OFI

MODEL 20

CONSTANT SPEED

BLENDER

INSTRUCTIONAL

MANUAL

OPERATING INSTRUCTIONS

OFI MODEL 20 CONSTANT SPEED BLENDER

GENERAL

OFI's Model 20 Constant Speed Blender was designed to prepare well cements for testing according to the guidelines stated within API Specification 10. Research has demonstrated that the properties of well cements are highly dependent upon mixing procedures. In addition, studies have indicated that when constant speed blenders/mixers are used, data obtained from thickening time tests has greater reproducibility and generally correlates better with data obtained from other laboratories. The Model 20 was designed to provide a means of consistently preparing cement slurries for testing purposes and can be utilized to mix cements according to the procedures stated by the API.

METHOD OF OPERATION

The proper amount of mix water is carefully weighed and poured into the mixing container of the blender. The rotational speed is set to 4000 rpm and allowed to stabilize at this speed. The "TIMER" switch is pressed and the cement is immediately added to the mix water. The cement should be uniformly added to the water in less than fifteen seconds. After 15 seconds the rotational speed is automatically increased to 12,000 rpm and the slurry is mixed an additional 35 seconds. A microprocessor is utilized to maintain the rotational speed within the recommendations established by the API and is independent of fluctuations in line voltage and the viscosity of the cement slurry.

INSTALLATION OF THE UNIT

1. The unit should be carefully removed from the packing box and placed upon a counter safely away from sinks and other possible hazards.

2. The blending assembly should be placed upon the base of the unit and the power supply cord should be inserted into the receptacle under the cabinet housing labeled "BLENDER". The transducer cable should be inserted into the center connection port and fastened in place with the two clamps and screws provided. Lastly the unit should be connected to a suitable AC power supply.

OPERATION OF THE UNIT

1. Before switching the unit on insure that the "AUTO/VARIABLE" switch is in the center position and that the control potentiometer is turned fully counter-clockwise. Place the "4000/12,000" and the "TIMER/START" switches in the off position, (i.e. these are three position switches and the center position is off).

2. The unit may be operated in three modes; **AUTO, VARIABLE** and **MANUAL**.

OPERATION IN THE MANUAL MODE

1. Place the mix water into the mixing cup and place the lid on top of the container.

2. The "AUTO/VARIABLE" switch should be in the "AUTO" position.

3. Place the "4000/12000" switch to the "4000" position to start the unit.

   NOTE: Upon initial starting of the unit the rpm may exceed 4000 rpm and will stabilize at 4000 rpm within a few seconds.

4. After stabilization, the cement should be added to the mix water in not more than 15 seconds and the blender lid placed upon the top of the container. The timer may be reset to "zero" by pressing the "RESET" switch (R) on the timer.

5. After a period of 15 seconds the rotational speed should be increased to 12,000 rpm by moving the "4000/12,000" switch to the "12,000" position.

6. After mixing the cement an additional 35 seconds the blender should be stopped by placing the "4000/12,000" switch to the middle position.

7. Return the "AUTO/VARIABLE" switch to the center position.

8. Clean the blending cup and lid as soon as possible to prevent any cement from building up on the container.

OPERATION IN THE VARIABLE MODE

1. Place the mix water into the mixing cup and place the lid on top of the container and insure that the potentiometer control knob is in the fully counter clockwise position.

2. Ensure that the "AUTO/VARIABLE" switch is in the "VARIABLE" position .

3. The rotational speed of the blender may be increased by turning the control potentiometer clockwise.

4. The timer may be reset to "zero" by pressing the "RESET" switch (R) on the timer.

5. Return the "AUTO/VARIABLE" switch to the center position.

6. Clean the blending cup and lid as soon as possible to prevent any cement from building up on the container.

OPERATION IN THE AUTO MODE

1. Place the mix water into the mixing cup and place the lid on top of the container.

2. The "AUTO/VARIABLE" switch should be in the "AUTO" position. The "TIMER/START" switch should be in the "START" position.

