

MicroTech™ Air-Cooled Screw Chiller Controller

Point mapping data for the MicroTech BACdrop™ Gateway with PMF version 1.08 software and the following MicroTech air-cooled screw chiller applications (models ALS):

- **Two compressor**
- **Three compressor**
- **Four compressor**

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Revision History

Version 1	1999-05-24	Initial release. For PMF versions 1.01.
Version 2	1999-07-14	<i>No changes to point mapping data.</i> For PMF versions 1.01 through 1.03.
Version 3	1999-07-23	For PMF version 1.04. Added the Active Setpoint (i.e., the actual setpoint used to control the leaving evaporator water temperature). Simplified the way current alarms are reported. Added previous alarm objects. Added alarm codes 10 and 22. Corrected point mapping errors for SC1 and SC2 alarm data. Deleted time/date stamp objects for all alarms. Added saturated evaporator and condenser temperatures. Added three new alarm data objects per current alarm; these were recently added to the chiller controller software. Added two OAT reset objects for consistency with other applications. Deleted objects that were for obsolete water-cooled (PFS-A) applications. Renamed most objects for consistency with other applications.
Version 4	1999-08-12	<i>No changes to point mapping data.</i> For PMF versions 1.04 and 1.05.
Version 5	1999-08-30	<i>No changes to point mapping data.</i> For PMF versions 1.04 through 1.06.
Version 6	1999-11-19	<i>No changes to point mapping data.</i> For PMF versions 1.04 through 1.07.
Version 7	2000-02-24	<i>No changes to point mapping data.</i> For PMF versions 1.04 through 1.08. See updated software compatibility table on page 4.
Version 8	2003-12-22	Made changes for C vintage chiller. Use version 1.11 for B vintage and 1.12 for C vintage.

Notice

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Introduction

The MicroTech™ BACdrop™ Gateway integrates a MicroTech network into a BACnet™ building automation system (BAS) network so that you can monitor and control McQuay International equipment from the BAS network. The gateway translates between BACnet variables on an Ethernet® network and McQuay memory locations on the proprietary McQuay network.

This document provides point mapping information for the MicroTech air-cooled screw chiller applications used in Models ALS. For other MicroTech applications, refer to the appropriate BACnet Data Information Packet documentation.

Network Configuration

The BACnet network interface to the BACdrop gateway must be Ethernet, 10BaseT.

Once the MicroTech network has been commissioned (typically by a McQuay representative), the BAS vendor can connect the Ethernet network to the BACdrop gateway. The network must be intact for the BAS to control the chillers; however, the chillers are capable of operating even if communications with the BAS are lost.

For more information, refer to IM 689, *MicroTech BACdrop Gateway*.

Software Identification and Compatibility

It is extremely important that compatibility be maintained between the software in the BACdrop gateway and its associated MicroTech controllers. This section provides information about software compatibility for both current and old releases of BACdrop and MicroTech software. New releases of BACdrop software and the BACnet Data Information Packets will be made available on the McQuay International bulletin board system called McQuay OnLine. For access to McQuay OnLine, contact the McQuay Controls group in Minneapolis.

BACdrop Software: The PMF File

The BACdrop gateway contains a single point mapping file (PMF) that contains specific point mapping information for MicroTech control applications. The *standard* PMF file contains all currently supported *standard* MicroTech control applications. This BACnet Data Information Packet (BDIP) describes only the portion of the standard PMF that pertains to standard MicroTech air-cooled screw chiller applications. Other BDIPs describe other portions of the PMF file and other MicroTech applications.

Custom PMF files can be written for custom MicroTech control applications, but in such instances the information in this document may not apply. Custom PMF files will have an “x” in their names; e.g., “PMFx122.”

MicroTech Controller Software: IDENTs

All MicroTech application software is labeled with an “IDENT.” In most cases, the IDENT has a nomenclature scheme, which is described in the installation and operation manuals for the controller. The last two or three characters of the IDENT are always used to denote the version and revision of the software. For example, the characters “03G” would mean revision G of the third version. In general, the revision level is incremented for very minor changes and the version level is incremented for major changes.

The IDENT can be read from a MicroTech controller in one of four ways:

1. Using the keypad/display

If a MicroTech controller is equipped with a keypad/display, you can use it to find the IDENT (except on series-100 centrifugal chillers).

2. Using the BACdrop commissioning software

A network diagnostic can be used to show the IDENTs.

3. Using MicroTech Monitor™ software

If Monitor software is available, it will typically show the IDENT on an application screen. Or a network diagnostic can be used to show the IDENTs. The read/write memory function can also be used to read IDENTs directly from memory.

4. Using the BACnet BAS

From the BACnet side of the gateway, an IDENT can be read in the property Application_Software_Version, which is part of the DEVICE object for the MicroTech controller.

Compatibility

The PMF file contains a detailed map that associates BACnet objects with the memory locations and functions within the MicroTech controllers. These memory locations are defined by the MicroTech application software within the controllers, and thus compatibility between the PMF file and the MicroTech application software (IDENTs) must be maintained.

Note that the BACdrop gateway is not able to check for software compatibility. It is the responsibility of the installer (typically a representative of McQuay International) to assure software compatibility using the information presented here.

This edition of this BDIP documents the versions of BACdrop and MicroTech controller software as shown in the table below. If you encounter a later version of software, please refer to McQuay OnLine for an update to this document.

Software Compatibility

BACnet Data Information Packet	Describes PMF versions	Compatible IDENTs	Application description
BD 01-3 through 01-7	1.04 – 1.11		
BC 01-8	1.12	SC22U30*	Two-compressor air-cooled screw chiller
		SC23U30*	
		SC26U30*	
		SC32U30*	Three-compressor air-cooled screw chiller
		SC33U30*	
		SC36U30*	
		SC42E30*	Four-compressor air-cooled screw chiller
		SC42S30*	
		SC43E30*	
		SC43S30*	
		SC46E30*	
		SC46S30*	

Supplemental Literature

For more information on the BACdrop gateway and the MicroTech control applications, see the following documents:

IM 689 MicroTech BACdrop Gateway, Installation and Maintenance Data

IM 549 MicroTech Air-Cooled Screw Chiller Controller, Installation and Maintenance Data

Conversions and Conventions

Temperatures

All temperatures are stated in degrees Fahrenheit (°F). To get degrees Celsius (°C), use the following:

$$C = \frac{F - 32}{1.8}$$

Pressures

All pressures are stated in pounds per square inch (psi). To get kilo-Pascals (kPa), use the following:

$$kPa = 6.89 \times psi$$

Abbreviations

BAS building automation system

kPa kilo-Pascals

OAT outdoor air temperature

psi pounds per square inch

RLA rated load amps

Two-Compressor Air Cooled Screw Chiller

Analog Value Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	ActiveSetpoint	64	°F	0 – 127
2	StageOfCooling	95	no units	0 – 8
3	UnitStatus 0 = Off: Manual 1 = Off: System Switch 2 = Off: Remote Communication 3 = Off: Remote Switch 4 = Off: Schedule 5 = Off: Alarm 6 = Off: Pumpdown Switches 7 = Off: Ambient Lockout 8 = Starting 9 = Waiting For Flow 10 = Waiting For Load 11 = Staging Up 12 = Staging Down 13 = Running: Auto Staging 14 = Running: Manual Staging	95	no units	0 – 14
4	Circuit1Status 0 = Off: System Switch 1 = Off: Manual 2 = Off: Alarm 3 = Off: Pumpdown Switch 4 = Off: Wait For Cycle 5 = Off: Wait For Flood 6 = Off: Ready To Start 7 = Start Pumpdown 8 = Pumping Down 9 = Start Requested 10 = Pre-purge 11 = Open Solenoid, Waiting For Pressure 12 = Low Ambient Start 13 = Cooling	95	no units	0 – 13
6	Circuit1SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
7	Circuit1SatEvapTemp	64	°F	0 – 254; 255 = N/A
8	Circuit1SatCondTemp	64	°F	0 – 254; 255 = N/A
9	Circuit1CurrentAlarm 0 = None 1 = Interstage Solenoid Valve Open 2 = High Condenser Pressure: Hold Stage 3 = High Condenser Pressure: Stage Down 4 = Refrigerant Freeze Protect: Stage Down 5 = Loss Of Chilled Water Flow 6 = No Pumpdown 7 = No Start: Low Evap Pressure 8 = Pre-purge Fail 9 = Low Ambient Start 10 = High Discharge Temp 11 = <i>not used</i> 12 = Refrigerant Freeze Protect: Shut Down Circuit 13 = Low Evaporator Pressure 14 = Compressor Motor Protect 15 = Re-power After Power Loss	95	no units	0 – 35

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
	16 = <i>not used</i> 17 = <i>not used</i> 18 = No Evaporator Pressure Drop 19 = Below Minimum Lift Pressure 20 = No Oil Level 21 = No Liquid Start 22 = High Liquid Line Pressure Drop 23 = <i>not used</i> 24 = <i>not used</i> 25 = High Condenser Pressure 26 = Mechanical High Pressure Switch 27 = <i>not used</i> 28 = Bad Discharge Temp Sensor 29 = Bad Suction Temp Sensor 30 = Bad Evaporator Pressure Sensor 31 = Bad Condenser Pressure Sensor 32 = Phase/Voltage Monitor 33 = Chilled Water Freeze Protect 34 = Bad Voltage Ratio Sensor 35 = Bad Leaving Evap Water Temp Sensor			
10	Circuit1AtAlarm_Capacity	98	percent	0 – 100
11	Circuit1AtAlarm_EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
12	Circuit1AtAlarm_CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
13	Circuit1AtAlarm_LvgEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
14	Circuit1AtAlarm_EntEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
16	Circuit1AtAlarm_SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
18	Circuit1AtAlarm_EXVPosition	95	no units	0 – 760; 0 = fully closed 760 = fully open
19	Circuit1AtAlarm_FanStage	95	no units	0 – 6
21	Circuit1PreviousAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
22	Compressor1OperatingHours	71	hours	0 – 65279
23	Compressor1Starts	95	no units	0 – 65279
24	Circuit2Status <i>Same as Circuit1Status (4)</i>	95	no units	0 – 13
26	Circuit2SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
27	Circuit2SatEvapTemp	64	°F	0 – 254; 255 = N/A
28	Circuit2SatCondTemp	64	°F	0 – 254; 255 = N/A
29	Circuit2CurrentAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
30	Circuit2AtAlarm_Capacity	98	percent	0 – 100

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
31	Circuit2AtAlarm_EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
32	Circuit2AtAlarm_CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
33	Circuit2AtAlarm_LvgEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
34	Circuit2AtAlarm_EntEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
36	Circuit2AtAlarm_SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
38	Circuit2AtAlarm_EXVPosition	95	no units	0 – 760; 0 = fully closed 760 = fully open
39	Circuit2AtAlarm_FanStage	95	no units	0 – 6
41	Circuit2PreviousAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
42	Compressor2OperatingHours	71	hours	0 – 65279
43	Compressor2Starts	95	no units	0 – 65279

ANALOG_VALUE 1: ActiveSetpoint

The Active Setpoint, which is used to control the leaving evaporator water temperature. It includes any chilled water reset that may be in effect. The resolution is 0.5°F.

