Table S1. Parameters used in the numerical non-stationary single compartment model.

Model parameter	Symbol	Value, range tested
AP duration[1]	σ	0.5 ms
Resting calcium concentration	$[Ca^{2+}]_{rest}$	50 nM*
AP-evoked change of total Ca^{2+} concentration	$\Delta[Ca^{2+}]_{total}$	0 – 300 µM
Ca^{2+} extrusion rate Figure 1 G	k_{rem}	1.0 - 2.0 ms^{-1}
Fluorescent indicator (Fluo-4) Parameters [2,3]		
Ca^{2+} association rate	k_{on}^{I}	0.6 μM^{-1} ms^{-1}
Ca^{2+} dissociation rate	k_{off}^{I}	0.21 ms^{-1}
Total indicator concentration, Figure S2 A and B	$[I]_{total}$	150 - 190 µM
Dynamic range	γ	100
Parvalbumin[4]		
Ca^{2+} association rate	k_{on}^{B}	0.018 μM^{-1} ms^{-1}
Ca^{2+} dissociation rate	k_{off}^{B}	0.00095 ms^{-1}
Dissociation constant	K_D^B	0.051 µM
Total concentration of Ca^{2+} binding sites	$[B]_{total}$	0 - 300 µM
Calbindin-D_{28K}[5,6]		
Ca^{2+} association rate fast binding sites	$k_{on}^{B_1}$	0.087 μM^{-1} ms^{-1}
Ca^{2+} dissociation rate fast binding sites	$k_{off}^{B_1}$	0.037 ms^{-1}
Dissociation constant fast binding sites	$K_D^{B_1}$	0.42 µM
Total concentration of fast Ca^{2+} binding sites	$[B_1]_{total}$	0 - 150 µM
Ca^{2+} association rate slow binding sites	$k_{on}^{B_2}$	0.011 μM^{-1} ms^{-1}
Ca^{2+} dissociation rate slow binding sites	$k_{off}^{B_2}$	0.0026 ms^{-1}
Dissociation constant slow binding sites	$K_D^{B_2}$	0.24 µM
Total concentration of slow Ca^{2+} binding sites	$[B_2]_{total}$	0 - 150 µM

*The average resting Ca^{2+} concentration was estimated using the formula $[Ca^{2+}]_{rest} = K_D^I \frac{F_0/F_m - 1/\gamma}{1 - F_0/F_m}$ [3].

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