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wilevco

# AUTOMATIC BATTER CONTROL SYSTEM
# INSTRUCTION MANUAL

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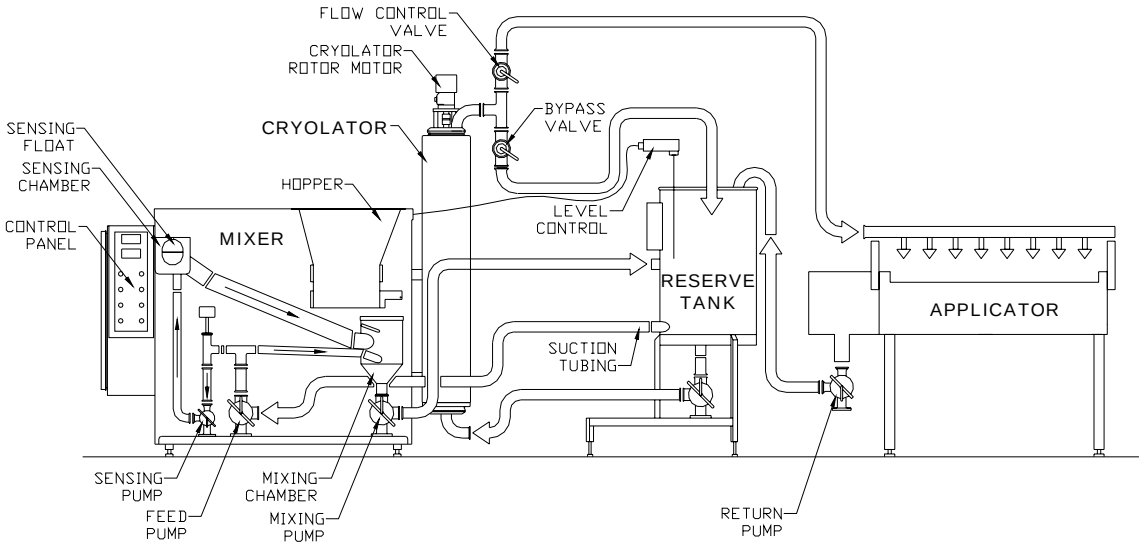
September 24, 2007

# INTRODUCTION

## TYPICAL SYSTEM

A typical Wilevco system, made up of a Mixer, Cryolator and Reserve Tank interfaces with an applicator . Under some conditions the Reserve Tank is not used such as when mixing very thick or leavened batters.




## MIXER

The main components of the mixer are the control panel, hopper, mixing chamber, level probe and sensing chamber. The sensing chamber has a moveable gate for changing the opening to allow for different thicknesses of batter. The mixer mixes and monitors the batter making corrections to viscosity as needed. The mixer also monitors temperature sending a signal to the refrigeration system to either turn on or off the refrigeration. Lastly, the mixer monitors the volume of batter in the system mixing more batter as needed.

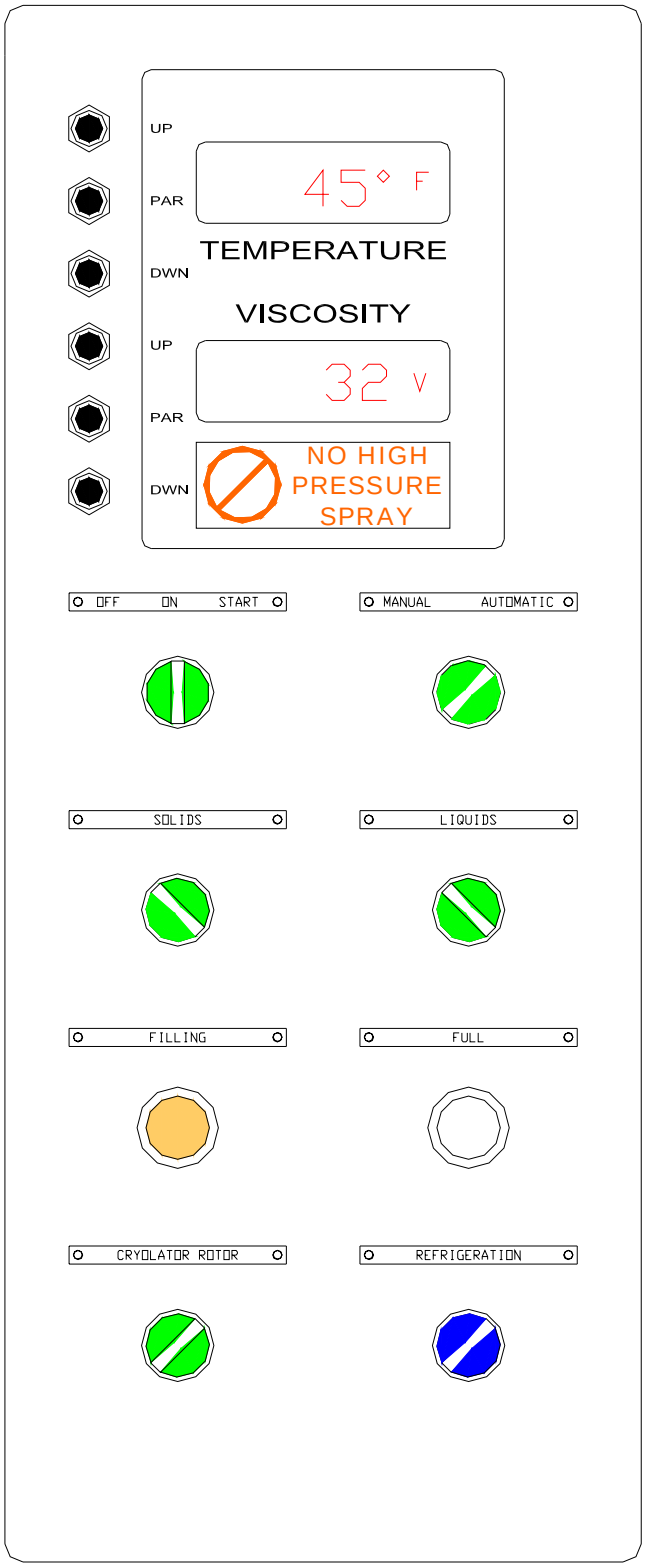
## CRYOLATOR

The Cryolator, generally mounted on the end of the mixer, is a scraped surface heat exchanger for chilling the batter. The batter is chilled to produce a higher quality product. Another benefit of chilling is that the viscosity (thickness) is easier to maintain when the batter is consistently cold.

## RESERVE TANK

The reserve tank is used to provide filtration of the batter and/or when one mixer serves two applicators. The reserve tank has an internal filter screen and may be equipped with extra filter baskets. The reserve tank is not used when mixing leavened (tempura style) batters.

# OPERATOR CONTROLS



# OPERATION

## PRE-START CHECKLIST

1. Check that inside the hopper is completely dry; wipe down if necessary.

**NOTE:** DO NOT attempt to dry the hopper with the mixer running.

2. Check that all components are assembled correctly.

3. Check that all guards are in place.

4. Check that the cover is installed correctly.

5. Check that all clamps and fittings are tight.

**NOTE:** Pump clamps should be hand tight only.

6. Check that all return and/or circulation pumps on other equipment are assembled correctly and fittings are tight.

7. Check that the level control probe is in place and the bracket is fastened securely.

## START-UP

1. Fill the mixer at the sensing chamber until the mixing chamber is half full. Ensure that all pumps are wet.

2. Fill the reserve tank (if used) with enough water to fill the Cryolator and batter lines.

3. Fill the applicator with enough water to fill the return line (and Cryolator if a reserve tank is not used).

**NOTE:** It is best to use as little water as possible. This way you can make up the batter faster and the system will not over-flow.

4. Put the “LIQUIDS”, “SOLIDS”, “CRYOLATOR ROTOR” and “REFRIGERATION” switches in the **(↖)** “off” position.

5. Put the “AUTOMATIC / MANUAL” switch in the **(↖)** “MANUAL” position.

# START-UP (CONT.)

6. Start the reserve tank (if used) and applicator pump(s). Balance flow if required. Check for leaks; repair if required.

7. Start the mixer by holding the "OFF / ON / START" switch in the **(↗)** "Start" position until the digital viscosity display reads "10" or more, then release the switch and it will return to the "Run"**(↑)** position. Check for leaks; repair if required.

8. Turn on **(↗)** the "CRYOLATOR ROTOR". If you have a hydraulic drive, make sure that the rotor is turning at about 175 RPM.

9. Turn on **(↗)** the "REFRIGERATION" (blue switch) and set the refrigeration controller to the desired temperature. To set the temperature, push the **"PAR"** button and then the **"UP"** ↑ or **"DWN"** ↓ button. When the display shows the desired temperature set point , push the **"PAR"** button again to lock in the new set point and return to displaying the actual batter temperature.

10. Set the desired viscosity on the viscosity controller. Push the **"PAR"** button and then the **"UP"** ↑ or **"DWN"** ↓ button to set the desired viscosity; then push the **"PAR"** button again to lock in the new set point and return to displaying the actual batter viscosity readout.

11. Fill the hopper with dry mix.

**NOTE:** DO NOT put anything but dry mix in the hopper.

12. Turn on **(↗)** "SOLIDS" manually until the batter is almost as thick as desired. When the batter viscosity readout is a few points below the set point, turn off **(↖)** the "SOLIDS" switch.

13. Turn the mixer to **(↗)** "AUTOMATIC". The mixer will now automatically make any corrections that may be required to bring the batter to the desired viscosity set point.

14. Once you have reached the desired temperature and viscosity, start production.

15. After production starts, you can "tune" the mixer (see page 7).

# TUNING THE MIXER

"Tuning" the mixer is properly adjusting the water flow rate so that, when water and the batter mix are added together, the batter viscosity does not change from the set point. In other words, when the mixer is in "AUTOMATIC" and goes on "FILLING" and the mixer is "tuned" the viscosity does not change. If **not** "tuned", either the batter will get thin because the water flow rate is too high or it will get thick because the water flow rate is too low.
NOTE: The mixer will not go on filling if the batter viscosity is away from the set point. Because an out of "tune" mixer will constantly be correcting the viscosity, you may run out of batter or plug up the mixing chamber.

## STEPS FOR TUNING:

1. After start up and having reached your batter's correct viscosity, note the number value of the viscosity digital readout.

2. Switch the mixer to **(↖)** "MANUAL"

3. Turn on **(↗)** the "LIQUIDS" and "SOLIDS" together for about a minute and note the water flow rate in the flow rate gauge.

