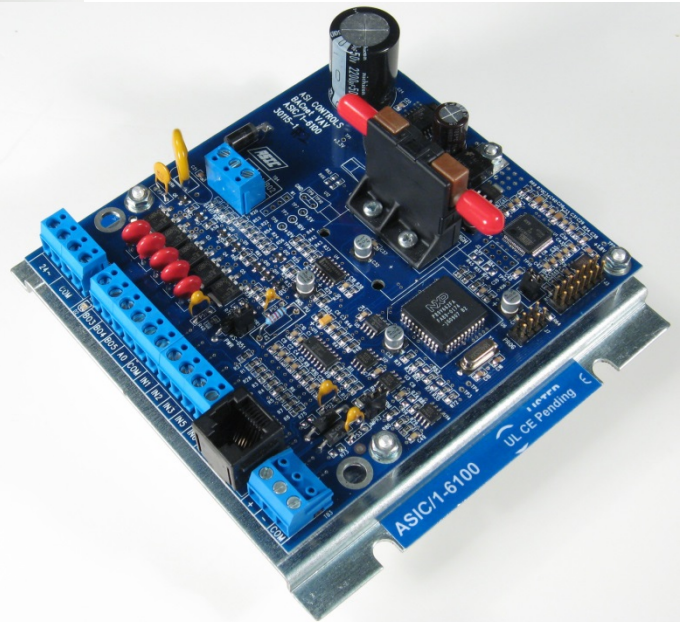


# Engineering Guide

By ASI Controls



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# ASIC/1-6100 Overview

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## ASIC/1-6100 Engineering Guide

The ASIC/1-6100 BACnet VAV Engineering Guide provides detailed technical information necessary to access and exploit the full capabilities of this ASI Controls product. It includes Table Definitions showing the specific location of parameters and setpoints. It provides a listing of all Command messages for time synchronization, and override of control state, input values, and outputs. It also includes a full Glossary describing each parameter in the controller. The Appendix includes Global and Group addresses, and a Firmware History.



The ASIC/1-6100 BACnet VAV controller combines the proven functionality of an ASI Terminal controller with the interoperability afforded by BACnet open protocol.

The ASIC/1-6100 is a pre-programmed digital controller for the control of pressure independent Variable Air Volume (VAV), and Fan-Powered VAV terminal units. The controller includes an integral damper actuator and on-board airflow sensor and maintains the space temperature by varying the air volume. The controller monitors zone temperature through the WS-0X1 Wall Sensor and calculates the correct air volume to be distributed to the space based upon comparing this temperature with the cooling and heating setpoints. This pressure independent controller is mounted on the VAV terminal being controlled. The controller has personalities for cooling only, and cooling with hot water or electric reheat, and constant or intermittent fan.

The ASIC/1-6100 controller communicates as a native BACnet device. ASI Analog Inputs are scaled based on the Input Convert Type and Units field to deliver the BACnet



Present Value and Units properties. Analog Inputs may be overridden by setting the OutOfService property and writing to the Present Value. ASI Normally Open, Normally Closed, and Multiplexed Inputs are reported as BACnet Binary Outputs.

The Analog Output is scaled in percent of full scale, and may be overridden by writing to the BACnet Present Value.

ASI Triac Outputs are reported as BACnet Binary outputs and may be overridden by writing to the BACnet Present Value.

Read/write BACnet Analog Values and Binary Values are based on the configuration of the BACnet Custom Tables. Up to 48 Custom Analog or Binary Values may be configured for monitoring and changing Setpoints, Status, and other parameters in the controller. In addition some Standard Analog and Binary Values are preconfigured.

The ASIC/1-6100 can communicate concurrently on the BACnet MSTP bus and through the Wall Sensor with ASI protocol.

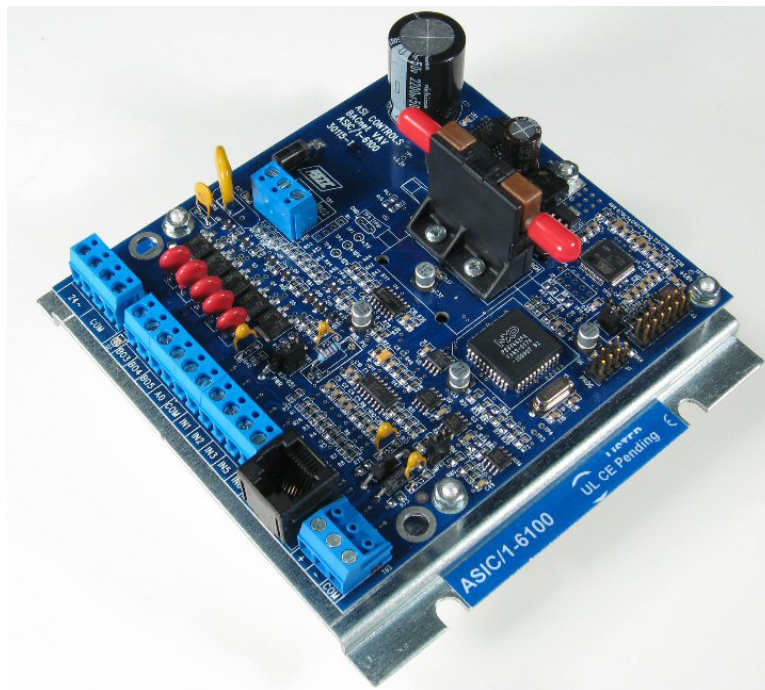
The ASIC/1-6100 on the BACnet network can be reached from ASI Visual Expert by selecting a BACnet connection. ASI Expert can request Who-Is service, and builds a list of recognized ASI/BACnet devices. Double clicking on the device brings seamless tunneling of ASI messages over BACnet.

To set the controller into operation the operator needs only to enter a unique device address, select the correct personality for the application and verify or modify duct area and airflow K-factors.

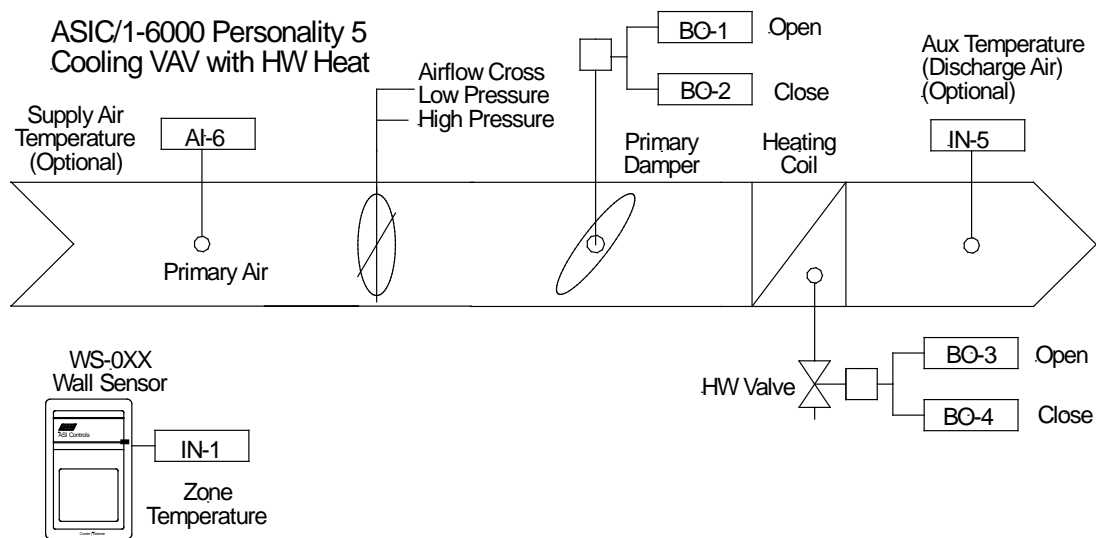
The pre-programmed controller allows newly installed zones to be started up quickly and efficiently. Pre-tuned PI algorithms mean that controllers can accurately maintain space temperature.

The controllers include after-hours override, user temperature setpoint adjustment, minimum and maximum airflow setpoints and lighting control features. Afterhours usage is automatically stored at each unit for retrieval by the building operator. Time-based features such as scheduled changes in setpoints and lighting control may be used when the controller is connected in a network that can synchronize the ASIC/1 internal software clock.

The ASIC/1-6100-MB comes mounted on a metal base with airflow. The ASIC/1-6100-MB-PD has no airflow sensor.



# VAV Personalities



The ASIC/1-6100 is based on the ASIC/1-6000 and is preprogrammed with different personalities for single duct cooling VAV terminals. The Zone Temperature is compared with the Active Heating and Cooling Temperature Setpoints.

If Cooling is required, a PI calculation is used to determine the Cooling Requirement, and the Primary Airflow Setpoint is calculated between Cooling Minimum and Cooling Maximum Airflow. The Primary Air Damper is then modulated to meet the Primary Airflow Setpoint giving Pressure Independent operation.

In the Deadband Control Mode the Primary Airflow is set to minimum.

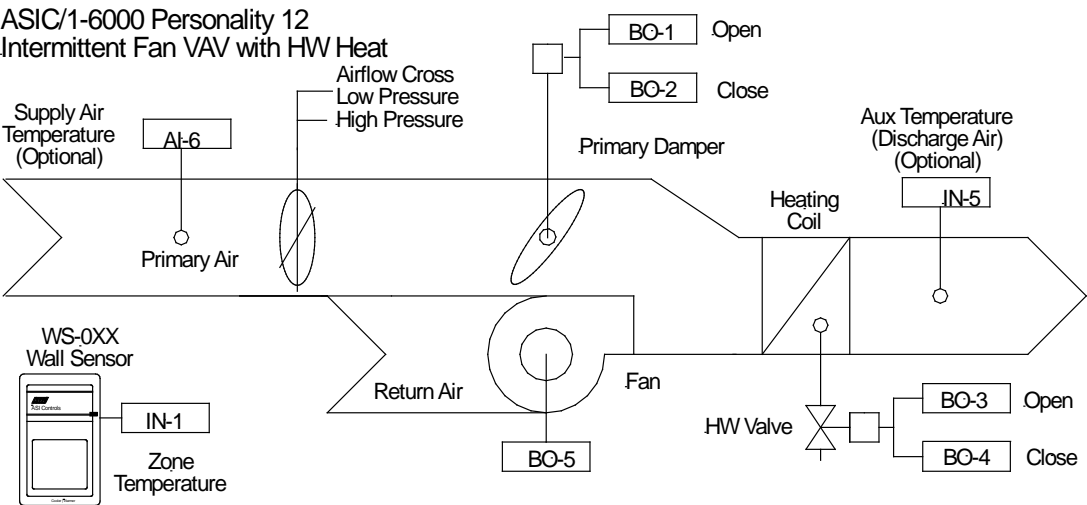
If Heating is required and available the Primary Airflow is set to the Heating Minimum Airflow Setpoint and a Heating Requirement is calculated. Depending on the type of heat available, the Hot Water Valve is modulated open or closed based on drive time; one two or three stages of electric heat are duty cycled, or the Thermic Valve is pulsed on and off.

The operation of the singled duct VAV terminal is determined by the Personality selected. Please see the Application Bulletin 70, Single Duct VAV for further details.

	No Reheat	1 Stage Electric	2 Stage Electric	3 Stage Electric	HW Valve Open/Close	Thermic Valve
VAV	1	2	3	4	5	18



# Intermittent Fan Personalities



The ASIC/1-6100 is preprogrammed with different personalities for fan-powered parallel VAV system with intermittent fan.

The Zone Temperature is compared with the Active Heating and Cooling Temperature Setpoints.

If Cooling is required, a PI calculation is used to determine the Cooling Requirement, and the Primary Airflow Setpoint is calculated between Cooling Minimum and Cooling Maximum Airflow. The Primary Air Damper is then modulated to meet the Primary Airflow Setpoint giving Pressure Independent operation.

If the Primary Airflow falls below the Fan Energize Airflow Setpoint then the Fan is turned On.

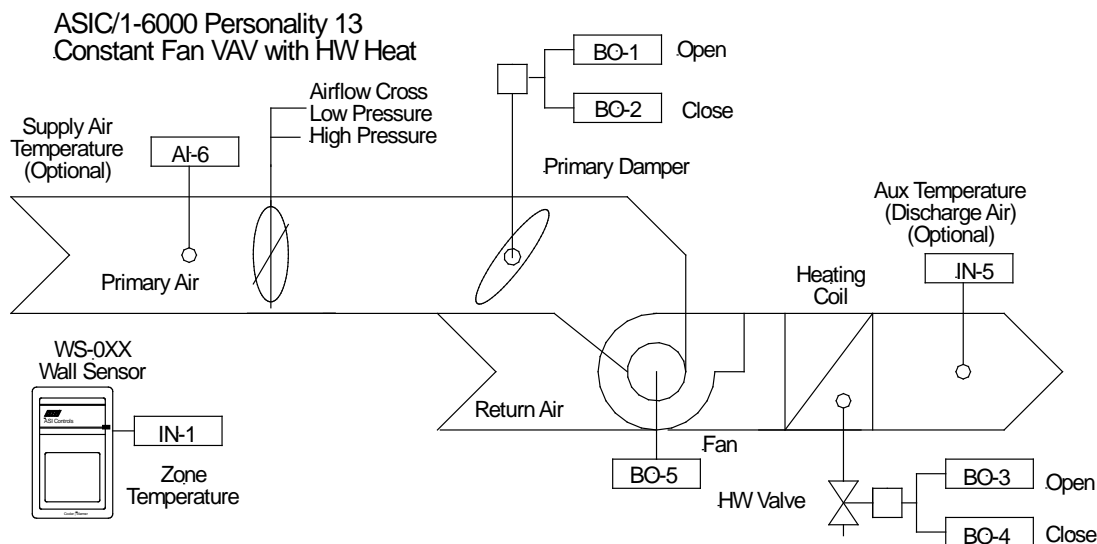
In the Deadband Control Mode the Primary Airflow is set to minimum.

If Heating is required and available the Primary Airflow is set to the Heating Minimum Airflow Setpoint and a Heating Requirement is calculated. Depending on the type of heat available, the Hot Water Valve is modulated open or closed based on drive time; one two or three stages of electric heat are duty cycled, or the Thermic Valve is pulsed on and off.

The operation of fan-powered parallel VAV terminal is determined by the Personality selected. Please see the Application Bulletin 71, Intermittent Fan VAV for further details.

	No Reheat	1 Stage Electric	2 Stage Electric	3 Stage Electric	HW Valve Open/Close	Thermic Valve
Intermittent Fan	16	6	7	NA	12	19

# Constant Fan Personalities



The ASIC/1-6100 is preprogrammed with different personalities for fan-powered series VAV terminals with constant fan.

The Zone Temperature is compared with the Active Heating and Cooling Temperature Setpoints.

If Cooling is required, a PI calculation is used to determine the Cooling Requirement, and the Primary Airflow Setpoint is calculated between Cooling Minimum and Cooling Maximum Airflow. The Primary Air Damper is then modulated to meet the Primary Airflow Setpoint giving Pressure Independent operation.

In the Deadband Control Mode the Primary Airflow is set to minimum.

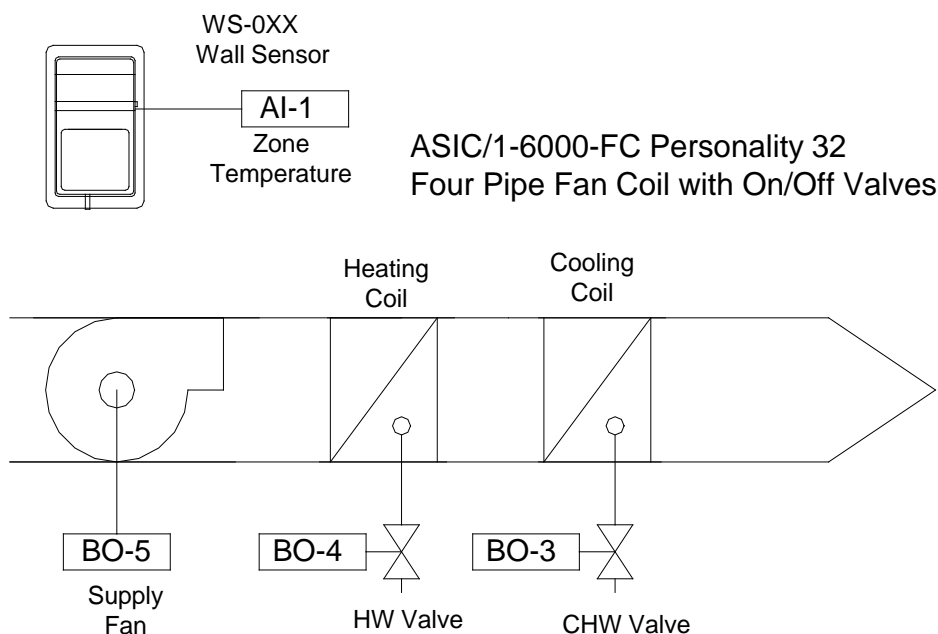
If Heating is required and available the Primary Airflow is set to the Heating Minimum Airflow Setpoint and a Heating Requirement is calculated. Depending on the type of heat available, the Hot Water Valve is modulated open or closed based on drive time; one two or three stages of electric heat are duty cycled, or the Thermic Valve is pulsed on and off.

For Series Fan Powered Terminal box control, the constant fan operation is based on the control state, and mode. In Deadband the fan is on or off depending on the sequence selected. The fan is ON whenever the primary air damper is not closed. In the morning warm up state, the fan is on. In night setback or unoccupied states, the fan is off unless the system is in heating mode.

The operation of fan-powered series VAV terminal is determined by the Personality selected. Please see the Application Bulletin 72, Constant Fan VAV for further details.

	No Reheat	1 Stage Electric	2 Stage Electric	3 Stage Electric	HW Valve Open/Close	Thermic Valve
Constant Fan	17	9	10	NA	13	20

# Fan Coil Personalities



Two new personalities, 31, 2-pipe On/Off Fan Coil and 32, 4-pipe On/Off Fan Coil have been implemented for simple fan coil applications such as hotel rooms in firmware 600a1.4.

We also include an optional Door Event feature that works with the Occupancy sensor to determine if the zone is occupied. The Door Switch that closes when the door is closed is wired in series with a 1.82 kohm resistor on Input 6. One or more Occupancy sensor switches that close on occupancy are wired across Input 5.

There is also an optional Window Switch Feature to turn off the fan and valves if the Window is open. One or more Window Switches that close when the window is closed are wired in series with a 3.32 kohm resistor on Input 6.

When the door event feature determines that the zone is occupied, the lights are turned on. They are turned off when the zone is not occupied.

The controller ASIC/1-6100-FC is mounted on a metal base with no Airflow Sensor. This product is not currently UL Listed.

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## About this Document

This manual was produced using *Doc-To-Help*®, by WexTech Systems, Inc. This manual, ASIC/1-6100 Engineering Guide, DOC-1688, and Windows™ help system was last revised on 2015-01-14. ASI Controls is always working to improve our products. Should you have any questions, or suggestions that would help our products better meet your needs, or that would help us serve you better, please call, write, or e-mail to:

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# ASIC/1-6100 Tables

## Table Messages

The data in the ASIC/1 product family is organized into standard tables. Each table entry represents one byte of data. ASI Expert and the ASI DDE and ASI LinkOPC servers use this fact to identify the data to be displayed.

**Table 1, Non-Volatile General Parameters**

Entry	Description	
1	Device Address, hi byte	
2	Device Address, lo byte	
3	Baud Rate (New155A..)	[Default, 96]
4	Spare	
5	Demand Reset Range (New 155A..)	[Default, 6]
6	Demand Group (New 155A..)	[Default, 0]
7	Demand Shed Level (New 155A..)	[Default, 6]
8	Demand Rotate Level (New 155A..)	[Default, 6]
9	Group Address	[Default, 0]
10	Reserved - Not Used	
11	Reserved - Not Used	
12	Reserved - Not Used	
13	Reserved - Not Used	
14	Not Used	[Default 10] FW175A..
15	Personality	[Default, 1]
16...47	Description, bytes 1..32	[Default, 'ASIC 155A .....']

**Table 2, Non-Volatile Setpoints**

Note: All Airflow setpoints and values are in raw units of 25 fpm at K-factor = 2338.  
The value in CFM is given by  
$$\text{CFM (raw)} \times (25 \text{ ft/min}) \times (\text{Kf}/2338) \times (\text{Duct\_Area} \times 0.005 \text{ ft}^2)$$

Note: FW150B, FW600A if Half Degree Enable is "yes" then Temperature Setpoints are in 0.5 deg increments. If Zone Temperature is in deg C, then Temperature Setpoints are in Celsius.

Entry	Description	
1	Cooling Occupied Temperature Setpoint	[Default, 74]
2	Heating Occupied Temperature Setpoint	[Default, 72]
3	Cooling Airflow Occupied Min Setpoint	[Default, 0]FW155A...600A [Default, 20] FW175A..
	Damper CLG Min Position	FW600A



4	Cooling Airflow Occupied Max Setpoint	[Default, 80]
	Damper CLG Max Position	FW600A
5	Heating Airflow Occupied Min Setpoint	[Default, 0]FW155A...600A
	Damper HTG Min Position	FW600A
6	Heating Airflow Occupied Max Setpoint	[Default, 80]
	Damper HTG MaxPosition	FW600A
7	Fan Energize Airflow Setpoint	[Default, 160]
8	Throttle Range (0.1 deg F) (New 155A..)	[Default, 4.0 deg F]
9	Integral Time (0.5 min increments) (New 155A..)	[Default, 5 = 2.5 min]
10	Cooling Unoccupied Temp Setpoint	[Default, 85 F]
11	Heating Unoccupied Temp Setpoint	[Default, 65 F]
12	Cooling Night Setback Temp Setpoint	[Default, 85 F]
13	Heating Night Setback Temp Setpoint	[Default, 65 F]
14	Zone Temperature Alarm Range	[Default, 4 F]
15	Primary Airflow Alarm Range	[Default, 160]
16	Secondary Airflow Alarm Range –Not Used	[Default, 160]
17	Changeover Setpoint	[Default, 0 F]
18	Zone Sensor Bias (0.1 deg F)	[Default, 0.0 deg]
19	–Not Used - Blend Total Occupied Airflow Setpoint	[Default, 0] FW155A..
20	–Not Used - Blend Total Unoccupied Airflow Setpoint	[Default, 0]
21	–Not Used - Blend Ratio Numerator	[Default, 1]
22	–Not Used - Blend Ratio Denominator	[Default, 1]
23	Cooling Airflow Unocc Minimum Setpoint	[Default, 0]FW155A.. [Default, 20] FW175A..
24	Cooling Airflow Unocc Maximum Setpoint	[Default, 80]
25	Heating Airflow Unocc Minimum Setpoint	[Default, 0] FW155A.. [Default, 20] FW175A..
26	Heating Airflow Unocc Maximum Setpoint	[Default, 80]
27	Cooling Airflow NSB Minimum Setpoint	[Default, 0] FW155A.. [Default, 20] FW175A..
28	Cooling Airflow NSB Maximum Setpoint	[Default, 80]
29	Heating Airflow NSB Minimum Setpoint	[Default, 0]FW155A.. [Default, 20] FW175A..
30	Heating Airflow NSB Maximum Setpoint	[Default, 80]
31	Demand Reset Range (New 155A..)	[Default, 0]
32	Upper Limit (CLG)Temperature Setpoint	[Default 85] FW155B
33	Lower Limit (HTG)Temperature Setpoint	[Default 65] FW155B
34	Upper Limit HTG Temp Setpoint	[Default 85] FW600A,655A1.3
35	Lower Limit CLG Temp Setpoint	[Default 65] FW600A,655A1.3
36	Spare FW600A	
37	SpareFW600A	

**Table 3, Non-Volatile Control Parameter**

Entry	Description	
01	Baud Rate (FW150F..)	[Default, 9600] 96 = 9600 baud, 192 = 19,200, 128 = 38,400,else 9600 baud
02	Primary Airflow Smooth Filter	[Default, 6]
03	Not Used- Secondary Airflow Smooth Filter	[Default, 6]
04	Output Override Power-up State	[Default, 0] (New FW155A)
05	Output Override Power-up On Status	[Default, 0] (New FW155A)
06	Occupancy Delay (4s)	[Default ] (600a1.4)
07	Door Event Time (4s)	[Default ] (600a1.4)
08	Electric Heat Minimum AF SP (eElectricMinAF)	[Default 10] (155A2.3)
09	Not Used - Outside Airflow Hysteresis (eOATHysteresis)	[Default 5] (155A2.3)
10	Electric Heat Base Time	[Default, 240]
11	Afterhours Time Allowed (in minutes)	[Default, 60]

12	Airflow Hysteresis	[Default, 1]
13	User Adjust Setpoint (in deg F)	[Default, 3]
14	Not Used - Outside Airflow Setpoint	(FW155A2.0)
15	Occupancy Sensor Threshold (FW155A,1.3)(600a1.3)	[Default,25]
16	Primary Airflow Calibrate Low Byte	
17	Primary Airflow Calibrate High Byte	
18	Not Used - Secondary Airflow Calibrate Low Byte	
19	Not Used - Secondary Airflow Calibrate High Byte	
20	HW Valve Base Time (in seconds)	[Default, 120 s]
21	AO Maximum (eAOMaxOutput) FW600A	[Default, 254]
22	AO Minimum Output LOW(eAOMinOutput) FW600A	[Default, 0]
23	AO Assignment (eAOAssignment) FW600A	[Default, 2]
	0 – None	
	1 – Cooling Requirement	
	2 – Heating Requirement	
	3 - Not Used	
	4 - Changeover Heating/Cooling	
	5 – ECM Fans Speed	
	6..15 - None	
24	Damper Drive Time (s) (FW600A)	
25	ECM Fan Speed Setpoint (FW600A)	

Note: When Output Masks are changed it requires a power reset before the new value becomes effective.

