STERICO TEMPERATURE CONTROL UNIT SERVICE AND INSTRUCTION MANUAL MODEL - 6016-M

Engineered and manufactured by INDUSTRIAL CONTROL DIVISION STERLING, INC.

5200 West Glinton Avenue, Milwaukee, Wisconsin 53223 Manufacturers of Temperature Control Equipment since 1916

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WODEL COIC-M.

DESCRIPTION:

FLUID HEATING:

Heating of the fluid is accomplished through the specially designed low watt density electrical immersion heater inserted into the heater tank; the immersion heater temperature is controlled by the manual indicating thermostat mounted on the front of the control panel — a safety thermostat is installed on the electrical panel; this safety thermostat is set at 530° F. during testing at the factory. The safety thermostat has its own sensing bulb inserted in the heater flange completely separated from the control system.

The Model 6016-M is supplied with a 6-FW, 3-phase low watt density immersion heater; activating a magnetic contactor.

A 2" heater tank is used for the 6 KW immersion heater.

208V, 240V, 380V, 415V, 480V, 6COV

6 KW

10 GPM @ 30 PSI

20,490 BTU/hr.

CIRCULATION:

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Circulation of the fluid is controlled by a slow speed, high temperature, positive displacement purp, which is belt-driven by the electric motor. It may be supplied with a drip return pump as an option.

We can supply a field installation kit of a Drip Return Pump #C-682-00380-1 for units that were originally supplied with a drip pan only.

The packed prop drips oil; this indicated that the purp is getting proper lubrication: it is very important that this is kept clean.

CCOLING:

A specially designed shell and tube type heat exchanger of copper nickel with stainless steel expansion joints is provided as standard equipment in these units. The standard size offered is approximately 1.5 sq. ft. in surface area.

FUL-FLO VALVE:

The purpose of this valva is a safety device that in the event the delivery line has been obstructed and the pressure in the line exceeds the set pressure on the pressure gauge, the Ful-Flo Valve will open and divert the fluid back into the return line.

CIRCULATING CONNECTION LINES:

Delivery and return lines of the unit are 1" female pipe thread. These lines are located at the top of the unit.

The Model 6016-M is equipped with a heat exchanger, a water supply line rated at 65 EST maximum is required and a drain line is necessary. (Caution: The drain line should be directed away from parsonnel and flow directly into an open drain. This drain line must not have any back pressure or obstructions).

Requirements for water connections are:

SUPPLY	, ,	1	, ,	DRAIN
1/2"				3/4"

Sterling Inc. stocks the recommended types of Flexible Metal Hoses in many lengths; our P/N A-572-16969-00. Please state length requirements when ordering.

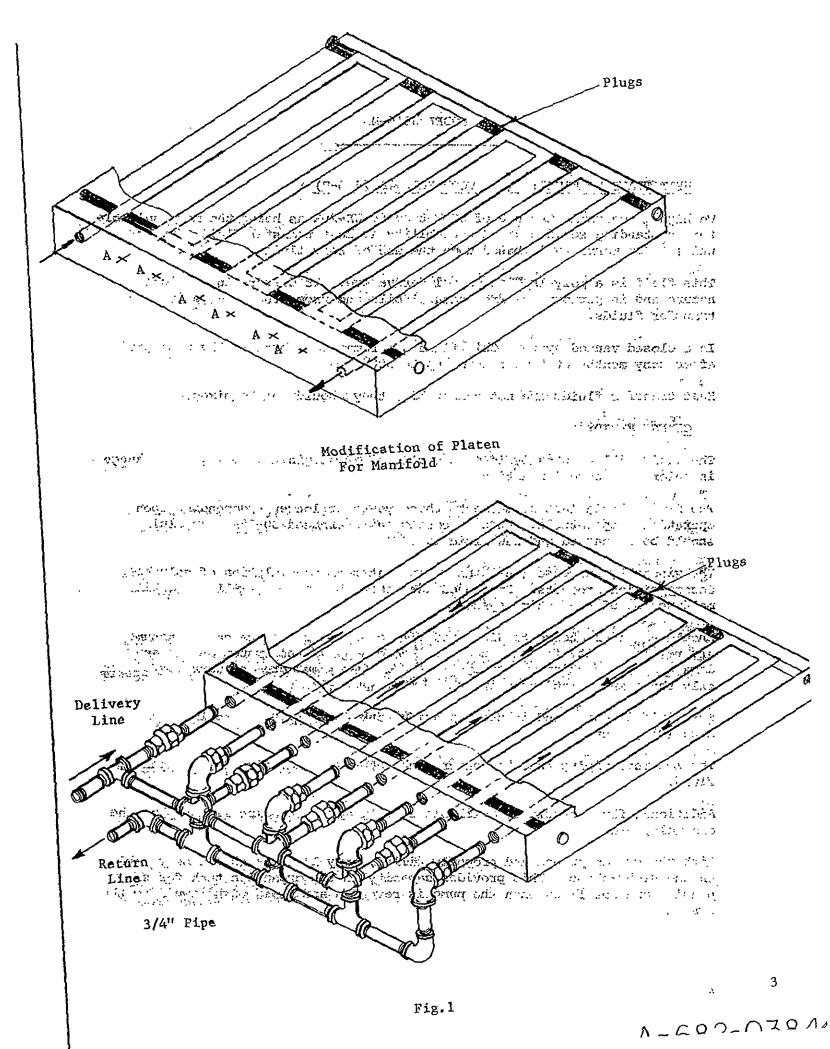
Hoses must be adequate to withstand the maximum temperatures and pressures at which the unit is to be operated.

