OPERATORS' MANUAL

Cee® Model 100
(including Flange Mount Models)
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WEIGHT:

13" height x 24" length x 13" depth

DIMENSIONS:

Below for 240 V

Power Type 3AG 7 Amp Slow Blow 32 Amp Slow

300 Wires

120 Volts AC, 50/60 Hz (240 Volts AC, optional)

POWER SUPPLY:

Lithium battery, life expectancy of 33 years.

USER PROGRAM STORAGE:

Acceleration of 30000 RPM/s

Speed of 6000 RPM (+/- 5 RPM) with an

Microprocessor controlled to a maximum

PID (Proportional Integral Derivative)

SPIN CONTROL:

Cree (Cost Effective Equipment) Model 100

MODEL:

SPECIFICATIONS

SYSTEM DESCRIPTION

Section 0
Information on various options will be distributed as they become available.

• Built-in diagnostic software aids in system installation and testing.

- Common solutions: 120 Volt AC, exhaust, drain, and vacuum

- A benchtop unit, the 100 Series covers approximately two square feet and requires only

- Setting, spin speed, acceleration and time which allows for very precise spinning

- The battery-backed memory stores up to ten user programs with ten individual steps for

FEATURES

SYSTEM DESCRIPTION

Section 0
UNPACKING INSTRUCTIONS:

Section 1

6. Place in the unit with operation by pressing the power switch to the "ON" position. The

chemical drum, needles, and spinners exchangers (1.1/2") D) in the house exhaust.

5. Also on the back are two utility connections. Connect the drum (3/4") D) to the house

of 25: Hz.

4. On the back is one 1/4" NPT pipe fitting: for vacuum. Connect this to a vacuum source

3. Remove the plastic wrap.

2. Lift the unit of the packaging eare by gripping the ends only. Do not lift by any of the top

1. Remove all loose packaging material & accessory items from the shipping crate.

UNPACKING THE UNIT.

possibility of damage to the unit during shipment.

Model 100 Spinners are packed with expanded foam and protective plastic wrap to reduce the
Desired program to execute:
Places the system in RUN mode. Allows selection of

Place the system in PROGRAM mode.
Encoding numerical data.
Selects a program to modify or to RUN, as well as

Spinner operation:

SYSTEM KEYBOARD FUNCTIONS:

The machine operates through here.
The keyboard shown below guides the system controller. All programming and functioning of

KEYBOARD FUNCTIONS

SPINNER SYSTEM OPERATION:

Section 2
Keyboard:

Clear: Key function very much like a calculator/computer
during data entry and program selection. This key and the
signifies acceptance of the currently displayed choice

Substitute manually:

An important note: The controller will not remember a
system return to the model number display shown above.
Resets the system completely. All operations halt, and the
operation.

Error occurred.

Instructs the system to continue from the point at which the
system checked. This key is useful for
check return and motion, and are primarily used for
start diagnostic routines. These mainly operate spin

Diagnose:

SECTION 2

SPINNER SYSTEM OPERATION:

GEFashion 100 Spinner

Approved for: Non-ferrous, Non-dissolution
Influence - Base Wrought, Forged, Chrome
Casting, Turned - Machined
Cable: External, Inside
Dimensions: 0.004

Section 2

continued
CONFIGURATION

CONFIGURATION

CLEAR

KEYBOARD FUNCTIONS

continued

SPINNER SYSTEM OPERATION:

Section 2
FLOW CHART SYSTEM

PROGRAMMING

Those on the machine which you are using.

Note: The values shown are for demonstration purposes only and may not necessarily match

are individually modifiable or reviewed.

information such as spin speed, ramp rate, and spin duration. Programs, numbered zero to nine,

The Model 100 Spinner stores ten user programs in battery-backed memory. Programs contain

SPINNER PROGRAMMING

Section 3
Values from 0 to 9 are accepted as program numbers.

```
) ENTER
# ENTER PROGRAM #
| PROM MODE/PROG #
```

case program number 2, to edit program number given. Press ",, and then , ENTER.

The display now reads "PROGRAM MODE," The most recently accessed program number will appear as a default in this
program mode. This indicates that we are now in

```
KEY
PRESS PROGRAM
| PROGRAM
```

The display mode:

From the model number display (CEE ---- 100 SPINNER), press the "PROGRAM" key to enter

**PROCEDURE:**

Procedure contains up to ten spin steps to allow ramped and multistep processing.

The CEE Series 100 spinners store up to 10 user programs numbered 0 to 9. Each program

**SPINNER PROGRAMMING:**

Section 3
Values from 0 to 999 seconds are acceptable values.

\[
\begin{array}{|c|}
\hline
\text{ENTER SPIN DURATION} \\
000.00 \text{SEC} \\
\hline
\end{array}
\]

This value to 43 seconds, press , "43", and .

