Installation Guide (3/6 Outputs)

Quick Start

⚠ CAUTION

This document is for 3-relay, 6-analog-output, 6-external-input BAC-12xx36/13xx36/14xx36 series only. THESE MODELS ARE NOT COMPATIBLE WITH THE BACKPLATES OF OLDER BAC-10000 SERIES FLEXSTATS (WITH ONLY 3 EXTERNAL INPUTS)! If replacing an older 3-input FlexStat, replace the backplate as well. See other installation guides for other models.

To select and use a FlexStat in an application:
1. Select the appropriate model for the intended application and options (see the FlexStat Data Sheet).
2. Mount and wire the unit (see this Installation Guide).
3. Configure/program the unit (see the FlexStat Operation and Application Guides).
4. If necessary, troubleshoot any issues (see the FlexStat Operation Guide).
5. Operate the unit (see the FlexStat Operation Guide).

NOTE: This document gives basic mounting, wiring, and setup information only. For configuration, programming, operation, and other information, see the KMC Controls web site for the latest documents.

Mounting

For optimum temperature sensor performance, the FlexStat must be mounted on an interior wall and away from heat sources, sunlight, windows, air vents, and air circulation obstructions (e.g., curtains, furniture). Additionally, for a model with an occupancy sensor option, install it where it will have unobstructed view of the most typical traffic area. (See the FlexStat Application Guide for more information.)

If replacing an existing thermostat, label wires as needed for reference when removing the existing thermostat.

1. Complete rough-in wiring at each location prior to thermostat installation. Cable insulation must meet local building codes.

⚠ CAUTION

To prevent mounting screw heads from touching the circuit board in the thermostat, use only the mounting screws supplied by KMC Controls. Using other screws may damage the FlexStat. Do not turn screws in farther than necessary to remove the cover.

2. If the cover is locked on the backplate, turn the hex screws in the bottom and top of the FlexStat CLOCKWISE until they (just) clear the cover. (See Illustration 1.) Pull the cover away from the backplate (mounting base).

3. Route the wiring through the backplate.

4. With the embossed “UP” and arrows toward the ceiling, fasten the backplate to a wall handy-box. BAC-12xxx models mount directly on vertical 2 x 4 inch boxes, but they require an HMO-10000/HMO-10000W wall mounting plate for horizontal or 4 x 4 boxes. BAC-13xxx/14xxx models mount directly on any of those types of boxes.

5. Make the appropriate connections to the terminal blocks. (See the Connections and Wiring section.)

6. Place the FlexStat cover over the backplate while being careful not to pinch or dislodge any wiring. Back the hex screws (counterclockwise) out of the brackets until they engage the FlexStat cover and hold it in place.
Connections and Wiring

Wiring Considerations

- Because of the many connections (power, network, inputs, outputs, and their respective grounds or switched commons), be sure wiring is well planned before installation of conduit!

- Make sure that conduit for all wiring has adequate diameter for all necessary wiring. Using 1-inch conduit and junction boxes is recommended! Use external junction boxes above the ceiling or in another convenient location as needed to make connections that run to the FlexStat’s junction box.

- To prevent excessive voltage drop, use a conductor size that is adequate for the wiring length! Allow plenty of “cushion” to allow for transient peaks during startup.

- Using multiple conductor wires for all inputs (e.g., 8 conductor) and outputs (e.g., 12 conductor) is recommended. Grounds for all the inputs can be combined on one wire.

⚠️ CAUTION
To avoid damage from ground loops and other communication issues in networked FlexStats, correct phasing on MS/TP network and power connections on ALL the networked controllers is critically important.

Network Wiring

For Ethernet or IP communications, plug an Ethernet cable into the RJ-45 jack on the back of the FlexStat.

For MS/TP communications, connect the –A terminals in parallel with all other –A terminals on the network and the +B terminals in parallel with all other +B terminals. (See Illustrations 2 and 5.) Connect the shields of the cable (Belden cable #82760 or equivalent) together at each device. Use a wire nut or the S terminal in KMC BACnet controllers. (FlexStats, however, do not have an S terminal.) Connect the cable shield to a good earth ground at one end only.

NOTE: The S terminal in KMC controllers is provided as a connecting point for the shield. The terminal is not connected to the ground of the controller. When connecting to controllers from other manufacturers, verify the shield connection is not connected to the controller’s ground.

For more information on principles and good practices when connecting an MS/TP network, see Planning BACnet Networks (Application Note AN0404A).

