

Simple terms

Thermodynamic System (TS)
| any object or system of objects

Types of TS

| **Isolated** (no interaction with surroundings), **Closed** (no mass exchange), **open** (mass exchange)

State Postulate

| Defines a number of properties required to fix a state

Intensive properties

| (mass ind.) if the property is the same

Extensive properties

| (mass dep.) if the property is doubled

Energys

macroscopic energys

| **(Work)** kinetic, potential

microscopic energys

| **(Heat transfer)** thermal, chemical, nuclear, etc

1LT

Closed

| $U = Q_{net} - W_{net}$

Open

| $U = Q_{net} - W_{net} + m(e_{in} - e_{out})$

adiabatic

| no heat transfer

isothermal

| T is constant

isobaric

| P is constant

isochoric

| V is constant

Equations

Specific _____

| $x = X/m$

kinetic energy

| $ke = v^2/2$

potential energy

| $pe = gh$

specific total energy

| $e = ke + pe + u$

total energy

| $E = mv^2/2 + mgh + u$

electric power

| $W = \text{Voltage} * \text{current}$

steady electric power

| $W = \text{Voltage} * \text{current} * \text{time}$

boundary work

| $W = P * V$

shaft work

| $W = T * 2\pi * \text{number of turns}$

Devices

Thermal devices

| $n = Q/m_{fuel} * HV$ (burner, water heater)

Mechanical devices (Turbine)

| $n = W_{out} / E_{fluid}$

