MULTISTACK

The Modular Water Chiller

BACnet Portal
Technical Manual

MULTISTACK WEB PORTAL

MS20/30/50 Application - BACnet over TCP/IP

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GENERAL DESCRIPTION

The Multistack WEB PORTAL is a device that acts as a translator between a Multistack COMPUT25 and the ASHRAE standard BACnet protocol.

SPECIFICATIONS

Power Supply Requirements for Portal: 24VAC ± 10%, 0.3 A (7.2 VA), 50-60 Hz.

Status Indication: Power, Run, and Error LED indicators. LED indicators for Transmit and Receive on each of the communication ports.

Battery: Seven-year lithium BR2325 battery provides a minimum of 10,000 hours of data retention during power outages.

Operating Temperature Range: 0-130°F (-17.8 to 54.4 °C).

Operating Humidity Range: 10-95% relative humidity, non-condensing.

Listed By: PAZX (UL 916), PAZX7 (cUL C22.2 No. 205-M1983), FCC Part 15- Subpart B-Class A.

COMMUNICATIONS WIRING

1. BAS Interface (10baseT port):

The Multistack WEB PORTAL communicates with a Building Automation device or other devices via a BACnet over Ethernet connection. This connection is located in the upper left corner of the WEB PORTAL. The DIP SWITCHES located in the lower right corner of the portal are for addressing. They should already be set with switches 3 and 4 ON and switches 1, 2, and 5 OFF.

NOTE: The Customer or Building Automation provider is responsible for providing the CAT5 cable to connect to the building network.

2. COMPUT25 Interface (Port 2):

The Multistack WEB PORTAL talks directly to a Multistack COMPUT25 using a 3-wire EIA-232 connection. The WEB PORTAL has been factory configured with Port 2 set-up for communications to a COMPUT25. This port is the 5-pin terminal block located on the left hand side of the WEB PORTAL. A DB25-pin male serial cable connection is required at the COMPUT25. The maximum distance for this connection is 50 feet. Multistack provides a 6-foot serial cable to connect Port 2 of the WEB PORTAL to the RS-232 connector in the Multistack COMPUT25. (See Photo 1)

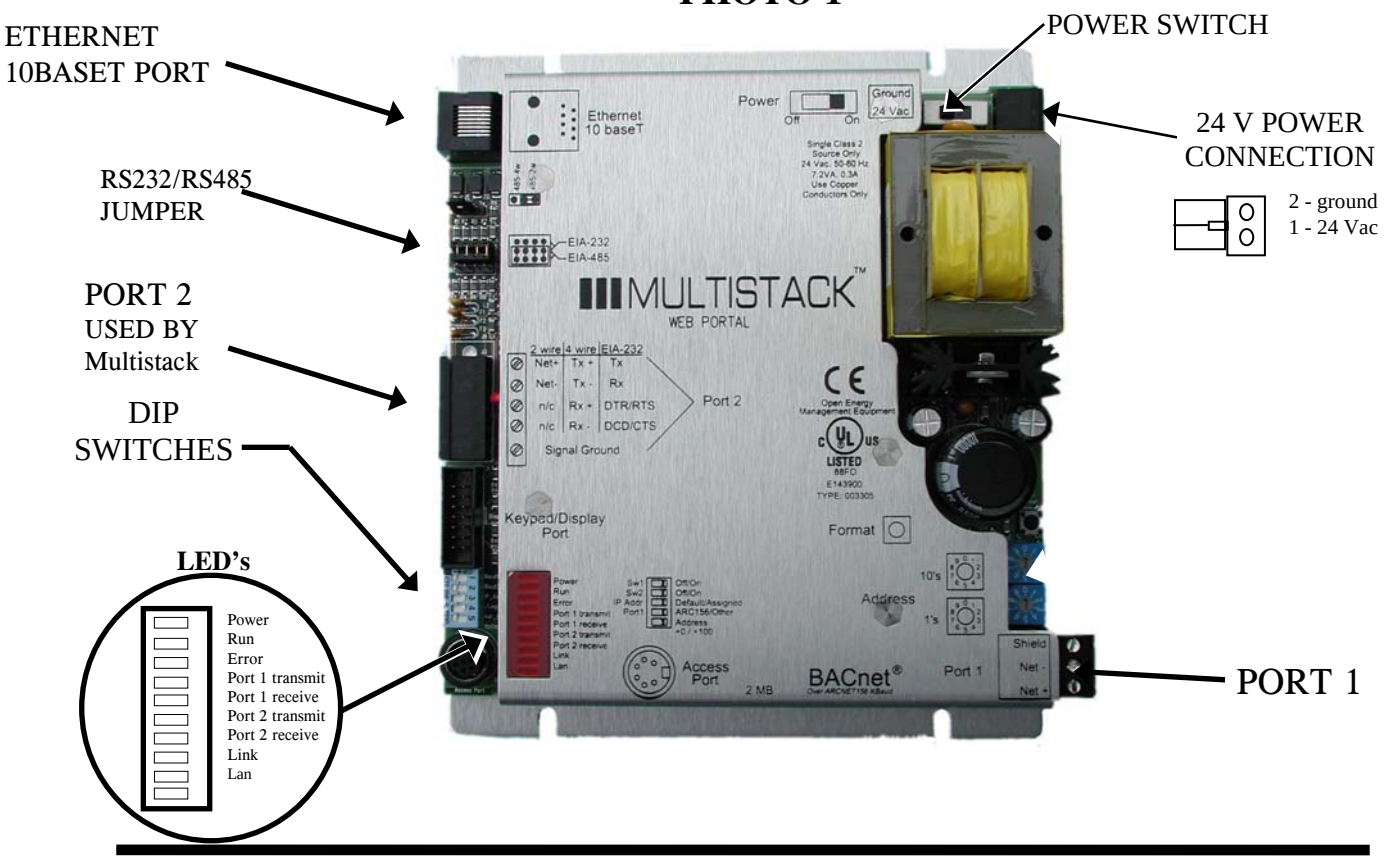
****The portal will be set up by Multistack to communicate to the COMPUT25 at 2400 baud, 8 bits, no parity, and 1 stop bit. THIS IS NOT ADJUSTABLE!!

