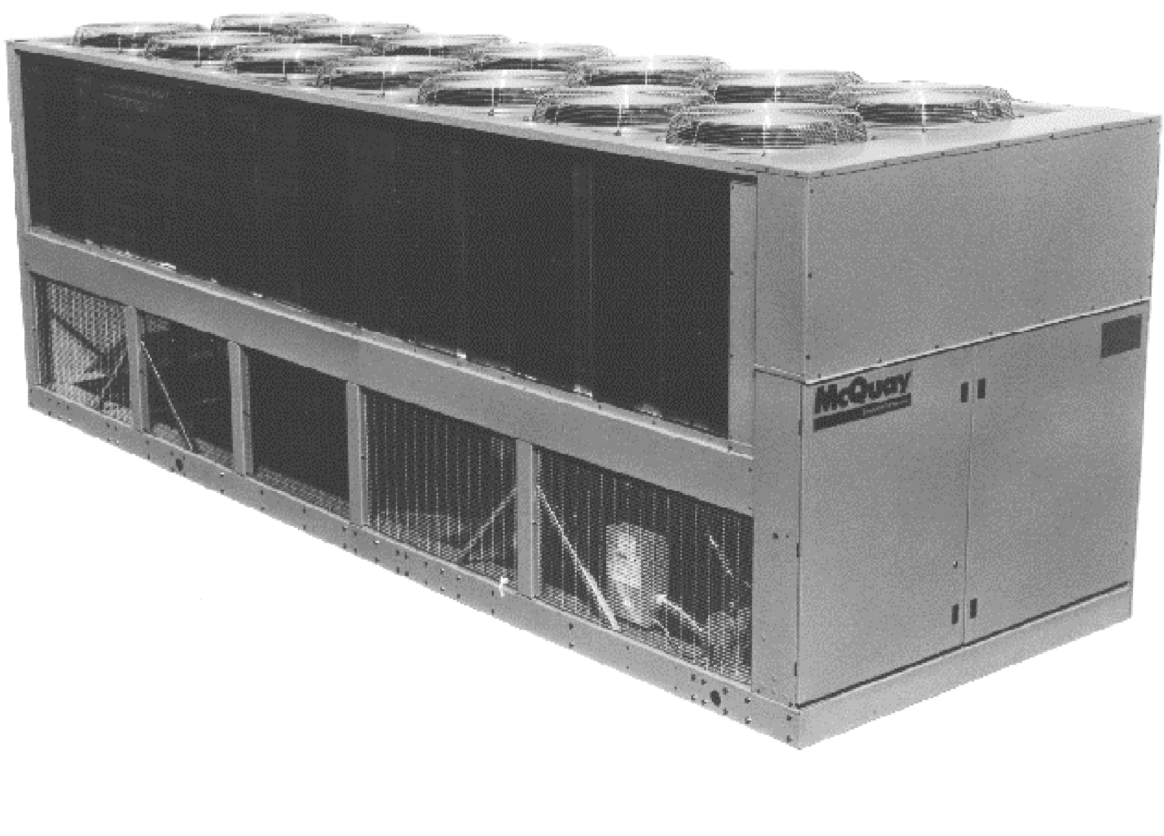
MicroTech® Air Cooled Screw Chiller

Open Protocol™ Data Communications

Information Packet
Version 2.3
April, 2003



McQuay® International

NOTICE

Contents

Revision History

Version 2.3

Made changes for the version 30 code

Remove single compressor because there isn't any version 30 code for single compressor screw chillers

Version 2.2

Corrected Alarm memory locations, all codes

Updated valid software idents

Version 2.1

Changed title from MicroTech® StarGate™ Screw Chiller to MicroTech® Air Cooled Screw Chiller

Removed all references to StarGate™

Corrected *Clear Circuit #3 Alarm* memory location

Updated valid software idents

Version 2.0

Added single compressor screw chiller.

Added 4 compressor screw chiller.

Removed *%RLA* read only point for all 4 chillers

Version 1.2

I/O configurations and memory locations

have been added for 4-Compressor Chillers.

Memory locations of Conditions at Time of Alarm have been revised for 3-Compressor Chillers.

Version 1.1

This is a formatting revision only.

Version 1.0

The initial release of the document.

Overview

Compatible Unit Control Software for Open Protocol

The McQuay Open Protocol™ for air-cooled screw chillers allows other automation integrators to communicate with a network of screw chillers or a single screw chiller and obtain useful operating information through communication "reads" to the controller. In addition, remote control of the screw chiller is possible by communication "writes" to the controller of new setpoints and commands.

Air-cooled screw chillers included in this Open Protocol Document. McQuay International manufactures four different MicroTech® air-cooled screw chillers. Their software configurations are summarized as follows:

The asterisk '' is a wildcard; any character is valid*

Configuration	Unit Model Number	Software IDENT
Two-Compressor	ALS 125* through 204*	SC2??30*
Three-compressor	ALS 205* through 280*	SC3??30*
Four-compressor	ALS 300* through 425*	SC4??30*

Software IDENT varies depending on the refrigerant type (first '?' in IDENT is either be 2, 3 or 6; the second '?' in the IDENT could either be U, E or S, it is the system of units to be displayed on the unit keypad. It does not matter what the ?? values are in terms of the points listed later in this document.

Because of the different functionality of each software configuration, memory locations and therefore the Open Protocol interfaces to the four possible MicroTech chillers are slightly different.

The Open Protocol integrator must know which software configuration the screw chiller is using to know which Open Protocol memory locations are applicable. The selling McQuay representative knows this information. If the unit is already installed, the IDENT information may be read directly off of the unit's keypad display.

Hexadecimal values are indicated by a preceding '$'

In addition, software IDENTs are stored within the controllers in memory locations $0A08-$0A0F. The above IDENTs result when the memory locations are translated into ASCII. For example, control processor code for a two-compressor chiller might be "SC23U20N" which would be represented as: $53, $43, $32, $33, $55, $32, $30, $4E.

Typical Open Protocol Control Functions

The Open Protocol allows automation integrators to achieve many control functions that in the past would require hardwired interfaces between the building automation system (BAS) and the chiller. Using Open Protocol, it is possible to eliminate much of the expensive field wiring and provide the interface through communications.

These are the typical Open Protocol control functions:

- Remote start/stop of the chiller
- Chilled water reset
- Demand limit
- Remote alarm clearing

Remote Start/Stop of the Chiller

Using communication "writes" to the "Network Command" memory location, the McQuay® MicroTech chiller may be commanded to be enabled or disabled. This is the preferred method of remotely turning the chiller on or off. When the "Network Command" is "Disable," the LCD display on the chiller will show "Off:RemoteComm."

The memory for "Network Command" is a RAM location that, upon loss and subsequent restoration of power, is initialized to "Enable." Thus the automation system should refresh this memory location to the desired state on a frequent basis, such as every minute.

A standard feature of the MicroTech controller is an output dedicated to control of the chiller's evaporator pump. We recommend using this output to control the pump.

Chilled Water Reset

Chilled water reset is achieved quite easily through communications. See the Network Evaporator Leaving Water Temperature Setpoint.

Demand Limit

An automation system can establish the maximum number of cooling stages that can be active for the chiller through the "Network Demand Limit" setpoint. This is vital for systems that seek to reduce chiller capacity at certain times to avoid peak electrical demand charges.

Remote Alarm Clearing

The automation system can clear an active alarm in the MicroTech chiller through communications. Care should be exercised so that alarms are cleared only by authorized individuals and only when the cause of the alarm has been corrected and/or repaired.

Network Configuration

This section explains how the McQuay International screw Chiller Open Protocol Network works so that you can choose the correct equipment and program your system to communicate through McQuay International's MicroTech Open Protocol.

There are two scenarios for connecting to the controllers that are used to make an Open Protocol Screw Chiller Network. They are as follows:

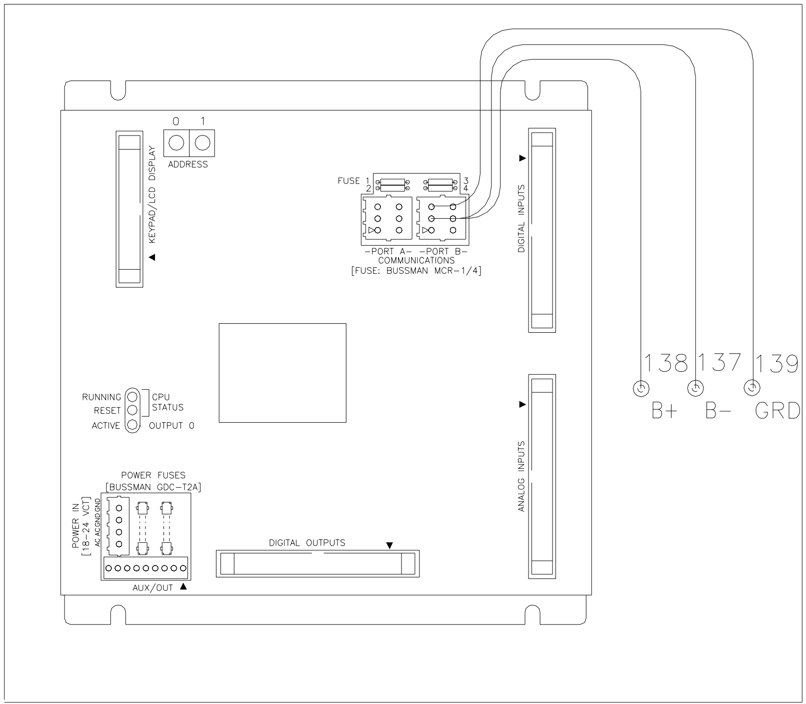
- Communications to a single chiller
- Communications to two or more chillers

Communications to a Single Chiller

All McQuay MicroTech screw chillers are shipped from the factory with one communications port factory-configured for RS-232, 9600 baud. The port is located on the unit controller and is designated Port A. The port may also be accessed via RS-485 by replacing the factory installed RS-232 plug with an RS-485 plug. The RS-485 plug may be constructed according to the Open Protocol Wiring Diagram booklet, or may be purchased through McQuay International.

The following diagram shows the chiller-to-network connections on Port B; communications between the chiller and Building Automation System (BAS) established on Port A.

Unit Controller (Model 250/280)



Communications to Two or More Chillers

The OPM provides a single communications port entry into the McQuay MicroTech Network. The OPM panel consists of a McQuay model 120 controller. The automation integrator connects to Comm Port A, which is switch selectable to RS-232 or RS-485 communications, 9600 baud. Port A is the automation control integrator's Open Protocol communications port. Comm Port B is a daisy chained, multi-drop, 9600 baud, RS-485 proprietary McQuay protocol.

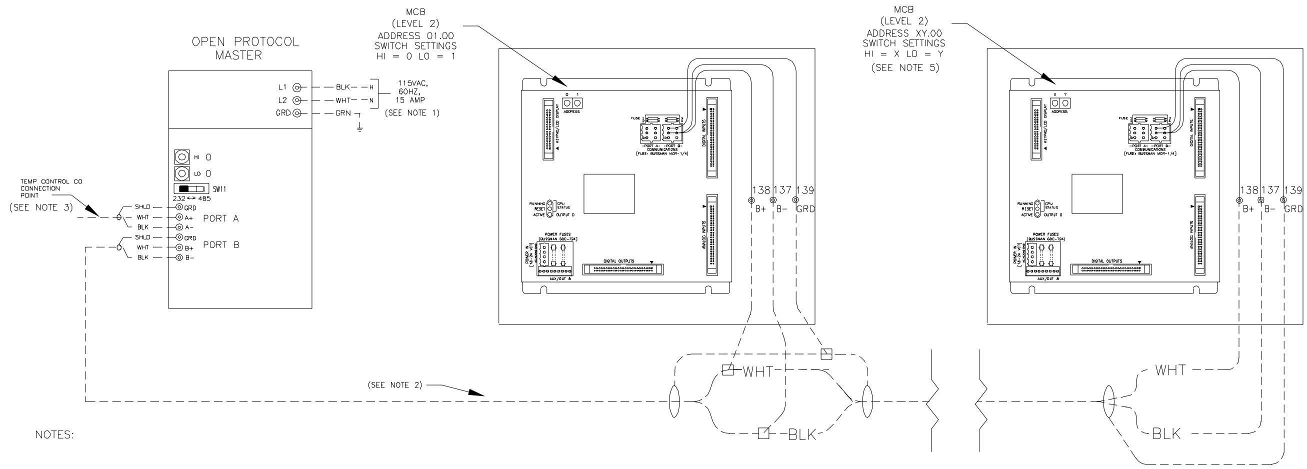
The main function of the OPM is to provide the network communications interface for up to 64 MicroTech controllers.