Hoses, fittings and channel connections in the mold or other equipment being controlled should be at least 1/4" in order not to restrict the flow of fluid through the circuit; if the flow is restricted by too small of connecting hoses or hoses with excess bends, loops, etc., the pressure relief valve will open and the flow through the internal circulating lines will be greatly reduced.

If your cold, (i.e. has already been made with serpentine channeling), we would like to suggest modification as shown in Fry. A-682-03844 and using a manifold, preferably of 3/4" NPT pipe.

In order to eliminate any back pressure, it would be advisable to drill holes at points 'A' and tap for 3/4" pipe.

Several parallel runs are far more practical than one long serpentine run and in many cases, can make a difference between precise control and erratic operation.



MODEL GGL6-M

HEAT TRANSFER FINID: (Sie UCON Bul. #F-7490-F)

We highly recommend the use of UCON-type 50-HE-20X as being the most suitable for outstanding survice and dependability as heat transfer fluids for our units. Our warranty is based upon the use of this fluid.

This fluid is a polyalkaline glycol derivative. It differs in chemical nature and in performance from natural oils and from other synthetic heat transfer fluids.

In a closed vented system, this fluid has remained substantially unchanged after many months at temperatures up to 500° F.

Heat transfer fluids are not compatible, they should not be mixed.

CHANGE FLUID:

The fluid will eventually lose it's clarity and begin to darken, this change in color is a normal reaction.

The fluid should last from one to three years or longer - depending upon operation temperatures. When viscosity has increased 30-35%, the fluid should be discarded and new fluid added.

The viscosity increase: (thickening) indicates an accumulation of soluable decomposition products. Prolonged use of thickened fluid will result in malfunction of the entire system.

Should the user choose to disregard our recommendations, we cannot assume any responsibility for the successful operation of the system or for any damage or malfunction which might result. Our manufacturing warranty covers only those installations using the recommended fluid.

The fluid is contained in the expansion tank which holds approximately nine (9) gallons.

The internal piping and the heater tank requires about five (5) gallons of fluid.

Additional fluid should be available to fill the connecting lines; plus the channels, etc.

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With the system purged and properly filled, only 1" to 2" should be visable in the sight-glass. This provides capacity in the expansion tank for expansion and for fluid when the pump is reversed and fluid withdrawn from the system.

VENT CONNECTION:

On the back of the units is a fill connection and a "Vent Connection".

At higher temperatures where the liquid may give off appreciable vapors or fumes, adequate ventilation should be provided on this connection. This vent connection must not be closed at any time. The vapors from the UCON fluid are non-toxic, non-irritating.

If a long vent is required, it is suggested that the vent be trapped near the exit to collect the moisture which can develop on the vent when the unit is cooled.

atmosphere.

PERFORMANCE:

The Model 6016-M single-zone, heating and cooling unit is a simple unit to operate.

There are four basic electrical controls, plus a pressure vacuum gauge and a manual temperature controller:

START ON-OFF STOP LOCK

START:

When this button is depressed, the starter is manually energized and supplies power to the motor. Voltage is applied to the transformer, which in turn applies power to the ON-OFF switch.

