

Relative Calibration Functional Test

Instructions: For each system included on the checklist, verify the items indicated using **Yes** for acceptable, **No** for unacceptable, or **NA** for Not Applicable. For unacceptable items, identify what is required to correct the problem in the comments area provided. Use numbers to refer to comments. Identify the responsible contractor, if know, for any items requiring further action.

Equipment Required:

1. Field thermometer of some sort.
2. Lab grade thermometer (Optional, but highly desirable)
3. Minute by minute trending of points to be tested (Optional)
4. Shortridge meter with temperature probe (Optional but if available can be used as the field thermometer)

Acceptance Criteria: This test places the system in a steady state operating mode and then adjusts the return air temperature sensor, the mixed air temperature sensor, the warm-up coil discharge temperature sensor and the air handling unit discharge temperature sensor so that they read the same value when subjected to the same operating condition. Acceptance criteria are as follows:

1. With the system in a steady state condition, all sensors read the same value relative to a baseline, with-in their accuracy tolerance prior to adjustment.
2. With the system in a steady state condition, all sensors read the same value after adjustment.

The test will be performed at two different temperature levels in an effort to provide consistent readings from these sensors under all normally encountered operating conditions.

Date(s) of Test: _____

Time(s) of Test: _____

Test Technician _____

Item Number	Requirement	Initial and Date when Complete
Prerequisites		
1	Verify that all applicable prestart and start-up verification checks from the equipment manufacturer have been completed and that the system is fully functional.	
2	Verify that the sensors that are to be tested are certified and installed per the accuracy requirements of the specifications.	
3	Visually inspect the sensors that are to be tested to verify that they are installed in a manner that will allow them to measure the parameter intended and are free from influences due to mounting arrangement or configuration.	
4	Verify that the loads served by the system can tolerate the 15 to 60 minute period of operation with out active discharge temperature control that is required to perform this test.	
5	Target a day for the test when it is anticipated that the outdoor conditions will be in the mid 50°F range and suitable for operating on 100% outdoor air with out the need to heat or cool. This will allow calibration at two operating points. If the test cannot be scheduled for such a day prior to substantial completion, then proceed with the test in the full recirculation mode only.	
Preparation		

