REFLEX® MODEL 204 DANCER POSITION REGULATOR

PART NUMBER 12M03-00104
APPLICATION NOTES

1. The Dancer Position Regulator is designed to control an electric motor drive in response to the position and motion of a potentiometer coupled to a process dancer roll.

   Adjustments are included to insure stability over a wide-range of operating conditions. As a general rule, at speeds up to 4000 FPM the system can be stabilized if there is at least 1 second of storage in the dancer. In most cases 1/2 second of storage is adequate.

   EXAMPLE: Machine operating at 600 FPM

   $$\frac{600 \text{ FPM}}{60 \text{ SEC/MIN}} = 10 \text{ Feet per second}$$

   10FPS x 1/2 second = 5 feet total storage
   (with 180 degrees wrap on dancer roll,
   total movement +/- 1 1/4 feet.)

2. When making the initial start-up, be sure the dancer potentiometer is properly installed mechanically. There must be greater movement of the potentiometer than the dancer, otherwise the dancer will break the potentiometer at one end or the other. The resistance of the dancer potentiometer is not critical but should not be less than 1K nor more than 50K.

3. Run the drive without material in the machine and move the dancer manually to establish that the drive will move the dancer in the proper direction under normal operating conditions.

   If the sense is reversed, reverse the two outer leads to the dancer potentiometer. On a winder, a slack web condition will require an increase in drive speed. On an unwind, a slack web condition will require a decrease in drive speed.

4. With an empty core on the winder, thread up the machine with a string or light web that will break if the drive is not operating properly and adjust the Lead and Lag adjustments so that with the dancer in range with no slack, the drive can be started and establish dancer position without hunting or overshoot with the main machine at standstill.

   CAUTION: MAKE SURE ALL SLACK IS REMOVED BEFORE ENERGIZING THE DRIVE.

5. Adjustments are provided to set a gain-versus-frequency characteristic for stable operation over a wide range of conditions. Intially the adjustments should be set as follows (100% = full clockwise):

   POSITION = 50%
   GAIN = 20% (cw makes dancer sensitive)
   LEAD = 50% (cw makes dancer slow)
   LEAD BREAK = 0% (cw kills lead signal)
   LAG = 50% (cw makes drive sluggish)
   LAG BREAK = 50% (ccw makes drive sluggish)

6. With the line at standstill, and the Dancer at one end of its travel, but no slack in the web, turn on the Dancer Controlled Drive. It should pick up and position the dancer near the center of it's travel without overshoot.

   These adjustments should prove satisfactory for most applications. For more critical (high speed, large roll diameter change) some additional adjustment may be required.

   The control cannot be damaged for any combination of adjustment. Satisfactory operation of the system can be obtained in the least amount of time, if the nature of the adjustment is understood and the effects observed and noted. Don't hesitate to put all adjustments back to initial settings and start over, if operation is not satisfactory.

7. If the dancer overshoots, turn the Lead Potentiometer clockwise 5% at a time and repeat step 7. If the "Lead" potentiometer does not correct the problem by the time it is turned to 85%, try adjusting the Lag and Lag Break potentiometers.

If "Lead" is set too high it may make the Dancer too slow to respond to process changes.

The "Lead" circuit tends to inject electrical "Noise" into the system. The "Lead Break" is used to provide a high frequency cutoff (above 10 Hz) to limit the noise. Too much "Lead Break" (above 10%) will nullify the effect of "Lead".

8. The "Lag" network will filter out some of the "Noise" and may have to be readjusted if the "Lead" network adjustments are changed.

   Turning the "Lag" adjustment clockwise filters out noise but makes the drive sluggish. This may be desirable in applications where the process causes unnecessary movement of the dancer (as when winding an eccentric roll).

   For fastest response the "Lag" adjustment should be turned counter clockwise and the "Lag Break" turned clockwise (20% and 80% are typical).

9. With REFLEX Power Converters, satisfactory performance is normally achieved when the peak-to-peak ripple on the output of the assembly (terminals 4 and 8) as measured with an oscilloscope is between 1 and 2 volts.

10. If greater accuracy (less movement of the dancer) is required, turn the "Gain" potentiometer clockwise. Sometimes accuracy must be poor to allow the dancer to move to provide additional storage as when transferring from one roll to another.

    As the "Gain" is increased, readjust the "Lead" and "Lag" networks to maintain stability.

11. Repeat steps 8 through 11 with a full roll. Increase the gain until the dancer begins to overshoot, then back off slightly. If the drive tends to be unstable with a full roll turn the "Lead" clockwise.

12. A DC signal of up to 6 volts positive from a LVDT or the REFLEX Demodulator Part Number 12MO3-00103 may be connected to the input terminals 3 and 8 if an LVDT or Short-Stroke Reactor is used in place of the Dancer Position potentiometer.

13. If the signal on terminal 3 is negative and/or a remote "Position" adjustment is required, turn the on-board "Position" potentiometer 3P full CCW and connect an external 10K potentiometer between terminals 1 or 2, and 8. The arm of the potentiometer is connected through a 6.8K, 1/2 watt resistor to the Summing Input, terminal 5.

    If the input signal is negative, connect the high end of the external 10K potentiometer to terminal 2 (positive 6 volts). If remote adjustment only is required, connect the high end of the external 10K potentiometer to terminal 1 (negative 6 volts).

14. The "Position" reference may be changed if it is desirable to operate the dancer closer to one end of its travel or the other. This may be adjusted while the machine is running.