26	Primary Damper Open Mask	[Default, 01 hex]
27	Primary Damper Closed Mask	[Default, 02 hex]
28	Not Used - Secondary Damper Open Mask	[Default, 00 hex]
29	Not Used - Secondary Damper Closed Mask	[Default, 00 hex]
30	Fan On/Off Mask	[Default, 10 hex] FW600A.. [Default, 20 hex] FW155A..
31	Electric Heat 1 On/Off Mask	[Default, 04 hex] FW155A..
32	Electric Heat 2 On/Off Mask	[Default, 08 hex] FW155A..
33	Electric Heat 3 On/Off Mask	[Default, 10 hex] FW155A..
34	Thermic HW valve On/Off Mask	[Default, 04 hex] FW155A..
35	Lights On/Off Mask	[Default. None] 600A [Default, 80 hex] FW155A
36	HW Valve Open Mask	[Default, 04 hex]
37	HW Valve Closed Mask	[Default, 08 hex]
38	Aux Cooling Wait (150E..)	[Default, 120 s]
39	Aux Cooling Temp Offset (150E..)	[Default, 2 F]
40	Aux Cooling Output Mask (150E..)	[Default, 00h ]
	FC CHW Valve On/Off Mask (600A1.4)	[Assign 0x04]
41	Aux Cooling Airflow Hysteresis (150E..)	[Default, 5 ]
42	Single Setpoint Deadband(600a1.8)	[Default, 5]
43	Auxiliary Heat Output Mask	[Default, 0 ]
	FC HW Valve On/Off Mask (600A1.4)	[Assign 0x08]
44	Auxiliary 1 Output Mask (New 155A..)	[Default, 0 ]
45	Auxiliary 2 Output Mask (New 155A..)	[Default, 0 ]
46	Auxiliary 3 Output Mask (New 155A..)	[Default, 0 ]
47	VV_DefaultOutputState (600a1.8)	[Default, 0 ]
48	Airflow 1 Integration Time (seconds) (600a1.8)	[Default, 0 ]
49	VV_T3_E49_Spare (600a1.8)	
50	VV_T3_E50_Spare (600a1.8)	
51	VV_T3_E51_Spare (600a1.8)	
52	VV_T3_E52_Spare (600a1.8)	

**Table 4, Non-Volatile Monitored Data**

Entry	Description	
1	Afterhours Date Stamp, month	[Default, 0]
2	Afterhours Date Stamp, day	[Default, 0]
3	Afterhours Date Stamp, hour	[Default, 0]
4	Afterhours Total Time, LO	[Default, 0]
5	Afterhours Total Time, HI	[Default, 0]
6	Afterhours Time Allowed (New 155A..)	[Default, 60 min]

**Table 5, Non-Volatile Function Tables**

Entry	Description	
1	Primary Airflow K-factor (lo)	[Default, 34]
2	Primary Airflow K-factor (hi)	[Default, 9]
3	Not Used - Secondary Airflow K-factor (lo)*	[Default, 34]
4	Not Used - Secondary Airflow K-factor (hi)*	[Default, 9]

Note: All Airflow setpoints and values are in raw units of 25 fpm at K-factor = 2338.  
The value in CFM is give by

$$\text{CFM (raw)} * (25 \text{ ft/min}) * (\text{Kf}/2338) * (\text{Duct\_Area} * 0.005 \text{ ft}^2)$$

Note:  $09 * 256 + 34 = 2338$  decimal

Air flow velocity in ft/min =  $(\text{raw}) * (25 \text{ ft/min}) * (\text{K-factor}/2338)$

Note: Duct area in 0.005 sq ft increment. (70 decimal =  $0.35 \text{ ft}^2$ )

5	Primary Duct Area (lo)	[Default, 70]
6	Primary Duct Area (hi)	[Default, 0]
7	Not Used - Secondary Duct Area (lo)	[Default, 70]
8	Not Used - Secondary Duct Area (hi)	[Default, 0]
9	Not Used - Blend Ratio Numerator	[Default, 1]
10	Not Used - Blend Ratio Denominator	[Default, 1]
HW Valve Output as function of Heating Requirement		
11	HW Valve Table (1) 0% (New 155A..)	[Default, 0]
12	HW Valve Table (2) 25% (New 155A..)	[Default, 64]
13	HW Valve Table (3) 50% (New 155A..)	[Default, 128]
14	HW Valve Table (4) 75% (New 155A..)	[Default, 192]
15	HW Valve Table (5) 100% (New 155A..)	[Default, 254]

**Table 6, Non-Volatile Flags**

Note: Individual flags may be read and set with the 4Bh and 4Ch messages.

Note: When Non-VolatileFlags are changed it requires a power reset before the new value becomes effective.

Entry	Description	
1	Non-Volatile flag #1	[Default, 0]
	1 = Yes, 0 = No	
	bit 0 - State Schedule Disable	
	bit 1 - Lights Schedule Disable	
	bit 2 - Multiple Airflow Min/Max Enable	
	bit 3 - Morning Warm-up Option 2 Enable;	
	0 = Morning Warm-up Option 1;	
	1 = Morning Warm-up Option 2	
	bit 4 - Reserved	
	bit 5 - Reserved	
	bit 6 - Ignore Globals Enable; 0 Accept Globals	

- bit 7 - NSB Option 2 Enable – Intermittent Fan;  
0= NSB Option 1, 1 = NSB Option 2
- 2 Non-Volatile flag #2 [Default, 1]  
1 = Yes, 0 = No  
bit 0 - Afterhours Enable  
bit 1 - Outside Airflow Enable (FW155A2.0)  
bit 2 - Force Emergency 1  
bit 3 - Force Emergency 2  
bit 4 - Dual Heating Enable  
bit 5 - Auxiliary Heating Enable (New 155A..)  
bit 6 - Auxiliary Cooling Enable  
bit 7 – Default State Unoccupied (FW 155A2.2)
- 3 Non-Volatile flag #3 [Default, 0]  
bit 0 – Reverse Lights Enable (efInvertLitesEn) (155A2.0)  
bit 1 – UNO Intermittent Fan Enable (UNO Option 2 Enable)( 155A..)  
bit 2 - User Adjust Switch Enable(New 155A..)  
bit 3 - Shed Fan Enable(New 155A..)  
bit 4 - Occupancy Sensor Enable (New 155A...,600a1.3)  
bit 5 - Occupancy Sense Close (New 155A.., 600a1.3)  
bit 6 - Lights Occupied Enable (New 155A..)  
bit 7 - IFAN Heating Only Enable (New 155A..)
- 4 Non-Volatile flag #4 [Default, 0]  
bit 0 - Local Heat Enable (New 155A..)  
bit 1 - Thermic Valve Reversed (New 155A..)  
bit 2 - Occupancy Afterhours Enable(New 155A..)(600a1.3)  
bit 3 - Not Used - Fan Speed Enable (New FW155A1.7..)  
Door Event Enable (600A1.4)  
bit 4 - Not Used - Fan Speed PWM Enable (155A2.1,B3.1).  
Window Switch Enable (600A1.4)  
bit 5 - WS-051 OCC-UNOC Enable (600A2.1)  
bit 6 – Spare (600A1.4)  
bit 7 -
- 5 Non-Volatile flag #5 (155B only) [Default, 0]  
bit 0 –Single Setpoint Enable (600A1.3,655a2.0)  
bit 1 –  
bit 2 -  
bit 3 -  
bit 4 – Pressure Dependent Enable (600A..)  
bit 5 - Flash Enable (600A..)  
bit 6 – Half Degree Enable (600A,155B,655A..)  
bit 7 – Digital Display Enable (600A,155B,655A..)

## Table 7, Non-Volatile Daily Event Schedules

Each ASIC/1 contains a time of day and event schedule. The day is divided into 96 periods of 15 minutes. The control state changes when there is an exact match to a scheduled event. An event time of zero (00:00) indicates that the schedule is “not used”.

At midnight, the clock rolls over to period 0, of the next day. The controller examines the last event of the new day and assumes that the beginning of the day is the same as the end of the day.

On synchronize the controller looks at the most recent event to determine the scheduled state. If there is no recent event, it looks to the last event of the day assumes that the beginning of the day is the same as the end of the day. The controller does not look to the previous days schedule, when looking for the most recent time of day event.

A time event of midnight (12:00AM or 24:00) is a valid end of day event. (FW155A, ...)

For 8655 655A this rule works for all states (UNOCC, OCC, NSB, MRDY). For 8055 155A and 155B and 6000 600A the MRDY state is ignored. For 8255 FW255A do not use MRDY at end of day.

For older products 8015 (150E...,154E...), 8205, etc., the control state changes only on exact match. To set an event at midnight use period 1, (00:15 hrs) .

The Daily Event Schedule is implemented through Table 7

The defaults for the Saturday, Sunday, and Holiday schedules are:

NSB	= (00:15 hours)	[Default, 1]
Lights Off 1	= (00:15 hours)	[Default, 1]

The defaults for the weekday schedules are:

NSB #1	= (19:00 hours, 7 PM)	[Default, 76 decimal]
Lights Off 1	= (19:00 hours, 7 PM)	[Default, 76 decimal]
Occupied #1	= (07:00 hours, 7 AM)	[Default, 28 decimal]
Lights On 1	= (07:00 hours, 7 AM)	[Default, 28 decimal]
All others default to zero.		[Default, 0]

Entry	Description	Entry	Description
1	Occupied #1 holiday	11	Occupied #1 Monday
2	Occupied #2 holiday	12	Occupied #2 Monday
3	Unoccupied #1 holiday	13	Unoccupied #1 Monday
4	Unoccupied #2 holiday	14	Unoccupied #2 Monday
5	Night setback holiday	15	Night setback Monday
6	Morning Warm-up hol	16	Morning Warm-up Monday
7	Lights ON 1 holiday	17	Lights ON 1 Monday
8	Lights OFF 1 holiday	18	Lights OFF 1 Monday
9	Lights ON 2 holiday	19	Lights ON 2 Monday
10	Lights OFF 2 holiday	20	Lights OFF 2 Monday
21	Occupied #1 Tuesday	31	Occupied #1 Wednesday
22	Occupied #2 Tuesday	32	Occupied #2 Wednesday
23	Unoccupied #1 Tuesday	33	Unoccupied #1 Wednesday
24	Unoccupied #2 Tuesday	34	Unoccupied #2 Wednesday
25	Night setback Tuesday	35	Night setback Wednesday
26	Morning Warm-up Tue	36	Morning Warm-up Wednesday
27	Lights ON 1 Tuesday	37	Lights ON 1 Wednesday
28	Lights OFF 1 Tuesday	38	Lights OFF 1 Wednesday
29	Lights ON 2 Tuesday	39	Lights ON 2 Wednesday
30	Lights OFF 2 Tuesday	40	Lights OFF 2 Wednesday
Entry	Description	Entry	Description
41	Occupied #1 Thursday	51	Occupied #1 Friday
42	Occupied #2 Thursday	52	Occupied #2 Friday
43	Unoccupied #1 Thursday	53	Unoccupied #1 Friday
44	Unoccupied #2 Thursday	54	Unoccupied #2 Friday
45	Night setback Thursday	55	Night setback Friday
46	Morning Warm-up Thur	56	Morning Warm-up Friday
47	Lights ON 1 Thursday	57	Lights ON 1 Friday
48	Lights OFF 1 Thursday	58	Lights OFF 1 Friday
49	Lights ON 2 Thursday	59	Lights ON 2 Friday
50	Lights OFF 2 Thursday	60	Lights OFF 2 Friday
61	Occupied #1 Saturday	71	Occupied #1 Sunday
62	Occupied #2 Saturday	72	Occupied #2 Sunday
63	Unoccupied #1 Saturday	73	Unoccupied #1 Sunday
64	Unoccupied #2 Saturday	74	Unoccupied #2 Sunday
65	Night setback Saturday	75	Night setback Sunday
66	Morning Warm-up Sat	76	Morning Warm-up Sunday
67	Lights ON 1 Saturday	77	Lights ON 1 Sunday
68	Lights OFF 1 Saturday	78	Lights OFF 1 Sunday
69	Lights ON 2 Saturday	79	Lights ON 2 Sunday
70	Lights OFF 2 Saturday	80	Lights OFF 2 Sunday



## Table 8, Non-Volatile Input Configuration

A new table is established for configuring Inputs.

Conversions affect the results displayed in Table 9.

Input Conversions

Entry Description

Engineering Unit Input Conversions (eInputConversions)

1	MSNBL Input 1 Type	[Default: 14h] Zone Temp deg F
	LSNBL Input 1 Convert	
2	MSNBL Input 2 Type	[Default: 00h] raw
	LSNBL Input 2 Convert	
3	MSNBL Input 3 Type	[Default: 32h] User Adjust, 20k pot
	LSNBL Input 3 Convert	
4	MSNBL Input 4 Type	[Default: 22h] Primary AF CFM
	LSNBL Input 4 Convert	
5	MSNBL Input 5 Type	[Default: 10h] 3 k thermistor, deg F
	LSNBL Input 5 Convert	
6	MSNBL Input 6 Type	[Default: 10h] 3 k thermistor, deg F
	LSNBL Input 6 Convert	
7	Reserved	[Default: 03h] Volts
8	Reserved	[Default: 03h] Volts

Alternate Conversion Parameters (eAlternateConversions)

9	Spare	[Default: 00h]
10	Spare	[Default: 00h]
11	Spare	[Default: 00h]

Custom Input Parameters LO Byte, HI Byte(eCustomParameters)

12,13	Custom Span IN-5	[Default: 4095]
14,15	Custom Offset IN-5	[Default: 0]
16,17	Custom Span IN-6	[Default: 4095]
18,19	Custom Offset IN-6	[Default: 0]
20,21	Not Used - Custom Span IN-7	[Default: 4095]
22,23	Not Used - Custom Offset IN-7	[Default: 0]
24,25	Not Used - Custom Span IN-8	[Default: 4095]
26,27	Not Used - Custom Offset IN-8	[Default: 0]

### ***Input Type = 0 - Raw***

Convert Type

- 0 = 12 bit, Raw 0..4095; Fault Limit: High raw 4090, Low raw 3
- 1 = 10 bit, Raw 0..1023; Fault Limit: High raw 1020, Low raw 3
- 2 = 8 bit, Raw 0..255 ; Fault Limit: High 250, Low raw 3
- 3 = Volts, 0 to 5.000; ; Fault Limit: High raw 4090, Low raw 3

### ***Input Type = 1 - Temperature (3 kohm thermistor)***

Convert Type

- 0 = 0.01 deg F (3.32 kohm pull-up)
- 1 = 0.01 deg C (3.32 kohm pull-up)
- 2 = 0.01 deg F (1.82 kohm pull-up)
- 3 = 0.01 deg C (1.82 kohm pull-up)
- 4 = Zone Temperature, 0.01 deg F (3.32 kohm pull-up)
- 5 = Zone Temperature, 0.01 deg C (3.32 kohm pull-up)

### ***Input Type= 2 - AWM3300 Airflow Sensor***

Raw value in units of 25 ft/min.

Convert Type

- 0 = Primary Airflow, FPM (feet/min)
- 1 = Secondary Airflow, FPM (feet/min)
- 2 = Primary Airflow, CFM (cubic feet/min)
- 3 = Secondary Airflow, CFM (cubicfeet/min)
- 4 = Primary Airflow, LPS (liter/sec)

- 5 = Secondary Airflow, LPS (liter/sec)
- 6 = Primary Airflow, CMH (cubic meter/hour)
- 7 = Secondary Airflow, CMH (cubic meter/hour)

### ***Input Type =3 - User Adjust***

Convert Type

- 0 = -100 %, 0, +100% Slide Switch, 510 ohm pullup
- 1 = -100 % to 100% .5 k to 5.5k pot, 5.11 k pull-up.
- 2 = -100 % to 100% 10 k to 30k pot., 10 k pull-up

### ***Input Type = 4 - Zone Pressure Slope/Offset (Tracker)***

Convert Type

- 0 = 0 to 5 Vdc = -0.1 to + 0.1 "wc Modus

### ***Input Type = 5 - Humidity (0..100%)***

Convert Type

- 0 = 0 to 5 Vdc = 0 to 100 % RH

### ***Input Type = 6 - Custom Inputs***

Convert Type

- 0 = 0 to 5 Vdc = CO2 0 to 2400 ppm
- 1 = Custom (inputs 5,6,7,8 only)  
Specific Slope(Span/4095) and Offset needed for designated input.

### ***Input Type= 7 - AWM3200 Airflow Sensor***

Raw value in units of 25 ft/min.

Convert Type

- 0 = Primary Airflow, FPM (feet/min)
- 1 = Secondary Airflow, FPM (feet/min)
- 2 = Primary Airflow, CFM (cubic feet/min)
- 3 = Secondary Airflow, CFM (cubic feet/min)
- 4 = Primary Airflow, LPS (liter/sec)
- 5 = Secondary Airflow, LPS (liter/sec)
- 6 = Primary Airflow, CMH (cubic meter/hour)
- 7 = Secondary Airflow, CMH (cubic meter/hour)

### ***Input Type= 8 - Binary Inputs min.***

Convert Type

- 0 = Binary Normally Open
- 1 = Binary Normally Closed
- 2 = Binary Triple Contact

### ***Input Type = 9 - Temperature (10 kohm thermistor type 2)***

(Input Conversion)

MSNBL Input Type 9, 10k Thermistor Type 2

LSNBL Input Convert

- |  |                    |
|--|--------------------|
| (144) 0 = "10k ThermType2 (3.32k Rp) F"      | "10kType2(3.3k)F"  |
| (145) 1 = "10k ThermType2 (3.32k Rp) C"      | "10kType2(3.3k)C"  |
| (146) 2 = "10k ThermType2 (10k Rp) F"        | "10kType2(10k)F"   |
| (147) 3 = "10k ThermType2 (10k Rp) C"        | "10kType2(10k)C"   |
| (148) 4 = "Zone 10k ThermType2 (3.32k Rp) F" | "Z10kType2(3.3k)F" |
| (149) 5 = "Zone 10k ThermType2 (3.32k Rp) C" | "Z10kType2(3.3k)C" |

Note: 10 k thermistor Type 2 is implemented in 655A1.2

### ***Input Type = 10 - Temperature (10 kohm thermistor type 3)***

MSNBL Input Type 10, 10k Thermistor Type 3

LSNBL Input Convert

- |   |                   |
|---|-------------------|
| (160) 0 = "10k ThermType3 (3.32k Rp) F" | "10kType3(3.3k)F" |
| (161) 1 = "10k ThermType3 (3.32k Rp) C" | "10kType3(3.3k)C" |
| (162) 2 = "10k ThermType3 (10k Rp) F"   | "10kType3(10k)F"  |
| (163) 3 = "10k ThermType3 (10k Rp) C"   | "10kType3(10k)C"  |

(164) 4 = "Zone 10k ThermType3 (3.32k Rp) F"      "Z10kType3(3.3k)F"  
 (165) 5 = "Zone 10k ThermType3 (3.32k Rp) C"      "Z10kType3(3.3k)C"  
 Note: 10 k thermistor Type 3 is implemented in 655A1.2

### ***Input Type = 11 – Sensirion SDP1000-R Airflow Sensor***

Raw value in units of 25 ft/min.

Convert Type

- (176) 0 = Primary Airflow, FPM (feet/min)
- (177) 1 = Secondary Airflow, FPM (feet/min)
- (178) 2 = Primary Airflow, CFM (cubic feet/min)
- (179) 3 = Secondary Airflow, CFM (cubic feet/min)
- (180) 4 = Primary Airflow, LPS (liter/sec)
- (181) 5 = Secondary Airflow, LPS (liter/sec)
- (182) 6 = Primary Airflow, CMH (cubic meter/hour)
- (183) 7 = Secondary Airflow, CMH (cubic meter/hour)

Note: Sensirion SDP1000-R Airflow sensor implemented in 610a0.1

## **Table 9, RAM Input Values**

Word, 16 bit, smoothed values. Note the actual value being read depends on the input configuration that is in Table 8. (New FW155A..) The values displayed depend on the Input Types and Convert Types in Table 14.

Old Doubles , Table 9 Entries 1..16 ( Added FW600A1.1)

LO Byte- Fraction, HI Byte - Integer,  
 Changed in FW155A Rev.1.3..

NOTE: Old Doubles Not Implemented in FW155B 1.0 ... FW600A1.0  
 Displays arbitrary number (rStackEnd)

New Doubles, Table 9 Entries 47 ..62

Integer in 0.01 deg , LO Byte, and HI Byte  
 FW155A Rev.1.1..1.2

### **Old Doubles**

Input Values - New Style, Integer in 0.01 deg , LO Byte, and HI Byte  
 FW155A Rev.1.1..1.2, 600A1.1

- 1,2      Zone Temp (IN-1) 0.01 deg
- 3,4      Slide Switch (IN-2)
- 5,6      Variable User Adjust/Interlock (IN-3)
- 7,8      Primary Airflow (IN-4) - In 25 ft/min
- 9,10     Aux Temperature (IN-5) 0.01 deg
- 11,12   Supply Air Temp 1 (IN-6) ) 0.01 deg
- Zone Pressure
- 13,14   Reserved 1/2 AO1
- 15,16   Reserved Vunreg/10

Raw Input Values (rRawInputData) 0..4095

- 17,18   Raw (IN-1)
- 19,20   Raw (IN-2)
- 21,22   Raw (IN-3)
- 23,24   Raw (IN-4)
- 25,26   Raw (IN-5)
- 27,28   Raw (IN-6)
- 29,30   Raw (IN-7)
- 31,32   Raw (IN-8)

Alternate Converted Values.

- 33,34   Primary Airflow Conversion (rPrimaryAirConvert)

35,36 Secondary Airflow Conversion (rSecondaryAirConvert)  
 37,38 Alternate Airflow Conversion (Spare)  
 Working Heating and Cooling Calculation Values  
 39,40 Zone Temp Previous (rOldZoneTemperature)  
 41,42 Zone Temp New (rNewZoneTemperature)  
 43,44 Primary Calculation 0..25500 (rPrimaryCalculation)  
 45,46 Secondary Calculation 0..25500 (rSecondaryCalculation)

#### New Doubles

Engineering Unit Input Values

Input Values - New Style, Integer in 0.01 deg , LO Byte, and HI Byte  
 Added FW155A Rev.1.3...