This display shows that the parameter is in the spin duration. To change this value, press , "000.00", and .

Values from 0 to 30000 rpm/second are acceptable ramp rates. The ramp rate for this step is

\[
\begin{array}{|c|}
\hline
\text{ENTER RAMP RATE} \\
000.00 \text{ RPM/SEC} \\
\hline
\end{array}
\]

Acceleration press , "13900", and .

Press the clear key and enter the correct value.

Values from 0 to 6000 rpm are acceptable spin speeds. If a mistake is made at any time simply

\[
\begin{array}{|c|}
\hline
\text{ENTER SPIN SPEED} \\
000.00 \text{ RPM} \\
\hline
\end{array}
\]

Current value is 375 rpm. To change the spin speed press , "375", and .

Program number five. The parameter being edited is the velocity for step number zero and the

The display reads , "000.00", and .

**SPINNER PROGRAMMING**

**Section 3**
The display will revert to the model number display but no changes will be saved.

No changes are saved until the program is ended and the system reverts back to the mode entered.

**CLEAR: ENTER**

**END PROGRAM**

P/G VEL 1 1000 RPM

**PROCEDURE: continued**

The next step. This will cause the previous step to be the last one in the program.

leakage at the end of a given step, leave the velocity value empty by pressing "CLEAR" for the number 9 is reached or until the program is ended. To force the process program to

**SPINNER PROGRAMMING:**

Section 3
proportional coefficient of the control system. To change this value press "10" and "ENTER".
The display will read "PROF COEFF: 100". This display indicates that we are accessing the

<table>
<thead>
<tr>
<th>PRESS CONF KEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE=100 SPINNER</td>
</tr>
</tbody>
</table>

From the model number display "CEE ---- 100 SPINNER", press "CONF".

PROCEDURE:

4. The Integration Limit.
3. The Derivative Coefficient.
2. The Integral Coefficient.
1. The Proportional Coefficient.

There are four parameters that affect motor operation on the Cee Series 100 spinners.

Those on the machine which you are using.

Note: The values shown are for demonstration purposes only and may not necessarily match

performance with a variety of subspace shapes, sizes, and thicknesses. By adjusting these parameters it is possible to tune the motor control system for optimum

spin motor. These parameters are global and are not affected by individual program values.

Configuration mode allows access to a set of parameters that control the operation of the

<table>
<thead>
<tr>
<th>SPINNER SYSTEM CONFIGURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 4</td>
</tr>
</tbody>
</table>
shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited. The derivative coefficient is now changed to 20000 and the display shows the next coefficient to be edited.
PROCEDURE: continued

The display now reads „INTEGER LIMIT 10„.

This display indicates that we are accessing the integration limit of the control system. To change this value, press „100„ and „ENTER„.

Values from 0 to 32767 are acceptable. If a mistake is made at any time, simply press the clear key and enter the correct value. The integration limit is now changed to 100 and the system returns to the model number display (CEE—100 SPINNER).
With the proportional power signal to the motor power circuit, the running sum is multiplied by the integral coefficient and applied along with the integral to generate a finite integral of the error. In other words, a sum of the error signal is built up over time. This running sum is multiplied by the integral coefficient and applied along with the integral to generate a finite integral of the error. The integral control loop uses the error signal to adjust the motor speed to match the target speed.

This can be overcome by increasing the proportional coefficient but this causes instability.

And the motor speed will then oscillate above and below the target speed, sometimes quite dramatically.

Proportional loops tend to show a consistent drop when used alone. The actual motor speed would always be somewhat lower than the target speed. Proportional loops produce the desired performance.

If the error signal is directly proportional to the error signal, fixed alone, this control loop would not work as expected. The error signal is multiplied by the proportional coefficient and applied to the motor power circuit. The power applied to the motor speed will vary depending on the difference of the actual speed during operation. This difference or error signal is multiplied by the proportional coefficient when compared to the target speed. The proportional coefficient adjusts the power applied to the motor by comparing the target speed with the actual speed during operation.

THE PROPORTIONAL COEFFICIENT:

FILTER COEFFICIENT:

SPINNER SYSTEM CONFIGURATION:

Section 4
Example configuration parameters for silicon wafers:

<table>
<thead>
<tr>
<th>80</th>
<th>00001</th>
<th>001</th>
<th>6</th>
<th>15mm</th>
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</thead>
<tbody>
<tr>
<td>80</td>
<td>00001</td>
<td>001</td>
<td>6</td>
<td>125mm</td>
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<tr>
<td>80</td>
<td>00001</td>
<td>001</td>
<td>8</td>
<td>100mm</td>
</tr>
<tr>
<td>80</td>
<td>00001</td>
<td>001</td>
<td>8</td>
<td>75mm</td>
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With high precision and accuracy, when these four parameters are well chosen the spinmer can operate over its full range of speeds.