ANALOG_VALUE 2: StageOfCooling

The stage of cooling capacity at which the chiller is currently operating.

ANALOG_VALUE 3: UnitStatus

The overall state of the chiller. See IM manual for more information.

ANALOG_VALUE 4: Circuit1Status

The overall state of refrigerant circuit #1. See IM manual for more information.

ANALOG_VALUE 6: Circuit1SuperheatTemp

The superheat temperature in circuit #1. It is calculated by subtracting the saturated suction temperature from the actual refrigerant temperature in the suction line. The resolution is 0.1°F.

ANALOG_VALUE 7: Circuit1SatEvapTemp

The saturated evaporator temperature in circuit #1. It is calculated by converting the evaporator pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 8: Circuit1SatCondTemp

The saturated condenser temperature in circuit #1. It is calculated by converting the condenser pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 9: Circuit1CurrentAlarm

The current alarm in circuit #1. If multiple alarms exist at the same time, the most serious alarm (i.e., the one with the highest code number) is given.

Note that alarms 32 through 35 affect the entire chiller and so they are reported for both circuit #1 and circuit #2 when they occur. Similarly, when either one of these “unit alarms” clear, both will clear.

ANALOG_VALUE 10: Circuit1AtAlarm_Capacity

The capacity at which circuit #1 was running at the time of alarm. The resolution is 1%.

ANALOG_VALUE 11: Circuit1AtAlarm_EvapPressure

The evaporator pressure in circuit #1 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 12: Circuit1AtAlarm_CondPressure

The condenser pressure in circuit #1 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 13: Circuit1AtAlarm_LvgEvapWaterTemp

The evaporator leaving water temperature at the time of circuit #1 alarm. The resolution is 0.1°F.

ANALOG_VALUE 14: Circuit1AtAlarm_EntEvapWaterTemp

The evaporator entering water temperature at the time of circuit #1 alarm. The resolution is 0.1°F.

ANALOG_VALUE 16: Circuit1AtAlarm_SuctionTemp

The temperature in the circuit #1 suction line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 18: Circuit1AtAlarm_EXVPosition

The position of the electronic expansion valve (EXV) in circuit #1 at the time of alarm. The value is expressed in “steps.”

ANALOG_VALUE 19: Circuit1AtAlarm_FanStage

The condenser fan stage in operation at the time of circuit #1 alarm. See IM manual for more information on condenser fan staging.

ANALOG_VALUE 20: Circuit1AtAlarm_OAT

The outdoor air temperature at the time of circuit #1 alarm. The resolution is 0.1°F.

ANALOG_VALUE 21: Circuit1PreviousAlarm

The previous alarm in circuit #1. In most cases, a previous alarm is a cleared alarm. An exception will occur when an active higher priority alarm replaces an active lower priority alarm. In this instance, the lower priority alarm will be pushed into the previous alarm spot even though it is still active.

ANALOG_VALUE 22: Compressor1OperatingHours

The total operating hours for compressor #1.

ANALOG_VALUE 23: Compressor1Starts

The running total of starts for compressor #1.

ANALOG_VALUE 24: Circuit2Status

The overall state of refrigerant circuit #2. See IM manual for more information.

ANALOG_VALUE 26: Circuit2SuperheatTemp

The superheat temperature in circuit #2. It is calculated by subtracting the saturated suction temperature from the actual refrigerant temperature in the suction line. The resolution is 0.1°F.

ANALOG_VALUE 27: Circuit2SatEvapTemp

The saturated evaporator temperature in circuit #2. It is calculated by converting the evaporator pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 28: Circuit2SatCondTemp

The saturated condenser temperature in circuit #2. It is calculated by converting the condenser pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 29: Circuit2CurrentAlarm

The current alarm in circuit #2. If multiple alarms exist at the same time, the most serious alarm (i.e., the one with the highest code number) is given.

Note that alarms 32 through 35 affect the entire chiller and so they are reported for both circuit #1 and circuit #2 when they occur. Similarly, when either one of these “unit alarms” clear, both will clear.

ANALOG_VALUE 30: Circuit2AtAlarm_Capacity

The capacity at which circuit #2 was running at the time of alarm. The resolution is 1%.

ANALOG_VALUE 31: Circuit2AtAlarm_EvapPressure

The evaporator pressure in circuit #2 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 32: Circuit2AtAlarm_CondPressure

The condenser pressure in circuit #2 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 33: Circuit2AtAlarm_LvgEvapWaterTemp

The evaporator leaving water temperature at the time of circuit #2 alarm. The resolution is 0.1°F.

ANALOG_VALUE 34: Circuit2AtAlarm_EntEvapWaterTemp

The evaporator entering water temperature at the time of circuit #2 alarm. The resolution is 0.1°F.

ANALOG_VALUE 36: Circuit2AtAlarm_SuctionTemp

The temperature in the circuit #2 suction line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 38: Circuit2AtAlarm_EXVPosition

The position of the electronic expansion valve (EXV) in circuit #2 at the time of alarm. The value is expressed in “steps.”

ANALOG_VALUE 39: Circuit2AtAlarm_FanStage

The condenser fan stage in operation at the time of circuit #2 alarm. See IM manual for more information on condenser fan staging.

ANALOG_VALUE 41: Circuit2PreviousAlarm

The previous alarm in circuit #2. In most cases, a previous alarm is a cleared alarm. An exception will occur when an active higher priority alarm replaces an active lower priority alarm. In this instance, the lower priority alarm will be pushed into the previous alarm spot even though it is still active.

ANALOG_VALUE 42: Compressor2OperatingHours

The total operating hours for compressor #2.

ANALOG_VALUE 43: Compressor2Starts

The running total of starts for compressor #2.

Analog Input Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	Circuit1CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
2	Circuit1EvapPressure	56	psig	0 – 150;

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
				5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
3	Circuit1DischargeTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
4	Circuit1SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
5	EnteringEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
6	LeavingEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
7	OutdoorAirTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
8	Circuit2CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
9	Circuit2EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
10	Circuit2DischargeTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
11	Circuit2SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
12	Circuit1FanStage	64	No Units	0 - 6
13	Circuit2FanStage	64	No Units	0 - 6

ANALOG_INPUT 1: Circuit1CondPressure

The condenser pressure in circuit #1. The resolution is 0.1 psi.

ANALOG_INPUT 2: Circuit1EvapPressure

The evaporator pressure in circuit #1. The resolution is 0.1 psi.

ANALOG_INPUT 3: DischargeTemp

The discharge temperature of circuit #1. The resolution is 0.1°F.

ANALOG_INPUT 4: Circuit1SuctionTemp

The temperature of the low-pressure vaporized refrigerant entering compressor #1. The resolution is 0.1°F.

ANALOG_INPUT 5: EnteringEvapWaterTemp

The temperature of the chilled water entering the evaporator. The resolution is 0.1°F.

ANALOG_INPUT 6: LeavingEvapWaterTemp

The temperature of the chilled water leaving the evaporator. The resolution is 0.1°F.

ANALOG_INPUT 7: OutdoorAirTemp

The temperature of the outdoor air. The resolution is 0.1°F.

ANALOG_INPUT 8: Circuit2CondPressure

The condenser pressure in circuit #2. The resolution is 0.1 psi.

ANALOG_INPUT 9: Circuit2EvapPressure

The evaporator pressure in circuit #2. The resolution is 0.1 psi.

ANALOG_INPUT 10: Circuit2DischargeTemp

The discharge temperature of circuit #2. The resolution is 0.1°F.

ANALOG_INPUT 11: Circuit2SuctionTemp

The temperature of the low-pressure vaporized refrigerant entering compressor #2. The resolution is 0.1°F.

ANALOG_INPUT 12: Circuit1FanStage

The condenser fan stage in operation. See IM manual for more information on condenser fan staging.

ANALOG_INPUT 13: Circuit2FanStage

The condenser fan stage in operation. See IM manual for more information on condenser fan staging.

Analog Output Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	EnteringEvapWaterTempSpt	64	°F	15 – 80
2	LeavingEvapWaterTempSpt	64	°F	10 – 80
3	MaxChilledWaterResetSpt	64	°F	0 – 45
4	NetworkDemandLimit	98	percent	0 – 100
5	NetworkLvgEvapWaterTempReset	98	percent	0 – 100
6	ResetOptionSetpoint 0 = No Reset 1 = Return 2 = 4–20 mA 3 = Network 4 = Ice 5 = Outdoor Air Temperature	95	no units	0 – 5
7	MaxReset@OAT	64	°F	0 – 90
8	NoReset@OAT	64	°F	0 – 90

ANALOG_OUTPUT 1: EnteringEvapWaterTempSpt

The entering evaporator water temperature setpoint. This setpoint is used only with the Return chilled water reset option. The default value is 54°F and the resolution is 0.5°F.

With Return reset, the controller automatically modulates the Active Setpoint (i.e., the actual leaving evaporator water temperature setpoint) as required to maintain the entering evaporator water temperature at this setpoint.

ANALOG_OUTPUT 2: LeavingEvapWaterTempSpt

The leaving evaporator water temperature setpoint. This object can be used to set the base cooling setpoint before any chilled water reset is added to produce the Active Setpoint. If no reset is being

used, the Active Setpoint will always be set equal to this object's value. The default value is 44°F and the resolution is 0.5°F.

When a MicroTech chiller controller is not configured for low temperature operation, it will automatically limit the low end of the valid range to a value that is above freezing (default is 40°F).

ANALOG_OUTPUT 3: MaxChilledWaterResetSpt

The maximum amount of reset that can be used to modify the Active Setpoint. See “ANALOG_OUTPUT 6: ResetOptionSetpoint” below for more information on how this object is used. The default value is 10°F and the resolution is 0.5°F.

ANALOG_OUTPUT 4: NetworkDemandLimit

The demand limiting signal from the BAS.

The chiller can be demand limited in two ways: (1) a hardwired 4–20 mA signal or (2) a BAS via network communications. Either or both ways can be used. Here is the formula:

$$D = C - \frac{[(C - 1) \times (S + N)] + 50}{100}$$

where: D = Demand limit on available cooling stages
 C = Number of cooling stages equipment has
 S = 4–20 mA demand limit signal in percent of 4–20 range
 N = Network demand limit signal in percent

Example 1:

Assume that a chiller has eight cooling stages and “50” has been written to the Network Demand Limit object. No external 4–20 mA signal is present.

$$D = 8 - \frac{[(8 - 1) \times (0 + 50)] + 50}{100}$$

$$D = 8 - \frac{[7 \times 50] + 50}{100}$$

D = 4 stages, maximum limit

Example 2:

Assume that a chiller has eight cooling stages, the input from the 4–20 mA signal is 8 mA, and the value of the Network Demand Limit object is “0.”

$$D = 8 - \frac{[(8 - 1) \times (25 + 0)] + 50}{100}$$

$$D = 8 - \frac{[7 \times 25] + 50}{100}$$

D = 5.75, which when rounded equals 6 stages, maximum limit

Note: This object’s value is stored in volatile memory, so after a power reset the desired value must be rewritten to the MicroTech controller.