Item Number	Requirement	Initial and Date when Complete												
1	<p>Coordinate with the Owner and end-users served by the system for an appropriate test time. Note limits on deviations from set point that can be tolerated in the areas served during the test window and monitor these parameters during the test period. Terminate the test if they are about to be exceeded.</p> <table border="1" data-bbox="331 415 1523 583"> <thead> <tr> <th data-bbox="331 415 1040 457"><i>Area</i></th> <th data-bbox="1040 415 1334 457"><i>Criteria</i></th> <th data-bbox="1334 415 1523 457"></th> </tr> </thead> <tbody> <tr> <td data-bbox="331 457 1040 499">General office area (monitor return temperature)</td> <td data-bbox="1040 457 1334 499">75+/- 3°F</td> <td data-bbox="1334 457 1523 499">___ Verified</td> </tr> <tr> <td data-bbox="331 499 1040 541">Computer room</td> <td data-bbox="1040 499 1334 541">72+/- 3°F</td> <td data-bbox="1334 499 1523 541">___ Verified</td> </tr> <tr> <td data-bbox="331 541 1040 583">Return air CO₂ level</td> <td data-bbox="1040 541 1334 583">less than 750 ppm</td> <td data-bbox="1334 541 1523 583">___ Verified</td> </tr> </tbody> </table>	<i>Area</i>	<i>Criteria</i>		General office area (monitor return temperature)	75+/- 3°F	___ Verified	Computer room	72+/- 3°F	___ Verified	Return air CO ₂ level	less than 750 ppm	___ Verified	
<i>Area</i>	<i>Criteria</i>													
General office area (monitor return temperature)	75+/- 3°F	___ Verified												
Computer room	72+/- 3°F	___ Verified												
Return air CO ₂ level	less than 750 ppm	___ Verified												
2	Obtain copies of the specifications for accuracy for the sensors to be tested. Note the accuracy spec in the space provided below in step 10 of the procedure.													
3	Obtain copies of the factory calibration certificates for the sensors to be tested													
4	<p>Place the following AHU01 points into trending or install data loggers.</p> <table border="1" data-bbox="331 743 1523 911"> <tbody> <tr> <td data-bbox="331 743 1334 785">Return air temperature AHU01RAT</td> <td data-bbox="1334 743 1523 785">___ In trend</td> </tr> <tr> <td data-bbox="331 785 1334 827">Mixed air temperature AHU01MAT</td> <td data-bbox="1334 785 1523 827">___ In trend</td> </tr> <tr> <td data-bbox="331 827 1334 869">Preheat coil discharge temperature AHU01PhT</td> <td data-bbox="1334 827 1523 869">___ In trend</td> </tr> <tr> <td data-bbox="331 869 1334 911">Supply fan discharge air temperature AHU01LAT</td> <td data-bbox="1334 869 1523 911">___ In trend</td> </tr> </tbody> </table> <p>The following system points will also be trended to document that the temperature in the area they serve did not exceed the limits requested by the Owner.</p> <table border="1" data-bbox="331 995 1523 1079"> <tbody> <tr> <td data-bbox="331 995 1334 1037">Computer room temperature 01VAV15SpT</td> <td data-bbox="1334 995 1523 1037">___ In trend</td> </tr> <tr> <td data-bbox="331 1037 1334 1079">Return air CO₂ level AHU01RtCO2</td> <td data-bbox="1334 1037 1523 1079">___ In trend</td> </tr> </tbody> </table>	Return air temperature AHU01RAT	___ In trend	Mixed air temperature AHU01MAT	___ In trend	Preheat coil discharge temperature AHU01PhT	___ In trend	Supply fan discharge air temperature AHU01LAT	___ In trend	Computer room temperature 01VAV15SpT	___ In trend	Return air CO ₂ level AHU01RtCO2	___ In trend	
Return air temperature AHU01RAT	___ In trend													
Mixed air temperature AHU01MAT	___ In trend													
Preheat coil discharge temperature AHU01PhT	___ In trend													
Supply fan discharge air temperature AHU01LAT	___ In trend													
Computer room temperature 01VAV15SpT	___ In trend													
Return air CO ₂ level AHU01RtCO2	___ In trend													
Procedure														
1	<p>With the system operating, document the supply and return fan heat by measuring the entering and leaving air temperature at each fan with the same thermometer and then subtracting the two readings¹.</p> <p><i>Supply fan heat</i></p> <table data-bbox="331 1268 1334 1394"> <tbody> <tr> <td data-bbox="331 1268 1133 1310">Fan inlet temperature</td> <td data-bbox="1133 1268 1334 1310">_____ °F</td> </tr> <tr> <td data-bbox="331 1310 1133 1352">Fan outlet temperature</td> <td data-bbox="1133 1310 1334 1352">_____ °F</td> </tr> <tr> <td data-bbox="331 1352 1133 1394">Fan heat (outlet temperature - inlet temperature)</td> <td data-bbox="1133 1352 1334 1394">_____ °F</td> </tr> </tbody> </table> <p><i>Return fan heat</i></p> <table data-bbox="331 1415 1334 1539"> <tbody> <tr> <td data-bbox="331 1415 1133 1457">Fan inlet temperature</td> <td data-bbox="1133 1415 1334 1457">_____ °F</td> </tr> <tr> <td data-bbox="331 1457 1133 1499">Fan outlet temperature</td> <td data-bbox="1133 1457 1334 1499">_____ °F</td> </tr> <tr> <td data-bbox="331 1499 1133 1539">Fan heat (outlet temperature - inlet temperature)</td> <td data-bbox="1133 1499 1334 1539">_____ °F</td> </tr> </tbody> </table>	Fan inlet temperature	_____ °F	Fan outlet temperature	_____ °F	Fan heat (outlet temperature - inlet temperature)	_____ °F	Fan inlet temperature	_____ °F	Fan outlet temperature	_____ °F	Fan heat (outlet temperature - inlet temperature)	_____ °F	
Fan inlet temperature	_____ °F													
Fan outlet temperature	_____ °F													
Fan heat (outlet temperature - inlet temperature)	_____ °F													
Fan inlet temperature	_____ °F													
Fan outlet temperature	_____ °F													
Fan heat (outlet temperature - inlet temperature)	_____ °F													

