

## STE-6000 Series Setpoint Dial Ranging with the Custom Input Property

by Kurt Wilkes, Training Manager

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Current STE-6014/6017/6018/6019/6020 room temperature sensors have a rotary setpoint dial with temperature increments from warmer (sun symbol) to cooler (snowflake symbol), replacing the previous °F or °C scale. The installation

guide for these models describes setting up BACnet and KMDigital controllers for use with the dials. The following is an alternate way for BACnet controllers that may be easier and gives the added advantage of allowing custom setpoint ranges. (KMDigital controllers already have an analogous configuration method.)

The setpoint pot (potentiometer) is a variable resistor that varies from 0 to 10K ohms when adjusting the knob from full cool to full heat. With the input voltage pull-down resistor selected, BAC-7000 and BAC-5800 series controllers see this as approximately 0 to 2.5 VDC (but the FlexStat and Building Controller see approximately 0 to 1.5 VDC).

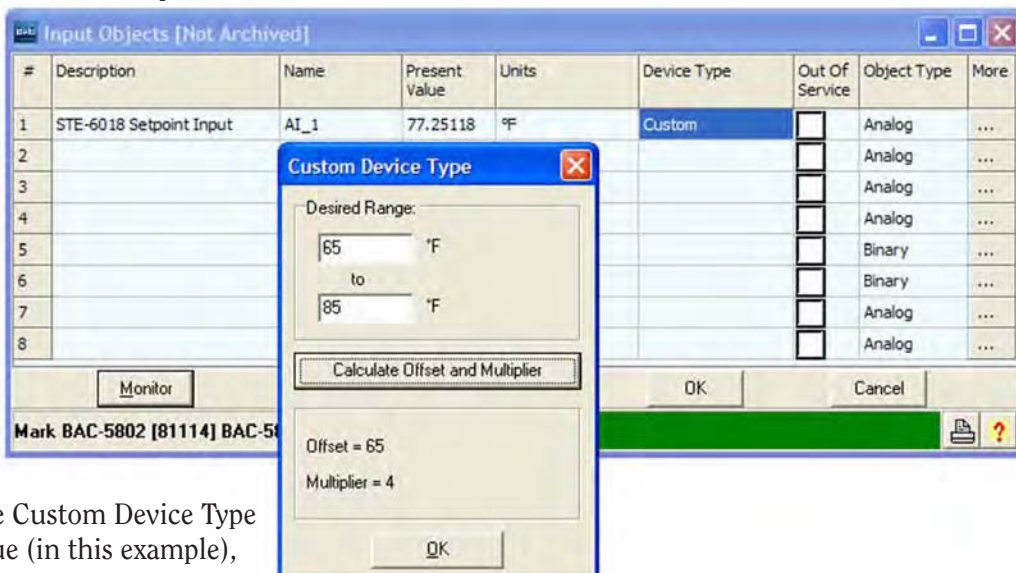
To select custom setpoint ranges, select the input units °F or °C in BACstage or TotalControl, and then determine the range you want (e.g., 65–75). However, Custom Device Type represents the input in voltage from 0–5 VDC even though the voltage read across the potentiometer will only be 0–2.5 VDC. To compensate for this, calculate the difference in the low and high setpoint range and add that to the high value for the Custom values ( $75 - 65 + 75 = 85$  for this example). Thus, in the Custom Device Type window, enter 65 for the low value (in this example),

enter the calculated 85 for the high value, and save changes. This will allow the input knob to adjust from 65–75.

This method provides easy adjustment of the input range and the input will display a setpoint value. However, it is less precise than the table method. The voltage read from the input is not linear (because of the pull-down voltage divider in the input). Thus, setting the knob at the halfway point does not give a setpoint exactly halfway in the range, and the actual range might show something like 68.09 to 74.85. Nevertheless, since icons and not numeric values are on the dial, this should be fine in most room temperature applications. The dial is to control comfort level, not accurate temperature values. (The tables method described in the STE-6014/6017/6018/6019/6020 installation guide compensates for the nonlinearity, but although that more time-consuming approach is more precise, it cannot have the setpoint range easily modified.)

For this application, the Building Controller's Custom Device Type for the input is configured in TotalControl in a similar way as the other BACnet controllers. If it does not work as expected, check that the Lookup Table on the Building Controller's web configuration page is set to None. For similar applications with the FlexStat, see the FlexStat application guide. For the similar process in KMDigital controllers, see the STE-6014/6017/6018/6019/6020 installation guide.

In the next newsletter issue, I'll describe setpoint ranging using Control Basic (for both BACnet and KMDigital controllers).



## Using Control Basic for Setpoint Ranging of STE-6000 Series Setpoint Dials

by Kurt Wilkes, Training Manager

Tech Tips

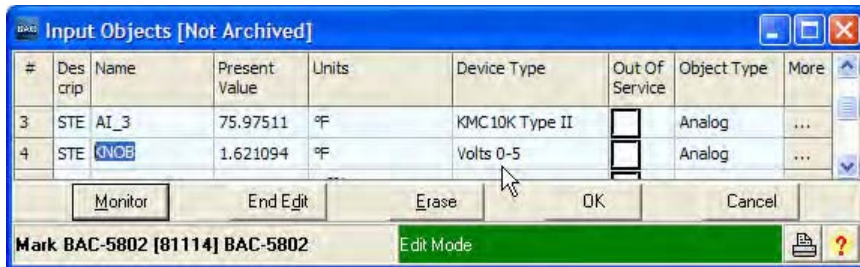


In my last column (Q1, 2011) I described using Custom Device Type for setpoint ranging of STE-6014/6017/6018/6019/6020 room temperature sensors with a rotary 10K ohm setpoint dial.

A more versatile technique for BAC/KMD-5xxx and BAC/KMD-7xxx controllers is to use Control Basic, which has the advantages of a linear setpoint adjustment, easy changing of the setpoint range, and optional automatic changing of the setpoint range according to the season.

In this example, the range will again be 65–75.

1. For the controller input connected to the setpoint pot, select (turn on) the pull-down resistor, rename the AI (IN in KMDigital) as KNOB, and select 0–5 VDC from the Device Type property.



2. Configure three Analog Value objects (Variables in KMDigital):

MAXSP = 75 Analog value for high Setpoint [Relinquish Default = 75]

MINSP = 65 Analog value for low Setpoint [Relinquish Default = 65]

ACTSTPT = Analog value, active calculated Setpoint

3. Create and run a line in Control Basic:

$$10 \text{ ACTSTPT} = \text{MINSP} + (\text{MAXSP} - \text{MINSP}) * \text{KNOB} / (5 - \text{KNOB})$$

For systems that change setpoint limits based on heating or cooling, modify the above steps as in the following example. Line 10 uses the local variables H and L to store the heating and cooling high and low limits. Line 20 then limits ACTSTPT as shown in the previous examples.

$$10 \text{ IF HEATING THEN } H = \text{HMAXSP}, L = \text{HMINSPP} \\ \text{ELSE } H = \text{CMAXSP}, L = \text{CMINSPP}$$

$$20 \text{ ACTSTPT} = L + (H - L) * \text{KNOB} / (5 - \text{KNOB})$$

For KMDigital controllers, except for Variable vs. Analog Value and AI vs. IN, the rest is the same. However, this procedure as described will not work in the FlexStat and the Building Controller because of differences in input voltages and setup. A future tech tip may address an equivalent process specifically for those devices.

