

# Operation Guide



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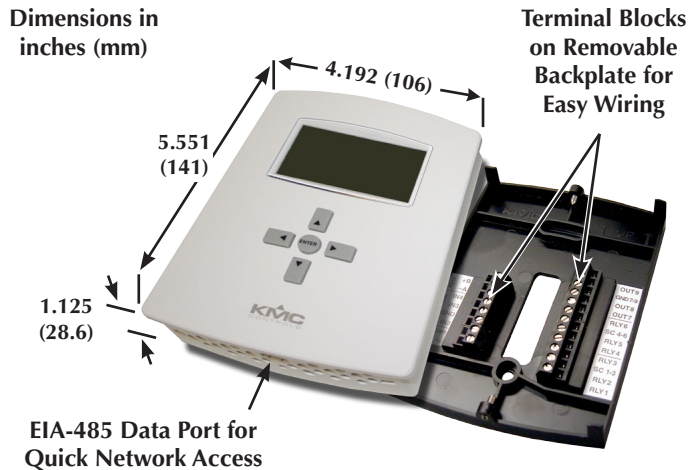
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# Overview

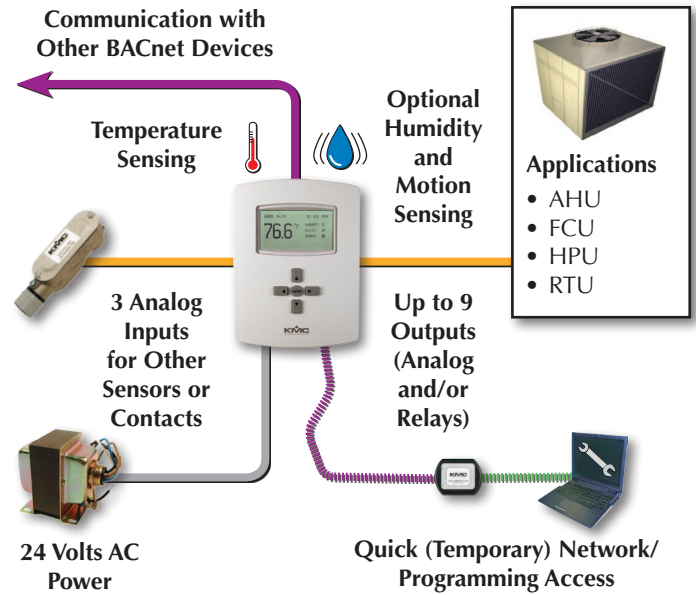
The KMC FlexStat series of intelligent temperature/humidity/occupancy-sensing, wall-mounted, thermostat/controllers are native BACnet Advanced Application Controllers (B-AAC) for use in a BACnet system. The FlexStat simplifies networked zone control for common packaged HVAC equipment, such as packaged rooftop units, fan coil units, heat pumps, and other similar applications. In addition, applications such as pressure dependent VAV, terminal reheat, and medium-sized central station air handling equipment applications may also be addressed through the on-board libraries of programs built into the devices.

The on-board library of programs permits rapid configuration of a wide range of HVAC control applications.

The FlexStat series also provides the capability to customize the standard library of sequences using KMC's BACstage programming tool. This enables a local authorized KMC installing contractor to adapt the standard library to the unique site needs and application specific requirements of a particular project.



# Applications and Installation

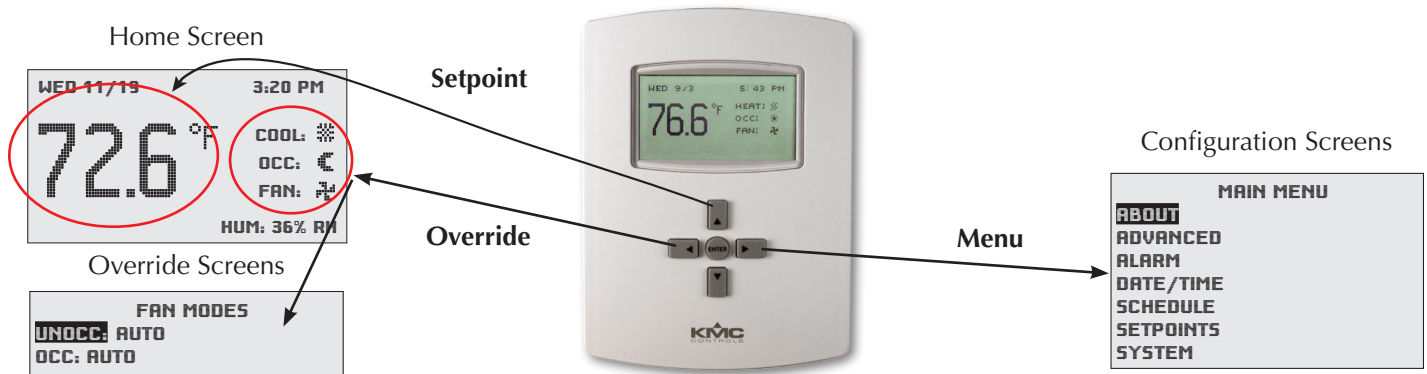


1. Wire the FlexStat's backplate to the desired equipment and set the FlexStat's end-of-line and input pull-up resistor switches.
2. Select the relevant application and options from the (Advanced) Application submenu of the Advanced Menu and other appropriate menus.
3. Configure the FlexStat for the BACnet network. (See [Network Connection on page 16.](#))

For general mounting and connection details, including network wiring, EOL termination, power connections, input/output connections, pull-up resistor switch settings, see the relevant model's Installation Guide. For extended information about wiring and sequences for specific applications, see the BAC-10000 Series Application Guide.

# Operation (Basic)

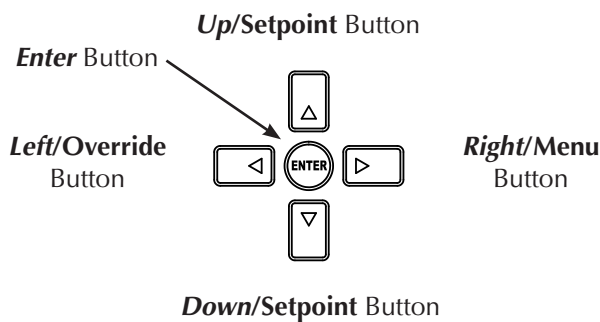
## Home, Main Menu, and Override Screens



## Navigation

Navigate the menus and change settings by pressing a combination of various arrow buttons and the Enter button. Push the:

- Enter button to select and/or exit value editing.
- Up or Down button to move among entries.
- Right or Left button to move among value fields.
- Left button to return to the Home screen.



## Main Menu and Settings

From the Home (temperature display) screen, press the *Right* arrow button to enter the Main Menu. You may need to enter a password to change any settings.

**NOTE:** Access to the Main Menu, setpoint adjust, and System/Occupancy/Fan override may require a password.

## Room Temp. Setpoint Adjustment

From the Home (temperature display) screen, press the *Up* or *Down* arrow button **once** to view the existing setpoint.

To **temporarily** change the setpoint, press the *Up* or *Down* arrow button repeatedly until the desired setting is displayed and press *Enter*. (If *Enter* is not pressed, the display will return to the Home screen after about five seconds and the new setpoint value will still be saved.) The new setpoint will hold until the next schedule change.

To **permanently** change the setpoint for occupied mode, go to the Setpoints section under the Main Menu. (In the Setpoints menu, heating/cooling setpoints/setbacks and deadband can be changed with, if required, the correct password access. See [Setpoints on page 13.](#))

## H/C, Fan, Occupancy, and Override

When the fan is commanded to run, the animated "FAN" icon rotates (if programmed to). When the fan command stops, the fan icon is motionless.



The "OCC" icon shows a sun when in Occupied mode and a quarter moon when in Unoccupied mode.

HEAT or COOL will show (and be animated when there is an active command), depending on the current mode. This can also be turned OFF.