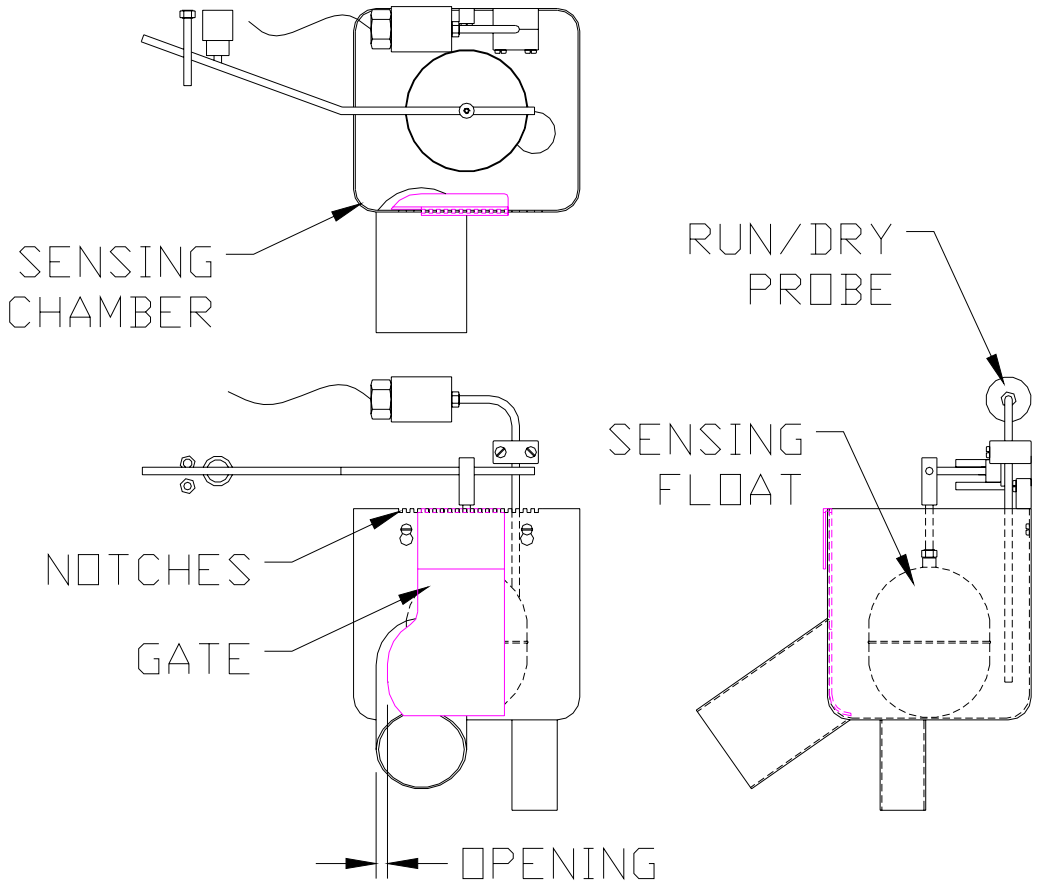
4. After about a minute, shut off **(↖)** the "LIQUIDS" and "SOLIDS".

5. Observe the viscosity digital readout. If the readout goes up more than one or two points, increase the water flow rate slightly. If the readout goes down, decrease the water flow rate slightly.

6. Repeat until the digital readout stays the same or goes up just one or two points.

7. Switch the mixer to **(↗)** "AUTOMATIC".

8. Make a note on your "Product Page" of the digital readout, the final water flow rate and the sensing gate position (number of notches from the right side open).




## SENSING CHAMBER GATE ADJUSTMENT

The “Gate” may be moved along the notches in the sensing chamber to change the size of the opening. If you are using a thin batter, you want the opening to be smaller. This forces the sensing float to ride higher and not bump the bottom. If you are using a thick batter, the opening should be larger. This gives the thick batter a large opening to flow out of, preventing the sensing chamber from over-flowing. The target should be between 20 and 70 on the viscosity display.

**NOTE:** Changing the gate opening in the sensing chamber **does not** change the viscosity of the batter.

Even though the mixer may be “tuned”, some batters are easier to control if you change the gate opening either raising or lowering the sensing float. For example, thick batters seem to run better if the sensing float is higher in the sensing chamber; thick batters may tend to stick to the float tending to drag it down. If you have “tuned” the mixer, have the viscosity and temperature where you want it and the mixer behaves erratically, change the gate opening in the sensing chamber. A slight adjustment of the opening will often eliminate problems. Once you find the correct location of the gate, count the number of open notches on the sensing chamber and make note of it on you product page.

## LEVEL CONTROL

The level control probe is located in the reserve tank or the applicator if a reserve tank is not used. If the batter level drops below the end of the probe, the mixer will go on “FILLING” (amber) and add water and dry mix until the batter level comes up and touches the end of the probe.

**NOTE:** It is very important that the level probe bracket be mounted securely to the reserve tank or applicator. If it is not, the probe will not work or will give false readings.

**NOTE:** It is best to keep the level probe low in your system. It is much easier to control the viscosity and temperature of a small volume of batter.

# VISCOSITY ADJUSTMENT

To change the viscosity setting, push the **"PAR"** button on the viscosity controller. Then push the **"UP"** ↑ or **"DWN"** ↓ button to move the setting up or down; move the number higher for thicker batter and lower for thinner batter. When you have the display at the setting you desire, push the **"PAR"** button again to lock-in the new setting and return to displaying the actual or current viscosity number. Please note that the number value on the meter is a reference number and does not relate specifically any other forms of viscosity measurement such Zahn cup, centipoise, etc. Do not attempt to adjust the viscosity while the mixer is on "FILLING" (amber). This may cause the system to run out of batter or plug up the mixing chamber. Large changes in viscosity may be made in "MANUAL" but the mixer may have to be "tuned" after a large adjustment.

If the batter viscosity is at the set point, "SP 3" will show below the display numbers.

If the batter is below the set point, too thin, "SP 2" will flash and the mixer will add "SOLIDS" on a timed basis.

If the batter is above the set point, too thick, "SP 4" will flash and the mixer will add "LIQUIDS" on a timed basis.

# TEMPERATURE ADJUSTMENT

To change the temperature setting, push the **"PAR"** button on the temperature controller. Then push the **"UP"** ↓ button to move the setting up or the **"DWN"** ↓ button to move setting down. When you have the display at the setting you desire, push the **"PAR"** button again to lock in the new set point and return to displaying the actual or current temperature. The temperature meter accurately reads in degrees Fahrenheit or Celcius.

**WARNING:** Never move the temperature set point below 38º F (3º C).

When the temperature of the batter rises above the set point, the "REFRIGERATION" switch will light (blue). If the temperature of the batter drops below the set point, the "REFRIGERATION" switch light (blue) will go out.

NOTE: If the "REFRIGERATION" is on, you must have batter circulation through the Cryolator and the rotor must be turning. If the rotor is turning, you must have circulation through the Cryolator. It is normal for the Cryolator to leak a little batter at the top bearing.

# SHUT-DOWN

1. Prior to shutdown, allow the dry mix in the hopper to run low.

2. Use up as much of the batter in the system as possible. Ground the level probe so the mixer remains "FULL" (white) and leave the mixer in **(↗)** "AUTOMATIC" to maintain viscosity control for the rest of the production.

3. Turn off **(↖)** the "REFRIGERATION" approximately 20 minutes before shutdown.

   NOTE: Do not stop circulation through the Cryolator or rotor rotation until the temperature display reads "60º F" (16º C) or the frost has melted off the refrigeration flanges.

4. After production has stopped, shut down the equipment and drain the batter. Then flush the mixer and all other equipment with fresh water until the water runs clear. Wash down any batter buildup or spills.

5. After flushing the system, turn off **(↖)** the mixer.

**NOTE:** The mixer may be shut down at any time by pushing the "Emergency Stop Button". However, this may cause the Cryolator to freeze. Do not leave the Emergency Stop Button depressed if the equipment is not going to used for a period of time (overnight for instance); shut-off the mixer as noted in step #5 above.

# TROUBLESHOOTING

Typical problems during operation of the System.

## INDEX



## A. MIXER

### 1. Mixer runs out of batter.

Check:

- Mixer is in **(↗)** “AUTOMATIC”.
- Mixer is “tuned” correctly.
- There is dry mix in the hopper.
- There is at least 40-PSI (2.5 atmospheres) water pressure AT ALL TIMES.
- The sensing gate is in the correct location and fully installed.
- The level control is functioning properly.

## Mixer Troubleshooting (continued):

**2. Mixing chamber overflows or plugs up.**

Check:

- Mixer was **not** left in **(↖)** "MANUAL" with "SOLIDS" **(↗)** on.
- Mixer is "tuned" correctly
- Water supply is on.
- Gate is in correct position.
- Drive belts and impellers are in good condition.
- A worn or damaged feed pump impeller will cause a low liquid level in the mixing chamber.
- A worn or damaged mixing pump impeller will reduce mixing capabilities.
- Suction line to the Mixer has not collapsed. NOTE: This line must be suction type vinyl or stainless tube.
- The vortex suppressor is secured in place in the mixing chamber.

**NOTE**: Belts and impellers should be checked by qualified personnel.

**3. Viscosity readout is higher or lower than the previous day.**

- Check that sensing float is connected to the input shaft correctly.
- Check that the gate is in the correct position.

**4. Temperature readout is higher or lower than the previous day.**

Check batter temperature in sensing chamber and compare to display. If more than 2º deviation, have Maintenance calibrate the temperature controller.

**5. Viscosity readout stays constant but the actual viscosity varies.**

Check:

- Sensing float is not stuck to the side of the sensing chamber.
- Input shaft moves freely.
- Viscosity display changes when float moves.

**6. Mixer does not add timed "SOLIDS" in "AUTOMATIC".**

- With the Mixer in "**(↗)** AUTOMATIC" , move the set point well above the display reading.
- If the Mixer still does not add "SOLIDS" advise Maintenance of your test and suggest they check the "SOLIDS" timer and "In-Zone" relay.

## Mixer Troubleshooting (continued):

**7. Mixer does not add timed "LIQUIDS" in "AUTOMATIC".**

- With the Mixer in **(↗)** "AUTOMATIC", move the set point well below the display reading.
- If the Mixer still does not add "LIQUIDS" advise Maintenance of your test and suggest they check the "Liquids" timer and "In-Zone" relay.

**8. Timed "LIQUIDS" or "SOLIDS" will not shut off.**

- Call Maintenance to check timers.

**9. Batter level is high and mixer stays on "FILLING" or batter level is low and the mixer stays on "FULL".**

- Check that level probe bracket is tight.
- If bracket is tight call Maintenance to check relay.

**10. Leaking batter.**

Leaks are best corrected before mixing batter when there is only water in the system. It is far better to drain a little water and correct a leak than to work a shift with batter leaking onto the floor.

Pump leaks (note: pump clamps should be HAND TIGHT only.)

1. After draining the water check the following:
   - ρ Assembly
   - ρ Missing or damaged o-rings
   - ρ Worn shaft seal or wearplate
2. Notify Maintenance if any replacements are required.

Fitting leaks:

1. Clamp is in correct position.
2. Gasket is in good condition.

## B. CRYOLATOR

**1. Cryolator freezes.**

Check:

- Temperature set point is not too low.
- There is circulation and rotation:
  - ➢ At least 15 GPM circulation
  - ➢ Rotor turning at 175 rpm

## Cryolator Troubleshooting, Cryolator Freezes (continued):

How to thaw:

- For a minor freeze, turn off **(↖)** the "CRYOLATOR ROTOR" and the "REFRIGERATION" switches, and continue circulation and production. Usually the rotor will turn in a few minutes and the refrigeration may be turned back on
- For a major freeze, where production quality may be seriously jeopardized:
  - Turn off **(↖)** the "REFRIGERATION" switch.
  - Turn off **(↖)** the "CRYOLATOR ROTOR" SWITCH.
  - Shut down the line.
  - Remove and plug the hose going to the bottom of the Cryolator.
  - Remove the hose at the top of the Cryolator.
  - Place a fresh water hose in the top and flush.
  - Continue until rotor turns freely – usually a few minutes.

