All the modifications are within the existing “Group – Operational Faults” (around Page 1798)

1. 1 existing section is modified

* Operational Fault Objects

1. 2 new sections are added

* FaultModel:ThermostatOffset
* FaultModel:HumidistatOffset

Rongpeng Zhang, Mar. 4th, 2015

### Operational Fault Objects

EnergyPlus contains a number of objects to model operational faults of sensors, meters, equipment and systems. The current implementation allows the modeling of the following fault types: (1) sensor faults with air economizers, (2) thermostat/humidistat offset faults, and (3) heating and cooling coil fouling faults.

The objects used by EnergyPlus to model the faults are as follows:

* FaultModel:TemperatureSensorOffset:OutdoorAir
* FaultModel:HumiditySensorOffset:OutdoorAir
* FaultModel:EnthalpySensorOffset:OutdoorAir
* FaultModel:TemperatureSensorOffset:ReturnAir
* FaultModel:EnthalpySensorOffset:ReturnAir
* FaultModel:Fouling:Coil
* FaultModel:ThermostatOffset
* FaultModel:HumidistatOffset

FaultModel:ThermostatOffset

This object defines the offset fault of a thermostatthat leads to inappropriate operations of the HVAC system.

***Field: Name***

This is the user-defined name of the fault.

***Field: Thermostat Name***

This field defines the name of the thermostat object associated with the fault. It should be the name of a ZoneControl:Thermostat object.

***Field: Availability Schedule Name***

This field provides the name of a schedule that will determine whether this fault is applicable or not. When a fault is not applicable it is not modeled in the simulations. When it is applicable, then a user-defined sensor offset and a severity schedule will be applied. This schedule should be set to “1.0” when a fault is applicable and “0.0” when it is not. If this field is blank, the schedule has values of 1.0 for all time periods.

***Field: Severity Schedule Name***

This field provides the name of a schedule that represents severity of a fault. This is used as a multiplier to the reference thermostat offset value. This schedule should be set to a non-zero value when a fault is applicable and “0.0” when it is not. If this field is blank, the schedule has values of 1.0 for all time periods.

***Field: Reference Thermostat Offset***

This field defines the reference offset value of the thermostat. A positive value means the zone air temperature reading is higher than the actual value. A negative value means the reading is lower than the actual value. A “0.0” value means no offset. Default is 2.0. The units are in degrees Celsius.

FaultModel:HumidistatOffset

This object defines the offset fault of a humidistatthat leads to inappropriate operations of the HVAC system.

***Field: Name***

This is the user-defined name of the fault.

***Field: Humidistat Name***

This field defines the name of the humidistat object associated with the fault. It should be the name of a ZoneControl:Humidistat object.

***Field: Humidistat Offset Type***

This choice field determines the humidistat offset fault type. Two fault types are available: (1) Type ThermostatOffsetIndependent: humidistat offset is not related with thermostat offset. For this type, user needs to specify the Reference Humidistat Offset, Availability Schedule, and Severity Schedule(2) Type ThermostatOffsetDependent: humidistat offset is caused by thermostat offset fault. For this type, user only needs to specify the Related Thermostat Offset Fault Name.

***Field: Availability Schedule Name***

This field provides the name of a schedule that will determine if this fault is applicable. This field is applicable for the Type ThermostatOffsetIndependent. When a fault is not applicable it is not modeled in the simulations. When it is applicable, then a user-defined sensor offset and a severity schedule will be applied. This schedule should be set to “1.0” when a fault is applicable and “0.0” when it is not. If this field is blank, the schedule has values of 1 for all time periods.

***Field: Severity Schedule Name***

This field provides the name of a schedule that represents severity of a fault. This field is applicable for the Type ThermostatOffsetIndependent. This is used as a multiplier to the reference humidistatoffset value. This schedule should be set to a non-zero value when a fault is applicable and “0.0” when it is not. If this field is blank, the schedule has values of 1.0 for all time periods.

***Field: Reference Humidistat Offset***

This field defines the reference offset value of the humidistat. This field is required for the Type ThermostatOffsetIndependent. A positive value means the zone air temperature reading is higher than the actual value. A negative value means the reading is lower than the actual value. A “0.0” value means no offset. Default is 5.0. The units are in percentage.

***Field: Related Thermostat Offset Fault Name***

This field provides the name of a Thermostat Offset Fault object that causes the humidistat offset fault. It should be the name of a FaultModel:ThermostatOffset object. This field is required for the Type ThermostatOffsetDependent. This is used as a multiplier to the reference humidistatoffset value. This schedule should be set to a non-zero value when a fault is applicable and “0.0” when it is not. If this field is blank, the schedule has values of 1.0 for all time periods.

An example of IDF codes for the thermostat/humidistat offset fault models:

FaultModel:ThermostatOffset,

Ther\_Offset\_Zone1, !- Name

Zone 1 Thermostat, !- Thermostat Name

AlwaysOn, !- Availability Schedule Name

AlwaysOne, !- Severity Schedule Name

2.0; !- Reference Thermostat Offset

FaultModel:HumidistatOffset,

Humi\_Offset\_Zone1, !- Name

Zone 1 Humidistat, !- Humidistat Name

ThermostatOffsetDependent, !- Humidistat Offset Type

, !- Availability Schedule Name

, !- Severity Schedule Name

, !- Reference Humidistat Offset

Ther\_Offset\_Zone1; !- Related Thermostat Offset Fault Name

FaultModel:HumidistatOffset,

Humi\_Offset\_Zone2, !- Name

Zone 2 Humidistat, !- Humidistat Name

ThermostatOffsetIndependent, !- Humidistat Offset Type

AlwaysOn, !- Availability Schedule Name

AlwaysOne, !- Severity Schedule Name

10, !- Reference Humidistat Offset

; !- Related Thermostat Offset Fault Name