To override these modes from the Home (temperature display) screen, press the *Left* arrow button. Press *Up* or *Down* to get to the desired line and then *Enter* (twice) to edit the mode setting. Press *Left* to exit to Home.

# Configuration (Initial Setup)

NOTE: Menus shown in this document reflect firmware version R1.3.0.4 or later. Actual context-sensitive screens are dependent on firmware version, FlexStat model, and options selected.

NOTE: If   appear at the top of the screen (such as in the Main Menu), scroll up or down to see the rest of the menu's off-screen choices.

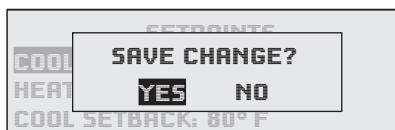
## Main Menu Overview



Navigate the menus and change settings by pressing a combination of buttons. Press the:

- *Enter* button to select and/or exit value editing.
- *Up/Down* button to move among **entries** (up/down lines).
- *Left/Right* button to move among **value fields** (left/right spaces).
- *Left* button to return to the Home screen.

NOTE: A log-in may be required to access menu items.



When prompted about a change (on any menu), press *Right/Left* to select the desired choice and then *Enter*.

## About the FlexStat

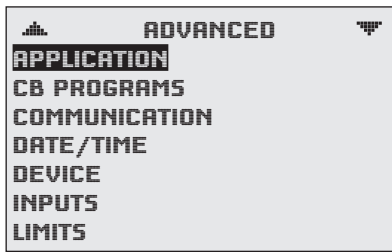


This display-only screen shows (scroll to see all):

- Firmware version (FW)
- Build date
- Application software version (ASV)
- Model number
- Application configuration and options (set in the Application menu)
- Device instance (set in the Device menu)
- MAC address (set in the Communications menu)
- Serial number
- Board revision

NOTE: ASV will show CUSTOM if any built-in Control Basic program (1–5) is not running or has auto-run disabled.

## Advanced Menu

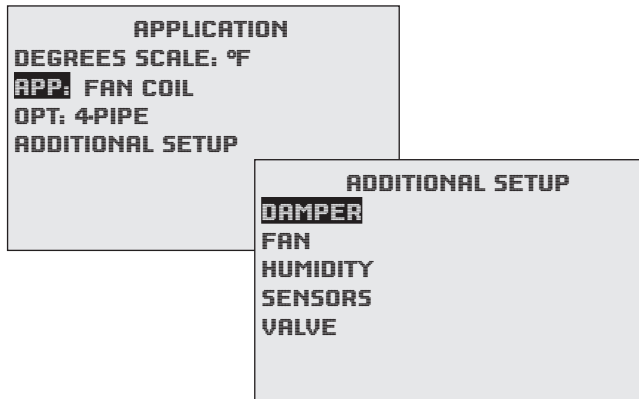


The Advanced Menu displays various submenus. Not all submenus can be seen on the screen at one time. Scroll up or down to see additional submenus. To select the desired submenu, press:

1. *Up/Down* to move.
2. *Enter* to select.

NOTE: The Advanced Menu has more submenus than can appear on the screen at once. Keep scrolling up or down to see all the options.

### (Advanced) Application Options



To change ° F or C, preprogrammed application type, and options, press:

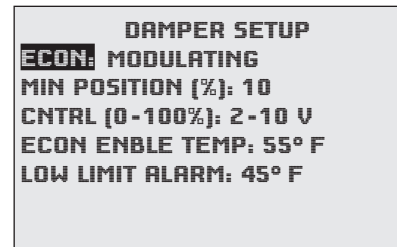
1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Right/Left* to move among value fields.
4. *Up/Down* to increment/decrement value.

**The type of application (as well as the model of FlexStat) affects the context-sensitive options under Additional Setup.**

### Auxiliary Heat (Heat Pump Only)



### Damper Setup



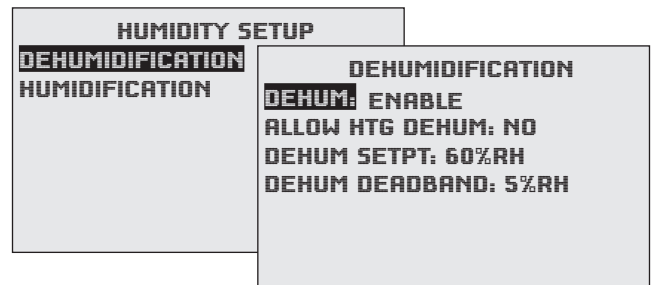
NOTE: If the Economizer option is selected when there is no mixed air temperature sensor connected, a Low Limit Alarm will result. See [Alarms on page 11](#).

### Fan Setup



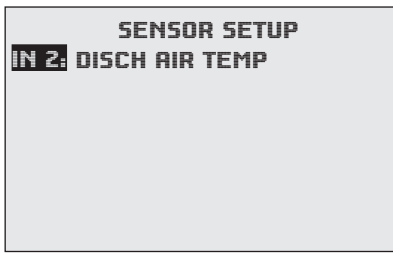
NOTE: For a Fan Fail Alarm, see [Sensor Setup on page 6](#) and [Alarms on page 11](#).

### Humidity Setup



NOTE: If a dehumidification option is enabled, the Space Humidity Alarm will also be enabled. See [Alarms on page 11](#).

## Sensor Setup



The Input 2 sensor (AI2) can be configured for discharge air temperature (Type III thermistor is the default), fan status (dry contact), or unused.

- If set for discharge air temperature, the sensor can be calibrated and changed from the default Type III thermistor to a Type II. See [\(Advanced\) Inputs on page 8](#).
- If set for discharge air temperature, Trend Log #2 is automatically created and monitors the discharge air temperature, but it has no effect on operation.
- If set for fan status and no closed contact is detected when there is a call for fan operation, a Fan Fail Alarm is created. See [Alarms on page 11](#).
- If set for unused, built-in applications will not use AI2, but the input would be available to custom programming.

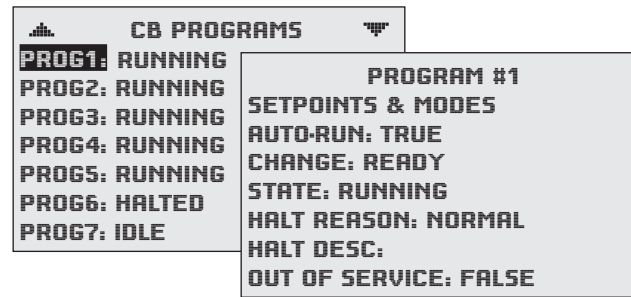
## Staging Setup



## Valve Setup



## (Advanced) CB (Control Basic) Programs



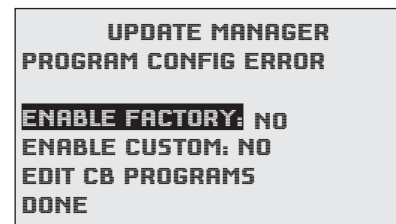
To halt or load/run the built-in (1–5) and custom (6–10) Control Basic programs, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Right/Left* to move among value fields.
4. *Up/Down* to increment/decrement value.

NOTE: If **custom** Control Basic programs are installed and a **restore to factory settings is performed, all factory programs are restarted but all custom Control Basic programs are halted.** Change the state of each program by loading/running the program from the CB Programs menu (or BACstage).

NOTE: If **custom** Control Basic programs are installed **and set to autorun, whenever the firmware is updated, ALL (factory and custom) programs are halted.** If **custom** Control Basic programs are installed **but NOT set to autorun, whenever the firmware is updated, factory programs are restarted but any (manual) running custom programs are halted at restart.**

Change the state of each custom program by using the Update Manager or loading/running each program from the CB Programs menu (or BACstage).



NOTE: **Customized programs are the responsibility of the user.** KMC Controls does not provide support for such programs.

## (Advanced) BACnet Communications

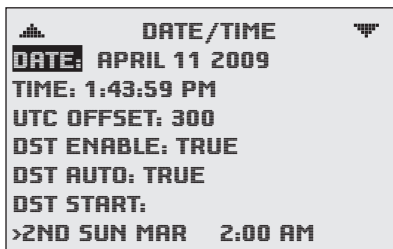


To set parameters for BACnet MS/TP EIA-485 communications, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.