The screw chiller controller is factory mounted. The unit controller provides pre-programmed, pre-engineered and pre-tested stand-alone control. There is one controller for each screw chiller.

Once the McQuay communication network has been commissioned (by a McQuay representative, the BAS vendor can connect their Open Protocol device to the OPM. The screw chillers will continue to operate when communications are lost. However, the network must be intact for read and write requests from the BAS vendor's communication device to be passed along to the screw chillers.

When the BAS communicating device is connected to the OPM panel, the communications configuration is as follows:

OPM MCB and Screw MCB



Supplemental Literature

It is the objective of this document to give an overview of the screw chiller and to document the available points offered through Open Protocol. It is strongly recommended that the following documentation be used in conjunction with this document. A detailed sequence of operation is described in the Operation and Maintenance (OM) manual (if available). Unit wiring details are given in the Installation and Maintenance manual (if available). Open Protocol wiring details and diagrams for connectors are given in the Open Protocol Wiring Diagrams booklet. The generic Open Protocol Data Information Packet explains the how to access via the McQuay MicroTech protocol.

Ver 1.4	***Open Protocol Data Information Packet***	***Apr, 96***
IOMMALS	***Installation & Maintenance Data***	***Feb, 98***
CD573875Y	***Open Protocol Wiring Diagrams***	***Jun, 98***

Conversions and Conventions

Converting 2 Byte Variables

In the following read only and read/write tables, a 2-byte variable address is indicated by a dash (-). The first memory location listed will always be the high byte and the second memory location listed will be the low byte. For example, $04DB-C, $04DB is the high byte and $04DC is the low byte.

Two byte variables use the following conversion unless otherwise specified:

Value = HiByte*255+LoByte.

HiByte and LoByte are the decimal equivalents of the hex byte. The V*alue* may need to be further processed by the given conversion to get the final result in the units specified.

Note on Temperatures

All temperatures given above are in degrees Fahrenheit, to get degrees Celsius, you must use the standard formula for temperature conversion:

ºC = (5/9) * (ºF -32)

Note on Pressures

All pressures given above are in PSI, to get KPA, you must use the following standard conversion:

KPA = 6.89*PSI

OPM - Open Protocol Master Panel

There is only one memory location that can be read in the Open Protocol Master Panel. It is used to verify that the OPM is powered and communicating, and that the applications code is intact.

Open Protocol Master Status ***$0400***

0-254 = Program is running
255 = Program is not running

Read Only Memory Locations (2-Compressor Chillers)

Variable Name	Address	Range	Conversion	Units/ Description
Active Chilled Water Temperature Setpoint	$045A	30 - 160 (15-80°F)	X/2	°F
Circuit #1 Condenser Pressure	$0467-8	0-4500 (0-450 PSI)	X/10	PSI
Circuit #1 Conditions at Time of Alarm: Capacity	$1F13	0-100		Percent
Circuit #1 Conditions at Time of Alarm: Condenser Pressure	$1F09-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #1 Conditions at Time of Alarm: Evaporator Leaving Water Temperature	$1F0F-10	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Conditions at Time of Alarm: Evaporator Pressure	$1F07-8	0-1500 (0-150 PSI)	X/10	PSI
Circuit #1 Conditions at Time of Alarm: Fan Stage	$1F14	0-6		
Circuit #1 Conditions at Time of Alarm: Outdoor Air Temp	$1F11-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Conditions at Time of Alarm: Suction Temperature	$1F0B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Current Alarm	$08B9	0 – 35		See alarm list below

Variable Name	Address	Range	Conversion	Units/ Description
Circuit #1 Current Alarm ***Hour*** ***Minute*** ***Month*** ***Date*** ***Year***	 $1F02 $1F01 $1F05 $1F04 $1F06	 0-23 0-59 1-12 1-31 0-99		
Circuit #1 Evaporator Pressure	$0463-4	0-1500 (0-150 PSI)	X/10	PSI
Circuit #1 Discharge Temperature	$0479-A	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Status	$0428	0 – 13		See circuit status list below
Circuit #1 Suction Temperature	$0475-6	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Superheat Temperature	$04D7-8	0-2360 (0 to 263°F)	X/10	°F
Circuit #2 Condenser Pressure	$0469-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #2 Conditions at Time of Alarm: Capacity	$2013	0-100		Percent
Circuit #2 Conditions at Time of Alarm: Condenser Pressure	$2009-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #2 Conditions at Time of Alarm: Evaporator Leaving Water Temperature	$200F-10	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Conditions at Time of Alarm: Evaporator Pressure	$2007-8	0-1500 (0-150 PSI)	X/10	PSI
Circuit #2 Conditions at Time of Alarm: Fan Stage	$2014	0-6		
Circuit #2 Conditions at Time of Alarm: Outdoor Air Temp	$2011-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Conditions at Time of Alarm: Suction Temperature	$200B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Current Alarm	$08BA	0 – 35		See alarm list below
Circuit #2 Current Alarm ***Hour*** ***Minute*** ***Month*** ***Date*** ***Year***	 $2002 $2001 $2005 $2004 $2006	 0-23 0-59 1-12 1-31 0-99		

Variable Name	Address	Range	Conversion	Units/ Description
Circuit #2 Evaporator Pressure	$0465-6	0-1500 (0-150 PSI)	X/10	PSI
Circuit #2 Discharge Temperature	$047B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Status	$0429	0 - 13		See circuit status list below
Circuit #2 Suction Temperature	$0477-8	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Superheat Temperature	$04D9-A	0-2360 (0 to 263°F)	X/10	°F
Compressor #1 Operating Hours	$0862-3	0 - 65279		Hours
Compressor #1 Starts	$086A-B	0 - 65279		Starts
Compressor #2 Operating Hours	$0864 -5	0 - 65279		Hours
Compressor #2 Starts	$086C -D	0 - 65279		Starts
Evaporator Entering Water Temperature	$046E -F	600-3630 (-40 to 263°F)	(X/10)-100	°F
Evaporator Leaving Water Temperature	$0461-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Outdoor Air Temperature	$047D-E	600-3630 (-40 to 263°F)	(X/10)-100	°F
Stage of Cooling	$042B	0 - 8		
Unit Status	$0427	0 - 14		See unit status list below

Active Chilled Water Temperature Setpoint $045A

The setpoint used by the chiller to control the leaving water temperature. This is the combination of setpoint and reset values

Circuit #1 Condenser Pressure $0467/$0468

Measured pressure in condenser in circuit #1.

Circuit #1 Conditions at Time of Alarm: Capacity $1F13

Capacity at which circuit #1 was running at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Condenser Pressure $1F09/$1F0A

Condenser pressure in circuit #1 at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Evaporator Leaving Water Temperature $1F0F/$1F10

Evaporator leaving water temperature at time of circuit #1 alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Evaporator Pressure $1F07/$1F08

Evaporator pressure in circuit #1 at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Fan Stage $1F14

Fan stage in operation at time of circuit #1 alarm occurrence. Maximum fan stages per model:

ALS125-140	4
ALS155-170	5
ALS175-204	6

Circuit #1 Conditions at Time of Alarm: Outdoor Air Temp $1F11/$1F12

Outdoor air temperature at time of circuit #1 alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Suction Temperature $1F0B/$1F0C

Measured temperature in circuit #1 suction line at time of alarm occurrence.

Circuit #1 Current Alarm $08B9

Alarm Name	Active
No Alarms	0
Interstage Solenoid Valve Open	1
High Condenser Pre-Alarm Hold Stage	2
High Condenser Pre-Alarm Stage Down	3
Freeze Refrigerant Pre-Alarm Stage Down	4
Loss Of Chilled Water Flow	5
No Pump Down	6
Low Evap No Start	7
Pre-purge Fail	8
Low Ambient Start	9
High Discharge Temp	10
(not used)	11
Refrigerant Freeze Protect	12
Low Evaporator Pressure	13
Motor Protect	14
Re-power After Power Loss	15
(not used)	16
(not used)	17
No Evap Press Drop	18
Low Lift Pressure	19
Low Oil Level	20
No Liquid Start	21
High Liquid Press Drop	22
(not used)	23
(not used)	24
High Condenser Pressure	25
Mechanical High Pressure	26
(not used)	27

Alarm Name	Active
Bad Discharge Temp Sensor	28
Bad Compressor Suction Temp Sensor	29
Bad Evaporator Pressure Sensor	30
Bad Condenser Pressure Sensor	31
Bad Phase Voltage	32
Chilled Water Freeze Protect	33
Bad Voltage Ratio	34
Bad Leaving Evap Temp Sensor	35

Circuit #1 Current Alarm Hour...Year *$1F01-1F06*

These locations contain the time (hour and minute) and date (day, month and year) that the alarm occurred.

Circuit #1 Evaporator Pressure *$0463/$0464*

Measured pressure in evaporator in circuit #1.

Circuit #1 Discharge Temperature *$0479/$047A*

This location contains the temperature, in °F, of the compressor discharge refrigerant.

Circuit #1 Status *$0428*

Defined values:

0 = Off, S-1 System Switch
1 = Off, Manual Setpoint
2 = Off, Alarm
3 = Off, Pump Down Switch
4 = Off, Wait For Cycle Timers
5 = Off, Wait For Flood Timer
6 = Off, Ready to Start
7 = Start Pump Down
8 = Pump Down
9 = Start Requested
10 = Pre-purge
11 = Open Solenoid
12 = Low Ambient Start
13 = Cooling

Circuit #1 Suction Temperature *$0475/$0476*

This location contains the temperature, in °F, of the low-pressure vaporized refrigerant entering the compressor.

Circuit #1 Superheat Temperature *$04D7/$04D8*

This location contains the Superheat Temperature in °F. The superheat temperature is calculated by subtracting the evaporator refrigerant temperature from the Suction Temperature.

Circuit #2 Condenser Pressure *$0469/$046A*

Measured pressure in condenser in circuit #2.

Circuit #2 Conditions at Time of Alarm: Capacity $2013

Capacity at which circuit #2 was running at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Condenser Pressure $2009/$200A

Condenser pressure in circuit #2 at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Evaporator Leaving Water Temperature $200F/$2010

Evaporator leaving water temperature at time of circuit #2 alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Evaporator Pressure $2007/$2008

Evaporator pressure in circuit #2 at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Fan Stage $2014

Fan stage in operation at time of circuit #2 alarm occurrence. Maximum fan stages per model:

ALS125-140	4
ALS155-170	5
ALS175-204	6

Circuit #2 Conditions at Time of Alarm: Outdoor Air Temp $2011/$2012

Outdoor air temperature at time of circuit #2 alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Suction Temperature $200B/$200C

Measured temperature in circuit #1 suction line at time of alarm occurrence.

Circuit #2 Current Alarm $08BA

Same as Circuit #1 Above

Circuit #2 Current Alarm Hour...Year $2001-2006

These locations contain the time (hour and minute) and date (day, month and year) that the alarm occurred.

Circuit #2 Evaporator Pressure $0465/$0466

Measured pressure in evaporator in circuit #2.

Circuit #2 jDischarge Temperature $047B/$047C

This location contains the temperature, in °F, of the compressor discharge refrigerant.

Circuit #2 Status $0429

Same as Circuit #1 Above

Circuit #2 Suction Temperature $0477/$0478

This location contains the temperature, in °F, of the low-pressure vaporized refrigerant entering the compressor.

Circuit #2 Superheat Temperature *$04D9/$04DA*

This location contains the Condenser Superheat Temperature in °F. The superheat temperature is calculated by subtracting the evaporator refrigerant temperature from the Suction Temperature.

Compressor #1 Operating Hours *$0862/$0863*

Cumulative total of operating hours for compressor #1.

Compressor #1 Starts *$086A/$086B*

Running total of starts for compressor #1.

Compressor #2 Operating Hours *$0864/$0865*

Cumulative total of operating hours for compressor #2.

Compressor #2 Starts *$086C/$086D*

Running total of starts for compressor #2.

Evaporator Entering Water Temperature *$046E/$046F*

This location contains the temperature, in °F, of the chilled water entering the evaporator.

Evaporator Leaving Water Temperature *$0461/$0462*

This location contains the temperature, in °F, of the chilled water leaving the evaporator.

Outdoor Air Temperature *$047D/$047E*

This location contains the ambient temperature, in °F, of the outdoor air.

