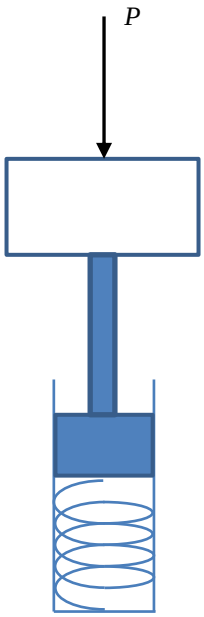
12. The piston *A* moves vertically between two smooth walls. If the spring has a stiffness of $k = 15\,\text{lb/in}$. Determine the distribution of the stretch of the spring if it is subjected to a normally distributed force $P \sim N(15, 0.15^2)$ lb. The weight of the block is $W \sim N(10, 0.1^2)$ lb, and *P* and *W* are independent. Assuming the weights of rod and piston are negligible.



Answer

$$\mu_x = (\mu_W + \mu_P)/k = 2.5\,\text{in}$$

$$\sigma_x = \sqrt{\sigma_W^2 + \sigma_P^2}\,/k = 0.018\,\text{in}$$ **Ans**.