Port 2 Pin-Out Designation

Multistack Portal Port 2		Comput25 (RS232 Port)
Pin 1 (TX)	———	Pin 2 (RX)
Pin 2 (RX)	———	Pin 3 (TX)
Pin 3 (DTR/RTS)	———	No Connection
Pin 4 (DCD/CTS)	———	No Connection
Pin 5 (GND)	———	Pin 7 (GND)

NOTE: Check to make sure that the RS232/ RS485 jumper is selected for EIA-232. This jumper is located adjacent to the 5-pin connector on the left hand side of the module (See Photo 1). With EIA-232 selected for Port 2, the 2 wire/4 wire jumper directly above the RS232/RS485 jumper can be ignored.

PHOTO 1



POWER WIRING

CAUTION: The WEB PORTAL is a Class 2 device (less than 30VAC, 100 VA maximum). Take the appropriate isolation precautions when mounting this device in a panel with non-Class 2 devices.

1. Turn the WEB PORTAL's power switch OFF (see Photo 1) to prevent the module from being powered up until proper voltage is verified.

2. Connect the power wires to the appropriate terminals maintaining proper polarity. The terminals are labeled Ground and 24 VAC.

2. Verify that 24 VAC is present at the power input terminals of the WEB PORTAL (See Photo 1). The voltage input should be between 21.6 VAC and 26.4 VAC.

3. Turn the WEB PORTAL's power switch ON, the Power, Run and Error LEDs should turn ON and the Run and Error LEDs begin blinking. The Error LED should then turn off. If this does not occur, turn the power switch OFF and check for wiring errors.

LED IDENTIFICATION

The Multistack Portal's LEDs are as follows (see Photo 1):

Power - portal is being supplied with power.
Run - 2 flashes/second indicates normal operation.
Error - lights when an error is detected. (Table 2)
Port 1 Transmit - lights when Port 1 receives data.
Port 1 Receive - lights when Port 1 transmits data.
Port 2 Transmit - lights when Port 2 receives data.
Port 2 Receive - lights when Port 2 transmits data.
Link - lights when the 10BaseT port has a link.
Lan - lights when the portal is communicating with then LAN

TABLE 2

RUN LED	ERROR LED	CONDITION
2 flashes per sec.	Off	All normal
2 flashes per sec.	2 flashes alternating	5 minute auto-restart delay after system error
2 flashes per sec.	2 flashes in sync, then pause	Module is configured with different baud rate than rest of network
2 flashes per sec.	On	Module halted after frequent system errors.
5 flashes per sec.	On	Contact Technical Support
5 flashes per sec.	Off	Download in progress.
7 flashes per sec.	7 flashes per sec.	Brownout recovery delay (10 seconds)
14 flashes per sec.	14 flashes per sec.	Brownout in progress (Supply voltage low)

BACnet over TCP/IP SETUP

Table 3 is a listing of all the points available in a Multistack Chiller. The **Object Identifier** is the description of each point. The other columns give a listing of the BACnet **Object Type**, **Object Instance, Object Enumeration, Action,** and **Reference Name**. BACnet **Object Type**'s are abbreviated as follows:

AV	R	Analog Value (Read Only)
AV	W	Analog Value (Write Only)
BV	R	Binary Value (Read Only)
BV	W	Binary Value (Write Only)

CONNECTION TYPE

The default CONNECTION TYPE for the BACnet over ETHERNET to the WEB PORTAL is a CAT5 Cable via a RJ-45 connector. This connector plugs into the Ethernet 10BaseT port. If this needs to be changed, please contact a Multistack Representative.

BACnet COMMUNICATION SETUP

The rate of communication between a BACnet device and the WEB PORTAL is third party dependant. The 10BaseT port on the WEB PORTAL is capable of sending information at 10 Mbps. This is not adjustable.

TCP/IP NETWORK

The WEB PORTAL may be connected directly to the Ethernet network using the 10BaseT port. To prevent circular routes, the WEB PORTAL will be configured only for BACnet/IP. The **IP Network Number** will be defaulted to **6100**. The **UDP Port Number** set to **47808**. If these settings need to be changed, please contact a Multistack Representative.

IP ADDRESS

The following is the default IP Addressing scheme in the portal.

IP – 192.168.1.101
Subnet Mask – 255.255.255.0
Gateway – 0.0.0.0

If these settings need to be changed, please contact a Multistack Representative.

DEVICE INSTANCE

The **device instance number** is **610001**. If this setting needs to be changed, please contact a Multistack Representative.

Configuration for:

IP Address:
Subnet Mask:
Gateway:
UDP Port:
BACnet/IP Network #:
Device Instance:

POINTS LIST (Object Instance)

READ POINTS

 # OF COMPRESSORS - The total number of compressors in the system as set by the dip switch setting in the COMPUT25. (AV-1)

CAPACITY – The number of compressors on compared to the total in the system. (AV-2)

DEMAND - Current load compared to maximum design load. This value is determined by the system entering chilled water temperature and the settings of the variables. (AV-3)

CURRENT FAULTS – Tells how many compressors are in a fault condition. (AV-4)

ENT CHW SYS TEMP - Entering Chilled Water System Temperature. (AV-5)

LEV CHW SYS TEMP - Leaving Chilled Water System Temperature. (AV-6)

ENT CW SYS TEMP - Entering Condenser Water System Temperature. (AV-7)

LEV CW SYS TEMP - Leaving Condenser Water System Temperature. (AV-8)

