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Model 20 Constant Speed Blender

120-60: For Cement, 115 Volt

120-60-1: For Cement, 230 Volt

120-60-F: For Fracturing Fluids, 115 Volt

120-60-1-F: For Fracturing Fluids, 230 Volt

Instruction Manual

Updated 11/2/2011

Ver. 2.4

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Intro

OFITE'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.

Description

The proper amount of mix water is carefully weighed and poured into the mixing container of the blender. The rotational speed is set to 4,000 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 15 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.

The 120-60-F Constant Speed Blender is intended for testing Fracturing Fluids. The rotational speeds are set to 500 and 1,000 RPM respectively.

Components

| | |
|------------|--|
| #122-075 | 7-Amp Fuse, 5 mm × 20 mm (115 Volt Only) |
| #122-074 | 4-Amp Fuse, 5 mm × 20 mm (115 Volt Only) |
| #122-073-1 | 3-Amp Fuse, 5 mm × 20 mm (230 Volt Only) |
| #122-074-1 | 5-Amp Fuse, 5 mm × 20 mm (230 Volt Only) |
| #122-200 | Hardened Blade Assemblies (1 Liter) |
| #122-202 | Container, Stainless Steel (1 Liter) |
| #122-203 | Container Lid (1 Liter) |
| #122-204 | Bottom Gasket |
| #122-209 | Waring Blender® with Magnetic Pickup |
| #164-42 | Male Connector for Power Cable (230 Volt Only) |
| #171-44 | Rubber Foot |

Optional:

#120-61 One Year's Spare Parts for Constant Speed Blender (120-60, 115V)

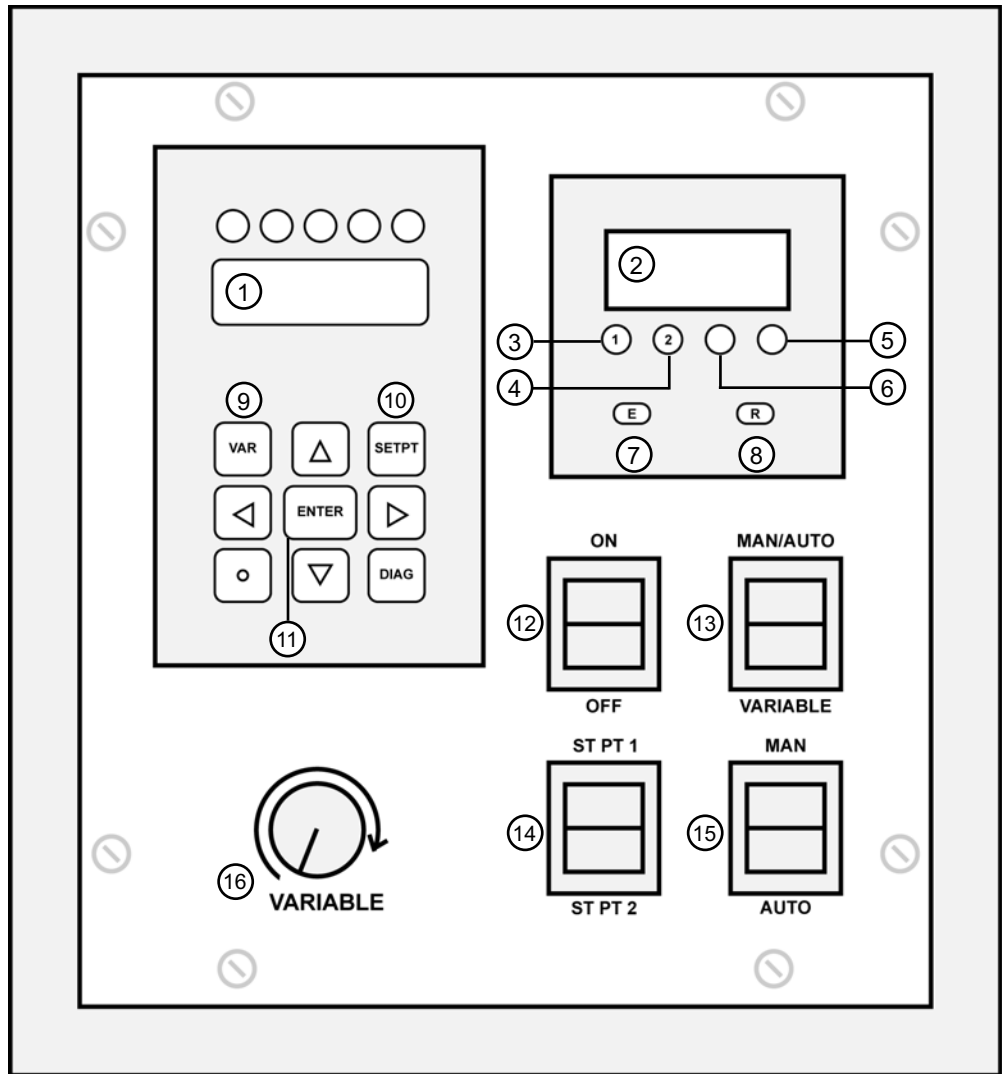
| | |
|----------|---|
| #122-200 | Blending Assembly / Square Drive, 1 qt, Qty: 12 |
| #122-202 | Stainless Steel Container, 1 qt |
| #122-203 | Container Lid, 1 qt |
| #122-204 | Bottom Gasket, Qty: 6 |
| #122-075 | 7-Amp Fuse, 5 mm × 20 mm, Qty: 4 |
| #122-074 | 4-Amp Fuse, 5 mm × 20 mm, Qty: 4 |

