Operators Manual

Model 9805
Large Volume
Refrigerated Open Bath

Microprocessor Controller Digital Set & Read
with High Flow Centrifugal Pump

110-085
4/6/11

Table of Contents

Section 1 - General Information

1.1 Warranty

Thank you for your purchase, we are confident it will serve you for a long time. Our warranty to you is as follows:

The manufacturer agrees to correct for the original user of this product, either by repair, or at the manufacturer's election, by replacement, any defect which develops after delivery of this product within the period as stated on the warranty card. In the event of replacement, the replacement unit will be warranted for 90 days or warranted for the remainder of the original unit's parts or labor warranty period, whichever is longer.

If this product should require service, contact the manufacturer/suppliers' office for instructions. When return of the product is necessary, a return authorization number will be assigned and the product should be shipped, transportation charges pre-paid, to the indicated service center. To insure prompt handling, the return authorization number should be placed on the outside of the package and a detailed explanation of the defect enclosed with the item.

This warranty shall not apply if the defect or malfunction was caused by accident, neglect, unreasonable use, improper service, or other causes not arising out of defects in material or workmanship. There are no warranties, expressed or implied, including, but not limited to, those of merchantability or fitness for a particular purpose which extends beyond the description and period set forth herein. The manufacturer's sole obligation under this warranty is limited to the repair or replacement of a defective product and the manufacturer shall not, in any event, be liable for any incidental or consequential damages of any kind resulting from use or possession of this product.

"Warranty applies only to the original enduser and cannot be transferred or sold to another end user without written consent from the manufacturer."

Some states do not allow: (A) limitations on how long an implied warranty lasts or (B) the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

1.2 Unpacking

Your circulating bath is shipped in a special crate. Retain the crate and all packing materials until the unit is completely assembled and working properly. Set up and run the unit immediately to confirm proper operation. Beyond one week, your unit may be warranty repaired, but not replaced. If the unit is damaged or does not operate properly, contact the transportation company, file a damage claim, then contact the company where your unit was purchased.

1.3 Package Contents

– Open Refrigerated Circulating Bath
– Operators Manual
– Warranty Card

1.4 Description

This bath provides open bath cooling power for applications which require a large reservoir. All models have a microprocessor controller, digital set/read and readout in °C or °F. The refrigeration system has modulation capability to provide cooling as needed and thus greater temperature stability and longer compressor life. Wettable parts are brass, copper, polypropylene, PVC and stainless steel. Refer to the serial number plate on rear of the bath for model and electrical data.

1.5 Specifications

Refer to the serial number plate on rear of the bath for electrical data.

Model 9805

Specification		
Compressor		1 HP
Temperature Range		–10° to 60°C
Temperature Setability		0.1°C
Temperature Stability		±0.5°C
Overall Dimensions	in.	44 x 301/2 x 371/2
(w x l x h)	cm	111.8 x 77.5 x 95.3
Reservoir Capacity		50 gal / 189 Liters
Reservoir Dimensions	in	32 x 22 x 16
(w x l x h)	cm	81.5 x 55.8 x 44.5
Heater		2200 Watts
Cooling Capacity @	0°C	940 Watts
	10°C	1925 Watts
	20°C	2850 Watts
Pump Flow		4.3 gpm / 16.3lpm
Electrical Specifications		208-230V, 1ph, 15A

Section 2 - Operation

Before proceeding, be sure all power controls are off.

2.1 Set Up & Location

Locate the bath on a strong, level surface. Position the bath for unobstructed air flow through the front and rear screens. Avoid voltage drops by using properly grounded power outlets wired with 14 gauge or larger diameter wire. If possible, be close to the power distribution panel. Minimize low line voltage problems by eliminating the use of extension cords.

2.2 Reservoir Fluids

Use a fluid in the bath that will flow freely. For most applications above +15°C, distilled water is satisfactory. Do not use hard tap water or extremely pure deionized water which may promote corrosion of the stainless steel reservoir.

