

Engineering Data**SED: 8012**Group: **Centrifugal Chiller**Date: **March 2002**Supercedes: **New**

Supplement to PM WSC/WDC-1
MicroTech II™ for
Centrifugal Compressor Water Chillers
Model WSC/WDC



Control Features

WSC/WDC Chillers Feature MicroTech II™ Controls

McQuay has incorporated the latest microprocessor technology into the MicroTech II control system to give you the ultimate in chiller control. The control includes many energy-saving features not found in any other microprocessor system on the market today. MicroTech II controller's innovative design will help keep your chiller running efficiently . . . day in, day out, for years to come.

Figure 1, Unit Controller and Operator Interface Touch Screen



The Unit Controller and Operator Interface Touch Screen mounted on a chiller unit are shown to the left. Note that the touch screen panel is on an adjustable arm so that it can be positioned comfortably for the operator. Also note that the right side of the panel contains a built-in floppy drive from which data can be conveniently download. These are but a few of the thoughtful touches built into this control system to optimize ease of operation, reliability, and efficient operation.

Figure 2, Compressor Controller



unprecedented reliability in a chiller control system. overload.

A major feature of the McQuay MicroTech II controller is the distributed control scheme. The picture to the left shows the compressor control panel (with cover removed) mounted at the rear of the unit adjacent to the compressor itself. Its purpose, logically enough, is to operate and control the compressor. Stacked above it in the system architecture is the unit controller and Operator Interface Touch Screen. If the Interface Touch Screen and/or unit controller is out of service, the chiller can continue to operate on the compressor controller alone. This feature provides This panel also contains the oil pump contactor and

MicroTech II Features and Benefits

FEATURE	BENEFIT
Easy integration into Building Management System via Protocol Selectability.	Designer is open to select any BAS supplier using an industry standard protocol and MicroTech II control will interface with it.
Easy to read, adjustable, 10 inch, Super VGA Color Touchscreen operator interface	Operators can observe chiller operation at a glance and easily select various screens and change set points
Plottable historic trend data	Water temperatures, refrigerant pressures, and motor load plots can provide valuable information for energy conservation
Precise $\pm 0.2^{\circ}\text{F}$ chilled water control	Provides stability in chilled water system
Proactive pre-alarm correction of "unusual conditions" allows chiller to stay online	Activates alarm and modifies chiller operation to provide maximum possible cooling
Automatic control of chilled water and condenser water pumps	Integrated lead/lag and automatic engagement of backup pump
Controls up to four stages of tower fans and modulation of tower fan or bypass valve	Optimum integrated control of cooling tower water based on system conditions
Twenty-five previous alarms along with the operating conditions at the time of the fault are stored in memory	Invaluable asset in trouble shooting
Multiple language capability metric, in-lb	Great asset for world-wide applications

Designed with the System Operator in Mind

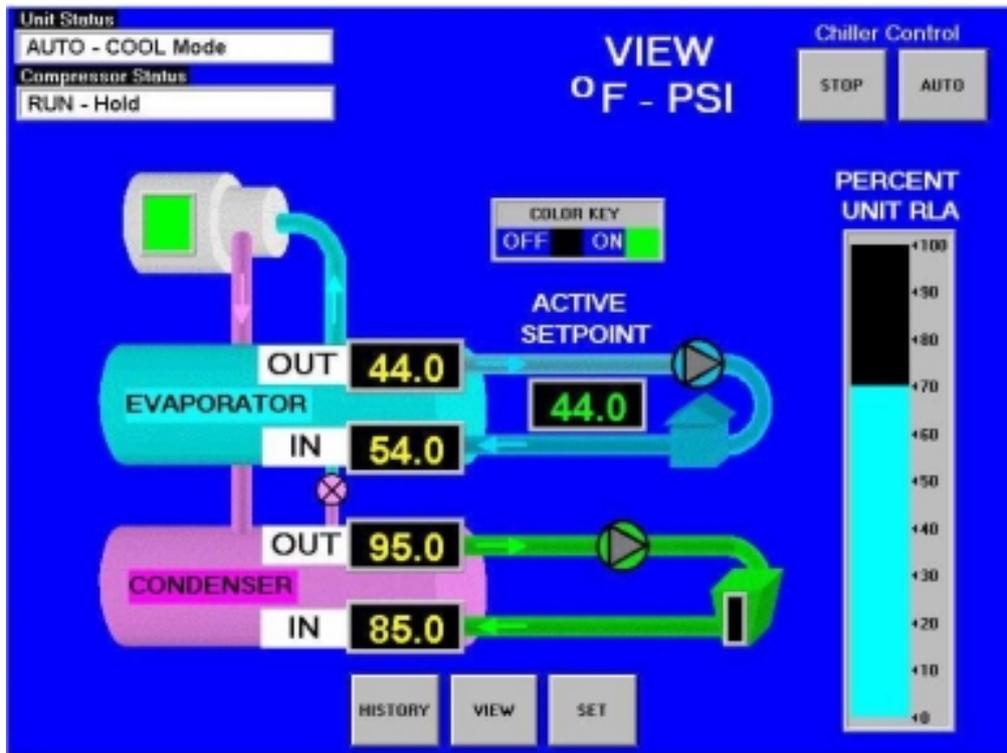
Reliable, economic use of any chiller depends on easy operator interface. That's why operation simplicity was one of the main considerations in the development of MicroTech II controller. The operator interface with the chiller is through a 10 inch, Super VGA color monitor with touch-screen capability. The operator can clearly see the entire chiller graphically displayed with all of the key operating parameters viewable on the screen. Other screens, such as alarm history, are easily accessed through touch screen buttons. Competitive screw chiller controllers do not have this level of sophistication. See the following page for the initial home screen.