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ON-OFF SWITCH:

When the switch is in the "ON" position, power is applied to the temperature controller, which in turn regulates either "heating or cooling".

When this switch is in the "OFF" position, the unit is neither heating or cooling, but is circulating.

STOP:

When the button is depressed, the starter is manually de-energized cutting the voltage to the motor and transformer, making the complete electrical control (115V) system de-activated.

LOCK:

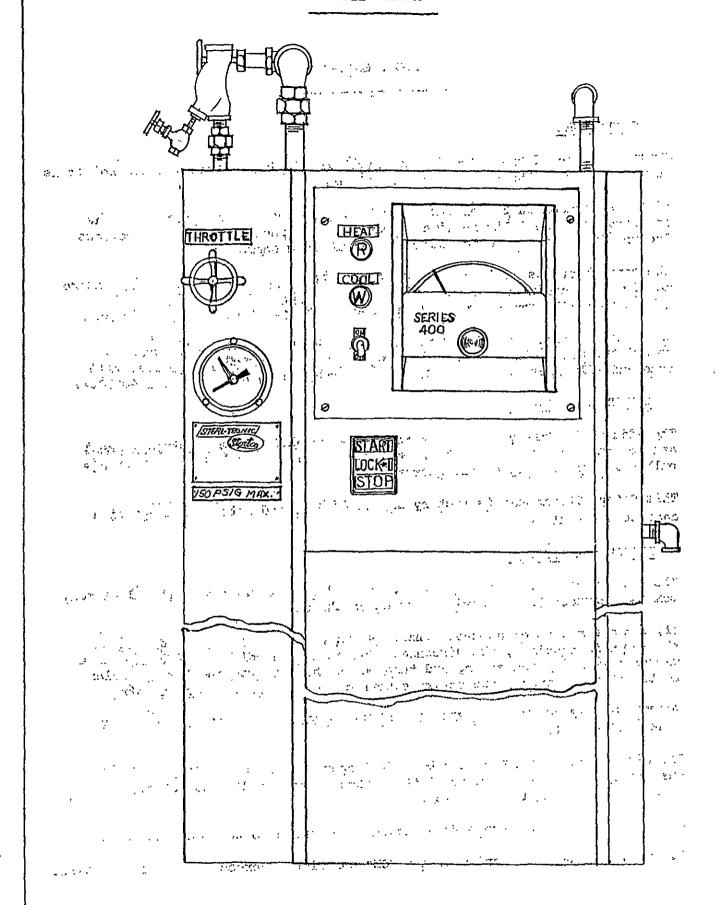
When the switch is in the "STOP" position, the lock can be pulled out. A padlock can be inserted in the lock to prevent anyone from starting the unit.

PRESSURE GAUGE:

This compound pressure gauge has dial reading in inches of mercury vacuum and pounds per square inch pressure.

The red arrow is set to indicate pressure at which the Ful-Flo Valve is fully open.

The black arrow indicates the actual pressure the pump is developing.



TEMPERATURE CONTROLLER:

Control action of this electro-mechanical indicating temperature controller is provided through the principal of liquid change.

With a variation in temperature, the liquid in the sensing bulb, which is inserted into the delivery line, expands or contracts, causing the bellows located inside the case to actuate the switching mechanism.

The controller has an integral set stop to limit the maximum set temperature to 500° F. Turning the control knob to the right, the indicator needle (black top) will move; this is to be set at the point of heat requirement.

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The black indicator needle shows the actual heat, as it slowly advances toward the heat setting. When the two needles are aligned, the heat will autoratically shut off. (See Controller Instruction Sheet - Model 40-702).

SAFIEY THERMOSTAT:

The adjustable Safety Thermostat is mounted in the inside electrical panel and has it's own sensing bulb which is installed in the heater tank flange bulb well, on the top of the heater tank.

This Safety Thermostat is factory set at 450° F. and acts as a protection against overheating.

DISCONNECT SWITCH:

The Disconnect Switch Lock Handle is mounted on the outside of the electrical box and controls the electrical system of the unit.

If, for one reason or another, while the unit is in operation and a fast shut-down is required, the Disconnect Switch Lock Handle acts the same as a master switch, by depressing and turning the handle from the "ON" position to the "OFF" position, the entire electrical system of the unit is off.