NOTE: The Max Master is the highest MAC address a device will attempt to locate when polling for master devices on the local network. To avoid possible communication issues with the network or a computer connected through a KMD-5576 USB Communicator, **the Max Master number should be the lowest number needed for that network.**

## (Advanced) Date/Time



To enter date and time information, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Right/Left* to move among value fields.
4. *Up/Down* to increment/decrement value.

For areas that observe Daylight Saving Time, select True/On for DST ENABLE.

If the FlexStat is used in a BACnet network with UTC (Coordinated Universal Time) synchronization (via broadcasting or addressing a single thermostat) set the UTC Offset value. The UTC Offset value is in minutes and corresponds to the distance of the local time zone to the zero degree meridian. In stand-alone operation or networks that do not have UTC broadcasts, setting this value is not necessary.

Sample Time Zones	Offset to Equal UTC
Alaska	9 hours = 540 minutes
USA/Canada Pacific Standard Time	8 hours = 480 minutes
USA/Canada Mountain Standard Time	7 hours = 420 minutes
USA/Canada Central Standard Time	6 hours = 360 minutes
USA/Canada Eastern Standard Time	5 hours = 300 minutes
Bolivia, Chile	4 hours = 240 minutes
Argentina, Uruguay	3 hours = 180 minutes
United Kingdom, Portugal	0 hours = 0 minutes
Europe (most countries)	-1 hours = -60 minutes
Egypt, Israel, Turkey	-2 hours = -120 minutes
Kuwait, Saudi Arabia	-3 hours = -180 minutes
United Arab Emirates	-4 hours = -240 minutes
India, Sri Lanka	-5.5 hours = -330 minutes
China, Mongolia	-8 hours = -480 minutes
Korea, Japan	-9 hours = -540 minutes
New Zealand	-12 hours = -720 minutes

NOTE: The BACnet standard for this offset value is: "The time zones to the west of the zero degree meridian shall be positive values, and those to the east shall be negative values." The value is in **minutes**, not hours.

## (Advanced) BACnet Device Properties

```
DEVICE
INSTANCE: 1
NAME: FlexStat_101
LOCATION: KMC Controls
RESTART: NO
RESTORE FACTORY: NO
```

To set the BACnet device instance, name, and location, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.

The FlexStat can also be restarted or restored to factory defaults from this menu. See [Resetting the FlexStat on page 14](#) for more information about that function.

## (Advanced) Inputs

```
INPUTS
1: SPACE TEMP
2: DISCH AIR TEMP
3: MIXED AIR TEMP
4: OUTSIDE AIR TEMP
4: SPACE HUMIDITY
INPUT #2
DISCH AIR TEMP
VALUE: 60.0° F
CAL. OFFSET: 0.0
OUT-OF-SERVICE: FALSE
SENSOR: 10K TYPE III
```

Inputs vary according to model, selected application, and selected application options. See [\(Advanced\) Application Options on page 5](#).

To change sensor type and calibration offset, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Right/Left* to move among value fields.
4. *Up/Down* to increment/decrement value.

Value will show a temperature reading or a voltage (0.0 to 3.0), depending on the sensor. Analog sensors can be calibrated using the Calibration Offset option.

## (Advanced) Temp. Setpoint Limits

```
LIMITS
OCC MIN CLG: 71° F
OCC MAX HTG: 76° F
UNOCC MIN CLG: 77° F
UNOCC MAX HTG: 65° F
```

To set the minimum and maximum allowed user/operator setpoint values, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Right/Left* to move among value fields.
4. *Up/Down* to increment/decrement value.

## (Advanced) Motion Sensor

```
MOTION SENSOR
MOTION OCC: ENABLE
STATE: OCCUPIED
```

In BAC-11xxx models, a motion/occupancy sensor may be enabled to trigger occupancy override. During scheduled “off” times, the motion sensor will start occupancy override (for 1 hour as a default) when it detects motion. Occupancy override will end (with the default setting) 1 hour after motion was last detected. The length of occupancy override is configurable in the System menu. See [System Setup on page 13](#).

To enable/disable or monitor the motion/occupancy sensor (if installed), press:

1. *Enter* to select.
2. *Right/Left* to move among value fields.
3. *Up/Down* to increment/decrement value.

The State field monitors whether motion has been detected during the last scan of the motion sensor input (BI6). Detected motion will show an “occupied” state. This can be used during troubleshooting to determine if motion is being detected.



## (Advanced) Security Levels and Passwords

SECURITY	
ACCESS LEVELS	
PASSWORDS	
ACCESS LEVELS	PASSWORDS
SETPOINT ADJ.: NONE	USER: 1 0 0 0
MAIN MENU: ADMIN	OPERATOR: 1 2 3 4
SYSTEM MODE: OPER	ADMIN: 5 6 7 8
OCC OVERRIDE: USER	
FAN OCC/UNOCC: OPER	

Access to the Main Menu, Setpoint Adjust, and System/Occupancy/Fan settings have a default password level of User. This level can be changed for each function to None, Operator, or Administrator through the Access Levels menu. Passwords are set in the Passwords menu.

Any person can view the display but might not be able to change any settings without logging in with one of the three levels of passwords:

- None (Level "0"): No password is required (everyone has access).
- User (Level 1): See the Menu Items Access Levels chart.
- Operator (Level 2): See the Menu Items Access Levels chart.
- Administrator (Level 3): Can access all menus and change all editable values. **DO NOT FORGET THIS PASSWORD!**

**NOTE:** Setting a password to (the default) 0000 eliminates the password prompt and allows full access for that level. If no password is set for ADMIN, no password prompt will occur. If any password is set for ADMIN, the menu items accessible at the various levels are shown in the following chart.

**NOTE:** Changes in security levels and/or passwords take effect when the current Administrator log-in has timed out. Log-ins last until 60 seconds (default) after the last button press. Desired length of inactivity time-out can be changed in the Systems submenu.

**NOTE:** When setting a password, the *Up* button increases the alphanumeric value (0 through 9 and then A through Z). The *Down* button decreases the value. **DO NOT FORGET THE ADMIN PASSWORD!**

To enter an alphanumeric password at the prompt:

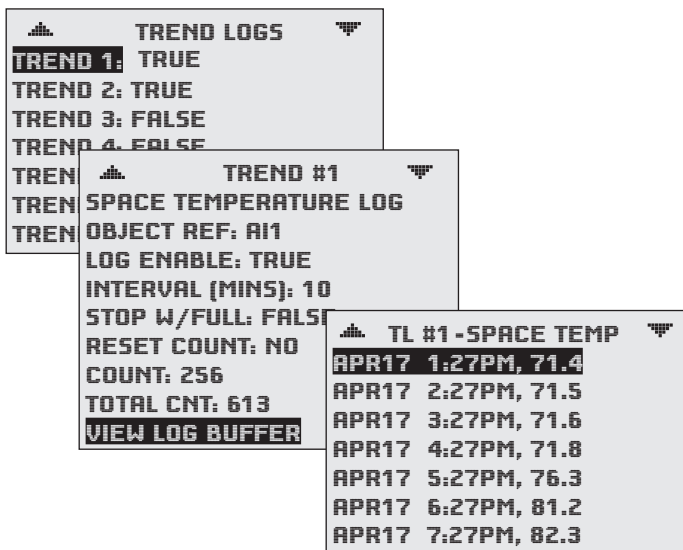
1. *Up/Down* to move.
2. *Enter* to select.
3. *Up/Down* to increment/decrement value.

The required password level is specified in the prompt.

For additional security and protection from vandalism, install the FlexStat inside a third-party locking thermostat guard/cover (but proper airflow must be maintained).