3. Press the "RESET" button "R" on the timer to start the unit.

   NOTE: Upon initial starting of the unit the rpm may exceed 4000 rpm and will stabilize at 4000 rpm within a few seconds.

4. After stabilization, reset the timer to zero again and immediately begin to add the cement. The cement should be added to the mix water in not more than 15 seconds and the blender lid placed upon the top of the container.

NOTE: After 15 seconds the timer will activate an internal relay which will automatically increase the rotational speed to 12,000 rpm. Ensure that the cement is added to the mix water and that the lid is placed upon the container in less than 15 seconds.

5. After mixing the cement at 12000 rpm for 35 seconds the timer will activate a relay at setpoint 2 and stop the blender.

6. Return the "AUTO/VARIABLE" switch to the center position.

7. Clean the blending cup and lid as soon as possible to prevent any cement from building up on the container.

ABOUT THE TIMER

The timer is continuously on whenever power is applied to the unit. The unit will measure elapsed time to its maximum value and then stop at setpoint 2.

From the factory, setpoint 1 is set to 15 seconds while setpoint 2 is established at 50 seconds. These values are in accordance to the values as established within API Specification 10.

In the event that the user wishes to change these values, perform the following.

1. Depress "P1" or "P2" to change setpoint 1 or setpoint 2 respectively.

2. The current setpoint value is displayed and may be changed by depressing the four upper buttons until the necessary value is obtained. The values controlled by each switch will scroll from 0-9 and then return to 0.

3. After the correct value is obtained press the "E" switch to store the value into the timers memory.

ABOUT THE SPEED CONTROLLER

From the factory, setpoint 1 is set to 4000 RPM while setpoint 2 is established at 12000 RPM. These values are in accordance to the values as established within API Specification 10.

In the event that the user wishes to change these values, perform the following.

1. Press "SET SPEED" to activate the speed control menu.

2. Use the "ARROW" keys to scroll to either "SETPOINT 1" or "SETPOINT 2".

3. Key in the numeric value of the new setpoint with the key pad.

4. Press "ENTER" to store the new value into the controllers memory.

CHANGING THE "PID" PARAMETERS.

For optimum operation, it may be necessary to change the PID parameters within the controller. To tune the controller perform the following procedures.

1. Operate the unit in "MANUAL MODE" with a typical fluid within the container. Toggle between 4000 rpm and 12,000 rpm and watch for over or undershoot. If there is significant overshoot access "VARIABLE 12" and reduce the value by 5.

To access "VARIABLE 12" press the "VAR" key, key in "12", and then press "ENTER". Key in the new value and press "ENTER" to store it into memory.

Variables, 13 and 14 may be accessed and changed in the same manner.

If there is no overshoot or undershoot, but the response was slow, increase the value of "Variable 12" by 5.

Repeat the above procedure changing the value of "VARIABLE 12" until there is minimal overshoot and the ramp is smooth. Note that to fine tune the controller the value can be incremented in steps of 1 or 2 and not necessarily a value of 5.

2. Run the controller at 12,000 rpm. Increase "VARIABLE 13" by 5 and observe for any oscillations around the setpoint. If no oscillations occur increase "Variable 13" by 5 until oscillations begin.

3. After the onset of oscillations, reduce "VARIABLE 13" by 5.

4. Run at 4000 rpm. Toggle to 12000 rpm. If excessive undershoot occurs when changing to 12000 rpm, increase "VARIABLE 14" by 5.

5. Run at 12000 rpm. Toggle to 4000 rpm. If there is excessive overshoot, increase "VARIABLE 14" by 5.

6. Repeat steps 4 and 5 until minimal over and undershoot occur.

The above is a trial and error procedure and each setting and its result should be documented. Initial values for Variables 12, 13 and 14 are set at 1, 100 and 15 respectively.

APPENDIX

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