(CAUTION: THE THREE WIRES FROM THE POWER SOURCE TO THE TOP OF THE SWITCH ARE STILL, "HOT").

The Disconnect Switch Lock can be made inoperable in the "OFF" position by pushing up on the small lever of the bottom of the handle and putting a regular lock through the opening.

This method prevents anyone from turning the handle to the "ON" position.

In order to place the handle in the "ON" position, depress the handle and turn.

MODEL 6016-M PRELIMINARY OPERATION

INSTALLATION:

INITIAL PROCEDURES:

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This unit is supplied for the 3-phase operation for a selected voltage. Caution must be taken to provide a correctly sized power supply to the unit. This unit must be properly grounded.

All electrical connections must be secure and should be checked before the state of the s

ELECTRICAL:

It will be necessary to drill a hole in the cabinet for a power supply

HEATER CAP.	TOTAL AMPS	٠.	•	TOTAL AMPS
each circuit KW .)	3/60/220	~ <u>-</u>		3/60/440

6 KW

WATER SUPPLY: (See Page 2)

2 18 25

(See Päge 5)

CIRCULATION: (See Dwg. C-682-03839)

FLOW DIAGRAM: (Heating & Cooling)

HEATING:

With the "ON-OFF" switch in the "ON" position, the motor will run and activate the pump, the heat indicator light will illuminate RED.

The fluid is drawn down to the pump by gravity feed; as the fluid is circulated through the pump, a pressure will be indicated on the pressure gauge.

The fluid travels into the bottom of the heater tank where it is heated (relative to the heat requirements set on the temperature controller) by the immersion heater.

As the pressure builds up on the pressure gauge and the fluid reaches the top of the tank, the heat sensor indicates the temperature on the temperature controller.

The fluid is forced into the shell of the heat exchanger (which includes separate cooling tubes) and into the delivery process supply connecting line and circulated through the mold.

NOTE: If the pressure in the line is greater than the set pressure on the pressure gauge, the fluid will by-pass the delivery to the process supply and will be diverted through the Ful-Flo (Safety Valve) back in the return line.

As it is circulated through the mold, the fluid cools down slightly and is returned from the mold to the return connecting line, back through the strainer which collects any foreign matter and back down the return line into the pump and recirculated back into the heater tank.

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CAUTION: It is very important that the sight gauge glass indicates that there is is an ample supply of fluid contained in the fluid expansion tank. An inch or two visable in the sight gauge glass is sufficient after the unit is properly purged.

COOLING:

With the "ON-OFF" switch in the "ON" position, the motor will run and activate the pump, the cool indicator light will illuminate WHITE.

The hot fluid will flow the same way as in the heating cycle, except that the heater will be disengaged and the solenoid valve will be activated and cold water from water supply line will flow through the strainer, solenoid valve, throttle valve and check valve into the bottom of the heat exchanger, circulating through the cooling tubes inside the heat exchanged and cooling the hot fluid circulating around the cold tubes.

The circulation of water is then routed out through the drain line.

MODEL 6016-M PRELIMINARY OPERATION

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FILLING THE TANK WITH FLUID:

The expansion tank holds nine (9) gallons of fluid; the internal piping and the heater tank require five (5) gallons of fluid.

Additional fluid should be added to fill the connecting lines, plus the channels in the mold.

As the unit is operating in the heating cycle - the fluid expands; caution must be taken to never over fill the tank.

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START-UP PROCEDURES: (See Dwg. C-682-03839)

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- 1. Close the Return Line Valve.
- 2. Place a small container under the opened Blow-Off Valve to catch the fluid.
- 3. Position the "ON-OFF" switch to the "ON" position. Check motor rotation by observing the pressure gauge. If indicating pressure, rotation is correct; if indicating vacuum, reverse the two motor connections.
- 4. If there is any air in the lines it will come out of the Blow-Off Valve.
- 5. Allow the unit to run for a brief period for complete circulation, watch the flow coming out of the Blow-Off Valve for bubbles or erratic flow.
- 6. When the fluid runs steadily, close the Blow-Off Valve.

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- 7. Open the Return Line Valve.
- 8. Re-check the Sight Gauge Glass.

OPERATION: (Heating only)

- 1. Set the desired temperature on the Temperature Controller.
- 2. Turn the "OFF-ON" switch to the "ON" position.
- 3. The heat indicator will illuminate (RED) indicating that the unit is in the heating cycle.

