DAMPER FAILURE

Description of Fault

Damper failures indicate either underventilation, or failure of the economizer to adequately modulate. Underventilation occurs when, if no heating or cooling has been energized for 40 minutes, and the outside air damper is commanded to 100% open, the outside air and supply air temperatures are greater than 10°F apart. Inadequate modulation is determined by comparing the calculated outside air percentage when the economizer is set to 100% with when it is set to 0%.

Possible Cause

This issue may be caused by a failure of the economizer actuator, maladjustment or slipping of the damper linkages, or mechanical failure of a damper.

Troubleshooting

Economizer Actuator Failure

1. Set the service switch to Economizer 50% and verify that the outside air and return air dampers modulate to 50% open.
2. Set the service switch to Economizer 100% and verify that the outside air damper opens to 100% outside air and the return air damper closes. If the dampers do not move at all when commanded it likely indicates an actuator failure.
3. Check to see the actuator has power by checking the power terminals with a volt meter to ensure 24VAC power is present.
   a. If actuator requires an isolation transformer, verify that it has been installed correctly. The yellow wires should be attached to the actuator’s power terminals. If the actuator has power, check to see the actuator has a signal.
Floating Point Actuators

Floating point actuators operate using open and close commands and rely on proper actuator timing to function correctly. The controller “remembers” what position the actuator is in by how many seconds it has been driven in one direction or the other. Typical full stroke timing is 90 seconds. It is important to take your voltage measurements within the stroke time of the actuator to determine proper signal from the controller.

1. Verify proper signal connections to actuator.
   a. The PURPLE 2c cable’s wires should be connected to the actuator’s signal terminals. The WHITE wire from PURPLE 3c cable should be capped or taped off.
   b. Set the service switch to Economizer 100%. Wait 90 seconds then set the switch to Heat 1 to close the economizer. With a volt meter, check the voltage between the PURPLE 2c cable’s WHITE wire and the PURPLE 3c cable’s BLACK wire (“close” and “common”, respectively). Voltage should read 24VAC.
   c. Set the service switch to Economizer 100%. Check the voltage between the PURPLE 2c cable’s BLACK wire (open) and the common wire. Voltage should read 24VAC.

Proportional Actuators

1. Verify proper signal connections to actuator. Signal wire should be connected from Purple jacketed 3 conductor cable. Wires from Purple jacketed 2 conductor cable should be capped or taped off. Using the service switch, set the switch to outside air damper 0%. With a volt meter, check the voltage between the signal wire (white wire from Purple jacketed 3 conductor cable) and the common wire (black wire from the Purple jacketed 3 conductor cable). Voltage should read 2VDC. Set the service switch to outside air damper 100%. Check the voltage between the signal wire and the common wire. Voltage should read 10VDC. For resistive control actuators, verify economizer adapter module has been installed correctly. Swap economizer adapter module with another unit, if available, to rule out a bad adapter module.
2. Damper linkage is not adjusted properly or slipping: If the damper is modulating properly, but the outside air or return air dampers are not completely open or closed when they should be the linkage needs to be adjusted. When the return air damper is closed, verify that it is completely closed and that there are no gaps that would allow return air to leak past the damper. Check all set screws to make sure they are tight and not allowing any slippage. If return air damper does not close completely, adjust the damper linkage until the return air damper closes tightly.

3. Mechanical failure: If the damper is not modulating properly, but signals and power to the actuator have been verified, check to see the dampers are not binding or jamming. Visually inspect dampers for objects that may be impeding the dampers from stroking completely. Disconnect linkage from actuator and manually stroke dampers to ensure smooth operation. If dampers still fail to operate and all items above have been verified to be correct, the damper actuator has failed and will need to be replaced.