Menu Items Access Levels			
Menus	User	Operator	Administrator
<b>Home Screen</b>	* = Selectable, Default is User		
Setpoint Adjust (Up/Down)	x*	x*	x*
System Mode (Auto/Heat/Cool/Off)	x*	x*	x*
Occupancy Override (On/Off)	x*	x*	x*
Fan Modes (Auto/On/Off)	x*	x*	x*
<b>Main Menu*</b> (Default is User)			
About	x	x	x
Advanced		x	x
Alarm		x	x
Date/Time		x	x
Schedule		x	x
Setpoints		x	x
System		x	x
Trend Viewer	x	x	x
<b>Advanced Menu</b>			
Application			x
Additional Setup			x
Control Basic Programs		x	x
Communication			x
Date/Time		x	x
Device			x
Inputs		x	x
Limits		x	x
Motion Sensor		x	x
Security			x
Trend Logs		x	x
Test		x	x
This chart shows conditions in which an administrator password is set (is not 0000) and default password levels are used.			

## (Advanced) Trend Logs



NOTE: Space temperature (AI1) is the default trend log #1. If AI2 is configured for discharge air temperature, that will become the default trend log #2. See [Sensor Setup on page 6](#).

To set the desired object to track, press:

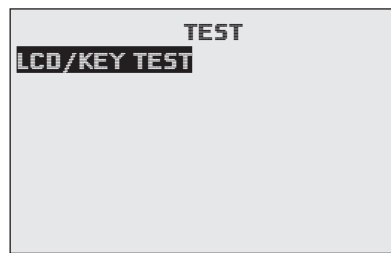
1. *Up/Down* to move among entries.
2. *Enter* to select.

The trend log buffer may be viewed by scrolling down and selecting View Log Buffer. The buffer may also be viewed from the Main Menu by scrolling down to the [Trend Viewer](#) (see [page 13](#)).

NOTE: The BACnet standard for log **intervals** is hundredths of seconds. The simplified display on the FlexStat converts the value to minutes. However, BACstage™ and TotalControl® *do* display hundredths of seconds but in different ways. For a “10” (minute) interval on a FlexStat display, TotalControl would show “00:10:00.00” (hours:minutes:seconds.hundredths of seconds) and BACstage would show “60000” (hundredths of seconds) instead.

NOTE: If applicable to the model, the **humidity sensor** is **AI5** and the **motion sensor** is **BI6**, which can also be configured for trend logs. See the BAC-10000 Series Application Guide (P/N 913-019-03) or relevant BAC-10000 Series Installation Guide for other desired input and output objects in an application.

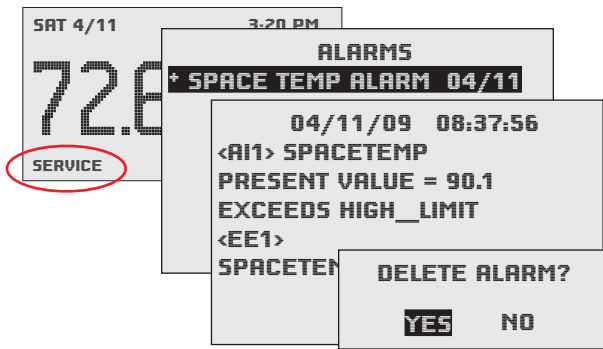
## (Advanced) Test



The test menu merely tests the display's pixels and key functions.

1. *Up/Down* to move among entries.
2. *Enter* to select and exit.

## Alarms



A flashing “SERVICE” on the Home screen indicates an alarm. To view and delete alarms, press:

1. *Right* to move among fields.
2. *Enter* to select. (*Enter* on Alarm Details screen to delete the alarm.)
3. *Left* to go back one page.

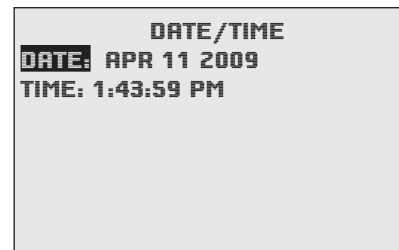
Built-in alarms are triggered under these conditions:

- **Space Temp Alarm**—temperature outside the range of 56 to 86° F for over 300 seconds.
- **Space Humidity Alarm**—humidity above 65% for over 300 seconds. This is available only in FlexStat models with a humidity sensor and a dehumidification option selected in the Humidity setup). See [Humidity Setup on page 5](#).
- **Fan Fail Alarm**—no fan status signal within five seconds of call for fan (and Input 2 is configured for the fan status sensor option). See [Sensor Setup on page 6](#).
- **Low Limit Alarm (freeze stat)**—space temperature is below the adjustable (under Damper Setup) low limit alarm temp for one second (when configured for the economizer option). **After a low limit alarm is generated, the fan will not run until after the FlexStat is restarted.** See [Restart under Resetting the FlexStat on page 14](#). See also [Damper Setup on page 5](#).

(Up to six additional alarms may be added with custom programming.)

NOTE: Time delays and limits can be modified in the corresponding Event Enrollment objects using TotalControl.

## Date/Time



To enter date and time information (only), press:

1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Right/Left* to move among value fields.
4. *Up/Down* to increment/decrement value.

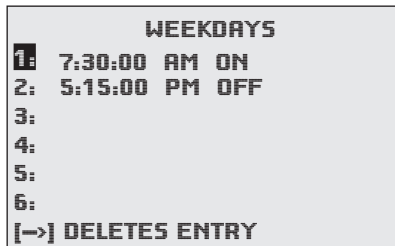
More options (such as UTC offset and daylight saving time options) are available in the ([Advanced](#)) [Date/Time](#) menu (see [page 7](#)).

# Schedules



To select the desired schedule, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Left* to go back one page.



To enter weekly schedules for occupied (ON) and unoccupied (OFF) times, press:

1. *Right/Left* to move among days and *Enter* to select.
2. *Up/Down* to move among entries and *Enter* to select and edit.
3. *Right/Left* to move among value fields.
4. *Up/Down* to increment/decrement value.
5. *Enter* to exit value editing.
6. *Left* to move back to days or back one page.



The Holiday entries will override the normal occupied weekly schedule entries and keep those days' settings at their setback values. Setback values are entered in the Setpoints section of the Main Menu. (See also the maximum and minimum setpoint values in the Limits section of the Advanced Menu.)

To enter upcoming holidays, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Right/Left* to move among value fields.
4. *Up/Down* to increment/decrement value.

## Setpoints

SETPOINTS	
COOL SETPT:	74° F
HEAT SETPT:	67° F
COOL SETBACK:	80° F
HEAT SETBACK:	64° F
MIN SETPT DIFF:	2° F
DEADBAND:	2° F
DEHUM SETPT:	60 % RH

In the Setpoints menu, deadband, setbacks, and setpoints for various values are set. (The room temperature setpoint can also be manually changed from the Home menu.)

To adjust the setpoints, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Up/Down* to increment/decrement value.

## System Setup

SYSTEM	
SYSTEM ENABLE:	AUTO
OCC OVRIDE (HRS):	1.0
INACTIVITY (SECS):	60
DISPLAY BLANKING:	NO

To adjust the system configuration values, such as system enable (auto, off, heat, or cool), occupancy override time, and display inactivity time-out:

1. *Up/Down* to move among entries.
2. *Enter* to select.
3. *Up/Down* to increment/decrement value.

**Occupancy Override on this menu** is the amount of time (in hours) a manual change in the setpoint (via the Up and Down buttons) will be allowed to override the scheduled setpoint. **When the time is set to 0, the override state will last until the next schedule change.**

**When Display Blanking is enabled (Y)**, the display turns off at the same time the backlight goes off (after reset, initial power-up, or time-out). When any button is pressed, the display will reappear until the time-out is reached again.

**The menu/display/backlight time-out** (seconds since the last button is pushed) is set in Inactivity.

Access to the Main Menu, setpoint adjust, and System/Occupancy/Fan override have a default password level of User. This level can be changed for each function to None, Operator, or Administrator through this screen. Passwords are set in the (Advanced) Passwords menu. See [\(Advanced\) Security Levels and Passwords on page 9](#).