#120-61-1 One Year's Spare Parts for Constant Speed Blender (120-60-1, 230V)

| | |
|------------|---|
| #122-200 | Blending Assembly / Square Drive, 1 qt, Qty: 12 |
| #122-202 | Stainless Steel Container, 1 qt |
| #122-203 | Container Lid, 1 qt |
| #122-204 | Bottom Gasket, Qty: 6 |
| #122-073-1 | 3-Amp Fuse, 5 mm × 20 mm, Qty: 4 |
| #122-074-1 | 5-Amp Fuse, 5 mm × 20 mm, Qty: 4 |

Specifications

- Hardened stainless steel mixing blades
- Stainless steel 1-liter mixing container
- Two preset mixing speeds and variable speed
- Maximum Speed for Cement Testing (120-60 / 120-60-1): 16,000 RPM
- Maximum Speed for Fracturing Fluid Testing (120-60-F / 120-60-1-F): 5,000 RPM
- Rotational speed is maintained at setpoint with microprocessor
- Timing relays automatically control mixing times at required RPM
- Digital instrumentation provides excellent readability
- Crated Size: 45" × 32" × 12" (114 × 81 × 31 cm)
- Crated Weight: Approximately 75 pounds (34.1 kg)



1. Rotational Speed Display (RPM)

This display shows the speed of the blade. On models for cement testing (120-60 / 120-60-1), multiply the value displayed here by 10 to determine the actual RPM of the blade.

2. Timer Display (Seconds)

3. Edit Setpoint 1 / Increase Setpoint Digit

Press this button to change the timer value of Setpoint 1. When editing a setpoint value, this button increases the first digit of the value by 1.

4. Edit Setpoint 2 / Increase Setpoint Digit

Press this button to change the timer value of Setpoint 2. When editing a setpoint value, this button increases the second digit of the value by 1.

5. Increase Setpoint Digit

This button increases the fourth digit of the setpoint value by 1.

6. Increase Setpoint Digit

This button increases the third digit of the setpoint value by 1.

7. Enter Button

Press this button to store the Setpoint value in memory.

8. Timer Reset

Press this button to reset the timer to zero.

9. Keypad: VAR

This button accesses the PID Parameter Control Menu.

10. Keypad: SETPT

Press this button to change the rotational speed of Setpoint 1 or Setpoint 2.

11. Keypad: ENTER

Press this button to store the Setpoint value in memory.