ANALOG_OUTPUT 5: NetworkLvgEvapWaterTempReset

The percentage of chilled water temperature reset to be used when “Network” (3) is selected as the Reset Option Setpoint. See “ANALOG_OUTPUT 6: ResetOptionSetpoint” below for more information.

Note: This object’s value is stored in volatile memory, so after a power reset the desired value must be rewritten to the MicroTech controller.

ANALOG_OUTPUT 6: ResetOptionSetpoint

Sets the chilled water reset method.

No Reset (0)

When No Reset is selected, the Active Setpoint simply assumes the value of the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2).

$$A = LvgEvap$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 LvgEvap = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)

Return Water (1)

If the entering evaporator water temperature falls below the return setpoint (ANALOG_OUTPUT 1), the Active Setpoint object (ANALOG_VALUE 1) is slowly modulated upward. If the entering evaporator water temperature goes above this return setpoint, the Active Setpoint is slowly modulated

downward. The active setpoint's modulation range is limited by the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2) on the low side and the return setpoint (ANALOG_OUTPUT 1) on the high side.

The Return reset method is really a cascade control loop, not a reset function per se. The return water is maintained at its setpoint by incrementally varying the leaving evaporator water setpoint over time. For more information, see the chiller controller IM manual.

External 4–20 mA Signal (2)

A 4–20 mA signal is used to vary the Active Setpoint according to the following formula:

$$A = LvgEvap + \frac{mA - 4}{16} \times MaxR$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)
 mA = the value of the external 4–20 mA reset signal (assume values less than 4 mA are equal to 4 mA)

Network Signal (3)

A written network value is used to vary the Active Setpoint according to the following formula:

$$A = LvgEvap + \frac{Net}{100} \times MaxR$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)
 Net = the value of the network reset signal (ANALOG_OUTPUT 5) in percent

Ice (4)

The Active Setpoint is set according to a hardwired analog input as follows:

$$A = LvgEvap + MaxR \quad \text{Normal mode, any value of 4 mA or greater}$$

$$A = LvgEvap \quad \text{Ice mode, any value less than 4 mA}$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)

Outdoor Air Temperature (5)

The outdoor air temperature is used to vary the active setpoint according to the following formula when the outdoor air temperature is within the range defined by the MaxReset@OAT and NoReset@OAT values:

$$A = LvgEvap + \frac{NoOaT - T_o}{NoOaT - MaxOaT} \times MaxR$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)
 $NoOaT$ = the NoReset@OAT value (ANALOG_OUTPUT 8)
 $MaxOaT$ = the MaxReset@OAT value (ANALOG_OUTPUT 7)
 T_o = the outdoor air temperature

When the outdoor air temperature is less than the MaxReset@OAT value, the Active Setpoint is set equal to the sum of the leaving evaporator water temperature setpoint and the max reset setpoint.

When the outdoor air temperature is greater than the NoReset@OAT value, the Active Setpoint is set equal to the leaving evaporator water temperature setpoint.

ANALOG_OUTPUT 7: MaxReset@OAT

The outdoor air temperature at which the maximum amount of reset will be used. This object is used only with the Outdoor Air Temperature reset method. The resolution is 1°F.

ANALOG_OUTPUT 8: NoReset@OAT

The outdoor air temperature at which no reset will be used. This object is used only with the Outdoor Air Temperature reset method. The resolution is 1°F.

Binary Output Objects

Instance	Object_Name Property	Active_Text Property	Inactive_Text Property
1	ClearCircuit1Alarm 1 = Clear Alarm 0 = No Action	Clear Alarm	No Action
2	ClearCircuit2Alarm 1 = Clear Alarm 0 = No Action	Clear Alarm	No Action
3	NetworkCommand 1 = Disable 0 = Enable	Disable	Enable

BINARY_OUTPUT 1: ClearCircuit1Alarm

Clears the current active alarm in circuit #1. The object's value automatically changes to zero when the alarm is cleared. Note that some alarms are self-clearing. This object would need to be used only for manual-clear alarms. (If a self-clearing alarm is cleared with this object, it will recur immediately since the alarm condition is still present. No harm will occur.)

Note: Never command this object without investigating and correcting the cause of the alarm.

BINARY_OUTPUT 2: ClearCircuit2Alarm

Clears the current active alarm in circuit #2. See "BINARY_OUTPUT 1: ClearCircuit1Alarm" above for more information.

BINARY_OUTPUT 3: NetworkCommand

The NetworkCommand object can be used to disable the chiller through the network interface. If all other enable/disable features are enabled, setting the NetworkCommand object to 1 disables the chiller. If any of the enable/disable features are disabled, the NetworkCommand object has no effect. The NetworkCommand object is initialized to "Enable" (0).

Note: This object's value is stored in volatile memory. After a power reset, it will initialize to "Enable" (0). If the desired value is "Disable," a 1 must be rewritten to the MicroTech controller after the reset.

Three-Compressor Air Cooled Screw Chiller

Analog Value Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	ActiveSetpoint	64	°F	0 – 127
2	StageOfCooling	95	no units	0 – 12
3	UnitStatus 0 = Off: Manual 1 = Off: System Switch 2 = Off: Remote Communication 3 = Off: Remote Switch 4 = Off: Schedule 5 = Off: Alarm 6 = Off: Pumpdown Switches 7 = Off: Ambient Lockout 8 = Starting 9 = Waiting For Flow 10 = Waiting For Load 11 = Staging Up 12 = Staging Down 13 = Running: Auto Staging 14 = Running: Manual Staging	95	no units	0 – 14
4	Circuit1Status 0 = Off: System Switch 1 = Off: Manual 2 = Off: Alarm 3 = Off: Pumpdown Switch 4 = Off: Wait For Cycle 5 = Off: Wait For Flood 6 = Off: Ready To Start 7 = Start Pumpdown 8 = Pumping Down 9 = Start Requested 10 = Pre-purge 11 = Open Solenoid, Waiting For Pressure 12 = Low Ambient Start 13 = Cooling	95	no units	0 – 13
5	Circuit1DischargeSuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
6	Circuit1SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
7	Circuit1SatEvapTemp	64	°F	0 – 253; 254 = N/A
8	Circuit1SatCondTemp	64	°F	0 – 253; 254 = N/A
9	Circuit1CurrentAlarm 0 = None 1 = Interstage Solenoid Valve Open 2 = High Condenser Pressure: Hold Stage 3 = High Condenser Pressure: Stage Down 4 = Refrigerant Freeze Protect: Stage Down 5 = Loss Of Chilled Water Flow 6 = No Pumpdown 7 = No Start: Low Evap Pressure 8 = Pre-purge Fail 9 = Low Ambient Start 10 = High Discharge Temp 11 = <i>not used</i> 12 = Refrigerant Freeze Protect: Shut Down Circuit 13 = Low Evaporator Pressure	95	no units	0 – 35

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
	14 = Compressor Motor Protect 15 = Re-power After Power Loss 16 = <i>not used</i> 17 = <i>not used</i> 18 = No Evaporator Pressure Drop 19 = Below Minimum Lift Pressure 20 = No Oil Level 21 = No Liquid Start 22 = High Liquid Line Pressure Drop 23 = <i>not used</i> 24 = <i>not used</i> 25 = High Condenser Pressure 26 = Mechanical High Pressure Switch 27 = <i>not used</i> 28 = Bad Discharge Temp Sensor 29 = Bad Suction Temp Sensor 30 = Bad Evaporator Pressure Sensor 31 = Bad Condenser Pressure Sensor 32 = Phase/Voltage Monitor 33 = Chilled Water Freeze Protect 34 = Bad Voltage Ratio Sensor 35 = Bad Leaving Evap Water Temp Sensor			
10	Circuit1AtAlarm_Capacity	98	percent	0 – 100
11	Circuit1AtAlarm_EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
12	Circuit1AtAlarm_CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
13	Circuit1AtAlarm_LvgEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
14	Circuit1AtAlarm_EntEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
15	Circuit1AtAlarm_LiquidLineTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
16	Circuit1AtAlarm_SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
17	Circuit1AtAlarm_SubcoolingTemp	64	°F	0 – 263; 5886.5 = N/A
18	Circuit1AtAlarm_EXVPosition	95	no units	0 – 760; 0 = fully closed 760 = fully open
19	Circuit1AtAlarm_FanStage	95	no units	0 – 6
20	Circuit1AtAlarm_OAT	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
21	Circuit1PreviousAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
22	Compressor1OperatingHours	71	hours	0 – 65279
23	Compressor1Starts	95	no units	0 – 65279

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
24	Circuit2Status <i>Same as Circuit1Status (4)</i>	95	no units	0 – 13
25	Circuit2DischargeSuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
26	Circuit2SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
27	Circuit2SatEvapTemp	64	°F	0 – 253; 254 = N/A
28	Circuit2SatCondTemp	64	°F	0 – 253; 254 = N/A
29	Circuit2CurrentAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
30	Circuit2AtAlarm_Capacity	98	percent	0 – 100
31	Circuit2AtAlarm_EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
32	Circuit2AtAlarm_CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
33	Circuit2AtAlarm_LvgEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
34	Circuit2AtAlarm_EntEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
35	Circuit2AtAlarm_LiquidLineTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
36	Circuit2AtAlarm_SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
37	Circuit2AtAlarm_SubcoolingTemp	64	°F	0 – 263; 5886.5 = N/A
38	Circuit2AtAlarm_EXVPosition	95	no units	0 – 760; 0 = fully closed 760 = fully open
39	Circuit2AtAlarm_FanStage	95	no units	0 – 6
40	Circuit2AtAlarm_OAT	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
41	Circuit2PreviousAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
42	Compressor2OperatingHours	71	hours	0 – 65279
43	Compressor2Starts	95	no units	0 – 65279
44	Circuit3Status <i>Same as Circuit1Status (4)</i>	95	no units	0 – 13
45	Circuit3DischargeSuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
46	Circuit3SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
47	Circuit3SatEvapTemp	64	°F	0 – 253; 254 = N/A
48	Circuit3SatCondTemp	64	°F	0 – 253; 254 = N/A
49	Circuit3CurrentAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
50	Circuit3AtAlarm_Capacity	98	percent	0 – 100
51	Circuit3AtAlarm_EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
52	Circuit3AtAlarm_CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
53	Circuit3AtAlarm_LvgEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
54	Circuit3AtAlarm_EntEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
55	Circuit3AtAlarm_LiquidLineTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
56	Circuit3AtAlarm_SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
57	Circuit3AtAlarm_SubcoolingTemp	64	°F	0 – 263; 5886.5 = N/A
58	Circuit3AtAlarm_EXVPosition	95	no units	0 – 760; 0 = fully closed 760 = fully open
59	Circuit3AtAlarm_FanStage	95	no units	0 – 6
60	Circuit3AtAlarm_OAT	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
61	Circuit3PreviousAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
62	Compressor3OperatingHours	71	hours	0 – 65279
63	Compressor3Starts	95	no units	0 – 65279

ANALOG_VALUE 1: ActiveSetpoint

The Active Setpoint, which is used to control the leaving evaporator water temperature. It includes any chilled water reset that may be in effect. The resolution is 0.5°F.