¹ This information will be used later in the test if a fan is located between two sensors under test. Thermometer accuracy for this measurement is not critical as long as the same thermometer is used for both readings since the readings are subtracted from each other, thus canceling any error.

Item Number	Requirement	Initial and Date when Complete															
2	<p>Document the current software calibration and scaling factors for the sensors to be tested in the space below.</p> <table border="0"> <thead> <tr> <th data-bbox="337 338 407 365"><i>Point</i></th> <th data-bbox="1052 338 1122 365"><i>Slope</i></th> <th data-bbox="1192 338 1305 365"><i>Intercept</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="380 375 805 403">Return air temperature AHU01RAT</td> <td data-bbox="1052 396 1170 403">_____</td> <td data-bbox="1192 396 1310 403">_____</td> </tr> <tr> <td data-bbox="380 413 805 441">Mixed air temperature AHU01MAT</td> <td data-bbox="1052 434 1170 441">_____</td> <td data-bbox="1192 434 1310 441">_____</td> </tr> <tr> <td data-bbox="380 451 935 478">Preheat coil discharge temperature AHU01PhT</td> <td data-bbox="1052 472 1170 478">_____</td> <td data-bbox="1192 472 1310 478">_____</td> </tr> <tr> <td data-bbox="380 489 971 516">Supply fan discharge air temperature AHU01LAT</td> <td data-bbox="1052 510 1170 516">_____</td> <td data-bbox="1192 510 1310 516">_____</td> </tr> </tbody> </table>	<i>Point</i>	<i>Slope</i>	<i>Intercept</i>	Return air temperature AHU01RAT	_____	_____	Mixed air temperature AHU01MAT	_____	_____	Preheat coil discharge temperature AHU01PhT	_____	_____	Supply fan discharge air temperature AHU01LAT	_____	_____	
<i>Point</i>	<i>Slope</i>	<i>Intercept</i>															
Return air temperature AHU01RAT	_____	_____															
Mixed air temperature AHU01MAT	_____	_____															
Preheat coil discharge temperature AHU01PhT	_____	_____															
Supply fan discharge air temperature AHU01LAT	_____	_____															
3	<p>Modify the software calibration and scaling factors to return them to the standard upon which the input is based. For example, if the sensor is a 4-20 ma sensor with a range of 0-100°F, then set the system up so that 4ma indicates 0°F and 20ma indicates 100°F². Document these settings in the space provided.</p> <table border="0"> <thead> <tr> <th data-bbox="337 674 407 701"><i>Point</i></th> <th data-bbox="1052 674 1122 701"><i>Slope</i></th> <th data-bbox="1192 674 1305 701"><i>Intercept</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="380 714 805 741">Return air temperature AHU01RAT</td> <td data-bbox="1052 735 1170 741">_____</td> <td data-bbox="1192 735 1310 741">_____</td> </tr> <tr> <td data-bbox="380 751 805 779">Mixed air temperature AHU01MAT</td> <td data-bbox="1052 772 1170 779">_____</td> <td data-bbox="1192 772 1310 779">_____</td> </tr> <tr> <td data-bbox="380 789 935 816">Preheat coil discharge temperature AHU01PhT</td> <td data-bbox="1052 810 1170 816">_____</td> <td data-bbox="1192 810 1310 816">_____</td> </tr> <tr> <td data-bbox="380 827 971 854">Supply fan discharge air temperature AHU01LAT</td> <td data-bbox="1052 848 1170 854">_____</td> <td data-bbox="1192 848 1310 854">_____</td> </tr> </tbody> </table>	<i>Point</i>	<i>Slope</i>	<i>Intercept</i>	Return air temperature AHU01RAT	_____	_____	Mixed air temperature AHU01MAT	_____	_____	Preheat coil discharge temperature AHU01PhT	_____	_____	Supply fan discharge air temperature AHU01LAT	_____	_____	
<i>Point</i>	<i>Slope</i>	<i>Intercept</i>															
Return air temperature AHU01RAT	_____	_____															
