BACnet Data Information Packet	BD 07-6
	Group: **Controls**
	Date: **March 2000**

MicroTech®
Reciprocating Chiller Controller

Point mapping data for the MicroTech BACdrop™ Gateway with PMF version 1.08 software and standard MicroTech reciprocating chiller or chiller/heat pump applications as used in models:

- **U.S. manufactured ALR, WHR, THR**
- **AGR**

Contents

Revision History

Version 1	1999-07-16	Initial release. For PMF version 1.03. Requires BACdrop executable file BDRPv149.exe or later.
Version 2	1999-07-29	*No changes to point mapping data.* For PMF versions 1.03 and 1.04. Requires BACdrop executable file BDRPv149.exe or later.
Version 3	1999-08-12	*No changes to point mapping data.* For PMF versions 1.03 through 1.05. Requires BACdrop executable file BDRPv149.exe or later.
Version 4	1999-08-30	*No changes to point mapping data.* For PMF versions 1.03 through 1.06. Requires BACdrop executable file BDRPv149.exe or later.
Version 5	1999-10-15	Added saturated evaporator and condenser temperatures (AV). Added chilled water flow status (BI). Added circuit lead-lag configuration setpoint (AO). Reordered all AV objects in a more logical order to make consistent with other point maps (no names changed). For PMF version 1.07.
Version 6	2000-03-01	*No changes to point mapping data.* For PMF versions 1.07 and 1.08. See updated software compatibility table on page 4.

Notice

Overview

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 reciprocating chiller applications used in models ALR (U.S. made), WHR (U.S. made), THR (U.S. made), and AGR. These chillers all use software that is of type "RCP" (see below). 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 reciprocating 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 07-5 and -6	1.07 and 1.08	RCP2E02G	Reciprocating chiller and chiller/heat pump
		RCP2S02G	
		RCP3E02G	
		RCP3S02G	

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 493	MicroTech Reciprocating Chiller Controller, Installation and Maintenance Data
IOMM AGR	Air-Cooled Reciprocating Chiller (Global Chiller Line), Installation, Operation and Maintenance Manual
IOMM ACR/AGR	Air-Cooled Reciprocating Chiller Split Systems (Global Chiller Line), Installation, Operation and Maintenance Manual

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

Analog Value Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	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: Ready To Start 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
2	StageOfCapacity	95	no units	0 – 8
3	ActiveSetpoint	64	°F	0 – 220
4	Heat/CoolStateOfTHR 0 = Cooling 1 = Heating	95	no units	0, 1
5	Comp1OperatingHours	71	hours	0 – 65,279
6	Comp2OperatingHours	71	hours	0 – 65,279
7	Comp3OperatingHours	71	hours	0 – 65,279
8	Comp4OperatingHours	71	hours	0 – 65,279
9	Comp1Starts	95	no units	0 – 65,279
10	Comp2Starts	95	no units	0 – 65,279
11	Comp3Starts	95	no units	0 – 65,279
12	Comp4Starts	95	no units	0 – 65,279
13	Circuit1Status 0 = Off: System Switch 1 = Off: Manual 2 = Off: Alarm 3 = Off: Pumpdown Switch 4 = Off: Wait For Cycle 5 = Off: Ready To Start 6 = Start Pumpdown 7 = Pumping Down 8 = Open Solenoid, Waiting For Pressure 9 = Running	95	no units	0 – 9
14	Circuit1SatEvapTemp	64	°F	0 – 253; 254 = N/A
15	Circuit1SatCondTemp	64	°F	0 – 253; 254 = N/A
16	Circuit1SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
17	Circuit1SubcoolingTemp	64	°F	0 – 263; 5886.5 = N/A
18	Circuit1CondApproachTemp	64	°F	0 – 263; 5886.5 = N/A