ANALOG_VALUE 2: StageOfCooling

The stage of cooling capacity at which the chiller is currently operating.

ANALOG_VALUE 3: UnitStatus

The overall state of the chiller. See IM manual for more information.

ANALOG_VALUE 4: Circuit1Status

The overall state of refrigerant circuit #1. See IM manual for more information.

ANALOG_VALUE 5: Circuit1DischargeSuperheatTemp

The Discharge Superheat temperature in circuit #1. It is calculated by subtracting the actual refrigerant temperature in the Discharge line from the saturated condensing temperature. The resolution is 0.1°F.

ANALOG_VALUE 6: Circuit1SuperheatTemp

The superheat temperature in circuit #1. It is calculated by subtracting the saturated suction temperature from the actual refrigerant temperature in the suction line. The resolution is 0.1°F.

ANALOG_VALUE 7: Circuit1SatEvapTemp

The saturated evaporator temperature in circuit #1. It is calculated by converting the evaporator pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 8: Circuit1SatCondTemp

The saturated condenser temperature in circuit #1. It is calculated by converting the condenser pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 9: Circuit1CurrentAlarm

The current alarm in circuit #1. If multiple alarms exist at the same time, the most serious alarm (i.e., the one with the highest code number) is given.

Note that alarms 32 through 35 affect the entire chiller and so they are reported for circuit #1, #2, and #3 when they occur. Similarly, when any one of these “unit alarms” clear, all will clear.

ANALOG_VALUE 10: Circuit1AtAlarm_Capacity

The capacity at which circuit #1 was running at the time of alarm. The resolution is 1%.

ANALOG_VALUE 11: Circuit1AtAlarm_EvapPressure

The evaporator pressure in circuit #1 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 12: Circuit1AtAlarm_CondPressure

The condenser pressure in circuit #1 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 13: Circuit1AtAlarm_LvgEvapWaterTemp

The evaporator leaving water temperature at the time of circuit #1 alarm. The resolution is 0.1°F.

ANALOG_VALUE 14: Circuit1AtAlarm_EntEvapWaterTemp

The evaporator entering water temperature at the time of circuit #1 alarm. The resolution is 0.1°F.

ANALOG_VALUE 15: Circuit1AtAlarm_LiquidLineTemp

The temperature in the circuit #1 liquid line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 16: Circuit1AtAlarm_SuctionTemp

The temperature in the circuit #1 suction line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 17: Circuit1AtAlarm_SubcoolingTemp

The subcooling temperature in circuit #1 at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 18: Circuit1AtAlarm_EXVPosition

The position of the electronic expansion valve (EXV) in circuit #1 at the time of alarm. The value is expressed in “steps.”

ANALOG_VALUE 19: Circuit1AtAlarm_FanStage

The condenser fan stage in operation at the time of circuit #1 alarm. See IM manual for more information on condenser fan staging.

ANALOG_VALUE 20: Circuit1AtAlarm_OAT

The outdoor air temperature at the time of circuit #1 alarm. The resolution is 0.1°F.

ANALOG_VALUE 21: Circuit1PreviousAlarm

The previous alarm in circuit #1. In most cases, a previous alarm is a cleared alarm. An exception will occur when an active higher priority alarm replaces an active lower priority alarm. In this instance, the lower priority alarm will be pushed into the previous alarm spot even though it is still active.

ANALOG_VALUE 22: Compressor1OperatingHours

The total operating hours for compressor #1.

ANALOG_VALUE 23: Compressor1Starts

The running total of starts for compressor #1.

ANALOG_VALUE 24: Circuit2Status

The overall state of refrigerant circuit #2. See IM manual for more information.

ANALOG_VALUE 25: Circuit2DischargeSuperheatTemp

The Discharge Superheat temperature in circuit #2. It is calculated by subtracting the actual refrigerant temperature in the Discharge line from the saturated condensing temperature. The resolution is 0.1°F.

ANALOG_VALUE 26: Circuit2SuperheatTemp

The superheat temperature in circuit #2. It is calculated by subtracting the saturated suction temperature from the actual refrigerant temperature in the suction line. The resolution is 0.1°F.

ANALOG_VALUE 27: Circuit2SatEvapTemp

The saturated evaporator temperature in circuit #2. It is calculated by converting the evaporator pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 28: Circuit2SatCondTemp

The saturated condenser temperature in circuit #2. It is calculated by converting the condenser pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 29: Circuit2CurrentAlarm

The current alarm in circuit #2. If multiple alarms exist at the same time, the most serious alarm (i.e., the one with the highest code number) is given.

Note that alarms 32 through 35 affect the entire chiller and so they are reported for circuit #1, #2, and #3 when they occur. Similarly, when any one of these “unit alarms” clear, all will clear.

ANALOG_VALUE 30: Circuit2AtAlarm_Capacity

The capacity at which circuit #2 was running at the time of alarm. The resolution is 1%.

ANALOG_VALUE 31: Circuit2AtAlarm_EvapPressure

The evaporator pressure in circuit #2 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 32: Circuit2AtAlarm_CondPressure

The condenser pressure in circuit #2 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 33: Circuit2AtAlarm_LvgEvapWaterTemp

The evaporator leaving water temperature at the time of circuit #2 alarm. The resolution is 0.1°F.

ANALOG_VALUE 34: Circuit2AtAlarm_EntEvapWaterTemp

The evaporator entering water temperature at the time of circuit #2 alarm. The resolution is 0.1°F.

ANALOG_VALUE 35: Circuit2AtAlarm_LiquidLineTemp

The temperature in the circuit #2 liquid line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 36: Circuit2AtAlarm_SuctionTemp

The temperature in the circuit #2 suction line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 37: Circuit2AtAlarm_SubcoolingTemp

The subcooling temperature in circuit #2 at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 38: Circuit2AtAlarm_EXVPosition

The position of the electronic expansion valve (EXV) in circuit #2 at the time of alarm. The value is expressed in “steps.”

ANALOG_VALUE 39: Circuit2AtAlarm_FanStage

The condenser fan stage in operation at the time of circuit #2 alarm. See IM manual for more information on condenser fan staging.

ANALOG_VALUE 40: Circuit2AtAlarm_OAT

The outdoor air temperature at the time of circuit #2 alarm. The resolution is 0.1°F.

ANALOG_VALUE 41: Circuit2PreviousAlarm

The previous alarm in circuit #2. In most cases, a previous alarm is a cleared alarm. An exception will occur when an active higher priority alarm replaces an active lower priority alarm. In this instance, the lower priority alarm will be pushed into the previous alarm spot even though it is still active.

ANALOG_VALUE 42: Compressor2OperatingHours

The total operating hours for compressor #2.

ANALOG_VALUE 43: Compressor2Starts

The running total of starts for compressor #2.

ANALOG_VALUE 44: Circuit3Status

The overall state of refrigerant circuit #3. See IM manual for more information.

ANALOG_VALUE 45: Circuit3DischargeSuperheatTemp

The Discharge Superheat temperature in circuit #3. It is calculated by subtracting the actual refrigerant temperature in the Discharge line from the saturated condensing temperature. The resolution is 0.1°F.

ANALOG_VALUE 46: Circuit3SuperheatTemp

The superheat temperature in circuit #3. It is calculated by subtracting the saturated suction temperature from the actual refrigerant temperature in the suction line. The resolution is 0.1°F.

ANALOG_VALUE 47: Circuit3SatEvapTemp

The saturated evaporator temperature in circuit #3. It is calculated by converting the evaporator pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 48: Circuit3SatCondTemp

The saturated condenser temperature in circuit #3. It is calculated by converting the condenser pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 49: Circuit3CurrentAlarm

The current alarm in circuit #3. If multiple alarms exist at the same time, the most serious alarm (i.e., the one with the highest code number) is given.

Note that alarms 32 through 35 affect the entire chiller and so they are reported for circuit #1, #2, and #3 when they occur. Similarly, when any one of these “unit alarms” clear, all will clear.

ANALOG_VALUE 50: Circuit3AtAlarm_Capacity

The capacity at which circuit #3 was running at the time of alarm. The resolution is 1%.

ANALOG_VALUE 51: Circuit3AtAlarm_EvapPressure

The evaporator pressure in circuit #3 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 52: Circuit3AtAlarm_CondPressure

The condenser pressure in circuit #3 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 53: Circuit3AtAlarm_LvgEvapWaterTemp

The evaporator leaving water temperature at the time of circuit #3 alarm. The resolution is 0.1°F.

ANALOG_VALUE 54: Circuit3AtAlarm_EntEvapWaterTemp

The evaporator entering water temperature at the time of circuit #3 alarm. The resolution is 0.1°F.

ANALOG_VALUE 55: Circuit3AtAlarm_LiquidLineTemp

The temperature in the circuit #3 liquid line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 56: Circuit3AtAlarm_SuctionTemp

The temperature in the circuit #3 suction line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 57: Circuit3AtAlarm_SubcoolingTemp

The subcooling temperature in circuit #3 at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 58: Circuit3AtAlarm_EXVPosition

The position of the electronic expansion valve (EXV) in circuit #3 at the time of alarm. The value is expressed in “steps.”

ANALOG_VALUE 59: Circuit3AtAlarm_FanStage

The condenser fan stage in operation at the time of circuit #3 alarm. See IM manual for more information on condenser fan staging.

ANALOG_VALUE 60: Circuit3AtAlarm_OAT

The outdoor air temperature at the time of circuit #3 alarm. The resolution is 0.1°F.

ANALOG_VALUE 61: Circuit3PreviousAlarm

The previous alarm in circuit #3. In most cases, a previous alarm is a cleared alarm. An exception will occur when an active higher priority alarm replaces an active lower priority alarm. In this instance, the lower priority alarm will be pushed into the previous alarm spot even though it is still active.

ANALOG_VALUE 62: Compressor3OperatingHours

The total operating hours for compressor #3.

ANALOG_VALUE 63: Compressor3Starts

The running total of starts for compressor #3.

Analog Input Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	Circuit1CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
2	Circuit1EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
3	Circuit1LiquidLineTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
4	Circuit1SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
5	Circuit1DischargeTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
6	EnteringEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
7	LeavingEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
8	OutdoorAirTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
9	Circuit2CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
10	Circuit2EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
11	Circuit2LiquidLineTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
12	Circuit2SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
13	Circuit2DischargeTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
14	Circuit3CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
15	Circuit3EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
16	Circuit3LiquidLineTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
17	Circuit3SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
18	Circuit3DischargeTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
19	Circuit1FanStage	64	No Units	0 - 6
20	Circuit2FanStage	64	No Units	0 - 6
21	Circuit3FanStage	64	No Units	0 - 6

ANALOG_INPUT 1: Circuit1CondPressure

The condenser pressure in circuit #1. The resolution is 0.1 psi.

ANALOG_INPUT 2: Circuit1EvapPressure

The evaporator pressure in circuit #1. The resolution is 0.1 psi.

ANALOG_INPUT 3: Circuit1LiquidLineTemp

The temperature of the liquid refrigerant entering the expansion valve in circuit #1. The resolution is 0.1°F.

ANALOG_INPUT 4: Circuit1SuctionTemp

The temperature of the low-pressure vaporized refrigerant entering compressor #1. The resolution is 0.1°F.