Mixed air temperature AHU01MAT	_____	_____															
Preheat coil discharge temperature AHU01PhT	_____	_____															
Supply fan discharge air temperature AHU01LAT	_____	_____															
4	<p>Disable alarms that could be triggered by the deviations from normal that will be seen during the test or coordinate with the operators to acknowledge them. Note all alarms that are disabled in the space provided for future reference when returning the system to normal operation.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>																
5	<p>Place the system into steady state operation in the full recirculation mode via the following steps.</p> <table border="0"> <tbody> <tr> <td data-bbox="337 1283 1317 1352">Close the manual isolation valves on the steam and condensate lines for the preheat coil.</td> <td data-bbox="1341 1325 1503 1352">___ Complete</td> </tr> <tr> <td data-bbox="337 1367 764 1394">Place the preheat coil in full bypass.</td> <td data-bbox="1341 1367 1503 1394">___ Complete</td> </tr> <tr> <td data-bbox="337 1409 1219 1478">Close the manual isolation valves on the steam and condensate lines for the humidifier, including the jacket heater.</td> <td data-bbox="1341 1451 1503 1478">___ Complete</td> </tr> <tr> <td data-bbox="337 1493 1187 1562">Close the manual isolation valves on the chilled water supply and return connections.</td> <td data-bbox="1341 1535 1503 1562">___ Complete</td> </tr> <tr> <td data-bbox="337 1577 1000 1604">Shut down the exhaust systems associated with AHU01.</td> <td data-bbox="1341 1577 1503 1604"></td> </tr> <tr> <td data-bbox="423 1619 708 1646"> Toilet exhaust fan EF-1.</td> <td data-bbox="1341 1619 1503 1646">___ Complete</td> </tr> <tr> <td data-bbox="423 1661 813 1688"> Janitor's closet exhaust fan EF-2.</td> <td data-bbox="1341 1661 1503 1688">___ Complete</td> </tr> </tbody> </table>	Close the manual isolation valves on the steam and condensate lines for the preheat coil.	___ Complete	Place the preheat coil in full bypass.	___ Complete	Close the manual isolation valves on the steam and condensate lines for the humidifier, including the jacket heater.	___ Complete	Close the manual isolation valves on the chilled water supply and return connections.	___ Complete	Shut down the exhaust systems associated with AHU01.		Toilet exhaust fan EF-1.	___ Complete	Janitor's closet exhaust fan EF-2.	___ Complete		
Close the manual isolation valves on the steam and condensate lines for the preheat coil.	___ Complete																
Place the preheat coil in full bypass.	___ Complete																
Close the manual isolation valves on the steam and condensate lines for the humidifier, including the jacket heater.	___ Complete																
Close the manual isolation valves on the chilled water supply and return connections.	___ Complete																
Shut down the exhaust systems associated with AHU01.																	
Toilet exhaust fan EF-1.	___ Complete																
Janitor's closet exhaust fan EF-2.	___ Complete																

² You may discover that the system has already been set up to do this. However, it is not uncommon to adjust the software scaling and calibration factors to “tweak” a sensor to compensate for its certified accuracy limitations so that it reads closer to the true temperature. In fact, this is exactly what we will do later in the procedure to calibrate the sensors relative to each other. At this stage of the test, it is important that the system be set up to the sensor standards to allow a baseline to be established and evaluate if everything is reading with-in its certified accuracy specification.