## Trend Viewer

TREND VIEWER	
1: SPACE TEMP	34
2: SPACE HUMIDITY	27
3: FAN	19
4: COOL 1	18
5: COOL 2	21
6:	
7:	

TL #1 SPACE TEMP	
APR11 1:27PM,	70.3
APR11 2:27PM,	71.3
APR11 3:27PM,	71.6
APR11 4:27PM,	71.8
APR11 5:27PM,	76.3
APR11 6:27PM,	81.2
APR11 7:27PM,	82.3

To view trend log buffers, press:

1. *Up/Down* to move among entries.
2. *Enter* to select.

Trend logs are set up in the [\(Advanced\) Trend Logs](#) menus (see [page 10](#)).

# Resetting the FlexStat

## Types of Reset

If the FlexStat is not operating correctly or **if a low limit alarm has occurred**, the FlexStat should be reset (reinitialized). Any reset interrupts normal operation, and three types of reset exist:

- A **warm start** is generally the least disruptive option (restarting normal operation the quickest).
- If problems still persist, try a **cold start**. (This should also be used after a new Control Basic program is loaded and compiled.)
- If problems still persist (or major changes in a firmware update have taken place) **restoring factory defaults** (and reconfiguring and reprogramming the FlexStat) may be required.

## Warm and Cold Starts

### ⚠ CAUTION

During a restart, the analog outputs go to zero, and relays go to their normally open state. A restart is a process that lasts around ten seconds, and it may result in several changes of state for an output, turning equipment off and on abruptly. Before resetting the FlexStat, manually override equipment as needed. If a large fan is controlled by the FlexStat, for example, set a minimum off time. See [Fan Setup on page 5](#) (built-in, selectable applications with compressors have a default programmed minimum off time of 300 seconds).

A **warm start** does the following in the FlexStat:

- (After zeroing out objects during the restart process) restores present values of objects to their last values before the restart (until they are updated by the FlexStat's programs).
- Restarts the controller's Control Basic programs.
- Leaves configuration and programming intact.

### ⚠ CAUTION

If the checksum test in RAM fails during a warm start, a cold start is performed instead.

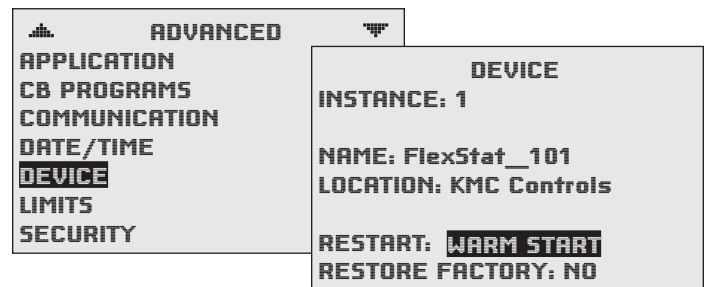
A **cold start** does the following in the FlexStat:

- (After zeroing out objects during the restart process) returns all object values to their relinquished defaults (until they are updated by the FlexStat's programs).

- Restarts the controller's Control Basic programs.
- Leaves configuration and programming intact.

NOTE: Menu changes may take up to about two minutes to write to nonvolatile Flash memory. If power to the FlexStat is lost during this time, changes may be lost. **Restarting the FlexStat from its menu, TotalControl, or BACstage are the recommended methods.**

NOTE: When power is restored after an outage, the FlexStat will attempt to do a warm start as long as the values in RAM are retained (up to about four hours). If the the RAM checksum test fails, a cold start will be done instead. (In custom Control Basic programming, using the POWERLOSS command may be desirable to determine start-up conditions and to take appropriate actions—see the Help system in TotalControl or BACstage for more information.)



To perform a **WARM start**, do one of the following:

- From the FlexStat menu, select Advanced > Device > Restart > Warm Start.
- From TotalControl or BACstage, select Reinitialize Device > Warm Start.
- Momentarily remove power to the FlexStat.

To perform a **COLD start**, do one of the following:

- From the FlexStat menu, select Advanced > Device > Restart > Cold Start.
- From TotalControl or BACstage, select Reinitialize Device > Cold Start.

# Restore Factory

Restore Factory (restoring the FlexStat to the factory settings) does the following:

- Clears present values.
- Restores the object database/configuration to the defaults.
- Restarts the controller's (factory installed) Control Basic programs.

NOTE: The MAC address and device instance are **not** restored to their original defaults, and custom Control Basic programs are **not** deleted. If **custom** Control Basic programs are installed, all factory programs are restarted **but all custom Control Basic programs are halted**. Custom programs may be restarted by loading/running the programs from the CB Programs menu. See [\(Advanced\) CB \(Control Basic\) Programs on page 6](#).

## ⚠ CAUTION

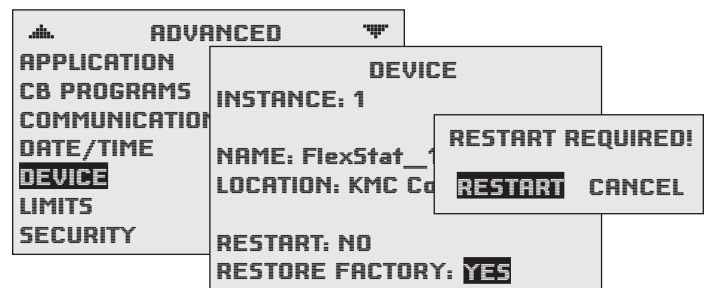
When returned to factory defaults, analog outputs will go to zero and relays will go to their normally open state. Before restarting the thermostat, manually override equipment as needed.

## ⚠ CAUTION

After a return to factory defaults, applications are unconfigured. You must select the desired application and appropriate settings before connected equipment will operate properly. (See [\(Advanced\) Application Options on page 5](#).)

To restore the FlexStat to factory settings:

1. Select Restore Factory from the Advanced > Device menu.
2. When prompted for the required restart, press Enter. (To Cancel, press the right button and then Enter or just let the display time-out).
3. After the FlexStat has restarted, review the settings and reconfigure as needed.



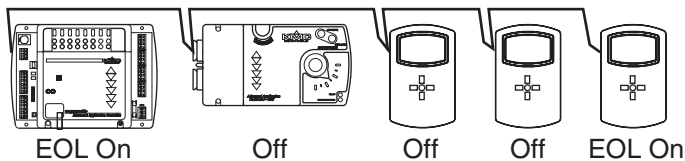
# Network Connection

## BACnet MS/TP Network Communication

Connect the network wiring and set the EOL switches accordingly. (See the Installation Guide for wiring and end-of-line switch information.)

From the FlexStat menus, adjust the device instance number, the MAC address, and baud rate from the defaults as necessary. Set the Max Master to the minimum necessary for the network. See [\(Advanced\) BACnet Device Properties on page 8](#) and [\(Advanced\) BACnet Communications on page 7.](#))

**NOTE:** The current FlexStat MAC address and device instance numbers can be viewed in the About menu. Each BACnet device on a network must have a unique MAC address and device instance.



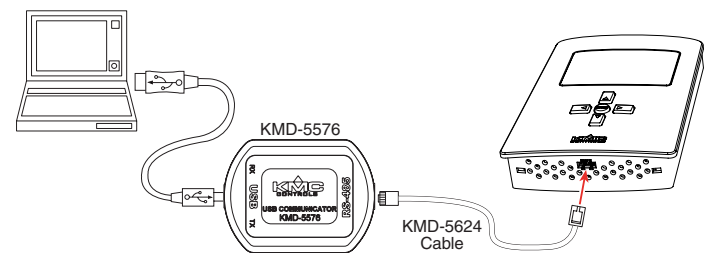
## PC Data Port Connection

The FlexStat is equipped with a PC data port located at the bottom of the thermostat housing. This port provides a temporary EIA-485 (formerly RS-485) connection to the digital network for network setup or troubleshooting.