ANALOG_INPUT 5: Circuit1DischargeTemp

The temperature of the high-pressure vaporized refrigerant leaving compressor #1. The resolution is 0.1°F.

ANALOG_INPUT 6: EnteringEvapWaterTemp

The temperature of the chilled water entering the evaporator. The resolution is 0.1°F.

ANALOG_INPUT 7: LeavingEvapWaterTemp

The temperature of the chilled water leaving the evaporator. The resolution is 0.1°F.

ANALOG_INPUT 8: OutdoorAirTemp

The temperature of the outdoor air. The resolution is 0.1°F.

ANALOG_INPUT 9: Circuit2CondPressure

The condenser pressure in circuit #2. The resolution is 0.1 psi.

ANALOG_INPUT 10: Circuit2EvapPressure

The evaporator pressure in circuit #2. The resolution is 0.1 psi.

ANALOG_INPUT 11: Circuit2LiquidLineTemp

The temperature of the liquid refrigerant entering the expansion valve in circuit #2. The resolution is 0.1°F.

ANALOG_INPUT 12: Circuit2SuctionTemp

The temperature of the low-pressure vaporized refrigerant entering compressor #2. The resolution is 0.1°F.

ANALOG_INPUT 13: Circuit2DischargeTemp

The temperature of the high-pressure vaporized refrigerant leaving compressor #2. The resolution is 0.1°F.

ANALOG_INPUT 14: Circuit3CondPressure

The condenser pressure in circuit #3. The resolution is 0.1 psi.

ANALOG_INPUT 15: Circuit3EvapPressure

The evaporator pressure in circuit #3. The resolution is 0.1 psi.

ANALOG_INPUT 16: Circuit3LiquidLineTemp

The temperature of the liquid refrigerant entering the expansion valve in circuit #3. The resolution is 0.1°F.

ANALOG_INPUT 17: Circuit3SuctionTemp

The temperature of the low-pressure vaporized refrigerant entering compressor #3. The resolution is 0.1°F.

ANALOG_INPUT 18: Circuit3DischargeTemp

The temperature of the high-pressure vaporized refrigerant leaving compressor #3. The resolution is 0.1°F.

ANALOG_INPUT 19: Circuit1FanStage

The condenser fan stage in operation. See IM manual for more information on condenser fan staging.

ANALOG_INPUT 20: Circuit2FanStage

The condenser fan stage in operation. See IM manual for more information on condenser fan staging.

ANALOG_INPUT 21: Circuit3FanStage

The condenser fan stage in operation. See IM manual for more information on condenser fan staging.

Analog Output Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	EnteringEvapWaterTempSpt	64	°F	15 – 80
2	LeavingEvapWaterTempSpt	64	°F	10 – 80
3	MaxChilledWaterResetSpt	64	°F	0 – 45
4	NetworkDemandLimit	98	percent	0 – 100
5	NetworkLvgEvapWaterTempReset	98	percent	0 – 100
6	ResetOptionSetpoint 0 = No Reset 1 = Return 2 = 4–20 mA 3 = Network 4 = Ice 5 = Outdoor Air Temperature	95	no units	0 – 5
7	MaxReset@OAT	64	°F	0 – 90
8	NoReset@OAT	64	°F	0 – 90

ANALOG_OUTPUT 1: EnteringEvapWaterTempSpt

The entering evaporator water temperature setpoint. This setpoint is used only with the Return chilled water reset option. The default value is 54°F and the resolution is 0.5°F.

With Return reset, the controller automatically modulates the Active Setpoint (i.e., the actual leaving evaporator water temperature setpoint) as required to maintain the entering evaporator water temperature at this setpoint.

ANALOG_OUTPUT 2: LeavingEvapWaterTempSpt

The leaving evaporator water temperature setpoint. This object can be used to set the base cooling setpoint before any chilled water reset is added to produce the Active Setpoint. If no reset is being used, the Active Setpoint will always be set equal to this object's value. The default value is 44°F and the resolution is 0.5°F.

When a MicroTech chiller controller is not configured for low temperature operation, it will automatically limit the low end of the valid range to a value that is above freezing (default is 40°F).

ANALOG_OUTPUT 3: MaxChilledWaterResetSpt

The maximum amount of reset that can be used to modify the Active Setpoint. See "ANALOG_OUTPUT 6: ResetOptionSetpoint" below for more information on how this object is used. The default value is 10°F and the resolution is 0.5°F.

ANALOG_OUTPUT 4: NetworkDemandLimit

The demand limiting signal from the BAS.

The chiller can be demand limited in two ways: (1) a hardwired 4–20 mA signal or (2) a BAS via network communications. Either or both ways can be used. Here is the formula:

$$D = C - \frac{[(C - 1) \times (S + N)] + 50}{100}$$

where: D = Demand limit on available cooling stages
C = Number of cooling stages equipment has
S = 4–20 mA demand limit signal in percent of 4–20 range
N = Network demand limit signal in percent

Example 1:

Assume that a chiller has 12 cooling stages and "50" has been written to the Network Demand Limit object. No external 4–20 mA signal is present.

$$D = 12 - \frac{[(12 - 1) \times (0 + 50)] + 50}{100}$$

$$D = 12 - \frac{[11 \times 50] + 50}{100}$$

D = 6 stages, maximum limit

Example 2:

Assume that a chiller has 12 cooling stages, the input from the 4–20 mA signal is 8 mA, and the value of the Network Demand Limit object is "0."

$$D = 12 - \frac{[(12 - 1) \times (25 + 0)] + 50}{100}$$

$$D = 12 - \frac{[11 \times 25] + 50}{100}$$

D = 8.75, which when rounded equals 9 stages, maximum limit

Note: This object's value is stored in volatile memory, so after a power reset the desired value must be rewritten to the MicroTech controller.

ANALOG_OUTPUT 5: NetworkLvgEvapWaterTempReset

The percentage of chilled water temperature reset to be used when "Network" (3) is selected as the Reset Option Setpoint. See "ANALOG_OUTPUT 6: ResetOptionSetpoint" below for more information.

Note: This object's value is stored in volatile memory, so after a power reset the desired value must be rewritten to the MicroTech controller.

ANALOG_OUTPUT 6: ResetOptionSetpoint

Sets the chilled water reset method.

No Reset (0)

When No Reset is selected, the Active Setpoint simply assumes the value of the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2).

$$A = LvgEvap$$

where: A = the Active Setpoint (ANALOG_VALUE 1)

$LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)

Return Water (1)

If the entering evaporator water temperature falls below the return setpoint (ANALOG_OUTPUT 1), the Active Setpoint object (ANALOG_VALUE 1) is slowly modulated upward. If the entering evaporator water temperature goes above this return setpoint, the Active Setpoint is slowly modulated downward. The active setpoint's modulation range is limited by the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2) on the low side and the return setpoint (ANALOG_OUTPUT 1) on the high side.

The Return reset method is really a cascade control loop, not a reset function per se. The return water is maintained at its setpoint by incrementally varying the leaving evaporator water setpoint over time. For more information, see the chiller controller IM manual.

External 4–20 mA Signal (2)

A 4–20 mA signal is used to vary the Active Setpoint according to the following formula:

$$A = LvgEvap + \frac{mA - 4}{16} \times MaxR$$

where: A = the Active Setpoint (ANALOG_VALUE 1)

$LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)

$MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)

mA = the value of the external 4–20 mA reset signal (assume values less than 4 mA are equal to 4 mA)

Network Signal (3)

A written network value is used to vary the Active Setpoint according to the following formula:

$$A = LvgEvap + \frac{Net}{100} \times MaxR$$

where: A = the Active Setpoint (ANALOG_VALUE 1)

$LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)

$MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)

Net = the value of the network reset signal (ANALOG_OUTPUT 5) in percent

Ice (4)

The Active Setpoint is set according to a hardwired analog input as follows:

$A = LvgEvap + MaxR$ Normal mode, any value of 4 mA or greater

$A = LvgEvap$ Ice mode, any value less than 4 mA

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)

Outdoor Air Temperature (5)

The outdoor air temperature is used to vary the active setpoint according to the following formula when the outdoor air temperature is within the range defined by the MaxReset@OAT and NoReset@OAT values:

$$A = LvgEvap + \frac{NoOaT - T_o}{NoOaT - MaxOaT} \times MaxR$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)
 $NoOaT$ = the NoReset@OAT value (ANALOG_OUTPUT 8)
 $MaxOaT$ = the MaxReset@OAT value (ANALOG_OUTPUT 7)
 T_o = the outdoor air temperature

When the outdoor air temperature is less than the MaxReset@OAT value, the Active Setpoint is set equal to the sum of the leaving evaporator water temperature setpoint and the max reset setpoint.

When the outdoor air temperature is greater than the NoReset@OAT value, the Active Setpoint is set equal to the leaving evaporator water temperature setpoint.

ANALOG_OUTPUT 7: MaxReset@OAT

The outdoor air temperature at which the maximum amount of reset will be used. This object is used only with the Outdoor Air Temperature reset method. The resolution is 1°F.

ANALOG_OUTPUT 8: NoReset@OAT

The outdoor air temperature at which no reset will be used. This object is used only with the Outdoor Air Temperature reset method. The resolution is 1°F.

Binary Output Objects

Instance	Object_Name Property	Active_Text Property	Inactive_Text Property
1	ClearCircuit1Alarm 1 = Clear Alarm 0 = No Action	Clear Alarm	No Action
2	ClearCircuit2Alarm 1 = Clear Alarm 0 = No Action	Clear Alarm	No Action
3	ClearCircuit3Alarm 1 = Clear Alarm 0 = No Action	Clear Alarm	No Action
4	NetworkCommand 1 = Disable 0 = Enable	Disable	Enable

BINARY_OUTPUT 1: ClearCircuit1Alarm

Clears the current active alarm in circuit #1. The object's value automatically changes to zero when the alarm is cleared. Note that some alarms are self-clearing. This object would need to be used only

for manual-clear alarms. (If a self-clearing alarm is cleared with this object, it will recur immediately since the alarm condition is still present. No harm will occur.)

Note: Never command this object without investigating and correcting the cause of the alarm.

BINARY_OUTPUT 2: ClearCircuit2Alarm

Clears the current active alarm in circuit #2. See “BINARY_OUTPUT 1: ClearCircuit1Alarm” above for more information.

BINARY_OUTPUT 3: ClearCircuit3Alarm

Clears the current active alarm in circuit #3. See “BINARY_OUTPUT 1: ClearCircuit1Alarm” above for more information.

BINARY_OUTPUT 4: NetworkCommand

The NetworkCommand object can be used to disable the chiller through the network interface. If all other enable/disable features are enabled, setting the NetworkCommand object to 1 disables the chiller. If any of the enable/disable features are disabled, the NetworkCommand object has no effect. The NetworkCommand object is initialized to “Enable” (0).

Note: This object’s value is stored in volatile memory. After a power reset, it will initialize to “Enable” (0). If the desired value is “Disable,” a 1 must be rewritten to the MicroTech controller after the reset.