47,48 Zone Temp (IN-1)  
 49,50 A1\_AuxTempIN-02-word  
 51,52 A1\_AuxTempIN-03-word/Variable User Adjust/Interlock (IN-3)  
 53,54 Primary Airflow (IN-4) - in ft/min  
 55,56 Secondary Airflow (IN-5) -in ft/min  
 57,58 Aux Temp 1 (IN-6)  
 Zone Pressure (Tracker) FW175A..  
 59,60 Reserved 1/2 AO1  
 61,62 Reserved Vunreg/10

### Table 10, RAM Values

Entry	Description
1	ASIC/1 Time, seconds
2	ASIC/1 Time, minutes (0..59)
3	ASIC/1 Time, hours (0..23)
4	ASIC/1 Time, day (1..7) 1 = Monday
5	Control State (rPollStatus+1) bit 0,1 - 0= unocc; 1=occ; 2=nsb; 3=mwu
6	Control Mode (rPollStatus+1) bit 4,5 - 0=db; 1 = cooling; 2 = heating;
7	Afterhours Time Remaining
8	Zone Sensor Flags (rPollStatus+6) bit 0 - reserved bit 1 - Afterhours Status 1 = Yes, in afterhours bit 2,3 - Slide Switch Status 00h = 0 = slide switch is center 01h = 1 = slide switch is up 10h = 2 = slide switch is down Note: 1 and 2 were reversed in earlier documentation. bit 4 - reserved bit 5 - reserved bit 6 - reserved bit 7 - reserved
9	Alarm Status (rPollStatus+2) bit 0,1 - Alarm 1 - Zone Temperature Alarm bit 0 = 1 HI, zone temperature too hot; bit 1 = 1 LO, zone temperature too cold bit 2,3 - Alarm 2 - Primary Airflow Alarm – Not Used bit 2 = 1 HI, Primary Airflow too high; bit 3 = 1 LO Primary Airflow too low; bit 4,5 - Alarm 3 - Secondary Airflow Alarm bit 4 = 1 HI, Secondary (Exhaust) Airflow too high; bit 5 = 1 LO, Secondary (Exhaust) Airflow too low; bit 6 - Afterhours Status 1 - if pushbutton has been pressed and AfterhoursTime Allowed is non zero.

	bit 7 - Synchronize Required 1 = synchronization required
Entry	Description (continued)
10	Status Flags (rBitFlags+2) bit 0 - reserved bit 1 - Non-VolatileWritten Status 1 = Non-Volatilewas written bit 2 - reserved bit 3 - reserved bit 4 - reserved bit 5 - reserved bit 6 - reserved bit 7 - Holiday Status 1 = Today is a Holiday
11	Emergency Flags (rBitFlags+8) bit 0,1 - Emergency Status 0 = No Emergency 1 1 = Emergency 1 2 = Emergency 2 bit 2 - Synchronized Status 1 = Is synchronized. bit 3 - reserved bit 4 - reserved bit 5 - reserved bit 6 - reserved bit 7 - reserved
12	Changeover Flags (rBitFlags+5) bit 0 - reserved bit 1 - reserved bit 2 - reserved bit 3,4 - Changeover Mode 00b = 0 = Changeover Auto 01b = 1 = Changeover forced ON 10b = 2 - Changeover forced OFF bit 5 - Changeover Status 1 = In changeover bit 6 - Sensor Failure Status 0 = Zone Temperature OK 1 = Zone Temperature Fail bit 7 - Non-VolatileStatus 1 = Non-Volatile corruption
13	Miscellaneous Status Flags (rBitFlags+0) bit 0 - State Overridden (rfSTATE_OVERRIDE) bit 1 - Occupancy Status (rfOccupancy) (600a1.3) bit 2 - reserved bit 3 - reserved bit 4 - reserved bit 5 - reserved bit 6 - reserved bit 7 - reserved
14	Status Flags (rBitFlags+4) bit 0 - reserved bit 1 - reserved bit 2 - Controller Interlock 1 = Interlock Present bit 3 - reserved bit 4 - reserved bit 5 - reserved bit 6 - reserved bit 7 - reserved

- 15 Variable User Adjust Status (rVariableOffset)  
-20 to +20 = -100% to +100%
- 16 Cooling Requirement (rCoolingRequirement)  
0 to 255 = 0 to 100% (New 155A..)

Note: All Airflow setpoints and values are in raw units of 25 fpm  
at K-factor = 2338. The value in CFM is given by  
 $CFM = (raw) * (25 \text{ ft/min}) * (Kf/2338) * (Duct\_Area * 0.005 \text{ ft}^2)$

- 17 Primary Airflow  
Actual Primary airflow value, in 25 ft/min increments.
- 18 Status Flags (rBitFlags+3)  
bit 0 - reserved  
bit 1 - Factory LoopBack OK (610a0.1)  
bit 2 - reserved  
bit 3 - reserved  
bit 4 - reserved  
bit 5 - reserved  
bit 6 - reserved  
bit 7 - reserved
- 18 Not Used - Secondary Airflow  
Actual Secondary airflow value, in 25 ft/min increments.
- 19 Primary Airflow Setpoint , in 25 ft/min increments  
Damper Position Setpoint (s) (600A..)
- 20 Heating Requirement (rHeatingRequirement)  
0 to 255 = 0 to 100% (New 155A..)  
Product of Heating PI algorithm.  
HW Heating - HW Valve Position SP .(see T10,47, FW155A..)  
Not Used - Dual Duct - Heating Airflow Setpoint.(see T10,46, FW155A..)  
Electric Heat - Electric Heat On Time.(see T10,48, FW155A..)
- 21 HW Valve Actual Position (rValvePositionSP)
- 22 Damper Output Status - (rMotorStatus)  
bits 0,1 - Primary Damper Output Status  
00h = 0 = Stop  
01h = 1 = Drive Open  
10h = 2 = Drive Closed  
bits 4,5 - Secondary Damper Output Status  
00h = 0 = Stop  
01h = 1 = Drive Open  
10h = 2 = Drive Closed
- 23 Active Cooling Temperature Setpoint
- 24 Active Heating Temperature Setpoint
- 25 Zone Temperature - Rounded (New 155A..)  
Zone Temperature - Previous (FW150E..)
- 26 Output Status -Actual (Bitwise representation)
- 27 Aux Temperature 1 (IN-6) Truncated \*  
Zone Pressure (IN-6) Truncated
- 28 Aux Temperature 2 (IN-7) Truncated \*
- 29 Aux Temperature 3 (IN-8)Truncated \*

\*Note: These entries are not available in FW150E or 151C.

Note: New RAM Values start here

- 30 Scheduled Status (rTodLights\_State)  
MSNBL State Scheduled Status  
0=UNOCC, 1=OCC, 2=NSB,3=MRDY  
bit 4 Lights Scheduled Off Status  
1=Lights Off, 0=Lights On  
LSNBL Lights Scheduled Status



1=Lights Off, 2=Lights On, 3=Lights Off, 4=Lights On,

#### Input Status

- 31 Input O/R Status  
(bitwise) bit0 = Input 1,..., bit7 = Input 8
- 32 Input Fault Status (rFaultStatus)  
Bit pairs 00 = 0 - no fault  
10 = 2 - LO fault  
11 = 3 - HI Fault  
01 = 1 reserved  
bits0,1 - Input 1 Fault  
bits2,3 - Input 2 Fault  
bits4,5 - Input 3 Fault  
bits6,7 - Input 4 Fault
- 33 Input Fault Status (rFaultStatus+1)  
bits0,1 - Input 5 Fault  
bits2,3 - Input 6 Fault  
bits4,5 - Input 7 Fault  
bits6,7 - Input 8 Fault
- 34 Output Status-Raw  
(bitwise) bit0 = Output 1,..., bit7 = Output 8

#### Tri-state Output Status

For tri-state outputs the status will be a Nibble which will have one of the following values. 0= Stop, 1= Open, 2 = Close , 3 = OR Open, 4 = OR Close, 5 = OR Min, 6 = OR Max, 7 = OR Stop.

- 35 Damper Status  
MSNBL Output Primary Damper Status  
LSNBL Output Secondary Damper Status  
Tracker Exhaust Damper Status
- 36 Valve Status  
MSNBL Output HW Valve Status  
LSNBL Spare

#### Binary Output Status

For binary outputs the status will be a pair of bits which will have one of the following values. 0= Off, 1= On, 2 = OR Off, 3 = OR On .

- 37 Function Status On, Off, OR  
BITS\_0,1 Output Status- Fan  
BITS\_2,3 Output Status- E HTG 1  
BITS\_4,5 Output Status- E HTG 2  
BITS\_6,7 Output Status- E HTG 3
- 38 Function Status On, Off, OR  
BITS\_0,1 Output Status- Thermic  
BITS\_2,3 Output Status- Lights  
BITS\_4,5 Output Status- Aux CLG  
BITS\_6,7 Output Status- Aux HTG
- 39 Function Status On, Off, OR  
BITS\_0,1 Output Status- Aux 1  
Tracker Positive Indicator  
BITS\_2,3 Output Status- Aux 2  
Tracker Neutral Indicator  
BITS\_4,5 Output Status- Aux 3  
Tracker Negative Indicator  
BITS\_6,7 Spare
- 40 Output OR State  
0 = Not Overridden, 1 = Overridden.  
(bitwise) bit0 = Output 1,..., bit7 = Output 8

41	Output OR On Status 0 = Overridden Off, 1 = Overridden On. (bitwise) bit0 = Output 1,..., bit7 = Output 8
Active Airflow Setpoints K1*A1*Vsp CFM	
42	Active CLG AF Min SP
43	Active CLG AF Max SP
44	Active HTG AF Min SP
45	Active HTG AF Max SP
46	Secondary Airflow SP in 25 ft/min increments Dual Duct - Heating Airflow Setpoint.(T10,20, FW150E..)
47	HW Valve Position SP HW Heating - HW Valve Position SP .(T10,20, FW150E..)
48	Electric Heat Timer Electric Heat - Electric Heat On Time.(T10,20, FW150E..)
49	Light Blink Timer
50	Trend Timer
51	Aux Cooling Timer
Active Demand Limit Parameters	
52	Active Demand Level
53	Active Demand Group
54	Mode Override Status (FW155A..)
55	Input Overrides Raw (rRawOverRides) (155A)
56	Input Overrides Double (rDoubleOverRides) (155A)
57	Trend Pointer (rTrendPointer) (FW175) rTrendPointer
58	Spare (600a) (rTest1)
59	Spare (600a) (rCurrentMode)

## Table 11, PROM Data (Read Only)

Entry	Description
1	Product Number (ASCII)
2	Product Number (ASCII)
3	Product Number (ASCII)
4	Product Number (ASCII)
5	Version Number (ASCII)
6	Version number (ASCII)
7	Firmware revision (ASCII)
8	Firmware revision (ASCII)
9	Firmware revision (ASCII)
10	Firmware revision (ASCII)
11..21	FW Date Stamp (655A)
22..27	FW Time Stamp (655A)

## Table 12, Reserved

This Table is no longer supported

## Table 13, Non-Volatile Trend Setup

Trending in the ASIC/1=8X55 has been revised as follows.

With FW155A.. the trend interval is in 15 minute periods. The trend data always starts at midnight. The first trend entry is at 00:00 hours as identified by the Trend Day of Week.

Trending only takes place when the controller is synchronized and when Trend Day of Week is non-zero.

Both trends use the same date stamp and trend pointer.

The trend pointer is the offset from the starting byte based on the time that has elapsed since mid-night on the Trend Date Stamp Day of Week. The trend may extend across multiple days up to 1 week.

Two RAM data trends of 96 values have been assigned. Trend data is read from Non-Volatile memory

When the calculated trend position exceeds 96 values, or the day returns to the current Date, then the trend rolls over and begins again with the current Trend Day of Week.

#### Entry Description

1	Trend User Date, month	[Default,0]
2	Trend User Date, day	[Default, 0]
3	Trend User Date, hour	[Default, 0]
4	Trend Day of Week	[Default, 0]
5	Trend Number of Values (RAM)	[Default, 0]
6	Trend Interval (quarterhours)	[Default,1 = 15 min]
7	Trend 1 Table Number	[Default, 10]
8	Trend 1 Entry Number	[Default, 25,Zone Temperature]
9	Trend 2 Table Number	[Default, 10]
10	Trend 2 Entry Number	[Default, 17,Primary Airflow]

### Table 14, Non-Volatile Trend 1 Data

#### Entry Description

1	Trend 1 Data Value 1
...	
96	Trend 1 Data Value 96

### Table 15, Non-Volatile Trend 2 Data

#### Entry Description

1	Trend 2 Data Value 1
...	
96	Trend 2 Data Value 96

### Table 16, RAM Standard Polling

This standard polling table always returns the following 8 data bytes from the controller.

HI alarm is bit0,2,4,6, LO alarm is bit 1,3,5,7.

#### Entry Description

1	Polling Alarm 1	
	BITS_0,1	Alarm 1 - HI,LO Zone Temp Alarm
	BITS_2,3	Alarm 2 - HI,LO Primary Airflow
	BITS_4,5	Alarm 3 - HI,LO Secondary Airflow (Dual Duct)
	BITS_6,7	Alarm 4 HI- Spare
		Alarm 4 LO- Spare
2	Polling Alarm 2	
	BITS_0,1	Alarm 5 HI,LO
	BITS_2,3	Alarm 6 - future
	BITS_4,5	Alarm 7 - future
	BITS_6,7	Alarm 8 - future
3	Polling Status	
	BITS_0,1	Poll Status - Mode
	BITS_2,3	Poll Status - State
	BITS_4,5	Poll Status - Reserved
	BITS_6	Poll Status - InAfterhr
	BITS_7	Poll Status - HP Request

4	Zone Temp - Rounded
5	Active CLG SP
6	Active HTG SP
7	Output Status
8	Primary Airflow Conversion LO Byte (rPrimaryAirConvert)
9	Primary Airflow Conversion HI Byte
10	Not Used - Secondary Airflow Conversion LO Byte (rSecondaryAirConvert)
11	Not Used - Secondary Airflow Conversion HI Byte (rSecondaryAirConvert)

## Table 17, Non-Volatile Input Raw Fault Limits

These 8 bit values are used to determine if the input raw readings are out of range. Note: 0 to 5 Vdc inputs will show a low fault if the voltage is below 0.06 Vdc or a high fault if the voltage is above 4.70 Vdc.

### Low Input Raw Fault Limits (eLoFault)

1	Input 1 Low Fault Limit	[Default 3]
2	Input 2 Low Fault Limit	[Default 3]
3	Input 3 Low Fault Limit	[Default 3]
4	Input 4 Low Fault Limit	[Default 3]
5	Input 5 Low Fault Limit	[Default 3]
6	Input 6 Low Fault Limit	[Default 3]
7	Input 7 Low Fault Limit	[Default 3]
8	Input 8 Low Fault Limit	[Default 3]

### Hi Input Raw Fault Limits (eHiFault)

9	Input 1 Hi Fault Limit	[Default 240]
10	Input 2 Hi Fault Limit	[Default 240]
11	Input 3 Hi Fault Limit	[Default 240]
12	Input 4 Hi Fault Limit	[Default 240]
13	Input 5 Hi Fault Limit	[Default 240]
14	Input 6 Hi Fault Limit	[Default 240]
15	Input 7 Hi Fault Limit	[Default 240]
16	Input 8 Hi Fault Limit	[Default 240]

## Table 18, XRAM Data

This standard table returns values from XRAM in the 8655. When values are displayed it is polled by Expert. 655A

Entry	Description
1	AO1 Output Value xAOCommand FW600A
2	AO1 Unscaled xAOUnScaledValue FW600A
3	AO Override Status xAOOverrideFlags FW600A bit 0 – AO1 Overridden
4	AO1 Override Value xAOOverrideValue FW600A
5	Test Variable (xDuctTempSingles)
6	Test Variable (xDuctTempSingles+1)
7	Test Variable (xDuctTempSingles+2)
8	Test Variable (xTest1)
9	Test Variable (xTest1+1)
10	Test Variable (xTest1+2)
11	Occupancy Timer (xOccDelayTimer)(600a1.4)
12	Status Byte (xStatusFlags1) bit 0 – Window Switch Status (600A1.4) bit 1 – Door Switch Status (600A1.4) bit 2 – Door Switch Previous (600A1.4)
13	Door Event Timer (600a1.4)
14	Window Timer (xWindowTimer)(600a1.4)
15	Damper Initialize Position (s) (xDamperInitTimer) (600a)
16	Damper Position (s) (xPresentMotorPosition) (600a)

17,18    Airflow1 Error Sum (600a1.8)  
 19        (600a1.8)  
 20        (600a1.8)

## Table 60, Polling Setup

Included for backward compatibility only.

Allows set-up of specific 1-byte data items to be returned when reading Table 61.(FW 150E...,154E...)

Note: Only 4 bytes may be downloaded at a time.

Entry    Description

1	Polling List 1 Table	[Default, 10]
2	Polling List 1 Entry	[Default, 25] Zone Temperature
3	Polling List 2 Table	[Default, 10]
4	Polling List 2 Entry	[Default, 17] Primary Airflow
5	Polling List 3 Table	[Default, 00]
6	Polling List 3 Entry	[Default, 00]
7	Polling List 4 Table	[Default, 00]
8	Polling List 4 Entry	[Default, 00]

## Table 61, Polling Value

Returns the 4; bytes identified in Table 60. (FW150E...,154E...)

Entry    Description

1	Polling List 1 Value
2	Polling List 2 Value
3	Polling List 3 Value
4	Polling List 4 Value

## Table 201, Custom BACnet Mapping AV/BV00-11

Configures Custom BACnet Analog/Binary Values (FW610a0.1.)

Each Analog/Binary Value defined by (Table, Entry, Select, Flags, Object Name)

If the Select is Bit then the it is defined as a Binary Value, and the Analog Value is “unused”.

Entry                      Description

00..19	AV/BV00
20..39	AV/BV01
40..59	AV/BV02
60..79	AV/BV03
80..99	AV/BV04
100..119	AV/BV05
120..139	AV/BV06
140..159	AV/BV07
160..179	AV/BV08
180..199	AV/BV09
200..219	AV/BV10
220..239	AV/BV11

	BACnet Property	ASI Property
240	BACnet MSTP MAC Address	BAC_MACAddress
241	BACnet MSTP.MaxInfoFrames(63)	BAC_MaxInfoFrames 1
242	BACnet MSTP.MaxMaster (64)	BAC_MaxMaster 127
243	BACnet MSTP BaudRate	BAC_BaudRate
244,245	BACnet MSTP Device Instance(75)	BAC_DeviceInstance

## Table 202, Custom BACnet Mapping AV/BV12-23

Configures Custom BACnet Analog/Binary Values (FW610a0.1.)

Each Analog/Binary Value defined by (Table, Entry, Select, Flags, Object Name)

Entry	Description
00..19	AV/BV12
20..39	AV/BV13
40..59	AV/BV14
60..79	AV/BV15
80..99	AV/BV16
100..119	AV/BV17
120..139	AV/BV18
140..159	AV/BV19
160..179	AV/BV20
180..199	AV/BV21
200..219	AV/BV22
220..239	AV/BV23

## Table 203, Custom BACnet Mapping AV/BV24-35

Configures Custom BACnet Analog/Binary Values (FW610a0.1.)

Each Analog/Binary Value defined by (Table, Entry, Select, Flags, Object Name)

Entry	Description
00..19	AV/BV24
20..39	AV/BV25
40..59	AV/BV26
60..79	AV/BV27
80..99	AV/BV28
100..119	AV/BV29
120..139	AV/BV30
140..159	AV/BV31
160..179	AV/BV32
180..199	AV/BV33
200..219	AV/BV34
220..239	AV/BV35

## Table 204, Custom BACnet Mapping AV/BV36-47

Configures Custom BACnet Analog/Binary Values (FW610a0.1.)

Each Analog/Binary Value defined by (Table, Entry, Select, Flags, Object Name)

Entry	Description
00..19	AV/BV36
20..39	AV/BV37
40..59	AV/BV38
60..79	AV/BV39
80..99	AV/BV40
100..119	AV/BV41
120..139	AV/BV42
140..159	AV/BV43
160..179	AV/BV44
180..199	AV/BV45
200..219	AV/BV46
220..239	AV/BV47



# ASIC/1-6100 Commands

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## ASIC/1-6100 State Commands

### 0x10 Set/Reset Operating State

This command forces the controller into an operating state.

(150A...,154D...,155A,251A...,255A..., 600A) This message writes to RAM.

ASI DDE Server supports this message

\_CommandOR = M1 -> MT=10, M1

ASI DDE Server \_StateOR sends MT=10 where

\_StateOR =1 -> MT=10, M1=6, UNO

\_StateOR =2 -> MT=10, M1=5, OCC

\_StateOR =3 -> MT=10, M1=3, NSB

\_StateOR =4 -> MT=10, M1=4, MRDY

\_StateOR =5 -> MT=10, M1=7, Restore

ASI LinkOPC Server uses the A1\_CommandORAction, DT=50, Class = 1, to send the Operating State Command to the controller.

Message body:

M1 = 01 (01h) - Disable ASIC/1 **-DO NOT USE!!**

02 (02h) - Enable ASIC/1 A1\_MagicORAction

A1\_StateORAction

03 (03h) - Set State to Night Setback -

04 (04h) - Set State to Morning Ready

05 (05h) - Set State to Occupied [Default State]

06 (06h) - Set State to Unoccupied

07 (07h) - Restore State to Daily Event Schedule

A1\_ChangeoverAction

08 (08h) - Set Changeover ON -

09 (09h) - Set Changeover OFF

10 (0Ah) - Reset Changeover to Normal

11 (0Bh) - Reserved HP Enable

12 (0Ch) - Reserved HP Disable

A1\_AsIfPushedAction

13 (0Dh) - As If Pushed (New FW155A..)-

    duplicates function of afterhours push-button exactly.

A1\_ClearCompLockout

14 (0Eh) - .)

15 (0Fh) -

A1\_ControlModeAction

16 (10h) - Set Deadband Control Mode (New FW155A..)

17 (11h) - Set Cooling Control Mode(New FW155A..)



18 (12h) - Set Heating Control Mode(New FW155A..)

19 (13h) - Restore Control Mode(New FW1355A..)

Response: ACK

## 0x12 Set/Reset Emergency State

This commands sets the emergency state of the ASIC/1. (150A...,154D...,155A..., FW251A ...255A...,600A) Note: This command writes to NON-VOLATILE memory

ASI DDE Server supports this message

\_EmergencyOR=M1 ->MT=12h, M1

ASI LinkOPC Server uses A1\_EmergencyORAction to send this command

Message body:

- M1 = 1 - Assume Emergency 1 state
- 2 - Assume Emergency 2 state
- 3 - Cancel ALL Emergency states

Response: ACK

## 0x16 Set/Reset Demand Status

Implement Demand Limit for spread of setpoints .

This message is used to set the demand level and demand group. Each controller will take predetermined action based on demand level and rotating demand group statuses. The broadcast demand group is compared with the controller demand group assignment. If the current rotating demand group is identical to the controller rotating demand group, then the output will typically be shed. The demand management controller is responsible for changing the rotating demand group periodically. ( FW155A..., FW255A...,600A)

Note: This message writes to RAM.

ASI DDE Server supports this message

\_DemandOR=Value ->MT=16h, M1(LOBYTE),M2(HIBYTE)

ASI LinkOPC Server uses A1\_DemandOR to send this command.

Message body:

- M1 = 0 - Clear Demand Level
- 1 - Demand Level = 1
- 2 - Demand Level = 2
- 3 - Demand Level = 3
- 4 - Demand Level = 4
- 5 - Demand Level = 5
- 6 - Demand Level = 6
- M2 = [0, ...,255] Demand Group

Response: ACK

M1 = 16

# ASIC/1-6100 Override Outputs

Note: The BACnet interface will clear any overrides that it does not initiate. To force an output Out of Service so that local ASI overrides can be used it is necessary to set the Power-up Override Status and then reset the controller.

## 0x20 Physical Output Override

Disconnects Control Algorithm from Output (150A...,154D....., FW251A ...255A..)

Note: This command writes to RAM, New MT=26h writes to NON-VOLATILE.

ASI DDE Server supports this message

\_OutOROn =M2                      ->MT=20h, M1=1,M2  
\_OutOROff =M2                    ->MT=20h, M1=2,M2  
\_OutORClear =M2                 ->MT=20h, M1=3,M2

ASI LinkOPC Server uses A1OutputOverrideAction to send this command.

Message body:

M1 =    1 - Override output ON  
         2 - Override output OFF  
         3 - Restore output to algorithmic response  
         (leaves outputs in existing state, without regard to previous state)  
M2 = Number of physical output, 1....8

Response: ACK

## 0x21 Override Outputs by Function

ASI DDE Server supports this message

\_FunctionOR=M1                 ->MT=21h, M1

ASI LinkOPC Server uses VV\_FunctionORAction to send this command

Note: Commands ON,OFF, and Restore write to NON-VOLATILE in FW150, Write to RAM in FW155A.and FW255A Commands MIN and MAX write to RAM.