C(X) SUCT TEMP - Individual compressor suction temperature where (X) is the compressor number. (See Table 3)

C(X) LOCHW TEMP - Individual compressor leaving chilled water temperature where (X) is the compressor number. (See Table 3)

LEAD COMPRESSOR - The first compressor to start and last compressor to turn off if available to run. (AV-9)

LOAD LIMIT - A percentage value to limit the system load. (AV-10)

UPPER SET POINT - The desired entering chilled water temperature (ENT CHW SYS TEMP) at full load. (AV-11)

LOWER SET POINT - The desired leaving chilled water temperature (LEV CHW SYS TEMP) at full load. (AV-12)

VSP (Variable Set Point) - A percentage value that is used to determine the no load chilled water temperature. (AV-13)

No Load CHWT =
[(A Temp - B Temp) * C% ÷ 100] + B Temp

EXAMPLE: Upper Set Point = 55, Lower Set Point = 45, VSP = 30%

NoLoad CHWT = [(55-45) * 30 ÷ 100] + 45 = 48 °F

TDIFF (Delay Time) - A time in seconds which sets the amount of time between starts and stops of compressors. (AV-14)

FAIL INDIC (Failure Indicator) - A percentage value which provides for an output signal in the COMPUT25 whenever compressors of the indicated value have failed. A 0% setting will give an output signal after any failure within the system. (AV-16)

FLUSH TIME - The time in hours at which the DDRS-210A is cycled. This is a condenser blow down valve. (AV-153)

FLUSH DURATION - The time in seconds to set how long the DDRS-210A is energized. It is recommended to keep this value below 15 seconds for most instances. (AV-154)

MONTH – The current month set in the COMPUT25.

DAY – The current day set in the COMPUT25.

YEAR - The current year set in the COMPUT25.

HOUR – The current hour set in the COMPUT25.

TIME – The current minute set in the COMPUT25.

The default settings for the previous System Variables are:

ITEM	DEFAULT
UPPER SET POINT	55 (°F)
LOWER SET POINT	45 (°F)
VSP	50%
FLUSH TIME	12:00 (noon)
FLUSH DURATION	15 (SEC)
LOAD LIMIT	100%
TDIFF	90 (SEC)

FAULTS C(X) - Module fault information. This is an analog number which is coded to give the type of fault that has occurred on the INDIVIDUAL compressor circuit. In this definition, (X) represents the compressor number 1-24. Refer to the Table in the section entitled **FAULTS** for further information.

FAULT (X) TYPE - This is an analog value which will represent the type of fault for each of the faults in the FAULT REVIEW. Refer to Tables in the section entitled **FAULT REVIEW** for further information.

FAULT (X) COMP # - This value gives the compressor number that a fault occurred on. It will be a value between 0-24. A 0 value represents a system fault, while a value of 1-24 represents the compressor number of which the fault occurred on. Refer to Tables in the section entitled **FAULT REVIEW** for further information.

HRS @ XX% - This value relates the total operating hours to the % load and is subdivided into 10% segments.

MOST CURRENT FAULT – This value tells which fault in the fault review happened more recently than the others. To get the order of the fault review to compare with what is at the master controller, take this value and go backwards down the list using the FAULT (X) number.

Example: If the value for the MOST CURRENT FAULT was 7, then FAULT 7 information would be the most current fault and should match the value in position 20 at the master controller. The order of the fault from 20-1 would be 7, 6, 5, 4, 3, 2, 1, 20, 19, 18, 17, 16…..8. Therefore, FAULT 8 would be the oldest fault and the next fault position to be overwritten.

ON/OFF STATUS - Displays whether the chiller is *ON* or *OFF*. (BV-1) **(ON=1 & OFF=0)**

EX1 FAULT DISPLAY - Input in the COMPUT25 that disables the chiller and requires resetting at the COMPUT25 to resume operation. (BV-2) **(Fault=1 & Normal=0)**

EX2 REMOTE OFF - Input in the COMPUT25 that disables the chiller, no reset required to resume operation. Circuit acts just like an On/Off switch. (BV-3) **(Stopped=1 (will not run) & Started=0 (capable of running))**

EX3 FAULT DISPLAY - Input in the COMPUT25 that disables the chiller and requires resetting at the COMPUT25 to resume operation. (BV-4) **(Fault=1 & Normal=0)**

EX4 FAULT DISPLAY - Input in the COMPUT25 that disables the chiller. No reset required. This EX4 input is a special input designed for use with a Power Phase Monitor (PPM). (BV-5) **(Fault=1 & Normal=0)**

LOW CHW FLOW - Low Chilled Water Flow. Input in the COMPUT25 that disables the chiller and is intended to be used with the Chilled Water Flow Switch. This fault requires a reset and restart at the COMPUT25 to resume operation. (BV-6) **(Fault=1 & Normal=0)**

LOW CW FLOW - Low Condenser Water Flow. Input in the COMPUT25 that disables the chiller and is intended to be used with the Condenser Water Flow Switch. This fault requires a reset and restart at the COMPUT25 to resume operation. (BV-7) **(Fault=1 & Normal=0)**

LO CHW TEMP SYS - Low Leaving Chilled Water System Temperature Fault (Below 36 °F). This fault requires a reset and restart at the COMPUT25 to resume operation. (BV-8) **(Fault=1 & Normal=0)**

COMP. (X) STATUS - The present state of each individual compressor where (X) is the compressor number. This condition can be either ON or OFF. **(ON=1 & OFF=0)**

WRITE POINTS

ON/OFF CONTROL - This is the point that a BACnet device will control for ON or OFF operation. This point should be left ON anytime the BAS system wants the chiller running. (BV-W-33) **(ON=1 & OFF=0)**

UPPER SET POINT - Input for changing the Upper Set Point variable in the COMPUT25. (AV-W-134)