**NOTE:** DO NOT USE hot water; use only cool water.

**NOTE:** A temporary bypass batter line may be installed and production continued until the Cryolator thaws IF allowed.

**CRITICAL !! There must be a pressure relief valve in the refrigeration system. Use of hot water to thaw the Cryolator may cause the remaining refrigerant in the Cryolator jacket to expand rapidly. This expansion may generate enough pressure to cause the relief valve to open. !!**

2. **There are wide swings on the temperature readout (actual batter temperature).**

   This indicates that the refrigeration controls have not been balanced. Notify Maintenance of the problem at once.

3. **There is constant batter temperature but it is higher than temperature setpoint and/or the batter never gets cold enough.**

   - Compare the temperature in the sensing chamber to the temperature readout.
   - Have Maintenance check that there is sufficient refrigerant.
   - Have Maintenance check the balance of the refrigeration.
   - This may indicate icing, where a thin layer of ice has coated the inside surface of the Cryolator. Turn off **(↖)** the "REFRIGERATION" switch for a few minutes to melt the ice.
   - This may indicate incorrect assembly of the Cryolator rotor and blades. If necessary, shut down the line or isolate the Cryolator and check assembly.

## Cryolator Troubleshooting (continued):

**4. Cryolator continues to chill batter more than 3 degrees below setpoint.**

Check:

- That the "REFRIGERATION" (blue) light turns off – if not, notify Maintenance.
- If the temperature controller is working correctly (the light is going off at set point), this may indicate too much refrigeration. Notify Maintenance immediately.

## C. RESERVE TANK

1. **Reserve Tank overflows.**

- Check the level control to ensure that it is functioning correctly.
- Check that the applicator return pump is suitable and in good condition.

**NOTE:** A poor return pump will allow batter to build up in the applicator. When enough batter builds up for the pump to catch a prime, the batter surges back to the reserve tank, often overflowing.

2. **Batter level in the Reserve Tank surges up and down.**

This indicates that the applicator return pump is losing prime and/or is not capable of returning the batter delivered.
Check the condition of the applicator return pump:

- Size and type:
    - Large, high horsepower centrifugal pumps may "overpower" the batter and cavitate. A smaller pump or different type of pump may be called for.
    - Thick batters often require a positive displacement pump.
- Orientation of discharge:
    - Centrifugal pumps discharging off the bottom of the housing, or discharging downward, may cavitate, or fail to catch a prime.
- Type and length of inlet:
    - Long inlets, or inlets of 1-1/2" ID often reduce pump performance.
    - Use pump housings with short 2" ID inlets.

# SANITATION

## OVERVIEW:

Proper sanitation is critical to the operation of any food-handling system. The best equipment in the world cannot be used if it hasn't been cleaned properly before operation.

Sanitation personnel are also in a unique position to head-off problems. They regularly see the equipment taken apart and can make simple inspections and tell maintenance about problems before the problems cause downtime.

While the exact procedure may vary because of the type and number of systems, and from location to location, the basic procedure remains the same:

1. Maintain circulation and rotation in the Cryolator (if part of your system) until the temperature display reads "60º F" (16º C) or until all of the frost has melted off the refrigeration pipes.

2. Drain the batter.

**NOTE:** Check local drain codes and requirements.

3. Disassemble, clean and reassemble the equipment.

Always keep in mind:

1. Take care not to damage parts when cleaning.

2. If containers are used to hold the parts, they should be plastic. PLACE, DO NOT THROW, parts into the container.

3. NEVER place any parts on the floor.

When re-assembling the equipment, inspect all parts for wear or damage. Notify Maintenance of any suspect parts or conditions, such as worn gaskets or cut cables, etc.

1. NEVER assemble the equipment with damaged parts.

2. NEVER assemble the equipment if a part is missing.

# SUGGESTED PROCEDURE

## Cryolator

1. To prevent freezing, maintain the circulation of the batter through the Cryolator, and the turning of the rotor, until the temperature display reads “60º F” (16º C), or all the frost has melted off the refrigeration lines.

   - If the rotor is frozen, batter or water may be circulated until it thaws.

   - If a rapid thaw is required, the top cap may be removed and cool water poured in by hose from the top. NEVER use hot water.

     NEVER remove the bottom cap before removing the rotor.

     NEVER leave the rotor turning without circulation of batter or water.

2. Once the system is drained (see Mixer section below), remove and clean the:

   - Top cap and drive
   - Seal Collar, Seal Collar o-ring, spring and washer
   - Blades
   - Rotor

3. Cleaning Cryolator blades

   - Clean with a medium scouring pad, and soap or detergent.
   - Report blades that are dull, broken or missing pins.

**NOTE !** Handle blades with care.

- Blades are sharp, and could injure you if handled carelessly.
- Blades will break if dropped.

## **SUGGESTED PROCEDURE,** Cryolator (continued)

4. Rotor:

    - NEVER stand the rotor on the bottom drive guide. This will "mushroom" the drive guide and cause bottom bearing failure.
    - Use a rack or cart to secure the rotor and blades.
    - Check the bottom of the rotor for wear.

5. Reassemble Cryolator and inspect all parts for wear prior to re-assembly.
    - Bearings
        - Check condition. Notify Maintenance if replacement is needed.
    - Blades:
        - Check condition and that the scraper edge is sharp.
        - Install with long "tab" at the top.
    - Rotor:
        - Washer and seal collar spring should be over pin on rotor.
        - Have seal collar spring "tab" in notch of seal collar.
    - Cap gaskets:
        - In place and in good condition.
    - Clamps or "T" bolts:
        - Hand tight only.

## Mixer

1. Drain the system after all equipment is shut off.
    - DO NOT use the Mixer pumps to pump down the system.
    - Use the applicator pump to remove as much batter as possible from the system.
        - If the applicator pump is a positive displacement type, it is important that the pump does not run dry.
    - If there are restrictions on batter going into the floor drains, the system may be refilled with water after the initial pump-down, re-circulated and pumped down again.
        - This will make the last amount that must go on the floor diluted.

## Mixer (continued)

2. Take apart the mixer for cleaning.
   - ρ Do not remove the pump impellers from the pump bodies unless they must be replaced.
   - ρ Break down the batter circuit in large pieces.
     - ➢ It is easier to clean a few large pieces than many small ones
   - ρ Place the o-rings and gaskets in a safe place.

**TIP:** Many crews make a large "safety pin" from stainless steel wire and leave it in the Mixer. As the gaskets and o-rings are removed they are placed on the safety pin.

   - ρ Handle the parts carefully.
     - ➢ There are many sealing surfaces that will become difficult to assemble if they become dented.

**TIP:** Place parts in a plastic tub, being careful not to bang parts together.

   - ρ Clean all stainless parts with a medium-weight scouring pad and detergent.
     - ➢ Do not use a scouring pad on the inside of plastic tubing or the display guard window.
   - ρ Clean under the bedplate on a regular basis.
     - ➢ This often neglected area may be the source of unwanted buildup.
   - ρ Avoid damaging the corners and safety bars of the Mixer cover.

3. Reassemble the Mixer.
   - ρ Pumps
     - ➢ Have the double notch side of the impeller facing you and oriented to direction of motor

**TIP:** Wilevco supplies impellers with two notches on one side of the hub. By assembling the pumps with the double notches out, you will be sure that the impeller will run in the same direction all the time – greatly extending its life.

     - ➢ O-rings in place.
     - ➢ Clamps HAND TIGHT only.

## Mixer (continued)

- Fittings
  - Gaskets in good condition and in place
  - Clamps secure
- Vinyl Tube
  - Hose clamp at end of stainless tube
- Sensing Chamber

**CRITICAL !!** Do not bend "Flow/No Flow" probe. **!!**

- Sensing chamber is mounted on both studs.
- Gate in place and secure.
- Sensing float stem in socket.

**CRITICAL !!** The input shaft must be handled with care as it is connected to instruments. Rough handling may cause damage. **!!**

4. The remaining parts of the Mixer should be assembled in the reverse order from which they were taken apart.

5. Finally, be sure the door(s) are shut and secure.

## Reserve Tank

1. Drain the RT of all batter.
2. Remove the filter screen and any filter baskets.
3. Disassemble and clean the pump.
4. Flush and scour the inside of the tank.
   - Failure to scour the inside of the tank may result in the buildup of a hard, white film, which will be very hard to remove.
5. Clean under the bedplate on a regular basis.
   - This often-neglected area may be the source of unwanted buildup.
6. Reassemble
   - Pump
     - Impeller oriented to direction of motor.
     - O-rings in place.
     - Clamps HAND TIGHT only.
     - Level control in place and secure.
     - Cover in place.
7. Reassemble batter line connections.
   - Suction line to the Mixer MUST be suction type tubing.
   - Hose clamps at the end of stainless tube.

# MAINTENANCE

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# OVERVIEW

The maintenance of a Wilevco System is similar to that of other machines where pumps, motors and drives are used. Preventive and routine maintenance will reduce production time lost to unnecessary problems.

# TECHNICALLY SPEAKING, HOW the WILEVCO SYSTEM WORKS

**CONTROLLERS:**

The Wilevco mixer uses two solid state controllers: one for viscosity and one for temperature.

The viscosity controller receives a variable voltage reading from the potentiometer that is connected to the input shaft. The voltage reading has been scaled within the controller to read 0 to 100 on the display. The input shaft is moved by the sensing float reacting to changes in viscosity. As the sensing float rises and falls, the digital display on the viscosity controller will rise and fall through a scale of 0 (no flow) to 100 (very thick). The operator sets the controller to the desired viscosity (set point).

In **(↗)** "AUTOMATIC":

- If the sensing float falls below the set point (thinning batter), the controller energizes a relay starting the solids auger on a timed basis and "SP 2" will flash below the digital display.
- If the sensing float rises above the set point (thickening batter), the controller energizes a relay opening the liquid solenoid on a timed basis and "SP 4" will flash below the digital display.
- If the sensing float is at the set point, "SP 3" will remain on below the digital display and no corrections will be made.

The temperature controller takes a signal from the RTD in the batter circuit. The operator sets the controller to the desired temperature. If the batter temperature rises above the set point, a signal is sent to the refrigeration system and "SP 1" will flash below the digital display. If the batter temperature falls to or below the set point, the signal is shut off.

**TIMERS:**

When the mixer is in **(↗)** "AUTOMATIC", the correcting signals from the viscosity controller pass through solid-state timers. There is one timer for solids and one timer for liquids. These timers have two control knobs to adjust the "On" and "Off" cycles. The adjustment of the on and off cycles allows you to customize the response of the mixer to your particular batter. ONLY use your fingers to adjust the knobs. Using a tool may lead to broken "stops" inside the relay making it useless.

## How it works (continued):

### LEVEL CONTROL:

The level control probe is placed in the reserve tank or applicator. The level control bracket provides the "ground" for the system and must be secured tightly. With the mixer in **(↗)** "AUTOMATIC", the level control system is enabled.

The level control system functions this way:

- With the viscosity controller reading the set point and the batter level below the level probe, "LIQUIDS" and "SOLIDS" are added together to make more batter until the level reaches and touches the bottom of the probe.
- With the viscosity controller reading below the set point (thinning batter) and the batter level below the probe, the "FILLING" light will flash and timed "SOLIDS" are added to correct the viscosity before making more batter.
- With the sensing float above the set point (thickening batter) and the batter level below the probe, the "FILLING" light will flash and timed "LIQUIDS" are added to correct the viscosity before making more batter.