To connect a computer to the port, a means of converting the EIA-485 signal to a USB or EIA-232 (formerly RS-232) signal will be needed. For USB, use a KMC KMD-5576 USB Communicator. For EIA-232, use a third-party interface. (See the instructions included with those devices and software.) To connect to the PC data port:

1. Connect the keyed, flat end of the KMD-5624 interface cable (included with the KMD-5576) to the port on the bottom of the FlexStat.
2. Connect the modular plug of the cable to the interface device that converts the EIA-485 signal from the FlexStat into a USB or EIA-232 signal.
3. Connect the suitable cable from the interface device to the computer's serial or USB port. Install any required software and configure the port as necessary.

**NOTE:** To avoid faulty communication with the KMD-5576 USB Communicator, the Max Master number may need to be reduced to the minimum required for the network and the driver and latency settings on the computer may need to be checked or updated. See [Troubleshooting on page 17.](#)





# Troubleshooting

## Alarm Issues

### Alarm, (False) Fan Fail

- Check configuration. Be sure the Fan Status option is not selected when there is no sensor/switch for it.
- Check that the IN2 (fan status) input pull-up resistor switches are fully latched in the correct positions. Any passive, dry contact should use the 10K Ohm setting. (See the Connections and Wiring section of the relevant BAC-10000 Series Installation Guide.)
- Check IN2 (fan status) input wiring.
- Check the connected fan status sensor/switch.
- Using BACstage or TotalControl, check that AI2 (fan status) is not configured as “Out Of Service.”

### Alarm, (False) Low Limit (Freeze Stat)

- Check the Low Limit Alarm setting—see [Damper Setup on page 5](#).
- Check configuration. Be sure the Economizer option is not selected when there is no mixed air temperature sensor.
- Check that the IN3 (mixed air temp.) input pull-up resistor switches are fully latched in the correct positions (see the Connections and Wiring section of the relevant BAC-10000 Series Installation Guide).
- Check IN3 (mixed air temperature) input wiring.
- Check the connected mixed air temperature sensor.
- Using BACstage or TotalControl, check that AI3 (mixed air temp.) is not configured as “Out Of Service.”

**NOTE:** After a low limit alarm is generated, the fan will not run until after the FlexStat is restarted. See [Resetting the FlexStat on page 14](#).)

### Alarm, (False) Space Temp. or Humidity

- See [Alarms on page 11](#).
- See [Temperature Reading Is Incorrect on page 19](#).
- See [Temperature Setpoint Is Not Maintained on page 19](#).
- Using TotalControl, adjust the limits or time delay.

## Communication Issues

### Firmware Upgrade Fails

- Ensure the WD (watch dog) jumper is temporarily removed during the upgrade process (see the KMD-5699 Installation Guide, P/N 913-019-04). Reinstall the pin on the left and center pins after the upgrade process is complete.
- Check connections.
- Ensure firmware for the correct model is selected in the Firmware Upgrade Tool.

**NOTE:** If firmware for a wrong model is accidentally installed, the outputs will not match the applications/configuration on the display.

**NOTE:** Backing up the existing settings and firmware image before or during the upgrade process is good practice.

**NOTE:** Restoring to the factory defaults and reconfiguring might be needed if how the FlexStat operates changes. **Read all notes accompanying the firmware update!**

### KMD-5576 Communication Faulty

- Upgrade to the latest version of BACstage (ver. 2.4.0.25 or later required).
- Check the settings for the USB port on the computer (Device Manager > Ports) and the MS/TP port in BACstage (Access > Connection Parameters).
- Reduce the Max Master number down to the minimum needed for that network—see [\(Advanced\) BACnet Communications on page 7](#).
- Install latest driver and check latency settings. See Latency Settings for KMD-5576 Service Bulletin (SB0308A) on the KMC web site.
- See also [MS/TP Network Communication Faulty](#) below.

### MS/TP Network Communication Faulty

- Reduce the Max Master number down to the minimum needed for that network—see [\(Advanced\) BACnet Communications on page 7](#).
- Check that EOL switches are fully latched in the correct positions (see the relevant BAC-10000 Series Installation Guide).
- Check MAC address and device instance numbers.
- Check baud rate.

## Cover and Display Issues

### Cover Binds on Backplate

- **Carefully** remove the FlexStat cover from the backplate and inspect for bent pins and/or terminal socket connectors. If cover pins are bent, use a needle-nose pliers to straighten them. If socket connectors are bent, use a pointed object (such as a thumbtack or straightened paperclip) to straighten them. (Pushing the pointed object into the socket from the back side can be helpful.)
- Replace the backplate.

**NOTE:** When installing the cover on the backplate, be sure to not pinch or dislodge any wiring. Do not use excessive force. If there is any binding, pull out cover and examine pins and terminal socket connectors.

### Display Is Blank or Erratic

- Check that Display Blanking is not unintentionally enabled. (See [System Setup on page 13.](#))
- Check for a tripped circuit breaker to the transformer.
- Check for proper supply voltage from transformer and that the transformer has enough capacity (VA) for all connected devices (see their respective data sheets).
- Carefully remove the FlexStat cover from the backplate, check pins and connectors, and reinsert. (See [Cover Binds on Backplate on page 18.](#))
- Check connections.
- Put another FlexStat on the installed backplate, and if the second FlexStat functions properly, replace the first FlexStat.

### Display Freezes (Buttons Have No Effect)

- Carefully remove the FlexStat cover from the backplate and ensure the WD (watch dog) jumper (near the bottom of the board) is installed on the left and center pins. The jumper is temporarily removed during a firmware update and should be reinstalled when the process is completed. (See the KMD-5699 Installation Guide, P/N 913-019-04, for more information.) Reinstalling the cover on the backplate will restart the FlexStat.

## Custom Programming and Web Issues

### Control Basic Programs Do Not Work

**NOTE:** The FlexStat has a library of built-in applications and options that are configured through the FlexStat's display. Beyond these standard configurations, custom changes can be added to a FlexStat using KMC's BACstage (ver. 2.4.0.26 or later) or TotalControl (ver. 2.0.5 or later).

**NOTE:** Control Basic (read-only) programs 1 through 5 are used for built-in applications and can **not** be modified directly. Programs 6 through 10 are empty and can be used for additional programming. Using BACstage or TotalControl, a program (1 through 5) can be copied, pasted into a new program code object (6 through 10), edited, and run in place of the original. (Although programs 1–5 cannot be edited, they can be halted and set to not autorun after restart.)

**NOTE:** **Customized programs are the responsibility of the user.** KMC Controls does not provide support for such programs.

- In the [BAC-10000 Series Application Guide \(P/N 913-019-03\)](#), **carefully REVIEW ALL the information in the Custom Programming section!**
- Set programs to autorun and/or check if they have halted. Review [\(Advanced\) CB \(Control Basic\) Programs on page 6.](#)
- Ensure objects are written to correct priority levels. See the Custom Web Graphics section in the [BAC-10000 Series Application Guide \(P/N 913-019-03\)](#).
- Custom programming requires BACstage (ver. 2.4.0.26 or later) or TotalControl (ver. 2.0.5 or later). Upgrade to the latest version for the most complete functionality.
- For assistance with Control Basic commands, see the Help system in TotalControl or BACstage.

### Custom Web Graphics Do Not Work

- In the [BAC-10000 Series Application Guide \(P/N 913-019-03\)](#), review the Custom Web Graphics section.
- See also [Control Basic Programs Do Not Work](#) above.

# Input, Sensor, and Value Issues

## Input Values Are Outside the Expected Range

- Check that **ALL** the input pull-up resistor switches are fully latched in the correct positions. See the Connections and Wiring section of the relevant BAC-10000 Series Installation Guide. **A single incorrect switch position may affect multiple inputs. All input switches must be latched in either 10K Ohm or 0–12 VDC positions even if no input is connected! Input switch pairs (3-4, 5-6, and 7-8) must never have both switches set to the left or both to the right—if switch 3 is set to the left, for example, 4 must be set to the right (or vice versa).**
- Check that the correct input type is selected on the Inputs screen. A Type III thermistor is the default on IN2 through IN4. See [\(Advanced\) Inputs on page 8](#).
- Check input wiring. See [Wiring Issues on page 21](#).
- Check connected sensors.
- Using BACstage or TotalControl, check that the input is not configured as “Out Of Service.”
- Restore the FlexStat to factory settings (see [Resetting the FlexStat on page 14](#)) and reconfigure.