Laboratory grade ethylene glycol & water (50/50) must be used for applications from +15° to –15°C. This bath, its internal components, and the fluid must be protected from freezing starting at +15°C.

To optimize temperature stability (when operating at low temperatures and high room temperature conditions, or when using the bath at elevated temperatures) it is recommended blanketing the fluid with floating polyethylene balls (Cat. No. 060301). The balls provide an insulating barrier over the surface and are easily pushed aside to access immersed samples.

Only use fluids that will satisfy safety, health and equipment compatibility requirements. Caustic, corrosive or flammable liquids must not be used.

WARNING: Do not use a flammable fluid as a fire hazard may result.

You are responsible for proper selection and use of the fluids.
Extreme range operation should be avoided.

Stay within the fluid's normal range for best temperature stability, low vaporization, and safety.

FLUID DESCRIPTION	SPECIFIC HEAT @25°C	NORMAL RANGE	EXTREME RANGE
Water	1.00	10°C to 90°C	2°C to 100°C
Ethylene Glycol 30% / Water 70%	.90	0°C to 95°C	-15°C to 107°C
Ethylene Glycol 50% / Water 50%	.82	-25°C to 100°C	-35°C to 115°C
Ethylene Glycol 100%	.62	50°C to 120°C	-35°C to 125°C
Methanol 60% / Water 40%	.52	-45°C to 0°C	—
Dynalene™-HC 50	.76	-50°C to 60C°	-62°C to 60°C
DC200 5 cs Silicone Oil	.32	-35°C to 65°C	-50°C to 125°C*
DC200 10 cs Silicone Oil	.34	-20°C to 80°C	-35°C to 165°C*
DC200 20 cs Silicone Oil	.36	0°C to 100°C	-10°C to 230°C*

***WARNING - Fluid's flashpoint temperature.**
DC fluids are manufactured by Dow Corning.

DO NOT use the following fluids:

1. Automotive antifreeze with additives
2. Hard tap water
3. Deionized water with a resistance > 1 meg ohm
4. Any flammable fluids
5. Concentrations of acid or bases
6. Bleach (Sodium Hypochlorite)
7. Solutions with chromates or chromium salts
8. Solutions with halides: chlorides, fluorides, bromides, iodides or sulfur

2.3 Reservoir Drain

For easy cleaning, there is a reservoir drain at the rear of the unit. The drain cap has a button-like seal to prevent leakage, part # 300-235. Replace the seal if leakage occurs. The drain outlet size is standard refrigeration 1/4 inch SAE. The pipe thread is 7/16 inch diameter with 20 threads per inch.

2.4 Power

After attaching the removable line cord to the back of the unit, plug the cord into a properly wired, grounded outlet with the same voltage and frequency indicated on the identification label on the back of the unit.

The power supply must be single phase, 208-230V. The circuit breaker on the rear of the unit must be ON. With the power button on the control panel OFF, but with the bath plugged in, the display responds by showing standby (....). If there is no response, verify the circuit breaker on the rear of the unit is in the ON position.

Use of an extension cord is not recommended. If necessary, use an extension cord that is properly grounded and will handle the total wattage of the unit. The extension cord should not cause a voltage drop to the bath.

Warning! When refrigeration is switched off, it should not be restarted for approximately 10 minutes in order to allow the internal pressures to equalize. System damage could result if you do not observe this waiting period.

NOTE: The Chiller incorporates a special lockout "LLO" feature that can be enabled to prevent unauthorized or accidental changes to set point and other operational values. This feature is described in detail in Section 2.8. It should not be enabled until all operational parameters are set.

2.5.1 Selecting the Temperature Unit (°C or °F)

The LEDs adjacent to the Temperature Display indicate the unit (°C or °F) used for temperature displays. To change from °C to °F or vice versa, proceed as follows:

To change to °F — Place the Circuit Breaker/Power Switch on the rear of the instrument in the "Off" position. Press and hold the Units/Menu Select Button while returning the Circuit Breaker/Power Switch to the "On" position.