The level control relay has a built-in five-second delay to prevent over-reaction to turbulent conditions when "FILLING" and a solid state timer to delay initiation of the filling cycle when leaving "FULL". The relay also has a red LED, which is illuminated with the mixer in "AUTOMATIC" to indicate that the relay is functioning properly.

### RUN / START:

To prevent damage to the impellers in a run dry situation, the "Run / Start" circuit is designed to shut off the Mixer if the liquid level runs low.

The components of this circuit are:

- "OFF / ON / START" switch on the control panel.
- Flow probe mounted in the sensing chamber.
- Auxiliary contacts in the main motor starter.

To start the mixer, the operator momentarily holds the "OFF / ON / START" switch to the **(↗)** "START" position. This sends a 110-volt signal directly to the main motor starter. Once flow is established, the liquid level in the sensing chamber rises making contact with the flow probe, energizing the flow probe relay. The operator releases the switch, which is spring loaded to return to the run or **(↑)** "ON" position. The flow probe relay and the main motor auxiliary contacts now maintain the circuit to the main motor starter.

If the flow ever decreases to the point that liquid no longer contacts the flow probe, the mixer shuts off.

## How it works (continued):

### WATER CIRCUIT:

The water circuit is designed to deliver a precise volume of water to the mixing chamber.

**NOTE: It is critical that the mixer be supplied with 10 GPM at 40 PSI (.63 L/sec. At 2.7 atmospheres) <u>minimum at all times</u>.**

The operator tunes the mixer to provide the correct balance between the liquid and solids by adjusting the water flow rate. If the water pressure or volume falls below the requirements, the mixer will not perform satisfactorily.

### CRYOLATOR:

The Cryolator is a vertical swept surface heat exchanger. Batter is pumped in the bottom, scrapped off the super cold surface by the three blades held by the rotor, and exits out the top. The rotor is held in place by two plastic bearings. The top bearing, pressed into the top cap, works with the seal collar and seal collar spring to prevent excessive leaking at the top. This is a "wet seal"; some leakage should be expected. The bottom bearing, pressed into the bottom cap, supports and guides the rotor. The drive may be electric or hydraulic. If a hydraulic drive is used the RPM should be monitored, 175 RPM is ideal.

- Low RPM will increase the chance of freezing.
- High RPM will increase wear on the bearings.

Batter should be pumped through the Cryolator at between 15 and 20 GPM (.94 and 1.3 L/sec.). Lower circulation will increase the chance of freezing. Higher circulation will reduce chilling capability.

### PUMPS:

JABSCO flexible vane sanitary pumps are used in Wilevco Systems because of their very low shear pumping properties and ease of maintenance. Most problems with impeller usage are related to the pump's inability to be "run dry". Wilevco partially addresses this problem with the "Run / Start" circuit which turns the Mixer off when the liquid level runs low. It is also the responsibility of the operator to run the System correctly and Maintenance to insure that the impellers, wearplates, shaft seals, bearings, clamps and drives are adjusted and installed properly and/or are in good condition.

# MAINTENANCE OF MAJOR SYSTEM COMPONENTS

## CONTROLLERS:

Wilevco uses solid-state controllers for viscosity and temperature control functions. These controllers are pre-programmed and "locked" at the factory. To date, failure of these controllers has been extremely rare. Most failures occur when the controller is exposed to water or dust either by the control panel door being left open or the controller is not properly installed (with a rubber gasket). In the event of a failure, a pre-programmed unit may be shipped from Wilevco. If a controller is obtained elsewhere, the steps for programming are located in the manufacturers manual.

Common sense will go a long way in preventing problems with the controllers. While the control surfaces are sealed, operators, or those making inputs into the controllers should ensure that their fingers are reasonably clean and NEVER use tools of any sort to make inputs. The spring-loaded guard door should always be shut unless adjustments are being made.

### A. VISCOSITY CONTROLLER CALIBRATION.

The viscosity controller is pre-programmed to energize "SOLIDS", SP 2, at two points below, and "LIQUIDS", SP 4, at two points above the set point that is adjusted by the operator. Further, the range, 0 – 100, is set with "0" being when the sensing float is resting on the bottom of the sensing chamber, and "100" when the sensing float is at the top of the sensing chamber.

**NOTE**: If the sensing float or sensing float stem are changed you **must** check the 0 – 100 range.

If the viscosity controller must be re-programmed refer to the controller manufacturers handbook. Prior to programming you will need to remove the jumper between terminal #7 and #8 at the back of the controller.

**WARNING:** DO NOT remove this jumper until you have read and understand the handbook.

### B. TEMPERATURE CONTROLLER CALIBRATION.

Check the liquid temperature in the sensing chamber with a calibrated thermometer and compare with the temperature controller readout. If there is more than a 2º variation refer to the controller manufacturers handbook for programming instructions. Prior to programming you will need to remove the jumper between terminal #7 and #8 at the back of the controller (see warning above).

**TIMERS:**

The solid state timers used for timed liquid and solids in the Mixer have adjustments for the “On” and “Off’ cycle. Care should be taken to make any adjustments by HAND ONLY. Use of any tool may damage the internal stops making the timer useless. The timers may be adjusted to meet the requirements of your specific products. For example a batter that is very sensitive to additions of liquid may require that the “On” duration be shortened and/or the “Off” duration lengthened.

**NOTE:** It is not practical to adjust the timers for every product. Try to find an acceptable compromise when many products and/or batters are used.

**INTERLOCKS.**

The Mixer is equipped with magnetic interlocks on the belt guard and cover. These interlocks are controlled by a solid state relay connected to the control circuit. If one of the sensor units is damaged or the relay fails, the Mixer will not run.

**AUTOMATIC SHUT OFF (RUN / START CIRCUIT)**

The flow probe in the sensing chamber detects the presence of liquid. If liquid is not present, the mixer will shut off, preventing impeller damage. The flow probe relay in the control panel has a red LED, which indicates that it is working. NOTE: To trouble shoot the control circuit when the mixer is not running, the flow probe must be grounded, giving a false “liquid present” reading.

**LEVEL CONTROL:**

A conductance type level control is used with a single stainless steel probe. The probe is mounted in the Reserve Tank or applicator if a Reserve Tank is not used. If the probe is mounted in the applicator, the probe may be cut to the desired length. The probe assembly is mounted in a bracket, which provides for height adjustment, and must be secure. The bracket provides the “ground” (earth) for the circuit. If not grounded, the level probe will not work.

The level control relay in the control panel has a red LED which indicates that it is working. Remember, the level control function only works in “Automatic”. To prevent “chatter” or in turbulent conditions, the relay has a built-in five-second delay from the time liquid makes contact with the bottom of the probe (“FILLING” to “FULL”). There is also a solid state timer to adjust the delay from the time liquid loses contact with the probe (“FULL” to “FILLING”). The standard setting for this timer is five (5) seconds. For very low volume systems, such as when a Reserve Tank is not used, it may be desirable to adjust this timer to a point less than 5 seconds.

**MAINTENANCE of COMPONENTS, Level Control (continued):**

**Note:** The level probe relay has a built-in five-second reaction delay. This delay prevents "chatter" in turbulent circumstances when "FILLING". There is a solid-state timer to delay initiation of the filling cycle once the liquid loses contact with the end of the probe preventing short cycling.

**Note:** The level probe assembly is connected via a 4-conductor cut-resistant cable. If this cable is replaced you MUST USE A 4-CONDUCTOR CABLE. **Proper grounding is critical.**

**FLOW CONTROL PROBE:**

The Flow Control Probe is mounted in the sensing chamber. This probe, and the Flow Control Relay in the control panel, are part of the "Run /Start" circuit and detect liquid in the sensing chamber. While the probe is reasonably robust, care should be taken that it is not bent. The relay has a red LED, which indicates that the relay is working.

**CRYOLATOR:**

Maintenance of the Cryolator involves checking and replacing bearings, gaskets and blades.

If the rotor is allowed to turn without circulation of liquid, or the seal collar has been installed upside-down, the seal collar may melt its way into the top bearing. This will cause a total failure of the seal and if not corrected will lead to rotor damage.

Grooves on the sealing area of the rotor are an indication of past mis-assembly (typically the seal collar upside-down). The seal collar has "seized" on the top bearing and the seal collar o-ring has cut into the rotor. This damage will cause the seal assembly to leak excessively and must be repaired by a machine shop.

If the rotor is allowed to turn without circulation for any length of time the bottom bearing will heat up and fail. If rotation continues, there will be serious damage to the rotor and bottom cap.

**TIP:** When a new bottom bearing is installed, adjust the drive coupling so that a 1/8-inch "gap" is visible between one of the coupling halves and the coupling insert. As the bearing, which is 3/8-inch thick wears, the "gap" will grow, giving a visual indication of the bearing wear. When the gap reaches about 3/8-inch it is time to replace the bearing.

**MAINTENANCE of COMPONENTS, Cryolator (continued):**

Before the Cryolator begins operation, a refrigeration engineer or contractor must balance the refrigeration system. Balancing the system involves adjusting the backpressure regulator, or other controlling device, so that the refrigeration does not overload the product. If there is too much refrigerant, or the refrigerant temperature is too cold, the batter will tend to freeze. If there is too little refrigerant or the refrigerant temperature is not cold enough, the batter will be too warm.

**PUMPS:**

The JABSCO flexible vane sanitary pumps used in Wilevco Systems have a neoprene rubber impeller. This impeller, while providing excellent low shear pumping, can be damaged.

NEVER run the pump dry.

- If the impellers are run without liquid, the rubber heats up, becomes brittle, and breaks.
- Two good indicators that the pump has been run dry are separation of one or more vanes at the hub, and charring or scuffing of the hub.

NEVER run the impeller in alternate directions.

- The impellers take a “set” when they are run. If they are run in one direction one day and the other direction the following day, they will not last as long as they would have if run in one direction all the time.

NEVER over-tighten the end cover clamp.

- If the end cover clamp is over-tightened, the end cover will “bow” in the center and may generate enough friction to burn the impeller even with the circulation of liquid. Signs of over-tightening are cracked or broken clamps and end covers with “donut” wear patterns on the inside.

ASSEMBLY

- Assemble pump impellers with the two notches facing out (toward the assembler). Wilevco supplies impellers with two notches on one side of the hub. By assembling the pumps with the notches facing out, you will be sure that the impeller will run in the same direction all the time, greatly increasing its life.

**TIP:** To install larger impellers, cut off the impeller end of an old shaft a few inches past the impeller portion. Place this “stub” shaft in a vice and slide the new impeller on the stub. Holding the pump body by the two ports, push and twist the body onto the impeller. Make sure the “rotation” is correct.

**MAINTENANCE of COMPONENTS, Pumps (continued):**

BEARINGS

- Pump bearings are checked when the pumps are dis-assembled by shaking the shaft end. If a movement or "click" is felt, it is an indication that the bearings have started to wear.
- DO NOT install grease fittings on the JABSCO pumps. The bearings used are double sealed and the bearing spacer design makes it very difficult for grease to effectively reach the bearings.

**TIP:** If a bearing housing is rebuilt:

- Use two ball bearings.
- At one end of the outer spacer, cut two "slots" wide enough for a bearing-puller. When the replacement bearings wear out, the slots will allow use of your bearing puller - greatly simplifying the job.

DRIVES

- Ensure that belt tension is correct. Pump bearings may be damaged by an "over-tight" drive.
- **ALWAYS REPLACE GUARDS AFTER SERVICING OR CHANGING A DRIVE.**
- Guards are interlocked and, if not fully installed, the Mixer will not run.