12. Two-Way Switch: **ON - OFF**

This switch provides power to the unit.

13. Two-Way Switch: **MAN/AUTO - Variable**

This switch determines the operating mode of the unit. If it is set to **MAN/AUTO**, the **MAN - AUTO** switch (15) becomes active. If it is set to **VARIABLE**, the unit will be in Variable Mode.

14. Three-Way Switch: **ST PT 1 / ST PT 2**

This switch remains inactive unless the **MAN/AUTO - Variable** switch (13) is set to **MAN/AUTO** and the **MAN - AUTO** switch (15) is set to **MAN**. It toggles the rotational speed between Setpoint 1 and Setpoint 2. If it is in the center position, the unit will not rotate.

For testing Cement (part numbers 120-60 and 120-60-1), Setpoint 1 is 4,000 RPM and Setpoint 2 is 12,000 RPM. For testing Fracturing Fluids, Setpoint 1 is 500 and Setpoint 2 is 1,000 RPM.

15. Three-Way Switch: **MAN - AUTO**

This switch remains inactive unless the **MAN/AUTO - Variable** switch (13) is set to **MAN/AUTO**. It toggles the operating mode between Manual Mode and Auto Mode. If it is in the center position, the unit will not rotate.

16. Potentiometer

This knob remains inactive unless the **MAN/AUTO - Variable** switch (13) is set to **Variable**. It provides greater control over the rotational speed of the unit.

Installation

1. Carefully remove the unit from the packing box and place it on a counter safely away from sinks and other possible hazards.
2. Place the blending assembly on the base of the unit.
3. Plug the power supply cord into the port underneath the cabinet housing labeled "BLENDER".
4. Plug the transducer cable into the center port and fasten in place with the two clamps and screws provided. Do not over tighten.
5. Finally, plug the power supply cord into a suitable AC power supply.

Operation

The blending assembly has two speeds, "HI" and "LO". The Constant Speed Blender will not operate unless the blending assembly is set to "HI". Before operation, press the "HI" button on the blending assembly.

The unit has three operating modes: Manual, Variable, and Auto. The **MAN/AUTO - Variable** switch (13) and the **MAN/AUTO** switch (15) set the mode.

1. To set the unit to Manual Mode, set the **MAN/AUTO - Variable** switch (13) to **MAN/AUTO** and the **MAN - AUTO** switch (15) to **MAN**.
2. To set the unit to Auto Mode, set the **MAN/AUTO - Variable** switch (13) to **MAN/AUTO** and the **MAN - AUTO** switch (15) to **AUTO**.
3. To set the unit to Variable Mode, set the **MAN/AUTO - Variable** switch (13) to **Variable**.

Before turning the unit on, be sure to set the *MAN/AUTO* switch (15) and the *ST PT 1 / ST PT 2* switch (14) to the center position and turn the *Potentiometer* (16) fully counter-clockwise.



Operation

Manual Mode

1. Place the mix water into the mixing cup and place the lid on top of the container.
2. The **MAN/AUTO - Variable** switch (13) should be in the **MAN/AUTO** position. The **MAN/AUTO** switch (15) should be in the **MAN** position.
3. Place the **ST PT 1 / ST PT 2** switch (14) to the **ST PT 1** position to start the unit.

When you initially start the unit, the rotational speed may exceed the setpoint, but will stabilize within a few seconds.



4. After stabilization, you have 15 seconds to add the cement to the mix water and cover the container with the lid. Reset the timer to zero by pressing the Reset Button (8).
5. After 15 seconds, increase the rotational speed by setting the **ST PT 1 / ST PT 2** switch (14) to **ST PT 2**.
6. After mixing the cement an additional 35 seconds, stop the blender by setting the **ST PT 1 / ST PT 2** switch (14) to the center position.
7. Return the **MAN/AUTO** switch (15) to the center position.
8. After mixing is complete, clean the blending cup and lid as soon as possible to prevent any cement from building up on the container.