MS/TP EOL (End-Of-Line) Termination

The controllers/thermostats on the physical ends of an EIA-485 wiring segment must have end-of-line termination installed for proper network operation. (See Illustrations 2 through 4.) If a FlexStat is at the physical end of the MS/TP network line, set both the EOL termination switches to On (to the right/up) on the back of the circuit board. If not on the end, ensure that both switches are Off (left/down).

⚠️ CAUTION
This document is for 3-relay, 6-analog-output, 6-external-input BAC-12xx36/13xx36/14xx36 series ONLY. THESE MODELS ARE NOT COMPATIBLE WITH THE BACKPLATES OF OLDER BAC-10000 SERIES FLEXSTATS (WITH ONLY 3 EXTERNAL INPUTS)!

If replacing an older 3-input FlexStat, replace the backplate as well.
NOTE: On BAC-13xxxx/14xxxx models, terminals are rotated 90° CCW.

Input Connections

Passive input devices require pull-up resistors in the circuit. For passive input devices (e.g., switch contacts and 10K ohm thermistors) on IN2 through IN4 and IN7 through IN9, set the pull-up switches on the back of the circuit board to the 10K position. For active voltage devices, set the switches to the 0–12 VDC position. (See Illustrations 3 through 5.)

NOTE: Unlike the EOL switch pairs, the INPUT switch pairs must NOT have both switches set to the same direction—if one of the pair’s switches is set to the left, for example, the other must be set to the right (or vice versa). ALL the input pull-up resistor switch pairs must be fully latched in either 10K Ohm or 0–12 VDC position even if a switch pair has no input connected! A single incorrect switch position may cause errors in multiple inputs.

NOTE: Type II or III 10K ohm thermistors can be selected by changing the menu setting in Advanced > Inputs > Input # > Sensor (see the Configuration section). If a remote space temperature sensor is connected to A17, space temperature can be configured for onboard, remote, averaging of the two, the lowest reading, or the highest reading.

NOTE: FlexStat inputs do not support 1K ohm RTDs.

Output Connections

Connect the device under control between the desired output terminal and the related SC (Switched Common for relays) or GND (Ground for analog outputs) terminal. (See Illustration 5). For the bank of three relays, there is one Switched (relay) Common connection (in place of the GND terminal used with analog outputs). (See Illustration 6.) For the relay circuit, the phase side of the AC should be connected to the SC terminal.

Do not attach a device that draws current exceeding the FlexStat’s output capacity:

- Maximum output current for individual ANALOG outputs (4–9) is 20 mA @ 12 VDC (each).
- Max. output current is 1 A for individual RELAYS @ 24 VAC/VDC or a total of 1.5 A for relays 1–3.
For example, (discontinued) KMC REE-3211 relays would exceed the FlexStat’s analog output capacity, but they can be used with the FlexStat’s internal relays 1–3 as shown in the following applications pages. (Use a Core Components CVR11C-0/LD96200 in the REE-3211’s place in those applications.)

FlexStat relays 1–3 are NO, SPST (Form “A”). (To emulate binary outputs with the analog outputs, set the output voltage to be either 0 or 12 VDC in Control Basic.)

**Power Connection**

The FlexStat requires an external, 24 volt, AC power source. Use a KMC Controls Class-2 transformer to supply power. Connect the transformer’s neutral lead to the 24 VAC Common/~/C terminal and the AC phase lead to the 24 VAC Phase/~/R terminal. (See Illustration 5.) Power is applied to the FlexStat when the transformer is powered.

KMC Controls recommends powering only one controller/thermostat from each transformer. If installing a FlexStat in a system with other controllers/thermostats powered from a single transformer, however, phasing must be correct and the total power drawn from the transformer must not exceed its rating.

**Configuration**

To configure the FlexStat, navigate the menus and change settings by pressing a combination of buttons. Press the Right (Menu) button and then 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: Applications on pages 5–11 are the packaged programs selectable from the Advanced > Application menu in the BAC-1xxx36 (only) models. Other FlexStat models have other applications.

NOTE: Humidity, motion, and CO₂ sensor options in menus are dependent on the FlexStat model and selected application.

For detailed configuration, operation, troubleshooting, and other information, see the FlexStat Operation Guide.

For additional wiring, customization, programming, and application information, see the FlexStat Application Guide.

**Applications Notes and Cautions**

⚠️ **CAUTION**

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

Do not mistakenly connect 24 VAC to an analog output ground.

NOTE: Although typical terminal code letters are shown, check the schematics of your unit for wiring details!