To change to °C — Place the Circuit Breaker/Power Switch on the rear of the instrument in the "Off" position. Press and hold the Power Button on the front panel while returning the Circuit Breaker/Power Switch to the "On" position.

IMPORTANT: All user settings, except baud rate and calibration offset, return to the original factory defaults when the unit in which temperature is displayed is changed. The Chiller's temperature set point and various alarm settings should be reset to the desired values.

2.5.2 Displaying and Adjusting the Set Point

Press the Select/Set Knob on the front panel. The current set point temperature will be displayed and the decimal point at the bottom right of the display will flash, indicating the temperature can be changed.
Rotate the Select/Set Knob until the desired set point temperature is displayed. The setting is accepted after either pressing the Select/Set Knob a second time or will be accepted automatically after a few seconds of inactivity.

2.5.3 Pressure / Flow Rate Display and Units (Not available – no sensors on this model)

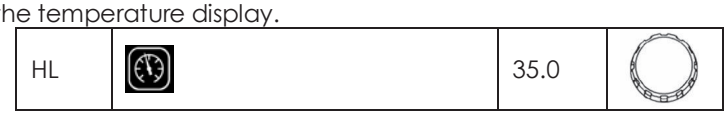
2.6 Setting Operational Parameters

The Chiller's various operational parameters, such as temperature, flow rate, and pressure alarm values, are all user-adjustable. They are accessed by pressing and holding the Units/Menu Button until HL appears on the pressure/flow rate display. Pressing and releasing the Units/Menu Button once HL appears allows you to scroll through the various parameters; rotating the Select/Set Knob allows you to change the displayed setting. You can accept the displayed value by either pressing the Select/Set Knob or allowing the display to timeout.

Menu Item	Description	Choices / Ranges / Comments	Default Setting
HL	High Temperature Limit Alarm Set Point	+20° to 72°C / 68° to 162°F	50°C
LL	Low Temperature Limit Alarm Set Point	-14°C to +15°C / 7° to 59°F (all units)	0.0°C
HA	Front Panel High Ambient Temperature Alarm Set Point	+30° to 45°C. Always displayed and set in °C.	45°C
FP	N/A		
FP			
FL			
FL			
Sd			
AF	Auto-Refrigeration Temperature Set Point	+20° to 50°C Always displayed/set in °C.	35°C
Rp	N/A		
c1	Internal Probe Calibration Offset	±2.9°C. Always displayed/set in °C.	0.0°C
c2	N/A		
F c			
PC			
Ct	Chiller Type	0 – 15 Factory Set	02
Fb	N/A		

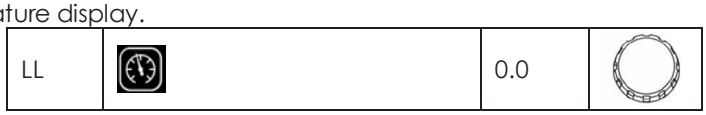
2.6.1.1 High Temperature Limit (HL)

This menu item serves two functions. First, it establishes the maximum allowable set point temperature and thus helps prevent an operator from inadvertently setting the temperature set point above a pre-established temperature. Secondly, it serves as a high temperature alarm, automatically activating both audio and visual alarm indicators when the measured fluid temperature reaches the HL setting. The compressor, heater, fan, and pump will also turn off. To change the high limit value, rotate the Select/Set Knob until the desired high limit value is displayed on the temperature display.



2.6.1.2 Low Temperature Limit (LL)

This menu item also serves a dual function. First, it establishes the minimum allowable set point temperature and thus helps prevent an operator from inadvertently setting the temperature set point below a pre-established temperature. Secondly, it serves as a low temperature alarm, automatically activating both audio and visual alarm indicators when the measured fluid temperature drops to the LL setting. The compressor, heater, fan, and pump will also turn off. To change the low limit value, rotate the Select/Set Knob until the desired low limit value is displayed on the temperature display.