If the fluid is cold, the black indicator needle could exceed the setting of the red indicator set point, but as the fluid heats the black indicator needle will indicate system pressure, and unless severe restrictions are in the system, should indicate about 10 PSI below the red indicator. As the circulating fluid is heated, the temperature of the fluid is recorded by the heat indicator needle; as it reaches the previously set temperature, the heater will shut off. As the fluid cools down below the set point, the heater will come back on and maintain a controlled heat.

CIRCULATION:

FLOW DTAGRAM: (See Dwg. C682-03839)

With the "ON-OFF" switch in the "ON" position - the motor will run and activate the pump.

The fluid is drawn down to the pump by gravity feed; as the fluid is circulated through the pump, a pressure will be indicated on the pressure gauge.

The fluid travels into the bottom of the heater tank where it is heated (relative to the heat requirements set on the temperature controller) by the immersion heater.

As the pressure builds up on the pressure gauge and the fluid reaches the top of the tank, the heat sensor indicates the temperature on the temperature controller.

The fluid is forced up to the delivery process supuly connecting lines and circulated through the wold.

NOTE: If the pressure in the line is greater than the set pressure on the pressure gauge - the fluid will by pass the delivery to the process supply and will be diverted through the Ful-Flo (safety valve) back to the return line.

As it is circulated through the mold, the fluid cools down slightly and is returned from the mold to the return connecting line - back down the return line into the pump and recirculated back into the heater tank.

CAUTION:

It is very important that the sight gauge glass indicates that there is an ample supply of fluid contained in the fluid expansion tank. An inch or two visable in the sight gauge glass is sufficient after the system is properly purged.

COOLING

THROTTLE VALVE:

The Throttle Valve is used as a control valve to regulate the amount of cold water entering the bottom of the Heat Exchanger, circulating up into the cooling tubes to cool down the circulating hot fluid.

The time lapse between heating and cooling can be regulated by this valve.

If the "COOL-HEAT" indicator light switches from "COOL" to "HEAT" in rapid succession, too much cold water is entering the cooling tubes; results could damage the Heat Exchanger.

Close the Throttle Valve to a point where a rassonable time element is established, depending upon the temperature of the mold.

CHECK VALVE:

This vertical lift check valve eliminates the back flow of water from the heat exchanger.

BLOW-OFF VALVE:

The Blow-Off Valve is used to clean out the brass filter screen of foreign materials brought in with the water supply.

DRAIN VALVE:

This Drain Valve is used to completely drain the entire unit of fluids. A hose line or a pipe can be connected to the valve and directed to a floor drain or a container.

PRESSURE RELIEF VALVE:

This Pressure Relief Valve is rated at 150 PSI and its function is to protect the heat exchanger,

If the drain line is restricted and the pressure exceeds 150 PSI, the valve will open up to release the pressure in the line.

As soon as the pressure returns to normal (65 FSI) the valve will close.

MODEL 6016-M PREVENTATIVE MAINTENANCE

Periodic inspection of the following equipment must be made to maintain optimum performance of your Sterleo Temperature Control Unit.

MOTOR:

- 1. Clean out the motor air intake grill of dust and any oil accumulation.
- 2. Check the bolts and nuts that hold the motor to the support.
- 3. Make certain that the belts are aligned with the pump. Replace if necessary.

PUMP:

- 1. It is a good practice to keep the pump as clean as possible. This will facilitate inspection, adjustment and repair work and help prevent omission of lubrication to fittings covered or hidden with dirt.
- 2. Check the bolts and nuts that hold the pump to the support.
- 3. Make certain that the belts are aligned with the motor.

Under normal operating conditions, the pump packing should allow a drop or two of oil per minute. The packing is of the finest type available for this service and it depends upon a small amount of oil flow for lubrication.

When the new unit is first started, the packing should be checked periodically and tightened as the pump wears in.

Do not over-tighten the packing gland to a point where the pump will not drip. This will shorten the life of the packing and will damage the shaft.

4. Grease all zerks after 500 hours of operation or after 60 days, whichever comes first.

Use #2 ball bearing grease. If the pump is hot, use a high temperature.

VENT CONNECTION:

- 1. Check connecting lines for leaks.
- 2. Check to see if vent connections are open at all times.