Item Number	Requirement	Initial and Date when Complete
	Place the system in full recirculation (verify by visually checking the dampers).	
	Minimum outdoor air damper fully closed.	___ Verified
	Maximum outdoor air damper fully closed.	___ Verified
	Return air damper fully open.	___ Verified
	Relief damper fully closed.	___ Verified
6	<p>While waiting for the system to stabilize, document any temperature change that is occurring through the mixing box due to damper leakage.</p> <p>Return air temperature ahead of the return damper. _____ °F</p> <p>Average mixed air temperature at the discharge of the mixed air plenum³. _____ °F</p> <p>Change (difference between the two readings). _____ °F</p>	
7	<p>Document the standard that will be used for comparison of all temperatures during the test. The allowable choices are listed below in the order of desirability. Use the most desirable option available at the time of the test. (Check off which will be used).</p> <p>Lab grade mercury thermometer _____</p> <p>Field thermometer _____</p> <p>Discharge temperature sensor _____</p> <p>Location where the standard will be inserted into the system to take the baseline reading. _____</p>	
8	Allow the system to stabilize in the full recirculation mode for 10-15 minutes.	
9	<p>If the discharge sensor has been selected as the standard, evaluate its reading relative to other indicators like the apparent operating conditions and information from the other sensors taking fan heat into consideration. If the indication from the discharge sensor is significantly out of line from what would be anticipated based on the other available information, then it's accuracy may be out of spec and the test should be discontinued until the sensor's accuracy can be checked or a different standard becomes available. Indicate pass or fail in the check-off column.</p>	___ Pass/Fail

³ Take multiple readings - one at the center of each filter in the filter bank - and average them. Using the Shortridge meter in the automatic mode makes this very easy.

Item Number	Requirement	Initial and Date when Complete																																							
10	<p>At this point, all of the sensors should be reading nearly identical values since they are all being subjected to the same condition. The only difference between what the sensors indicate should be due to their accuracy tolerance and/or due to the effect of fan heat and damper leakage in the mixing plenum. Document the readings from the sensors and the deviation from the selected standard⁴. Compare the deviation from the selected standard to the accuracy specification to determine if the sensor passes this portion of the test or not (deviation from the standard outside the accuracy window fail). Include compensation for other offsets like fan heat and damper leakage in the mixing plenum where appropriate using the information gathered in steps 1 and 6⁵.</p> <p>Notes: _____</p> <p>_____</p> <p>_____</p> <hr/> <p><i>Baseline reading from the standard</i> _____ °F</p> <table border="1"> <thead> <tr> <th><i>Point</i></th> <th><i>Reading</i></th> <th><i>Deviation</i></th> <th><i>Accuracy Tolerance</i></th> <th><i>Other Offsets</i></th> <th><i>Allowable Deviation</i></th> <th></th> </tr> </thead> <tbody> <tr> <td>Return air temperature AHU01RAT</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>Pass/Fail</td> </tr> <tr> <td>Mixed air temperature AHU01MAT</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>Pass/Fail</td> </tr> <tr> <td>Preheat discharge air temperature AHU01PhT</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>Pass/Fail</td> </tr> <tr> <td>Supply fan discharge temperature AHU01LAT</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>Pass/Fail</td> </tr> </tbody> </table>	<i>Point</i>	<i>Reading</i>	<i>Deviation</i>	<i>Accuracy Tolerance</i>	<i>Other Offsets</i>	<i>Allowable Deviation</i>		Return air temperature AHU01RAT	_____	_____	_____	_____	_____	_____	Pass/Fail	Mixed air temperature AHU01MAT	_____	_____	_____	_____	_____	_____	Pass/Fail	Preheat discharge air temperature AHU01PhT	_____	_____	_____	_____	_____	_____	Pass/Fail	Supply fan discharge temperature AHU01LAT	_____	_____	_____	_____	_____	_____	Pass/Fail	
<i>Point</i>	<i>Reading</i>	<i>Deviation</i>	<i>Accuracy Tolerance</i>	<i>Other Offsets</i>	<i>Allowable Deviation</i>																																				
Return air temperature AHU01RAT	_____	_____	_____	_____	_____	_____	Pass/Fail																																		
Mixed air temperature AHU01MAT	_____	_____	_____	_____	_____	_____	Pass/Fail																																		
Preheat discharge air temperature AHU01PhT	_____	_____	_____	_____	_____	_____	Pass/Fail																																		
Supply fan discharge temperature AHU01LAT	_____	_____	_____	_____	_____	_____	Pass/Fail																																		
11	<p>Resolve all problems with sensors that fail the test in step 10 prior to proceeding.</p> <p>Notes: _____</p> <p>_____</p> <p>_____</p>																																								