FW600A does not have Secondary Damper.

Note: Functional overrides act immediately. On restore they will be restored to sequence conditions the next time the function is executed. For many functions it is immediate, but for Restore Fan it may take up to a minute. If a function override is applied for an output that is not active for the current sequence, that output will not change when its output is restored. All function overrides clear on reset of power.

Message body:

M1 =    1 (01h) - Force Heat OFF  
         2 (02h) - Force Heat ON  
         3 (03h) - Restore Heat  
         4 (04h) - Force FAN OFF  
         5 (05h) - Force FAN ON  
         6 (06h) - Restore FAN  
         7 (07h) - Force Lights OFF  
         8 (08h) - Force Lights ON  
         9 (09h) - Restore Lights  
         10 (0Ah) - Force Primary Damper CLOSED (FW155A..)  
         11 (0Bh) - Force Primary Damper OPEN (FW155A..)  
         12 (0Ch) - Force Primary Damper MINIMUM (FW155A..)  
         13 (0Dh) - Force Primary Damper MAXIMUM (FW155A..)  
         14 (0Eh) - Restore Primary Damper (FW155A..)

Secondary Damper (Heating or Exhaust)(Not in FW600A)

15 (0Fh) - Force Secondary Damper CLOSED (FW155A..)

16 (10h) - Force Secondary Damper OPEN (FW155A..)  
 17 (11h) - Force Secondary Damper MINIMUM (FW155A..)  
 18 (12h) - Force Secondary Damper MAXIMUM (FW155A..)  
 19 (13h) - Restore Secondary Damper (FW155A..)  
 20 (14h) - Force Aux CLG OFF (New FW155A..)  
 21 (15h) - Force Aux CLG ON (New FW155A..)  
 22 (16h) - Restore Aux CLG  
  
 23(17h) - Force Aux HTG OFF (New FW155A..)  
 24(18h) - Force Aux HTG ON (New FW155A..)  
 25 (19h) - Restore Aux HTG (New FW155A..)  
  
 26 (1Ah) - Force Cooling Damper STOP (New FW155A..)  
 27 (1Bh) - Force Heating Damper STOP (New FW155A..)  
 28 (1Ch) - Force HW Valve STOP (New FW155A..)  
 29 (1Dh) - Reserved  
 30 (1Eh) - Force Aux 1 OFF (New FW155A..)  
 31 (1Fh) - Force Aux 1 ON (New FW155A..)  
 32 (20h) - Restore Aux 1 (New FW155A..)  
 33 (21h) - Force Aux 2 OFF (New FW155A..)  
 34 (22h) - Force Aux 2 ON (New FW155A..)  
 35 (23h) - Restore Aux 2 (New FW155A..)  
 36 (24h) - Force Aux 3 OFF (New FW155A..)  
**37 (25h) - Force Aux 3 ON (New FW155A..)**  
 38 (26h)- Restore Aux 3 (New FW155A..)  
  
 39 (27h)- Force Thermic Valve OFF (New FW155A..)  
 40 (28h) - Force Thermic Valve ON (New FW155A..)  
 41 (29h)- Restore Thermic Valve (New FW155A..)

Response: ACK

## 0x27, Override Analog Output Value

DT= 50, Class = 12, ASIC/1 Analog Output Override

Used in ASIC/1-8655, ASIC/1-6000

TCL: DeviceAction [A1\_AOOverrideAction ] [index=M1] [Value=M2,M3]  
 DeviceAction A1\_AOOverrideAction 2 231

Note: This command writes to RAM. AO overrides are not preserved through reset.

Sets override flag and downloads a new Value.

Message body:

M1 = 01 - OR AO1  
       02 - OR AO2  
 M2 = Override Value (0..255)

Response: ACK

Note: if the Analog Output Assignment is None, then the BACnet interface marks the Analog Output as Out of Service and local ASI overrides can be used.

## 0x28, Clear Analog Output Override

DT= 50, Class = 13, ASIC/1 Analog Output Override

Used in ASIC/1-8655, ASIC/1-6000

TCL: DeviceAction [A1\_AOOverrideClear ] [index=M1] [Value=M2,M3]  
 DeviceAction A1\_AOOverrideClear 2 0

Clears override flag .

Message body:  
M1 = 01 - OR AO1  
02 - OR AO2  
Response: ACK

---

## Group 4: Messages to Handle Inputs

### 0x31 Restore Inputs to Normal Operation

Sets integer and fractional values to 0 first. (150A...,154D...)

ASI DDE Server supports this message

\_InputORClear=M1 ->MT=31h, M1

ASI LinkOPC Server uses A1\_InputOverrideClear to send this command

Message body:

M1 = 00 - Restore all overridden inputs. (150E...,154E...)  
1...8 - Restore input selected (Same as in message type 30)

Response: ACK

### 0x35 Disable Input and Force New 2 byte Value

Message 35h sets the input override flag, and writes a new value in the converted value Table 9, Entries 1..16, in engineering units. . The airflow value is typically in CFM. The Temperature values are typically in units of 0.01 F. (FW155A..., 255A..., 355A)

ASI Data Servers support this message

\_InputORB,M1 = Value ->MT=35, M1, M2=LO(Value),M3=HI(Value)

ASI LinkOPC Server uses A1\_InputOverrideAction to send this command

The input override is restored with message 31h.

Note: This message writes to RAM.

Message body:

M1 = 01 - Force input 1 Table 9, Entry 47,48 Zone Temperature  
02 - Force input 2 Table 9, Entry 49,50 User Adjust  
03 - Force input 3 Table 9, Entry 51,52 Variable User Adjust  
04 - Force input 4 Table 9, Entry 53,54 Airflow  
05 - Force input 5 Table 9, Entry 55,55 Aux Temperature  
06 - Force input 6 Table 9, Entry 57,58 Supply Air Temp  
07 - Force input 7 Table 9, Entry 59,60 Not Used  
08 - Force input 8 Table 9, Entry 61,62 Not Used  
  
17 (11h) - Force input 1 raw Table 9, Entry 17,18  
18 (12h) - Force input 2 raw Table 9, Entry 19,20  
19 (13h) - Force input 3 raw Table 9, Entry 21,22  
20 (14h) - Force input 4 raw Table 9, Entry 23,24  
21 (15h) - Force input 5 raw Table 9, Entry 25,25  
22 (16h) - Force input 6 raw Table 9, Entry 27,28  
23 (17h) - Force input 7 raw Table 9, Entry 29,30  
24 (18h) - Force input 8 raw Table 9, Entry 31,32

M2 = New value (LO) 0...255

M3 = New Value (HI)

Response: ACK

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# Time Messages

## 0x38 Synchronize

This command downloads information using time in "Host" computer. Upon reset the controller loses time information and is "unsynchronized." Upon synchronization the controller examines the Time of Day Schedule to determine the proper state. (150A...,154D...,155A..., FW251A ...255A..)

Note: This command writes to RAM.

ASI DDE Server supports this message

\_TimeOR=M1 ->MT=38h, M1, etc. from PC

ASI LinkOPC Server uses A1\_ASIC1Synchronize to send this command

Beginning with FW 150D.. and 154D.., if the controller is already synchronized before receiving a new synchronize command, the controller examines the time of day schedule for an EXACT match. Only if there is an EXACT match will the controller revert to the time of day schedule. Otherwise the controller maintain its current state including any state overrides that are in effect.

Message body:

M1 = Day, 01...07 where 1 = Monday (81...87 hex represent holidays)

M2 = Hours, 0...23 decimal

M3 = Minutes, 0...59 decimal

M4 = Seconds, 0...59 decimal

Response: ACK

## 0x48 Reset ASIC/1 as if From Power-up

The controller software clock will lose synchronization during a reset of power. The Reset message causes the controller to respond as if power had been turned off and turned on. The Reset message never gets a response message. A command to reset the ASIC/1 causes a 500ms delay in responding to a new command. (150A...,154D.., 155A.., FW251A ...255A...,355A..)

ASI DDE Server supports this message

\_Reset=M1 ->MT=48h, . from PC

ASI LinkOPC Server uses A1\_Reset to send this command

Message body: None

Response: None

# ASIC/1-6100 Glossary

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## Introduction

The glossary contains, in alphabetical order, brief definitions of all of the control parameters and setpoints used by the ASIC/1-6100 and ASIC/1-6000 controllers and earlier controllers. The range of acceptable values, default value loaded upon a controller reset, and whether the parameter is user-changeable or not, are included.

Parameters are referred to in the glossary by their full proper names. On the Setup software and ASI Setup screens, parameters may be referred to by abbreviated or different names for lack of space or other reasons. Where differences exist between the proper names and the current screen parameter name, the screen parameter name is included as ("Parameter").

## Parameters and Setpoints

The table number, T, and entry number, E, for a given is indicated at the end of the description as (T,E), (T,E,WORD), (T,E,bit0), etc.

### ***Active Cooling Airflow Maximum Setpoint***

Present Maximum Cooling Airflow Setpoint for Control. (FW155A,T10,43)

### ***Active Cooling Airflow Minimum Setpoint***

Present Minimum Cooling Airflow Setpoint for Control.(FW155A,T10,42)

### ***Active Cooling Temperature Setpoint***

The current cooling temperature setpoint saved in RAM in deg F. (FW150:T10,23)

### ***Active Demand Group***

Present Demand Group as received on the communication line.(FW155A,T10,53)

### ***Active Demand Level***

Present Demand Level as received on the communication line. (FW155A,T10,52)

### ***Active Heating Airflow Maximum Setpoint***

Present Maximum Heating Airflow Setpoint for Control.(FW155A,T10,45)

### ***Active Heating Airflow Minimum Setpoint***

Present Minimum Heating Airflow Setpoint for Control.(FW155A,T10,44)

### ***Active Heating Temperature Setpoint***

The current heating temperature setpoint saved in RAM in deg F. (FW150:T10,24)

### ***Active User Adjust***

Current Temperature offset because of current User Adjust. (FW155A,T10,15)

### ***Afterhour Date Stamp***

Holds a month, date and hour which the user should set to the current date and hour when he resets Afterhour Total Time to zero. [XX/XX XX am/PM]. User-changeable.(FW150:T4,1,3 Bytes)

### ***Afterhour Enable***

If set to [Yes] the push-button on the wall sensor will activate Afterhour Override mode upon being depressed. When this is enabled the push-button will give override to occupied mode, or toggle the lights if already in occupied mode and permit operation of the slide switch to raise or lower the setpoint by an amount given by the use adjust setpoint. [Yes, No Default No]. User-changeable. (FW150:T6,2,bit0)

### ***Afterhour Request***

Tells whether the Afterhour button has been pressed and Afterhour time allowed is non-zero. [Yes or No]. Not user-changeable. (FW150:T10,9,bit6)

### ***Afterhour Status***

Tells whether the controller is currently operating in Afterhour Override mode. [Yes or No]. Not user-changeable. (FW150:T10,8,bit1) ). See also Poll Status - In Afterhours (FW155A, T10,32, bit6).

### ***Afterhour Time Allowed***

This is an EEPROM variable that represents the number of minutes the After Hours Override will be in effect when the push button is pressed. The time period that Afterhour Override will be in effect following a triggering by the wall sensor push-button. This is used only during Night Setback or in an Unoccupied State. Default 60 minutes Range 0-255 minutes Resolution 1 minute [0 to 255 minutes]. User-changeable.(FW150:T3,11) Also (FW155A,T3,11 & T4,11)

### ***Afterhour Time Remaining***

The number of minutes remaining before Afterhour Override mode will cease to operate and the control will revert to its original state. [0 to 255 mins]. Not user-changeable. (FW150:T10,7)

### ***Afterhour Total Time***

The accumulated time the controller has spent in Afterhour Override mode. The user must set this counter to 0 and appropriately change the Afterhour Date Stamp if he or she wished to begin a new tracking of the time spent in Afterhour Override mode. [0 to 65535 mins, Default 0 mins]. (FW150:T4,4,WORD) User-changeable.

### ***Airflow Hysteresis***

This is an EEPROM variable. The damper motor will not be activated until the actual airflow differs from the calculated value by more than the hysteresis band. Default 25 FPM Range 0 - 3300 Feet per Minute Scaling 1 bit per 25 FPM Resolution 25 FPM. All airflow values are displayed in CFM. (FW150:T3,12)

### ***Airflow Integration Time***

Used by the Airflow PI algorithm. The time in seconds for a constant 25 ft/min count error to add up to 1 pulse output. If the Airflow Integration Time is zero, the PI algorithm is not used, and the damper drives to the Airflow Setpoint and stops.

T3,E48 VV\_AF1IntegrationTime (600a1.8,880a)

T3,E49 VV\_AF2IntegrationTime (880a)

### ***Alarm 1 - Zone Temperature Alarm***

bit 0 = 1 zone temperature too hot; bit 1 = 1 zone temperature too cold;  
(FW150:T10,9,bits 0,1) This alarm is set in Occupied control state only.  
(FW150E,,FW151A..C) This alarm is set in all control states (FW152A,FW153A..).  
(FW155A.T10,9,bits0,1 & T16,1, bits0,1)

### ***Alarm 2 - Cooling Airflow Alarm***

bit 2 = 1 primary airflow too high; bit 3 = 1 primary airflow too Low; (FW150:T10,9,bits 2,3) This alarm is set in Occupied control state only. (FW150E,,FW151A..C) This alarm is set in all control states (FW152A,FW153A..).  
(FW155A.T10,9,bits2,3 & T16,1, bits2,3)

### ***Alarm 3 - Heating Airflow Alarm – Not Used***

In dual duct applications where the second airflow is controlled bit 4 = 1 secondary airflow too high; bit 5 = 1 secondary airflow too low ; (FW150:T10,9,bits 4,5) This alarm

is set in Occupied control state only. (FW150E,,FW151A..C) This alarm is set in all control states (FW152A,FW153A..).  
(FW155A,T10,9,bits4,5 & T16,1, bits4,5)

### **Analog Output Assignment**

Identifies the value used to control the analog output:

- 0 - None Not Used.
- 1 - CLGRequirement ; 2 – HTG Requirement;
- 3 - EconoCoolReq ,
- 4 - Changeover HTG/CLG
- 5 – ECM Fans Speed

FW600A T3,E23 (0..2 only) VV\_AO1Assign (T3,23,LSN)

### **Analog Output Max Output**

The voltage 0..255 = 0..10 Vdc when the control input is 100% (255)

FW600A T3,E21

FW655A PA\_AO1MaxVolts( T3,26) , PA\_AO2MaxVolts( T3,27) .

### **Analog Output Min Output**

The voltage 0..255 = 0..10 Vdc when the control input is 0% (0)

FW600A T3,E22

FW655A PA\_AO1MinVolts (T3, 36), PA\_AO2MinVolts( T3,37) .

### **Analog Output Value**

The actual output value 0..255 = 0..10 Vdc

FW600 T18,1 Scaled, T18,2 Unscaled,

FW655A PA\_AO1OutputValue (18,2), PA\_AO1OutputValue (18,3)

### **Analog Override Status/Value**

FW600 T18,E3, bit 0 AO1 Override Status

T18,E4 AO1Analog Override Value

### **ASIC/1 Day "Day of Week"**

The day of the week as the controller knows it. The clock may be synchronized to the current day, date and time as the PC knows them by placing the cursor at the screen location for this parameter and pressing <s>. The day may be set to holiday by placing the cursor at the screen location and pressing <h>. The holiday status may only be cleared by a re-synchronization of the controller. These are the only two methods by which the clock may be changed.(FW150,T10,4,LS\_NBL)

NOTE: If the controller clock reads "NA" for the day, this indicates that the controller has not been synchronized. [1 = Monday].

### **ASIC/1 Time "Time of Day"**

The time of day as the controller knows it. The clock may be synchronized to the current day, date and time as the PC knows them by placing the cursor at the screen location for this parameter and pressing <s>. The day may be set to holiday by placing the cursor at the screen location and pressing <h>. The holiday status may only be cleared by a re-synchronization of the controller. These are the only two methods by which the clock may be changed. [ XX:XX:XX]. (FW150,T10,1,3 BYTES)

### **Aux Temp 1 (IN-6)**

Optional Auxiliary Temperature measured on Input #6, smoothed and converted using Input Convert Type and saved in RAM. (FW155A,T9,11,WORD)

### **Aux Temp 1 (IN-6) - Truncated**

Optional Auxiliary Temperature measured on Input #6 and rounded to single byte value and saved in RAM. (FW150:T10,27,BYTE)

### **Aux Temp 2 (IN-7)**

Optional Auxiliary Temperature measured on Input #7, smoothed and converted using Input Convert Type and saved in RAM. (FW155A, T9,13,WORD)



### ***Aux Temp 2 (IN-7) - Truncated***

Optional Auxiliary Temperature measured on Input #7 and rounded to single byte value and saved in RAM. (FW155A:T10,28,BYTE)

### ***Aux Temp 3 (IN-8)***

Optional Auxiliary Temperature measured on Input #8, smoothed and converted using Input Convert Type and saved in RAM. (FW150:T9,15,WORD)

### ***Aux Temp 3 (IN-8) - Truncated***

Optional Auxiliary Temperature measured on Input #7 and rounded to single byte value and saved in RAM. (FW155A:T10,29,BYTE)

### ***Auxiliary 1,2,3 Output Mask***

Auxiliary outputs may be assigned which are not connected to the sequence of operation. They may be controlled only by overrides from a user interface.

Auxiliary 3 Output Mask (FW155A, T3,44,BYTE)

Auxiliary 2 Output Mask (FW155A, T3,45,BYTE)

Auxiliary 3 Output Mask (FW155A, T3,46,BYTE)

### ***Auxiliary Airflow***

This is a RAM variable for the flow through the second auxiliary or heating duct. This value is used for dual duct boxes. Display depends on Input Conversion Type, typically Input-5. Default CFM. Word Value based on Secondary AF K-factor, and Duct Area All airflow values are displayed in CFM. (FW155:T9,9,WORD)

### ***Auxiliary Cooling Airflow Hysteresis***

Amount that airflow must drop before auxiliary cooling is terminated. - raw 25 ft/min [Default 5] (FW150:T3,41) (FW150E...,FW151A..D)

### ***Auxiliary Cooling Enable***

Enables Auxiliary Cooling Feature which will bring on an additional output if the primary airflow is equal to the Cooling Maximum Airflow setpoint by a value greater than the Aux Cooling Temperature Offset for an Auxiliary Cooling Wait Time .[Yes, No] (FW150:T6,2,bit 6) (FW150E...,FW151A..D)

### ***Auxiliary Cooling Mask***

Assigns output mask if Aux Cooling has been enabled. (FW150:T3,40) (FW150E...,FW151A..D)

### ***Auxiliary Cooling Temp Offset***

Number of degrees that zone temperature must exceed active setpoint before auxiliary cooling is brought on. in deg F or deg C [Default 2 F] (FW150:T3,39) (FW150E...,FW151A..D)

### ***Auxiliary Cooling Timer***

The RAM length of time that Auxiliary Cooling Temp Offset exists before auxiliary cooling is brought on. (FW155A:T10,\_\_,BYTE)

### ***Auxiliary Cooling Wait Time***

The length of time that Auxiliary Cooling Temp Offset exists before auxiliary cooling is brought on. [Default 120 s] (FW150:T3,38,BYTE) (FW150E...,FW151A..D)

### ***Auxiliary Heat Output Mask***

A Heat Output Mask is used to assign the physical output to be used for this purpose.

The Auxiliary Heat Output Mask,, is in EEPROM location Absolute 10FBh and has not been included in either Table 3 or in the 24:/25h messages.(FW151A..C Only) (FW155A, T3,43,BYTE)

### ***Auxiliary Heating Enable***

Enables Output on Auxiliary Heating Mask whenever the controller is in Heating Mode. (FW155A, T6,2,bit5). Is off in deadband and cooling.

### ***Auxiliary Heating Mask***

It indicates the physical output assigned to Auxiliary Heating Output (FW155,T3,42)

### ***BACnet MSTP BaudRate***

Baud Rate for BACnet MSTP Communication  
0=9600, 1=19,200, 2=38,400, 3=76,800  
T201 E 243 Byte BAC\_BaudRate (FW 610a1.0)

### ***BACnet MSTP Device Instance***

The BACnet Device Instance must be unique for the entire systems of connected BACnet controllers. It may be, but does not have to be, the same as the System Bus Address. It is a double word value in the range 1 to 4194304. The Device ID corresponds to the instance of the BACnet Device object in the controller. Factory default BACnet Device ID is 162. BACnet Device Instance (property 75) a 22-bit unique address used to identify the controller on a BACnet network.  
T201 E 244,245 Word BAC\_DeviceInstance (FW 610a1.0)

### ***BACnet MSTP MAC Address***

MAC address returned by BACnet Who Is for BACnet MSTP Communication  
T201 E240 Byte BAC\_MACAddress (FW 610a1.0)

### ***BACnet MSTP MaxInfoFrames***

Maximum Number of Information Frames to be broadcast while the controller has the token. [Typical 1](property 63) T201 E 241 Byte BAC\_MaxInfoFrames (FW 610a1.0)

### ***BACnet MSTP MaxMaster (64)***

The Max Masters parameter represents the highest MAC address on this network. If uncertain or if device may be added in the future the Max Masters should be set to 127. (property 64) T201 E 242 Byte BAC\_MaxMaster (FW 610a1.0)

### ***Baud Rate***

The communication speed. 192 = 19,200 baud, 96 = 9600 baud, 12 = 1200 baud., 128 = 38,400 baud If any other value then baud rate is 9600 baud. New baud rate takes effect immediately. (FW150F, T3,1) (FW155A, T3,1 and T1,3)

### ***Changeover Mode***

Displays status of forced changeover. If the controller is in changeover, it assumes that the primary supply air is hot.

"ON" = changeover has been forced on;

"OFF" = changeover forced off; and

"AUTO" = No forced Changeover

(FW150:T10,12,bits 3,4)

### ***Changeover Setpoint***

This is an EEPROM variable. When the duct temperature becomes greater than this value, the controller will enter a Changeover state. Implementation of the auto-changeover feature requires installation of an additional duct temperature sensor on input 6. The measured supply air temperature at the inlet is compared with Changeover Setpoint. If the supply air temperature is greater than the Changeover Setpoint the controller will go into a heating only changeover mode. If the auto-changeover setpoint is zero this feature is disabled. [Default 0 deg F (disabled)] Range 0-255 deg F Resolution 1 deg F (FW150:T2,17)

### ***Changeover Status***

Changeover is active. If the controller is in changeover, it assumes that the primary supply air is hot. Primary Airflow Setpoint will be modulated from HTG AF Min to HTG AF Max in proportion to the difference between the Zone temperature and the HTG Temp SP using a Heating Throttling Range. In changeover the fan speed will be modulated. The controller will update damper position so that the measured primary airflow matches the airflow setpoint. During changeover the local heating is locked out. (FW150:T10,12,bit5)

### ***CHW Valve On/Off Mask***

Identifies output used for On/Off Chilled Water Valve for Fan Coil Personalities. Typically assigned to Output 3. Same parameter used for VAV Aux Cooling Output

Mask (150E..) [Default, 00h ] (existing) Table 3 Entry 40 CHW Valve On/Off Mask (600A1.4)

### **Control Mode**

The operating modes for the controller are Cooling, Deadband, and Heating. The control enters deadband when the temperature falls one degree F below the Active Cooling Setpoint, or above the Active Heating Setpoint. The control enters cooling when the temperature reaches the Active Cooling Setpoint. The control enters heating when the temperature reaches the Active Heating Setpoint. (FW150:T10,6,bits4,5)

### **Control State**

During Occupied State the space temperature will be controlled between the CLG and HTG Temperature Setpoints. During Night Setback and Unoccupied states the primary damper is closed and the fan is off. During Morning Warm-up the controller functions exactly as in Occupied. Changeover is used to provide central heat.

RAM Controller State Byte. (bit 0,1; 0= unocc, 1=occ, 2=nsb, 3=mwu) Bits not specifically defined can be indeterminate. (FW150:T10,5,bits0,1) . (FW155A, T10,5,bits0,1, and T10,33,bits0,1)

### **Controller Interlock**

Shorting input #3 gives Interlock for address (input = 0 V). (FW150:T10,14,bit 2) The interlock is required for all messages with a B4B4h destination address.