**LUBRICATION:**

Lubrication is extremely important for satisfactory operation

- Maintain the proper oil level in the reducer(s) at all times.
- Use quality lubricants such as Mobil 600W or equivalent 140-weight oil at all times.
- Apply an anti-seizing compound to all shafts when changing sheaves or sprockets.
- DO NOT install grease fittings on the JABSCO pumps. The bearings used are double sealed and the bearing spacer design makes it very difficult for grease to effectively reach the bearings.
- The Cryolator seal collar o-ring may be lubricated with an acceptable edible grease to ease installation and to slow leaking from the "wet seal" top bearing.

# PREVENTIVE MAINTENANCE

A preventive maintenance schedule is an essential part of any maintenance program. Waiting until equipment wears out, breaks down, or gets out of tolerance – causing down-time – is far more costly than correcting the problem before it stops production.

The following items should be part of the routine maintenance schedule. (Items may be deleted depending on the type of System.)

**DAILY**:

Check

- all pump impellers
- all shaft seals
- for water and dust in the control panel
- drive belt tension
- all bearings for noise
- Cryolator blades and bearings
- all hydraulic drives for leaks

**TIP:** With a modest amount of cooperation, many of these items may be easily checked daily by Sanitation when the equipment is being cleaned. Any piece of equipment needing repair, replacement or adjustment can then be brought to the attention of Maintenance for action.

**WEEKLY PREVENTATIVE MAINTENANCE (in production):**

Weekly, even while the System is in production, you can easily perform the “Three-Minute Check”.

MIXER:

If the Mixer is not operating in **(↗)** “AUTOMATIC”, find out reason from the operator.

Drives:

Listen for excessive noise from drives. Ensure that the belt and chain guards are in place and secure.

Fittings:

- ρ Check clamps for correct installation and leaks.
- ρ Check vinyl tube for correct connection; hose clamps at end of stainless tube.

**Weekly Preventative Maintenance (continued):**

Pumps:

- Listen for noise of worn bearings.
- Leaks:
  - ♦ At cover and/or back of pump body indicates damaged or missing o-rings.
  - ♦ At wearplate indicates shaft seal needing replacement or worn wearplate or both.

LEVEL CONTROL

Note: Functions in **(↗)** "AUTOMATIC" mode only.

Check that:

- ρ Bracket is secure.
- ρ Probe is clear of cover or sides of tank.
- ρ Probe is free of excess buildup.
- ρ "FULL" light (white) is on with liquid level over probe.
- ρ "FILLING" light (amber) is on with liquid level below probe.
- ρ Remember, there is a timed delays to "FULL" and "FILLING".

AUTOMATIC VISCOSITY CONTROL

Note: Functions in **(↗)** "AUTOMATIC" mode only.

When "FULL" (high liquid level):

1. Note reading on viscosity controller display.
2. Move set point above reading on display
   - Press the **"PAR"** button and note set point reading.
   - Press the **"UP"** ↑ button until number is 3 points above observed reading and press the **"PAR"** button again.
3. Timed "SOLIDS" should come on.
4. Move set point below reading on display
   - Press the **"PAR"** button.
   - Press **"DWN"** ↓ button until number is 3 points below observed reading and press the **"PAR"** button again.
5. Timed "LIQUIDS" should come on.
6. Move set point back to original setting.

**Weekly Preventative Maintenance (continued):**

When “FILLING” (low liquid level):

**NOTE:** With the viscosity reading at the set point, “SOLIDS”, “LIQUID”, and “FILLING” lights should come on.

1. Note reading on viscosity controller display.
2. Move set point above reading on display.
    - Press the **“PAR”** button and note set point reading.
    - Press the **“UP”** ↑ button until number is 3 points above observed reading and press the **“PAR”** button again.
3. Only timed “Solids” should come on and the “FILLING” light (amber) should flash.
4. Move set point below reading on display.
    - Press the “P” button.
    - Press **“DWN”** ↓ button until number is 3 points below observed reading and press the **“PAR”** button again.
5. Only timed “LIQUID” should come on and the “FILLING” light (amber) should flash.
6. Move set point back to original setting and, if required, the mixer will continue “FILLING”.

TEMPERATURE

- ρ Measure the temperature of the liquid in the sensing chamber with a reliable thermometer. Your reading should be within one or two degrees of the reading on the temperature controller.
- ρ Move the temperature set point 3 degrees below the temperature reading (same procedure as for viscosity controller). The “Refrigeration” (Blue) light should come on.
- ρ Move the temperature set point 3 degrees above the temperature reading. The “Refrigeration” (Blue) light should go out.

CRYOLATOR

- ρ Observe “gap” in drive coupling. Large gap indicates bottom bearing wear.
- ρ Observe top of rotor. Rotor should turn “true”, “wobble” at top of rotor indicates serious bottom bearing wear or damage to bottom drive guide on rotor.
- ρ Observe “wet seal” at top cap. Excessive leaking indicates possible incorrect assembly of shaft seal assembly, worn seal collar o-ring or damaged seal area on rotor.

**WEEKLY Preventative Maintenance (out of production):**

If weekly check is done while the System is OUT of production, check the following:

MIXER:

Drives:

- Belt tension.
- Chain tension.
- Guards secure.

Fittings:

- Condition of gaskets.
- Condition and correct connection for the vinyl tube.

Pumps:

- Clamps are not over-tightened.
- Condition of o-rings.
- Impellers are in good condition and installed with the double notch OUT.
- Condition of wearplates.
- Shaft seals are in good condition.
- Shake the pump shafts to check for early signs of bearing wear. Which is indicated by a slight “click” or movement.

Controllers:

- With the three-phase power disconnected or the three-phase circuit breaker off and the “Flow / No Flow” probe in the sensing chamber grounded, perform the controller portion of the “Three-Minute Check”.
- Remove the ground from the “Flow / No Flow” probe and start the Mixer. When the switch returns to the “Run” position the Mixer should turn off.

Cover:

- Check that all safety bars are in place and secure.
- Check that the cover fits easily on the Mixer.

**Weekly Preventative Maintenance (continued):**

CRYOLATOR:

- ρ Disassemble the Cryolator and check for:
  - Correct assembly.
  - Condition of the blades.
  - Condition of the top and bottom bearings.
  - Condition of the rotor.
  - Condition of the seal collar and o-ring..
- ρ Reassemble and check for:
  - Correct “gap” in coupling.
  - Correct rotation.
- ρ Look for signs of leakage in the drive unit.

RESERVE TANK

- ρ Make same pump checks as in Mixer.
- ρ Ensure that cover is in place.

**Monthly Preventative Maintenance** (in or out of production):

- ρ Check oil level in reducer(s)
- ρ Drain any oil from Cryolator refrigerant jacket

**Annual Preventative Maintenance** (in or out of production):

- ρ Check for dirt in water strainer in regulator
- ρ Change oil in solids reducer
- ρ Change oil in Cryolator reducer (electric drive only)

# MAINTENANCE TROUBLESHOOTING GUIDE

The first step in trouble shooting a problem is to gather as much information as possible from the operator. Ask questions until you know exactly what the system will and will not do.

If the problem cannot be solved by going through Operational Trouble Shooting (page 9), check each part of the System which could house the problem for obvious defects: leaks, loose parts, incorrect or bad relays, etc. Often, the most obvious problem goes unnoticed.

**CRITICAL !! DISCONNECT THE POWER IF ANY COMPONENT IS TO BE REPAIRED, CLEANED OR REPLACED. !!**

## Operational Problems

1. **Mixer will not run**.
    - Check circuit breakers in control panel.
    - Check circuit breakers at power panel.
    - Check the interlock circuit.
    - Check emergency stop button.

2. **Mixer starts but will not stay running.**
    - Remember to hold "OFF / ON / START" switch in **(↗)** "START" position until viscosity display reads "10" or more.
    - Check that gate is in sensing chamber and is secure.
    - Check "OFF / ON/ START" switch.

3. **Mixer will not shut off when viscosity readout is "5" or less.**
    - Check that the flow probe in the sensing chamber has not been grounded.
    - Check the flow probe relay in the control panel.

4. **Mixer will not run in (↗) "AUTOMATIC".**
    - If there is no timed "LIQUIDS" or "SOLIDS" (one or both) in "AUTOMATIC" but either or both may be added in "MANUAL", the "In Zone" relay in the control panel is bad.
    - If there is irregular or interrupted behavior of other functions when in **(↗)** "AUTOMATIC", check:
        - Condition of auto/manual switch.
        - Wiring connections to auto/manual switch.

5. **Batter gets too thick.**
   Check:
   - Water is connected to mixer and is on.
   - There is 40 PSI (2.7 atmospheres) water pressure at all times.
   - Mixer is “tuned” correctly.
   - The Mixer is in **(↗)** “AUTOMATIC”.
   - The sensing gate is in the optimum position.
   - Free movement of the input shaft.

6. **Batter gets too thin.**
   Check:
   - Mixer is “tuned” correctly.
   - The Mixer is in **(↗)** “AUTOMATIC”..
   - The sensing gate is in the optimum position.
   - Free movement of the input shaft.

7. **Actual batter viscosity changes but the readout stays the same.**
   Check:
   - For free movement of the input shaft.
   - Nothing is under the sensing float.
   - The display changes as the sensing float moves.

8. **There is a low batter level in the mixing chamber or the mixing chamber plugs up easily.**
   Check:
   - The feed pump impeller is in good condition.
   - The suction line to the Mixer is not collapsed or obstructed.

**Note:** A long suction line to the Mixer will reduce the efficiency of the feed pump and may cause rapid impeller failure. This line must be as short as possible and be suction type vinyl tube or stainless tube.

9. **There is high batter level in the mixing chamber and/or the mixing chamber overflows.**
   Check:
   - Mixing pump impeller is in good condition.
   - Mixing pump drive is in good condition.
   - Vortex suppressor is in place and secure.

10. **The mixing chamber “spits”.**
    Check:
    - Mixing pump impeller is in good condition.
    - If level in mixing chamber is low, check feed pump impeller.
    - Vortex suppressor is directing flow into the center of the mixing chamber.

**11. The sensing chamber "spits".**

Check the feed pump impeller (sensing pump on Series V, VII or VIII).

**12. There are bubbles or foam in the sensing chamber.**

Check for a suction leak from the applicator or reserve tank to the feed pump on Series VI or sensing pump on Series V, VII or VIII.

**13. Pump leaks.**

The most common pump leaks result from the shaft seal and/or wearplate becoming worn. Replace any worn or non-serviceable parts.

**TIP:** There are three ways to avoid damaging an impeller:

1. Never run the pump dry.
2. Never over-tighten the pump clamp.
3. Never run the impeller in opposite directions on consecutive days (double notch out).

## Cryolator Troubleshooting

**1. BATTER DOES NOT GET COLD ENOUGH, YET REFRIGERATION STAYS ON ALL OF THE TIME (As indicated by the blue "Refrigeration" switch light).**

- Check the refrigeration tonnage **and** temperature available to the Cryolator.
- Check that all valves and controls are functioning.
- Drain oil from the Cryolator jacket.

**2. TEMPERATURE DISPLAY INCREASES SHARPLY WHEN THE REFRIGERATION COMES ON.**

- Adjust the amount of refrigerant being delivered. The rapid increase indicates that there is too much refrigerant for the demand. The refrigerant must be balanced to the demand.