Stage of Cooling *$042B*

Stage of cooling capacity at which the chiller is currently operating.

Unit Status *$0427*

Defined values:

0 = Off, Manual Setpoint
1 = Off, S-1 System Switch
2 = Off, Remote Communication
3 = Off, Remote Switch
4 = Off, Time Schedule
5 = Off, Alarm
6 = Off, Pump Down Switches
7 = Off, Ambient Lock
8 = Starting
9 = Waiting For Flow
10 = Waiting For Load
11 = Cool Stage Up
12 = Cool Stage Down
13 = Cooling
14 = Manual Cool Staging

Read/Write Memory Locations (2-Compressor Chillers)

Variable Name	Address	Range	Conversion	Units
Clear Circuit #1 Alarm 1 = Clear Active Alarm 0 = Do Nothing	$091A	0 - 1		
Clear Circuit #2 Alarm 1 = Clear Active Alarm 0 = Do Nothing	$091B	0 - 1		
Evaporator Entering Water Temperature Setpoint	$090D	30 - 160 (15-80°F)	X/2	°F
Evaporator Leaving Water Temperature Setpoint	$0905	20 - 160 (10-80°F)	X/2	°F
Maximum Chilled Water Reset Setpoint	$090C	0 - 90 (0-45°F)	X/2	°F
Network Command 0=Enable 1=Disable	$044F	0 - 1		
Network Demand Limit	$044D	0 - 100		Percent
Network Evaporator Leaving Water Temperature Reset	$044E	0 - 100		Percent
Reset Option Setpoint	$090B	0 - 5		

Clear Circuit #1 Alarm *$091A*

1 = Clear Active Alarm
0 = Do Nothing

Memory location will change to zero when alarm is cleared.

Clear Circuit #2 Alarm — *$091B*

1 = Clear Active Alarm
0 = Do Nothing

Memory location will change to zero when alarm is cleared.

Evaporator Entering Water Temperature Setpoint — *$090D*

Temperature setpoints are not stored as direct representations of a temperature. They are stored as temperature * 2. This will allows temperatures to be specified in 0.5°F increments.

Example: 54.5°F is stored as 109 decimal.

Default value of Evaporator Entering Water Temperature Setpoint is 108 (54°F).

Evaporator Leaving Water Temperature Setpoint — *$0905*

Default value of Evaporator Leaving Water Temperature Setpoint is 88 (44°F).

Maximum Chilled Water Reset Setpoint — *$090C*

Default value of Maximum Chilled Water Reset Setpoint is 20 (10°F).

Network Command — *$044F*

The Network Command is a way to disable the chiller through the Open Protocol interface. If all other enable/disable features are in the "enabled" position, writing a "1" to the Network Command memory location will disable the chiller. If any of the enable/disable features is in the "disabled" position, the Network Command will have no effect. The memory for Network Command is a RAM location that, upon loss and subsequent restoration of power, is initialized to "Enable."

Network Demand Limit — *$044D*

The chiller can be Demand Limited two ways - either by a hardwired 4 - 20 mA signal or by network communications. Here is the formula:

C - {[(C-1) * (%S + %N)] + 50} / 100

Where: C = Number of cooling stages
S = 4 - 20 mA range in percent
N = Network range in percent

Example 1:

If there are eight cooling stages, and "50" has been written to the Network Demand Limit. (No external 4 - 20 mA signal is wired).

8 – {[(8-1) * (0+50)] + 50}/ 100

8 - {[7*50] + 50} / 100 = 4 stages Maximum Limit

Example 2:

If there are eight cooling stages, the input from the 4 - 20 signal is 8 mA and the Network Demand Limit is zero.

8 - {[(8-1) * (25+0)] + 50} / 100

8 - {[7*25] + 50} / 100 = 6 stages Maximum Limit

Network Evaporator Leaving Water Temperature Reset — *$044E*

This location contains the percentage of chilled water temperature reset to be performed when Network Chilled Water Reset is selected as the Reset Option Setpoint (below).

Reset Option Setpoint — *$090B*

Possible values:

0 = No Chilled Water Reset (default)
1 = Return Chilled Water Reset (see I&M)
2 = 4 - 20 mA Chilled Water Reset
3 = Network Chilled Water Reset
4 = Ice Chilled Water Reset (see I&M)
5 = Outdoor Air Temperature Chilled Water Reset

To reset from a hardwired 4 - 20 mA signal, write "2" to $090B. The chilled water supply temperature will then be controlled from a range of 44°F (Evaporator Leaving Water Setpoint) to 54°F [Maximum Chilled Water Temperature Reset Setpoint (10°F) plus the Evaporator Leaving Water Temperature Setpoint (44°F)]. At 4 mA or below, the temperature setpoint will be 44°F. At 20 mA, the temperature setpoint will be 54°F.

To reset through communication, write "3" to $090B. The chilled water supply temperature will then be controlled from a range of 44°F (Evaporator Leaving Water Setpoint) to 54°F [Maximum Chilled Water Temperature Reset (10°F) + Evaporator Leaving Water Temperature Setpoint (44°F)]. You may write 0 through 100 (% reset) to the Network Evaporator Leaving Reset. If you write a "0," the temperature setpoint will be 44°F. If you write a "100," the temperature setpoint will be 54°F.

Read Only Memory Locations (3-Compressor Chillers)

Variable Name	Address	Range	Conversion	Units
Active Chilled Water Temperature Setpoint	$045A	30 - 160 (15-80°F)	X/2	°F
Circuit #1 Condenser Pressure	$0467-8	0-4500 (0-450 PSI)	X/10	PSI
Circuit #1 Conditions at Time of Alarm: Capacity	$1C13	0-100		Percent
Circuit #1 Conditions at Time of Alarm: Condenser Pressure	$1C09-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #1 Conditions at Time of Alarm: Evaporator Leaving Water Temperature	$1C0F-10	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Conditions at Time of Alarm: Evaporator Pressure	$1C07-8	0-1500 (0-150 PSI)	X/10	PSI
Circuit #1 Conditions at Time of Alarm: Fan Stage	$1C14	0-5		
Circuit #1 Conditions at Time of Alarm: Outdoor Air Temp	$1C11-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Conditions at Time of Alarm: Suction Temperature	$1C0B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Current Alarm	$08B9	0 – 35		See alarm list below
Circuit #1 Current Alarm ***Hour*** ***Minute*** ***Month*** ***Date*** ***Year***	 $1C02 $1C01 $1C05 $1C04 $1C06	 0-23 0-59 1-12 1-31 0-99		

Variable Name	Address	Range	Conversion	Units
Circuit #1 Discharge Temperature	$0487-8	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Evaporator Pressure	$0463-4	0-1500 (0-150 PSI)	X/10	PSI
Circuit #1 Liquid Line Temperature	$0479-A	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Status	$0428	0 - 13		See status list below
Circuit #1 Discharge Superheat Temperature	$04DF-E0	0-2360 (0 to 263°F)	X/10	°F
Circuit #1 Suction Temperature	$0475-6	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Superheat Temperature	$04D7-8	0-2360 (0 to 263°F)	X/10	°F
Circuit #2 Condenser Pressure	$0469-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #2 Conditions at Time of Alarm: Capacity	$1D13	0-100		Percent
Circuit #2 Conditions at Time of Alarm: Condenser Pressure	$1D09-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #2 Conditions at Time of Alarm: Evaporator Leaving Water Temperature	$1D0F-10	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Conditions at Time of Alarm: Evaporator Pressure	$1D07-8	0-1500 (0-150 PSI)	X/10	PSI
Circuit #2 Conditions at Time of Alarm: Fan Stage	$1D14	0-5		
Circuit #2 Conditions at Time of Alarm: Liquid Line Temperature	$1D0D-E	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Conditions at Time of Alarm: Outdoor Air Temp	$D011-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Conditions at Time of Alarm: Suction Temperature	$1D0B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Current Alarm	$08BA	0 – 35		See alarm list below

Variable Name	Address	Range	Conversion	Units
Circuit #2 Current Alarm ***Hour*** ***Minute*** ***Month*** ***Date*** ***Year***	 $1D02 $1D01 $1D05 $1D04 $1D06	 0-23 0-59 1-12 1-31 0-99		
Circuit #2 Discharge Temperature	$0489-A	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Evaporator Pressure	$0465-6	0-1500 (0-150 PSI)	X/10	PSI
Circuit #2 Liquid Line Temperature	$047B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Status	$0429	0 - 13		See circuit status list below
Circuit #2 Discharge Superheat Temperature	$04E1-2	0-2360 (0 to 263°F)	X/10	°F
Circuit #2 Suction Temperature	$0477-8	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Superheat Temperature	$04D9-A	0-2360 (0 to 263°F)	X/10	°F
Circuit #3 Condenser Pressure	$0481-2	0-4500 (0-450 PSI)	X/10	PSI
Circuit #3 Conditions at Time of Alarm: Capacity	$1E13	0-100		Percent
Circuit #3 Conditions at Time of Alarm: Condenser Pressure	$1E09-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #3 Conditions at Time of Alarm: Evaporator Leaving Water Temperature	$1E0F-10	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Conditions at Time of Alarm: Evaporator Pressure	$1E07-8	0-1500 (0-150 PSI)	X/10	PSI
Circuit #3 Conditions at Time of Alarm: Fan Stage	$1E14	0-5		
Circuit #3 Conditions at Time of Alarm: Liquid Line Temperature	$1E0D-E	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Conditions at Time of Alarm: Outdoor Air Temp	$1E11-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Conditions at Time of Alarm: Suction Temperature	$1E0B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F

Variable Name	Address	Range	Conversion	Units
Circuit #3 Current Alarm	$08BE	0 - 35		See alarm list below
Circuit #3 Current Alarm ***Hour*** ***Minute*** ***Month*** ***Date*** ***Year***	 $1E02 $1E01 $1E05 $1E04 $1E06	 0-23 0-59 1-12 1-31 0-99		
Circuit #3 Discharge Temperature	$049B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Evaporator Pressure	$047F-80	0-1500 (0-150 PSI)	X/10	PSI
Circuit #3 Liquid Line Temperature	$0485-6	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Status	$042A	0 - 13		See circuit status list below
Circuit #3 Discharge Superheat Temperature	$04E9-A	0-2360 (0 to 263°F)	X/10	°F
Circuit #3 Suction Temperature	$0483-4	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Superheat Temperature	$04E5-6	0-2360 (0 to 263°F)	X/10	°F
Compressor #1 Operating Hours	$0862-3	0 - 65279		Hours
Compressor #1 Starts	$086A-B	0 - 65279		Starts
Compressor #2 Operating Hours	$0864-5	0 - 65279		Hours
Compressor #2 Starts	$086C-D	0 - 65279		Starts
Compressor #3 Operating Hours	$0866-7	0 - 65279		Hours
Compressor #3 Starts	$086E-F	0 - 65279		Starts
Evaporator Entering Water Temperature	$046E-F	600-3630 (-40 to 263°F)	(X/10)-100	°F
Evaporator Leaving Water Temperature	$0461-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Outdoor Air Temperature	$0470-1	600-3630 (-40 to 263°F)	(X/10)-100	°F
Stage of Cooling	$042B	0 – 12		
Unit Status	$0427	0 - 14		See unit status list below

Active Chilled Water Temperature Setpoint ***$045A***

The setpoint used by the chiller to control the leaving water temperature. This is the combination of setpoint and reset values

Circuit #1 Condenser Pressure *$0467/$0468*

Measured pressure in condenser in circuit #1.

Circuit #1 Conditions at Time of Alarm: Capacity *$1C13*

Capacity at which circuit #1 was running at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Condenser Pressure *$1C09/$1C0A*

Condenser pressure in circuit #1 at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Evaporator Leaving Water Temperature *$1C0F/$1C10*

Evaporator leaving water temperature at time of circuit #1 alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Evaporator Pressure *$1C07/$1C08*

Evaporator pressure in circuit #1 at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Fan Stage *$1C14*

Fan stage in operation at time of circuit #1 alarm occurrence. Maximum fan stages per model:

ALS205-220	4
ALS235-280	5

Circuit #1 Conditions at Time of Alarm: Liquid Line Temperature *$1C0D/$1C0E*

Measured temperature in circuit #1 liquid line at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Outdoor Air Temp *$1C11/$1C12*

Outdoor air temperature at time of circuit #1 alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Suction Temperature *$1C0B/$1C0C*

Measured temperature in circuit #1 suction line at time of alarm occurrence.