⁴ At this point, if all of the sensors were identical and there was no such thing as calibration error, then all of the readings would be identical to each other and have the same deviation from the standard (probably none). But, this will very seldom be the case in the field due to manufacturing tolerances and other effects that combine to show up as the calibration tolerance for the sensors.

⁵ Compensation for fan heat should be included for each fan that is between the baseline sensor and the sensor under consideration. For example if the fan heat were measured to be 1°F, and the discharge sensor is in the fan discharge and the baseline is a lab grade thermometer, also located in the fan discharge, then the only allowable deviation from the baseline for the discharge sensor will be its accuracy tolerance. But, the deviation from baseline allowable for the sensor in the preheat coil discharge would include the fan heat in addition to its accuracy tolerance. Similar considerations apply to the effects of damper leakage and the temperature change it creates across the mixed air plenum.

Item Number	Requirement	Initial and Date when Complete																																			
12	<p>Skip this step if all of the sensors passed step 10. Otherwise, retest and document the results below after completing step 11.</p> <p><i>Baseline reading from the standard</i> _____ °F</p> <table border="1"> <thead> <tr> <th data-bbox="331 380 607 415"><i>Point</i></th> <th data-bbox="607 380 748 415"><i>Reading</i></th> <th data-bbox="748 380 889 415"><i>Deviation</i></th> <th data-bbox="889 380 1031 457"><i>Accuracy Tolerance</i></th> <th data-bbox="1031 380 1172 457"><i>Other Offsets</i></th> <th data-bbox="1172 380 1333 457"><i>Allowable Deviation</i></th> <th data-bbox="1333 380 1523 457"></th> </tr> </thead> <tbody> <tr> <td data-bbox="331 464 607 541">Return air temperature AHU01RAT</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td data-bbox="1333 464 1523 541">___ Pass/Fail</td> </tr> <tr> <td data-bbox="331 548 607 625">Mixed air temperature AHU01MAT</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td data-bbox="1333 548 1523 625">___ Pass/Fail</td> </tr> <tr> <td data-bbox="331 632 607 737">Preheat discharge air temperature AHU01PhT</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td data-bbox="1333 632 1523 737">___ Pass/Fail</td> </tr> <tr> <td data-bbox="331 743 607 856">Supply fan discharge temperature AHU01LAT</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td data-bbox="1333 743 1523 856">___ Pass/Fail</td> </tr> </tbody> </table>	<i>Point</i>	<i>Reading</i>	<i>Deviation</i>	<i>Accuracy Tolerance</i>	<i>Other Offsets</i>	<i>Allowable Deviation</i>		Return air temperature AHU01RAT	_____	_____	_____	_____	_____	___ Pass/Fail	Mixed air temperature AHU01MAT	_____	_____	_____	_____	_____	___ Pass/Fail	Preheat discharge air temperature AHU01PhT	_____	_____	_____	_____	_____	___ Pass/Fail	Supply fan discharge temperature AHU01LAT	_____	_____	_____	_____	_____	___ Pass/Fail	
<i>Point</i>	<i>Reading</i>	<i>Deviation</i>	<i>Accuracy Tolerance</i>	<i>Other Offsets</i>	<i>Allowable Deviation</i>																																
Return air temperature AHU01RAT	_____	_____	_____	_____	_____	___ Pass/Fail																															
Mixed air temperature AHU01MAT	_____	_____	_____	_____	_____	___ Pass/Fail																															
Preheat discharge air temperature AHU01PhT	_____	_____	_____	_____	_____	___ Pass/Fail																															
Supply fan discharge temperature AHU01LAT	_____	_____	_____	_____	_____	___ Pass/Fail																															