**3. ROTOR STOPS AND CRYOLATOR FREEZES.**

Check:

- Temperature set point is above "38" ("3" if degrees C).
- Temperature reading in the sensing chamber is the same as the display.
- Temperature of the batter at the applicator.

**Cryolator Troubleshooting (continued):**

**NOTE:** Under certain conditions the temperature of the batter in the applicator may be as much as 10º lower than what is indicated by the display. If this is the case, the operator should be advised of the differential and adjust the set point to prevent freezing.

HOW TO THAW:

1. For a minor freeze:
   - Turn off **(↖)** "REFRIGERATION" switch, and
   - Turn off **(↖)** "CRYOLATOR ROTOR" switch,
   - Continue circulation and production. Usually the rotor will turn in a few minutes and the "REFRIGERATION" on may be turned back **(↗)** on.

2. For a major freeze, where production quality may be seriously jeopardized:
   - Turn off **(↖)** the "REFRIGERATION" switch and
   - Turn off **(↖)** the "CRYOLATOR ROTOR" switch and
   - Shut down the line.
   - ρ Remove and plug the hose going to the bottom of the Cryolator.
   - ρ Remove the hose at the top of the Cryolator.
   - ρ Place a fresh water hose in the top and flush.
   - ρ Continue until rotor turns freely – usually a few minutes.

**NOTE:** DO NOT USE hot water - use only cool water.

**NOTE:** A temporary bypass batter line may be installed and production continued until the Cryolator thaws if allowed.

**CRITICAL !! There must be a pressure relief valve in the refrigeration system. Use of hot water to thaw the Cryolator may cause the remaining refrigerant in the Cryolator jacket to expand rapidly. This expansion may generate enough pressure to cause the relief valve to open. !!**

**4. Batter leaks at the top of the rotor.**

- Some leakage at the top of the Cryolator is normal.
- Excessive leakage may be caused by:
  - o Incorrect assembly of the seal collar and seal collar spring.
  - o Worn seal collar o-ring.

**Cryolator Troubleshooting (continued):**

- If the sealing area on the rotor, the seal collar, seal collar o-ring, and the seal collar spring are in good condition:
  - Use some edible grease on the o-ring when installing the seal collar.
  - "Stretch" the seal collar spring to force the seal collar against the top bearing. **NOTE:** too much "stretch" will cause premature bearing wear.

**5. Blade pins are breaking.**

This is an indication of one of three things:

- The Cryolator has been frozen, placing stress on the pins, or,
- The blades were installed upside-down causing them to "bow" when the top cap is forced down.
- The blades were installed outside the guide tabs on the rotor causing a severe "bow".

**Note:** You can check for persistent "bow" in the blades by sighting along the sharp edge. If the edge is worn more in the center than the ends the blade has been installed incorrectly in the past.

**6. The bottom bearing is wearing rapidily.**

Check:

- Coupling has a "gap".
  - With no gap in the coupling the drive assembly will place downward force on the bottom bearing causing rapid wear.
- Bottom guide shaft of the rotor.
  - If the shaft end is "mushroomed" from being stood on the floor it will damage the bottom bearing.

7. **The bottom bearing is broken.**

The bottom bearing breaks when the rotor is dropped while assembling the Cryolator. Replace the bearing.

8. **There is a wobble in the rotor when turning.**

This indicates an out of center rotor. This may be caused by:

- Worn bearings.
- A worn bottom guide shaft.
- Blades installed upside-down causing the blades to "bow " which places a side load on the rotor.
- Missing blade(s).

**9. The seal collar has melted into the top bearing.**

- The rotor was allowed to turn without circulation of liquid.

# SPARE PARTS INFORMATION

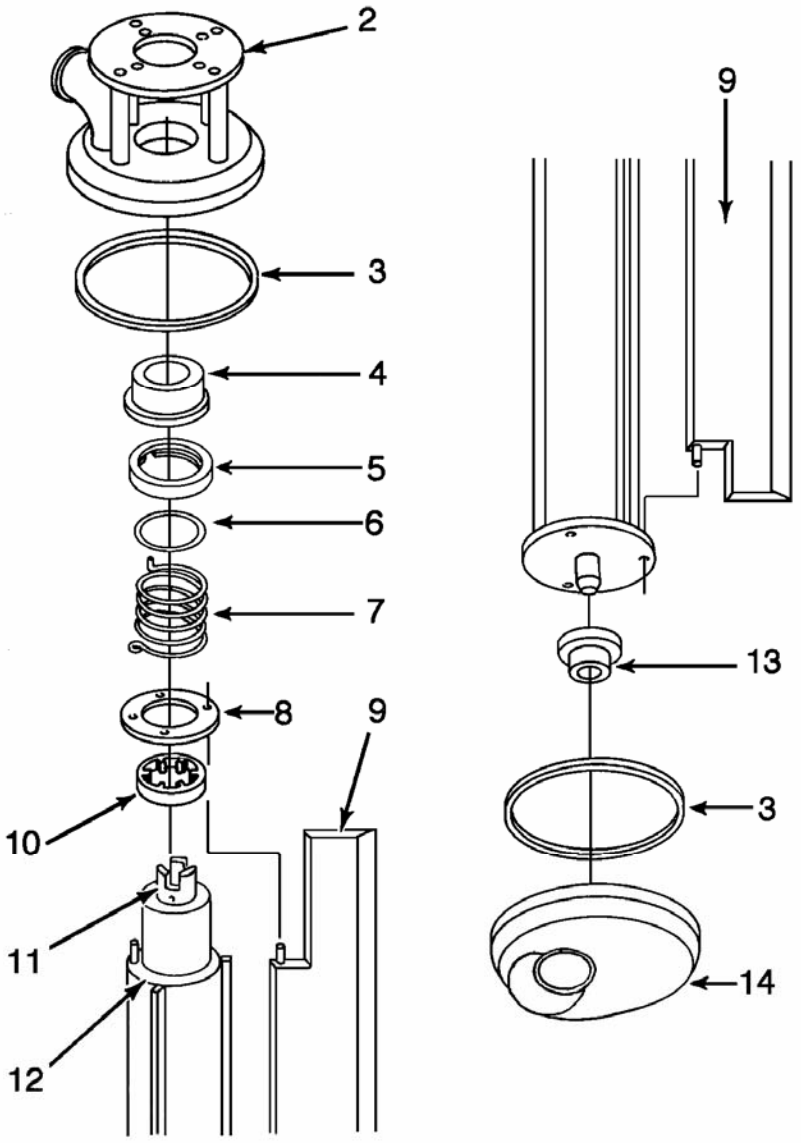
Refer to your Specification Sheet for details on your equipment. When ordering parts it is helpful if you have the Wilevco part number and description of the part. Wilevco part numbers are three digits, a dash and three more digits, such as “120-480”. The description may be found on the Specification Sheet, such as “8M-640-12mm”. In this case a drive belt. While it is not practical to list all the parts and part numbers, there are some parts that are commonly ordered.

## PARTS LIST INDEX



For ordering all other parts, please have your equipment serial number(s) with an accurate description of the part required prior to calling. If a brand name and/or number for the part is not available, try to obtain a description of location in the machine, function, size, color, etc.

# 4.5 X 6 CRYOLATOR PARTS




TOP BOTTOM

# 4.5 X 6 CRYOLATOR PARTS LIST

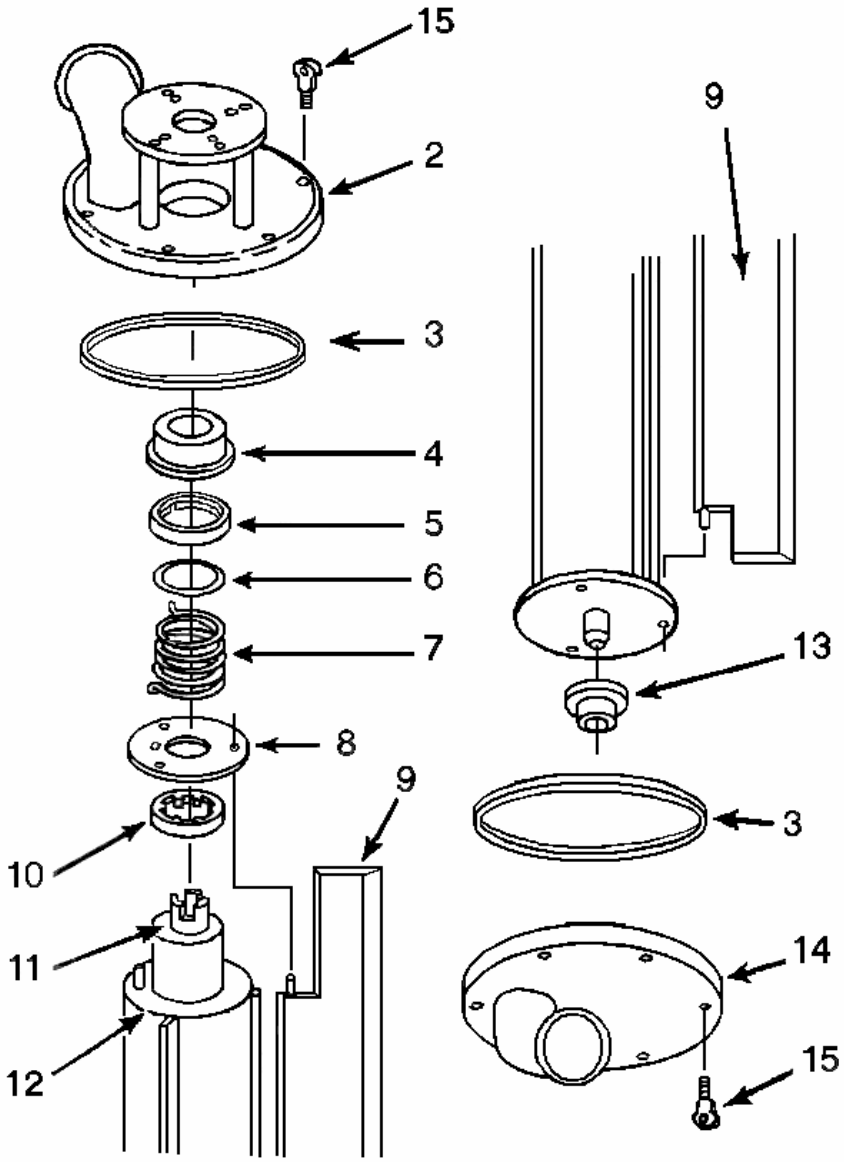
| NUMBER | DESCRIPTION | | PART NUMBER |
|---|---|---|---|
| 2. | TOP CAP: | - 1 ½" DISCHARGE | 080-106 |
| | | - 2" DISCHARGE | 080-156 |
| 3. | CAP GASKET (2) | | 080-180 |
| 4. | C-13A TOP BEARING | | 080-005 |
| 5. | C-17A SEAL COLLAR | | 100-045 |
| 6. | SEAL COLLAR O-RING | | 020-020 |
| 7. | SEAL COLLAR SPRING | | 100-035 |
| 8. | TOP WASHER | | 100-025 |
| 9. | BLADE (3): | C-36W | 100-060 |
| | | C-116 (3/8" THICK) | 100-061 |
| 10. | COUPLING INSERT | | 120-015 |
| 11. | COUPLING (HALF SHOWN) | | 120-035 |
| 12. | ROTOR | | 100-020 |
| 13. | C-14B BOTTOM BEARING | | 080-020 |
| 14. | BOTTOM CAP: | - 1 ½" INLET | 080-116 |
| | | - 2" INLET | 080-154 |