LOWER SET POINT - Input for changing the Lower Set Point variable in the COMPUT25. (AV-W-135)

VSP (Variable Set Point) - Input for changing the VSP variable in the COMPUT25. (AV-W-136)

LOAD LIMIT - Input for changing the LOAD LIMIT in the COMPUT25. (AV-W-137)

TDIFF (Delay Time) - Input for changing the TDIFF variable in the COMPUT25. (AV-W-138)

FAIL INDICATOR - Input for changing the FAIL INDIC variable in the COMPUT25. (AV-W-139)

LEAD COMPRESSOR - Input for changing the LEAD COMP variable in the COMPUT25. (AV-W-140)

FLUSH TIME - Input for changing the FLUSH TIME variable in the COMPUT25. Hour only input for this setting. (AV-W-141)

FLUSH DURATION - Input for changing the FLUSH DURATION in the COMPUT25. This is a setting in seconds to set how long the DDRS-210A is energized. (AV-W-142)

THINGS TO CONSIDER FOR REMOTE START/STOP OF A MULTISTACK CHILLER

A Multistack chiller can be controlled On and Off by writing to BACnet Object Instance BV-W 33; ON/OFF CONTROL as described earlier, but this is not always the best procedure. This point is at the same level of priority as the keypad at the Master Control. If the BAS wants the chiller OFF, and a person near the chiller wants it ON, there could be a battle back and forth as to the condition of the chiller. When using this write point, the BAS system will need to also monitor BACnet Object Instance BV 1, ON/OFF STATUS. If the status of the chiller is OFF, then when the BAS system writes (BV-W 33) ON the chiller will change to ON. This should then also change the status of BV 5 to ON. If the customer presses the ON/OFF push button at the chiller, the chiller will shut OFF, the ON/OFF STATUS (BACnet Object Instance BV 1) will change to OFF, even though the BAS system has ON/OFF CONTROL (BACnet Object Instance BV-W 33) set to ON. The BAS system will then have to turn ON/OFF CONTROL OFF for a short while, and then turn it back ON to get the chiller to start again.

An alternate way to control the starting and stopping of a Multistack chiller is to use a “dry” set of contacts controlled by the BAS system. This set of contacts would then need to be wired into the Comput25, Master Control. A digital input for Remote Start/Stop is reserved at the Master Control and is labeled EX2. The BAS system can also monitor the status of EX2 by means of BACnet Object Instance (BV 3), EX2 REMOTE OFF. If this input is open, the Multistack chiller would be disabled, and nothing would be allowed to run. The EX2 input must be closed in order for the chiller to run.

FAULTS CONDITIONS

SYSTEM FAULTS DEFINITION

EX1 FAULT DISPLAY - Input in the COMPUT25 that disables the chiller and requires resetting at the COMPUT25 to resume operation.
(Fault=1 & Normal=0)

EX2 REMOTE OFF - Input in the COMPUT25 that disables the chiller, no reset required to resume operation. Circuit acts just like an On/Off switch.
(Stopped=1 (will not run) & Started=0 (capable of running))

EX3 FAULT DISPLAY - Input in the COMPUT25 that disables the chiller and requires resetting at the COMPUT25 to resume operation.
(Fault=1 & Normal=0)

EX4 FAULT DISPLAY - Input in the COMPUT25 that disables the chiller. No reset required. This EX4 input is a special input designed for use with a Power Phase Monitor (PPM). **(Fault=1 & Normal=0)**

LOW CHW FLOW - Low Chilled Water Flow. Input in the COMPUT25 that disables the chiller and is intended to be used with the Chilled Water Flow Switch. This fault requires a reset and restart at the COMPUT25 to resume operation.
(Fault=1 & Normal=0)

LOW CW FLOW - Low Condenser Water Flow. Input in the COMPUT25 that disables the chiller and is intended to be used with the Condenser Water Flow Switch. This fault requires a reset and restart at the COMPUT25 to resume operation.
(Fault=1 & Normal=0)

LO CHW TEMP SYS - Low Leaving Chilled Water System Temperature Fault (Below 36 °F). This fault requires a reset and restart at the COMPUT25 to resume operation.
(Fault=1 & Normal=0)

NOTE: System fault information is sent to BACnet devices in the form of digital inputs. Each system fault has a **BACnet Object Instance** assigned to it. There are seven different system faults, and they are assigned **BACnet Object Instances** BV2-8 (See Table 3). If the input is 'ON' then that particular fault is set. If the input is 'OFF' then that particular fault is cleared.

MODULE FAULTS DEFINITIONS

HP - High Pressure Cutout. This fault requires resetting at both the HP control and the COMPUT25 to resume operation.

LP - Low Pressure Cutout. This fault requires resetting at the LP control and the COMPUT25 to resume operation.

TH - Thermal Fault. This would occur if the motor protector sensed an overload in the compressor motor. It would also occur if any component in the motor protector circuit failed open. This fault requires resetting at the COMPUT25 and on some units, at the overload relay also.

LOSUC - Low Suction Temperature. If during operation this temperature should drop to 25 °F, the compressor will shut down. The temperature must rise back up to 30 °F before the fault can be reset.

LOCHW - Low Leaving Chilled Water Temperature (Below 36 °F). (Evaporator freeze protection) The temperature must rise back up to 40 °F before the fault can be reset.

COMMUN-Communication Error between units.

NOTE: Module fault information for individual compressor circuits are sent to BACnet devices in the form of an analog number. The **Object Identifier** is labeled **FAULTS C(X)** where (X) is the compressor number in the system. There are four different conditions of a fault for a Multistack Portal. (Off mode) - This fault occurred while the circuit was not running. (Current) - This fault is still present, and corrective action must be taken. (Reset) - Fault can be reset and operation resumed by resetting the fault. (Record) - Fault has been reset, and the compressor is available to run. The following table lists the possible **module** faults in a Multistack system.