Circuit #1 Current Alarm *$08B9*

Alarm Name	Active
No Alarms	0,1
High Condenser Pre-Alarm Hold Stage	2
High Condenser Pre-Alarm Stage Down	3
Freeze Refrigerant Pre-Alarm Stage Down	4
Loss Of Chilled Water Flow	5
No Pump Down	6
Low Evap No Start	7
Pre-purge Fail	8
(not used)	9
Low Ambient Start	10
(not used)	11

Alarm Name	Active
Refrigerant Freeze Protect	12
Low Evaporator Pressure	13
Starter Fault	14
Re-power After Power Loss	15
(not used)	16
(not used)	17
No Evap Press Drop	18
Low Lift Pressure	19
No Liquid Run	20
No Liquid Start	21
High Liquid Press Drop	22
(not used)	23
High Discharge Temp	24
High Condenser Pressure	25
Mechanical High Pressure	26
(not used)	27
Bad Discharge Temp Sensor	28
Bad Compressor Suction Temp Sensor	29
Bad Evaporator Pressure Sensor	30
Bad Condenser Pressure Sensor	31
Bad Phase Voltage	32
Chilled Water Freeze Protect	33
Bad Voltage Ratio	34
Bad Leaving Evap Temp Sensor	35

Circuit #1 Current Alarm Hour...Year *$1C01-1C06*

These locations contain the time (hour and minute) and date (day, month and year) that the alarm occurred.

Circuit #1 Discharge Temperature *$0487/$0488*

This location contains the temperature, in °F, of the high-pressure vaporized refrigerant leaving the compressor.

Circuit #1 Evaporator Pressure *$0463/$0464*

Measured pressure in evaporator in circuit #1.

Circuit #1 Liquid Line Temperature *$0479/$047A*

This location contains the temperature, in °F, of the liquid refrigerant entering the expansion valve.

Circuit #1 Status *$0428*

Defined values:

0 = Off, S-1 System Switch
1 = Off, Manual Setpoint
2 = Off, Alarm
3 = Off, Pump Down Switch
4 = Off, Wait For Cycle Timers
5 = Off, Wait For Flood Timer
6 = Off, Ready
7 = Start Pump Down
8 = Pump Down
9 = Start Requested
10 = Pre-purge
11 = Open Solenoid
12 = Low Ambient Start
13 = Cooling

Circuit #1 Discharge Superheat Temperature *$04DF/$04E0*

This location contains the Discharge Superheat Temperature in °F. The Discharge Superheat Temperature is calculated by subtracting the condenser refrigerant Temperature from the discharge temperature.

Circuit #1 Suction Temperature *$0475/$0476*

This location contains the temperature, in °F, of the low-pressure vaporized refrigerant entering the compressor.

Circuit #1 Superheat Temperature *$04D7/$04D8*

This location contains the Superheat Temperature in °F. The superheat temperature is calculated by subtracting the evaporator refrigerant temperature from the Suction Temperature.

Circuit #2 Condenser Pressure *$0469/$046A*

Measured pressure in condenser in circuit #2.

Circuit #2 Conditions at Time of Alarm: Capacity *$1D13*

Capacity at which circuit #2 was running at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Condenser Pressure *$1D09/$1D0A*

Condenser pressure in circuit #2 at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Evaporator Leaving Water Temperature *$1D0F/$1D10*

Evaporator leaving water temperature at time of circuit #2 alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Evaporator Pressure *$1D07/$1D08*

Evaporator pressure in circuit #2 at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Fan Stage *$1D14*

Fan stage in operation at time of circuit #2 alarm occurrence. Maximum fan stages per model:

ALS205-220	4
ALS235-280	5

Circuit #2 Conditions at Time of Alarm: Liquid Line Temperature *$1D0D/$1D0E*

Measured temperature in circuit #2 liquid line at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Outdoor Air Temp *$1D11/$1D12*

Outdoor air temperature at time of circuit #2 alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Suction Temperature *$1D0B/$1D0C*

Measured temperature in circuit #2 suction line at time of alarm occurrence.

Circuit #2 Current Alarm *$08BA*

Same as Circuit #1 Above

Circuit #2 Current Alarm Hour...Year *$1D01-1D06*

These locations contain the time (hour and minute) and date (day, month and year) that the alarm occurred.

Circuit #2 Discharge Temperature *$0489/$048A*

This location contains the temperature, in °F, of the high-pressure vaporized refrigerant leaving the compressor.

Circuit #2 Evaporator Pressure *$0465/$0466*

Measured pressure in evaporator in circuit #2.

Circuit #2 Liquid Line Temperature *$047B/$047C*

This location contains the temperature, in °F, of the liquid refrigerant entering the expansion valve.

Circuit #2 Status *$0429*

Same as Circuit #1 above

Circuit #2 Discharge Superheat Temperature *$04E1/$04E2*

This location contains the Discharge Superheat Temperature in °F. The Discharge Superheat Temperature is calculated by subtracting the condenser refrigerant Temperature from the discharge temperature.

Circuit #2 Suction Temperature *$0477/$0478*

This location contains the temperature, in °F, of the low-pressure vaporized refrigerant entering the compressor.

Circuit #2 Superheat Temperature *$04D9/$04DA*

This location contains the Superheat Temperature in °F. The superheat temperature is calculated by subtracting the evaporator refrigerant temperature from the Suction Temperature.

Circuit #3 Condenser Pressure *$0481/$0482*

Measured pressure in condenser in circuit #3.

Circuit #3 Conditions at Time of Alarm: Capacity *$1E13*

Capacity at which circuit #3 was running at time of alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Condenser Pressure *$1E09/$1E0A*

Condenser pressure in circuit #3 at time of alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Evaporator Leaving Water Temperature *$1E0F/$1E10*

Evaporator leaving water temperature at time of circuit #3 alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Evaporator Pressure *$1E07/$1E08*

Evaporator pressure in circuit #3 at time of alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Fan Stage *$1E14*

Fan stage in operation at time of circuit #3 alarm occurrence. Maximum fan stages per model:

ALS205-220	4
ALS235-280	5

Circuit #3 Conditions at Time of Alarm: Liquid Line Temperature *$1E0D/$1E0E*

Measured temperature in circuit #3 liquid line at time of alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Outdoor Air Temp *$1E11/$1E12*

Outdoor air temperature at time of circuit #3 alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Suction Temperature *$1E0B/$1E0C*

Measured temperature in circuit #3 suction line at time of alarm occurrence.

Circuit #3 Current Alarm *$08BE*

Same as Circuit #1 Above

Circuit #3 Current Alarm Hour...Year *$1E01-1E06*

These locations contain the time (hour and minute) and date (day, month and year) that the alarm occurred.

Circuit #3 Discharge Temperature — *$049B/$049C*

This location contains the temperature, in °F, of the high-pressure vaporized refrigerant leaving the compressor.

Circuit #3 Evaporator Pressure — *$047F/$0480*

Measured pressure in evaporator in circuit #3.

Circuit #3 Liquid Line Temperature — *$0485/$0486*

This location contains the temperature, in °F, of the liquid refrigerant entering the expansion valve.

Circuit #3 Status — *$042A*

Same as Compressor #1 and #2 above.

Circuit #3 Discharge Superheat Temperature — *$04E9/$04EA*

This location contains the Discharge Superheat Temperature in °F. The Discharge Superheat Temperature is calculated by subtracting the condenser refrigerant Temperature from the discharge temperature.

Circuit #3 Suction Temperature — *$0483/$0484*

This location contains the temperature, in °F, of the low-pressure vaporized refrigerant entering the compressor.

Circuit #3 Superheat Temperature — *$04E5/$04E6*

This location contains the Superheat Temperature in °F. The superheat temperature is calculated by subtracting the evaporator refrigerant temperature from the Suction Temperature.

Compressor #1 Operating Hours — *$0862/$0863*

Cumulative total of operating hours for compressor #1.

Compressor #1 Starts — *$086A/$086B*

Running total of starts for compressor #1.

Compressor #2 Operating Hours — *$0864/$0865*

Cumulative total of operating hours for compressor #2.

Compressor #2 Starts — *$086C/$086D*

Running total of starts for compressor #2.

Compressor #3 Operating Hours — *$0866/$0867*

Cumulative total of operating hours for compressor #3.

Compressor #3 Starts — *$086E/$086F*

Running total of starts for compressor #3.

Evaporator Entering Water Temperature — *$046E/$046F*

This location contains the temperature, in °F, of the chilled water entering the evaporator.

Evaporator Leaving Water Temperature — *$0461/$0462*

This location contains the temperature, in °F, of the chilled water leaving the evaporator.

Outdoor Air Temperature — *$0470/$0471*

This location contains the ambient temperature, in °F, of the outdoor air. (Applies to air cooled units only.)

Stage of Cooling — *$042B*

Stage of cooling capacity at which the chiller is currently operating.

Unit Status — *$0427*

Defined values:

0 = Off, Manual Setpoint
1 = Off, S-1 System Switch
2 = Off, Remote Communication
3 = Off, Remote Switch
4 = Off, Time Schedule
5 = Off, Alarm
6 = Off, Pump Down Switches
7 = Off, Ambient Lock
8 = Starting
9 = Waiting For Flow
10 = Waiting For Load
11 = Cool Stage Up
12 = Cool Stage Down
13 = Cooling
14 = Manual Cool Staging

Read/Write Memory Locations (3-Compressor Chillers)

Variable Name	Address	Range	Conversion	Units
Clear Circuit #1 Alarm	$091A	0 – 1		
Clear Circuit #2 Alarm	$091B	0 – 1		
Clear Circuit #3 Alarm	$091F	0 – 1		
Evaporator Entering Water Temperature Setpoint	$090D	30 – 160 (15°F – 80°F)	X/2	°F
Evaporator Leaving Water Temperature Setpoint	$0905	20 – 160 (10°F – 80°F)	X/2	°F
Maximum Chilled Water Reset Setpoint	$090C	0 – 90 (0°F – 45°F)	X/2	°F
Network Command	$044F	0 – 1		0 = Enable 1 = Disable
Network Demand Limit	$044D	0 - 100%		Percent
Network Evaporator Leaving Water Temperature Reset	$044E	0 - 100%		Percent
Reset Option Setpoint	$090B	0 – 5		

Clear Circuit #1 Alarm *$091A*

1 = Clear Active Alarm
0 = Do Nothing

Memory location will change to zero when alarm is cleared.

Clear Circuit #2 Alarm *$091B*

1 = Clear Active Alarm
0 = Do Nothing

Memory location will change to zero when alarm is cleared.

Clear Circuit #3 Alarm *$091F*

1 = Clear Active Alarm
0 = Do Nothing

Memory location will change to zero when alarm is cleared.

Evaporator Entering Water Temperature Setpoint *$090D*

Temperature setpoints are not stored as direct representations of a temperature. They are stored as temperature * 2. This will allows temperatures to be specified in 0.5°F increments.

Example: 54.5°F is stored as 109 decimal.

Default value of Evaporator Entering Water Temperature Setpoint is 108 (54°F).

Evaporator Leaving Water Temperature Setpoint *$0905*

Default value of Evaporator Leaving Water Temperature Setpoint is 88 (44°F).

Maximum Chilled Water Reset Setpoint *$090C*

Default value of Maximum Chilled Water Reset Setpoint is 20 (10°F).

Network Command *$044F*

The Network Command is a way to disable the chiller through the Open Protocol interface. If all other enable/disable features are in the "enabled" position, writing a "1" to the Network Command memory location will disable the chiller. If any of the enable/disable features is in the "disabled" position, the Network Command will have no effect. The memory for Network Command is a RAM location that, upon loss and subsequent restoration of power, is initialized to "Enable."

Network Demand Limit *$044D*

The chiller can be Demand Limited two ways - either by a hardwired 4 - 20 mA signal or by network communications. Here is the formula:

C - {[(C-1) * (%S + %N)] + 50} / 100

Where: C = Number of cooling stages
S = 4 - 20 mA range in percent
N = Network range in percent

Example 1:

If there are twelve cooling stages, and "50" has been written to the Network Demand Limit. (No external 4 - 20 mA signal is wired).

12 – {[(12-1) * (0+50)] + 50}/ 100

12 - {[11*50] + 50} / 100 = 6 stages Maximum Limit

Example 2:

If there are twelve cooling stages, the input from the 4 - 20 signal is 8 mA and the Network Demand Limit is zero.