2.6.1.3 High Ambient Temperature Limit (HA)

This menu item protects the Chiller from overheating due to a high ambient temperature. Should the ambient temperature rise above the limit value, the audio and visual alarms will activate and the compressor, heater, fan, and pump will turn off.

To change the high ambient temperature value, rotate the Select/Set Knob until the desired high ambient temperature limit value is displayed on the temperature readout.

NOTE: This value is always displayed/set in °C.

HA		45	

2.6.1.4 Maximum Fluid Pressure (FP) N/A No Sensors on this model

This is the maximum allowable fluid pressure and can be set in either PSI or kPa (the LED adjacent to the display indicates the active unit of measure). Should the fluid pressure rise above the maximum fluid pressure value, the audio and visual alarms will activate and the compressor, heater, fan, and pump will turn off.

FP			80	

2.6.2.5 Minimum Flow Rate (FL) N/A No Sensors on this model

This is the minimum allowable flow rate and can be set in either GPM or LPM (the LED adjacent to the display indicates the active unit of measure). Should the fluid flow rate drop below the minimum flow rate value, the audio and visual alarms will activate and the compressor, heater, fan, and pump will turn off.

FL			0.0	

2.6.2.6 Maximum External / Internal Temperature Differential (Sd) N/A Not available for this model

Sd			5.0	

2.6.2.7 Auto-Refrigeration Temperature (AF)

This menu item allows you to select the temperature at which refrigeration is activated. To change the displayed value, rotate the Select/Set Knob until the desired auto-refrigeration temperature is displayed.

NOTE: This value is always displayed/set in °C.

AF			35.0	

2.6.2.8 Remote Probe (rP) N/A Not available for this model

rP		NO	

2.6.2.9 Internal Calibration Offset (C1)

This menu item allows you to adjust the Chiller's internal temperature reading to match that of a traceable standard. It allows you to offset the displayed temperature value by as much as ±2.9°C.

NOTE: Calibration offset values are always set and displayed in °C. To prevent the operator from accidentally changing the calibration offset, a special sequence of keystrokes is required to access this function.
Press and hold the Units/Menu Button until HL appears on the display.
Press and release the Units/Menu Button until rP appears on the display.
Press and hold the Units/Menu Button.
While holding the Units/Menu Button, press and release the Select/Set Knob.
When CAL appears on the temperature readout, release the Units/Menu Button. The current calibration offset value will appear on the temperature readout.
Rotate the Select/Set Knob until the desired calibration offset is displayed. Press the Select/Set Knob or simply allow the display to time out to accept the displayed value.

C1		0.0	

2.6.2.10 External Calibration Offset (C2)

C2		0.0	

2.6.2.11 Flow Rate Calibration (F c) N/A Not available for this model

F c		1.0	

2.6.2.12 Baud Rate (PC) N/A Not available for this model

PC		96	

2.6.2.13 Chiller Type (Ct)

This menu item allows you to view the current chiller model and will be a value from 0 – 15. This is a factory setting and cannot be changed, but it does provide very useful information for troubleshooting.

Ct		_ _	

2.6.2.14 Fuse Bit (Fb) N/A Not available for this model

Fb		h_ _	

2.7 Display, Alarm, and Error Messages

When certain conditions are detected, a message code flashes on the display and the local audio alarm sounds. Depending on the nature of the condition, power to various systems components, such as the compressor, heater, fan, and pump, is removed. When condition is rectified, push front panel Power button or turn circuit breaker off then on to clear the fault or error.