13	<p>Modify the software calibration factors as required to cause all of the sensors to read the same value as the baseline sensor. Remember to compensate for the effects of fan heat and damper leakage in the mixing plenum. Document the results below.</p> <table border="1"> <thead> <tr> <th data-bbox="331 1003 889 1039"><i>Point</i></th> <th data-bbox="889 1003 1031 1039"><i>Slope</i></th> <th data-bbox="1031 1003 1172 1039"><i>Intercept</i></th> <th data-bbox="1172 1003 1333 1081"><i>Final Value</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="331 1087 889 1123">Return air temperature AHU01RAT</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td data-bbox="331 1129 889 1165">Mixed air temperature AHU01MAT</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td data-bbox="331 1171 889 1207">Preheat coil discharge temperature AHU01PhT</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td data-bbox="331 1213 889 1249">Supply fan discharge temperature AHU01LAT</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table>	<i>Point</i>	<i>Slope</i>	<i>Intercept</i>	<i>Final Value</i>	Return air temperature AHU01RAT	_____	_____	_____	Mixed air temperature AHU01MAT	_____	_____	_____	Preheat coil discharge temperature AHU01PhT	_____	_____	_____	Supply fan discharge temperature AHU01LAT	_____	_____	_____																
<i>Point</i>	<i>Slope</i>	<i>Intercept</i>	<i>Final Value</i>																																		
Return air temperature AHU01RAT	_____	_____	_____																																		
Mixed air temperature AHU01MAT	_____	_____	_____																																		
Preheat coil discharge temperature AHU01PhT	_____	_____	_____																																		
Supply fan discharge temperature AHU01LAT	_____	_____	_____																																		
14	<p>If time and outdoor conditions permit, perform the following additional steps to ensure the relative accuracy of the sensors over a range of operating conditions. Otherwise, proceed to the Follow-up/Return to Normal section of the procedure.</p>																																				
15	<p>Place the system in the 100% outdoor air mode to subject the sensors to a different operating condition (verify by visually checking the dampers).</p> <table border="1"> <tbody> <tr> <td data-bbox="331 1430 1333 1465">Minimum outdoor air damper fully open.</td> <td data-bbox="1333 1430 1523 1465">___ Verified</td> </tr> <tr> <td data-bbox="331 1472 1333 1507">Maximum outdoor air damper fully open.</td> <td data-bbox="1333 1472 1523 1507">___ Verified</td> </tr> <tr> <td data-bbox="331 1514 1333 1549">Return air damper fully closed.</td> <td data-bbox="1333 1514 1523 1549">___ Verified</td> </tr> <tr> <td data-bbox="331 1556 1333 1591">Relief damper fully closed.</td> <td data-bbox="1333 1556 1523 1591">___ Verified</td> </tr> <tr> <td data-bbox="331 1598 1333 1633">Restart the exhaust systems associated with AHU01.</td> <td data-bbox="1333 1598 1523 1633"></td> </tr> <tr> <td data-bbox="331 1640 1333 1675">Toilet exhaust fan EF-1.</td> <td data-bbox="1333 1640 1523 1675">___ Complete</td> </tr> <tr> <td data-bbox="331 1682 1333 1717">Janitor's closet exhaust fan EF-2.</td> <td data-bbox="1333 1682 1523 1717">___ Complete</td> </tr> </tbody> </table>	Minimum outdoor air damper fully open.	___ Verified	Maximum outdoor air damper fully open.	___ Verified	Return air damper fully closed.	___ Verified	Relief damper fully closed.	___ Verified	Restart the exhaust systems associated with AHU01.		Toilet exhaust fan EF-1.	___ Complete	Janitor's closet exhaust fan EF-2.	___ Complete																						
Minimum outdoor air damper fully open.	___ Verified																																				
Maximum outdoor air damper fully open.	___ Verified																																				
Return air damper fully closed.	___ Verified																																				
Relief damper fully closed.	___ Verified																																				
Restart the exhaust systems associated with AHU01.																																					
Toilet exhaust fan EF-1.	___ Complete																																				
Janitor's closet exhaust fan EF-2.	___ Complete																																				
16	<p>Allow the system to stabilize in the 100% outdoor air mode for 10-15 minutes.</p>																																				