12 - {[(12-1) * (25+0)] + 50} / 100

12 - {[11*25] + 50} / 100 = 9 stages Maximum Limit

Network Evaporator Leaving Water Temperature Reset *$044E*

This location contains the percentage of chilled water temperature reset to be performed when Network Chilled Water Reset is selected as the Reset Option Setpoint (below).

Reset Option Setpoint *$090B*

Possible values:

- 0 = No Chilled Water Reset (default)
- 1 = Return Chilled Water Reset (see I&M)
- 2 = 4 - 20 mA Chilled Water Reset
- 3 = Network Chilled Water Reset
- 4 = Ice Chilled Water Reset (see I&M)
- 5 = Outdoor Air Temperature Chilled Water Reset

To reset from a hardwired 4 - 20 mA signal, write "2" to $090B. The chilled water supply temperature will then be controlled from a range of 44°F (Evaporator Leaving Water Setpoint) to 54°F [Maximum Chilled Water Temperature Reset Setpoint (10°F) plus the Evaporator Leaving Water Temperature Setpoint (44°F)]. At 4 mA or below, the temperature setpoint will be 44°F. At 20 mA the temperature setpoint will be 54°F.

To reset through communication, write "3" to $090B. The chilled water supply temperature will then be controlled from a range of 44°F (Evaporator Leaving Water Setpoint) to 54°F [Maximum Chilled Water Temperature Reset (10°F) + Evaporator Leaving Water Temperature Setpoint (44°F)]. You may write 0 through 100 (% reset) to the Network Evaporator Leaving Reset. If you write a "0," the temperature setpoint will be 44°F. If you write a "100," the temperature setpoint will be 54°F.

Read Only Memory Locations (4-Compressor Chillers)

Variable Name	Address	Range	Conversion	Units
Active Chilled Water Temperature Setpoint	$045A	30 - 160 (15-80°F)	X/2	°F
Circuit #1 Condenser Pressure	$0467-8	0-4500 (0-450 PSI)	X/10	PSI
Circuit #1 Conditions at Time of Alarm: Capacity	$1C13	0-100		Percent
Circuit #1 Conditions at Time of Alarm: Condenser Pressure	$1C09-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #1 Conditions at Time of Alarm: Evaporator Leaving Water Temperature	$1C0F-10	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Conditions at Time of Alarm: Evaporator Pressure	$1C07-8	0-1500 (0-150 PSI)	X/10	PSI
Circuit #1 Conditions at Time of Alarm: Fan Stage	$1C14	0-5		
Circuit #1 Conditions at Time of Alarm: Outdoor Air Temperature	$1C11-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Conditions at Time of Alarm: Suction Temperature	$1C0B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Current Alarm	$08B9	0 – 35		See alarm list below
Circuit #1 Current Alarm ***Hour*** ***Minute*** ***Month*** ***Date*** ***Year***	 $1C02 $1C01 $1C05 $1C04 $1C06	 0-23 0-59 1-12 1-31 0-99		
Circuit #1 Evaporator Pressure	$0463-4	0-1500 (0-150 PSI)	X/10	PSI
Circuit #1 Discharge Temperature	$0479-A	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Status	$0428	0 - 13		See circuit status list below
Circuit #1 Discharge Superheat Temperature	$04DF-E0	0-2360 (0 to 263°F)	X/10	°F

Variable Name	Address	Range	Conversion	Units
Circuit #1 Suction Temperature	$0475-6	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #1 Superheat Temperature	$04D7-8	0-2360 (0 to 263°F)	X/10	°F
Circuit #2 Condenser Pressure	$0469-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #2 Conditions at Time of Alarm: Capacity	$1D13	0-100		Percent
Circuit #2 Conditions at Time of Alarm: Condenser Pressure	$1D09-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #2 Conditions at Time of Alarm: Evaporator Leaving Water Temperature	$1D0F-10	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Conditions at Time of Alarm: Evaporator Pressure	$1D07-8	0-1500 (0-150 PSI)	X/10	PSI
Circuit #2 Conditions at Time of Alarm: Fan Stage	$1D14	0-5		
Circuit #2 Conditions at Time of Alarm: Outdoor Air Temperature	$1D11-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Conditions at Time of Alarm: Suction Temperature	$1D0B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Current Alarm	$08BA	0 – 35		See alarm list below
Circuit #2 Current Alarm Hour Minute Month Date Year	 $1D02 $1D01 $1D05 $1D04 $1D06	 0-23 0-59 1-12 1-31 0-99		
Circuit #2 Evaporator Pressure	$0465-6	0-1500 (0-150 PSI)	X/10	PSI
Circuit #2 Discharge Temperature	$047B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Status	$0429	0 - 13		See circuit status list below
Circuit #2 Discharge Superheat Temperature	$04E1-2	0-2360 (0 to 263°F)	X/10	°F
Circuit #2 Suction Temperature	$0477-8	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #2 Superheat Temperature	$04D9-A	0-2360 (0 to 263°F)	X/10	°F
Circuit #3 Condenser Pressure	$0481-2	0-4500 (0-450 PSI)	X/10	PSI
Circuit #3 Conditions at Time of Alarm: Capacity	$1E13	0-100		Percent
Circuit #3 Conditions at Time of Alarm: Condenser Pressure	$1E09-A	0-4500 (0-450 PSI)	X/10	PSI

Variable Name	Address	Range	Conversion	Units
Circuit #3 Conditions at Time of Alarm: Evaporator Leaving Water Temperature	$1E0F-10	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Conditions at Time of Alarm: Evaporator Pressure	$1E07-8	0-1500 (0-450 PSI)	X/10	PSI
Circuit #3 Conditions at Time of Alarm: Fan Stage	$1E14	0-5		
Circuit #3 Conditions at Time of Alarm: Outdoor Air Temperature	$1E11-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Conditions at Time of Alarm: Suction Temperature	$1E0B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Current Alarm	$08BE	1 - 35; 129 - 163		See alarm list below
Circuit #3 Current Alarm ***Hour*** ***Minute*** ***Month*** ***Date*** ***Year***	 $1E02 $1E01 $1E05 $1E04 $1E06	 0-23 0-59 1-12 1-31 0-99		
Circuit #3 Evaporator Pressure	$047F-80	0-1500 (0-150 PSI)	X/10	PSI
Circuit #3 Discharge Temperature	$0485-6	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Status	$042A	0 - 13		See circuit status list below
Circuit #3 Discharge Superheat Temperature	$04E9-A	0-2360 (0 to 263°F)	X/10	°F
Circuit #3 Suction Temperature	$0483-4	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #3 Superheat Temperature	$04E5-6	0-2360 (0 to 263°F)	X/10	°F
Circuit #4 Condenser Pressure	$0489-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #4 Conditions at Time of Alarm: Capacity	$1F13	0-100		Percent
Circuit #4 Conditions at Time of Alarm: Condenser Pressure	$1F09-A	0-4500 (0-450 PSI)	X/10	PSI
Circuit #4 Conditions at Time of Alarm: Evaporator Leaving Water Temperature	$1F0F-10	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #4 Conditions at Time of Alarm: Evaporator Pressure	$1F07-8	0-1500 (0-150 PSI)	X/10	PSI
Circuit #4 Conditions at Time of Alarm: Fan Stage	$1F14	0-5		
Circuit #4 Conditions at Time of Alarm: Outdoor Air Temperature	$1F11-2	600-3630 (-40 to 263°F)	(X/10)-100	°F

Variable Name	Address	Range	Conversion	Units
Circuit #4 Conditions at Time of Alarm: Suction Temperature	$1F0B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #4 Current Alarm	$08B7	1 - 35; 129 - 163		See alarm list below
Circuit #4 Current Alarm ***Hour*** ***Minute*** ***Month*** ***Date*** ***Year***	 $1F02 $1F01 $1F05 $1F04 $1F06	 0-23 0-59 1-12 1-31 0-99		
Circuit #4 Evaporator Pressure	$0487-8	0-1500 (0-150 PSI)	X/10	PSI
Circuit #4 Discharge Temperature	$049D-E	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #4 Status	$0430	0 - 13		See circuit status list below
Circuit #4 Discharge Superheat Temperature	$04EB-C	0-2360 (0 to 263°F)	X/10	°F
Circuit #4 Suction Temperature	$049B-C	600-3630 (-40 to 263°F)	(X/10)-100	°F
Circuit #4 Superheat Temperature	$04E7-8	0-2360 (0 to 263°F)	X/10	°F
Compressor #1 Operating Hours	$0862-3	0 - 65279		Hours
Compressor #1 Starts	$086A-B	0 - 65279		Starts
Compressor #2 Operating Hours	$0864-5	0 - 65279		Hours
Compressor #2 Starts	$086C-D	0 - 65279		Starts
Compressor #3 Operating Hours	$0866-7	0 - 65279		Hours
Compressor #3 Starts	$086E-F	0 - 65279		Starts
Compressor #4 Operating Hours	$0868-9	0 - 65279		Hours
Compressor #4 Starts	$0870-1	0 - 65279		Starts
Evaporator Entering Water Temperature	$046E-F	600-3630 (-40 to 263°F)	(X/10)-100	°F
Evaporator Leaving Water Temperature	$0461-2	600-3630 (-40 to 263°F)	(X/10)-100	°F
Outdoor Air Temperature	$0470-1	600-3630 (-40 to 263°F)	(X/10)-100	°F
Stage of Cooling	$042B	0 – 16		
Unit Status	$0427	0 – 14		See unit status list below

Active Chilled Water Temperature Setpoint *$045A*

The setpoint used by the chiller to control the leaving water temperature. This is the combination of setpoint and reset values

Circuit #1 Condenser Pressure — *$0467/$0468*

Measured pressure in condenser in circuit #1.

Circuit #1 Conditions at Time of Alarm: Capacity — *$1C13*

Capacity at which circuit #1 was running at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Condenser Pressure — *$1C09/$1C0A*

Condenser pressure in circuit #1 at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Evaporator Leaving Water Temperature — *$1C0F/$1C10*

Evaporator leaving water temperature at time of circuit #1 alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Evaporator Pressure — *$1C07/$1C08*

Evaporator pressure in circuit #1 at time of alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Fan Stage — *$1C14*

Fan stage in operation at time of circuit #1 alarm occurrence. Maximum fan stages per model:

ALS300-340 4
ALS360-425 5

Circuit #1 Conditions at Time of Alarm: Outdoor Air Temperature — *$1C11/$1C12*

Outdoor air temperature at time of circuit #1 alarm occurrence.

Circuit #1 Conditions at Time of Alarm: Suction Temperature — *$1C0B/$1C0C*

Measured temperature in circuit #1 suction line at time of alarm occurrence.

Circuit #1 Current Alarm — *$08B9*

Alarm Name	Active
No Alarms	0
High Condenser Pre-Alarm Hold Stage	1
High Condenser Pre-Alarm Stage Down	2
Freeze Refrigerant Pre-Alarm Stage Down	3
Loss Of Chilled Water Flow	4
No Pump Down	5
Low Evap No Start	6
Pre-purge Fail	7
(not used)	8
Low Ambient Start	9
Low Subcooling Temp	10
(not used)	11
Refrigerant Freeze Protect	12
Low Evaporator Pressure	13
Starter Fault	14

Alarm Name	Active
Re-power After Power Loss	15
(not used)	16
(not used)	17
No Evap Press Drop	18
Low Lift Pressure	19
(not used)	20
No Liquid Start	21
High Liquid Press Drop	22
(not used)	23
High Discharge Temp	24
High Condenser Pressure	25
Mechanical High Pressure	26
(not used)	27
Bad Discharge Temp Sensor	28
Bad Compressor Suction Temp Sensor	29
Bad Evaporator Pressure Sensor	30
Bad Condenser Pressure Sensor	31
Bad Phase Voltage	32
Chilled Water Freeze Protect	33
Bad Voltage Ratio	34
Bad Leaving Evap Temp Sensor	35

Circuit #1 Current Alarm Hour...Year $1C01-1C06

These locations contain the time (hour and minute) and date (day, month and year) that the alarm occurred.

Circuit #1 Evaporator Pressure $0463/$0464

Measured pressure in evaporator in circuit #1.

Circuit #1 Discharge Temperature $0479/$047A

This location contains the temperature, in °F, of the compressor discharge refrigerant.