Four-Compressor Air Cooled Screw Chiller

Analog Value Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	ActiveSetpoint	64	°F	0 – 127
2	StageOfCooling	95	no units	0 – 16
3	UnitStatus 0 = Off: Manual 1 = Off: System Switch 2 = Off: Remote Communication 3 = Off: Remote Switch 4 = Off: Schedule 5 = Off: Alarm 6 = Off: Pumpdown Switches 7 = Off: Ambient Lockout 8 = Starting 9 = Waiting For Flow 10 = Waiting For Load 11 = Staging Up 12 = Staging Down 13 = Running: Auto Staging 14 = Running: Manual Staging	95	no units	0 – 14
4	Circuit1Status 0 = Off: System Switch 1 = Off: Manual 2 = Off: Alarm 3 = Off: Pumpdown Switch 4 = Off: Wait For Cycle 5 = Off: Wait For Flood 6 = Off: Ready To Start 7 = Start Pumpdown 8 = Pumping Down 9 = Start Requested 10 = Pre-purge 11 = Open Solenoid, Waiting For Pressure 12 = Low Ambient Start 13 = Cooling	95	no units	0 – 13
5	Circuit1DischargeSuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
6	Circuit1SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
7	Circuit1SatEvapTemp	64	°F	0 – 253; 254 = N/A
8	Circuit1SatCondTemp	64	°F	0 – 253; 254 = N/A
9	Circuit1CurrentAlarm 0 = None 1 = High Condenser Pressure: Hold Stage 2 = High Condenser Pressure: Stage Down 3 = Refrigerant Freeze Protect: Stage Down 4 = Loss Of Chilled Water Flow 5 = No Pumpdown 6 = No Start: Low Evap Pressure 7 = Pre-purge Fail 8 = <i>not used</i> 9 = Failed Low Ambient Start 10 = Low Subcooling At 75/100% Operation 11 = <i>not used</i> 12 = Refrigerant Freeze Protect: Shut Down Circuit 13 = Low Evaporator Pressure 14 = Compressor Motor Protect	95	no units	0 – 35

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
	15 = Re-power After Power Loss 16 = <i>not used</i> 17 = <i>not used</i> 18 = No Evaporator Pressure Drop 19 = Below Minimum Lift Pressure 20 = No Liquid Run 21 = No Liquid Start 22 = High Liquid Line Pressure Drop 23 = <i>not used</i> 24 = <i>not used</i> 25 = High Condenser Pressure 26 = Mechanical High Pressure Switch 27 = <i>not used</i> 28 = <i>not used</i> 29 = Bad Suction Temp Sensor 30 = Bad Evaporator Pressure Sensor 31 = Bad Condenser Pressure Sensor 32 = Phase/Voltage Monitor 33 = Chilled Water Freeze Protect 34 = Bad Voltage Ratio Sensor 35 = Bad Leaving Evap Water Temp Sensor			
10	Circuit1AtAlarm_Capacity	98	percent	0 – 100
11	Circuit1AtAlarm_EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
12	Circuit1AtAlarm_CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
13	Circuit1AtAlarm_LvgEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
14	Circuit1AtAlarm_EntEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
16	Circuit1AtAlarm_SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
17	Circuit1AtAlarm_SubcoolingTemp	64	°F	0 – 263; 5886.5 = N/A
18	Circuit1AtAlarm_EXVPosition	95	no units	0 – 760; 0 = fully closed 760 = fully open
19	Circuit1AtAlarm_FanStage	95	no units	0 – 6
20	Circuit1AtAlarm_OAT	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
21	Circuit1PreviousAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
22	Compressor1OperatingHours	71	hours	0 – 65279
23	Compressor1Starts	95	no units	0 – 65279
24	Circuit2Status <i>Same as Circuit1Status (4)</i>	95	no units	0 – 13
25	Circuit2DischargeSuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
26	Circuit2SuperheatTemp	64	°F	0 – 263;

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
				5886.5 = N/A
27	Circuit2SatEvapTemp	64	°F	0 – 253; 254 = N/A
28	Circuit2SatCondTemp	64	°F	0 – 253; 254 = N/A
29	Circuit2CurrentAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
30	Circuit2AtAlarm_Capacity	98	percent	0 – 100
31	Circuit2AtAlarm_EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
32	Circuit2AtAlarm_CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
33	Circuit2AtAlarm_LvgEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
34	Circuit2AtAlarm_EntEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
36	Circuit2AtAlarm_SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
37	Circuit2AtAlarm_SubcoolingTemp	64	°F	0 – 263; 5886.5 = N/A
38	Circuit2AtAlarm_EXVPosition	95	no units	0 – 760; 0 = fully closed 760 = fully open
39	Circuit2AtAlarm_FanStage	95	no units	0 – 6
40	Circuit2AtAlarm_OAT	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
41	Circuit2PreviousAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
42	Compressor2OperatingHours	71	hours	0 – 65279
43	Compressor2Starts	95	no units	0 – 65279
44	Circuit3Status <i>Same as Circuit1Status (4)</i>	95	no units	0 – 13
45	Circuit3DischargeSuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
46	Circuit3SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
47	Circuit3SatEvapTemp	64	°F	0 – 253; 254 = N/A
48	Circuit3SatCondTemp	64	°F	0 – 253; 254 = N/A
49	Circuit3CurrentAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
50	Circuit3AtAlarm_Capacity	98	percent	0 – 100
51	Circuit3AtAlarm_EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig;

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
				6142.5 = open; 6398.5 = short
52	Circuit3AtAlarm_CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
53	Circuit3AtAlarm_LvgEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
54	Circuit3AtAlarm_EntEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
56	Circuit3AtAlarm_SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
57	Circuit3AtAlarm_SubcoolingTemp	64	°F	0 – 263; 5886.5 = N/A
58	Circuit3AtAlarm_EXVPosition	95	no units	0 – 760; 0 = fully closed 760 = fully open
59	Circuit3AtAlarm_FanStage	95	no units	0 – 6
60	Circuit3AtAlarm_OAT	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
61	Circuit3PreviousAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
62	Compressor3OperatingHours	71	hours	0 – 65279
63	Compressor3Starts	95	no units	0 – 65279
64	Circuit4Status <i>Same as Circuit1Status (4)</i>	95	no units	0 – 13
65	Circuit4DischargeSuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
66	Circuit4SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
67	Circuit4SatEvapTemp	64	°F	0 – 253; 254 = N/A
68	Circuit4SatCondTemp	64	°F	0 – 253; 254 = N/A
69	Circuit4CurrentAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
70	Circuit4AtAlarm_Capacity	98	percent	0 – 100
71	Circuit4AtAlarm_EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
72	Circuit4AtAlarm_CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
73	Circuit4AtAlarm_LvgEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
74	Circuit4AtAlarm_EntEvapWaterTemp	64	°F	-50 – 280;

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
				5786.5 = N/A; 6042.5 = open; 6298.5 = short
76	Circuit4AtAlarm_SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
77	Circuit4AtAlarm_SubcoolingTemp	64	°F	0 – 263; 5886.5 = N/A
78	Circuit4AtAlarm_EXVPosition	95	no units	0 – 760; 0 = fully closed 760 = fully open
79	Circuit4AtAlarm_FanStage	95	no units	0 – 6
80	Circuit4AtAlarm_OAT	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
81	Circuit4PreviousAlarm <i>Same as Circuit1CurrentAlarm (9)</i>	95	no units	0 – 35
82	Compressor4OperatingHours	71	hours	0 – 65279
83	Compressor4Starts	95	no units	0 – 65279

ANALOG_VALUE 1: ActiveSetpoint

The Active Setpoint, which is used to control the leaving evaporator water temperature. It includes any chilled water reset that may be in effect. The resolution is 0.5°F.

ANALOG_VALUE 2: StageOfCooling

The stage of cooling capacity at which the chiller is currently operating.

ANALOG_VALUE 3: UnitStatus

The overall state of the chiller. See IM manual for more information.

ANALOG_VALUE 4: Circuit1Status

The overall state of refrigerant circuit #1. See IM manual for more information.

ANALOG_VALUE 5: Circuit1SubcoolingTemp

The subcooling temperature in circuit #1. It is calculated by subtracting the actual refrigerant temperature in the liquid line from the saturated condensing temperature. The resolution is 0.1°F.

ANALOG_VALUE 6: Circuit1SuperheatTemp

The superheat temperature in circuit #1. It is calculated by subtracting the saturated suction temperature from the actual refrigerant temperature in the suction line. The resolution is 0.1°F.

ANALOG_VALUE 7: Circuit1SatEvapTemp

The saturated evaporator temperature in circuit #1. It is calculated by converting the evaporator pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 8: Circuit1SatCondTemp

The saturated condenser temperature in circuit #1. It is calculated by converting the condenser pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 9: Circuit1CurrentAlarm

The current alarm in circuit #1. If multiple alarms exist at the same time, the most serious alarm (i.e., the one with the highest code number) is given.

Note that alarms 32 through 35 affect the entire chiller and so they are reported for circuit #1, #2, #3, and #4 when they occur. Similarly, when any one of these “unit alarms” clear, all will clear.

ANALOG_VALUE 10: Circuit1AtAlarm_Capacity

The capacity at which circuit #1 was running at the time of alarm. The resolution is 1%.

ANALOG_VALUE 11: Circuit1AtAlarm_EvapPressure

The evaporator pressure in circuit #1 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 12: Circuit1AtAlarm_CondPressure

The condenser pressure in circuit #1 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 13: Circuit1AtAlarm_LvgEvapWaterTemp

The evaporator leaving water temperature at the time of circuit #1 alarm. The resolution is 0.1°F.

ANALOG_VALUE 14: Circuit1AtAlarm_EntEvapWaterTemp

The evaporator entering water temperature at the time of circuit #1 alarm. The resolution is 0.1°F.

ANALOG_VALUE 15: Circuit1AtAlarm_LiquidLineTemp

The temperature in the circuit #1 liquid line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 16: Circuit1AtAlarm_SuctionTemp

The temperature in the circuit #1 suction line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 17: Circuit1AtAlarm_SubcoolingTemp

The subcooling temperature in circuit #1 at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 18: Circuit1AtAlarm_EXVPosition

The position of the electronic expansion valve (EXV) in circuit #1 at the time of alarm. The value is expressed in “steps.”

ANALOG_VALUE 19: Circuit1AtAlarm_FanStage

The condenser fan stage in operation at the time of circuit #1 alarm. See IM manual for more information on condenser fan staging.

ANALOG_VALUE 20: Circuit1AtAlarm_OAT

The outdoor air temperature at the time of circuit #1 alarm. The resolution is 0.1°F.

ANALOG_VALUE 21: Circuit1PreviousAlarm

The previous alarm in circuit #1. In most cases, a previous alarm is a cleared alarm. An exception will occur when an active higher priority alarm replaces an active lower priority alarm. In this instance, the lower priority alarm will be pushed into the previous alarm spot even though it is still active.

ANALOG_VALUE 22: Compressor1OperatingHours

The total operating hours for compressor #1.

ANALOG_VALUE 23: Compressor1Starts

The running total of starts for compressor #1.

ANALOG_VALUE 24: Circuit2Status

The overall state of refrigerant circuit #2. See IM manual for more information.