## Motion/Occupancy Sensor Does Not Work

- The initial firmware (R.1.0.0.0 and earlier) did not support this sensor within the built-in selectable programs. Custom programming was required—see the BAC-10000 Series Application Guide, P/N 913-019-03. Upgrade to the latest firmware for built-in support.
- After an initial power-up or restart, the motion/occupancy sensor requires about 30 seconds before it will begin responding to motion.
- The motion/occupancy sensor initiates override only during “off” times in the schedule. See [Schedules on page 12](#).
- Check that the motion sensor is enabled and detects motion. See [\(Advanced\) Motion Sensor on page 8](#).
- Using BACstage or TotalControl, check that BI6 (occ status) is not configured as “Out Of Service.”
- The FlexStat must be installed where there is a clear view of typical traffic area (reliable range is out to about 33 feet). Remove or move obstacles. Reinstall the FlexStat in a more optimal location if necessary.

- Connect remote motion sensors to an input (requires custom programming).
- For more information on detection performance, patterns, configuration, programming, and other issues, see the Motion/Occupancy Sensor section in the BAC-10000 Series Application Guide.

## Temperature Reading Is Incorrect

- After applying power for the first time (or after an outage), allow the FlexStat to self-calibrate a few minutes before verifying temperature reading.
- If the discrepancy is small, adjust the calibration offset—see [\(Advanced\) Inputs on page 8](#).
- Check that the thermistor is centered in its hole at the bottom of the case and has an air gap around it. Also check that its leads are not pinched, shorted, or broken and that the tape holding down the leads is not loose. (Some early models with humidity sensors did not have the additional thermistor—temperature was derived from the same chip that measured humidity.)
- Using BACstage or TotalControl, check that AI1 (space temp.) is not configured as “Out Of Service.”
- Check that the FlexStat is not mounted on an outside wall, is not exposed to heat sources or sunlight, is not exposed to drafts from windows or air vents, or is not blocked from normal air circulation.
- See also [Input Values Are Outside the Expected Range on page 19](#).

## Temperature Setpoint Is Not Maintained

- Select Occupied mode from the Home Menu—see [H/C, Fan, Occupancy, and Override on page 3](#).
- Override the fan to On from the Home Menu—see [H/C, Fan, Occupancy, and Override on page 3](#).
- Check that the appropriate application is selected—see [\(Advanced\) Application Options on page 5](#).
- Check that room temperature is being sensed correctly—see [Temperature Reading Is Incorrect on page 19](#).

# Output, Fan, and Relay Issues

## Analog Output Does Not Work

### ▲ CAUTION

Do not mistakenly connect 24 VAC to an analog output ground. This is not the same as a relay's switched common. See the backplate's terminal label for the correct terminal.

NOTE: The maximum current of an analog output is 20 mA @ 12 VDC. Excessive loads will be clamped at the maximum. Relays may chatter or fail to latch if they need more current than the maximum allowed. KMC REE-3111/3112 relays, for example, could be connected to the analog outputs, but REE-3211/3221/3213 relays would not operate reliably with analog outputs because their required power exceeds the FlexStat's capacity. (REE-3211/3221/3213 relays could, however, be used with the FlexStat relays and a separate power source.)

- Check current draw of load—it must be 20 mA or less. Substitute an output device that draws less current.
- Check that the output is on.
- See [Wiring Issues on page 21](#).
- See also [Fan Does Not Run on page 20](#).
- If Restore Factory has just been performed, see the Note and Cautions in [Restore Factory on page 15](#).
- If the firmware has just been upgraded, firmware for the wrong model type may have been installed (e.g., BAC-1xx63 firmware accidentally installed in a model BAC-1xx36). In the About menu, ASV may simply read "CUSTOM" instead of something like "BAC\_1xx36 R1.1.0.5" as it normally would have done. If so, repeat the firmware upgrade and ensure that the correct type of firmware is selected for the connected model.

NOTE: ASV in the About menu will also show CUSTOM if any built-in Control Basic program (1–5) is not running or has auto-run disabled.

## Fan Does Not Run

NOTE: The animated fan icon is coupled with BV18 in the packaged programming (not the actual fan output terminal).

- Select Occupied mode from the Home Menu—see [H/C, Fan, Occupancy, and Override on page 3](#).
- Override the fan to On from the Home Menu—see [H/C, Fan, Occupancy, and Override on page 3](#).
- See [Wiring Issues on page 21](#).
- Check that the appropriate application is selected—see [\(Advanced\) Application Options on page 5](#).
- Check the fan configuration—see [Fan Setup on page 5](#).
- Restart the FlexStat. **After a low limit alarm is generated, the fan will not run until after the FlexStat is restarted.** (See [Resetting the FlexStat on page 14](#).)

## Relay (Internal) Does Not Work

### ▲ CAUTION

Relays are for Class-2 voltages (24 VAC) only. Do not connect line voltage to the relays!

NOTE: Max. output current is 1 A for individual relays @ 24 VAC/VDC or a total of 1.5 A per bank of 3 relays (relays 1–3, 4–6, and 7–9). Do not attach a device that draws current that exceeds the corresponding value. Relays are NO, SPST (Form "A").

- Check current draw of load. Substitute an output device that draws less current.
- Check that the output is on.
- See [Wiring Issues on page 21](#).
- Restart the FlexStat.
- If Restore Factory has just been performed, see the Note and Cautions in [Restore Factory on page 15](#).

- If the firmware has just been upgraded, firmware for the wrong model type may have been installed (e.g., BAC-1xx63 firmware accidentally installed in a model BAC-1xx36). In the About menu, ASV may simply read “CUSTOM” instead of something like “BAC\_1xx36 R1.1.0.5” as it normally would have done. If so, repeat the firmware upgrade and ensure that the correct type of firmware is selected for the connected model.

NOTE: ASV in the About menu will also show CUSTOM if any built-in Control Basic program (1–5) is not running or has auto-run disabled.

### Relay (External) Does Not Work

- See [Analog Output Does Not Work on page 20](#).
- See [Relay \(Internal\) Does Not Work on page 20](#)

## Wiring Issues

### ⚠ CAUTION

Do not mistakenly connect 24 VAC to an analog output ground. This is not the same as a relay's switched common. See the backplate's terminal label for the correct terminal.

### ⚠ CAUTION

Relays are for Class-2 voltages (24 VAC) only. Do not connect line voltage to the relays!

- Remove the FlexStat from the backplate and inspect the terminals for loose or shorted wires.
- Use a voltmeter and ohmmeter to check the terminals for expected values. See the illustration below and the the Connections and Wiring section of the relevant BAC-10000 Series Installation Guide.

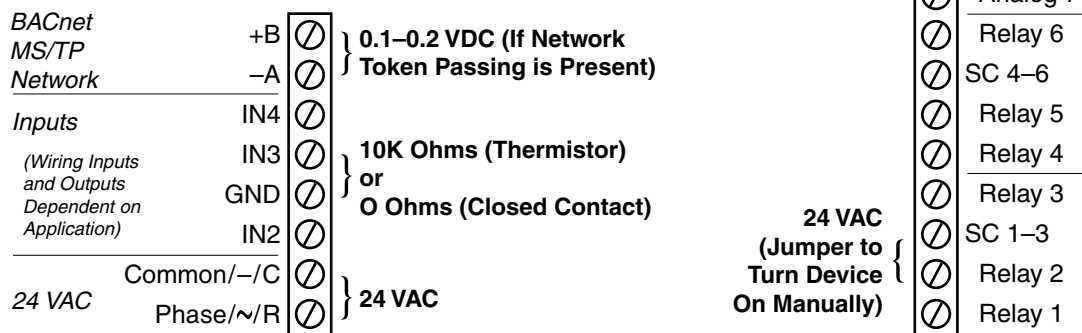
NOTE: Voltage on the BACnet MS/TP terminals changes according to the signals (passing of the token) between controllers on the network. No voltage indicates a bad connection or simply no active network.