Circuit #1 Status $0428

Defined values:

0 = Off, S-1 System Switch
1 = Off, Manual Setpoint
2 = Off, Alarm
3 = Off, Pump Down Switch
4 = Off, Wait For Cycle Timers
5 = Off, Wait For Flood Timer
6 = Off, Ready
7 = Start Pump Down
8 = Pump Down
9 = Start Requested
10 = Pre-purge
11 = Open Solenoid
12 = Low Ambient Start
13 = Cooling

Circuit #1 Discharge Superheat Temperature *$04DF/$04E0*

This location contains the Discharge Superheat Temperature in °F. The Discharge Superheat Temperature is calculated by subtracting the condenser refrigerant Temperature from the discharge temperature.

Circuit #1 Suction Temperature *$0475/$0476*

This location contains the temperature, in °F, of the low-pressure vaporized refrigerant entering the compressor.

Circuit #1 Superheat Temperature *$04D7/$04D8*

This location contains the Superheat Temperature in °F. The superheat temperature is calculated by subtracting the evaporator refrigerant temperature from the Suction Temperature.

Circuit #2 Condenser Pressure *$0469/$046A*

Measured pressure in condenser in circuit #2.

Circuit #2 Conditions at Time of Alarm: Capacity *$1D13*

Capacity at which circuit #2 was running at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Condenser Pressure *$1D09/$1D0A*

Condenser pressure in circuit #2 at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Evaporator Leaving Water Temperature *$1D0F/$1D10*

Evaporator leaving water temperature at time of circuit #2 alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Evaporator Pressure *$1D07/$1D08*

Evaporator pressure in circuit #2 at time of alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Fan Stage *$1D14*

Fan stage in operation at time of circuit #2 alarm occurrence. Maximum fan stages per model:

ALS300-340	4
ALS360-425	5

Circuit #2 Conditions at Time of Alarm: Outdoor Air Temperature *$1D11/$1D12*

Outdoor air temperature at time of circuit #2 alarm occurrence.

Circuit #2 Conditions at Time of Alarm: Suction Temperature *$1D0B/$1D0C*

Measured temperature in circuit #2 suction line at time of alarm occurrence.

Circuit #2 Current Alarm *$08BA*

Same as Circuit #1 above

Circuit #2 Current Alarm Hour...Year $1D01-1D06

These locations contain the time (hour and minute) and date (day, month and year) that the alarm occurred.

Circuit #2 Evaporator Pressure $0465/$0466

Measured pressure in evaporator in circuit #2.

Circuit #2 Discharge Temperature $047B/$047C

This location contains the temperature, in °F, of the compressor discharge refrigerant.

Circuit #2 Status $0429

Same as Circuit #1 above.

Circuit #2 Discharge Superheat Temperature $04E1/$04E2

This location contains the Discharge Superheat Temperature in °F. The Discharge Superheat Temperature is calculated by subtracting the condenser refrigerant Temperature from the discharge temperature.

Circuit #2 Suction Temperature $0477/$0478

This location contains the temperature, in °F, of the low-pressure vaporized refrigerant entering the compressor.

Circuit #2 Superheat Temperature $04D9/$04DA

This location contains the Superheat Temperature in °F. The superheat temperature is calculated by subtracting the evaporator refrigerant temperature from the Suction Temperature.

Circuit #3 Condenser Pressure $0481/$0482

Measured pressure in condenser in circuit #3.

Circuit #3 Conditions at Time of Alarm: Capacity $1E13

Capacity at which circuit #3 was running at time of alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Condenser Pressure $1E09/$1E0A

Condenser pressure in circuit #3 at time of alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Evaporator Leaving Water Temperature $1E0F/$1E0A

Evaporator leaving water temperature at time of circuit #3 alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Evaporator Pressure $1E07/$1E08

Evaporator pressure in circuit #3 at time of alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Fan Stage *$1E14*

Fan stage in operation at time of circuit #3 alarm occurrence. Maximum fan stages per model:

ALS300-340	4
ALS360-425	5

Circuit #3 Conditions at Time of Alarm: Outdoor Air Temperature *$1E11/$1E12*

Outdoor air temperature at time of circuit #3 alarm occurrence.

Circuit #3 Conditions at Time of Alarm: Suction Temperature *$1E0B/$1E0C*

Measured temperature in circuit #3 suction line at time of alarm occurrence.

Circuit #3 Current Alarm *$08BE*

Same as Circuit #1 Above

Circuit #3 Current Alarm Hour...Year *$1E01-1E06*

These locations contain the time (hour and minute) and date (day, month and year) that the alarm occurred.

Circuit #3 Evaporator Pressure *$047F/$0480*

Measured pressure in evaporator in circuit #3.

Circuit #3 Discharge Temperature *$0485/$0486*

This location contains the temperature, in °F, of the compressor discharge refrigerant.

Circuit #3 Status *$042A*

Same as Circuit #1 above.

Circuit #3 Discharge Superheat Temperature *$04E9/$04EA*

This location contains the Discharge Superheat Temperature in °F. The Discharge Superheat Temperature is calculated by subtracting the condenser refrigerant Temperature from the discharge temperature.

Circuit #3 Suction Temperature *$0483/$0484*

This location contains the temperature, in °F, of the low-pressure vaporized refrigerant entering the compressor.

Circuit #3 Superheat Temperature *$04E5/$04E6*

This location contains the Superheat Temperature in °F. The superheat temperature is calculated by subtracting the evaporator refrigerant temperature from the Suction Temperature**.**

Circuit #4 Condenser Pressure *$0489/$048A*

Measured pressure in condenser in circuit #4

Circuit #4 Conditions at Time of Alarm: Capacity $1F13

Capacity at which circuit #4 was running at time of alarm occurrence.

Circuit #4 Conditions at Time of Alarm: Condenser Pressure $1F09/$1F0A

Condenser pressure in circuit #4 at time of alarm occurrence.

Circuit #4 Conditions at Time of Alarm: Evaporator Leaving Water Temperature $1F0F/$1F10

Evaporator leaving water temperature at time of circuit #4 alarm occurrence.

Circuit #4 Conditions at Time of Alarm: Evaporator Pressure $1F07/$1F08

Evaporator pressure in circuit #4 at time of alarm occurrence.

Circuit #4 Conditions at Time of Alarm: Fan Stage $1F14

Fan stage in operation at time of circuit #4 alarm occurrence. Maximum fan stages per model:

ALS300-340	4
ALS360-425	5

Circuit #4 Conditions at Time of Alarm: Outdoor Air Temperature $1F11/$1F12

Outdoor air temperature at time of circuit #4 alarm occurrence.

Circuit #4 Conditions at Time of Alarm: Suction Temperature $1F0B/$1F0C

Measured temperature in circuit #4 suction line at time of alarm occurrence.

Circuit #4 Current Alarm $08B7

Same as Circuit #1 above

Circuit #4 Current Alarm Hour...Year $1F01-1F06

These locations contain the time (hour and minute) and date (day, month and year) that the alarm occurred.

Circuit #4 Evaporator Pressure $0487/$0488

Measured pressure in evaporator in circuit #3.

Circuit #4 Discharge Temperature $049D/$049E

This location contains the temperature, in °F, of the compressor discharge refrigerant.

Circuit #4 Status $0430

Same as Circuit #1 above.

Circuit #4 Discharge Superheat Temperature *$04EB/$04EC*

This location contains the Discharge Superheat Temperature in °F. The Discharge Superheat Temperature is calculated by subtracting the condenser refrigerant Temperature from the discharge temperature.

Circuit #4 Suction Temperature *$049B/$049C*

This location contains the temperature, in °F, of the low-pressure vaporized refrigerant entering the compressor.

Circuit #4 Superheat Temperature *$04E7/$04E8*

This location contains the Superheat Temperature in °F. The superheat temperature is calculated by subtracting the evaporator refrigerant temperature from the Suction Temperature.

Compressor #1 Operating Hours *$0862/$0863*

Cumulative total of operating hours for compressor #1.

Compressor #1 Starts *$086A/$086B*

Running total of starts for compressor #1.

Compressor #2 Operating Hours *$0864/$0865*

Cumulative total of operating hours for compressor #2.

Compressor #2 Starts *$086C/$086D*

Running total of starts for compressor #2.

Compressor #3 Operating Hours *$0866/$0867*

Cumulative total of operating hours for compressor #3.

Compressor #3 Starts *$086E/$086F*

Running total of starts for compressor #3.

Compressor #4 Operating Hours *$0868/$0869*

Cumulative total of operation hours for compressor #4

Compressor #4 Starts *$0870/$0871*

Running total of starts for compressor #4.

Evaporator Entering Water Temperature *$046E/$046F*

This location contains the temperature, in °F, of the chilled water entering the evaporator.

Evaporator Leaving Water Temperature *$0461/$0462*

This location contains the temperature, in °F, of the chilled water leaving the evaporator.

Outdoor Air Temperature *$0470/$0471*

This location contains the ambient temperature, in °F, of the outdoor air. (Applies to air cooled units only.)

Stage of Cooling *$042B*

Stage of cooling capacity at which the chiller is currently operating.

Unit Status *$0427*

Defined values:

0 = Off, Manual Setpoint
1 = Off, S-1 System Switch
2 = Off, Remote Communication
3 = Off, Remote Switch
4 = Off, Time Schedule
5 = Off, Alarm
6 = Off, Pump Down Switches
7 = Off, Ambient Lock
8 = Starting
9 = Waiting For Flow
10 = Waiting For Load
11 = Cool Stage Up
12 = Cool Stage Down
13 = Cooling
14 = Manual Cool Staging

Read/Write Memory Locations (4-Compressor Chillers)

Variable Name	Address	Range	Conversion	Units
Clear Circuit #1 Alarm	$091A	0 - 1		
Clear Circuit #2 Alarm	$091B	0 - 1		
Clear Circuit #3 Alarm	$097F	0 - 1		
Clear Circuit #4 Alarm	$0980	0 - 1		
Evaporator Entering Water Temperature Setpoint	$090D	30 - 160 (15°F - 80°F)	X/2	°F
Evaporator Leaving Water Temperature Setpoint	$0905	20 - 160 (10°F - 80°F)	X/2	°F
Maximum Chilled Water Reset Setpoint	$090C	0 - 90 (0°F - 45°F)	X/2	°F
Network Command	$044F	0 - 1		0 = Enable 1 = Disable
Network Demand Limit	$044D	0 - 100%		Percent
Network Evaporator Leaving Water Temperature Reset	$044E	0 - 100%		Percent
Reset Option Setpoint	$090B	0 - 5		

Clear Circuit #1 Alarm — *$091A*

1 = Clear Active Alarm
0 = Do Nothing

Memory location will change to zero when alarm is cleared.

Clear Circuit #2 Alarm — *$091B*

1 = Clear Active Alarm
0 = Do Nothing

Memory location will change to zero when alarm is cleared.

Clear Circuit #3 Alarm *$097F*

1 = Clear Active Alarm
0 = Do Nothing

Memory location will change to zero when alarm is cleared.

Clear Circuit #4 Alarm *$0980*

1 = Clear Active Alarm
0 = Do Nothing

Memory location will change to zero when alarm is cleared.

Evaporator Entering Water Temperature Setpoint *$090D*

Temperature setpoints are not stored as direct representations of a temperature. They are stored as temperature * 2. This will allows temperatures to be specified in 0.5°F increments.

Example: 54.5°F is stored as 109 decimal.

Default value of Evaporator Entering Water Temperature Setpoint is 108 (54°F).

Evaporator Leaving Water Temperature Setpoint *$0905*

Default value of Evaporator Leaving Water Temperature Setpoint is 88 (44°F).

Maximum Chilled Water Reset Setpoint *$090C*

Default value of Maximum Chilled Water Reset Setpoint is 20 (10°F).

Network Command *$044F*

The Network Command is a way to disable the chiller through the Open Protocol interface. If all other enable/disable features are in the "enabled" position, writing a "1" to the Network Command memory location will disable the chiller. If any of the enable/disable features is in the "disabled" position, the Network Command will have no effect. The memory for Network Command is a RAM location that, upon loss and subsequent restoration of power, is initialized to "Enable."

Network Demand Limit *$044D*

The chiller can be Demand Limited two ways - either by a hardwired 4 - 20 mA signal or by network communications. Here is the formula:

C - {[(C-1) * (%S + %N)] + 50} / 100

Where: C = Number of cooling stages
S = 4 - 20 mA range in percent
N = Network range in percent

Example 1:

If there are twelve cooling stages, and "50" has been written to the Network Demand Limit. (No external 4 - 20 mA signal is wired).

12 – {[(12-1) * (0+50)] + 50}/ 100

12 - {[11*50] + 50} / 100 = 6 stages Maximum Limit

Example 2:

If there are twelve cooling stages, the input from the 4 - 20 signal is 8 mA and the Network Demand Limit is zero.

