



**Figure S1.** Voltage traces of the responses of the model neuron to current steps.

A. The neuron does not fire rebound spikes in response to release from hyperpolarizing current steps. Parameters:  $\theta_m = -24$  mV,  $g_d = 0.39$  mS/cm<sup>2</sup>,  $I_{app} = 0$ ,  $I_{app}$  of the hyperpolarizing current step is  $-8$   $\mu$ A/cm<sup>2</sup>,  $V_L = -60$  mV. B. The neuron exhibits stuttering without delay for weak window  $I_{Na}$  and depolarized  $V_L$ , that is raised to  $-60$  mV from the reference parameter set of  $-70$  mV. Parameters:  $\theta_m = -24$  mV,  $g_d = 1.8$  mS/cm<sup>2</sup>,  $I_{app} = 1.7$   $\mu$ A/cm<sup>2</sup>.