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How to Troubleshoot Chiller Problems

Chiller Troubleshooting: Common Problems

Even when regularly inspected and maintained, the performance of your chiller may degrade or deteriorate over time. Pumps can fail; process lines can clog; refrigerant can leak; any number of problems associated with component aging or changing environmental conditions may occur (Table I).

Here are some initial steps to take to help isolate the problem:

1. **Make sure that the chiller is running**. A blown circuit breaker or fuse, loose wiring, or simply a power switch that's been put in the 'off' position may be preventing the chiller from running.
2. **Determine if the chiller is cooling.** Check the temperature of the coolant at the chiller's outlet to the process. If it isn't at or near the set point temperature, the evaporator may be iced up or the heat transfer properties of the coolant fluid may be deteriorating.
3. **Confirm that the pump is running.** A closed or partially closed valve, failed pump, inadequate coolant volume, or process line restriction may be preventing the adequate flow of liquid through the process coolant loop.
4. **Check the process and environmental conditions**. The load on the chiller may be too great due to changes in the process or the ambient temperature. Likewise, a change in the location of the chiller (near other heat generating equipment or further from the process equipment); loose, damaged, or missing insulation on the piping between the chiller and the process; or even fluctuations in line voltage may be compromising the chiller's heat removal capabilities.

Common Chiller Faults

Most modern chillers display a fault or error code when conditions affecting performance are detected. These codes are usually fairly specific and will help you quickly diagnose problems. Some of the more common alarms and faults are:

Low Temperature Alarm

The process temperature has fallen below a user-set temperature value. This may be due to insufficient heat load or too high of a low temperature alarm setting.

High Temperature Alarm

The process temperature has risen above a user-set temperature value. This may be due to too high a heat load or too low of a high temperature alarm setting.

Over-Temperature Safety Alarm

Indicates that the process temperature has exceeded a factory- or user-set safety cutoff. This may be due to a problem with the refrigeration system or a safety setting that is set at too low of a temperature.

Low Liquid Level Alarm

The level of coolant in the reservoir has fallen below an acceptable level. This may be due to evaporation or leaks in the circulation system.

PolyScience • 6600 W. Touhy • Nile, IL 60714 • www.polyscience.com
Phone 800-229-7569 • 847-647-0611 • ***Fax*** 847-647-1155 • ***Email*** sales@polyscience.com

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The chiller's alarm and error codes are extremely useful and can help you quickly diagnose problems.

Low Flow Alarm

The fluid flow rate has dropped below a minimum factory- or user-set safety setting. This may be due to restrictions or blockages in the process lines or equipment, a failing pump, insufficient coolant, or a minimum flow rate setting that is set too high.

High Pressure Alarm

The process pressure has risen above a factory- or user-set safety setting. This alarm may be due to restrictions or blockages in the process lines or equipment. The installation of a pressure bypass valve may be helpful in applications with naturally high process fluid pressures.

High Ambient Temperature Alarm

Ambient temperature has risen above a factory- or user-set safety setting. This is usually due to changes in environmental conditions, such as a new location or the installation of other heat generating equipment close to the chiller.

High Discharge Pressure Alarm

The refrigerant discharge pressure is too high. This may be due to a dirty or blocked condenser, dirty air filter, failing or failed cooling fan, high ambient temperature, or over-charging of the refrigerant system.

Low Discharge Pressure Alarm

The refrigerant discharge pressure is too low. This may be caused by refrigerant leakage, clogging of the condenser tubing, under-charging of the refrigerant system, or low ambient temperatures.

Regular preventative maintenance and knowing what to look for when the performance of your chiller deteriorates will help you optimize the uptime of both your chiller and the process it is cooling.

Your best source for information on proper maintenance and troubleshooting is the chiller manufacturer. Read the operating and service manuals that came with your chiller thoroughly and adhere to manufacturer's recommendations. Equally important, make sure those manuals are readily available to yourself and others responsible for chiller operation and maintenance.

Table I.
Common Chiller Problems and Possible Causes

Problem	*Possible Causes*
Chiller does not power up	Improper line voltage or loose connection
	Incorrect phase connection (3-phase units)
	Blown circuit breaker or fuse
	Power switch in 'off' position
No pumping or insufficient fluid flow	Improper or fluctuating line voltage
	Insufficient fluid in reservoir
	Pinched or restricted process line
	Closed or partially closed process valve
	Coolant fluid unsuitable for temperature requirements
	Blocked fluid filter
	Process piping too small
	Process restriction
	Pump failure
No cooling or insufficient cooling	Improper or fluctuating line voltage
	Clogged air filter or condenser
	Coolant fluid unsuitable for temperature requirements
	Heat transfer properties of the coolant fluid have deteriorated
	Refrigerant leak
	High ambient temperature
	Evaporator iced up

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