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FlexStat Firmware Revision History

About this Technical Bulletin

This technical bulletin lists the history of the firmware (after the initial release, R1.2.0.6) for the FlexStat. See the FlexStat Operation Guide for more information about various features.

Build R2.1.0.18 (July 2016)

Changes/Fixes

- To reduce the chance that cooling coils might be exposed to excessively cold air, the economizer function now uses a DAT (Discharge Air Temperature) sensor instead of a MAT (Mixed Air Temperature) sensor. (The DAT sensor previously was only used for trends by the built-in programs, not for control.)
- Replaced all references and aliases of MAT (Mixed Air Temperature) to DAT (Discharge Air Temperature). In relevant FlexStat installation guide drawings, the (STE-1416) MAT sensor would be eliminated, and the (STE-1402) DAT sensor should be connected to IN3 in its place. An averaging sensor is no longer needed since the AHU fan mixes the air upstream of the DAT sensor.
- Removed the option to select Discharge Air Temp for IN2 in the Advanced > Application > Additional Setup > Sensors menu. (IN2 options are now for Fan Status or Not Used.)
- Changed Trend2 to trend AI3 instead of AI2, but only if the damper economizer is configured as Modulating.
- Changed the default value of AV43 (DAT MIN) from 53 to 55° F and changed the default value of AV44 (DAT MAX) from 68 to 70° F. (The duct temperature at the DAT sensor is slightly higher than in the position of the former MAT sensor because of the temperature rise caused by the fan.)
- Changed the Low Limit Alarm reference from the MAT sensor to the DAT sensor.
- Miscellaneous other bug fixes and performance enhancements.

NOTE: See also the FlexStat Economizer Change of MAT to DAT Service Bulletin for important information about changes to operation and documentation!

Build R2.1.0.15 (September 2014)

New Features

- When there is a call for humidification or dehumidification (but not heating) while in heating mode, the display shows the relevant humidification icon (appearing water drop) or dehumidification icon (disappearing water drop).

Changes/Fixes

- Corrected code to stop dehumidification when the space temperature is below the active heating setpoint minus the heating span.
- Corrected code to allow heating during dehumidification.
- Miscellaneous other minor changes.

Build R2.1.0.9 (April 2014)

New Features

- Added the ability to adjust the screen's LCD Contrast to the top of the Advanced > User Interface menu.
- Made showing the date and time on the home screen display optional. Showing them can be disabled near the bottom of the Advanced > User Interface menu. If the date and time are disabled, a new spinning clock icon shows on the top of the home screen display instead.

Changes/Fixes

- Various bug fixes

Build R2.1.0.7 (July 2013)

New Features

- Added **MS/TP diagnostics** to the bottom of the Advanced > Communications > MS/TP menu. It consists of a set of internal MS/TP communication status and error counters from that FlexStat's perspective. (Diagnostics are only available when MS/TP is the active communications port.) See the (Advanced) Communications (BACnet) section in the [FlexStat Operation Guide](#) for details.
- The Communications menu now has a Status line that indicates the **Route Status** (e.g., Active, Down, or Sole Master) of the active network communication protocol. See the (Advanced) Communications (BACnet) section in the [FlexStat Operation Guide](#) for details.
- A "**Loading**" screen now appears during power-up or restart. It briefly shows the model number, installed firmware version, and boot progress.

Changes/Fixes

- Changed **default integral values** of COOLING INTG (AV80) and HEATING INTG (AV81) from 4.0 to 0.0. Changed default integral value of ECON INTG (AV82) from 6.0 to 0.0.
- Re-enabled edit of **Max_Info_Frames** in the MS/TP configuration menu. The allowed range for Max_Info_Frames is 1 to 20. The device object properties **Max_Master** and **Max_Info_Frames** are now writeable via BACnet.
- Changes to the MS/TP Max_Master and Max_Info_Frames properties are now immediately applied, with no restart required. The minimum value for Max_Master is the same as the device's MS/TP MAC address, and the maximum value is 127.
- When the MAC address is changed in the MS/TP configuration menu, the Max_Master value will be changed to 127 if the current Max_Master value is less than or equal to the new MAC address. The minimum value for Max_Master is the same as the device's MS/TP MAC address, the maximum value is 127.

- Handling of **duplicate MAC address detection** has changed. In previous firmware, a duplicate MAC address was treated as a configuration error, and the MS/TP channel would stop sending responses to requests but would continue to pass the token. The device would appear to be offline since it would not answer any BACnet requests. A restart could correct the problem until a duplicate MAC was detected again. Now when a duplicate MAC address is detected, the condition is flagged in the MS/TP channel diagnostic data, but the device continues to fully participate on the network.
- Fixed issues with the **Real Time Clock** speed and restarts.

Build R2.1.0.1 (September 2012)

New Features

- Installation of this firmware makes all standard FlexStat models **BTL Listed**. (Previously, BTL listing had been pending.)