Message Code	Description	Action Required
EAF N/A	Rear panel high ambient temperature	Warning - The ambient temperature is higher than the set ambient limit. Lower ambient temperature.
EC N/A	External remote control active, Chiller in standby (for units with remote control by 12 VDC option)	Normal — Unit idle until remotely activated.
EFL N/A	Low fluid level warning / alarm (for units with optional float switch)	Warning/Alarm — Fluid level is too low. An alarm will sound once every 8 seconds for 5 occurrences. If the fluid level has not been raised 8 seconds after the fifth alarm, the unit will shut down.
EHA	Front panel high ambient temperature warning.	Warning - The ambient temperature is higher than the set ambient limit. Lower ambient temperature or raise temperature limit.
EHL	High temperature set point warning	Warning — The temperature set point is higher than the high temperature limit value. If not corrected, the high temperature limit alarm will be activated when fluid temperature rises above established the HL value. Lower temperature set point or increase high temperature limit value.
ELL	Low temperature set point warning	Warning — The temperature set point is lower than the low temperature limit value. If not corrected, the low temperature limit alarm will be activated when fluid temperature falls below the established LL value. Increase temperature set point or decrease low temperature limit value.
LLO	Local Lockout	Normal — Indicates that Local Lockout feature (see Section 2.8) is enabled. Appears momentarily when Select/Set Knob is pressed to view/change set point value.
CAn	Cancel Local Lockout	Normal — Indicates the Local Lockout feature (see Section 2.8) has been disabled. Appears momentarily when Local Lockout status is changed from enabled (LLO) to disabled.
LO-H2O	No fluid flow and no fluid pressure	Warning — Indicates that the Chiller did not detect any fluid flow or pressure upon startup. Unit will normally run after 5 minutes after power on.

Fault Codes "Ft"

Message Code	Description	Action Required
01	Factory Reserved	None.
02	Low limit temperature alarm	Alarm — Process fluid temperature has dropped to low temperature limit value. Compressor, heater, fan, and pump turned off. Increase heat load on Chiller or decrease low temperature limit value.
03	High limit temperature alarm	Alarm — Process fluid temperature has reached high temperature limit value. Compressor, heater, fan, and pump turned off. Decrease heat load on Chiller or increase high temperature limit value.
04	Over-temperature protection alarm	Alarm — Process fluid temperature is above Chiller's factory set high temperature safety cutoff. Power to compressor, heater, and fan turned off; pump remains on. Lower process temperature. Reset OTP thermostat, push red button on right side of unit.
05	Low liquid level alarm N/A	Delayed Alarm — Activated when the liquid level in the reservoir falls below an acceptable level for 30 seconds of longer. Compressor, heater, fan, and pump turned off. Add fluid to reservoir.
06	High bath temperature alarm	Alarm — Fluid temperature has exceeded 82°C (180°F). Compressor, heater, fan, and pump turned off. Lower fluid temperature.
07	Low flow alarm N/A	Delayed Alarm — Flow rate has dropped below minimum flow rate setting for 30 seconds. Power to compressor, heater, fan, and pump turned off. Correct cause of low flow rate or decrease minimum flow rate setting.
08	High pressure alarm N/A	Delayed Alarm — Activated when fluid outlet pressure has exceeded high-pressure limit value for 30 seconds. Compressor, heater, fan, and pump turned off. Decrease outlet pressure by removing blockage or increase high-pressure limit value.
09	System fault	Fault — Power to compressor, heater, fan, and pump turned off. Contact service representative for corrective action.
10	Electronic power component fault (Triac)	Fault — Power to compressor, heater, fan, and pump turned off. Contact supplier.
11	Internal probe fault	Fault — Faulty temperature probe. Power to compressor, heater, fan, and pump turned off. Contact supplier.
12	External temperature probe fault N/A	Fault — Faulty external temperature probe. Power to compressor, heater, fan, and pump turned off. Replace ambient tracking probe or operate instrument using internal temperature probe. Contact supplier if fault persists.
13	Communications fault	Fault — Internal electronics failure. Power to compressor, heater, fan, and pump turned off. Contact supplier.
14	ADC fault, internal probe	Fault — ADC for internal probe faulty. Power to compressor, heater, fan, and pump turned off. Contact supplier.
15	ADC fault, external probe N/A	Fault — ADC for external probe faulty. Power to compressor, heater, fan, and pump turned off. Contact supplier.
16	Front panel high ambient temperature alarm	Alarm — Ambient temperature at front panel is higher than high ambient temperature limit. Compressor, heater, fan, and pump turned off. Occurs when the ambient temperature exceeds the set ambient limit by 5°C or more. Lower temperature in area in which Chiller is located or increase high ambient temperature limit value. See "High Ambient Temperature Limit" Section.
17	Rear panel high ambient temperature alarm N/A	Alarm — Ambient temperature at rear panel is higher than high ambient temperature limit. Compressor, heater, fan, and pump turned off. Occurs when the ambient temperature exceeds the ambient limit. Lower temperature in area in which Chiller is located. Temperature limit is not adjustable.