By constantly monitoring chiller status, the MicroTech II controller will automatically take proactive measures to relieve abnormal conditions or shut the unit down should a fault occur. For example, if a problem occurs in the cooling tower and discharge pressure starts to rise, the controller will automatically hold the load point and activate an alarm signal. A further rise in pressure will initiate compressor unloading in an effort to maintain the setpoint pressure. Should the pressure continue to rise, the unit will shut off at the cutout pressure setting.

The MicroTech II controller's memory retains a snapshot of faults including all the operating conditions at the time of the shutdown, and the time/date stamp. The controller's memory (no batteries required) can retain and display the cause of the current fault and the last twenty-five fault conditions. This method for retaining the fault, and operating conditions at the time of the fault, is extremely useful for trouble shooting and maintaining an accurate record of unit performance and history.

MicroTech features a two-level password security system to provide protection against unauthorized use.

Figure 3, MicroTech II Controller Home Screen



The Home Screen shown above is usually used as the primary viewing screen. It gives real time data on unit status, water temperatures, chilled water set point and motor amp draw. In other words it very clearly answers the vital question-is the chiller operating properly?

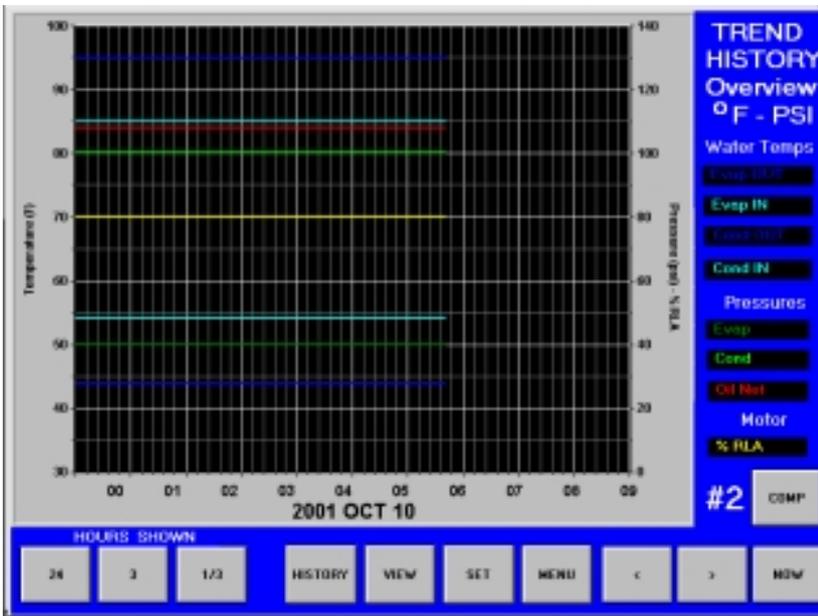
Should an alarm occur, a red button appears on the top of the screen (a remote signal is also available). Pressing this button accesses the Active Fault Screen that gives complete fault information and from which the fault can be quickly and easily cleared.