### **Cooling Airflow**

see Primary Airflow

### **Cooling Airflow Alarm Range**

see Primary Airflow Alarm Range

### **Cooling Airflow K-factor**

See Primary Airflow K-factor

### **Cooling Airflow Maximum Setpoint**

This EEPROM variable represents the maximum Airflow that will be allowed through the duct while in cooling mode. Default 2000 FPM Range 0 - 3300 Feet per Minute Scaling 1 bit per 25 FPM Resolution 25 FPM All airflow values are displayed in CFM. Also used for occupied state when Multiple Airflow Min/Max Enable is set. (FW150:T2,5)

### **Cooling Airflow Minimum Setpoint**

This EEPROM variable represents the minimum Airflow that will be allowed through the duct while in cooling mode. Default 0 FPM Range 0 - 3300 Feet per Minute Scaling 1 bit per 25 FPM Resolution 25 FPM. All airflow values are displayed in CFM. Also used for occupied state when Multiple Airflow Min/Max Enable is set. (FW150:T2,3)

### **Cooling Airflow NSB Maximum Setpoint**

This EEPROM variable represents the maximum Airflow that will be allowed through the duct while in cooling mode in the NSB state when Multiple Airflow Min/Max Enable is set. (FW150:T2,28) (150E..,151A..D)

### **Cooling Airflow NSB Minimum Setpoint**

This EEPROM variable represents the minimum Airflow that will be allowed through the duct while in cooling mode in the NSB state when Multiple Airflow Min/Max Enable is set. (FW150:T2,27) (150E..,151A..D)

### **Cooling Airflow Unocc Maximum**

This EEPROM variable represents the maximum Airflow that will be allowed through the duct while in cooling mode in the Unoccupied state when Multiple Airflow Min/Max Enable is set. (FW150:T2,24) (150E..,151A..D)

### **Cooling Airflow Unocc Minimum**

This EEPROM variable represents the minimum Airflow that will be allowed through the duct while in cooling mode in the Unoccupied state when Multiple Airflow Min/Max Enable is set. (FW150:T2,23) (150E..,151A..D)

### **Cooling Damper Closed Mask**

See Primary Damper Closed Mask

### **Cooling Damper Open Mask**

See Primary Damper Open Mask

### **Cooling Night Setback Temperature SP**

This is the desired zone temperature during Night Setback with the controller in cooling mode. Default 85 deg F Range 0-255 (45-95 effective) Resolution 1 deg F (FW150:T2,12)

### **Cooling Occupied Temperature SP**

Occupied Cooling Temperature Setpoint This is the desired zone temperature during an Occupied state in cooling mode. Default 74 deg F Resolution 1 deg F Units (FW150:T2,1)

### **Cooling Requirement**

The cooling requirement is a RAM value. In FW150 only the Primary Airflow Setpoint is Calculated. (FW150:T10,19). In FW155A it is always the cooling requirement is 0 to 255 = 0 to 100% (FW155A, T10,16)

### **Cooling Smooth Filter**

See Primary Airflow Smooth Filter

### **Cooling Unoccupied Temperature SP**

Unoccupied Cooling Temperature Setpoint This is the desired zone temperature during an Unoccupied state with the controller in cooling mode. Default 85 deg F Range (45 to 95 effective) Resolution 1 deg (FW150:T2,10)

### **Custom Span and Offset**

It is possible to configure custom inputs on Inputs 5,6,7, & 8. The Custom Span is the signed difference between the input value at 5 Vdc minus the input value at 0 Vdc. The Custom Offset is the input value at 0 Vdc. [Default, Custom Span = 4095, Custom Offset =, 0]

IN-5	Custom Span (T8,12,WORD)
	Custom Offset (T8,14,WORD)
IN-6	Custom Span (T8,16,WORD)
	Custom Offset (T8,18,WORD)
IN-7	Custom Span (T8,20,WORD) Not Used
	Custom Offset (T8,22,WORD) Not Used
IN-8	Custom Span (T8,24,WORD) Not Used
	Custom Offset (T8,26,WORD) Not Used

### **Damper CLG Min/Max Setpoint**

If Pressure Dependent Enable is yes, then in Cooling mode the Damper Position Setpoint is modulated as a percentage of the Damper Drive Time between the Damper Cooling Minimum and Maximum Setpoints. [ 0..100%] VV\_DamperCLGMinSP (FW600A, T2,E3), VV\_DamperCLGMaxSP (FW600A, T2,E4)

### **Damper Drive Time**

If Pressure Dependent Enable is yes, then the Damper Position Setpoint is modulated as a percentage of the Damper Drive Time.[ 0..255 sec] VV\_DamperDriveTime (FW600A, T3, E24)

### **Damper HTG Min/Max Setpoint**

If Pressure Dependent Enable is yes, then in Heating mode the Damper Position Setpoint is modulated as a percentage of the Damper Drive Time between the Damper Heating

Minimum and Maximum Setpoints. [ 0..100%] VV\_DamperHTGMinSP (FW600A, T2,E53), VV\_DamperHTGMaxSP (FW600A, T2,E6)

#### ***Damper Initialize***

If Pressure Dependent Enable is yes, then the Damper Initialize timer in seconds is used to drive the damper closed for a Damper Drive Time to reinitialize the damper position. VV\_DamperInitialize (FW600A, T18,E15)

#### ***Damper Position***

If Pressure Dependent Enable is yes, then the Damper is drive open or closed so that the Damper Position is equal to the Damper Position Setpoint in seconds. VV\_DamperPos (FW600A, T18,E16)

#### ***Damper Position Setpoint***

If Pressure Dependent Enable is yes, then the Damper Position Setpoint is modulated as a percentage of the Damper Drive Time VV\_DamperPosSP (FW600A, T10,E19)

#### ***Default State Unoccupied***

DefaultStateUnoccupied brings controller up in Unoccupied State at power up. On synchronization controller behaves normally.. Table 6 Entry 2 Bit 7 (155A2.2)

#### ***Default Output State***

Default state assumed by Binary Outputs on reset of power in Personality zero, or during Flash programming of the controller. [Default 0]

VV\_DefaultOutputState (T3,??) (FW600a, FW880a FW655a)

#### ***Default Table***

Type "Table 1" <Enter> This causes a "Brain Dump" of the standard Default Table #1.

#### ***Demand Group***

The Demand Group used by rotating demand shedding.(FW155A,T1,8,BYTE)

#### ***Demand Rotate Level***

The Active Demand Level at which rotating demand shedding occurs. (FW155A,T1,7,BYTE)

#### ***Demand Shed Level***

The Active Demand Level at which demand shedding occurs. (FW155A,T1,6,BYTE)

#### ***Description***

A 32 character description may be stored EEPROM to help identify that controller. Default (varies with EPROM version) Range up to 32 characters. To change the description. (FW150:T1,16..47)

#### ***Device Address***

The communications address of the accessed controller. Changing the device address of a controller requires that it be hardware interlocked (see text on the Address Screen to learn how to interlock a controller); address changing should only be done while in Local communications mode, as otherwise multiple controllers addresses may be altered. [1 to 16000]. User-changeable.

#### ***Digital Display Enable***

Enables the Digital Display Wall Sensor, WS-051. In deg F/C or in 0.5 deg F/C . See also Upper Limit Temperature Setpoint and Digital Display Enable. PA\_DigDisplayEnable (FW655A, 600A T6,5,bit7)

#### ***Dual Heating Enable***

The Dual Heating feature ramps primary damper with heating. Both the primary air and the hot water heating valve in heating mode are modulated from minimum to maximum in proportion to heat requirement. This applies ONLY to Hot Water and Thermic Valve personalities. This feature is enabled by setting Enable Dual HTG [Yes, No][Default No].(FW150:T6,2,bit4)

### ***ECM Fan Speed Setpoint***

If Analog Output Assignment is 5, ECM Fan Speed, then the Analog Output is set to the value given by the ECM Fan Speed Setpoint. (0..255= 0..100%) (FW600, T3,E25)

### ***Electric Heat 1 Mask***

It indicates the physical output assigned to Electric Heat 1 Output (FW150:T3,31).

### ***Electric Heat 2 Mask***

It indicates the physical output assigned to Electric Heat 2 Output (FW150:T3,32).

### ***Electric Heat 3 Mask***

It indicates the physical output assigned to Electric Heat 3 Output (FW150:T3,33).

### ***Electric Heat Base Time***

This EEPROM variable represents the duty cycle to be used for electric heat applications. Default 240 seconds Range 0-255 seconds Resolution 1 second (FW150,T3,10,BYTE)

### ***Electric Heat Minimum Airflow Setpoint***

Locks out Electric Heat if Primary Airflow falls below Electric Heat Minimum Airflow SP. If Electric Heat Min AF SP is zero then this feature is disabled. Table 3 Entry 8, [Default 10].(FW155A2.3)

### ***Electric Heat Timer***

This RAM variable is used to time the duty cycle for electric heat applications.(FW155,10,48) For Electric Heat Personalities only.

### ***Emergency Status***

RAM Emergency Status (FW150:T10,11,bits0,1);  
0 = indicates that no emergency is present;  
1 = emergency 1 state is set;  
2 = emergency 2 state is set.

EEPROM Emergency 1 state will force the damper to open and turn OFF the fan and electric heat. (FW150:T6,2,bits 2) EEPROM Emergency 2 state will force the damper to closed and turn OFF the fan and electric heat. (FW150:T6,2,bits 3)

### ***Fan Energize Airflow Setpoint***

This is a flow value at which an intermittent fan will turn on or off. It is stored in EEPROM. If the duct Airflow drops below this value, the fan will turn on, above this value the fan will be off. Default 4000 FPM Range 0 - 3300 Feet per Minute Scaling 1 bit per 25 FPM Resolution 25 FPM All airflow values are displayed in CFM.(FW150:T2,7)

### ***Fan On/Off Mask***

The output mask assignment for fan output. Displays output number that has been assigned (FW150:T3,30) [Default BO-5]

### ***Fan Status***

See Output Status - Fan

### ***Flash Enable***

Enables update of firmware (executable application program) over RS-485 communication. PA\_FlashEnable (FW655AT6,6,bit1) FW600AT6E5, bit6 [Default: No]

### ***Group Address***

This specifies the Group Address (Group Address 0) to which the controller will respond. Default 512D (200H) Range 100H-FF00H (multiples of 100H) Resolution 256 (100H) Extended group addressing is available which allows membership selection in up to 5 different categories. Consult protocol document for a discussion of extended group addressing. (FW150:T1,9) Default 0



### ***Half Degree Enable***

If Set Temperature setpoints are in 0.5 deg increments. Table 6,E5, bit 6. [Default Not Set]

### ***Heating Airflow Maximum Setpoint***

This EEPROM variable represents the maximum Airflow that will be allowed through the duct while in heating mode. Default 2000 FPM All airflow values are displayed in CFM. Also used for occupied state when Multiple Airflow Min/Max Enable is set. (FW150:T2,6)

### ***Heating Airflow Minimum Setpoint***

This EEPROM variable represents the minimum Airflow that will be allowed through the duct while in heating mode. Default 0 FPM Range 0 - 3300 Feet per Minute Scaling 1 bit per 25 FPM Resolution 25 FPM All airflow values are displayed in CFM. Also used for occupied state when Multiple Airflow Min/Max Enable is set. (FW150:T2,5)

### ***Heating Airflow NSB Maximum***

This EEPROM variable represents the maximum Airflow that will be allowed through the duct while in heating mode in the NSB state when Multiple Airflow Min/Max Enable is set. Resolution 25 FPM (FW150:T2,30) (150E..,151A..D)

### ***Heating Airflow NSB Minimum***

This EEPROM variable represents the minimum Airflow that will be allowed through the duct while in heating mode in the NSB state when Multiple Airflow Min/Max Enable is set. Resolution 25 FPM(FW150:T2,29) (150E..,151A..D)

### ***Heating Airflow Unocc Maximum***

This EEPROM variable represents the maximum Airflow that will be allowed through the duct while in heating mode in the Unoccupied state when Multiple Airflow Min/Max Enable is set. Resolution 25 FPM (FW150:T2,26) (150E..,151A..D)

### ***Heating Airflow Unocc Minimum***

This EEPROM variable represents the minimum Airflow that will be allowed through the duct while in heating mode in the Unoccupied state when Multiple Airflow Min/Max Enable is set. Resolution 25 FPM(FW150:T2,25) (150E..,151A..D)

### ***Heating Calculation***

See Heating Requirement

### ***Heating Night Setback Temperature SP***

This is the desired zone temperature during Night Setback with the controller in heating mode. Default 65 deg F Range 0-255 (45 to 95 effective) Resolution 1 deg F Units (FW150:T2,13)

### ***Heating Occupied Temperature SP***

Occupied Heating Temperature Setpoint This is the desired zone temperature during an Occupied state in heating mode. Default 72 deg F Range 0-255 (45-95 effective) Resolution 1 deg (FW150:T2,2)

### ***Heating Requirement***

The heating requirement is a RAM value. (FW150:T10,20) 0 to 255 = 0 to 100%.. In earlier product its meaning depended on personality. In FW155A it is always the heating requirement. (FW155A, T10,20)

1) For Dual Duct Heating it is the Secondary Airflow Setpoint which modulates between Heating Airflow Minimum Setpoint and Heating Airflow Maximum Setpoint. (FW150:T10,20) (FW155A, T10,46)

2) For Hot Water heating it is the Heating Requirement which is the percentage of the HW Valve Base Time use to calculate the HW Valve Position Setpoint. (FW150:T10,20) (FW155A, T10,47)

3) For Electric Heating it is the Heating Requirement which is the percentage of the Electric Heat Base Time used to calculate the Electric Heat Timer. (FW150:T10,48)

### ***Heating Unoccupied Temperature SP***

Unoccupied Heating Temperature Setpoint This is the desired zone temperature during an Unoccupied state with the controller in heating mode. Default 65 deg F Range (45-95 effective) Resolution 1 deg F (FW150:T2,11)

### ***Holiday Status***

Indicates that today is a holiday. (FW150:T10,10,bits 7)

### ***HW Valve Actual***

The actual drive time of the Hot Water Valve. The valve is driven until the actual drive time is equal to the HW Valve Position Setpoint. (FW150:T10,21)

### ***HW Valve Base Time***

This setpoint establishes the time required for the hot water valve to go from fully closed to fully open for Hot Water Heating. It is used to control the operation of the hot water valve. Default 120 seconds Range 1-255 seconds Resolution 1 second (FW150:T3,20)

### ***HW Valve Close Mask***

The output mask assignment for hot water closed output. Displays output number that has been assigned (FW150:T3,37)

### ***HW Valve On/Off Mask***

Identifies output used for On/Off Hot Water Valve for Fan Coil Personalities. Typically assigned to Output 4. Same parameter used for VAV Aux Heat Output Mask (150E..) [Default, 00h ] (existing) Table 3 Entry 43 (600A1.4)

### ***HW Valve Open Mask***

The output mask assignment for hot water open output. Displays output number that has been assigned (FW150:T3,36)

### ***HW Valve Position SP***

Current Hot Water Valve position setpoint which is the required drive time, saved in RAM.(FW150:T10,20) Note: For FW155A, T10,20 is the Heating Requirement, (FW155A,T10,47)

### ***IFan Heating Only Enable***

Used by intermittent fan personalities to allow fan operation only in the heating mode. The fan is off in deadband and cooling modes. (FW155A,T6,3,bit 7)

### ***Ignore Globals Enable***

If set to [Yes], all commands on the communications line sent using global addressing are ignored. [Yes, No Default No]. User-changeable.(FW150:T6,1,bit6)

### ***Input Fault Status***

Bit pairs show status of faults on inputs 1 through 8. (FW155A,T10,32,WORD)

Bit pairs 00 = 0 - no fault ;10 = 2 - LO fault; 11 = 3 - HI Fault; 01 = 1 reserved

### ***Input n - Raw***

The 12 bit raw input value. 0 to 5 Vdc = 0 to 4095. Note: Microprocessor is only accurate to 10 bits. (FW155A,T9,17, 8 WORDS)

### ***Input n Convert***

The type of conversion assigned to each input. (FW155A.,T14,1..8,LSNBL)

The LSNBL is the Convert Type. The MSNBL is the Input Type

### ***Input n Type***

The type assigned to each input. (FW155A.,T14,1..8,MSNBL. .

Input Type = 0 - Raw

Input Type = 1 - Temperature (3 kohm thermistor)

Input Type = 2 - AV3300 Airflow Sensor

Input Type =3 - User Adjust

Input Type = 4 - Static Pressure Slope/Offset (Tracker)

Input Type = 5 - Humidity (0..100%)



Input Type = 6 - CO2  
Input Type = 7 - AV3200 Airflow Sensor

### ***Input Override Status***

Shows status of overridden inputs. Bitwise. (FW155A,T10,31)

### ***Integral Time***

The Integral Time is a PI tuning parameter used for both heating and cooling. The Integral Time is the time required for the integral term to be the same size as the proportional term for a constant error. In units of 0.5 seconds. (FW155A,T2,9,BYTE)

### ***Light Blink Timer***

Used to time the 60 second wait before turning off lights.(FW155A,T10,64,BYTE)

### ***Lights Occupied Enable***

When enabled, the lights are on whenever the state is occupied for any reason, or when the lighting schedule says the lights are on. In occupied the push-button toggles the lights on and off. New(FW155A, T6,3,bit6)

### ***Lights On/Off 1,2 Schedule***

The Lights schedule has entries for two on and off times in 1/4 hour intervals for 8 days. (FW150E...,T7, various)

### ***Lights On/Off Mask***

The output mask assignment for chilled water On/Off output. Displays output number that has been assigned (FW150:T3,35)

### ***Lights Reverse Enable***

Lights Reverse Enable flag for reversing light outputs. Table 6 Entry 3 bit 0 (FW155A2.0)

### ***Lights Schedule Disable***

If this is set, then the lights will ignore the daily event lighting schedule. The will turn on only based on the afterhour push-button during occupied, if Lights Occupied Enable is set and the state is occupied, or communication override.(FW155A,T6,1,bit1)

### ***Lights Scheduled Off Status***

Indicates that the lights should be off as determined from the Schedule or On if unsynchronized. (FW155A,T10,30,bit4) 1=Lights Off, 0=Lights On

### ***Lights Scheduled Status***

The Lights determined from the Schedule or Occupied if unsynchronized. (FW155A,T10,30,MSNBL) 1=Lights Off, 2=Lights On, 3=Lights Off, 4=Lights On,

### ***Local Heat Enable***

When enabled local heating, hot water or electric, is available in changeover. In changeover heating if Local Heat Enable is Yes, then the heat is on at 100% whenever the control mode is heating. New(FW155A, T6,4,bit 0)

### ***Lower Limit CLG Temperature***

Lower Limit of user adjust in the Digital Display Wall Sensor in the CLG Control Mode. In deg F/C or in 0.5 deg F/C . See also Digital Display Enable.

A1\_LowerLimitCLGTempSP [deg F], A1\_LowerLimitCLGTempSP-half [0.5 deg F], A1\_LowerLimitCLGTempSPC [deg C], A1\_LowerLimitCLGTempSPC-half [0.5 deg C], 655A1.3, 600A (T2,39)

### ***Lower Limit (HTG) Temperature Setpoint***

Lower Limit of user adjust in the Digital Display Wall Sensor. In deg F/C or in 0.5 deg F/C . See also Upper Limit Temperature Setpoint and Digital Display Enable.

A1\_LowerLimitTempSP [deg F], A1\_LowerLimitTempSP-half [0.5 deg F], A1\_LowerLimitTempSPC [deg C], A1\_LowerLimitTempSPC-half [0.5 deg C], FW155B,655A (T2,33) Only in the HTG Control Mode FW655A13.

### ***Morning Warm-up Option 2 Enable***

One of two Morning Warm-up Sequences will be utilized. The specific behavior for each sequence is described in the application bulletin. 0 = MWU#1; 1 = MWU#2. Default 0 (FW150:T6,1,bit 3)

### ***Morning Warm-up Schedule***

The Morning Warm-up Schedule has entries for one on and off time in 1/4 hour intervals for 8 days. (FW150, T7,various)

### ***Multiple Airflow Min/Max Enable***

The multiple minimum and maximum airflow setpoints for Unoccupied and Night Setback states can be enabled. [No, Yes] (FW150:T6,1,bit 2) (150E...,151A..D)

### ***Night Setback Schedule***

The Night Setback Schedule has entries for one on and off time in 1/4 hour intervals for 8 days. (FW150, T7,various)

### ***NSB Option 2 Enable***

This indicates which of two Night Setback sequences will be utilized in NSB and Unoccupied control state. The specific behavior for each sequence is described in the application bulletin. Default 0 (FW150:T6,1,bit7)

### ***Occupancy Afterhours Enable***

If the Occupancy Afterhours Enable is yes, the switch on Input #8 is examined at all times to determine if the room is occupied. If Occupancy Afterhours Enable (efOccSensorAsPB) is Yes, the Afterhours feature is triggered by a maintained contact on input 8 in Unoccupied and Night Setback periods. If the Occupancy Status is Yes at the beginning of the UNO or NSB period, or if during UNO and NSB the Occupancy Status goes true, or if the Occupancy Status is still true at the end of the Afterhours period, Afterhours operation is triggered exactly as if the PB on Input#2 had been pressed. Afterhours Enable does not have to be set. . PA\_OccupancyAfterhourEn (600a1.3, FW155A;,T6,4,bit2) [Default No]

### ***Occupancy Sense Closed***

The Occupancy Sensor can be normally open or normally closed. If Occupancy Sense Close (efOccSenseOpen) is no, then Open contacts set the Occupancy Sensor Status to Yes. If Occupancy Sense Close is Yes, then Closed contacts set the Occupancy Sensor Status to Yes. A1\_OccupancySenseClose (600a1.3,T6,3,bit5)

### ***Occupancy Sensor Enable***

Enables operation of an occupancy sensor on Input 5 (8055, Input 8). If the Occupancy Sensor Enable is yes, the switch on Input #8 is examined at all times to determine if the room is occupied. . A1\_OccupancySenseEnable (600a1.3,T6,3,bit4)

### ***Occupancy Sensor Status***

The Occupancy Status identifies when the room appears to be occupied. If Occupancy Status (rfOccupancy) is No ,and the Control State is Occupied, control is placed in the Unoccupied state. If Occupancy Status is Yes and Occupancy Afterhours Enable is No, control is in the state determined by schedule, override state, or if State Schedule Disable is set or the controller is unsynchronized in the Occupied Control State . PA\_OccupancySensorStatus (655a2.0,T10,28,bit5) (600a1.3;155a;T10,13,bit1)

### ***Occupancy Sensor Threshold***

The Occupancy Sensor Threshold gives the 8-bit numeric value at which the decision for Occupancy Sensor Status is yes or no. Multiply by 4 to give the 12-bit raw value. [Default: 25] PA\_OccupancySensorThresh (655a, T3E21) (600a1.3;155a, T3E15)

### ***Operating Mode***

See Control Mode

### ***Output Override ON Status***

This variable indicates which physical outputs are overridden. This is now kept in RAM. (FW155A,T10,41)

### ***Output Override ON Status Defaults***

This variable indicates which overridden physical outputs are to be overridden in the ON condition at power-up. This is kept in EEPROM. (FW155A,T3,25)

### ***Output Override State***

This variable indicates which overridden physical outputs are ON. This is now kept in RAM. (FW155A,T10,40)

### ***Output Override State Defaults***

This variable indicates which physical outputs are to be overridden at power-up. This is kept in EEPROM. (FW155A,T3,24)

### ***Output Status - Actual***

Bitwise representation of physical output states in RAM. (FW150:T10,26)  
(FW155A,T10,26,Byte )

### ***Output Status - Auxiliary Heat***

A binary Heat Output is turned ON whenever, and all during the time the TD-1 is in the Heating Mode. This is completely independent of the normal hot water valve modulation that is already a part of the TD-1. (FW151A..C Only) Uses Auxiliary Heat Output Mask (FW150:T3,43) and Output Status (FW150:T10,26) and Output Override Status and Output Override State.

(FW155A,T10,37,Bits6,7)[[On, Off, O/R On, O/R Off, Restore]

### ***Output Status- CHW On/Off***

Status of the Output assigned to the CHW Valve On/Off Mask used in Fan Coil Personalities. (Aux CLG) Table 10 Entry 38 BITS\_4,5 (600a1.4)

### ***Output Status - Electric Heat 1 On/Off***

Uses Electric Heat 1 On/Off Mask (FW150:T3,31) and Output Status (FW150:T10,26) and Output Override and Output Override State.