NOTE: These applications are for 3 relay and 6 analog output BAC-12xx36/13xx36/14xx36 series only. See other installation guides for other models.

NOTE: CO₂, humidity, and motion sensor options are dependent on FlexStat model.

NOTE: For Bill of Materials listings of the various accessories shown in the sample diagrams, see the FlexStat Application Guide.

NOTE: The KMC REE-3211 is discontinued. Use Core Components CVR11C-0/LD96200 in its place. Do not use either with analog outputs! See Output Connections on page 3.

**Maintenance**

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

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

FCU (Fan Coil Unit)—2 Pipe, Modulating

### Applications

**DEGREES SCALE:** °F

**OPT. 2-PIPE**

**ADDITIONAL SETUP**

<table>
<thead>
<tr>
<th>APPLICATION</th>
</tr>
</thead>
</table>

| DEGREES SCALE: °F | OPT. 2-PIPE | ADDITIONAL SETUP |

#### FCU 2-PIPE MODULATING LAYOUT

---

#### Input Terminals

<table>
<thead>
<tr>
<th>FCU Input Connections</th>
<th>BACnet Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN9 Opt. Remote CO₂ Sensor*</td>
<td>A19</td>
</tr>
<tr>
<td>IN8</td>
<td>A18</td>
</tr>
<tr>
<td>IN4</td>
<td>A14</td>
</tr>
<tr>
<td>IN3 Supply Water Temp. (W-TMP)**</td>
<td>A13</td>
</tr>
<tr>
<td>IN2 Optional FST or DAT*</td>
<td>A12</td>
</tr>
</tbody>
</table>

*Fan Status (FST), Discharge Air Temperature (DAT), and (not shown on the diagram) remote temp./CO₂ sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

**Input for Supply Water Temp is typically a 10K, Type III thermistor.**

---

#### FCU Output Connections

<table>
<thead>
<tr>
<th>Output Terminals</th>
<th>FCU Output Connections</th>
<th>BACnet Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog 9 Ground (for analog output terminals 7–9)</td>
<td>AO9</td>
<td></td>
</tr>
<tr>
<td>Analog 8</td>
<td>AO8</td>
<td></td>
</tr>
<tr>
<td>Analog 7 Valve (VLV)</td>
<td>AO7</td>
<td></td>
</tr>
<tr>
<td>Analog 6</td>
<td>AO6</td>
<td></td>
</tr>
<tr>
<td>Analog 5</td>
<td>AO5</td>
<td></td>
</tr>
<tr>
<td>Analog 4</td>
<td>AO4</td>
<td></td>
</tr>
<tr>
<td>Relay 3 Fan 3</td>
<td>BO3</td>
<td></td>
</tr>
<tr>
<td>Relay 2 Fan 2</td>
<td>BO2</td>
<td></td>
</tr>
<tr>
<td>Relay 1 Fan 1</td>
<td>BO1</td>
<td></td>
</tr>
</tbody>
</table>

---

#### FCU (Fan Coil Unit)—2 Pipe, Modulating Output Terminals

<table>
<thead>
<tr>
<th>GND</th>
<th>Analog 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog 8</td>
<td>Analog 7</td>
</tr>
<tr>
<td>Analog 6</td>
<td>Analog 5</td>
</tr>
<tr>
<td>Analog 4</td>
<td>Relay 3</td>
</tr>
<tr>
<td>Relay 2</td>
<td>Relay 1</td>
</tr>
</tbody>
</table>

---

#### NOTE:

Do not use REE-3211/ CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.
FCU—4 Pipe, Modulating

NOTE: Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.

**Application**
Degrees Scale: °F
App. Fan Coil Opt. 4-Pipe

**Additional Setup**
Fan Humidity Optimum Start Sensors Valve

**Input Terminals**

<table>
<thead>
<tr>
<th>Input Terminals</th>
<th>FCU Input Connections</th>
<th>BACnet Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN9</td>
<td>Opt. Remote CO₂ Sensor*</td>
<td>A19</td>
</tr>
<tr>
<td>IN8</td>
<td>A18</td>
<td></td>
</tr>
<tr>
<td>IN4</td>
<td>A14</td>
<td></td>
</tr>
<tr>
<td>IN3</td>
<td>A13</td>
<td></td>
</tr>
<tr>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>IN2</td>
<td>Optional FST or DAT*</td>
<td>A12</td>
</tr>
</tbody>
</table>

*Fan Status (FST), Discharge Air Temperature (DAT), and (not shown on the diagram) remote temp./CO₂ sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

