



Technical Note: 10000043

Interfacing the MDC-360 to the Ferrofluidics Genius Evaporation Controller

This tech note describes how to interface the Maxtek MDC-360 controller to the Ferrofluidics GENIUS evaporation controller to provide automatic control of source pocket position, beam sweep pattern selection and source power control.

The interface between the MDC-360 and the GENIUS requires the following items:

- An MDC-360 with a Passive I/O card (PN# 179216). The Passive I/O card has ground true inputs as opposed to the 12 to 120 volt inputs on the 360's Active I/O card.
- Up to three unused inputs and three unused outputs on the MDC-360's I/O card.

Since the GENIUS can internally link a beam sweep pattern with a material, the 360 only needs to control the pocket position through the GENIUS. The GENIUS will output the programmed beam sweep pattern for the pocket that is selected. You can setup the interface between the 360 and the GENIUS so that the 360 can select sweep patterns independent of pocket position but this is not covered in this tech note since it makes the interface more difficult and is most likely unnecessary.

Pocket Position Control

To program the MDC-360 for automatic pocket position control, do the following steps:

- Press the MDC-360 Program key to enter the programming mode.
- Select Edit System Setup/Edit Source Setup
- Select the desired source number (1-4) that will be connected to the GENIUS
- Enter the number of pockets for the source (1-8)
- Set the Control parameter to BCD
- Set the Feedback parameter to BCD
- Set the Rotator Delay parameter to the maximum time required for the pocket rotator to rotate from pocket one around to pocket one again. This sets the time limit that the 360 will wait for the requested pocket to get into position. If this time expires then the 360 will halt the process and display a Source Fault error.
- Press the left arrow key twice to return to the System Setup Menu.
- Move up to Program Inputs screen and record the pin numbers for the pocket position feedback inputs labeled "SourceX BCD 0", "SourceX BCD 1", etc. The 360 created these inputs based on the source setup parameters programmed above. There will be from 1 to 3 inputs depending on the number of pockets. These inputs get connected to the GENIUS so the 360 knows what pocket is in position.
- Move up to Program Outputs screen and record the pin numbers for the pocket select outputs labeled "SourceX BCD 0", "SourceX BCD 1", etc. The 360 created these outputs based on the source setup parameters programmed above. These outputs get connected to the GENIUS so the 360 can tell it what pocket is required.

This completes the programming of the MDC-360. The next step is to program the GENIUS.

- Go to Options/System Setup menu and set the Pockets parameter to the number of pockets for the source.
- Go to Options/Service menu and make the I/O links for the GENIUS inputs. Please note that you only need to use the same number of inputs as the 360 created for the interface which depends on the number of pockets. All unused Pocket Set input functions should be set to low in the GENIUS. Pocket1 Set = IN1 Card1 Pocket2 Set = IN2 Card1 Pocket3 Set = IN3 Card1 Pocket4 Set = low Pocket5 Set = low Pocket6 Set = low

Go to the Service menu and set the I/O - Pocket parameter to 1

The following list shows the input and output connections which must be made between the 360 and the GENIUS to complete the interface. All of the connection pin numbers are given except for the 360's programmable inputs and outputs. Since the 360's programmable input and output pin numbers can be changed, the user must view the Program Input and Program Output screens to determine their pin numbers.

MDC-360 I/O (I/O conn. 1 or 2) GENIUS X119 Connector

- SourceN BCD 0 input B1
 - SourceN BCD 0 return B5
 - SourceN BCD 1 input B2
 - SourceN BCD 1 return B5
 - SourceN BCD 2 input B3
 - SourceN BCD 2 return B5
 - SourceN BCD 0 output A1
 - SourceN BCD 0 return A8
 - SourceN BCD 1 output A2
 - SourceN BCD 1 return A8
 - SourceN BCD 2 output A3
 - SourceN BCD 2 return A8
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- Select a different material for each layer such that layer 1 requires pocket 1 and so on. Note that the pocket number for a material is defined by the Pocket parameter in the Define Material Screen.
 - Set the Pause On Layer Complete parameter in the Display Setup menu to "yes" so the 360 will stop after getting each pocket into position.
 - Run the "dummy" process to test the interface.

When the "dummy" process is started, the 360 will enter the "Change Pocket" state for the first layer. In this state the 360 will activate the "SourceN Pocket 1" output and wait for the "SourceN Pocket 1" input to go true. If the input doesn't go true in the time allotted by the Rotator Delay parameter (source setup), then the 360 will indicate a Source Fault. If the input does go true in the allotted time then the 360 will continue with the layer. (Note that the current pocket position can be viewed in the Source/Sensor Status screen).

Since the layer thickness of the dummy process is set to zero, the 360 will go to Layer Complete and wait for a Start key press to start the next layer. The above steps will be repeated for the remaining layers until the process is complete.

If any of the layers resulted in the wrong pocket being selected then you should check the 360's programming, the GENIUS' programming and the wiring of the interface cable between the MDC-360 and the GENIUS.

Connect B8 to A7 on the X119 connector of the GENIUS so that the 360's relay outputs can activate the GENIUS' inputs.

The SourceN BCD 0,1&2 outputs from the MDC tell the GENIUS which pocket to rotate to. The SourceN BCD 0,1&2 inputs of the MDC tell the 360 which pocket is in position. The number of BCD inputs and outputs created by the MDC-360 depends on the setting of the Number of Pockets parameter in the 360's source setup. For 1 to 2 pockets the MDC will create SourceN BCD 0. For 3 to 4 pockets the MDC will create SourceN BCD 0&1. For 5 to 8 pockets the MDC will create SourceN BCD 0,1&2.

With the above connections and programming complete, the MDC-360 can now control the pocket position. To test the interface, do the following steps:

- Create a multi-layer "dummy" process in the 360. The process should have the same number of layers as the source has pockets (e.g. four pocket source = four layer process).
- Set all of the layer thicknesses to zero.

Source Power Control

You only need to set one parameter in the MDC-360 to make the 360's source output compatible with the GENIUS.

- Select Edit System Setup/Edit Source Setup
- Select the source desired number (1-4) that will be connected to the GENIUS
- Set the Source Voltage Parameter to 10V

The next step is to set the GENIUS to use the analog emission input by selecting Auto Emission in the Set Data.

Now connect the positive and negative sides of the 360's source output ("Source 1&2" or Source 3&4" depending on which source you are using, see figure 8-4 in the 360 manual for pin numbers) to the positive and negative sides of the GENIUS' inputs (X111 connector).

Document Title:	Interfacing the MDC-360 to the Ferrofluidics Genius Evaporation Controller
Document ID:	10000043
Creation Date:	
Modified Date:	4/21/2005
Related Products:	MDC-360C , MDC-361C
Product Line:	Thin Film / Vacuum
Notes:	Originally released as THIN FILM TECHNICAL NOTE V-143 This tech note also applies to: MDC-360 (obsolete), MDC-361 (obsolete), MDC-370 (obsolete)