NOT SHOWN:

| | | | |
|---|---|---|---|
| 1. DRIVES: | HYDRAULIC – | CHAR-LYNN | 540-010 |
| | ELECTRIC – | 2HP MOTOR | 500-003 |
| | | F721-10 REDUCER | 720-010 |

| | |
|---|---|
| CAP CLAMP (2) | 360-150 |

# 4.5 X 8 CRYOLATOR PARTS




TOP BOTTOM

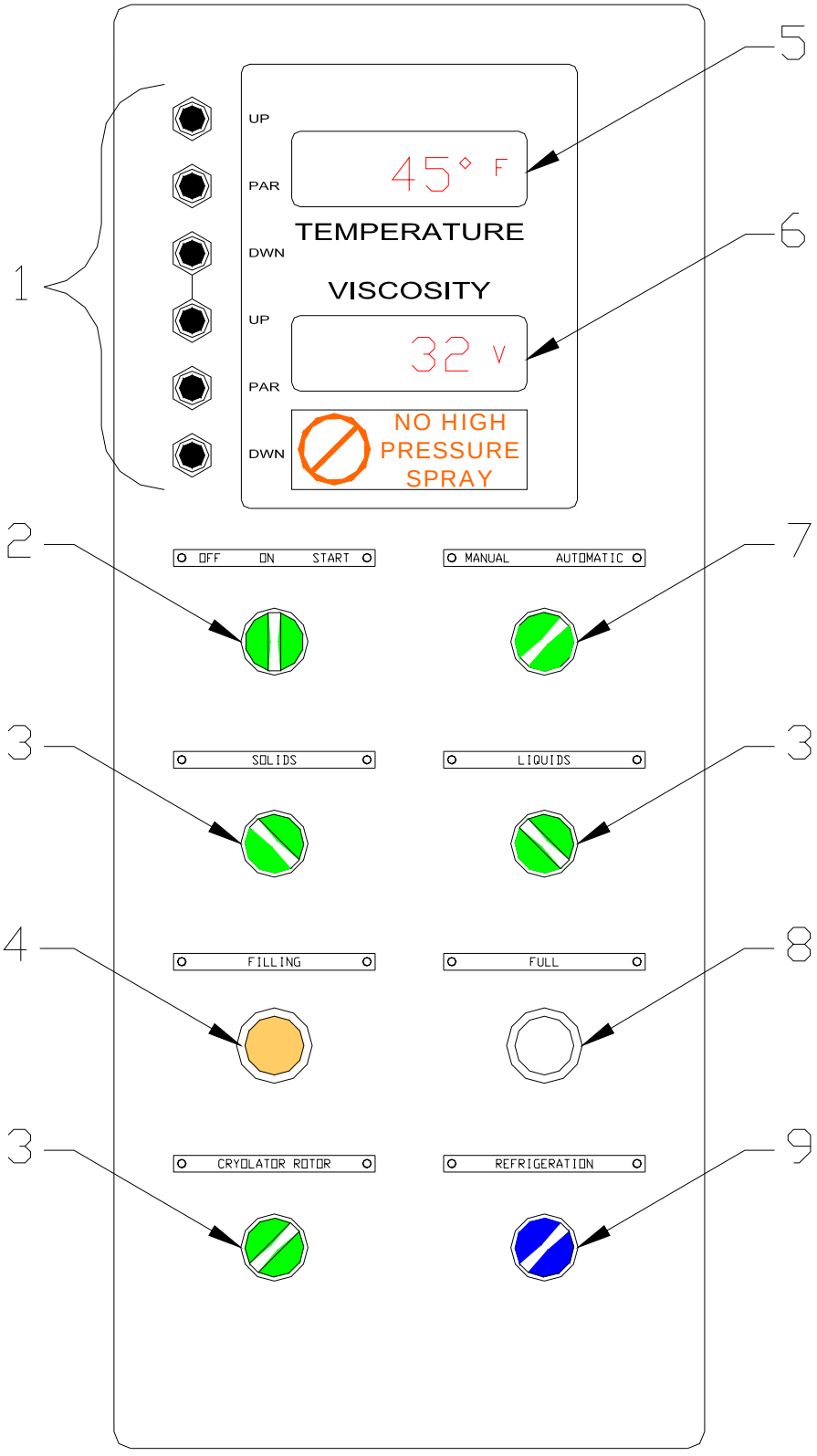
# 4.5 X 8 CRYOLATOR PARTS LIST

| NUMBER | DESCRIPTION | PART NUMBER |
|---|---|---|
| 2. | TOP CAP | 080-165 |
| 3. | CAP GASKET (2) | 080-181 |
| 4. | C-13A TOP BEARING | 080-005 |
| 5. | C-17A SEAL COLLAR | 100-045 |
| 6. | SEAL COLLAR O-RING | 020-020 |
| 7. | SEAL COLLAR SPRING | 100-035 |
| 8. | TOP WASHER | 100-026 |
| 9. | BLADE (3) C-36W | 100-060 |
| | C-116 (3/8” THICK) | 100-061 |
| 10. | COUPLING INSERT | 120-015 |
| 11. | COUPLING (HALF SHOWN) | 120-035 |
| 12. | ROTOR | 100-021 |
| 13. | C-14B BOTTOM BEARING | 080-020 |
| 14. | BOTTOM CAP | 080-164 |
| 15. | THUMB BOLT (12) | 080-157 |

NOT SHOWN:

| | | |
|---|---|---|
| DRIVES: | HYDRAULIC – CHAR-LYNN | 540-010 |
| | - ELECTRIC – 2HP | 500-003 |
| | - F721 – 10 REDUCER | 720-010 |

# OPERATOR CONTROLS



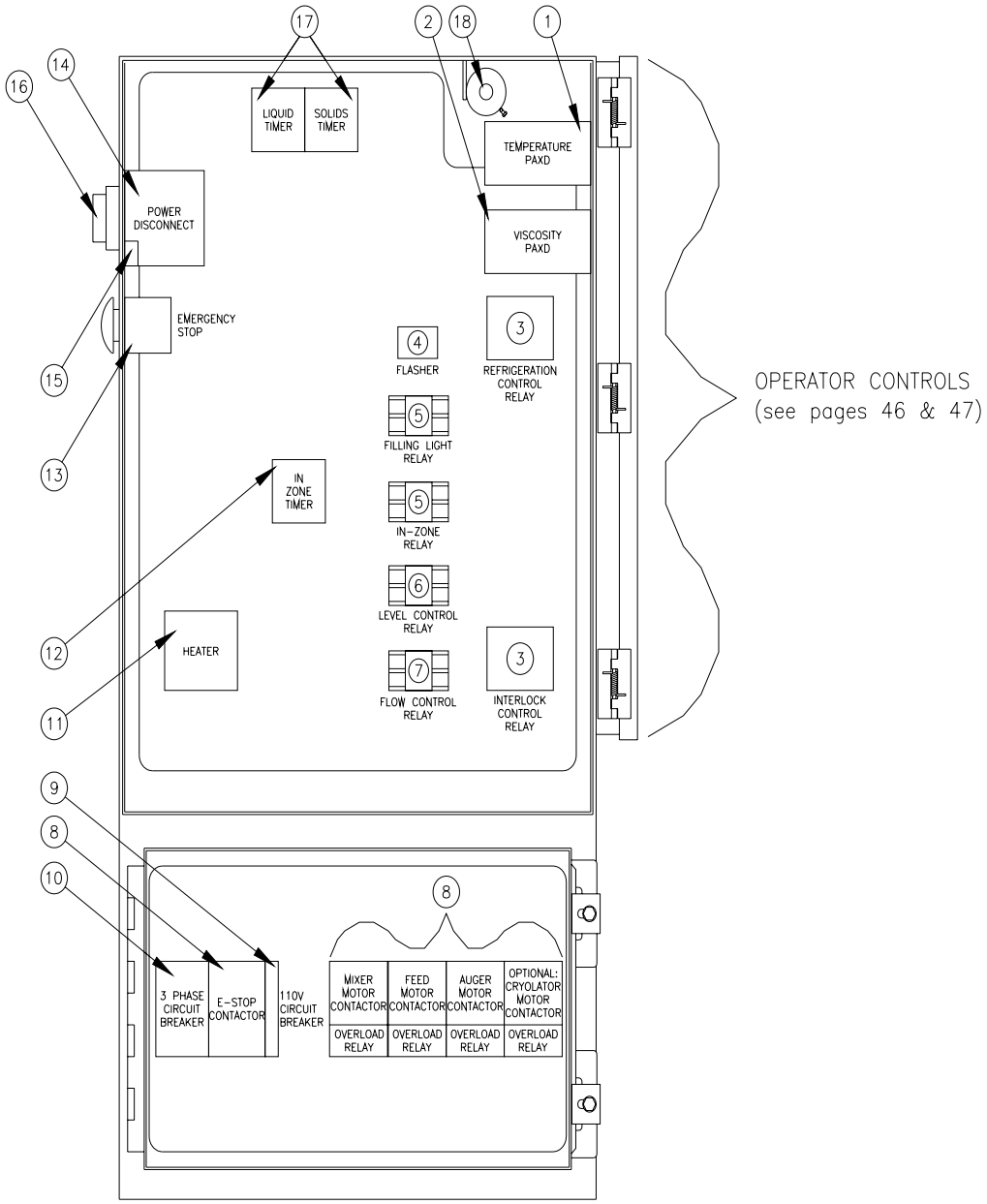
# OPERATOR CONTROL PARTS

| KEY | PART NUMBER | DESCRIPTION |
|---|---|---|
| **1.** | **Temperature and Viscosity CONTROLLER SWITCHES** | |
| | 280-140 | Pushbutton switch with: |
| | 280-141 | Pushbutton boot and retaining nut |
| **2.** | **OFF/ON/START SWITCH** | |
| | 280-160 | 3 - Position Illuminated Switch - Green |
| | 280-151 | “NC” Contact Block |
| | 280-150 | “NO” Contact Block |
| | 280-190 | White LED Bulb |
| **3.** | **SOLIDS, LIQUIDS, and CRYOLATOR ROTOR SWITCHES** | |
| | 280-165 | 2 - Position Illuminated Switch - Green |
| | 280-150 | “NO” Contact Block |
| | 280-190 | White LED Bulb |
| **4.** | **FILLING LIGHT** | |
| | 280-175 | Pilot Light – Orange Lens |
| | 280-190 | White LED Bulb |
| **5.** | **TEMPERATURE CONTROLLER** | |
| | 400-401 | Red Lion PAXT Controller w/Dual Relay |
| **6.** | **VISCOSITY CONTROLLER** | |
| | 400-402 | Red Lion PAXD Controller W/Quad Relay |
| **7.** | **AUTOMATIC / MANUAL SWITCH** | |
| | 280-165 | 2 – Position Illuminated Switch – Green |
| | 280-152 | “NO/NC” Contact Block |
| | 280-151 | “NC” Contact Block |
| | 280-190 | White LED Bulb |
| **8.** | **FULL LIGHT** | |
| | 280-180 | Pilot Light – White Lens |
| | 280-190 | White LED Bulb |
| **9.** | **REFRIGERATION SWITCH** | |
| | 280-170 | 2 – Position Illuminated Switch - Blue |
| | 280-150 | “NO” Contact Block |
| | 280-190 | White LED Bulb |

