The Ideal Spring

The IDEAL SPRING is frictionless, massless, and linear, *i.e.* the magnitude of the force needed **at each end** to hold an IDEAL SPRING at rest at a stretch (or compression) of $|\Delta x|$ is given by $F_{applied} \equiv k|\Delta x|$ where k is the SPRING CONSTANT (a positive-only scalar) in units of N/m, which depends only on the properties of the spring.

STANDARD CHOICES FOR THE IDEAL SPRING

1. x = 0 is chosen as the position of the free end when the spring is relaxed (the EQUILIBRIUM POSITION), so that $|x|$ is then the amount of stretch or compression.
2. $F_{\mathrm{OS},x}$ is the 1D vector contact force ON the OBJECT located at the free end BY the spring.

HOOKE'S LAW FOR THE IDEAL SPRING

$$F_{\mathrm{OS},x} = -kx$$

Hooke's Law gives the x-component of the force ON the object at the free end BY the spring. The MINUS SIGN means that the force exerted by the free end of the spring is always in the opposite direction of the displacement of that end.