ANALOG_VALUE 25: Circuit2SubcoolingTemp

The subcooling temperature in circuit #2. It is calculated by subtracting the actual refrigerant temperature in the liquid line from the saturated condensing temperature. The resolution is 0.1°F.

ANALOG_VALUE 26: Circuit2SuperheatTemp

The superheat temperature in circuit #2. It is calculated by subtracting the saturated suction temperature from the actual refrigerant temperature in the suction line. The resolution is 0.1°F.

ANALOG_VALUE 27: Circuit2SatEvapTemp

The saturated evaporator temperature in circuit #2. It is calculated by converting the evaporator pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 28: Circuit2SatCondTemp

The saturated condenser temperature in circuit #2. It is calculated by converting the condenser pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 29: Circuit2CurrentAlarm

The current alarm in circuit #2. If multiple alarms exist at the same time, the most serious alarm (i.e., the one with the highest code number) is given.

Note that alarms 32 through 35 affect the entire chiller and so they are reported for circuit #1, #2, #3, and #4 when they occur. Similarly, when any one of these “unit alarms” clear, all will clear.

ANALOG_VALUE 30: Circuit2AtAlarm_Capacity

The capacity at which circuit #2 was running at the time of alarm. The resolution is 1%.

ANALOG_VALUE 31: Circuit2AtAlarm_EvapPressure

The evaporator pressure in circuit #2 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 32: Circuit2AtAlarm_CondPressure

The condenser pressure in circuit #2 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 33: Circuit2AtAlarm_LvgEvapWaterTemp

The evaporator leaving water temperature at the time of circuit #2 alarm. The resolution is 0.1°F.

ANALOG_VALUE 34: Circuit2AtAlarm_EntEvapWaterTemp

The evaporator entering water temperature at the time of circuit #2 alarm. The resolution is 0.1°F.

ANALOG_VALUE 35: Circuit2AtAlarm_LiquidLineTemp

The temperature in the circuit #2 liquid line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 36: Circuit2AtAlarm_SuctionTemp

The temperature in the circuit #2 suction line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 37: Circuit2AtAlarm_SubcoolingTemp

The subcooling temperature in circuit #2 at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 38: Circuit2AtAlarm_EXVPosition

The position of the electronic expansion valve (EXV) in circuit #2 at the time of alarm. The value is expressed in “steps.”

ANALOG_VALUE 39: Circuit2AtAlarm_FanStage

The condenser fan stage in operation at the time of circuit #2 alarm. See IM manual for more information on condenser fan staging.

ANALOG_VALUE 40: Circuit2AtAlarm_OAT

The outdoor air temperature at the time of circuit #2 alarm. The resolution is 0.1°F.

ANALOG_VALUE 41: Circuit2PreviousAlarm

The previous alarm in circuit #2. In most cases, a previous alarm is a cleared alarm. An exception will occur when an active higher priority alarm replaces an active lower priority alarm. In this instance, the lower priority alarm will be pushed into the previous alarm spot even though it is still active.

ANALOG_VALUE 42: Compressor2OperatingHours

The total operating hours for compressor #2.

ANALOG_VALUE 43: Compressor2Starts

The running total of starts for compressor #2.

ANALOG_VALUE 44: Circuit3Status

The overall state of refrigerant circuit #3. See IM manual for more information.

ANALOG_VALUE 45: Circuit3SubcoolingTemp

The subcooling temperature in circuit #3. It is calculated by subtracting the actual refrigerant temperature in the liquid line from the saturated condensing temperature. The resolution is 0.1°F.

ANALOG_VALUE 46: Circuit3SuperheatTemp

The superheat temperature in circuit #3. It is calculated by subtracting the saturated suction temperature from the actual refrigerant temperature in the suction line. The resolution is 0.1°F.

ANALOG_VALUE 47: Circuit3SatEvapTemp

The saturated evaporator temperature in circuit #3. It is calculated by converting the evaporator pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 48: Circuit3SatCondTemp

The saturated condenser temperature in circuit #3. It is calculated by converting the condenser pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 49: Circuit3CurrentAlarm

The current alarm in circuit #3. If multiple alarms exist at the same time, the most serious alarm (i.e., the one with the highest code number) is given.

Note that alarms 32 through 35 affect the entire chiller and so they are reported for circuit #1, #2, #3, and #4 when they occur. Similarly, when any one of these “unit alarms” clear, all will clear.

ANALOG_VALUE 50: Circuit3AtAlarm_Capacity

The capacity at which circuit #3 was running at the time of alarm. The resolution is 1%.

ANALOG_VALUE 51: Circuit3AtAlarm_EvapPressure

The evaporator pressure in circuit #3 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 52: Circuit3AtAlarm_CondPressure

The condenser pressure in circuit #3 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 53: Circuit3AtAlarm_LvgEvapWaterTemp

The evaporator leaving water temperature at the time of circuit #3 alarm. The resolution is 0.1°F.

ANALOG_VALUE 54: Circuit3AtAlarm_EntEvapWaterTemp

The evaporator entering water temperature at the time of circuit #3 alarm. The resolution is 0.1°F.

ANALOG_VALUE 55: Circuit3AtAlarm_LiquidLineTemp

The temperature in the circuit #3 liquid line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 56: Circuit3AtAlarm_SuctionTemp

The temperature in the circuit #3 suction line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 57: Circuit3AtAlarm_SubcoolingTemp

The subcooling temperature in circuit #3 at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 58: Circuit3AtAlarm_EXVPosition

The position of the electronic expansion valve (EXV) in circuit #3 at the time of alarm. The value is expressed in “steps.”

ANALOG_VALUE 59: Circuit3AtAlarm_FanStage

The condenser fan stage in operation at the time of circuit #3 alarm. See IM manual for more information on condenser fan staging.

ANALOG_VALUE 60: Circuit3AtAlarm_OAT

The outdoor air temperature at the time of circuit #3 alarm. The resolution is 0.1°F.

ANALOG_VALUE 61: Circuit3PreviousAlarm

The previous alarm in circuit #3. In most cases, a previous alarm is a cleared alarm. An exception will occur when an active higher priority alarm replaces an active lower priority alarm. In this instance, the lower priority alarm will be pushed into the previous alarm spot even though it is still active.

ANALOG_VALUE 62: Compressor3OperatingHours

The total operating hours for compressor #3.

ANALOG_VALUE 63: Compressor3Starts

The running total of starts for compressor #3.

ANALOG_VALUE 64: Circuit4Status

The overall state of refrigerant circuit #4. See IM manual for more information.

ANALOG_VALUE 65: Circuit4SubcoolingTemp

The subcooling temperature in circuit #4. It is calculated by subtracting the actual refrigerant temperature in the liquid line from the saturated condensing temperature. The resolution is 0.1°F.

ANALOG_VALUE 66: Circuit4SuperheatTemp

The superheat temperature in circuit #4. It is calculated by subtracting the saturated suction temperature from the actual refrigerant temperature in the suction line. The resolution is 0.1°F.

ANALOG_VALUE 67: Circuit4SatEvapTemp

The saturated evaporator temperature in circuit #4. It is calculated by converting the evaporator pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 68: Circuit4SatCondTemp

The saturated condenser temperature in circuit #4. It is calculated by converting the condenser pressure into a corresponding value for saturated temperature. The resolution is 1°F.

ANALOG_VALUE 69: Circuit4CurrentAlarm

The current alarm in circuit #4. If multiple alarms exist at the same time, the most serious alarm (i.e., the one with the highest code number) is given.

Note that alarms 32 through 35 affect the entire chiller and so they are reported for circuit #1, #2, #3, and #4 when they occur. Similarly, when any one of these “unit alarms” clear, all will clear.

ANALOG_VALUE 70: Circuit4AtAlarm_Capacity

The capacity at which circuit #4 was running at the time of alarm. The resolution is 1%.

ANALOG_VALUE 71: Circuit4AtAlarm_EvapPressure

The evaporator pressure in circuit #4 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 72: Circuit4AtAlarm_CondPressure

The condenser pressure in circuit #4 at the time of alarm. The resolution is 0.1 psi.

ANALOG_VALUE 73: Circuit4AtAlarm_LvgEvapWaterTemp

The evaporator leaving water temperature at the time of circuit #4 alarm. The resolution is 0.1°F.

ANALOG_VALUE 74: Circuit4AtAlarm_EntEvapWaterTemp

The evaporator entering water temperature at the time of circuit #4 alarm. The resolution is 0.1°F.

ANALOG_VALUE 75: Circuit4AtAlarm_LiquidLineTemp

The temperature in the circuit #4 liquid line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 76: Circuit4AtAlarm_SuctionTemp

The temperature in the circuit #4 suction line at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 77: Circuit4AtAlarm_SubcoolingTemp

The subcooling temperature in circuit #4 at the time of alarm. The resolution is 0.1°F.

ANALOG_VALUE 78: Circuit4AtAlarm_EXVPosition

The position of the electronic expansion valve (EXV) in circuit #4 at the time of alarm. The value is expressed in “steps.”

ANALOG_VALUE 79: Circuit4AtAlarm_FanStage

The condenser fan stage in operation at the time of circuit #4 alarm. See IM manual for more information on condenser fan staging.

ANALOG_VALUE 80: Circuit4AtAlarm_OAT

The outdoor air temperature at the time of circuit #4 alarm. The resolution is 0.1°F.

ANALOG_VALUE 81: Circuit4PreviousAlarm

The previous alarm in circuit #4. In most cases, a previous alarm is a cleared alarm. An exception will occur when an active higher priority alarm replaces an active lower priority alarm. In this instance, the lower priority alarm will be pushed into the previous alarm spot even though it is still active.

ANALOG_VALUE 82: Compressor4OperatingHours

The total operating hours for compressor #4.

ANALOG_VALUE 83: Compressor4Starts

The running total of starts for compressor #4.

Analog Input Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	Circuit1CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
2	Circuit1EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
3	Circuit1DischargeTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
4	Circuit1SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A;

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
				6042.5 = open; 6298.5 = short
5	EnteringEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
6	LeavingEvapWaterTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
7	OutdoorAirTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
8	Circuit2CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
9	Circuit2EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
10	Circuit2DischargeTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
11	Circuit2SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
12	Circuit3CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
13	Circuit3EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
14	Circuit3DischargeTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
15	Circuit3SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
16	Circuit4CondPressure	56	psig	0 – 450; 5886.5 = 450+ psig; 6142.5 = open; 6398.5 = short
17	Circuit4EvapPressure	56	psig	0 – 150; 5886.5 = 145+ psig; 6142.5 = open; 6398.5 = short
18	Circuit4DischargeTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
19	Circuit4SuctionTemp	64	°F	-50 – 280; 5786.5 = N/A; 6042.5 = open; 6298.5 = short

ANALOG_INPUT 1: Circuit1CondPressure

The condenser pressure in circuit #1. The resolution is 0.1 psi.

ANALOG_INPUT 2: Circuit1EvapPressure

The evaporator pressure in circuit #1. The resolution is 0.1 psi.

ANALOG_INPUT 3: Circuit1DischargeTemp

The temperature of the Discharge refrigerant leaving the compressor in circuit #1. The resolution is 0.1°F.