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
19	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 = Refrigerant Freeze Protect: Shut Down Circuit 7 = Low Evaporator Pressure 8 = Compressor 4 Motor Protect 9 = Compressor 3 Motor Protect 10 = Compressor 2 Motor Protect 11 = Compressor 1 Motor Protect 12 = Compressor 4 Low Oil Pressure 13 = Compressor 3 Low Oil Pressure 14 = Compressor 2 Low Oil Pressure 15 = Compressor 1 Low Oil Pressure 16 = High Condenser Pressure 17 = Mechanical High Pressure Switch 18 = Bad Evaporator Pressure Sensor 19 = Bad Condenser Pressure Sensor 20 = Phase/Voltage Monitor 21 = Chilled Water Freeze Protect 22 = Bad Voltage Ratio Sensor 23 = Bad Leaving Evap Water Temp Sensor	95	no units	0 – 23
20	Circuit1AtAlarm_EvapPres	56	psig	0 – 145; 5886.5 = N/A; 6142.5 = open; 6398.5 = short
21	Circuit1AtAlarm_CondPres	56	psig	0 – 450; 5886.5 = N/A; 6142.5 = open; 6398.5 = short
22	Circuit1AtAlarm_SuctionTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
23	Circuit1AtAlarm_LiqLineTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
24	Circuit1PreviousAlarm *Same as Circuit1CurrentAlarm (19)*	95	no units	0 – 23
25	Circuit2Status *Same as Circuit1Status (13)*	95	no units	0 – 9
26	Circuit2SatEvapTemp	64	°F	0 – 254; 255 = N/A
27	Circuit2SatCondTemp	64	°F	0 – 254; 255 = N/A
28	Circuit2SuperheatTemp	64	°F	0 – 263; 5886.5 = N/A
29	Circuit2SubcoolingTemp	64	°F	0 – 263; 5886.5 = N/A
30	Circuit2CondApproachTemp	64	°F	0 – 263; 5886.5 = N/A
31	Circuit2CurrentAlarm *Same as Circuit1CurrentAlarm (19)*	95	no units	0 – 23
32	Circuit2AtAlarm_EvapPres	56	psig	0 – 145; 5886.5 = N/A; 6142.5 = open; 6398.5 = short

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
33	Circuit2AtAlarm_CondPres	56	psig	0 – 450; 5886.5 = N/A; 6142.5 = open; 6398.5 = short
34	Circuit2AtAlarm_SuctionTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
35	Circuit2AtAlarm_LiqLineTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
36	Circuit2PreviousAlarm *Same as Circuit1CurrentAlarm (19)*	95	no units	0 – 23

ANALOG_VALUE 1: UnitStatus

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

ANALOG_VALUE 2: StageOfCapacity

Stage of compressor capacity at which the unit is currently operating.

ANALOG_VALUE 3: ActiveSetpoint

The Active Setpoint, which is used to control the leaving evaporator water temperature during cooling operation and the leaving condenser water temperature during heating (Templifier) operation. The resolution is 0.5°F.

ANALOG_VALUE 4: Heat/CoolStateOfTHR

The current heating or cooling state of a unit configured as a chiller/Templifier (THR model). When the THR-Heat/CoolChangeover object (ANALOG_OUTPUT 8) is set to “Heating” (0) and the heat/cool changeover switch is open (i.e., the analog input is less than or equal to 4 mA), the unit operates as a heat pump (Templifier); otherwise, the unit operates as a chiller.

If the unit is configured as a chiller only (e.g., ALR, WHR, or AGR models), this object’s value is always “Cooling” (0).

ANALOG_VALUE 5: Comp1OperatingHours

The total operating hours for compressor #1. The counter will automatically rollover after 65,279 hours.

ANALOG_VALUE 6: Comp2OperatingHours

The total operating hours for compressor #2. The counter will automatically rollover after 65,279 hours.

ANALOG_VALUE 7: Comp3OperatingHours

The total operating hours for compressor #3. The counter will automatically rollover after 65,279 hours.

ANALOG_VALUE 8: Comp4OperatingHours

The total operating hours for compressor #4. The counter will automatically rollover after 65,279 hours.

ANALOG_VALUE 9: Comp1Starts

The total number of starts for compressor #1. The counter will automatically rollover after 65,279 starts.

ANALOG_VALUE 10: Comp2Starts

The total number of starts for compressor #2. The counter will automatically rollover after 65,279 starts.

ANALOG_VALUE 11: Comp3Starts

The total number of starts for compressor #3. The counter will automatically rollover after 65,279 starts.

ANALOG_VALUE 12: Comp4Starts

The total number of starts for compressor #4. The counter will automatically rollover after 65,279 starts.

ANALOG_VALUE 13: Circuit1Status

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

ANALOG_VALUE 14: 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 15: 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 16: 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 17: 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 18: Circuit1CondApproachTemp

The condenser approach temperature. It is calculated by subtracting the condenser leaving water temperature from the condenser refrigerant temperature. The resolution is 0.1°F.

This object is valid only when the unit is equipped with and configured for a water-cooled condenser.

ANALOG_VALUE 19: 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 20 through 23 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 20: Circuit1AtAlarm_EvapPres

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

ANALOG_VALUE 21: Circuit1AtAlarm_CondPres

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

ANALOG_VALUE 22: Circuit1AtAlarm_SuctionTemp

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

ANALOG_VALUE 23: Circuit1AtAlarm_LiqLineTemp

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

ANALOG_VALUE 24: 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 25: Circuit2Status

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

ANALOG_VALUE 26: 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 27: 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 28: 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 29: 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 30: Circuit2CondApproachTemp

The condenser approach temperature. It is calculated by subtracting the condenser leaving water temperature from the condenser refrigerant temperature. The resolution is 0.1°F.