Changing Set Points

The mystery of changing set points is a thing of the past. Look at how easy the job becomes with the McQuay MicroTech II. For example to change the chilled water set point, press SET from any screen, then press the WATER button (natural choice) and this screen appears, press button #1, Leaving Water Temperature, and you are ready to go. The left side of the screen even gives a complete description of the set point including the available range of settings.



Trend Logging



Ever wonder how your chiller performed last week? Were you holding chilled water temperature? What kind of cooling load did the chiller have? The McQuay MicroTech II can reach back in the past, thanks to its huge memory, and plot water temperatures, refrigerant pressures, and motor load. These values can also be downloaded through a convenient floppy drive, located right in the Interface Panel, and pasted into a spreadsheet for further evaluation.

MicroTech II Controller Increases Chiller Operating Economy

Many standard features have been incorporated into MicroTech II control in order to improve the operating economy of McQuay centrifugal chillers. In addition to replacing normal relay logic circuits, we've enhanced the controller's energy saving capabilities with the following features:

- Direct control of water pumps. Optically isolated digital output relays provide automatic lead-lag of the evaporator and condenser pumps, permitting pump operation only when required.
- User-programmable compressor soft loading. Prevents excessive power draw during pull down from high chilled-water temperature conditions.
- Chilled-water reset. Accomplished directly on the unit by maintaining a constant return water temperature by resetting the leaving water temperature based on the return water temperature. A remote 4-20ma or 1-5 VDC BAS signal can also be used to reset the leaving water directly. Raising the chilled water set point during periods of light loads dramatically reduces electrical consumption.
- Demand limit control. Maximum motor current draw can be set on the panel or can be adjusted from a remote 4-20ma or 1-5 VDC BAS signal. This feature controls maximum demand charges during high usage periods.
- Condenser water temperature control. Capable of four stages of tower fan control plus an optional analog control of either a three-way tower-bypass valve or variable speed tower-fan motor. Stages are controlled from condenser-water temperature. The three-way valve can be controlled to a different water temperature or track the current tower stage. This allows optimum chilled water plant performance based upon specific job requirements.
- Staging Options (Multiple Chiller Installations). Lead-lag and load-balance: the MicroTech II controller is capable of compressor lead-lag decisions and balancing compressor loads between McQuay chillers using defaults or operator defined staging.
- Plotting Historic Trends. Past operation of the chiller can be plotted as trend lines and even downloaded to spread sheets for evaluation. A valuable tool for optimizing efficiency.

Nonvolatile Memory

Since the MicroTech II controller's memory is nonvolatile, battery backup to protect the programs and settings in case of power loss is unnecessary.

Versatile Communications Capabilities Give You Even More Control

For complete flexibility there are three ways to interface with the MicroTech II controller:

1. Direct entry and readout locally at the controller's operator interface panel on the unit
2. Direct entry as above plus digital and analog input/output signals for certain functions such as:
 - Enable run input
 - Alarm signal output
 - 4-20ma or 0-5 VDC input for chilled water reset and load limiting
 - Pump and tower fan control.
 - Analog output for variable speed fan or tower bypass
3. Interface with Building Automation System with Standard Protocol Selectability with full read and write capability.

Building Automation Systems

All MicroTech II controllers and system controllers are capable of communications providing seamless integration and comprehensive monitoring, control and two-way data exchange with industry standard protocols LonMARK™ or BACnet™.

Here are just a few of the many points on a WSC/WDC chiller that are available remotely through one simple, low cost interface.

Operating Parameters

Entering/leaving water temperatures

Refrigerant temperatures and pressures

Motor amps as a percent of RLA

Hours of operation and number of starts

Chilled water and demand limit setpoints

Cause and conditions for last 25 active alarms

Protection/Cycling Conditions

High and low refrigerant pressures

Oil pressure differential

Motor condition from embedded sensors

System water pump failures

High discharge temperatures

Starter fault

Condenser water pump control relay

Water flow through the condenser should be discontinued when the chiller is inoperative. Continuous flow through a cooling tower, without inclusion of building heat in the water, will overcool condenser water if tower bypass is not employed and will unnecessarily depress the chiller's refrigerant pressure. Where energy conservation is desirable, shutting off condenser water flow when the chiller is not operating provides a practical, inexpensive method of saving power.

Alarm circuit

Terminals are provided in each unit control panel to supply 24-volt AC power to an external alarm circuit. A 25 VA low amp draw relay coil can be connected to these terminals. The coil will be deenergized when any of the unit or system's protective controls function. The alarm is not included.

