

# Waterheater

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**TODO:** waterheater - Residential waterheater (explicit model)

## Synopsis

```
class waterheater {
    parent residential_enduse;
    class residential_enduse {
        loadshape shape;
        enduse load; // the enduse load description
        complex energy[kVAh]; // the total energy consumed since the last meter reading
        complex power[kVA]; // the total power consumption of the load
        complex peak_demand[kVA]; // the peak power consumption since the last meter reading
        double heatgain[Btu/h]; // the heat transferred from the enduse to the parent
        double heatgain_fraction[pu]; // the fraction of the heat that goes to the parent
        double current_fraction[pu]; // the fraction of total power that is constant current
        double impedance_fraction[pu]; // the fraction of total power that is constant impedance
        double power_fraction[pu]; // the fraction of the total power that is constant power
        double power_factor; // the power factor of the load
        complex constant_power[kVA]; // the constant power portion of the total load
        complex constant_current[kVA]; // the constant current portion of the total load
        complex constant_admittance[kVA]; // the constant admittance portion of the total load
        double voltage_factor[pu]; // the voltage change factor
        double breaker_amps[A]; // the rated breaker amperage
        set {IS220=1} configuration; // the load configuration options
        enumeration {OFF=4294967295, NORMAL=0, ON=1} override;
        enumeration {ON=1, OFF=0, UNKNOWN=4294967295} power_state;
    }

    double tank_volume[gal]; // the volume of water in the tank when it is full
    double tank_UA[Btu]; // the UA of the tank (surface area divided by R-value)
    double tank_diameter[ft]; // the diameter of the water heater tank
    double water_demand[gpm]; // the hot water draw from the water heater
    double heating_element_capacity[kW]; // the power of the heating element
    double inlet_water_temperature[degF]; // the inlet temperature of the water tank
    enumeration {GASHEAT=1, ELECTRIC=0} heat_mode; // the energy source for heating the water heater
    enumeration {GARAGE=1, INSIDE=0} location; // whether the water heater is inside or outside
    double tank_setpoint[degF]; // the temperature around which the water heater will heat its content
    double thermostat_deadband[degF]; // the degree to heat the water tank, when needed
    double temperature[degF]; // the outlet temperature of the water tank
    double height[ft]; // the height of the hot water column within the water tank
    double demand[gpm]; // the water consumption
    double actual_load[kW]; // the actual load based on the current voltage across the coils
    double previous_load[kW]; // the actual load based on current voltage stored for use in controller
    complex actual_power[kVA]; // the actual power based on the current voltage across the coils
    double is_waterheater_on; // simple logic output to determine state of waterheater (1-on, 0-off)
    double gas_fan_power[kW]; // load of a running gas waterheater
    double gas_standby_power[kW]; // load of a gas waterheater in standby
}
```

## See also

- Residential module
  - User's Guide
  - Appliances

- house class – Single-family home model.
- residential\_enduse class – Abstract residential end-use class.
- occupantload – Residential occupants (sensible and latent heat).
- ZIPload – Generic constant impedance/current/power end-use load.
- Technical Documents
  - Requirements
  - Specifications
  - Developer notes
  - Technical support document
  - Validation

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- This page was last modified on 25 September 2012, at 23:05.