This object is valid only when the unit is equipped with and configured for a water-cooled condenser.

ANALOG_VALUE 31: 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 20 through 23 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 32: Circuit2AtAlarm_EvapPres

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

ANALOG_VALUE 33: Circuit2AtAlarm_CondPres

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

ANALOG_VALUE 34: Circuit2AtAlarm_SuctionTemp

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

ANALOG_VALUE 35: Circuit2AtAlarm_LiqLineTemp

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

ANALOG_VALUE 36: 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 Input Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	Circuit1CondPressure	56	psig	0 – 450; 5886.5 = N/A; 6142.5 = open; 6398.5 = short
2	Circuit1EvapPressure	56	psig	0 – 145; 5886.5 = N/A; 6142.5 = open; 6398.5 = short
3	Circuit1LiquidLineTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
4	Circuit1SuctionTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
5	Circuit2CondPressure	56	psig	0 – 450; 5886.5 = N/A; 6142.5 = open; 6398.5 = short
6	Circuit2EvapPressure	56	psig	0 – 145; 5886.5 = N/A; 6142.5 = open; 6398.5 = short
7	Circuit2LiquidLineTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
8	Circuit2SuctionTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
9	CondEnteringWaterTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
10	CondLeavingWaterTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
11	EvapEnteringWaterTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
12	EvapLeavingWaterTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
13	OutdoorAirTemp	64	°F	-50 – 300; 5786.5 = N/A; 6042.5 = open; 6298.5 = short
14	UnitPercentRLA	98	percent	0 – 125; 254 = zero percent

ANALOG_INPUT 1: Circuit1CondPressure

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

ANALOG_INPUT 2: Circuit1EvapPressure
The measured 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 the compressor in circuit #1. The resolution is 0.1°F.

ANALOG_INPUT 5: Circuit2CondPressure
The measured condenser pressure in circuit #2. The resolution is 0.1 psi.

ANALOG_INPUT 6: Circuit2EvapPressure
The measured evaporator pressure in circuit #2. The resolution is 0.1 psi.

ANALOG_INPUT 7: Circuit2LiquidLineTemp
The temperature of the liquid refrigerant entering the expansion valve in circuit #2. The resolution is 0.1°F.

ANALOG_INPUT 8: Circuit2SuctionTemp
The temperature of the low-pressure vaporized refrigerant entering the compressor in circuit #2. The resolution is 0.1°F.

ANALOG_INPUT 9: CondEnteringWaterTemp
The temperature of the water entering the condenser. (Applies to water-cooled units only.) The resolution is 0.1°F.

ANALOG_INPUT 10: CondLeavingWaterTemp
The temperature of the water leaving the condenser. (Applies to water-cooled units only.) The resolution is 0.1°F.

ANALOG_INPUT 11: EvapEnteringWaterTemp
The temperature of the water entering the evaporator. The resolution is 0.1°F.

ANALOG_INPUT 12: EvapLeavingWaterTemp
The temperature of the water leaving the evaporator. The resolution is 0.1°F.

ANALOG_INPUT 13: OutdoorAirTemp
The outdoor air temperature as measured at the sensor connected to the chiller. (Applies to air-cooled units only.) It is valid only if a sensor is present and the OAT Select configuration parameter (available at keypad/display) is set to “Local.” The resolution is 0.1°F.

ANALOG_INPUT 14: UnitPercentRLA
The percentage of rated load amps for the entire chiller as measured by an optional current transformer and input conditioning package. If the analog input from the current transducer drops below 0.1 Vdc, the MicroTech controller will set this object to 254 in order to differentiate between noise and low current draw. This object is useful only when the chiller is equipped with the optional current sensing package. The resolution is 1% RLA.

Analog Output Objects

Instance	Object_Name Property	Units Prop.	Units Description	Valid Range
1	THR-CondLeavingWaterTempSpt	64	°F	85 – 220
2	EvapEnteringWaterTempSpt	64	°F	15 – 80
3	EvapLeavingWaterTempSpt	64	°F	10 – 80
4	MaxWaterResetSpt	64	°F	0 – 45
5	NetworkDemandLimit	98	percent	0 – 100
6	NetworkLeavingWaterTempReset *For Ice reset method only:* 0 = No reset (Ice mode) 1 – 100 = Full reset (Normal mode)	98	percent	0 – 100
7	ResetOptionSetpoint 0 = No Reset 1 = Return (chillers only) 2 = 4–20 mA 3 = Network 4 = Ice (chillers only)	95	no units	0 – 4
8	THR-Heat/CoolChangeover 0 = Heating 1 = Cooling	95	no units	0, 1
9	LeadCircuitConfig 0 = Auto 1 = Circuit #1 Lead 2 = Circuit #2 Lead	95	no units	0 – 2

ANALOG_OUTPUT 1: THR-CondLeavingWaterTempSpt

The condenser leaving water temperature setpoint. When no reset is being used, this object can be used to set the Active Setpoint, which is used to control the condenser leaving water temperature during heating operation in THR units configured as chiller/templifier. The default value is 115°F and the resolution is 1°F.