(FW155A,T10,38,Bits2,3) [On, Off, O/R On, O/R Off, Restore]

### ***Output Status - Electric Heat 2 On/Off***

Uses Electric Heat 2 On/Off Mask (FW150:T3,32) and Output Status (FW150:T10,26) and Output Override and Output Override State. .

(FW155A,T10,38,Bits4,5) [On, Off, O/R On, O/R Off, Restore]

### ***Output Status - Electric Heat 3 On/Off***

Uses Electric Heat 3 On/Off Mask (FW150:T3,33) and Output Status (FW150:T10,26) and Output Override and Output Override State. .

(FW155A,T10,38,Bits6,7) [On, Off, O/R On, O/R Off, Restore]

### ***Output Status - Fan On/Off***

Uses Fan On/Off Mask (FW150:T3,30) and Output Status (FW150:T10,26) and Output Override and Output Override State. .

(FW155A,T10,37,Bits0,1)[On, Off, O/R On, O/R Off, Restore]

### ***Output Status- HW On/Off***

Status of the Output assigned to the HW Valve On/Off Mask. (Aux HTG) used in fan coil personalities. Table 10 Entry 38 BITS\_6,7 (600a1.4)

### ***Output Status - HW Valve***

The functional Output Status depends on the HW Valve Open and Close Output Masks (FW150:T3,36&37), the Output Override and Output Override State, and the output state (FW150:T10,26). .

(FW155A,T10,36,LS\_NBL) [Open, Close, Stop, O/R Open, O/R Closed, O/R Stop,]

### ***Output Status - Lights On/Off***

The functional Output Status depends on the Lights On/Off Output Mask (FW150:T3,35), the Output Override, the Output Override State, and the output state (FW150:T10,18). .

(FW155A,T10,37,Bits2,3) [On, Off, O/R On, O/R Off]

### ***Output Status - Primary Damper***

The functional Output Status depends on the Cooling Damper Open and Close Output Masks (FW150:T3,26&27), the Output Override and Output Override State, and the output state (FW150:T10,26).

(FW155A,T10,35,LSNBL)[Open, Close, Stop, O/R Open, O/R Closed, O/R Stop]

### ***Output Status - Raw***

Bitwise representation of physical output states in RAM (FW155A,T10,34,BYTE)

### ***Output Status - Thermic Valve***

The functional Output Status depends on the Thermic Valve Mask (FW150:T3,24),and Output Status (FW150:T10,26) and Output Override and Output Override State.

(FW155A,T10,38,Bits0,1) [On, Off, O/R On, O/R Off].If Thermic Valve Reversed is True then the physical output status will be the opposite of that indicated here.

### ***Personality***

One of 17 Personalities of the VAV or Fan Powered Terminal boxes. See Application notes for details. (FW155A,T1,15,BYTE)

### ***Poll Status - In Afterhours***

Tells whether the Afterhour button has been pressed and Afterhour time allowed is non-zero. [Yes or No]. Not user-changeable. (FW155A, T10,32, bit6). See also Afterhour Status (FW150:T16,3,bit1).

### ***Poll Status - Mode***

Shows present mode of the controller. (FW155A, T16,3, bit0,1). See also Control Mode (FW150:T10,6,bits4,5).

### ***Poll Status - State***

Shows present state of the controller. (FW155A, T16,3, bit2,3). See also Control State (FW150:T10,5,bits0,1).

### ***Pressure Dependent Enable***

If enabled, then the Damper is controlled based on percentage of Damper Drive Time in seconds, rather than Airflow (FW6000, T3,E24)

### ***Primary Airflow***

This is a RAM variable for the flow through the primary or cooling duct. Range 0 - 3300 Feet per Minute Scaling 1 bit per 25 FPM @ K-factor of 2338. Resolution 25 FPM. All airflow values are displayed in CFM. (FW150:T10,17)

### ***Primary Airflow Alarm Range***

This is an EEPROM variable that dictates how far the flow through the cooling duct must differ from the calculated value before the alarm bit is set. This value is used for single duct boxes in both heating, deadband, and cooling modes in occupied state. Default 4000 FPM Range 0 - 3300 Feet per Minute Scaling 1 bit per 25 FPM @ K-factor of 2338. Resolution 25 FPM All airflow values are displayed in CFM. (FW150:T2,15)

### ***Primary Airflow K-factor***

The Primary Airflow K-factor relates the measured air duct velocity in the primary duct to the actual air duct velocity.

$$v_{\text{actual}} = (K\text{-factor}/2338) * v_{\text{measured}}$$

It gives the duct velocity in feet per minute necessary to generate a velocity pressure in the flow cross of 1.0 inches water column. The default value of 2338 has been determined for flow cross in an 8" duct. A different K-factor is necessary for different cooling duct sizes and flow crosses. Default 2338 Range 1500-4200 (FW150:T5,1,WORDU)

### ***Primary Airflow Setpoint***

This is a RAM variable for the calculated primary airflow requirement. Range 0 - 3300 Feet per Minute Scaling 1 bit per 25 FPM @ K-factor of 2338. Resolution 25 FPM. (FW150:T10,19): FW155A,T10,19. The Primary Airflow Setpoint modulates from

Active Cooling Airflow Minimum to Maximum as the Cooling Requirement (FW155A,T10,16) modulates from 0 to 100% 0 to 255.

1) For VAV cooling it is the Primary Airflow Setpoint which modulates between Cooling Airflow Minimum Setpoint and Cooling Airflow Maximum Setpoint.

2) For Changeover Heating it is the Primary Airflow Setpoint which modulates between Heating Airflow Minimum Setpoint and Heating Airflow Maximum Setpoint.

### **Primary Airflow Smooth Filter**

This is an EEPROM variable that controls the time response of the running average used to smooth the Primary Airflow measurement. It can be modified slightly to compensate for erratic readings from the velocity pressure transducer. Default 6 Range 0-255 Cooling (FW150:T3,2) This should not be changed without a clear understanding of the process.

### **Primary Calculation**

FW155A it is usually the cooling requirement for the primary airflow is 0 to 25500 = 0 to 100% and is retained as a word value. In changeover it is used for the heating calculation that controls primary airflow. (FW155A, T9,43,WORD)

### **Primary Damper Closed Mask**

The output mask assignment for primary damper closed output. Displays output number that has been assigned (FW150:T3,27)

### **Primary Damper Open Mask**

The output mask assignment for primary damper open output. Displays output number that has been assigned (FW150:T3,26)

### **Primary Damper Status**

See Output Status - Primary Damper

### **Primary Duct Area**

Primary Duct Inlet Size This is an EEPROM variable that represents the inlet duct area for the primary (cooling) duct. Default 0.35 sq. ft. (8" dia.) Range 0.08-4.0 sq. ft. Scaling 1 bit per 0.005 sq. feet (FW150:T5,5,WORDU)

### **Product Identification**

FW150,T11,1,10BYTES. Returns firmware identification string. Same as MT=4Ah.

### **Reset ASIC/1**

The controller can be reset as if from loss of power upon command. When the controller is reset it loses time synchronization and clears all RAM values.

### **Scheduled State Status**

This indicates the control state would be used based on the State Schedules.  
1=UNOCC, 2=OCC,3=NSB,4=MRDY (FW155A,T10,30,LSNBL)

### **Secondary Calculation**

FW155A it is usually the heating requirement is 0 to 25500 = 0 to 100% and is retained as a word value. . In changeover the primary calculation is used for the heating calculation that controls primary airflow. (FW155A, T9,45,WORD)

### **Sensor Fault - Zone Sensor**

The values of inputs are verified to be within normal ranges. If an input value is suspect a bit is set in the RAM sensor failure status byte. (FW150:T10,12,bit 6)

### **Shed Fan Enable**

If set then the intermittent or constant fan I shed when Active Demand Level exceeds the Demand Rotate Level or Demand Shed Level. (FW155A,T6,3,bit 3)

### **Single Setpoint Enable**

Used when Digital Display is enabled to force a single Temperature Setpoint. WS-051 displays OCC CLG Temp SP. On change sets OCC HTG Temp SP = OCC CLG Temp SP -2. (600A1.3, T6,E5, bit0) (655a2.0,T6, E6, bit4)

(600A2.1) Improves Single Setpoint feature so that pressing Up, Down, or Mode allows change and displays the average of the OCC HTG and CLG Temperature Setpoints. Single Setpoint Enable and User Adjust Enable must be set to enable setpoint change. Up or down arrows change the Occupied Cooling Temperature Setpoint within the cooling maximum and minimum limits. Occupied Heating Temperature Setpoint is Occupied Cooling Temperature Setpoint minus the Single Setpoint Deadband. The new setpoints are saved on timeout (15s) or pressing the Mode button.

### **Slide Switch Status**

Switch status on wall sensor.

(FW150:T10,8,bit 2) slide switch is up ;

(FW150:T10,8,bit 3) slide switch is down.

### **State**

See, Control State

### **State Overridden**

This flag indicates that the control state has been overridden from the Scheduled State.

(FW155A,T10,13,bit0)

### **State Schedule Disable**

If this option is selected, then the state of the controller is dependent on messages sent on the communication line. Or on the status of the Occupancy Sensor. (FW150:T6,1,bit1)

### **State Scheduled Status**

The State determined from the Schedule or Occupied if unsynchronized. (FW155A, T10,30, LSNBL) 1=UNOCC, 2=OCC,3=NSB,4=MRDY

### **Sync/Holiday**

The ASIC/1 controller can be synchronized or put into holiday mode from this entry on the setup screen.

### **Synchronize Required**

ASIC clock needs synchronization. (FW150:T10,9,bit 7)

### **Synchronize Status**

ASIC clock is synchronized. (FW150:T10,11,bit 2)

### **Thermic Valve Mask**

Identifies output used for thermic valve .(FW155A,T3,34,BYTE)

### **Thermic Valve Reversed**

Indicates that thermic valve is reversed. When Thermic Valve Reversed is set valve is normally on. cycles off. The physical output identified by the thermic valve mask will be opposite to that reported by the Thermic Output Status. (FW155A,T6,4, Bit 1)

### **Throttling Range**

The Throttling Range is a PI tuning parameter used for both heating and cooling. The Throttling Range gives the error signal that is required to give an output of 100%. In units of 0.1 deg F or deg C. (FW155A,T2,8,BYTE) **Throttle Range** = 4.0 deg F; **Integral Time** = 2.5 min ;Calc Time = 30 s, fixed. Max\_range = 25500

Output Change = (25500/ThrottleRange)\*[ Δ Error\*(CalcTime/Int Time)  
+Δ Δ Error]

### **Trend 1,2 Table & Entry Number**

Any 2 parameters contained in the controller's tables may be trended. The table number and entry number for a given table may be determined from the Protocol Document.

User-changeable. (FW150E..)

Trend 1 Table Number (FW150:T13,7),

Trend 1 Entry Number (FW150:T13,8)

[Default, Zone Temperature (FW150:T10,25)]

Trend 2 Table Number (FW150:T13,9),

Trend 2 Entry Number (FW150:T13,10)

[Default, Cooling Airflow (FW150:T10,17)].



### ***Trend Day of Week***

The Trend runs continuously whenever the Trend Day of Week is non-zero. 1= Monday. . The trend pointer is kept in RAM and is recalculated based on quarter hour periods since midnight of the Trend Day of Week. Trend Day of Week is rewritten whenever the trend rolls over. It starts fresh after 7 days. (FW155A,T10,4). [Default, 0]

### ***Trend Interval***

The time interval which occurs between reading successive trend values in 15 minute increments. Same for both parameters trended. [0 to 255 \*15 min , Default 1 \*15 min]. User-changeable.(FW150:T13,6)

With FW155A only 96 values are trended and the minimum trend interval is 15 minutes. The trend starts each day at midnight. The trend rolls over at midnight and writes a new Trend Day of Week. NEW!!

### ***Trend Number of Values***

Returns the index of the last value trended. The trend pointer is kept in RAM and is recalculated based on non-zero Trend Day of Week. (FW155A,T10,??).

### ***Trend User Date***

The month, date, and hour minutes at which the trend was begun. The user may change the Trend User Date in the course of performing a trend [XX/XX XX]. User-changeable.(FW150:T13,1,3BYTES)

### ***Unoccupied Intermittent Fan Enable***

See Unoccupied Option 2 Enable

This indicates which of two Unoccupied sequences will be utilized in Unoccupied control state. If enabled, then the primary damper is closed in Unoccupied Deadband. Default 0 (FW150:T6,3,bit1)

### ***Unoccupied Option 2 Enable***

This indicates which of two Unoccupied sequences will be utilized in Unoccupied control state. If enabled, then the primary damper is closed in Unoccupied Deadband. Default 0 (FW150:T6,3,bit1)

### ***Unoccupied Schedule***

The Unoccupied Schedule has entries for two on and off times in 1/4 hour intervals for 8 days. (FW155A,T7,various)

### ***Upper Limit (CLG) Temperature Setpoint***

Upper Limit of user adjust in the Digital Display Wall Sensor. . In deg F/C or in 0.5 deg F/C . See also Lower Limit Temperature Setpoint and Digital Display Enable. A1\_UpperLimitTempSP FW155B,655A (T2,32) Only in the CLG Control Mode FW655A13.

### ***Upper Limit HTG Temperature***

Upper Limit of user adjust in the Digital Display Wall Sensor in the Heating Control Mode.. In deg F/C or in 0.5 deg F/C . See Digital Display Enable. A1\_UpperLimitHTGTempSP [deg F], A1\_UpperLimitHTGTempSP-half [0.5 deg F], A1\_UpperLimitHTGTempSPC [deg C], A1\_UpperLimitHTGTempSPC-half [0.5 deg C], 655A1.3, 600A (T2,38)

### ***User Adjust Switch Enable.***

Enables the User Adjust Switch Option. Requires an input #2 or #3 to be configured for a WT-0X1 User Adjust Switch. (FW155A,T6,3,bit2)

### ***User-Adjust Setpoint***

This is an EEPROM variable that represents the number of degrees that the user can adjust the temperature setpoint (either up or down). Default 3 deg F Range 0-16 deg F (+/-16) (FW150:T3,13)

### ***Variable User Adjust Enable***

Enables operation of User Adjust Switch or Variable User Adjust function. (FW155A,T6,3,bit0) Whether it is a Switch or a Potentiometer depends on the Input

Configuration. . Requires input #2 or #3 to be configured for a WT-0X1 User Adjust Switch.

#### ***WS-051 OCC-UNOC Enable***

Enables the WS-051 Occupied/Unoccupied feature. If WS-051 Occupied Unoccupied Enable is set, the O/R button toggles between OCC and UNOC. The Afterhours and Occupancy Sensor features are disabled. In Scheduled Occupied or Morning Ready State pressing the O/R button overrides to Unoccupied. In Scheduled Unoccupied or Night Setback State, pressing the O/R button overrides to Occupied. Pressing the O/R button a second time clears the override and returns to the Scheduled State. The AUTO icon is visible when in Scheduled State and not visible if State is overridden. (T6E4bit 5, 600A2.1) (T6E7bit0, 655a2.7)

#### ***Zone Sensor Bias***

Temperature Setpoint Bias or offset. This is an EEPROM variable that allows adjustment of the zone temperature sensor reading up or down a few degrees. Default:0 Range -/+ Scaling 1 bit per deg F. (FW150:T2,8)

#### ***Zone Temp Alarm Range***

This value dictates how far from the setpoint the zone temperature must fluctuate before the temperature alarm bit is set. If the difference between the setpoint and the zone temperature becomes greater than the Alarm SP, the alarm bit is set. Default 4 deg F Range 0-25 deg F (FW150:T2,14)

#### ***Zone Temp Fault Status***

Shows fault status of input designated as Zone Temperature. (FW150E,T10,12,bit6)

#### ***Zone Temperature***

The zone temperature reading the controller uses for heating/cooling calculation purposes obtained from the Wall Sensor attached to input #1. Not user-changeable  
(FW150:T9,1,WORD)

#### ***Zone Temperature - Previous***

The zone temperature reading the controller uses for heating/cooling calculation purposes obtained from the Wall Sensor attached to input #1. from 30 seconds earlier. Not user-changeable.(FW150:T9,33,WORD)

#### ***Zone Temperature - Truncated***

Zone Temperature measured on the assigned input and rounded to single byte value and saved in RAM. (FW150:T10,25,BYTE)



# ASIC/1-6100 BACnet

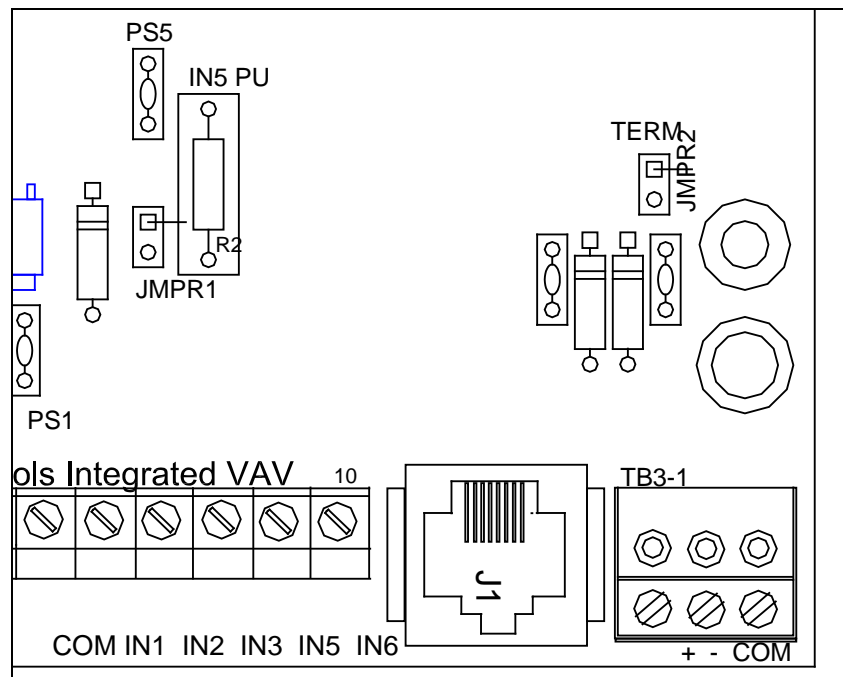
## Introduction

The ASIC/1-6100 controller has with a communication interface module that brings native BACnet-MSTP protocol to a standard ASIC/1 controller.

The ASIC/1-6100 communicates at 9600, 19,200, 38,400, or 76,800 baud via RS-485 connector TB3. 38,400 baud is recommended. It provides an optional 120 ohm terminating resistor for end of line by placing a shunt across TERM.

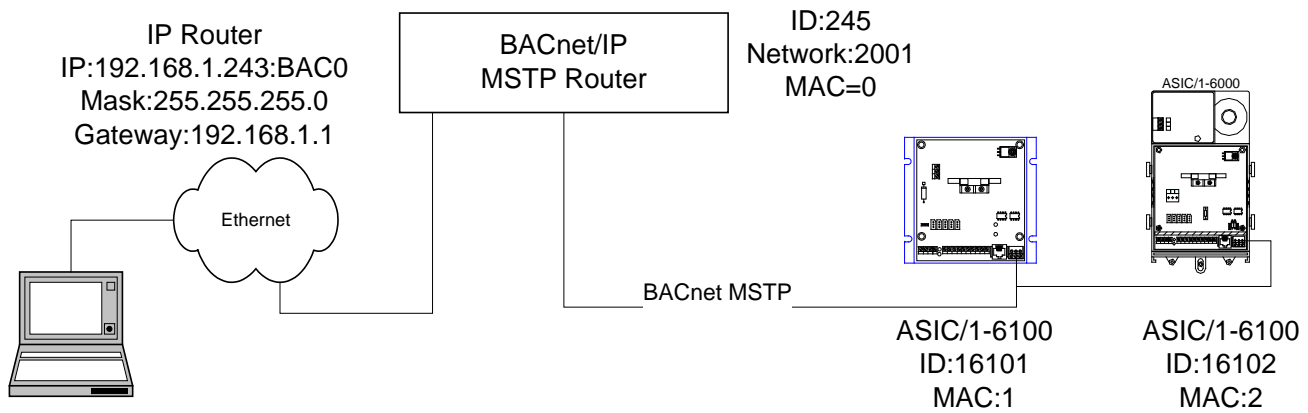
The following communication connections are available on the ASIC/1-6100:

- o BACnet MS/TP RS-485 Communications, TB3
- o ASI Protocol Wall Sensor Communication, J1



By setting a few parameters in the tables including: BACnet Device Instance, BACnet MAC Address, and BACnet Baud Rate, BACnet Max MAC Address, and BACnet Max Info Frames, the ASIC/1-6100 communicates as a native BACnet device.

The controller delivers BACnet Analog Inputs, Binary Outputs, and Analog Outputs based on the configuration of the ASI Input, Binary Output, and Analog Outputs respectively without any additional configuration.



ASI Analog Inputs are scaled based on the Input Convert Type and Units field to deliver the BACnet Present Value and Units properties. Analog Inputs may be overridden by setting the OutOfService property and writing to the Present Value . Specific names for each input are defined for each controller.

Additional BACnet Analog Inputs allow override commands for Command , Emergency, Demand Limit, and Functional Output.

ASI Analog Output is scaled in percent of full scale, and may be overridden by writing to the BACnet Present Value which sets the Priority Array.

ASI Binary Outputs are reported as BACnet Binary outputs and may be overridden by writing to the BACnet Present Value which sets the Priority Array. Specific names can be assigned in the controller for Binary Outputs.

Read/write BACnet Analog Values and Binary Values are based on the configuration of the Special Tables .. Up to 48 Analog or Binary Values are for monitoring and changing Setpoints, Status, and other parameters in the controller. In addition, Standard Analog and Binary Values are defined in the controller for often used points based on the controller personality.

No additional configuration is required to support native BACnet communication.

The BACnet Device properties are returned based on the MSTP configuration. Local time and Date properties can be synchronized using the BACnet Time Synchronize Service. ?

The ASIC/1-6100 continues to communicate with ASI protocol through the WS-0xx wall sensor.

ASI Visual Expert can also tunnel over BACnet to the ASIC/1-6100 by selecting a BACnet connection. ASI Expert can request Who-Is service, and builds a list of recognized ASI/BACnet devices. Double clicking on the device brings seamless tunneling of ASI messages over BACnet.

# ASIC/1-6100 BACnet Device Configuration

The ASIC/1-6100 gets its configuration information from the table entries which are configured by communicating with the local bus using ASI Expert through the WS-0xx wall sensor.

The screenshot shows a web-based configuration interface for the ASIC/1-6100 BACnet VAV. At the top, there is a 'Send' button and fields for 'Address: 16100', 'Firmware: 610a v0.1', and 'Description: ASIC/1-6100 BACnet VAV'. Below this is a navigation bar with tabs: 'BACnet MSTP', 'BACnet Values', 'Status', 'Configure', 'Output Summary', 'Other Views', 'Primary Airflow (CFM)', and 'Fan'. The main content area features the 'ASI CONTROLS' and 'BACnet' logos. A 'Reset ASIC' button is present, with a note: 'Changes to BACnet configuration require reset to take effect'. Below this, there are input fields for BACnet parameters: 'MSTP MAC Address: 11', 'MSTP Max Info Frames: 1', 'MSTP Max Master: 30', 'MSTP Baud Rate: 38400', and 'BACnet Device Instance: 116100'.

The BACnet Device Instance must be unique for the entire systems of connected BACnet controllers. It may be, but does not have to be, the same as the System Bus Address. It is a double word value in the range 1 to 4194304. The Device ID corresponds to the instance of the BACnet Device object in the controller. Factory default BACnet Device Instance is 162.

If you make any changes to the BACnet parameters, or that affect the mapping of BACnet points including Object Names, Input Convert Types, or BACnet Values, you need to Reset the controller.

Note: You must reset the controller for new BACnet properties to become active.

---

# BACnet/IP MSTP Router

BACnet MSTP runs on RS-485 twisted pair communication at speeds up to 76,800 baud. To connect to a BACnet MSTP network over Ethernet requires a BACnet/IP to MSTP Router, such as the Contemporary Controls, BASRT-B.



The router must be configured with the usual Ethernet parameters plus additional BACnet and MSTP Parameters .