When instability occurs, the last coefficient used on the Ce Series 100 spinmer is the integration limit. This coefficient is set at 100 rpm if the Ce Series 100 spinmer is used.

The derivative control loop acts as a stabilizer for the proportional and integral loops, creating performance problems for any instability.

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Punching your hand or fingers.

If there exists the remote possibility that the lid could fall closed thus

interlocking the lock/lockout system or a power actuated lid closure

Pinch Point: The standard Model 100 does not incorporate either an

SPIN EXHAUST LID

For adjustment knob locations:

Each rotation equals approximately 0.05°. To raise the lid 0.25°, rotate the adjustment knobs a

adequately in sequence and not more than one turn per sequence.

The spin section of the CEE Model 100 is furnished with an adjustable exhaust lid. This

LID ADJUSTMENT:

The drive for precise control of speed:

30,000 rpm/second for the smaller substations. Large or heavy substations require a lower ramp

acceleration (ramp rate) setting within the process program. The ramp rate can be set up to

OVERSHOOT OF THE LID RATED SPEED BY LARGER SUBSTATIONS IS SOMETIMES CAUSED BY A LARGE

SPINNER SYSTEM CONFIGURATION:

Section 4
3. At this point the display will show "READY/PRESS START."

| READY/PRESS START | LOAD WAFFER | START |

2. To enter a user program, press the appropriate numerical key "2", then ENTER.

| PRESS RUN KEY | CEE-100 SPINNER |

PROCEDURE

Before performing a spin operation or dispensing fluids, spin bowl. This caution prevents possible severe injury to the operator. Close the spin bowl. These conditions, dispensed materials and/or subliquid may be ejected from the system is waiting for input from the operator. The display reads "RUN PROC#?" where the flashing cursor indicates that the model number display (CEE----100 SPINNER) press the RUN Key. This initiates

**WARNING:** This spin unit can be operated when the lid is open. If operated under these conditions, dispensed materials and/or subliquid may be ejected from the system not exceed 30 psi (207 kpa) in operating the fluid dispensing system is insulated.

**CAUTION:** Excessive pressure should always be worn while processing substances. Do not to which program to run.

Running user spin programs on the Model 100 Spinner is not difficult. The Spinner system

**SPINNER PROGRAM RUNNING:**

Section 5
NOTE: To abort a spin program in progress, simply press the "STOP" key.

UNLOAD SPIN CHUCK

Display will look like this. An alarm will sound until the water has been removed.

7. This display is updated throughout all of the steps in a spin program. When finished, the
remaining time is displayed in this step.

Indicate that the current speed is 1369 revolutions per minute and that there are 153 seconds
remaining. Time RPM 1369 TIME 153

In the following format.

6. The spin process will continue automatically from here. The display is constantly updated.

Warning: When the appearance is centered, close the lid and press "START." If the water is not properly centered, it may be adjusted now. Press the "0" key to reset for

0 TO REST / START

5. At the end of the centering test the display will read as follows:

RECEIVING CENTERING

seconds to verify centering. At this point it should be obvious if the water is not centered.

4. The display will show the following message and the motor will run about 100rpm for 2

seconds. A safety goggle must be worn during operation of the spinner system to prevent

risk of injury.

Warning: Safety goggles must be worn during operation of the spinner system to prevent

PROCEDURE: continued

SPINNER PROGRAM RUNNING:

Section 5

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Help://www.brewerScience.com

Telephone: 314-364-0300, Telex: 361471, Fax: 314-364-9513
A division of Brewer Science Inc., 2401 Brewer Drive, Rolla, MO 65401

ACTION: Check connections to the blockage in tubing.

CAUSE: Blockage in tubing.

ERROR: There is no lube.

OBSTRUCTIONS: Nitrogen and/or blown fuses.

SYSTEM DEAD: No lights.

PRESS RESET. If diagnostics mode only, may occur in internal system error.

ERROR: Motor command error.

ERROR: Error - poor vacuum.

ERROR: Vacuum error on inner.

PROCEDURE:

1. Proceed with spin process on spin chuck to insufficient vacuum.
2. Check utility connections.
3. Verify presence of vacuum.
4. If at least 25 HP, check utility connections again, nitrous not functional.
5. Replace fuse (located at back of unit).
6. Replace fuse (located at back of unit).
7. Nitrogen and/or blown fuse.
8. SYSTEM DEAD: No lights.
9. PRESS RESET. If diagnostics mode only, may occur in internal system error.
10. ERROR: Motor command error.
11. ERROR: Error - poor vacuum.
12. ERROR: Vacuum error on inner.

ERRORS AND THEIR RECOVERIES:

Section 6