Changes/Fixes

- **Increased** number of **AV** objects to **150** and **LOOP** objects to **20**.
- **Fixed** Daylight Saving Time (**DST**) issues.
- Fixed a number of minor BTL-testing issues.
- Miscellaneous other bug fixes and enhancements.

Build R2.0.0.21 (June 2012)

New Features

- Under Advanced > Application > Additional Setup, the Aux Heat Setup menu now has entry for **Comp OAT Low** (AV17) when Aux Heat is configured for Comp Lockout. This is the outside air temperature value, below which the compressor is locked out. The user interface min./max. limits are 0 and 70 degrees, with a default value of 40 degrees F.
- Under Advanced > Application > Additional Setup, **Setback OAT Lockout** (BV43) is disabled by default. When enabled, AI4 is configured for OAT and the Lockout Temp selection appears in the menu. This may be useful when a system, such as an HPU, may have difficulty recovering from the unoccupied setpoint to the occupied setpoint during very cold weather. When enabled, the default lockout temperature (AV84) value is 30° F (–1° C) for HPU and 10° F (–12° C) for all other applications. The value is adjustable between –50 and 120° F (–45.5 and 49° C).
- **Precision of displayed space temperature** is now selectable. By default, Fahrenheit temperatures are displayed as a whole number of degrees, and Celsius temperatures are displayed to the nearest half of a degree. Tenth of degree precision can be selected under Advanced > User Interface > Show Temp Tenths.
- Under Advanced > Application > Additional Setup > Damper, when Modulating Economizer is enabled, **Outside Air Damper Low Limit** (BV42) maintains a minimum mixed air temperature. It will override economizing, DCV, or other calls for ventilation if low temperature threatens to damage equipment. For modulating economizers, OAD Low Limit is enabled by default but can be disabled if desired (such as for an AHU with gas heat).
- Under Advanced > Application > Additional Setup, Fan Setup now has a Heating Fan selection when the application supports heating and either Occupied fan (BV12) or Unoccupied fan (BV13) is set to Auto.

For heating applications, Heating Fan is set to Auto by default but can be disabled if needed (such as for an FCU that is factory wired to run at a fixed speed or for a baseboard heater without a fan).

- The Advanced > Communications > Active: Configure > MS/TP Settings menu now shows Max Info Frames as a view only. This value is the maximum number of information frames (data packets) that a controller may send out before it must pass the token.
- Added **Filter Weight** to Advanced > Input menus. Lower values cause the sensor readings to react more quickly to sudden changes, and higher values cause sensor readings to react more slowly (stabilize) to sudden changes.

Changes/Fixes

- Increased accuracy of the temperature sensing.
- Relocated the Inactivity and Display Blanking settings from the System menu to the Advanced > User Interface menu.
- Added code to prevent PID windup if System Mode is OFF.
- AV83 is now OAD LOW LIMIT INTG, AV84 is now SETBACK LOCKOUT TEMP, BV42 is now OAD LOW LIMIT CONTROL, BV43 is now SETBACK OAT LOCKOUT, BV44 is now HTG CALL FAN, BV45 is now OPT START PAUSE, and LOOP7 is now OAD LOW LIMIT LOOP.
- Numerous other miscellaneous performance enhancements and bug fixes.

Build R2.0.0.12 (April 2012)

New Features

- Supports existing BAC-10000 series model hardware as well as the three additional inputs and added hardware options (CO₂ sensor and IP networking) of the new **BAC-12xxxx/13xxxx/14xxxx models**.
- In BAC-1xxxxxE models, with an RJ-45 jack, add BACnet over Ethernet, BACnet over IP, and BACnet over IP as Foreign Device (for communication across the Internet) to the standard MS/TP communication. (Default communication for these models is BACnet over Ethernet.)
- Three types (Basic, Standard, or Advanced) of **DCV (Demand Control Ventilation)** are available in BAC-12xxxx/13xxxx/14xxxx models for an internal CO₂ sensor and/or a connected remote SAE-10xx CO₂ sensor (on IN9). With an SAE-10xx connected to a BAC-13xxxx/14xxxx, the higher of the external vs. internal CO₂ sensors is used with DCV. (DCV options are only available when using an AHU, RTU, or HPU application with a modulating economizer enabled.)
- **Remote space temperature sensor** option added to Sensor Setup menu for IN7 of BAC-12xxxx/13xxxx/14xxxx models. Choices are Onboard (only), Remote (only), Average, Highest, or Lowest.
- When the backlight is off, the first press of any button will simply **turn the backlight on**.
- **The displayed temperature scale can be toggled** between Fahrenheit and Celsius by pressing and holding the Enter key until the desired scale reading appears.
- **Optimum Start** menu added (under Advanced > Application > Additional Setup).
- **Standby** mode option added for models with a motion sensor (under Motion Sensor menu and disabled by default).