Operation

Variable Mode

1. Place the mix water into the mixing cup and place the lid on top of the container. Ensure that the potentiometer control knob is in the fully counter-clockwise position.
2. Make certain that the **ST PT 1 / ST PT 2** switch (14) is in the center position. Place the **MAN/AUTO - VARIABLE** (13) switch in the **Variable** position.
3. Increase the rotational speed of the blender by turning the control Potentiometer (16) clockwise.
4. Reset the timer to zero by pressing the reset button (8).
5. After mixing is complete, clean the blending cup and lid as soon as possible to prevent any cement from building up on the container.

Operation

Auto Mode

1. Place the mix water into the mixing cup and place the lid on top of the container.
2. Make certain that the **ST PT 1 / ST PT 2** switch (14) is in the center position. Place the **MAN/AUTO - VARIABLE** switch (13) to the **MAN/AUTO** position. Place the **MANUAL/AUTO** switch (15) switch to the **AUTO** position.



Note

Once the switch is placed into the *AUTO* position, the blender should start to accelerate. If the blender does not accelerate, reset the timer by pressing the reset button (8).

When you initially start the unit, the rotational speed may exceed the setpoint, but will stabilize within a few seconds.

3. After stabilization, reset the timer to zero again and immediately begin adding the cement. You have 15 seconds to add the cement to the mix water and place the lid on the container.



Note

After 15 seconds the timer will automatically increase the rotational speed to Setpoint 2. Ensure that the cement is added to the mix water and that the lid is placed on the container in less than 15 seconds.

4. After mixing the cement at Setpoint 2 for 35 seconds the timer will automatically stop the blender.
5. After mixing is complete, clean the blending cup and lid as soon as possible to prevent any cement from building up on the container.

Operation

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.

By default, setpoint 1 is set to 15 seconds and setpoint 2 is set to 50 seconds. These values conform to the guidelines established in API Specification 10.

To change these values, do the following:

1. Press "1" (3) or "2" (4) to change setpoint 1 or setpoint 2 respectively.
2. The display will show the current setpoint value. The four buttons beneath the display (3 - 6) each increase a separate digit of the setpoint value. The digits will scroll from 0 to 9 and then return to 0.
3. When you reach the correct setpoint value, press the enter button (7) to store it in the timer's memory.

Operation

Speed Controller

The Constant Speed Blender has two setpoints that are set at the factory. For Cementing testing, Setpoint 1 and Setpoint 2 are set to 4,000 and 12,000 RPM respectively. For Fracturing Fluid testing, they are set to 500 and 1,000 RPM.

To change these values, do the following:

1. Press "SETPT" (10) to activate the speed control menu.
2. Use the arrow keys to scroll to either "SETPOINT 1" or "SETPOINT 2".
3. Press "ENTER" (11).
4. Key in the numeric value (rotational Speed) of the new setpoint with the keypad.
5. Press "ENTER" (11) to store the new value into the controller's memory.

Operation

PID Parameters

For optimum performance, it may be necessary to change the PID parameters within the controller. To tune the controller, do the following:

1. Operate the unit in Manual Mode with a typical fluid within the container. Toggle between ST PT 1 and ST PT 2 and watch for over or undershoot. If there is significant overshoot access "VARIABLE 9" and reduce the value by 4.

To access "VARIABLE 9" press the "VAR" (9) key, press "9", and then press "ENTER" (11). Key in the new value and press "ENTER" (11) to store it into memory.

If there is no overshoot or undershoot, but the response was slow, increase the value of "Variable 9" by 4.

Repeat the above procedure, changing the value of "VARIABLE 9" 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 4.

Variable 10 may be accessed and changed in the same manner.

2. Run the controller at ST PT 2. Increase "VARIABLE 10" by 4 and watch for any oscillations around the setpoint. If no oscillations occur increase "Variable 10" by 4 until oscillations begin.
3. After the onset of oscillations, reduce "VARIABLE 10" by 4.
4. Repeat steps 2 and 3 until minimal over and undershoot occur.

This is a trial and error process. After each change, record the setting and its result. Variable 9 and 10 are initially set to 10 and 8 respectively.