12 - {[(12-1) * (25+0)] + 50} / 100

12 - {[11*25] + 50} / 100 = 9 stages Maximum Limit

Network Evaporator Leaving Water Temperature Reset *$044E*

This location contains the percentage of chilled water temperature reset to be performed when Network Chilled Water Reset is selected as the Reset Option Setpoint (below).

Reset Option Setpoint *$090B*

Possible values:
- 0 = No Chilled Water Reset (default)
- 1 = Return Chilled Water Reset (see I&M)
- 2 = 4 - 20 mA Chilled Water Reset
- 3 = Network Chilled Water Reset
- 4 = Ice Chilled Water Reset (see I&M)
- 5 = Outdoor Air Temperature Chilled Water Reset

To reset from a hardwired 4 - 20 mA signal, write "2" to $090B. The chilled water supply temperature will then be controlled from a range of 44°F (Evaporator Leaving Water Setpoint) to 54°F [Maximum Chilled Water Temperature Reset Setpoint (10°F) plus the Evaporator Leaving Water Temperature Setpoint (44°F)]. At 4 mA or below, the temperature setpoint will be 44°F. At 20 mA the temperature setpoint will be 54°F.

To reset through communication, write "3" to $090B. The chilled water supply temperature will then be controlled from a range of 44°F (Evaporator Leaving Water Setpoint) to 54°F [Maximum Chilled Water Temperature Reset (10°F) + Evaporator Leaving Water Temperature Setpoint (44°F)]. You may write 0 through 100

(% reset) to the Network Evaporator Leaving Reset. If you write a "0," the temperature setpoint will be 44°F. If you write a "100," the temperature setpoint will be 54°F.

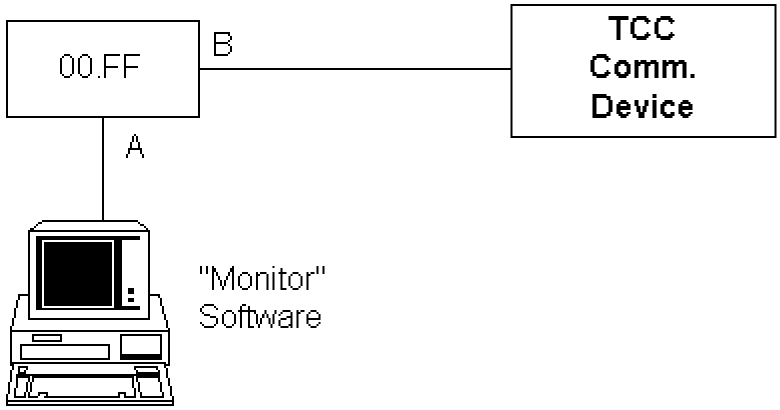
Required Development Testing Tools

Developing and testing an Open Protocol interface for the air-cooled screw chillers requires:

1. (1) Model 250
   (1) Model 120 (optional to test OPM configuration)
   (1) Power supply with power cord and adapter cables
   (1) RS-232 Communications Cable package
   (1) RS-485 Communication Cable package
2. Microsoft Windows-based McQuay Open Protocol Monitor and Simulator software for the screw chiller available on McQuay-Online. If you do not have access to McQuay-Online, please contact McQuay's Controls and Network Systems Marketing Group for software and access.

Setup of Hardware for Testing

One setup that is particularly helpful for proving out an Open Protocol interface is to direct connect both the BAS interface and the simulator monitor software simultaneously, as shown below. In this arrangement, the Open Protocol interface to the TCC Comm device is operational on the controller's Port B and the McQuay Monitor program is operational on a PC connected to the controller's Port A. The HEX switches on the Model 250 Controller will be Hi = F and Lo = F. In this configuration both ports are TTY (PC accessible) and Port A is always 1200 baud and Port B is 9600 Baud. Remember to always turn power off and on after resetting addresses.


00.FF
B
TCC
Comm.
Device
A
"Monitor"
Software

Simulator Monitor Software Guide

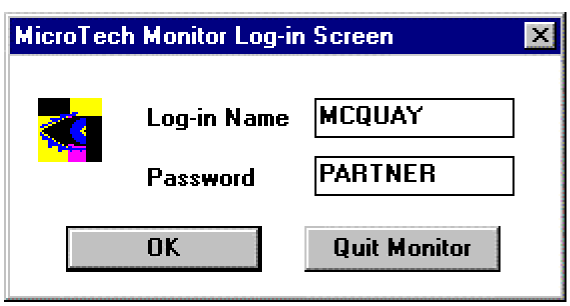
Overview

A simulator Windows based monitor software is available for most of McQuay's products offering Open Protocol. The screw chiller(s) in this document each have a simulator monitor software and are available on McQuay-Online. The software is intended to be a live monitoring version of this document. You will be able to test acquiring data from your interface to a simulator controller. We have disabled all of the sensor tasks from our real controller code to furnish a simulator control code, which is the .cod file(s) in your directory where you have installed the monitor software. This code in most cases will not simulate changing of control modes, it is intended to serve this purpose. If a detailed sequence of operation is required to further understand the operation of any unit, please consult the appropriate Operation Manual (OM). These documents are available upon request and are currently NOT on McQuay-Online.

Logging on to the software

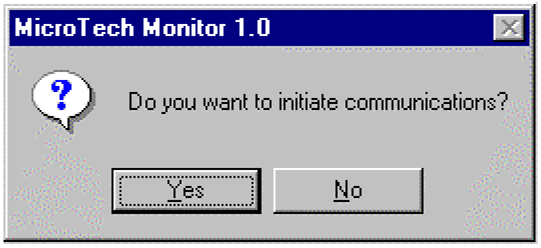
If you have an old copy of the monitor software that has not been updated yet and a password is required and you can not get into the software, please contact McQuay International Controls and Network Systems Marketing group on McQuay On-line. The current contact is Chuck Lehn.

Simulator Monitor software released after January 1, 1997 will have a username: MCQUAY password: PARTNER.

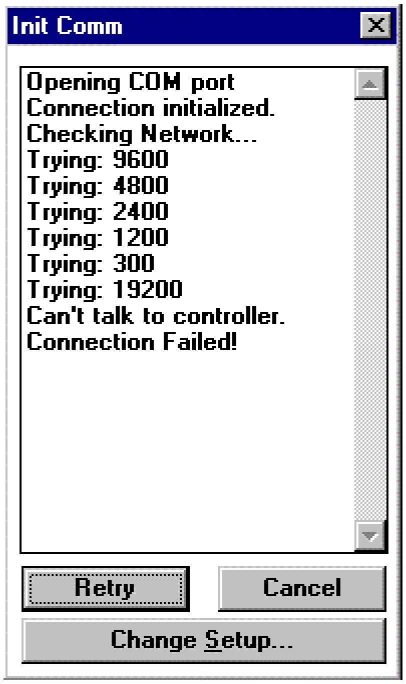


Communications Initialization

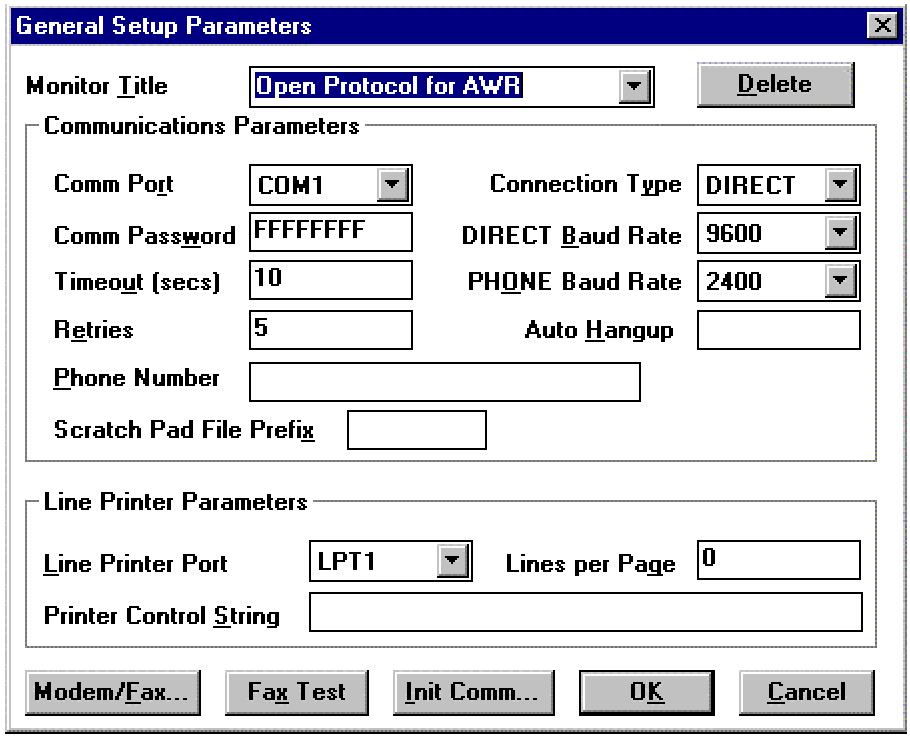
After logging in you will be asked to initiate communications



If you are connecting to a simulator controller you will want to select YES. If you are successful at connecting you will be at the main screen. If you are unsuccessful you will see the following:



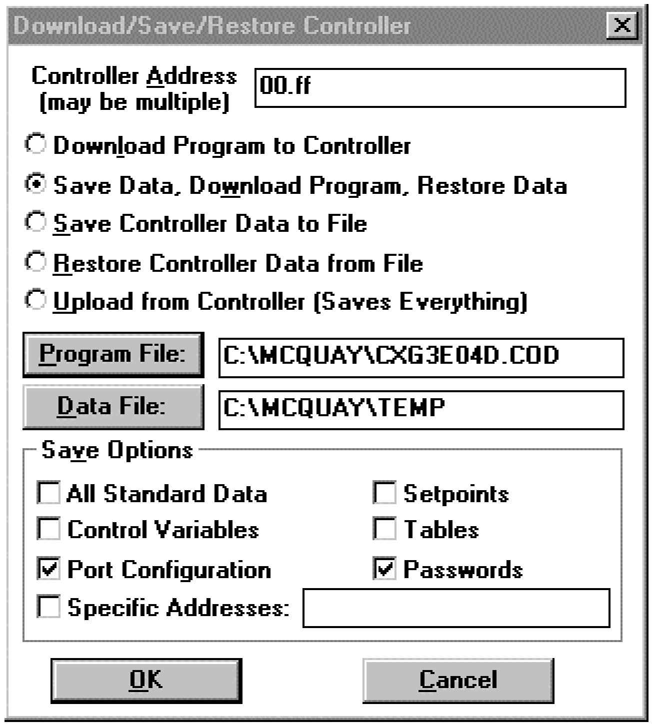
If you see this screen you may have a communications setup problem. You may select the Change Setup function to change communications parameters. You will come to a screen that looks like:



The problem is most likely you are using the wrong comm port on your PC. Check to make sure you are using either Comm 1 or Comm 2. The password for the controller will most likely be the default shown (FFFFFFFF). If for some reason your simulator has a different password, you may enter a new password here to try and establish communications to the controller. Note that this password does not change the controller password, it merely tries to match one of the four level passwords that exist in the controller. The connection type needs to be DIRECT, however the BAUD RATE does not need to match the baud rate that the controller port is set up for. When direct connecting to a controller the monitor software will test all possible connection speeds from 300 to 9600 Baud until a connection is made or all baud rates have been attempted. Once you have adjusted the above parameters, you may attempt to connect to the controller once again by pressing the Init Comm button.