ANALOG_INPUT 4: Circuit1SuctionTemp

The temperature of the low-pressure vaporized refrigerant entering compressor #1. The resolution is 0.1°F.

ANALOG_INPUT 5: EnteringEvapWaterTemp

The temperature of the chilled water entering the evaporator. The resolution is 0.1°F.

ANALOG_INPUT 6: LeavingEvapWaterTemp

The temperature of the chilled water leaving the evaporator. The resolution is 0.1°F.

ANALOG_INPUT 7: OutdoorAirTemp

The temperature of the outdoor air. The resolution is 0.1°F.

ANALOG_INPUT 8: Circuit2CondPressure

The condenser pressure in circuit #2. The resolution is 0.1 psi.

ANALOG_INPUT 9: Circuit2EvapPressure

The evaporator pressure in circuit #2. The resolution is 0.1 psi.

ANALOG_INPUT 10: Circuit2DischargeTemp

The temperature of the Discharge refrigerant leaving the compressor in circuit #2. The resolution is 0.1°F.

ANALOG_INPUT 11: Circuit2SuctionTemp

The temperature of the low-pressure vaporized refrigerant entering compressor #2. The resolution is 0.1°F.

ANALOG_INPUT 12: Circuit3CondPressure

The condenser pressure in circuit #3. The resolution is 0.1 psi.

ANALOG_INPUT 13: Circuit3EvapPressure

The evaporator pressure in circuit #3. The resolution is 0.1 psi.

ANALOG_INPUT 14: Circuit3DischargeTemp

The temperature of the Discharge refrigerant leaving the compressor in circuit #3. The resolution is 0.1°F.

ANALOG_INPUT 15: Circuit3SuctionTemp

The temperature of the low-pressure vaporized refrigerant entering compressor #3. The resolution is 0.1°F.

ANALOG_INPUT 16: Circuit4CondPressure

The condenser pressure in circuit #4. The resolution is 0.1 psi.

ANALOG_INPUT 17: Circuit4EvapPressure

The evaporator pressure in circuit #4. The resolution is 0.1 psi.

ANALOG_INPUT 18: Circuit4DischargeTemp

The temperature of the Discharge refrigerant leaving the compressor in circuit #4. The resolution is 0.1°F.

ANALOG_INPUT 19: Circuit4SuctionTemp

The temperature of the low-pressure vaporized refrigerant entering compressor #4. The resolution is 0.1°F.

Analog Output Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	EnteringEvapWaterTempSpt	64	°F	15 – 80
2	LeavingEvapWaterTempSpt	64	°F	10 – 80
3	MaxChilledWaterResetSpt	64	°F	0 – 45
4	NetworkDemandLimit	98	percent	0 – 100
5	NetworkLvgEvapWaterTempReset	98	percent	0 – 100
6	ResetOptionSetpoint 0 = No Reset 1 = Return 2 = 4–20 mA 3 = Network 4 = Ice 5 = Outdoor Air Temperature	95	no units	0 – 5
7	MaxReset@OAT	64	°F	0 – 90
8	NoReset@OAT	64	°F	0 – 90

ANALOG_OUTPUT 1: EnteringEvapWaterTempSpt

The entering evaporator water temperature setpoint. This setpoint is used only with the Return chilled water reset option. The default value is 54°F and the resolution is 0.5°F.

With Return reset, the controller automatically modulates the Active Setpoint (i.e., the actual leaving evaporator water temperature setpoint) as required to maintain the entering evaporator water temperature at this setpoint.

ANALOG_OUTPUT 2: LeavingEvapWaterTempSpt

The leaving evaporator water temperature setpoint. This object can be used to set the base cooling setpoint before any chilled water reset is added to produce the Active Setpoint. If no reset is being used, the Active Setpoint will always be set equal to this object's value. The default value is 44°F and the resolution is 0.5°F.

When a MicroTech chiller controller is not configured for low temperature operation, it will automatically limit the low end of the valid range to a value that is above freezing (default is 40°F).

ANALOG_OUTPUT 3: MaxChilledWaterResetSpt

The maximum amount of reset that can be used to modify the Active Setpoint. See “ANALOG_OUTPUT 6: ResetOptionSetpoint” below for more information on how this object is used. The default value is 10°F and the resolution is 0.5°F.

ANALOG_OUTPUT 4: NetworkDemandLimit

The demand limiting signal from the BAS.

The chiller can be demand limited in two ways: (1) a hardwired 4–20 mA signal or (2) a BAS via network communications. Either or both ways can be used. Here is the formula:

$$D = C - \frac{[(C - 1) \times (S + N)] + 50}{100}$$

where: D = Demand limit on available cooling stages
 C = Number of cooling stages equipment has
 S = 4–20 mA demand limit signal in percent of 4–20 range
 N = Network demand limit signal in percent

Example 1:

Assume that a chiller has 12 cooling stages and “50” has been written to the Network Demand Limit object. No external 4–20 mA signal is present.

$$D = 12 - \frac{[(12 - 1) \times (0 + 50)] + 50}{100}$$

$$D = 12 - \frac{[11 \times 50] + 50}{100}$$

D = 6 stages, maximum limit

Example 2:

Assume that a chiller has 12 cooling stages, the input from the 4–20 mA signal is 8 mA, and the value of the Network Demand Limit object is “0.”

$$D = 12 - \frac{[(12 - 1) \times (25 + 0)] + 50}{100}$$

$$D = 12 - \frac{[11 \times 25] + 50}{100}$$

D = 8.75, which when rounded equals 9 stages, maximum limit

Note: This object’s value is stored in volatile memory, so after a power reset the desired value must be rewritten to the MicroTech controller.

ANALOG_OUTPUT 5: NetworkLvgEvapWaterTempReset

The percentage of chilled water temperature reset to be used when “Network” (3) is selected as the Reset Option Setpoint. See “ANALOG_OUTPUT 6: ResetOptionSetpoint” below for more information.

Note: This object’s value is stored in volatile memory, so after a power reset the desired value must be rewritten to the MicroTech controller.

ANALOG_OUTPUT 6: ResetOptionSetpoint

Sets the chilled water reset method.

No Reset (0)

When No Reset is selected, the Active Setpoint simply assumes the value of the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2).

$$A = LvgEvap$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 LvgEvap = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)

Return Water (1)

If the entering evaporator water temperature falls below the return setpoint (ANALOG_OUTPUT 1), the Active Setpoint object (ANALOG_VALUE 1) is slowly modulated upward. If the entering evaporator water temperature goes above this return setpoint, the Active Setpoint is slowly modulated

downward. The active setpoint's modulation range is limited by the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2) on the low side and the return setpoint (ANALOG_OUTPUT 1) on the high side.

The Return reset method is really a cascade control loop, not a reset function per se. The return water is maintained at its setpoint by incrementally varying the leaving evaporator water setpoint over time. For more information, see the chiller controller IM manual.

External 4–20 mA Signal (2)

A 4–20 mA signal is used to vary the Active Setpoint according to the following formula:

$$A = LvgEvap + \frac{mA - 4}{16} \times MaxR$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)
 mA = the value of the external 4–20 mA reset signal (assume values less than 4 mA are equal to 4 mA)

Network Signal (3)

A written network value is used to vary the Active Setpoint according to the following formula:

$$A = LvgEvap + \frac{Net}{100} \times MaxR$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)
 Net = the value of the network reset signal (ANALOG_OUTPUT 5) in percent

Ice (4)

The Active Setpoint is set according to a hardwired analog input as follows:

$$A = LvgEvap + MaxR \quad \text{Normal mode, any value of 4 mA or greater}$$

$$A = LvgEvap \quad \text{Ice mode, any value less than 4 mA}$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)

Outdoor Air Temperature (5)

The outdoor air temperature is used to vary the active setpoint according to the following formula when the outdoor air temperature is within the range defined by the MaxReset@OAT and NoReset@OAT values:

$$A = LvgEvap + \frac{NoOaT - T_o}{NoOaT - MaxOaT} \times MaxR$$

where: A = the Active Setpoint (ANALOG_VALUE 1)
 $LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 2)
 $MaxR$ = the max reset setpoint (ANALOG_OUTPUT 3)
 $NoOaT$ = the NoReset@OAT value (ANALOG_OUTPUT 8)
 $MaxOaT$ = the MaxReset@OAT value (ANALOG_OUTPUT 7)
 T_o = the outdoor air temperature

When the outdoor air temperature is less than the MaxReset@OAT value, the Active Setpoint is set equal to the sum of the leaving evaporator water temperature setpoint and the max reset setpoint.

When the outdoor air temperature is greater than the NoReset@OAT value, the Active Setpoint is set equal to the leaving evaporator water temperature setpoint.

ANALOG_OUTPUT 7: MaxReset@OAT

The outdoor air temperature at which the maximum amount of reset will be used. This object is used only with the Outdoor Air Temperature reset method. The resolution is 1°F.

ANALOG_OUTPUT 8: NoReset@OAT

The outdoor air temperature at which no reset will be used. This object is used only with the Outdoor Air Temperature reset method. The resolution is 1°F.

Binary Output Objects

Instance	Object_Name Property	Active_Text Property	Inactive_Text Property
1	ClearCircuit1Alarm 1 = Clear Alarm 0 = No Action	Clear Alarm	No Action
2	ClearCircuit2Alarm 1 = Clear Alarm 0 = No Action	Clear Alarm	No Action
3	ClearCircuit3Alarm 1 = Clear Alarm 0 = No Action	Clear Alarm	No Action
4	ClearCircuit4Alarm 1 = Clear Alarm 0 = No Action	Clear Alarm	No Action
5	NetworkCommand 1 = Disable 0 = Enable	Disable	Enable

BINARY_OUTPUT 1: ClearCircuit1Alarm

Clears the current active alarm in circuit #1. The object's value automatically changes to zero when the alarm is cleared. Note that some alarms are self-clearing. This object would need to be used only for manual-clear alarms. (If a self-clearing alarm is cleared with this object, it will recur immediately since the alarm condition is still present. No harm will occur.)

Note: Never command this object without investigating and correcting the cause of the alarm.

BINARY_OUTPUT 2: ClearCircuit2Alarm

Clears the current active alarm in circuit #2. See “BINARY_OUTPUT 1: ClearCircuit1Alarm” above for more information.

BINARY_OUTPUT 3: ClearCircuit3Alarm

Clears the current active alarm in circuit #3. See “BINARY_OUTPUT 1: ClearCircuit1Alarm” above for more information.

BINARY_OUTPUT 4: ClearCircuit4Alarm

Clears the current active alarm in circuit #4. See “BINARY_OUTPUT 1: ClearCircuit1Alarm” above for more information.

BINARY_OUTPUT 5: NetworkCommand

The NetworkCommand object can be used to disable the chiller through the network interface. If all other enable/disable features are enabled, setting the NetworkCommand object to 1 disables the chiller. If any of the enable/disable features are disabled, the NetworkCommand object has no effect. The NetworkCommand object is initialized to “Enable” (0).

Note: This object’s value is stored in volatile memory. After a power reset, it will initialize to “Enable” (0). If the desired value is “Disable,” a 1 must be rewritten to the MicroTech controller after the reset.

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