- **Selectable rotation values** for the lower right of the display. On applicable models and applications, humidity, outside air temperature, and/or CO₂ levels can be easily shown or hidden (under User Interface menu). If more than one value is shown, the values will rotate. In applicable models, humidity and CO₂ levels are shown by default but can be hidden if desired. A fourth rotation value (e.g., setpoint or MAT) is available for custom programming (see the Sample Custom Applications section in the FlexStat application guide).
- Added **native support of AHU and RTU applications in Hospitality mode**.
- Added **Up Time** (time since last reset or power-up) to About > More menu.
- Can modify Cool and Heat proportional and integral values in new **(PID) Loops** menu. If modulating economizer is enabled, Economizer Proportional Cool, Economizer Proportional Normal, and Heat Economizer Integral values can be modified.
- Setback (OAT) lockout is available but disabled by default. When enabled, AI4 is configured for OAT and the Lockout Temp selection appears in the menu. This may be useful when a system, such as an HPU, may have difficulty recovering from the unoccupied setpoint to the occupied setpoint during very cold weather. When enabled, the default value is 30° F (–1° C) for HPU and 10° F (–12° C) for all other applications. The value is adjustable between –50 and 120° F (–45.5 and 49° C).
- For modulating economizers, OAD Low Limit is enabled by default but can now be disabled if desired (such as for an AHU with gas heat). (Do not disable the OAD Low Limit if coils or other equipment may consequently be damaged by low temperatures.)

Changes/Fixes

- Improved features and reliability of functions in Hospitality mode.
- The many items in the About menu were reorganized into submenus.
- Restart/Restore moved from under Device menu to their own separate menu.
- Min. Setpoint Differential moved from Setpoints menu to Limits menu.
- “Deadband” was changed to Heating and Cooling Proportional Bands and moved from Setpoints menu to Loops menu. They can now be changed by 0.5 degrees steps.
- In Schedule menu, Entire Week [Mon-Sun] was moved to top of menu.
- Revised the Damper menu.
- Moved the Motion Sensor menu moved from under the Advanced menu to the Advanced > Application > Additional Setup menu.
- Motion sensor defaults to enabled.
- Under Motion Sensor menu, “MOTION OCC” was changed to “OCC OVERRIDE.”
- Changed “DEHUM DEADBAND” to “DEHUM SPAN” on Setpoints and Dehumidification menus.
- Changed “HUM DEADBAND” to “HUM SPAN” on Setpoints and Humidification menus.
- Increased number of AV objects from 60 to 100, BV objects from 40 to 100, and MSV objects from 20 to 40.
- FlexStat will not operate if wrong type of firmware is installed (rather than operate incorrectly).
- Miscellaneous other bug fixes and enhancements.

Build R1.4.0.1 (November 2010)

Changes/Fixes

- Changes were made to facilitate FlexStat manufacturing. Users would not notice any change in features or operation.

Build R1.3.0.11 (November 2010)

New Features

- Added alternate User Interface modes for additional applications and security: Hospitality mode (with FCU and HPU support) and Locked UI mode.
- Instead of only 2H/2C, BAC-1xx63 RTU application now has staging options: 1H/1C, 1H/2C, 2H/1C, and 2H/2C.
- Added animated icons for ventilation, humidification, and dehumidification.
- Home screen now displays temperatures from –99 to 999 (with external temperature sensor). Temperatures between –9.9 and 99.9 degrees are displayed with tenths of a degree.
- In the ABOUT menu, added the VERSION line. The FW line now contains the firmware name (FLEXSTAT) and the VERSION line contains the firmware version information.
- Added END_COMMON_CODE label in Control Basic to make custom programming easier and more error resistant.
- Reserved BVs 28, 29, and 30 and MSVs 9, 10, 11, and 12 for the User Interface.

Changes/Fixes

- On the security screen the password character entry required an extra down arrow key press to transition from '0' to 'Z'.
- Revised the AUX HEAT and STAGING menu titles to be consistent with other SETUP menus.
- Improved centering of text for fonts with optional widths.
- FCU application now limits the value of MIN EVAL INTERVAL to no more than half a minute less than OPP WATER TIMER.
- FCU application changed name of binary output #1 from "FAN_1" to "FAN 1" to be consistent with naming convention for configured objects.
- In FCU 2-pipe application, when neither cooling nor heating water was available, unit would not exit WATER EVALUATION MODE. WATER EVAL MODE now operates correctly and must wait MIN EVAL TIMER (AV38) in between cycles of checking. When the water temperature was between the threshold for both heating and cooling water the fan would short cycle on a call for heating or cooling.
- In FCU 2-pipe application, the valves would open before the fan (temperature-wise) instead of synchronized with the fan when in AUTO fan cycle mode. The fan and valves now cycle together.
- The FCU application would not vary fan speed down to Low speed when set for constant fan in either the Occupied or Unoccupied mode—the fan would only run in either Medium or High speed. FCUs now fully ramp through all available speeds.