FAULTS C(X) Table

The following table is to decipher the FAULTS C(X), compressor faults. The integer value given at the point will coincide with a value in the table to give fault that is current or resetable.

FAULTS C(X)

VALUE	FAULT CONDITION
1	HP (Off mode)
2	LP (Off mode)
64	LOSUCT (Current)
65	HP (Current)
66	LP (Current)
69	HP (Current)
70	LP (Current)
72	LOCHW (Current)
96	COMMUN (Current)
128	LOSUCT (Reset)
129	HP (Reset)
130	LP (Reset)
132	TH (Reset)
133	HP (Reset)
134	LP (Reset)
136	LOCHW (Reset)

FAULT REVIEW

The FAULT REVIEW can also be helpful in determining fault conditions that may be present in the COMPUT25. The COMPUT25 will store the most current 20 faults. Each fault has a type **[FAULT (X) TYPE]** and a compressor number **[FAULT (X) COMP]** associated with it.

The FAULT (X) TYPE is an analog number which will give the type of fault that has occurred, and is dependant upon the FAULT (X) COMP value. If the FAULT (X) COMP value is 1-24 then the following table applies, and the fault condition is a **Module** Fault.

FAULT (X) TYPE (Module)

VALUE	FAULT CONDITION
0	LOSUCT (Record)
1	HP (Record)
2	LP (Record)
4	THERM (Record)
5	HP (Record)
6	LP (Record)
8	LOCHW (Record)
16	HI SUCT (Record)
32	COMM. (Record)
64	LOSUCT (Current/Reset)
65	HP (Current/Reset)
66	LP (Current/Reset)
69	HP (Current/Reset)
70	LP (Current/Reset)
72	LOCHW (Current/Reset)
80	HI SUCT (Current/Reset)
96	COMM. (Current/Reset)

If the FAULT (X) COMP value is 0 then the following table applies, and the fault condition is a **System** Fault.

FAULT (X) TYPE (System)

VALUE	FAULT CONDITION
1	EX1 FAULT (Record)
2	EX3 FAULT (Record)
4	EX4 FAULT (Record)
8	Lo Lev. H2O (Record)
16	Lo CHW. Flow (Record)
32	Lo CW. Flow (Record)
65	EX1 FAULT (Current)
66	EX3 FAULT (Current)
68	EX4 FAULT (Current)
72	Lo Lev. H2O (Current)
80	Lo CHW. Flow (Current)
96	Lo CW Flow (Current)
129	EX1 FAULT (Reset)
130	EX3 FAULT (Reset)
136	Lo Lev. H2O (Reset)
144	Lo CHW Flow (Reset)
160	Lo CW Flow (Reset)

The FAULT (X) COMP value is an analog value which is a number between 0-24. A 0 value represents a System Fault. A number of 1-24 represents a Module Fault, and is the compressor number that the fault has occurred on. The following is a list of examples.

EXAMPLES:

FAULT 1 TYPE	= 72
FAULT 1 COMP#	= 2
FAULTS C2	= 136

These numbers represent that Fault No. 1 in the FAULT REVIEW is a LOCHW on compressor #2, and the fault is in a RESETable condition.

FAULT 2 TYPE	= 8
FAULT 2 COMP#	= 1

These numbers represent that Fault No. 2 in the FAULT REVIEW is a LOCHW on compressor #1, and the fault is in the RECORD mode.

NOTE: Since the FAULT (X) TYPE came back as a RECORD condition, it is not necessary to look at the FAULTS C(X) value to determine if the fault is in a RESET or CURRENT condition.

FAULT 5 TYPE	= 130
FAULT 5 COMP #	= 0

In this example, since FAULTS 5 COMP # equals 0, there would be no associated FAULTS C(X) number. Therefore, these numbers represent that Fault No. 5 is a SYSTEM FAULT (because F5COMP = 0). This SYSTEM FAULT would then be defined as an EX3 FAULT in the RESETable mode.

FAULT 10 TYPE	= 1
FAULT 10 COMP#	= 0

Again, the FAULT (X) COMP # equals 0, therefore the numbers represent that Fault No. 10 is a SYSTEM FAULT, which is an EX1 FAULT in the RECORD mode.