2.8 Enabling/Disabling the Local Lockout

This feature is used to prevent unauthorized or accidental changes to set point and other operational values. When enabled, the values for the functions described in Sections 4.1, 4.2, 4.3, and 4.5 can be displayed, but not changed.
To enable the local lockout, press and hold the Select/Set Knob until LLO is displayed (approximately 5 seconds). Once enabled, LLO will appear momentarily when the Select/Set Knob is pressed to display the set point.
To disable the local lockout, press and hold the Select/Set knob until CAn appears momentarily as local lockout status changes from enabled (LLO) to disabled (approximately 5 seconds).

Section 3 - Maintenance and Calibration

The Chiller is designed to require a minimum of periodic maintenance.

3.1 Condenser, Reusable Filter

To keep the system operating at optimum cooling capacity, the condenser, the air vents, and reusable filter should be kept free of dust and dirt. They should be checked on a scheduled basis and cleaned as required.
The reusable filter is easily accessed from either the front of the unit. Use a mild detergent and water solution to wash off any accumulated dust and dirt and then rinse and dry thoroughly before reinstalling.

3.2 Temperature Calibration

At times, there may be a minor temperature difference between the Chiller's displayed temperature and the actual temperature as determined by a certified temperature measurement device. There may also be situations where you want the displayed temperature to match a particular value to have standardization between different instruments. These adjustments can be performed using the Chiller's temperature calibration offset functions. See Section 2.6.2.9 Internal Calibration Offset (C1)

Section 4 – Troubleshooting

WARNING: Refer servicing to qualified service personnel. When power is on, dangerous voltages exist within chassis components. Use extreme care when measuring voltages on live circuits.

4.1 Unit Will Not Operate (no cooling or pumping)

- Check that the power cord is plugged in to an operating electrical outlet.
- Check that the Circuit Breaker/Power Switch is ON.
- Check that the front panel Power Switch is ON.

4.2 No Pumping

- Check the fluid level in the whole system to make sure the pump is receiving fluid.
- Check if the pump motor is operating.
- Check for blockage within the circulating system.

4.3 Insufficient Pumping

- Check for low line voltage.
- Check for too small of a hose diameter.
- Check for too high of a fluid viscosity.
- Check for restrictions in the connecting tubing.

4.4 No Cooling or Insufficient Cooling

- Check for low or high line voltage.
- Check for blocked airflow through ventilation screens.
- Check ambient air temperature. High air temperature may cause the refrigeration compressor to temporarily shut down.
- Check for excessive heat being transferred to the cooling fluid liquid as this may exceed the cooling capacity of the refrigeration system.

4.5 Triac Failure "Ft 10"

- Triac fault message appears on the display, indicating that the triac has failed or the line supply voltage has a source of extreme interference from other equipment. Plug the unit into another power source. If it still displays triac failure, a triac or triac driver needs replacement.

4.6 Internal Probe Failure "Ft 11"

- The Internal Probe failure message appears on the display, indicating that the internal probe has failed or there is a problem with the circuitry reading the probe signal. Contact supplier.

Section 5 - Service and Technical Support

If you have followed the troubleshooting steps outlined in Section 6 and your Chiller still fails to operate properly, contact the supplier from whom the unit was purchased. Have the following information available for the customer service person:

— Model, Serial Number, and Voltage (from back panel label)

— Date of purchase and purchase order number

— Supplier's order number or invoice number

A summary of the problem

5.1 Electrical Wiring Diagram