Item Number	Requirement	Initial and Date when Complete
-------------	-------------	--------------------------------

17 Verify that the sensors are still reading the same or nearly the same values. (Note that the return air sensor cannot be tested in this mode.) If there are differences “tweak” the software calibration factors to eliminate them and/or provide a good compromise between the values indicated at this condition and the values indicated in the full recirculation condition. Remember to compensate for the effects of fan heat and damper leakage in the mixing plenum. It may be necessary to toggle back and forth between the recirculation mode and the 100% outdoor air mode to fine tune the settings. Document the final results below if they differ from the results on the full recirculation cycle.

<i>Point</i>	<i>Slope</i>	<i>Intercept</i>	<i>Final Value 100% OA</i>	<i>Final Value Recirc.</i>
Return air temperature AHU01RAT	_____	_____	N/A	_____
Mixed air temperature AHU01MAT	_____	_____	_____	_____
Preheat coil discharge temperature AHU01PhT	_____	_____	_____	_____
Supply fan discharge temperature AHU01LAT	_____	_____	_____	_____

Follow-up/Return to Normal

1	Return the system to normal operation via the following steps.	
	Open the manual isolation valves on the steam and condensate lines for the preheat coil.	___ Complete
	Return the preheat coil face and bypass dampers to automatic control.	___ Complete
	Open the manual isolation valves on the steam and condensate lines for the humidifier, including the jacket heater.	___ Complete
	Open the manual isolation valves on the chilled water supply and return connections.	___ Complete
	Return the economizer and minimum outdoor air control cycles to automatic (verify by visually checking the dampers).	
	Minimum outdoor air damper released to automatic control.	___ Verified
	Maximum outdoor air damper released to automatic control.	___ Verified
	Return air damper fully released to automatic control.	___ Verified
	Relief damper fully released to automatic control.	___ Verified
	Return the exhaust systems associated with AHU01 to automatic control.	
	Toilet exhaust fan EF-1.	___ Complete
	Janitor’s closet exhaust fan EF-2.	___ Complete
2	Re-enable all alarms that were disabled previously. Use the items noted under step 4 of the procedure as a guide.	
3	Print trend reports from the trends that were running during the test and save the trend files to a floppy to document the test process and results.	

Item Number	Requirement	Initial and Date when Complete
4	Remove all trends that the Owner does not wish to retain. Remove data loggers if they were installed in place of trending or to supplement trending.	
5	Back-up the controller database to ensure that the new calibration factors are saved to the system hard disk.	
6	Recommend that the Owner back up the system hard disk at the completion of the current commissioning process to ensure that the modifications and adjustments made can be recovered if the system hard disk fails.	
Comments:		