DRAIN LINE:

1. Check outlet of drain line for any obstructions or back pressure.

DRIP FAN:

1. Clean any fluid, dust, or dirt accumulation from pan.

PREVENTATIVE MAINTENANCE (continued)

FLUID:

- 1. Check the fluid for viscosity. Prolonged use of thickened fluid will result in malfunction of the entire system.
- 2. Check level of fluid in the sight glass.
- 3. If fluid level decreases, check all connections for leaks.

HEAT EXCHANGER:

- 1. Keep exterior of the heat exchanger clear of dust or dirt.
- 2. Check water supply line for correct pressure, leaks, etc.

STRAINERS:

1. Clean out the strainers twice a year, as a minimum, depending upon usage and operating conditions.

TROUBLE SHOOTING

RAPID DROP IN PRESSURE:

PROBABLE CAUSE

- a.) Leaks in connecting lines
- b.) Air in circulating lines
- c.) Low fluid
- d.) Ful-Flo Valve
- e.) Pressure line

NO PRESSURE:

(See 'Rapid Drop in Pressure)

- a.) Excess pump pressure
- b.) Water in circulating line

TEMPERATURE CONTROLLER:

a.) Heat indicator needle does not match the heat of the mold.

HEATING & COOLING: (Heating, but no Cooling)

- a.) Low or no water
- b.) Throttle valve closed
- c.) Blow-Cff valve inoperable
- d.) Solenoid valve inoperable
- e.) Clogged strainer
- f.) Clogged drain line

COOLING TOO FAST:

- a.) Throttle valve
- b.) Solenoid valve dirty

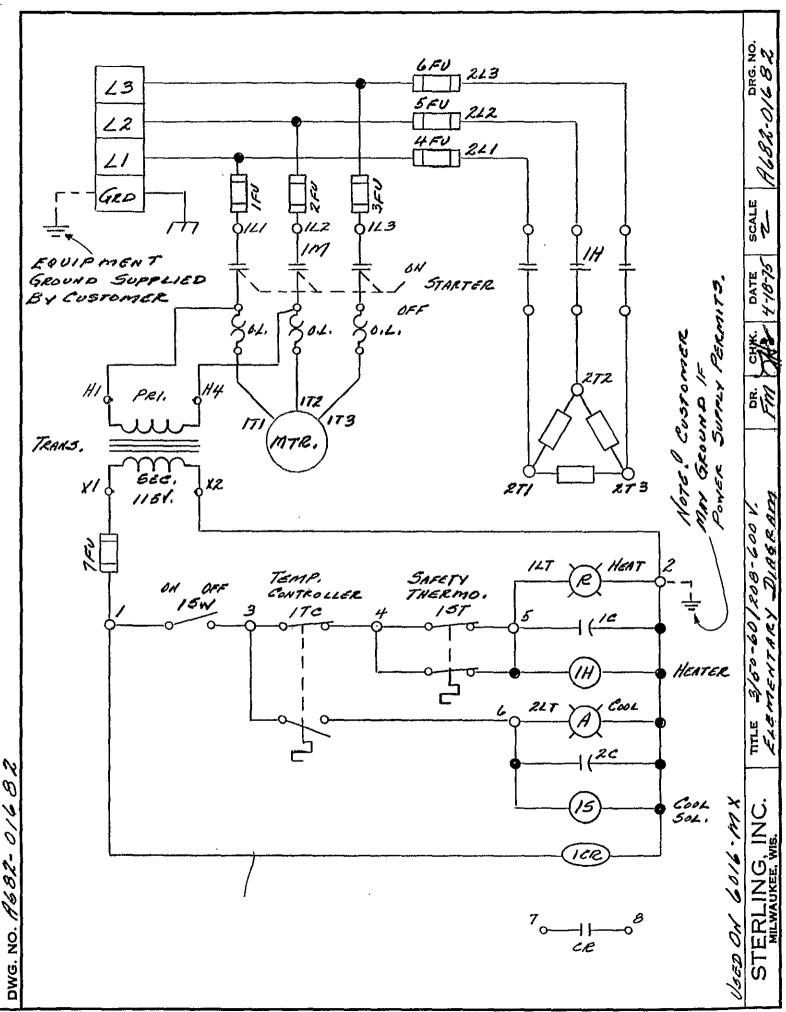
COOLING TOO SLOW:

a.) Throttle valve

PROBABLE REMEDY

- a.)Check all connecting lines
- b.)Refer to pages 11 & 14 procedures
- c.) Check sight gauge glass
- d.) Broken spring, valve stuck open
- e.) Check for broken line, loose connections.
- a.) Adjust thrust bearing
- b.) Refer to pgs 13 & 14 'Start-Up' procedures
- a.) Release the locknut. Turn the "Offset Adjusting Nut" right or left to change the F^o setting. Retighten the locknut.
 (See Fenwall Bul. (Fig. 2)
- a.) Check pressure of water supply line
- b.) Adjust the valve
- c.) Close valve tight
- d.) Check valve for proper operation.
 Watch the drain line
- e.) Dirt from strainer entered solenoid valve
- f.) Disconnect and check the line
- a.) Close the valve slightly
- b.) Check valve for proper operation.
- a.) Open the valves slightly, Watch drain line

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SPARE PARTS - MODEL 6016-M

PART NO.	DESCRIPTION	PRICE
075-00081 075-00039 100-00001	Pump - (HL-124-L)(W/O Press. Relief Valve) Pump - (HL-124-L) (W/ Press. Relief Valve) Pulley - Pump	\$293.00 435.00 9.50
720-09216-13	Motor - 1/2 H.P. 3/60/50/208,220-440V	87.00
100-00019	Pulley - Motor	4.00
100-00005	"V" Belt - (4L340)	3.00
729-00027 729-00038 729-00045	Contactor - 30 AMP (Honeywell) Contactor - 30 AMP (C.H.) Contactor - 30 AMP (ITE)	30.50 26.00 22.00
726-00033	Starter - Motor - Size "O" (A.B.)	57.50
704-00027	Transformer (200VA-460/230V-115-50-60 Hz)	34.00
725-00557	Fuse - Main - FRS-20	7.00
725-00506	Fuse - Control - FNM- 1 1/4A	2,00
725-00539	(230 Volt Power Supply) Fuse - Motor - FRN-3.5 @ 250V	1.50
725-00574	(460 Volt Power Supply) Fuse - Motor - FRS - 1.8 @ 600V.	5.00
724-00034	Thermostat - Safety W/Stop at 450°	44.00
724-00009	Controller - Dual (Circuit)	195.00
037-00041	Gauge - Pressure Vacuum	27.50
715-10019 715-10020	Pilot Light Receptacle (White) Pilot Light Receptacle (Red)	4.00 4.00
717-04006	Switch - Heater Control	4.50
542-00003	Insulation - Tank	7.50
542-00007-06	Gasket - Heater Tank	.70
722-00043-01 722-00043-02	Immersion Heater - 2" - 6 KW - 240V Immersion Heater - 2" - 6 KW - 480V	111.00 109.00
731-	Over-Load Elements - RXf. to A.B. Bulletin 815	4.00

Please give model and serial number when ordering parts. This is necessary to furnish the correct replacements. TERMS: 30 days F.O.B. Milwaukee, Wisconsin Prices are subject to change without notice.

5200 W. Clinton Avenue, Milwaukee, Wisconsin 53223 STERLING, INC.

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SPARE PARTS - MODEL 6016-M

PART NO.	DESCRIPTION	PRICE		
732-00012	Valve - Solenoid, 1/2" - 115V	\$ 41.50		
044-00013	Valve - Check , 1/2"	12.00		
041-00138	Valve - Pressure Relief	10.00		
106-00024	Heat Excannger, 1.5 sq. ft.	115.00		
573-00004 573-00003-1	Screen - "Y" Strainer - 1/2" Screen - "Y" Strainer - 1"	1.00		
162-00017-01	Sight Gauge Glass	3.00		
FLEXIBLE METAL HOSES				
572-16969-05 572-16969-03 572-16969-10		63.00 81.00 98.00		
572-16969-02 572-16969-06 572-16969-12	3/4" x 8 ft.	91.50 119.50 145.50		
572-16969-07 572-16969-04 572-16969-08	1" x 6 ft. 1" x 8 ft. 1" x 10 ft.	117.00 152.00 185.00		

Please give Model and Serial Number when ordering parts. This is necessary to furnish the correct replacements. TERMS: 30 days F.O.B. Milwaukee, Wisconsin. Prices are subject to change without notice.

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