- Check the wiring at the connected devices.

#### NOTE: Values Shown Are Approximate!

NOTE: BAC-1xxx63 Backplate Terminals Shown with FlexStat Removed; Outputs and Inputs Vary According to Application

NOTE: SC = Switched (Relay) Common, Should Have the Phase Side of 24 VAC Connected



Terminal Voltages and Resistances with FlexStat REMOVED from Backplate

## Maintenance

Remove dust as necessary from the holes in the top and bottom. Clean the display with soft, damp cloth and mild soap.

To maintain maximum sensitivity of optional built-in motion sensors, occasionally wipe dust or dirt off the lens—but do not use any fluid on the sensor.

## Firmware Upgrade

The existing version of firmware can be viewed from the About the FlexStat screen. (See [About the FlexStat on page 4](#)).

Firmware in the FlexStat can be upgraded using a PC and a KMD-5699 firmware flash upgrade kit available from KMC Controls. (For full upgrade instructions, see the KMD-5699 Installation Guide, P/N 913-019-04.)












## Programming (Custom)

The FlexStat has a library of built-in applications and options that are configured through the FlexStat's display. Beyond these standard configurations, custom changes can be added to a FlexStat using KMC's BACstage (ver. 2.4.0.26 or later) or TotalControl (ver. 2.0.5 or later). See the BAC-10000 Series Application Guide (P/N 913-019-03) for more information.

**NOTE:** Customized programs are the responsibility of the user. KMC Controls does not provide support for such programs.

## Accessories

HMO-10000	Horizontal or 4 x 4 handy box wall mounting plate, light almond	
HMO-10000W	HMO-10000 in white	
HPO-0044	Replacement cover hex screw	
KMD-5567	Network surge suppressor	
KMD-5575	Network repeater/isolator	
KMD-5576	EIA-485 to USB Communicator	
KMD-5624	PC data port (EIA-485) cable (FlexStat to USB Communicator)—included with the KMD-5576 (buy for third-party EIA-232 interfaces)	
KMD-5699	FlexStat firmware flash upgrade kit	
SP-001	Flat blade and hex end screwdriver (with KMC logo) for cover hex screws	
XEE-6111-040	Transformer, 120-to-24 VAC, 40 VA, <b>single-hub</b>	
XEE-6112-040	Transformer, 120-to-24 VAC, 40 VA, <b>dual-hub</b>	

## Support

FlexStats come with a printed Installation Guide. Additional resources for configuration, application, operation, programming, upgrading and much more is available on the award-winning KMC Controls web site ([www.kmcccontrols.com](http://www.kmcccontrols.com)).

The collection of FlexStat documents won a prestigious publications award for technical marketing support from the Chicago chapter of the Society for Technical Communication in March 2010.



## Important Notices

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# Reference

## Acronyms and Abbreviations

Common acronyms and abbreviations in FlexStat and related documents include:

amp = amperes

A = amperes

AAC = Advanced Application Controller

A/C = air conditioning

AC = alternating current

AHU = air handling unit

avg. = average

AWG = American Wire Gauge

BACnet = Building Automation Control network

BTL = BACnet Testing Laboratories

C = Celsius

cfh = cubic feet per hour

cfm = cubic feet per minute

cm = centimeters

DA = direct acting

DC = direct current

DPDT = double pole double throw

DPST = double pole single throw

EIA = Electronic Industries Alliance

EOL = end of line

F = Fahrenheit

FCU = fan coil unit

FIU = fan induction unit

ft-lbs. = foot pounds

g = grams

HPU = heat pump unit

HVAC = heating ventilating and air conditioning

Hz = hertz

IP = Internet protocol

LCD = liquid crystal display

mA = milliamperes

MAC = media access control

max. = maximum

min. = minimum

mm = millimeters

MS/TP = master-slave/token-passing

NC = normally closed

NO = normally open

pF = picofarad

RA = reverse acting

RH = relative humidity

RS = Recommended Standard

RTC = real time clock

RTU = roof top unit

SPDT = single pole double throw

SPST = single pole single throw

UL = Underwriters Laboratories

USB = universal serial bus

UTC = Coordinated Universal Time

V = volts

VA = volt-ampere

VAC = volts alternating current

VAV = variable air volume

VDC = volts direct current

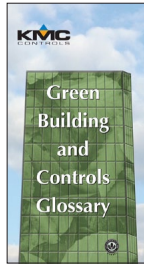
W = watts

NOTE: See also the Green Building and Controls Glossary (SB-046) for definitions of various terms in this catalog.



## Definitions of Terms

For **definitions** of various terms in this document, refer to the award-winning pocket-sized **Green Building and Controls Glossary (SB-046)**. A hyperlinked online version can be downloaded from the Brochures section of KMC Controls web site, [www.kmcccontrols.com](http://www.kmcccontrols.com). **Some of the more important glossary terms for this document are included on this page:**



**Air Handling Unit (AHU)**—An HVAC system component that conditions and delivers air through the system. It typically contains one or more supply and return fans, heating/cooling coils, and filters to condition the air.

**BACnet® (Building Automation Control Network)**—An interoperable, nonproprietary, communication protocol standard conceived by a consortium of building managers, system users, and manufacturers. BACnet defines how information is packaged for transportation between building automation system vendors.

**EIA-485**—A serial communications standard in which the voltage difference between two wires conveys the data. It is commonly used to network controllers via twisted-pair wiring. It was formerly known as RS-485.

**Fan Coil Unit (FCU)**—A fan terminal unit that conditions the air in a single room or zone. FCUs generally contain heating and cooling coils and have the ability to supply outside air to a space.

**Heat Pump Unit (HPU)**—A unit that uses direct expansion to remove or add heat to a space. On a call for heat, the heat pump pulls heat from a source such as outside air or the ground and puts it into a space. On a call for cooling, the process is reversed.

**Max Master**—The highest MAC address a device will attempt to locate when polling for master devices on the local network.

**MS/TP (Master Slave/Token Passing)**—A protocol (using the EIA-485 signaling standard) in which master devices can initiate requests for data but slave devices cannot (since slaves can only reply to messages from other devices). KMC advanced application controllers are all MS/TP master devices.

**Native BACnet Device**—A device that is fully BACnet compatible and uses BACnet as its primary, if not exclusive, method of communication.

**PID (Proportional Integral Derivative) Control**—A control algorithm that enhances the PI control algorithm by adding a component that is proportional to the rate of change (derivative) of the deviation of the controlled variable. This compensates for system dynamics and allows faster control response.

**PID Loop Controller**—A controller with an algorithm that calculates an output value that is based on the sensed value and the required setpoint. PID loop controllers provide more accurate and stable control than simpler controllers.

**Proportional Control**—A type of control in which a controlled device may operate at any position between fully closed to fully open. Within a specific range, the output response maintains a constant ratio to the input signal.

**Protocol**—A definition or set of communication rules by which information is exchanged between devices on a network.

**Real Time Clock (RTC)**—A device that keeps track of the current time in a controller even if power is interrupted for a period of time.

**Relative Humidity (RH)**—The ratio of the amount of water vapor in air to the maximum amount of water vapor that could be in the air if the vapor were at its saturation conditions.

**Roof Top Unit (RTU)**—An HVAC unit that is supplied as a package and installed outside of a building.

**Router**—A device that connects two or more networks and chooses the best path for data packets.

**USB (Universal Serial Bus)**—A popular, plug-and-play, high-speed, serial computer interface.

**UTC (Coordinated Universal Time)**—An international standard for determining time zones.

**Variable Air Volume (VAV)**—A method of temperature control in which the volume of constant temperature supply air exiting a duct is modulated (via dampers) to maintain a temperature setpoint in an individual space.

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