**Output Terminals**

<table>
<thead>
<tr>
<th>Output Terminals</th>
<th>FCU Output Connections</th>
<th>BACnet Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog 9</td>
<td>AO9</td>
<td></td>
</tr>
<tr>
<td>Analog 8</td>
<td>Heat Valve (HTV)</td>
<td>AO8</td>
</tr>
<tr>
<td>Analog 7</td>
<td>Cool Valve (CLV)</td>
<td>AO7</td>
</tr>
<tr>
<td>Analog 6</td>
<td>Humidification Valve (HUM or HUMV)</td>
<td>AO6</td>
</tr>
<tr>
<td>GND</td>
<td>Ground (for analog output terminals 7–9)</td>
<td></td>
</tr>
<tr>
<td>Analog 5</td>
<td>AO5</td>
<td></td>
</tr>
<tr>
<td>Analog 4</td>
<td>AO4</td>
<td></td>
</tr>
<tr>
<td>Relay 3</td>
<td>Fan 3</td>
<td>BO3</td>
</tr>
<tr>
<td>Relay 2</td>
<td>Fan 2</td>
<td>BO2</td>
</tr>
<tr>
<td>Relay 1</td>
<td>Fan 1</td>
<td>BO1</td>
</tr>
</tbody>
</table>

**FCU 4-PIPE MODULATING LAYOUT**

**Application**
Degrees Scale: °F
App.: 4-Pipe

**Additional Setup**
Fan Coil Opt. 4-Pipe

**Input Terminals**

<table>
<thead>
<tr>
<th>Input Terminals</th>
<th>FCU Input Connections</th>
<th>BACnet Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN9</td>
<td>Opt. Remote CO₂ Sensor*</td>
<td>A19</td>
</tr>
<tr>
<td>IN8</td>
<td>A18</td>
<td></td>
</tr>
<tr>
<td>IN4</td>
<td>A14</td>
<td></td>
</tr>
<tr>
<td>IN3</td>
<td>A13</td>
<td></td>
</tr>
<tr>
<td>GND</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>IN2</td>
<td>Optional FST or DAT*</td>
<td>A12</td>
</tr>
</tbody>
</table>

*Fan Status (FST), Discharge Air Temperature (DAT), and (not shown on the diagram) remote temp./CO₂ sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

NOTE: Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.
AHU (Air Handler Unit)—1 Heat and 1 Cool

NOTE: Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.

**APPLICATION DEGREES SCALE: °F**

**AIR HANDLER**

**OPT. 1H/1C**

**ADDITIONAL SETUP**

**DAMPER**

**FAN**

**HUMIDITY**

**OPTIMUM START**

**SENSORS**

---

Input Terminals | AHU Input Connections | BACnet Objects
---|---|---
IN9 | Opt. Remote CO₂ Sensor* | AI9
IN8 | | A18
IN4 | Opt. Outside Air Temp. (OAT)** | A14
GND | Ground | 
IN2 | Optional FST or DAT* | A12

*Fan Status (FST), Discharge Air Temperature (DAT), and (not shown on the diagram) remote temp./CO₂ sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

**NOTE:** When using the optional Outside Air Damper, MAT/OAT inputs must also be connected.

Output Terminals | AHU Output Connections | BACnet Objects
---|---|---
Analog 9 | Optional Outside Air Damper (OAD/RTD)* | AO9
GND | Ground (for analog output terminals 7–9) | 
Analog 8 | AO8
Analog 7 | AO7
Analog 6 | Optional Humidification Valve (HUM or HUMV) | AO6
GND | Ground (for analog output terminals 4–6) | 
Analog 5 | AO5
Analog 4 | Optional Fan Speed | AO4
Relay 3 | Heat 1 (W1) | BO3
Relay 2 | Cool 1 (Y1) | BO2
Relay 1 | Fan 1 (G) | BO1

*If optional Outside Air Damper is used, must also have MAT/OAT inputs.

---

NOTE: Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.
AHU—1 or 2 Heat and Modulating Cool

NOTE: Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.

Input Terminals | AHU Input Connections | BACnet Objects
--- | --- | ---
IN9 | Opt. Remote CO₂ Sensor* | A19
IN7 | Opt. Outside Air Temp. (OAT)** | A14
GND | Ground | 
IN2 | Optional FST or DAT* | A12

*Fan Status (FST), Discharge Air Temperature (DAT), and (not shown on the diagram) remote temp./CO₂ sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

**When using the optional Outside Air Damper, MAT/OAT inputs must also be connected.

NOTE: Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.