Table 3

Multistack Standard BACnet Points List					
	OBJECT TYPE & ENUMERATION	NOTES	ACTION	OBJECT INSTANCE	REFERENCE NAME
# OF COMPRESSORS	AV-2		R	1	**num_of_compressors_1**
CAPACITY	AV-2		R	2	**capacity_1**
DEMAND	AV-2		R	3	**demand_1**
CURRENT FAULTS	AV-2		R	4	**current_faults_1**
ENT CHW SYS TEMP	AV-2		R	5	**echw_sys_temp_1**
LEV CHW SYS TEMP	AV-2		R	6	**lchw_sys_temp_1**
ENT CW SYS TEMP	AV-2		R	7	**ecw_sys_temp_1**
LEV CW SYS TEMP	AV-2		R	8	**lcw_sys_temp_1**
LEAD COMPRESSOR	AV-2		R	9	**lead_comp_read_1**
LOAD LIMIT	AV-2		R	10	**load_limit_read_1**
UPPER SET POINT	AV-2		R	11	**upsetpt_read_1**
LOWER SET POINT	AV-2		R	12	**lowsetpt_read_1**
VSP	AV-2		R	13	**vsp_read_1**
TDIFF	AV-2		R	14	**tdiff_read_1**
FAIL INDICATOR	AV-2		R	15	**fail_indic_read_1**
FLUSH TIME	AV-2		R	16	**flush_time_read_1**
FLUSH DURATION	AV-2		R	17	**flush_duration_read_1**
MONTH	AV-2		R	18	**month_1**
DAY	AV-2		R	19	**day_1**
YEAR	AV-2		R	20	**year_1**
HOUR (TIME)	AV-2		R	21	**hour_1**
MINUTE (TIME)	AV-2		R	22	**minute_1**
FAULTS C1	AV-2	See Table on Pg 7	R	23	**faults_c1_1**
FAULTS C2	AV-2	See Table on Pg 7	R	24	**faults_c2_1**
FAULTS C3	AV-2	See Table on Pg 7	R	25	**faults_c3_1**
FAULTS C4	AV-2	See Table on Pg 7	R	26	**faults_c4_1**
FAULTS C5	AV-2	See Table on Pg 7	R	27	**faults_c5_1**
FAULTS C6	AV-2	See Table on Pg 7	R	28	**faults_c6_1**
FAULTS C7	AV-2	See Table on Pg 7	R	29	**faults_c7_1**
FAULTS C8	AV-2	See Table on Pg 7	R	30	**faults_c8_1**
FAULTS C9	AV-2	See Table on Pg 7	R	31	**faults_c9_1**
FAULTS C10	AV-2	See Table on Pg 7	R	32	**faults_c10_1**
FAULTS C11	AV-2	See Table on Pg 7	R	33	**faults_c11_1**
FAULTS C12	AV-2	See Table on Pg 7	R	34	**faults_c12_1**
FAULTS C13	AV-2	See Table on Pg 7	R	35	**faults_c13_1**
FAULTS C14	AV-2	See Table on Pg 7	R	36	**faults_c14_1**
FAULTS C15	AV-2	See Table on Pg 7	R	37	**faults_c15_1**
FAULTS C16	AV-2	See Table on Pg 7	R	38	**faults_c16_1**
FAULTS C17	AV-2	See Table on Pg 7	R	39	**faults_c17_1**
FAULTS C18	AV-2	See Table on Pg 7	R	40	**faults_c18_1**

Multistack Standard BACnet Points List

	OBJECT TYPE & ENUMERATION	NOTES	ACTION	OBJECT INSTANCE	REFERENCE NAME
FAULTS C19	AV-2	See Table on Pg 7	R	41	**faults_c19_1**
FAULTS C20	AV-2	See Table on Pg 7	R	42	**faults_c20_1**
FAULTS C21	AV-2	See Table on Pg 7	R	43	**faults_c21_1**
FAULTS C22	AV-2	See Table on Pg 7	R	44	**faults_c22_1**
FAULTS C23	AV-2	See Table on Pg 7	R	45	**faults_c23_1**
FAULTS C24	AV-2	See Table on Pg 7	R	46	**faults_c24_1**
C1 SUCT. TEMP	AV-2		R	47	**c1_suct_temp_1**
C1 LCHW TEMP	AV-2		R	48	**c1_lchw_temp_1**
C2 SUCT. TEMP	AV-2		R	49	**c2_suct_temp_1**
C2 LCHW TEMP	AV-2		R	50	**c2_lchw_temp_1**
C3 SUCT. TEMP	AV-2		R	51	**c3_suct_temp_1**
C3 LCHW TEMP	AV-2		R	52	**c3_lchw_temp_1**
C4 SUCT. TEMP	AV-2		R	53	**c4_suct_temp_1**
C4 LCHW TEMP	AV-2		R	54	**c4_lchw_temp_1**
C5 SUCT. TEMP	AV-2		R	55	**c5_suct_temp_1**
C5 LCHW TEMP	AV-2		R	56	**c5_lchw_temp_1**
C6 SUCT. TEMP	AV-2		R	57	**c6_suct_temp_1**
C6 LCHW TEMP	AV-2		R	58	**c6_lchw_temp_1**
C7 SUCT. TEMP	AV-2		R	59	**c7_suct_temp_1**
C7 LCHW TEMP	AV-2		R	60	**c7_lchw_temp_1**
C8 SUCT. TEMP	AV-2		R	61	**c8_suct_temp_1**
C8 LCHW TEMP	AV-2		R	62	**c8_lchw_temp_1**
C9 SUCT. TEMP	AV-2		R	63	**c9_suct_temp_1**
C9 LCHW TEMP	AV-2		R	64	**c9_lchw_temp_1**
C10 SUCT. TEMP	AV-2		R	65	**c10_suct_temp_1**
C10 LCHW TEMP	AV-2		R	66	**c10_lchw_temp_1**
C11 SUCT. TEMP	AV-2		R	67	**c11_suct_temp_1**
C11 LCHW TEMP	AV-2		R	68	**c11_lchw_temp_1**
C12 SUCT. TEMP	AV-2		R	69	**c12_suct_temp_1**
C12 LCHW TEMP	AV-2		R	70	**c12_lchw_temp_1**
C13 SUCT. TEMP	AV-2		R	71	**c13_suct_temp_1**
C13 LCHW TEMP	AV-2		R	72	**c13_lchw_temp_1**
C14 SUCT. TEMP	AV-2		R	73	**c14_suct_temp_1**
C14 LCHW TEMP	AV-2		R	74	**c14_lchw_temp_1**
C15 SUCT. TEMP	AV-2		R	75	**c15_suct_temp_1**
C15 LCHW TEMP	AV-2		R	76	**c15_lchw_temp_1**
C16 SUCT. TEMP	AV-2		R	77	**c16_suct_temp_1**
C16 LCHW TEMP	AV-2		R	78	**c16_lchw_temp_1**
C17 SUCT. TEMP	AV-2		R	79	**c17_suct_temp_1**
C17 LCHW TEMP	AV-2		R	80	**c17_lchw_temp_1**
C18 SUCT. TEMP	AV-2		R	81	**c18_suct_temp_1**
C18 LCHW TEMP	AV-2		R	82	**c18_lchw_temp_1**

