

# sum.els Summary of one-port elements

The one table to rule them all, [Table els.1](#).

**Table els.1:** parameters, elemental equations, and impedances of one-port elements for generalized, mechanical, electrical, fluid, and thermal systems.

		generalized	mechanical translation	mechanical rotation	electrical	fluid	thermal
variables	across	$\mathcal{V}$	velocity $v$	angular vel. $\Omega$	voltage $v$	pressure $P$	temp. $T$
	through	$\mathcal{F}$	force $f$	torque $T$	current $i$	vol. fr. $Q$	heat fr. $q$
A-type	capacitor	capacitor	mass	mom. inertia	capacitor	capacitor	capacitor
	capacitance	$C$	$m$	$J$	$C$	$C$	$C$
	elem. eq.	$\frac{d\mathcal{V}_C}{dt} = \frac{1}{C}\mathcal{F}_C$	$\frac{dv_m}{dt} = \frac{1}{m}f_m$	$\frac{d\Omega_J}{dt} = \frac{1}{J}T_J$	$\frac{dv_C}{dt} = \frac{1}{C}i_C$	$\frac{dP_C}{dt} = \frac{1}{C}Q_C$	$\frac{dT_C}{dt} = \frac{1}{C}q_C$
	impedance	$\frac{1}{Cs}$	$\frac{1}{ms}$	$\frac{1}{Js}$	$\frac{1}{Cs}$	$\frac{1}{Cs}$	$\frac{1}{Cs}$
T-type	inductor	inductor	spring	rot. spring	inductor	inertance	
	inductance	$L$	$1/k$	$1/k$	$L$	$I$	
	elem. eq.	$\frac{d\mathcal{F}_L}{dt} = \frac{1}{L}\mathcal{V}_L$	$\frac{df_k}{dt} = kv_k$	$\frac{dT_k}{dt} = k\Omega_k$	$\frac{di_L}{dt} = \frac{1}{L}v_L$	$\frac{dQ_I}{dt} = \frac{1}{I}P_I$	
	impedance	$Ls$	$s/k$	$s/k$	$Ls$	$Is$	
D-type	resistor	resistor	damper	rot. damper	resistor	resistor	resistor
	resistance	$R$	$1/B$	$1/B$	$R$	$R$	$R$
	elem. eq.	$\mathcal{V}_R = \mathcal{F}_R R$	$v_B = f_B/B$	$\Omega_B = T_B/B$	$v_R = i_R R$	$P_R = Q_R R$	$T_R = q_R R$
	impedance	$R$	$1/B$	$1/B$	$R$	$R$	$R$