ANALOG_OUTPUT 2: EvapEnteringWaterTempSpt

The entering evaporator water temperature setpoint. This setpoint is used only with the Return chilled water reset option, which is available only in units configured as chillers. 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 3: EvapLeavingWaterTempSpt

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 during cooling operation. The default value is 44°F and the resolution is 0.5°F.

ANALOG_OUTPUT 4: MaxWaterResetSpt

The maximum amount of reset that can be used to modify the Active Setpoint. See "ANALOG_OUTPUT 7: 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 5: NetworkDemandLimit

The demand limiting signal from the BAS. Demand limiting and thus this object apply only to units configured as chillers.

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:

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

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 NetworkDemandLimit object. No external 4–20 mA signal is present.

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

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

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.”

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

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

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 6: NetworkLeavingWaterTempReset

The percentage of water temperature reset to be used when “Network” (3) is selected as the Reset Option Setpoint. This object can also be used to switch modes when “Ice” (4) is selected as the Reset Option Setpoint. See “ANALOG_OUTPUT 7: 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 7: 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 3) during cooling operation or the leaving condenser water temperature setpoint (ANALOG_OUTPUT 1) during heating operation.

$A = LvgEvap$ Cooling operation

$A = LvgCond$ Heating operation

where: A = the Active Setpoint (ANALOG_VALUE 3)
$LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 3)
$LvgCond$ = the leaving condenser water temperature setpoint (ANALOG_OUTPUT 1)

Return Water (1)

The Return reset method can be selected only if the unit is configured as a chiller. If the entering evaporator water temperature falls below the return setpoint (ANALOG_OUTPUT 2), the Active Setpoint object (ANALOG_VALUE 3) 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 3) on the low side and the return setpoint (ANALOG_OUTPUT 2) 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 formulas:

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

$$A = LvgCond - \frac{mA - 4}{16} \times MaxR \qquad \text{Heating}$$

where: A = the Active Setpoint (ANALOG_VALUE 3)
$LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 3)
$LvgCond$ = the leaving condenser water temperature setpoint (ANALOG_OUTPUT 1)
$MaxR$ = the max reset setpoint (ANALOG_OUTPUT 4)
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 formulas:

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

$$A = LvgCond - \frac{Net}{100} \times MaxR \qquad \text{Heating}$$

where: A = the Active Setpoint (ANALOG_VALUE 3)
$LvgEvap$ = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 3)
$LvgCond$ = the leaving condenser water temperature setpoint (ANALOG_OUTPUT 1)
$MaxR$ = the max reset setpoint (ANALOG_OUTPUT 4)
Net = the value of the network reset signal (ANALOG_OUTPUT 6) in percent

Ice (4)

The Ice reset method can be selected only if the unit is configured as a chiller. The Active Setpoint is set according to a hardwired analog input and/or the NetworkLeavingWaterTempReset object (ANALOG_OUTPUT 6) that set the ice mode to either Ice or Normal as follows:

$A = LvgEvap + MaxR$ — Normal mode, any value of 4 mA or greater or NetworkLeavingWaterTempReset object set to 1 or above.

$A = LvgEvap$ — Ice mode, any value less than 4 mA and NetworkLeavingWaterTempReset object set to 0.

where: *A* = the Active Setpoint (ANALOG_VALUE 3)
LvgEvap = the leaving evaporator water temperature setpoint (ANALOG_OUTPUT 3)
MaxR = the max reset setpoint (ANALOG_OUTPUT 4)

ANALOG_OUTPUT 8: THR-Heat/CoolChangeover

The BAS's heat/cool changeover switch for units configured as chiller/Templifiers (THR models). When this object is set to "Heating" (0) and the heat/cool changeover switch is open (i.e., the analog input is less than or equal to 4 mA), the unit operates as a heat pump (Templifier). When this object is set to "Cooling" (1), the unit operates as a chiller. The actual heating or cooling state of the chiller/Templifier is available via the Heat/CoolStateOfTHR object (ANALOG_VALUE 4).

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 9: LeadCircuitConfig

A configuration parameter that determines which circuit will be lead. When this object is set to Auto (0), the controller will set the lead circuit by comparing the total number of compressor starts in each circuit. The circuit with the least number of total compressor starts will be lead.

Binary Input Objects

Instance	Object_Name Property	Active_Text Property	Inactive_Text Property
1	ChilledWaterFlowStatus 1 = Flow 0 = No Flow	Flow	No Flow

BINARY_INPUT 1: ChilledWaterFlowStatus

The state of the chilled water flow switch.

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.

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