Multistack Standard BACnet Points List

	OBJECT TYPE & ENUMERATION	NOTES	ACTION	OBJECT INSTANCE	REFERENCE NAME
C19 SUCT. TEMP	AV-2		R	83	**c19_suct_temp_1**
C19 LCHW TEMP	AV-2		R	84	**c19_lchw_temp_1**
C20 SUCT. TEMP	AV-2		R	85	**c20_suct_temp_1**
C20 LCHW TEMP	AV-2		R	86	**c20_lchw_temp_1**
C21 SUCT. TEMP	AV-2		R	87	**c21_suct_temp_1**
C21 LCHW TEMP	AV-2		R	88	**c21_lchw_temp_1**
C22 SUCT. TEMP	AV-2		R	89	**c22_suct_temp_1**
C22 LCHW TEMP	AV-2		R	90	**c22_lchw_temp_1**
C23 SUCT. TEMP	AV-2		R	91	**c23_suct_temp_1**
C23 LCHW TEMP	AV-2		R	92	**c23_lchw_temp_1**
C24 SUCT. TEMP	AV-2		R	93	**c24_suct_temp_1**
C24 LCHW TEMP	AV-2		R	94	**c24_lchw_temp_1**
FAULT 1 TYPE	AV-2	See Table on Pg 7	R	95	**fault_1_type_1**
FAULT 2 TYPE	AV-2	See Table on Pg 7	R	96	**fault_2_type_1**
FAULT 3 TYPE	AV-2	See Table on Pg 7	R	97	**fault_3_type_1**
FAULT 4 TYPE	AV-2	See Table on Pg 7	R	98	**fault_4_type_1**
FAULT 5 TYPE	AV-2	See Table on Pg 7	R	99	**fault_5_type_1**
FAULT 6 TYPE	AV-2	See Table on Pg 7	R	100	**fault_6_type_1**
FAULT 7 TYPE	AV-2	See Table on Pg 7	R	101	**fault_7_type_1**
FAULT 8 TYPE	AV-2	See Table on Pg 7	R	102	**fault_8_type_1**
FAULT 9 TYPE	AV-2	See Table on Pg 7	R	103	**fault_9_type_1**
FAULT 10 TYPE	AV-2	See Table on Pg 7	R	104	**fault_10_type_1**
FAULT 11 TYPE	AV-2	See Table on Pg 7	R	105	**fault_11_type_1**
FAULT 12 TYPE	AV-2	See Table on Pg 7	R	106	**fault_12_type_1**
FAULT 13 TYPE	AV-2	See Table on Pg 7	R	107	**fault_13_type_1**
FAULT 14 TYPE	AV-2	See Table on Pg 7	R	108	**fault_14_type_1**
FAULT 15 TYPE	AV-2	See Table on Pg 7	R	109	**fault_15_type_1**
FAULT 16 TYPE	AV-2	See Table on Pg 7	R	110	**fault_16_type_1**
FAULT 17 TYPE	AV-2	See Table on Pg 7	R	111	**fault_17_type_1**
FAULT 18 TYPE	AV-2	See Table on Pg 7	R	112	**fault_18_type_1**
FAULT 19 TYPE	AV-2	See Table on Pg 7	R	113	**fault_19_type_1**
FAULT 20 TYPE	AV-2	See Table on Pg 7	R	114	**fault_20_type_1**
FAULT 1 COMP #	AV-2	System=0 & Comp #=1-24	R	115	**fault_1_comp_1**
FAULT 2 COMP #	AV-2	System=0 & Comp #=1-24	R	116	**fault_2_comp_1**
FAULT 3 COMP #	AV-2	System=0 & Comp #=1-24	R	117	**fault_3_comp_1**
FAULT 4 COMP #	AV-2	System=0 & Comp #=1-24	R	118	**fault_4_comp_1**
FAULT 5 COMP #	AV-2	System=0 & Comp #=1-24	R	119	**fault_5_comp_1**
FAULT 6 COMP #	AV-2	System=0 & Comp #=1-24	R	120	**fault_6_comp_1**
FAULT 7 COMP #	AV-2	System=0 & Comp #=1-24	R	121	**fault_7_comp_1**
FAULT 8 COMP #	AV-2	System=0 & Comp #=1-24	R	122	**fault_8_comp_1**
FAULT 9 COMP #	AV-2	System=0 & Comp #=1-24	R	123	**fault_9_comp_1**