- In the FCU application, the default number of states for FAN SPEED OUTPUT (MSV8) did not correspond to the default configuration of FAN CONTROL TYPE (MSV3).
- When ALLOW_HTG_DEHUM was set to NO, DEHUM was started legally in the COOLING mode, but space temperature put the unit into HEATING mode and DEHUM would stay active. DEHUM now correctly stops when H/C mode changes from COOL to HEAT.
- NULL is no longer allowed for the Relinquished Default property for output objects (AO and BO). NAN is no longer allowed for Relinquish Default property and Present Value for analog output objects. The outputs have no way to represent these values physically, and it makes no sense to support them logically. Disallowing them forces the user to define what state they want the output in at all times.
- Changed code that writes to output objects so that the error flag used by ONERROR is set to true if a INVALID_VALUE is written to the present value of an output object. This allows Control Basic users to have application defined handling when a NAN value is assigned to an output object without causing the program to enter a HALTED state.
- Fixed the epsilon comparison so that “2=2” in Control Basic would have the right result.
- Fixed problem in which relinquishing of BVs and MSVs that could halt a program.
- Fixed an issue where CB was allowed to write to some properties (Program_State, Instance_Of, and Out_Of_Service) that are read only.

Build R1.3.0.4 (April 2010)

New Features

- Heat and Cool icons are now animated. Animation is enabled/disabled by control basic via the UI SYSTEM MODE ACTIVE object, BV27. Defaults to inactive.
- The APPLICATION menu now has an ADDITIONAL SETUP submenu. Application specific setup for Aux. Heat, Damper, Fan, Humidity, Sensors, Staging, and Valves were relocated to the ADDITIONAL SETUP menu.
- The ADVANCED menu now has a MOTION SENSOR submenu, which requires operator level access.
- Changing values in user interface now increments/decrements at an accelerated rate when the up/down arrow has been pressed for longer than 5 seconds.
- Input configuration menus now permit calibration offsets can be applied to each analog input by adjusting the OFFSET value in the corresponding input configuration screen.
- Display Blanking option allows the operator to configure the FlexStat so that when the backlight is off the display is blank. This is configured in the SYSTEM menu. The choices for DISPLAY BLANKING are YES and NO. The default value is NO. This function works in conjunction with the system INACTIVITY timer.
- MOTION OCC (BV24) now defaults to Active (1).
- Schedule 1 now defaults to Active (1).
- Device RESTART now allows selection of COLD START or WARM START.

Changes/Fixes

- The home screen now utilizes larger font.
- Improved readability of highlighted text.
- Analog Input object configuration properties may be modified after a firmware update. AI objects that have the Units property set to °F or °C will have some properties adjusted to the configuration required to utilize the internal temperature conversions. The properties affected are Device_Type, KMC Analog Multiplier, KMC Analog Offset, and KMC Analog Table.
- Analog Input objects that are used for temperature in degrees Fahrenheit now default the multiplier to 1.0 and the offset to 0.0. Inputs configured for TYPE II or TYPE III thermistors now use internal tables therefore the input table instance defaults to zero (no table).
- BAC-1xx63 Homescreen System Mode for HPU now indicates EMER with heat icon when Emergency Heat is enabled.
- Previously the Heat Pump application operating in Emergency Heat mode would continuously call for emergency heat. Now the AUX HEAT (BO5) and EMER HEAT (BO6) outputs are cycled to maintain the heating setpoint.
- Access levels changed for certain functions to allow operator access or remove user level access. ADVANCED menu now allows operator level access. ALARM, DATE/TIME, and SCHEDULE menus now require operator level access. CB PROGRAMS, INPUTS, TREND LOGS, and TEST menus now allow operator level access. ADDITIONAL SETUP menu requires admin level access.
- Thermistor inputs did not correctly read negative temperature values.
- Event Enrollment object state was not preserved after a warm start.
- Cycling power to the device would not clear alarms. A power cycle now does a warm start if the backup RAM data is valid. CB programs must use POWERLOSS to determine startup conditions and take appropriate action.
- Fixed program object Out_Of_Service property that would sometimes indicate TRUE even though the program was loaded and executing properly.
- Fan Failure alarm would not reset and rearm after a warm start. Event Enrollment objects Event_State property now set to NORMAL on startup.
- On the Trend setup menu, when the Interval value was edited the least significant digit was not displayed and could not be edited.
- Previously for HPU, if IN3 was configured as a temperature input and no sensor was connected, then Control Basic would think that the mixed air temp was -50° F and would always trip BV4, the low limit alarm, whether or not the economizer was enabled. This would in-turn lock out any outputs from working.