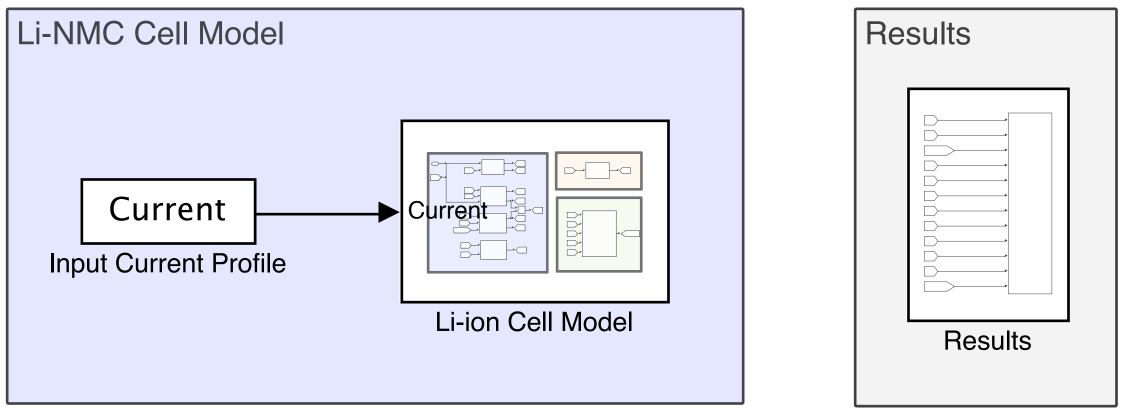
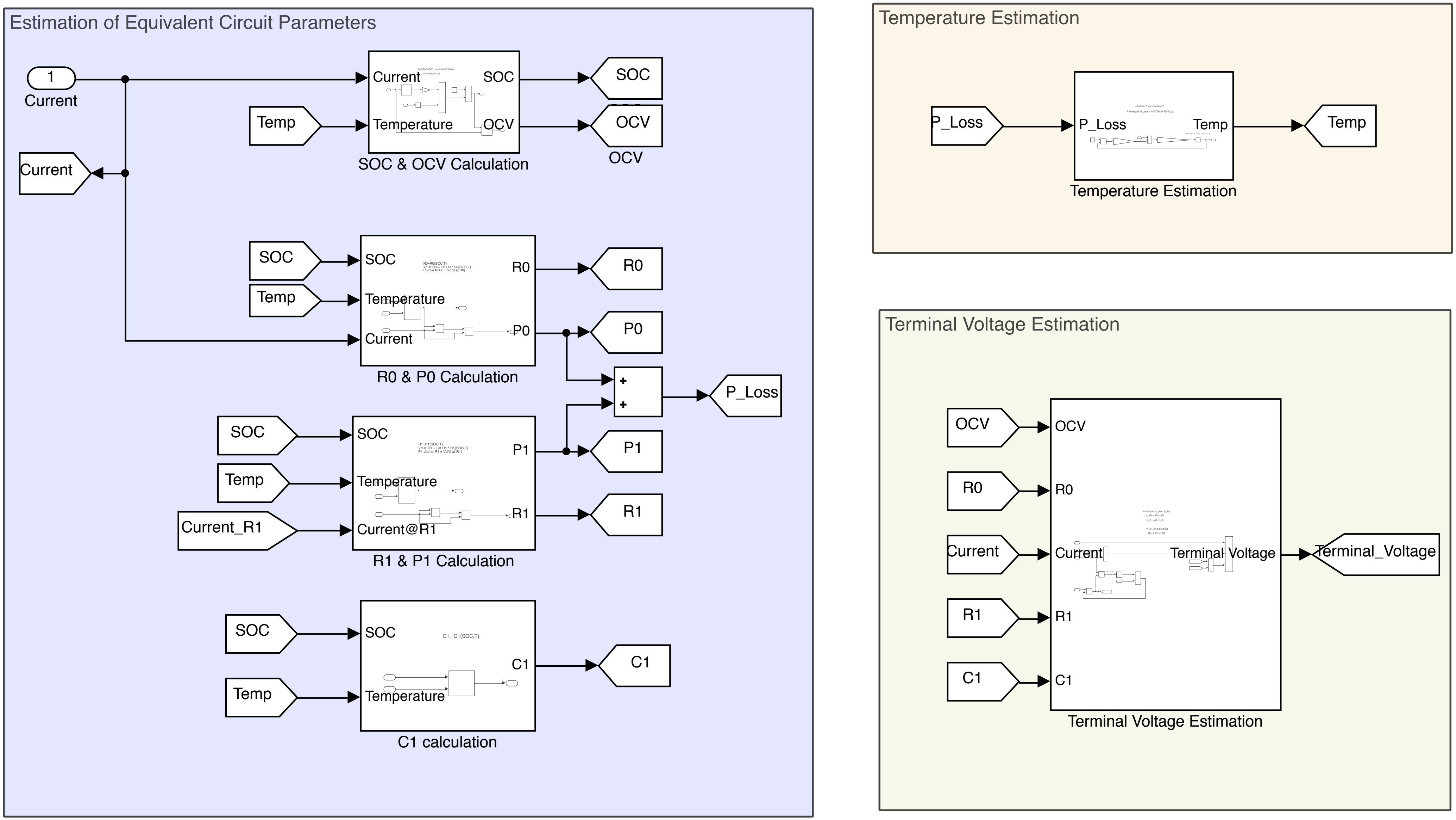
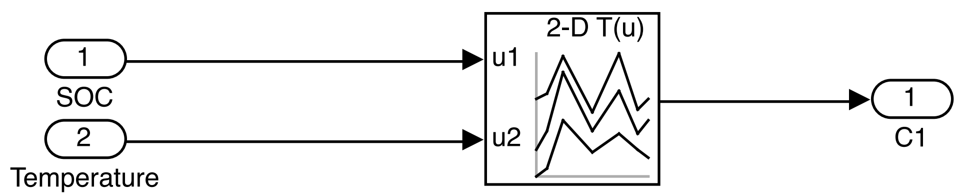