Multistack Standard BACnet Points List

	OBJECT TYPE & ENUMERATION	NOTES	ACTION	OBJECT INSTANCE	REFERENCE NAME
FAULT 10 COMP #	AV-2	System=0 & Comp #=1-24	R	124	**fault_10_comp_1**
FAULT 11 COMP #	AV-2	System=0 & Comp #=1-24	R	125	**fault_11_comp_1**
FAULT 12 COMP #	AV-2	System=0 & Comp #=1-24	R	126	**fault_12_comp_1**
FAULT 13 COMP #	AV-2	System=0 & Comp #=1-24	R	127	**fault_13_comp_1**
FAULT 14 COMP #	AV-2	System=0 & Comp #=1-24	R	128	**fault_14_comp_1**
FAULT 15 COMP #	AV-2	System=0 & Comp #=1-24	R	129	**fault_15_comp_1**
FAULT 16 COMP #	AV-2	System=0 & Comp #=1-24	R	130	**fault_16_comp_1**
FAULT 17 COMP #	AV-2	System=0 & Comp #=1-24	R	131	**fault_17_comp_1**
FAULT 18 COMP #	AV-2	System=0 & Comp #=1-24	R	132	**fault_18_comp_1**
FAULT 19 COMP #	AV-2	System=0 & Comp #=1-24	R	133	**fault_19_comp_1**
FAULT 20 COMP #	AV-2	System=0 & Comp #=1-24	R	134	**fault_20_comp_1**
UPPER SET POINT	AV-2	45-80°F	W	135	**upsetpt_write_1**
LOWER SET POINT	AV-2	35-70°F	W	136	**lowsetpt_write_1**
VSP	AV-2	0-80%	W	137	**vsp_write_1**
LOAD LIMIT	AV-2	0-100%	W	138	**load_limit_write_1**
T-DIFF	AV-2	15-200 seconds	W	139	**tdiff_write_1**
FAIL INDICATOR	AV-2	0-90%	W	140	**fail_indic_write_1**
LEAD COMPRESSOR	AV-2	1-24	W	141	**lead_comp_write_1**
FLUSH TIME	AV-2	0-23 (hour)	W	142	**flush_time_write_1**
FLUSH DURATION	AV-2	0-300 seconds	W	143	**flush_duration_write_1**
HRS @ 0-9%	AV-2		R	144	**lp_0_9_1**
HRS @ 10-19%	AV-2		R	145	**lp_10_19_1**
HRS @ 20-29%	AV-2		R	146	**lp_20_29_1**
HRS @ 30-39%	AV-2		R	147	**lp_30_39_1**
HRS @ 40-49%	AV-2		R	148	**lp_40_49_1**
HRS @ 50-59%	AV-2		R	149	**lp_50_59_1**
HRS @ 60-69%	AV-2		R	150	**lp_60_69_1**
HRS @ 70-79%	AV-2		R	151	**lp_70_79_1**
HRS @ 80-89%	AV-2		R	152	**lp_80_89_1**
HRS @ 90-100%	AV-2		R	153	**lp_90_100_1**
MOST CURRENT FAULT	AV-2	1-20	R	154	**most_crnt_flt_1**
ON/OFF STATUS	BV-5	Chiller ON=1 & Chiller OFF=0	R	1	**on_off_ctrl_read_1**
EX1 FAULT DISPLAY	BV-5	Fault=1 & Normal=0	R	2	**ex1_fault_1**
EX2 REMOTE OFF	BV-5	Stopped=1 & Start=0	R	3	**remote_on_off_1**
EX3 FAULT DISPLAY	BV-5	Fault=1 & Normal=0	R	4	**ex3_fault_1**
EX4 FAULT DISPLAY	BV-5	Fault=1 & Normal=0	R	5	**ex4_fault_1**
LOW CHW FLOW	BV-5	Fault=1 & Normal=0	R	6	**low_chw_flow_1**
LOW CW FLOW	BV-5	Fault=1 & Normal=0	R	7	**low_cw_flow_1**
LO CHW TEMP SYS	BV-5	Fault=1 & Normal=0	R	8	**low_chw_temp_1**
COMP. 1 STATUS	BV-5	ON=1 & OFF=0	R	9	**c1_status_1**

Multistack Standard BACnet Points List

	OBJECT TYPE & ENUMERATION	NOTES	ACTION	OBJECT INSTANCE	REFERENCE NAME
COMP. 2 STATUS	BV-5	ON=1 & OFF=0	R	10	**c2_status_1**
COMP. 3 STATUS	BV-5	ON=1 & OFF=0	R	11	**c3_status_1**
COMP. 4 STATUS	BV-5	ON=1 & OFF=0	R	12	**c4_status_1**
COMP. 5 STATUS	BV-5	ON=1 & OFF=0	R	13	**c5_status_1**
COMP. 6 STATUS	BV-5	ON=1 & OFF=0	R	14	**c6_status_1**
COMP. 7 STATUS	BV-5	ON=1 & OFF=0	R	15	**c7_status_1**
COMP. 8 STATUS	BV-5	ON=1 & OFF=0	R	16	**c8_status_1**
COMP. 9 STATUS	BV-5	ON=1 & OFF=0	R	17	**c9_status_1**
COMP. 10 STATUS	BV-5	ON=1 & OFF=0	R	18	**c10_status_1**
COMP. 11 STATUS	BV-5	ON=1 & OFF=0	R	19	**c11_status_1**
COMP. 12 STATUS	BV-5	ON=1 & OFF=0	R	20	**c12_status_1**
COMP. 13 STATUS	BV-5	ON=1 & OFF=0	R	21	**c13_status_1**
COMP. 14 STATUS	BV-5	ON=1 & OFF=0	R	22	**c14_status_1**
COMP. 15 STATUS	BV-5	ON=1 & OFF=0	R	23	**c15_status_1**
COMP. 16 STATUS	BV-5	ON=1 & OFF=0	R	24	**c16_status_1**
COMP. 17 STATUS	BV-5	ON=1 & OFF=0	R	25	**c17_status_1**
COMP. 18 STATUS	BV-5	ON=1 & OFF=0	R	26	**c18_status_1**
COMP. 19 STATUS	BV-5	ON=1 & OFF=0	R	27	**c19_status_1**
COMP. 20 STATUS	BV-5	ON=1 & OFF=0	R	28	**c20_status_1**
COMP. 21 STATUS	BV-5	ON=1 & OFF=0	R	29	**c21_status_1**
COMP. 22 STATUS	BV-5	ON=1 & OFF=0	R	30	**c22_status_1**
COMP. 23 STATUS	BV-5	ON=1 & OFF=0	R	31	**c23_status_1**
COMP. 24 STATUS	BV-5	ON=1 & OFF=0	R	32	**c24_status_1**
ON/OFF CONTROL	BV-5	Chiller ON=1 & Chiller OFF=0	W	33	**on_off_ctrl_write_1**

NOTES

AV	**R**	**Analog Value (Read Only)**
AV	**W**	**Analog Value (Write Only)**
BV	**R**	**Binary Value (Read Only)**
BV	**W**	**Binary Value (Write Only)**

SHADED AREAS WILL NOT APPLY TO YOUR CHILLER.