## Ethernet Parameters

IP Address	192.168.1.233
BACnet/IP UDP Port	BAC0 (47808)
IP Subnet	24-bits (255.255.255.0)
IP Gateway	192.168.1.1

## BACnet Parameters

BACnetDevice Instance	247
BACnet/IP Network	1
MS/TP MAC	0
MS/TP Network	2003
Max Masters	127
Max Info Frames	100
MS/TP Baudrate	38,400 (up to 76,800)
MS/TP Tolerance	Lenient ( or Strict)

The BACnet Router has a unique BACnet Device Instance, 247, and a BACnet/IP network number. The BACnet Router has a BACnet Device object.

The MSTP runs on an RS-485 twisted pair of wires at speeds up to 76,800 baud. 38,400 baud is recommended. It uses Master Slave Token Passing where each controller has a MSTP single byte MAC address. MAC addresses 0 to 127 represent master devices that participate in the token passing. MAC addresses 128 to 255 represent slave devices that only respond when talk to. Each device on the MSTP network must have a unique MAC address including the MSTP port on the router.

The Max Masters parameter represents the highest MAC address on this network. If uncertain or if device may be added in the future the Max Masters should be set to 127.

Max Info Frames is the maximum number of messages that can be routed onto the MSTP network by the router in one token pass. Values above 20 are typical.

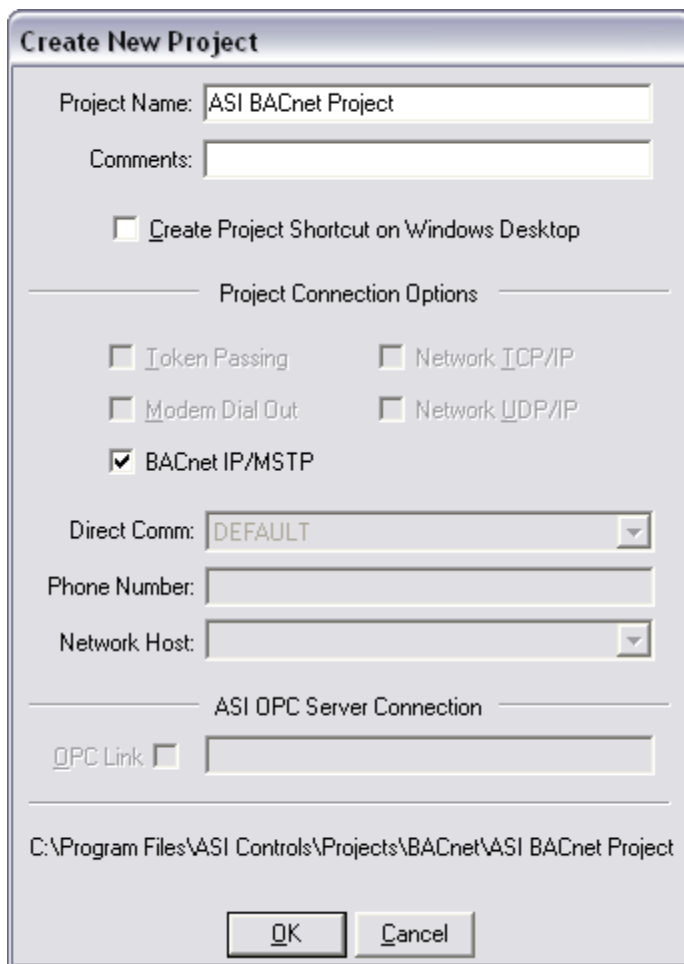
MSTP Tolerance affects the degree of interoperability with other devices. Lenient operation has less efficient traffic, but optimizes interoperability.

Consult the BACnet IP MSTP Router documentation for further information.

# ASI Expert with BACnet

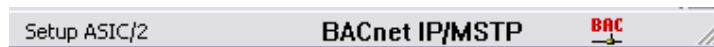
ASI Expert version 3.4 has the ability to communicate with ASI Controllers using ASI protocol, tunneling over a BACnet network. This allows modification of the ASI configuration for the ASIC/1-6100,

Create a new project and select BACnet IP/MSTP.



The 'Create New Project' dialog box is shown. It has a title bar 'Create New Project'. Inside, there is a 'Project Name' field with 'ASI BACnet Project' entered, and a 'Comments' field. Below these is a checkbox 'Create Project Shortcut on Windows Desktop' which is unchecked. A section titled 'Project Connection Options' contains four checkboxes: 'Token Passing' (unchecked), 'Network TCP/IP' (unchecked), 'Modem Dial Out' (unchecked), and 'Network UDP/IP' (unchecked). The 'BACnet IP/MSTP' checkbox is checked. Below this is a 'Direct Comm:' dropdown menu set to 'DEFAULT'. There are 'Phone Number' and 'Network Host' fields. A section titled 'ASI OPC Server Connection' has an 'OPC Link' checkbox which is unchecked. At the bottom, the project path is shown as 'C:\Program Files\ASI Controls\Projects\BACnet\ASI BACnet Project'. 'OK' and 'Cancel' buttons are at the bottom right.

ASI Expert goes into BACnet communication mode as shown in the lower right corner of the window.



From the new home screen select Who-Is to discover the available ASI BACnet devices.



A 'Who-Is' button is on the left. To its right is the text 'BACnet Device Instance Range' followed by two input fields: the first contains '0' and the second contains '4194303', with the word 'to' between them.

Who-Is will generate a list of ASI BACnet devices. Note: only BAC/2-MSTP devices with Maximum APDU 480 are currently available for communication.

Device ID	Device MAC	Network Address	Network ID	Product ID
116100	11	192.168.1.233 BAC0	2003	...
28543	13	192.168.1.233 BAC0	2003	...

Who-Is

BACnet Device Instance Range

0

to

4194303

Select one of the devices and double-click to Find-It.

**ASIC/1-6100 Device Profile**

CONTROLLER PROFILE

Product: ASIC/1-6100

Address: 16100 Change Address

Firmware: 610a v0.1

Description: ASIC/1-6100 BACnet VAV

COMMUNICATIONS PROFILE

Baud Rate: BACnet IP/MSTP

Network: 192.168.1.233:BAC0 2003:11

Device ID: 116100

ASIC/1-6100 Online...

OK

Cancel

It shows the BACnet IP/MSTP device Communication Profile with the BACnet IP Router network address, 192.168.1.233:BAC0; the BACnet Network Number, 2003;the Device MAC address, 11; and the BACnet Device ID, 116100.

ASI Expert then communicates with the ASIC/1 controller through the BAC/2-MSTP interface.

Note: ASI Devices that are attached to ASI BACports are not available through the ASI Expert BACnet interface. However they are available by normal UDP Ethernet connection to the BACport. The BACport acts as a simple ASI EtherLink.

---

## BACnet Device (8)

The BACnet Device object returns properties from the ASIC/1 controller from Table 201, plus the controller description from the Table 1, and the local Time from the ASI Clock.

### Device Properties

Device Properties from the controller configuration.

BACnet Property	ASI Property
Device.MaxInfoFrames(63)	BAC_MaxInfoFrames 1
Device.MaxMaster (64)	BAC_MaxMaster 127
Device.ObjectIdentifier (75)	BAC_DeviceInstance (Device, 116100)
Device.ObjectName (77)	A1_Description "ASIC/1-6100 BACnet VAV"

### Communication parameters

The BACnet communication parameters are stored in Table 201... These are not visible through BACnet.

BACnet Property	ASI Property
BACnet MSTP MAC Address	BAC_MACAddress
BACnet MSTP BaudRate	BAC_BaudRate

### Time Properties

Time Properties from the Controller

BACnet Property	ASI Property
Device.LocalDate (56)	Not Available
Device.LocalTime (57)	A1_ASIC1Time

### Firmware Properties

Device Properties from the BACnetVAV firmware

BACnet Property	
Device.ModelName(70)	ASIC/1-6100
Device.Description (28)	A1_Description
Device.FirmwareRevision (44)	0.5.4
Device.VendorIdentifier (120)	162
Device.VendorName (121)	ASI Controls
Device.ApplicationSoftwareVersion (12)	0.8b(alpha)
Device.DatabaseRevision (155)	0
Device.MaxAPDULengthAccepted (62)	480
Device.APDUTimeout (11)	3000
Device.NumberOfAPDURetries (73)	3
Device.ObjectType(79)	8, Device
Device.ProtocolRevision (139)	5
Device.ProtocolVersion (98)	1
Device.SegmentationSupported(107)	no-segmentation
Device.SystemStatus (112)	operational

## Device Custom Action Properties

Custom ASI Properties for controller actions including State Overrides, Emergency Overrides, and Demand Limit Overrides. These are write only properties, that always return 0.

BACnet Property	Action
ASIC_DEMAND_LEVEL (610000)	ASI MT=0x16
ASIC_EMERGENCY_STATE (610001)	ASI MT=0x12
ASIC_OPERATING_STATE (610002)	ASI MT=0x10

With FW610b1.0 and later the use of Device Custom Action Properties is deprecated in favor of the MultiStateValue Object.

### ***ASIC\_DEMAND\_LEVEL (610000) ASI MT=0x16***

Device Custom Property 610000 is used to write a Demand Level and Group to the controller. The property always reads 0. The value written is an unsigned integer consisting of Demand Group (high byte), and the Demand Level (low byte).

For example using the BACnet utility bacwp.exe to write to BACnet ID 116101, Demand Group 2, Demand Level 6 ( $2 \times 256 + 6 = 518$ ) would send the following write property command

```
bacwp.exe device-instance object-type object-instance property
          priority index tag value
bacwp 116101 8 116101 610000 0 0 2 518
```

where device-instance=116101, object-type=8, object-instance=116101, property=610000 priority = 0, index = 0, tag = 2(unsigned integer), value = 518

This sends the ASI Set/Reset Demand Message, MT=0x16, M1=Level, M2=Group.

### ***ASIC\_EMERGENCY\_STATE (610001) ASI MT=0x12***

Device Custom Property 610001 is used to write a Emergency Override to the controller. The property always reads 0. The value written is an unsigned integer where 1 - Assume Emergency 1 state; 2 - Assume Emergency 2 state, and 3 - Cancel ALL Emergency states. Note Emergency 1 has the highest priority must be canceled before Emergency 2 can be issued.

For example using the BACnet utility bacwp.exe to write to BACnet ID 116101, a value Emergency 2, would send the following write property command

```
bacwp.exe device-instance object-type object-instance property
          priority index tag value
bacwp 116101 8 116101 610001 0 0 2 2
```

where device-instance=116101, object-type=8, object-instance=116101, property=610001 priority = 0, index = 0, tag = 2(unsigned integer), value = 2

This sends the ASI Set/Reset Emergency Message, MT=0x12, M1=Level

### ***ASIC\_OPERATING\_STATE (610002) ASI MT=0x10***

Device Custom Property 610002 is used to write a Operating State Override to the controller. The property always reads 0.

This sends the ASI State Override Message, MT=0x10, M1=function. The function depends on the value written as an unsigned integer.

A1\_StateORAction

- 03 - Set State to Night Setback
- 04 - Set State to Morning Ready
- 05 - Set State to Occupied [Default State]



- 06 - Set State to Unoccupied
- 07 - Restore State to Daily Event Schedule

#### A1\_ChangeoverAction

- 08 - Set Changeover ON -
- 09 - Set Changeover OFF
- 10 - Reset Changeover to Normal

For example using the BACnet utility bacwp.exe to write to BACnet ID 116101, a value Night Setback (3), would send the following write property command

```

bacwp.exe device-instance object-type object-instance property
        priority index tag value
bacwp 116101 8 116101 610002 0 0 2 3

```

where device-instance=116101, object-type=8, object-instance=116101, property=610001 priority = 0, index = 0, tag = 2(unsigned integer), value = 3(Night Setback)

## BACnet Analog Input (0)

The BACnet Analog Input object maps to the ASIC/1-6100 inputs in order where Analog Input\_0 thru \_5 represents physical inputs IN-1 thru IN-6.

Input Name comes from new Table 31 E1..16 Input 1 Name, etc.

The Input Configuration Types are in Table 8.

Present Input Values are in Table 9 Entry 47,48 IN1, etc. Except for Input 4 Airflow which is in Table 16 E8 WORDU

Note: If the Input has been configured as a Normally Open Binary, Normally Closed Binary, Tri-Mux , or Quad Mux Input, then that Analog Input reports as “not used” and the physical input is configured as one or more binary inputs.

The BACnet Object Identifier consists of the Object Type 0 and the BACnet instance number 0 thru 5.

#### BACnet Property

AI.ObjectIdentifier (75) 0, (Analog Input, Instance 0)  
 AI.object-type (79) 0, Analog Input

Both the Description and the ObjectName report the Input Name stored in the controller.

BACnet Property	Value
AI.description (28)	“Zone Temperature”
AI.object-name (77)	“Zone Temperature”
AI.units (117)	64, degrees-fahrenheit
AI.present-value(85)	72.000000
AI.status-flags(111)	{ false,false,false,false }
AI.event-state(36)	normal
AI.out-of-service(81)	FALSE

## Analog Input Overrides

The Analog Input may be overridden by writing TRUE to AI.out-of-service and then writing a new value to the AI.present-value. The override is cleared by writing FALSE to AI.out-of-service. Only AI instance 0,IN-01 Zone Temperature, and AI Instance 3, IN-04 Airflow can be overridden.

---

## BACnet Binary Input (3)

If an ASI Input has been configured as a Normally Open Binary, Normally Closed Binary, Tri-Mux, or Quad Mux Input, then that Analog Input reports as “not used”. The Input is configured as one or more binary inputs.

BACnet Binary Input Instance numbers are assigned in the order that occur starting with ASI Input 1 through 6. Normally Open and Normally Closed are assigned to one BI instance; Tri-MUX to 3 instances and Quad-MUX to 4 instances.

**CAUTION:** If you change one of the input configurations, adding or deleting a binary input, it will change the BACnet Binary Input Instance assignments.

### BACnet Property

BI.object-name(77)	"IN-5 TRI-MUX A"
BI.description(28)	"IN-5 TRI-MUX A"
BI.object-type(79)	3, Binary Input
BI.present-value(85)	inactive
BI.status-flags(111)	{ false,false,false,false }
BI.event-state(36)	normal
BI.out-of-service(81)	FALSE
BI.polarity(84)	0
BI.event-state(36)	normal

## Binary Input Override

Binary Inputs may be overridden by setting the BACnet OutOfService and writing to the present value. The ASI InputORStatus parameter is set, and the new value is written to the ASI Present Value. The BACnet StatusFlags will show bit3-Out of Service.

You must put the Binary Input "out of service" before you can write to the present-value (just like with Analog Inputs).

If you override more than one present-value of a multiplexed binary input, then all the values will remain overridden until you disable the "out of service" flag for ALL related Binary Inputs.

### BACnet Property

BI.Out-Of-Service (81)	False
BI.Status-Flags (111)	bit0 – In Alarm; bit1 – Fault; bit2 – Overridden; bit 3 – Out of Service

---

# BACnet Analog Output (1)

The BACnet Analog Output object maps to the single ASIC/1-6100 Analog Output. The BACnet Object Identifier consists of the Object Type 1 and the BACnet instance number 0.

The ObjectName reports the name based on the configuration stored in the controller.

T3 E23 AO Assignment (eAOAssignment)

- 0 – None
- 1 – CLG Requirement
- 2 – HTG Requirement
- 3 - Not Used
- 4 - X-over Heating/Cooling
- 5 – ECM Fan Speed
- 6..15 - None

## BACnet Property

AO.object-identifier(75)	(Analog Output, 0)
AO.object-name(77)	"Cooling Requirement"
AO.object-type(79)	Analog Output
AO.present-value(85)	99.607841
AO.status-flags(111)	{ false,false,false,false }
AO.event-state(36)	normal
AO.out-of-service(81)	FALSE
AO.units(117)	percent
AO.event-state(36)	normal
AO.priority-array(87);	{ Null,Null,Null,Null,Null,Null,Null,Null,Null,Null,Null,Null,Null,Null,Null }
AO.relinquish-default(104)	99.607841

The AO.present-value is the ASI Analog Output Value expressed in percent. The AO.present-value matches the state of the controller's physical output unless AO.out-of-service is true and the AO.present-value is overridden (priority array has non-null entry). The AO.relinquish-default property is read-only and follows the controller's sequence value.

## Analog Output Override

When AO.present-value is written, an entry in AO.priority-array is written. The controller's Analog Output is overridden and the highest priority override is written to AO.present-value. The BACnet interface is the master and continuously checks that these overrides are consistent. ASI overrides are ignored. The BACnet AO override remains in effect until all of the AO.priority-array entries are null, in which case sequence control of the output is restored.

If AO.out-of-service is set to true, then local ASI overrides work and the AO is said to be out of service.

When out of service AO.present-value does not reflect the state of the physical output if the AO has been overridden (an entry in AO.priority-array is non-null). In this case, the physical output is "disconnected" from present-value. However, when out of service AO.relinquish-default tracks the state of the physical output. Placing the AO back in service will "reconnect" AO.present-value to the controller's actual output state.

If the Analog Output Assignment, T3 E23, is "None", then on controller reset, the BACnet AO "Out\_Of\_Service" is set to true, and the local ASI overrides will work.

The AO StatusFlags (111) are set to show Overridden or Out of Service.

bit0 – In Alarm; bit1 – Fault; bit2 – Overridden; bit 3 – Out of Service

---

## BACnet Binary Output (4)

The BACnet Binary Output object maps to the ASIC/1-6100 Outputs representing physical Binary Outputs BO-1 thru BO-5.

The object-name depends on the ASIC/1-6100 personality and reflects the assigned usage for that output; For example: Hot Water Valve (open), Hot Water Valve (close), Electric Heat 1, Fan, etc. If the personality is changed, then on reset of power the new object names are used.

### BACnet Property

BO.object-identifier(75)	(Binary Output, 1)
BO.object-name(77)	"Primary Damper (close)"
BO.object-type(79)	4, Binary Output
BO.present-value(85)	inactive
BO.status-flags(111)	{ false,false,false,false }
BO.event-state(36)	normal
BO.out-of-service(81)	FALSE
BO.polarity(84)	0
BO.priority-array(87)"	{ Null,Null,Null,Null,Null,Null,Null,Null, Null,Null,Null,Null,Null,Null,Null,Null }
BO.relinquish-default(104)	0

Both the Description and the ObjectName report the Output Name stored in the controller. The relinquish-default property is read-only and follows the controller's sequence value.

## Binary Output Override

When BO.present-value is written, an entry in BO.priority-array is written. The controller's Binary Output is overridden and the highest priority override is written to BO.present-value. The BACnet interface is the master and continuously checks that these overrides are consistent. ASI overrides are ignored. The BACnet BO override remains in effect until all of the BO.priority-array entries are null, in which case sequence control of the output is restored.

If BO.out-of-service is set to true, then local ASI overrides work and the BO is said to be out of service.

When out of service BO.present-value does not reflect the state of the physical output if the BO has been overridden (an entry in BO.priority-array is non-null). In this case, the physical output is "disconnected" from present-value. However, when out of service BO.relinquish-default tracks the state of the physical output. Placing the BO back in service will "reconnect" BO.present-value to the controller's actual output state.

If the Output Power-up Override State ,T3 E4, set for the output, then on controller reset, the BACnet BO "Out\_Of\_Service" is set to true for the corresponding output, and the local ASI overrides will work.

The BO StatusFlags (111) are set to show Overridden or Out of Service.  
bit0 – In Alarm; bit1 – Fault; bit2 – Overridden; bit 3 – Out of Service

---

# BACnet Multi-State Values (19)

The controller has defined 15 Multi-State Value instances which can be used to override the Demand Level, Emergency State, and Operating State of the controller in addition to providing Functional Overrides of controller outputs. These are write-only objects which return the last value written. You must read the appropriate value back from the controller in order to verify the action has taken place.

In cases where a Multi-State Value changes the state of a controller output (example: Force Heat On), the corresponding BACnet output is placed out of service and the controller's physical output is changed to the appropriate state. When the corresponding "restore" command is sent to a Multi-State Value (in this example Restore Heat), the BACnet output is placed back in service and the controller's physical output tracks the BACnet output's present-value.

While an output is out of service, ASI overrides are honored for that output – for example from Visual Expert.

When out of service an output's present-value does not reflect the state of the physical output if the output has been overridden (an entry in output's priority-array is non-null). In this case, the physical output is "disconnected" from present-value. However, when out of service the output's relinquish-default property tracks the state of the controller's physical output. Placing a BACnet output back in service will "reconnect" the output's present-value to the controller's physical output state.

## Demand State Override (MSV, Instance 0)

Multi-State Value, Instance 0 is used to write a Demand Level and Group to the controller. The property always reads the last value written.

The value written is an unsigned integer consisting of Demand Group (high byte), and the Demand Level (low byte) using ASI message MT=0x16. The function depends on the value written to the MSV as an unsigned integer. The value written to the MSV is determined as follows:  $\text{demand\_level} + (\text{demand\_group} * 7) + 1$

For example, to set the demand level and group of a controller to demand level 1 demand group 2, write the unsigned integer 16 to MSV instance 0. The number 16 is computed as follows:  $16 = 1 + (2 * 7) + 1$

## Emergency State Override (MSV, Instance 1)

Multi-State Value, Instance 1 is used to write an Emergency State Override to the controller. The property always reads the last value written.

This sends the Emergency State Override Message, MT=0x12, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Set State to Emergency State 1
- 2 - Set State to Emergency State 2
- 3 - Cancel All Emergency States

Note Emergency 1 has the highest priority and must be canceled before Emergency 2 can be issued.

## Operating State Override (MSV, Instance 2)

Multi-State Value, Instance 2 is used to write an Operating State Override to the controller. The property always reads the last value written.

This sends the ASI State Override or As If Pushed Message, MT=0x10, M1=function. The function depends on the unsigned value written to the MSV.

- 1 - Set State to Night Setback
- 2 - Set State to Morning Ready
- 3 - Set State to Occupied [Default State]
- 4 - Set State to Unoccupied
- 5 - Restore State to Daily Event Schedule
- 6 – As If Pushed, Duplicates Function of After-Hours Push Button

## Changeover Override (MSV, Instance 3)

Multi-State Value, Instance 3 is used to write a Changeover Override to the controller. The property always reads the last value written.

This sends the ASI State Override Message, MT=0x10, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Set Changeover ON
- 2 - Set Changeover OFF
- 3 - Reset Changeover to Normal

## Control Mode Override (MSV, Instance 4)

Multi-State Value, Instance 4 is used to write a Control Mode Override to the controller. The property always reads the last value written.

This sends the ASI State Override Message, MT=0x10, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Set Deadband Control Mode
- 2 - Set Cooling Control Mode
- 3 - Set Heating Control Mode
- 4 - Restore Control Mode

## Heat Override (MSV, Instance 5)

Multi-State Value, Instance 5 is used to write a FunctionORAction Heat Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Force Heat OFF
- 2 - Force Heat ON
- 3 - Restore Heat
- 4 – Force HW Valve Stop

## FanOverride (MSV, Instance 6)

Multi-State Value, Instance 6 is used to write a FunctionORAction Fan Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Force FAN OFF
- 2 - Force FAN ON
- 3 - Restore FAN

## Lights Override (MSV, Instance 7)

Multi-State Value, Instance 7 is used to write a FunctionORAction Lights Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Force Lights OFF
- 2 - Force Lights ON
- 3 - Restore Lights

## **Damper Override (MSV, Instance 8)**

Multi-State Value, Instance 8 is used to write a FunctionORAction Damper Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Force Primary Damper STOP
- 2 - Force Primary Damper CLOSED
- 3 - Force Primary Damper OPEN
- 4 - Force Primary Damper MINIMUM
- 5 - Force Primary Damper MAXIMUM
- 6 - Restore Primary Damper

## **Aux Cooling Override (MSV, Instance 9)**

Multi-State Value, Instance 9 is used to write a FunctionORAction Aux Cooling Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Force Aux CLG OFF
- 2 - Force Aux CLG ON
- 3 - Restore Aux CLG

## **Aux Heating Override (MSV, Instance 10)**

Multi-State Value, Instance 10 is used to write a FunctionORAction Aux Heating Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Force Aux HTG OFF
- 2 - Force Aux HTG ON
- 3 - Restore Aux HTG

## **Aux 1 Override (MSV, Instance 11)**

Multi-State Value, Instance 11 is used to write a FunctionORAction Aux 1 Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

FunctionORAction

- 1 - Force Aux 1 OFF )
- 2 - Force Aux 1 ON
- 3 - Restore Aux 1

## **Aux 2 Override (MSV, Instance 12)**

Multi-State Value, Instance 2 is used to write a FunctionORAction Aux2 Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Force Aux 2 OFF
- 2 - Force Aux 2 ON
- 3 - Restore Aux 2

### **Aux 3 Override (MSV, Instance 13)**

Multi-State Value, Instance 13 is used to write a FunctionORAction Aux 3 Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

FunctionORAction

- 1 - Force Aux 3 OFF
- 2 - Force Aux 3 ON
- 3 - Restore Aux 3

### **Thermic Valve Override (MSV, Instance 14)**

Multi-State Value, Instance 14 is used to write a FunctionORAction Thermic Valve Override to the controller. The property always reads the last value written.

