the MIN trimpot no longer controls the minimum power level of the control. See the "S1 Programming Chart" for programming details. The control can be signaled by two different methods to switch between the Low and Normal speed pots.

An Electrical contact can signal the control when to switch between low and normal speeds. Low speed is obtained when terminals TB2-5&6 are connected. Normal speed is used when both TB2-5&6 and TB2-6&7 are connected. The output is OFF when terminals TB2-5&6 are not connected.

A Voltage signal can signal the control when to switch between low and normal speeds. Low speed is obtained when terminals TB2-5&6 are connected and there is no voltage present at the Interlock Input, TB2-11 & 12. When a voltage signal is properly applied at the Interlock Input, the Normal speed is enabled. The voltage signal can be 10-30VDC. See the ON/OFF control guide for TB2-11 & 12 wiring details. The output is OFF when terminals TB2-5&6 are not connected.

"30/40 Pulse Operation" – 30 or 40 Pulses per second output: With 60 Hz utility power, this option allows the control to produce frequencies of 30 or 40 PPS. (For 50 Hz input power, the frequencies are 25 or 33.3 PPS). Vibratory feeders with large parts, large tray feeders and a few inline track applications may operate below 60 PPS. A vibratory feeder that is converted to a lower pulse mode will require fewer springs.

The theory behind the "Low Pulse Rate" option at 30PPS is that the output of the control can be turned ON and OFF to simulate the desired low frequency waveform. Current flows through the vibratory feeder electromagnet coils during the ON time, and the coils are OFF the rest of the cycle. The output frequency depends on how low long it takes to complete one ON and OFF cycle. To simulate the desired frequency, the output is turned on (ON time) for a series of 60 Hz pulses, and then it is turned off (OFF time) for the same amount of time. Since the vibratory feeder is tuned to a resonate frequency, it is stimulated by the desired frequency, but it is unable to respond to the higher 60 Hz modulating frequency.

A vibratory feeder will provide a better feed rate when it is powered by a Variable Frequency control than it will with a fixed frequency control at 30 or 40 PPS. The coil size and the coil gap determine the maximum current draw of the vibratory feeder system. When sizing a distribution transformer for this control, the transformer will need to be oversized.

Operation: See the "S1 Programming Chart" for programming details.

30/40 Pulse mode selection:
For the 40 Hz operation, select 120 on the 60/120 dip switch. For 30hz operation, select 60 on the 60/120 dip switch.

During the initial operation of the control on the machine it is important to monitor the temperature of the coils on the vibratory feeder. If the coils become too hot to touch, the coil current is too high. Decrease the MAX pot setting and re-apply power after the coils have cooled. Overheating the coils will eventually cause them to short circuit and fail.

"Low Amplitude at 1": For operation at very low output voltages, select the "Low Voltage at 1" program. This option allows the control's output to operate at a much lower minimum voltage than the standard minimum voltage. See "S1 Programming Chart" for feature selection details.

NOISE IMMUNITY: For further details about noise immunity, see the Feeder Cube® application note for your model and the Rodix Solution titled Good Wiring Practices for Avoiding Electrical Noise Problems.

RODIX, INC.
2316 23rd Ave, Rockford, IL 61104
Toll Free (800) 562-1868, FAX (815) 316-4701
E-mail custserve@rodix.com
www.rodix.com