Input Terminals | AHU Input Connections | BACnet Objects
--- | --- | ---
IN9 | Opt. Remote CO₂ Sensor* | A19
IN7 | Opt. Outside Air Temp. (OAT)** | A14
GND | Ground | 
IN2 | Optional FST or DAT* | A12

*Fan Status (FST), Discharge Air Temperature (DAT), and (not shown on the diagram) remote temp./CO₂ sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

**When using the optional Outside Air Damper, MAT/OAT inputs must also be connected.
**AHU—Modulating Heat and 1 or 2 Cool**

**NOTE:** Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.

**APPLICATION DEGREES SCALE: °F**

**ADDITIONAL SETUP**

**DAMPER**

**FAN**

**HUMIDITY**

**OPTIMUM START**

**SENSORS**

**STAGING**

---

**AHU MODULATING H / 1 OR 2 C LAYOUT**

**Input Terminals** | **AHU Input Connections** | **BACnet Objects**
---|---|---
IN9 | Opt. Remote CO₂ Sensor* | AI9
IN8 | | A18
IN4 | Opt. Outside Air Temp. (OAT)** | A14
GND | Ground | 
IN2 | Optional FST or DAT* | A12

*Fan Status (FST), Discharge Air Temperature (DAT), and (not shown on the diagram) remote temp./CO₂ sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

**When using the optional Outside Air Damper, MAT/OAT inputs must also be connected.**

---

**Output Terminals** | **AHU Output Connections** | **BACnet Objects**
---|---|---
Analog 9 | Optional Outside Air Damper (OAT/RTD)* | AO9
GND | Ground (for analog output terminals 7–9) | 
Analog 8 | Heating Valve (HTV) | AO8
Analog 7 | | AO7
Analog 6 | Optional Humidifier Valve (HUM or HUMV) | AO6
GND | Ground (for analog output terminals 4–6) | 
Analog 5 | | AO5
Analog 4 | Optional Fan Speed | AO4
Relay 3 | Optional Cool 2 (Y2) | BO3
Relay 2 | Cool 1 (Y1) | BO2
Relay 1 | Fan (G) | BO1

*If optional Outside Air Damper is used, must also have MAT/OAT inputs.

**NOTE:** Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.
AHU—Modulating Heat and Modulating Cool

NOTE: Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.

APPLICATION

DEGREES SCALE: °F

APP: OPT, MOD H/MOD C

ADDITIONAL SETUP

DAMPER

FAN

HUMIDITY

OPTIMUM START

SENSORS

VALVE

Input Terminals | AHU Input Connections | BACnet Objects
---|---|---
IN9 | Opt. Remote CO₂ Sensor* | A19
IN8 | | A18
IN4 | Opt. Outside Temp. (OAT)** | A14
GND | Ground | A12
IN2 | Optional FST or DAT* | A12

*Fan Status (FST), Discharge Air Temperature (DAT), and (not shown on the diagram) remote temp./CO₂ sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

**When using the optional Outside Air Damper, MAT/OAT inputs must also be connected.

Output Terminals | AHU Output Connections | BACnet Objects
---|---|---
Analog 9 | Optional Outside Air Damper (OAD/RTD)* | A09
GND | Ground (for analog output terminals 7–9) | A10
Analog 8 | Heating Valve (HTV) | AO8
Analog 7 | Cooling Valve (CLV) | AO7
Analog 6 | Optional Humidifier Valve (HUM or HUMV) | AO6
GND | Ground (for analog output terminals 4–6) | A12
Analog 5 | | AO5
Analog 4 | Optional Fan Speed | AO4
Relay 3 | | BO3
Relay 2 | | BO2
Relay 1 | Fan | BO1

See also the AHU—Additional Options section on the last page for network, humidification, and fan speed options.

NOTE: Do not use REE-3211/CVR11C-0/LD96200 relays with analog outputs! See Output Connections on page 3.
AHU—Additional Options

Additional Resources

The latest support files are always available on the KMC Controls website (www.kmccontrols.com). To see all available files, you will need to log-in to the Partners site. For specifications and accessories, see the BAC-12xxxx/13xxxx/14xxxx Series FlexStat Data Sheet.

For operation, configuration, troubleshooting, and other information, see the FlexStat Operation Guide.

For additional wiring, application, and programming information, see the FlexStat Application Guide.

For additional instructions on programming, see the Help system for BACstage or TotalControl.