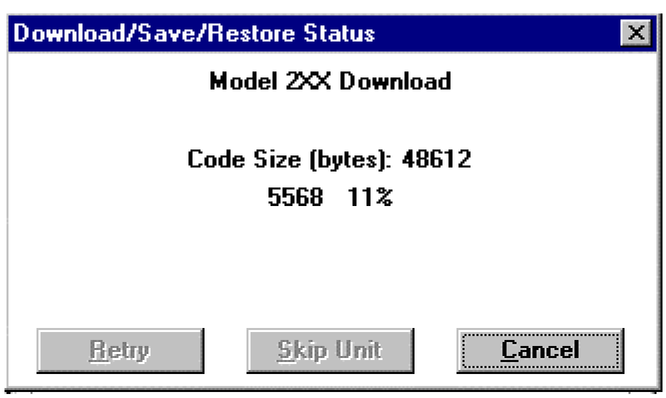
Downloading Simulation code

Once you have connected to the controller you may need to download simulator application code. From the Main Menu bar select the *Support* option. Under the menu items for support you will find *Download.* Select Download and you should see the following screen:



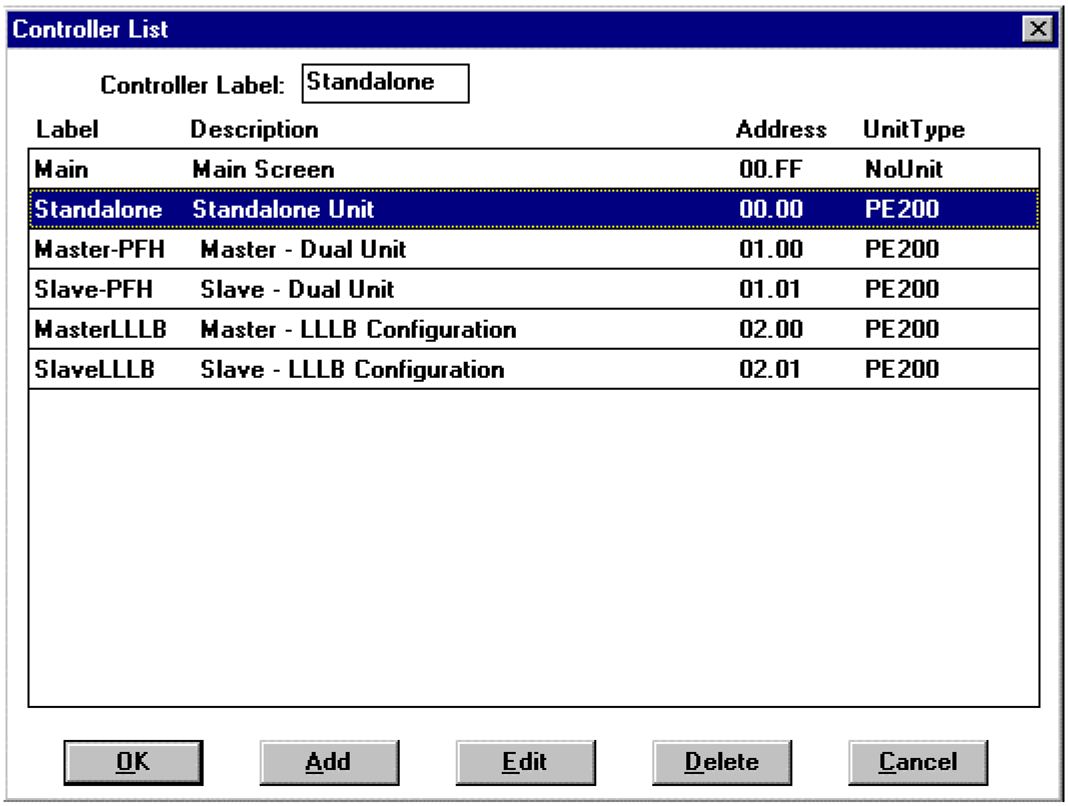
The controller address should be 00.ff in the case of a single unit connection. 00.ff is a special address that tells the software to connect to the direct connected controller regardless of the controller's address setting. Alternately, you may enter the address of the controller, however when trying to connect in this manner, the address must match. The *Save Data, Download Program, Restore Data* option should be chosen for every download. The program file will be the simulator code you wish to download to the controller. The data file is a temporary file in which will be stored controller data during the download process. This file may be deleted off of your hard drive after successful download. You must specify a data file name but the name of the file is arbitrary. The save options you should have checked are *Port Configuration* and *Passwords.*

You should see the download progress dialog box after initiating the download:



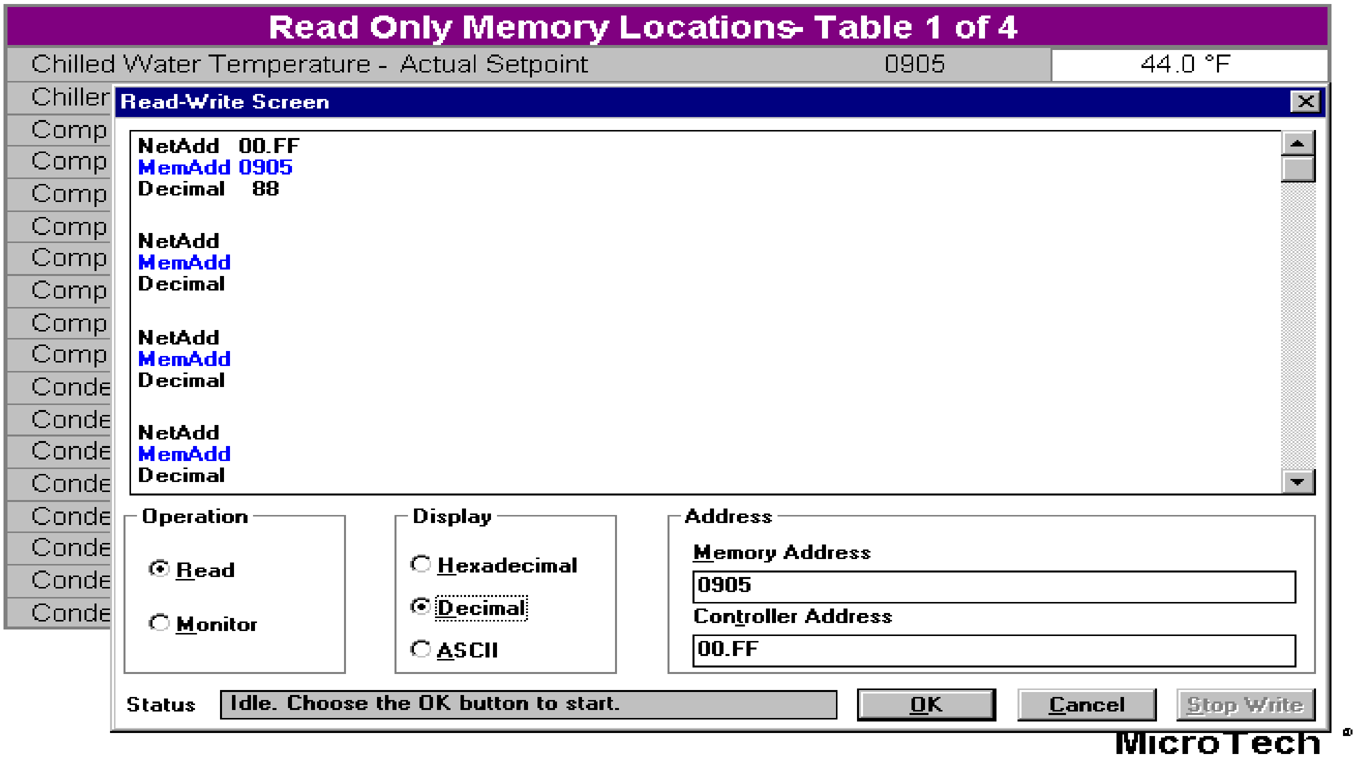
Monitoring a simulator controller

Once the code is properly downloaded into the simulator controller, you may begin to monitor memory locations in the Windows Simulator Monitor Software. From the Main Menu, choose *Screen*, and select *Monitor Unit.* Double-click the appropriate screen to start seeing simulator data. If you do not start seeing data, you may not have established a connection to the controller.



Support Menu - Read/Write screens

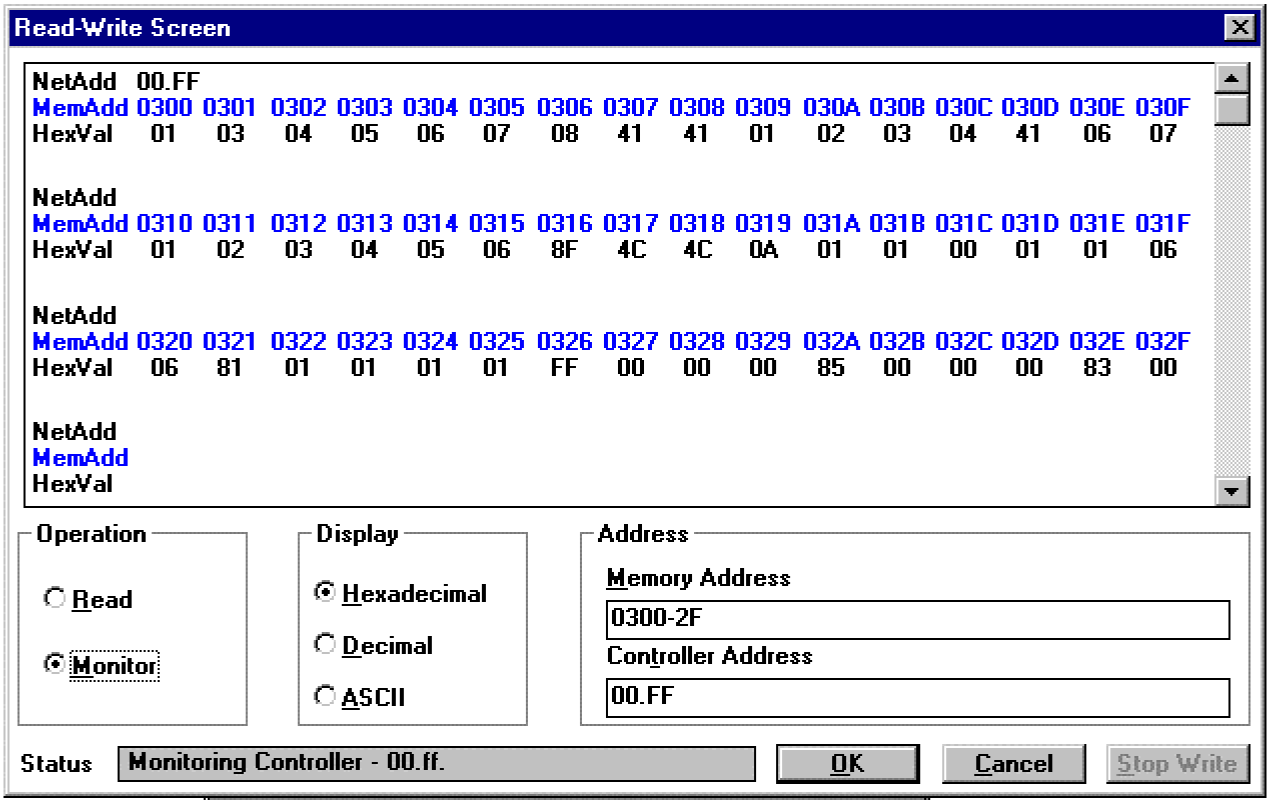
You may want to use the read/write screen in conjunction with the monitor screens to double check the raw data values coming back from the controller. The following screen is an example of how to use the read/write screen for comparison. The *Monitor Screen* option has been selected and the read/write option has also been selected (from the main menu, support option).



The above memory location for Chilled Water Temperature displays 44 degrees F. In the read/write screen you can see the decimal value of memory location $0905 which is 88. The conversion in this case is value/2 to get degrees F.

Disabling the Simulator Control Code

The simulator control code is a compiled version of the real control code with all of the sensors disabled. You may find that you want to test a memory location, but the simulator code doesn’t allow the change or it simply rewrites the previous value to that memory location. The following technique may be used to disable all of the tasks in the simulator code so that you may alter any memory location and the value will not be altered by the control code. Below is a read/write screen with memory locations 0300-032F shown. Note that the monitor function is chosen. When you monitor this screen, the values will change rapidly. If $FF or 255 decimal is written to each of these memory locations, the task timer will stop. If you want the task timers to start again, write a 1 to each memory location. If you select the 0300 to change, there is an option to change a single location or global change so you do not have to change each one individually. You may get an error writing to trailing memory locations. This is OK since not all of the trailing memory locations are task timers.



Further Information on Windows Monitor Software

This document should get you started using Windows Monitor. You should not have to use any of the other functions of Windows Monitor in order to test your interface. If further information on Windows Monitor is desired, please refer to *McQuay International MicroTech Monitor 1.0 for Windows User's Manual.*

Glossary of Terms

ALS

McQuay air-cooled screw chiller

BAS

Building Automation System

KPA

Kilopascals

OAT

Outdoor Air Temperature

OPM

Open Protocol Master

PFS

McQuay screw chiller, water-cooled model (NOT covered in this document - please look on McQuay-Online for document covering “water-cooled screw chillers”)

PSI

Pounds Per Square Inch