This sends the ASI FunctionORAction Message, MT=0x21, M1=function. The function depends on the value written to the MSV as an unsigned integer.

- 1 - Force Thermic Valve OFF
- 2 - Force Thermic Valve ON
- 3 - Restore Thermic Valve



## BACnet Analog Values(2)/Binary Values(5)

The ASIC/1 has special tables 201,202,203, and 204 that allow defining custom Analog or Binary Values in the controller.

Send

Address: 16100

Firmware: 610a v0.1

Description: ASIC/1-6100 BACnet VAV

BACnet MSTP

BACnet Values

Status

Configure

Output Summary

Other Views

Primary Airflow (CFM)

Fan

Object	Table	Entry	Select	Scale	Name	
AU00	2	14	Return LO Byte Only	none	ZoneTempAlarmRan	
AU01	2	17	Return LO Byte Only	none	ChangeoverSP	
AU02	2	18	Return Word Value	0.1	ZoneSensorBias	
AU03	2	7	Return LO Byte Only	airflow	FanEnergizeAirfl	
AU04	2	15	Return LO Byte Only	airflow	1StAFAlarmRange	
AU05	2	23	Return LO Byte Only	airflow	CLGAirflowUNOCCM	
AU06	2	24	Return LO Byte Only	airflow	CLGAirflowUNOCCM	
AU07	2	25	Return LO Byte Only	airflow	HTGAirflowUNOCCM	
AU08	2	26	Return LO Byte Only	airflow	HTGAirflowUNOCCM	
AU09	2	27	Return LO Byte Only	airflow	CLGAirflowNSBMin	
AU10	2	28	Return LO Byte Only	airflow	CLGAirflowNSBMax	
AU11	2	29	Return LO Byte Only	airflow	HTGAirflowNSBMin	
AU12	2	30	Return LO Byte Only	airflow	HTGAirflowNSBMax	
AU13	3	8	Return LO Byte Only	airflow	ElectricHeatMinA	
AU14	3	12	Return LO Byte Only	airflow	AirflowHysteresi	
AU15	16	8	Return Word Value	none	PrimaryAirflow	
AU16	16	7	Return LO Byte Only	none	OutputStatusActu	
BU17	16	7	Set if Lo Bit0 Set	none	Output1Status	
BU18	16	7	Set if Lo Bit1 Set	none	Output2Status	
BU19	16	7	Set if Lo Bit2 Set	none	Output3Status	
BU20	16	7	Set if Lo Bit3 Set	none	Output4Status	
BU21	16	7	Set if Lo Bit4 Set	none	Output5Status	
BU22	6	2	Set if Lo Bit0 Set	none	AfterhourEnable	

Custom Values are Analog or Binary depending on whether a number, or a bit is selected.

AV/BV00 to AV/BV47 are defined by data is stored in special ASIC/1-6100 configuration tables 201, 202, 203, and 204 which is only accessed by means of this special summary table.

AV48 to AV69 are fixed, and vary depending on the controller personality

BV70 to BV73 are fixed alarm status values.

<b>AV</b> 48	16	5	Return LO Byte Only	none	Cooling Temp SP	
<b>AV</b> 49	16	6	Return LO Byte Only	none	Heating Temp SP	
<b>AV</b> 50	2	1	Return LO Byte Only	none	CLG OCC Temp SP	
<b>AV</b> 51	2	2	Return LO Byte Only	none	HTG OCC Temp SP	
<b>AV</b> 52	2	10	Return LO Byte Only	none	CLG UNOC Temp SP	
<b>AV</b> 53	2	11	Return LO Byte Only	none	HTG UNOC Temp SP	
<b>AV</b> 54	2	12	Return LO Byte Only	none	CLG NSB Temp SP	
<b>AV</b> 55	2	13	Return LO Byte Only	none	HTG NSB Temp SP	
<b>AV</b> 56	10	16	Return LO Byte Only	% (percent)	CLG Requirement	
<b>AV</b> 57	10	20	Return LO Byte Only	% (percent)	HTG Requirement	
<b>AV</b> 58	10	52	Return LO Byte Only	none	Active Demand	
<b>AV</b> 59	16	3	Two Bits 2,3	none	Control State	
<b>AV</b> 60	16	3	Two Bits 0,1	none	Control Mode	
<b>AV</b> 61	18	16	Return LO Byte Only	none	Damper Pos (s)	
<b>AV</b> 62	10	35	LO Byte, LS Nibble	none	Damper Status	
<b>AV</b> 63	10	36	LO Byte, LS Nibble	none	HW Valve Status	
<b>AV</b> 64	10	11	Two Bits 0,1	none	Emergency Status	
<b>AV</b> 65	10	19	Return LO Byte Only	airflow	Active AirflowSP	
<b>AV</b> 66	2	3	Return LO Byte Only	airflow	CLG OCC AFMinSP	
<b>AV</b> 67	2	4	Return LO Byte Only	airflow	CLG OCC AFMaxSP	
<b>AV</b> 68	2	5	Return LO Byte Only	airflow	HTG OCC AFMinSP	
<b>AV</b> 69	2	6	Return LO Byte Only	airflow	HTG OCC AFMaxSP	
<b>BU</b> 70	16	1	Set if Lo Bit0 Set	none	HI ZoneTempAlarm	
<b>BU</b> 71	16	1	Set if Lo Bit1 Set	none	LO ZoneTempAlarm	
<b>BU</b> 72	16	1	Set if Lo Bit2 Set	none	HI Airflow Alarm	
<b>BU</b> 73	16	1	Set if Lo Bit3 Set	none	LO Airflow Alarm	

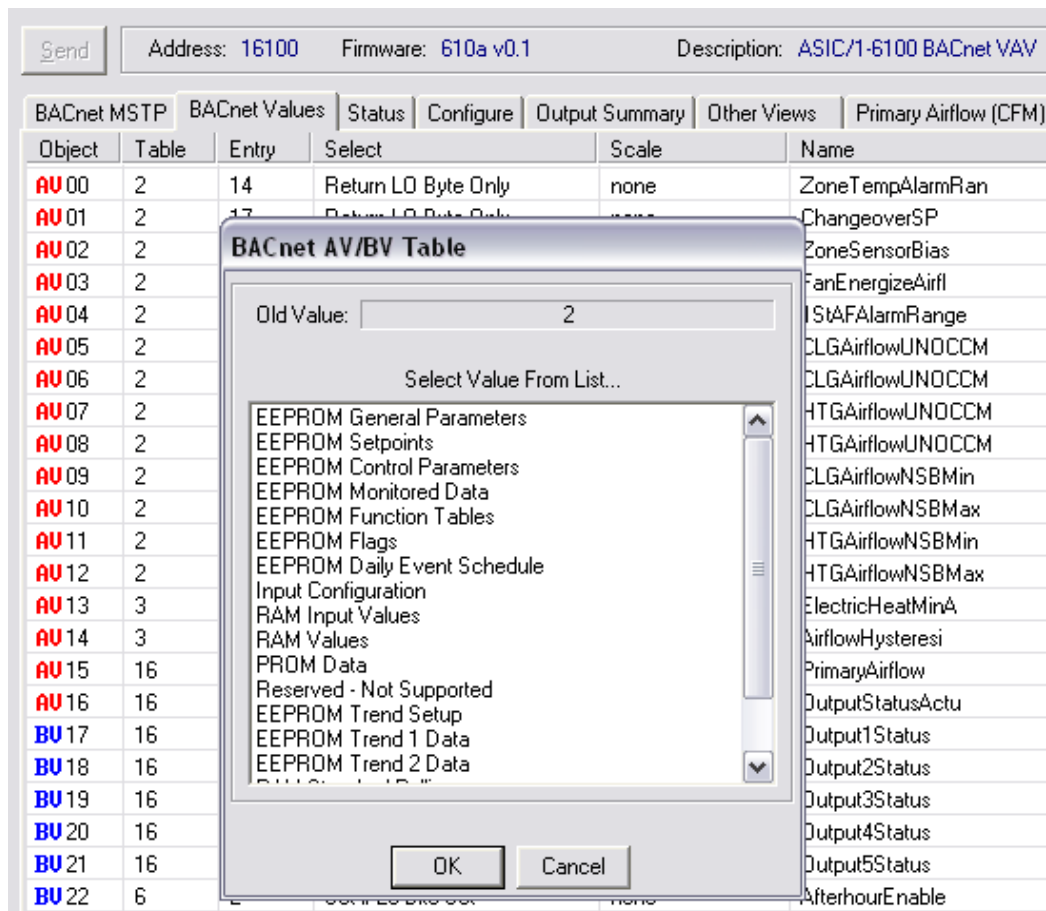
ASIC/1-6100 Configuration -- [12] Intermittent Fan with Hot Water Heat

## BACnet Value Summary Table

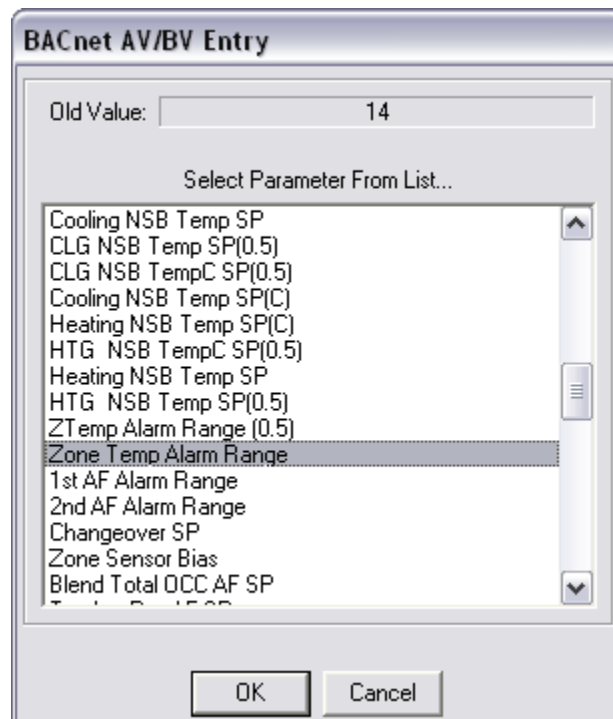
The BACnet Values summary table is defined in the ASI Expert a1-6100.pvs file by special table 2988 (0x0BAC) and a list of properties. The order of properties is fixed.

```
{ "BACnet Values" (2988)
  [ "Object", 50, 0]
  [ "Table", 50, 1]
  [ "Entry", 50, 2]
  [ "Select", 150, 3]
  [ "Scale", 100, 4]
  [ "Name", 150, 5]
}
```

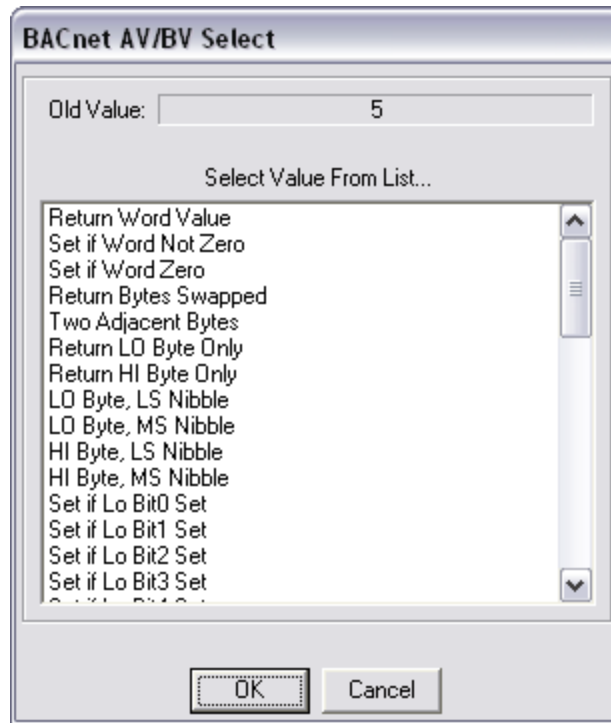
Custom BACnet Values can be added or edited by double clicking on the Table which brings up a dialog to select a table. Selecting EEPROM Setpoints(table 2) brings up a list of parameters from the asic1.mdb database that are available.



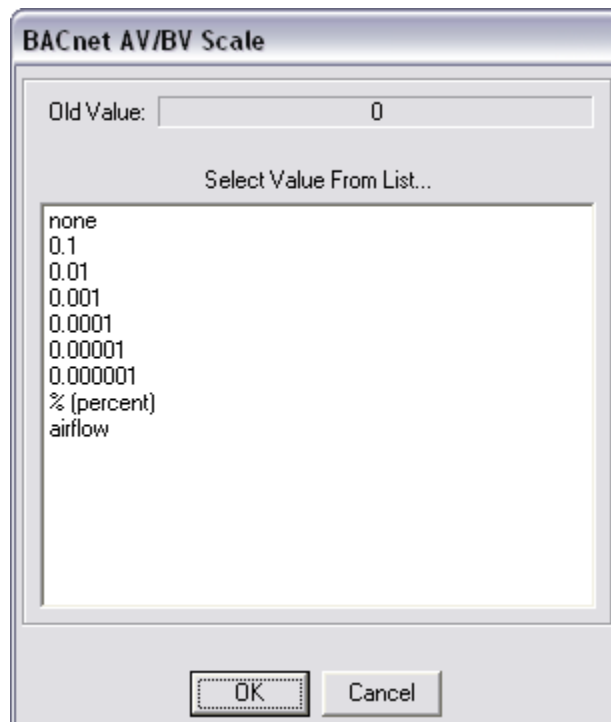
Selecting EEPROM Setpoints(table 2) brings up a list of parameters from the asic1.mdb database that are available.



Selecting the parameter will then complete the entry including the parameter Object Name. You may change the data selected by double clicking on Select which brings up a select dialog.



The Scale property allows changing how the data is displayed.



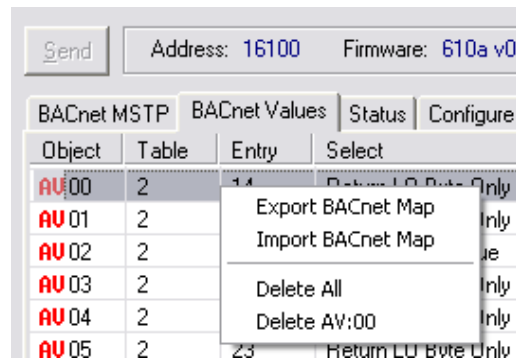
Presently you can not edit the Object Name from the summary screen.

By clicking on the Save button, the data is stored in the controller.

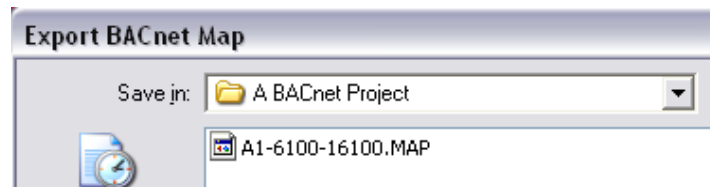
Note: Any changes to the Custom Values requires a controller reset before they are active.

## MAP file

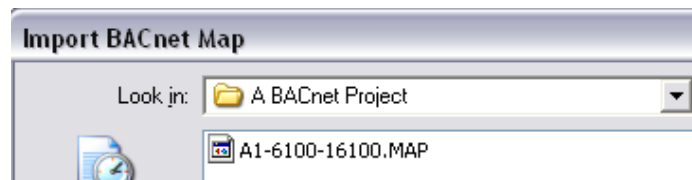
Right clicking on an entry brings up a dialog which allows deleting a specific entry, or Deleting All custom entries.



It also allows Export BACnet Map to a text file which is saved in the project file.



You may edit this file off-line, or copy it from another controller and use it to Import BACnet Map to the controller. Only the Custom BACnet Value points are imported.



```
ASIC/1-6100
OBJECT, TABLE, ENTRY, SELECT, FLAGS, NAME
AV:00, 02, 0e, 05, 00, ZoneTempAlarmRan
AV:01, 02, 11, 05, 00, ChangeoverSP
AV:02, 02, 12, 00, 01, ZoneSensorBias
AV:03, 02, 07, 05, 08, FanEnergizeAirfl
...
```



# ASIC/1-6100 Appendix

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## ASI Controller Addressing

### Device Addresses

Each controller has a 2 byte address kept in non-volatile memory that allows it to be directly addressed with commands on the communications line. When the controller recognizes its address, it processes the message and delivers the appropriate response message.

### Group Addresses

Device addresses that are evenly divisible by 256 are reserved for Group addressing. Each controller can be assigned a separate single byte group address, 1..255. Group addressing is used to send a one way communication to a specific group of devices in the system. . No response is made by any devices listening to a message sent to a group address.

Care must be taken in sending commands to a group destination address. Only controllers of a single type should be assigned to the same group, because each type has different parameter assignments. For example, ASIC/1-8055 VAV controllers may have different setpoint assignments than ASIC/1-8655 Roof Top Controllers.

### Global Addresses

All messages to ASI controllers may be transmitted using a Global Address. The Global address is fixed in each ASI controllers. Addresses 23,041 through 23,295 (0x5A01 through 0x5AFF) are reserved for device global addresses. All messages sent to the global address associated with a particular device will be received and acted on. No response is made by any listening devices to a 'Global' message.

Use of global address should be restricted to time synchronization (message type 38h), Set operating state (message type 10h), Set Emergency State (message type 12h). Other messages should be used only if all controllers on the system are the same type.

Global broadcast messages are always broadcast 3 times with a gap of approximately 50 ms between each repeated message.

The Device Global Address allows for global downloads of parameters and setpoints to all controllers of a particular type, without affecting other controllers which may use the same parameter location for a different purpose. The following Global Addresses are defined for the ASIC/1-8655 controllers.

Address 23,045 (0x5A05) ASIC/1-8055, ASIC/1-6000 VAV Controllers (155a,600a)

Address 23,125 (0x5A55) All ASIC/1-8x55 Controllers  
(155A,175A, 255A, 355A,655A,600A)

Address 23,130 (0x5A5A) All ASIC/1 terminal unit controllers.

## Initialization Addresses

Addresses 46,081 through 46,335 ('B4 01 hex' through 'B4 FF hex' ) are reserved for initialization of device addresses. These addresses are typically used with message type, 42h, Get address, to return the assigned device address of a controller. It is used with a hardware interlock in the ASIC/1 controllers. The ASIC/2 controllers do not use a hardware interlock.

Address 46,260 (0xB4B4) is used with a hardware interlock on ASIC/1 terminal unit controllers to perform certain commands such as installing a new controller address and loading the default table of parameters.

Address 46,165 (0xB455) is used with a hardware interlock on ASIC/1-8X55, or ASIC/1-6000 controller to perform certain commands such as installing a new controller address and loading the default table of parameters.

Address 46,112 (0xB420) is used with SINC/2 or SINC/3 Controller to retrieve the Device Address.

Address 46,192 (0xB470) is used with the ASIC/2 Controller family to retrieve the Device Address.

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## Firmware History

The ASIC/1-6100 firmware can be upgraded in the field over communications. The ASIC/1-6100 has two microprocessors and two firmwares.

The first microprocessor controls the VAV sequence of operation and the ASI communications. This firmware 610aXX-rel.hex is upgraded using Flash Dev over the ASI communication port thru the Wall Sensor.

The second processor is used to handle the BACnet interface and communication. This firmware, BACVAV\_XX.bin is upgraded using FlashBAC over the BACnet communication.

### ASIC/1-6100 Read Me(BACnet)

#### ***ASIC/1-6100 BACnetVAV\_08d.bin 2011-09-28***

- Fixes a bug in 0.8c which caused the AV/BV present-values not to update.

#### ***ASIC/1-6100 BACnetVAV\_08c.bin 2011-09-14***

- Changes to how the 6100 responds to a request for all of its objects at once. The AI,AO,BI,BO object inventory is unchanged. The AV's and BV's that are not in use (not mapped) are not be enumerated. Message segmentation is not supported, so there is a limit to the number of custom points that can be mapped in a single 480 byte APDU.

#### ***ASIC/1-6100 FW610a Rev 1.1a 2011-07-20***

- Adds feature to reinitialize HW Valve by driving it fully closed once every 24 hours, if not synchronized and if HW Reset Enable T6E4bit7 is set.

#### ***ASIC/1-6100 BACnetVAV\_08b.bin 2011-05-18***

- Optional BACnet "Description" Property added for all objects
- RX/TX LEDs should come on in "test mode"
- Reading 2 bit select types should work for any bit position..

#### ***ASIC/1-6100 FW610a Rev 1.0 2011-05-09***

- Initial Release Version based on FW600a 2.1

#### ***ASIC/1-6100 BACnetVAV\_08a.bin 2011-05-08***

- Add BACnet Device Properties 610000, 610001, 610002 for Emergency, State, and Demand overrides..



# BACnetVAV Upgrade

The BACnetVAV BACnet Communication software can be upgraded over BACnet using the ASI FlashBAC utility program version 1.005 or later.

The screenshot shows the 'ASI Controls In-Field BACnet Flash Programmer' window. At the top, there are logos for 'ASI CONTROLS' and 'BACnet'. Below the logos, the interface includes several input fields and controls:

- Device Type:** A dropdown menu set to 'ASIC/1-6100'.
- Device Identifier:** A text box containing '116101', with a tooltip indicating it is the 'Unique BACnet Device Instance (0 - 4194303)'.
- Device MAC:** A text box containing '38', with a tooltip indicating it is the 'BACnet/MSTP Mac Address (0 - 127)'.
- Device Network:** A text box containing '2003', with a tooltip indicating it is the 'BACnet/MSTP Network Number'.
- Device Program File:** A text box containing 'C:\ASI\flash6100\BACnetVAV\_08b.bin'.
- Checkboxes:** A checked box labeled 'Automatically discover BACnet/IP router to MSTP network'.
- BACnet/IP Router:** An empty text box.
- BACnet/IP Port:** A dropdown menu set to 'BAC0', with a tooltip indicating 'BAC0 = 47808, BAC1 = 47809, ...'.
- Buttons:** 'START' and 'STOP' buttons.
- Progress Bar:** A progress bar showing '0%' completion.
- Timer:** A display showing '0.0 seconds'.

Make sure that no other BACnet processes are running on the computer.

With the BACnet IP Port and Device Network, FlashBAC should discover the BACnet IP/Router information and download the latest software.

**ASI Controls In-Field BACnet Flash Programmer**

**ASI CONTROLS** **BACnet®**

Device Type:

Device Identifier:  Unique BACnet Device Instance (0 - 4194303)

Device MAC:  BACnet/MSTP Mac Address (0 - 127)

Device Network:  BACnet/MSTP Network Number

Device Program File:

☒ Automatically discover BACnet/IP router to MSTP network.

BACnet/IP Router:

BACnet/IP Port:  BAC0 = 47808, BAC1 = 47809, ...

21.7 seconds

**17%**

**sent 6528 / 37528 bytes**

## FW610a Upgrade

Use FlashDev version 1.106 or later to download the latest firmware to the controller thru ASI communication thru the wall sensor. Select the Hex file to download.. Select the appropriate COM port, and baud rate. Select Go.

**ASI In-Field Flash Programmer**

Flash Device: ASIC/1-6100

Device Address: 16101 Device List...

Connection: COM1

☐ SERIAL 1200 bps  
☒ SERIAL 9600 bps  
☐ SERIAL 19200 bps  
☐ SERIAL 38400 bps  
☐ UDP/IP Network  
☐ TCP/IP Network

---


Binary Flash Archive: C:\ASI\flash6100\610a10a-rel.hex [...]

☐ Output .hex + CRC8 CRC8 = 5e hex

**SENT 4608 / 22362 BYTES...**

**20%**

05/18/11 14:24:17 FLASHING ASIC/1-6100 @ 16101...

 14.1 seconds Go Abort 