**NOTE:** *Parts listed below used for older version switches of the temperature and viscosity controllers:*

| | | |
|---|---|---|
| **1.** | **Temperature SETPOINT ADJUSTMENT – UP ⇑ / ⇓ DOWN** | |
| | 280-125 | Pushbutton Switch – BLUE |
| | 280-135 | Pushbutton Boot |
| **2.** | **Temperature & Viscosity PROGRAM/SETPOINT SWITCH** | |
| | 280-120 | Pushbutton Switch – BLACK |
| | 280-135 | Pushbutton Boot |
| **3.** | **Viscosity SETPOINT ADJUSTMENT – UP ⇑ / ⇓ DOWN** | |
| | 280-130 | Pushbutton Switch – RED |
| | 280-135 | Pushbutton Boot |

# CONTROL PANEL



# CONTROL PANEL PARTS

| KEY | PART NO. | DESCRIPTION |
|---|---|---|
| 1. | 400-401 | Temperature Controller w/Dual Relay |
| 2. | 400-402 | Viscosity Controller w/Quad Relay |
| 3. | 280-085 | Relay |
| | 280-086 | Relay Cover |
| 4. | 220-160 | Flasher |
| 5. | 220-005 | Wilevco Relay |
| 6. | 440-040 | Level Probe Relay |
| 7. | 280-034 | Flow Probe Relay |
| 8. | 260-106 | Telemecanique LC1-D25-F7 Contactor |

**Note:** All contactors are the same. Contactor overloads vary, check your Specification Sheet for details. Additional contactor is used for electric Cryolator drive.

| | | |
|---|---|---|
| 9. | 260-145 | 120-Volt Circuit Breaker |
| 10. | 260-155 | 15 AMP 3 Phase Circuit Breaker or |
| | 260-160 | 30 AMP 3 Phase Circuit Breaker |
| 11. | 220-210 | Heater |
| 12. | 440-060 | In-Zone Timer |
| 13. | 280-195 | Emergency Stop Button |
| 14. | 280-059 | Power Disconnect Switch |
| 15. | 280-058 | Power Disconnect Auxiliary Contact |
| 16. | 280-055 | Power Disconnect Handle |
| 17. | 400-364 | Liquids/Solids Dual Control Timer |
| 18. | 400-400 | Viscosity Potentiometer |

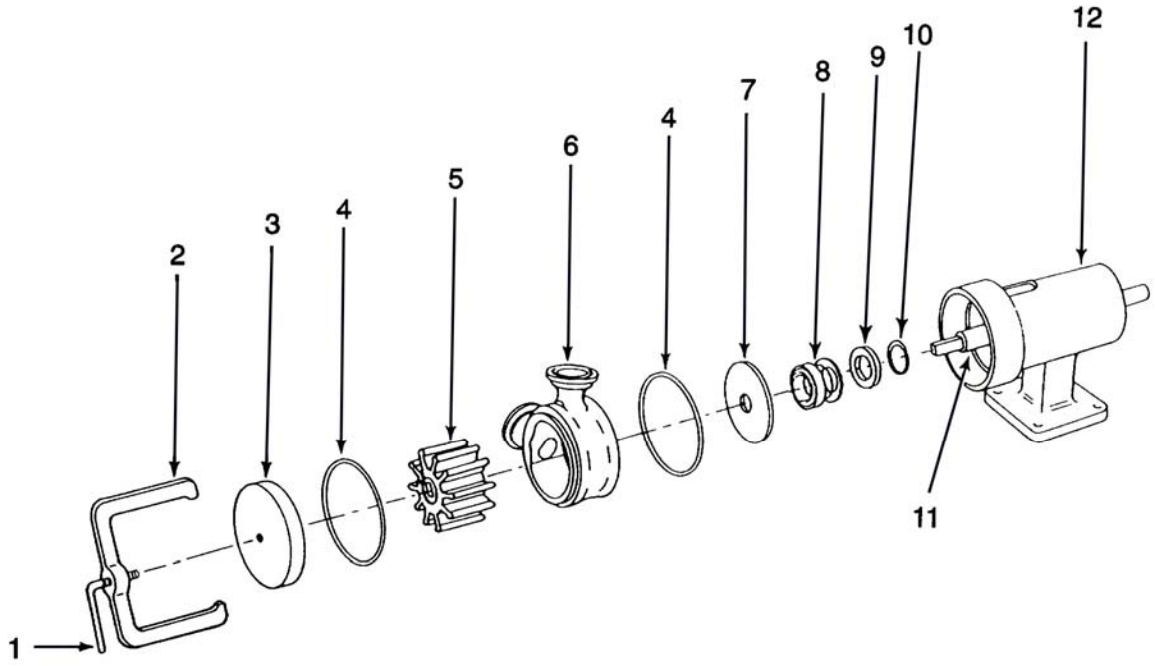
# SPROCKET and BELT DRIVES LIST

| Wilevco Part # | GATES Poly-chain Description |
|---|---|
| **BELTS:** | |
| 120-480 | 8M-640-12mm |
| 120-485 | 8M-720-12mm |
| 120-490 | 8M-800-12mm |
| 120-492 | 8M-896-12mm |
| 120-494 | 8M-1000-12mm |
| 120-495 | 8M-1120-12mm |
| 120-500 | 8M-1200-12mm |
| **BELT SPROCKETS:** | |
| 120-430 | 8M-22S-12 X 7/8 |
| 120-433 | 8M-28S-12 JA |
| 120-434 | 8M-28S-36 X1-1/8 |
| 120-435 | 8M-34S-12 JA |
| 120-436 | 8M-36S-12 JA |
| 120-440 | 8M-38S-12 SH |
| 120-445 | 8M-40S-12 SH |
| 120-448 | 8M-48S-12 SDS |
| 120-449 | 8M-50S-12 SDS |
| 120-450 | 8M-56S-12 SDS |
| 120-455 | 8M-60S-12 SDS |
| 120-460 | 8M-63S-12 SDS |
| 120-461 | 8M-63S-36 SDS |
| 120-464 | 8M-80S-12 SDS |
| **SPROCKET BUSHINGS:** | |
| 120-465 | JA X 5/8 |
| 120-466 | JA X 7/8 |
| 120-467 | JA X 24mm |
| 120-468 | JA X 1 |
| 120-469 | JA X 1-1/8 |
| 120-470 | SH X 7/8 |
| 120-471 | SH X 1-1/8 |
| 120-472 | SH X 5/8 |
| 120-473 | SH X 1-3/8 |
| 120-475 | SDS X 7/8 |
| 120-476 | SDS X 1-1/8 |
| 120-477 | SDS X 1-3/8 |
| 120-479 | SK X 1-3/8 |

# SPROCKET and BELT DRIVES LIST

| Wilevco Part # | Goodyear Eagle PD Description |
|---|---|
| **BELTS:** | |
| 120-650 | Y-640 |
| 120-655 | Y-720 |
| 120-660 | Y-800 |
| 120-665 | Y-896 |
| 120-670 | Y-1000 |
| 120-675 | Y-1120 |
| 120-680 | Y-1200 |
| **BELT SPROCKETS:** | |
| 120-555 | Y-22S X 7/8 |
| 120-561 | Y-28S X 7/8 |
| 120-570 | Y-34S-H |
| 120-575 | Y-36S-H |
| 120-580 | Y-38S-SH |
| 120-585 | Y-40S-SH |
| 120-590 | Y-48S-SDS |
| 120-595 | Y-50S-SDS |
| 120-600 | Y-56S-SDS |
| 120-605 | Y-60S-SDS |
| 120-610 | Y-63S-SDS |
| 120-615 | Y-80S-SDS |
| **SPROCKET BUSHINGS:** | |
| 120-510 | H X 5/8 |
| 120-520 | H X 7/8 |
| 120-521 | H X 1-1/8 |
| 120-474 | SH X 7/8 |
| 120-475 | SH X 1-1/8 |
| 120-476 | SH X 5/8 |
| 120-477 | SH X 1-3/8 |
| 120-475 | SDS X 7/8 |
| 120-476 | SDS X 1-1/8 |
| 120-477 | SDS X 1-3/8 |
| 120-479 | SK X 1-3/8 |

# Jabsco 15500 Series




| Key Number | Part Name | Wilevco Part Number | | | |
|---|---|---|---|---|---|
| | MODEL | S10 | S30 | S50 | S70 |
| 1 | Clamp Screw | 660-005 | 660-010 | 660-015 | 660-016 |
| 2 | Clamp | 660-095 | 660-100 | 660-105 | 660-106 |
| 3 | End Cover | 660-130 | 660-131 | 660-132 | 660-133 |
| 4 | O-Ring (2) | 020-005 | 020-010 | 020-015 | 020-017 |
| 5 | Impeller | 660-125 | 660-150 | 660-155 | 660-166 |
| 6 | Body | 660-250 | 660-251 | 660-252 | 660-253 |
| 7 | Wearplate | 660-260 | 660-261 | 660-262 | 660-263 |
| 8 | Shaft Seal | 660-240 | 660-240 | 660-241 | 660-242 |
| 9 | Shaft Seal Washer | 660-235 | 660-235 | 660-236 | 660-236 |
| 10 | Washer Retaining Ring | 660-230 | 660-230 | 660-231 | 660-232 |
| 9/10 | Seal Collar (sub above) | 660-270 | 660-271 | 660-272 | 660-273 |
| 11 | Shaft | 660-255 | 660-256 | 660-257 | 660-258 |
| 12 | Bearing Housing Complete | 660-035 | 660-040 | 660-045 | 660-046 |
| | Bearing Seal (2) | 660-020 | 660-025 | 660-030 | 660-031 |
| | Bearing (2) | 020-050 | 020-055 | 020-080 | 020-081 |
| | Retaining Ring (Shaft) | 020-230 | 020-260 | 020-250 | 020-257 |
| | Retaining Ring (Housing) | 020-235 | 020-240 | 020-245 | 020-247 |

*See Jabsco Parts list for Jabsco Part Numbers

# PRODUCT PAGE

PRODUCTION LINE NO. _____ POSITION NO. _____

MIXER SERIAL NO. _____

PRODUCT: _____

SIZE, WEIGHT, COUNT: _____

**WILEVCO DISPLAY SETTINGS: VISCOSITY** _____

**TEMPERATURE** _____

**WILEVCO GATE SETTING:** NUMBER OF OPEN NOTCHES _____

**WILEVCO WATER RATE:** _____ GPM

% PICK-UP _____

BATTER MIX MFR. & NO. _____

BREADER MFR. & NO. _____

PREDUST: _____

BATTER APPLICATOR SETTINGS: _____

BLOWER SETTING: _____

BREADER SETTINGS: _____

COMMENTS: _____

_____

_____

_____

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_____

# PRODUCT PAGE

PRODUCTION LINE NO. _____ POSITION NO. _____

MIXER SERIAL NO. _____

PRODUCT: _____

SIZE, WEIGHT, COUNT: _____

**WILEVCO DISPLAY SETTINGS: VISCOSITY** _____

**TEMPERATURE** _____

**WILEVCO GATE SETTING:** NUMBER OF OPEN NOTCHES _____

**WILEVCO WATER RATE:** _____ GPM

% PICK-UP _____

BATTER MIX MFR. & NO. _____

BREADER MFR. & NO. _____

PREDUST: _____

BATTER APPLICATOR SETTINGS: _____

BLOWER SETTING: _____

BREADER SETTINGS: _____

COMMENTS: _____

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