Li-NMC Cell Model
Current
Input Current Profile
Current
Li-ion Cell Model
Results
Results

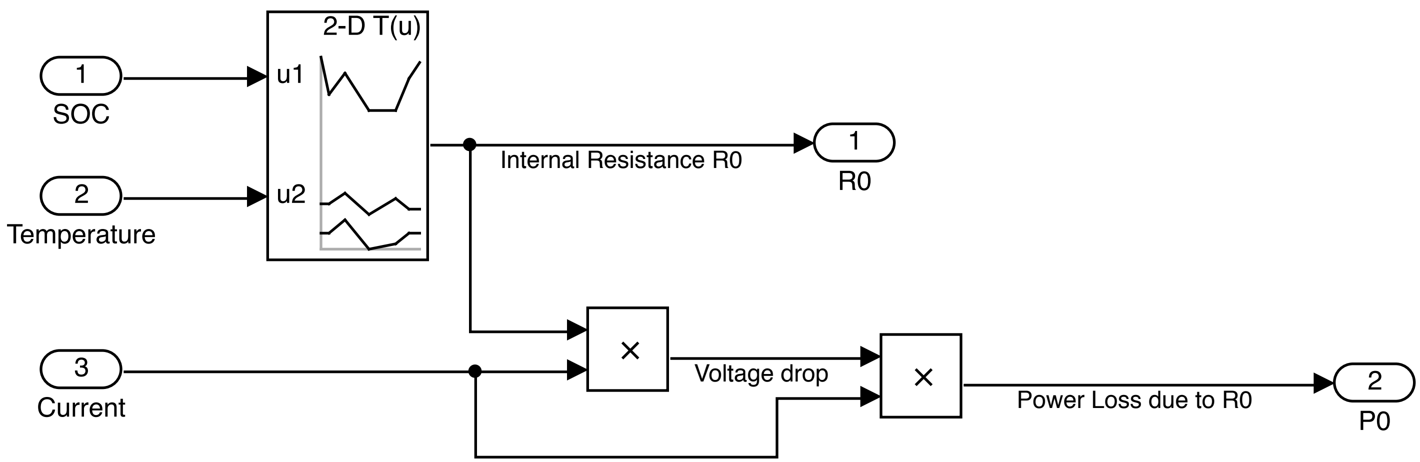


Estimation of Equivalent Circuit Parameters
1
Current
Current
Temp
Current
Temperature
SOC
OCV
SOC
OCV
OCV
SOC & OCV Calculation
SOC
Temp
SOC
Temperature
Current
R0
P0
R0
P0
R0 & P0 Calculation
+
+
P_Loss
SOC
Temp
Current_R1
SOC
Temperature
Current@R1
P1
R1
P1
R1
R1 & P1 Calculation
SOC
Temp
SOC
Temperature
C1
C1
C1 calculation
Temperature Estimation
P_Loss
P_Loss
Temp
Temp
Temperature Estimation
Terminal Voltage Estimation
OCV
R0
Current
R1
C1
OCV
R0
Current
R1
C1
Terminal Voltage
Terminal_Voltage
Terminal Voltage Estimation

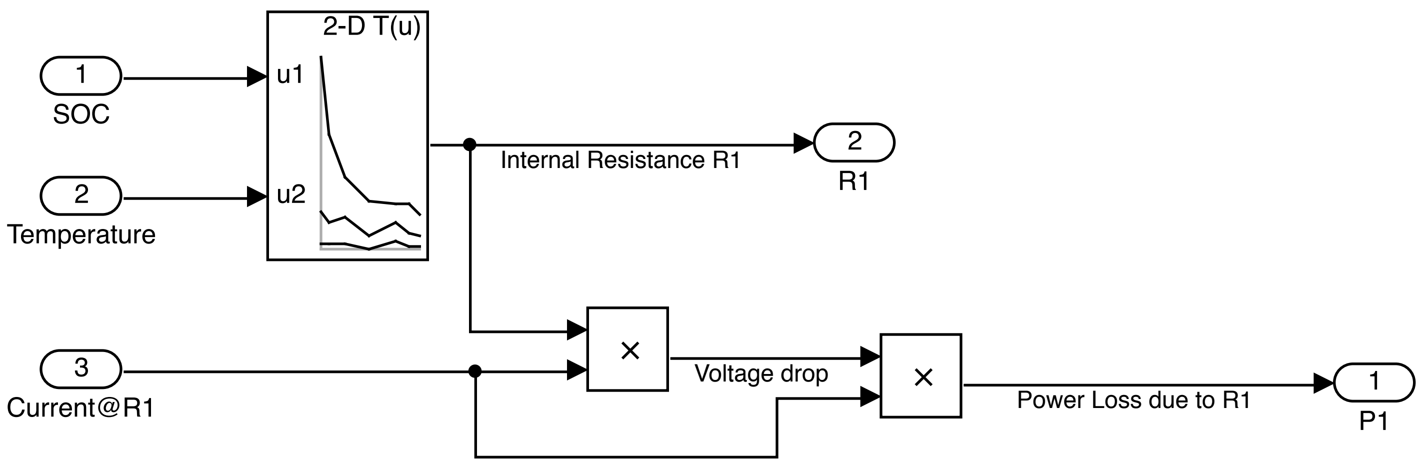
C1= C1(SOC,T)



R0=R0(SOC,T)
Vd at R0 = I at R0 * R0(SOC,T)
P0 due to R0 = Vd*(I at R0)

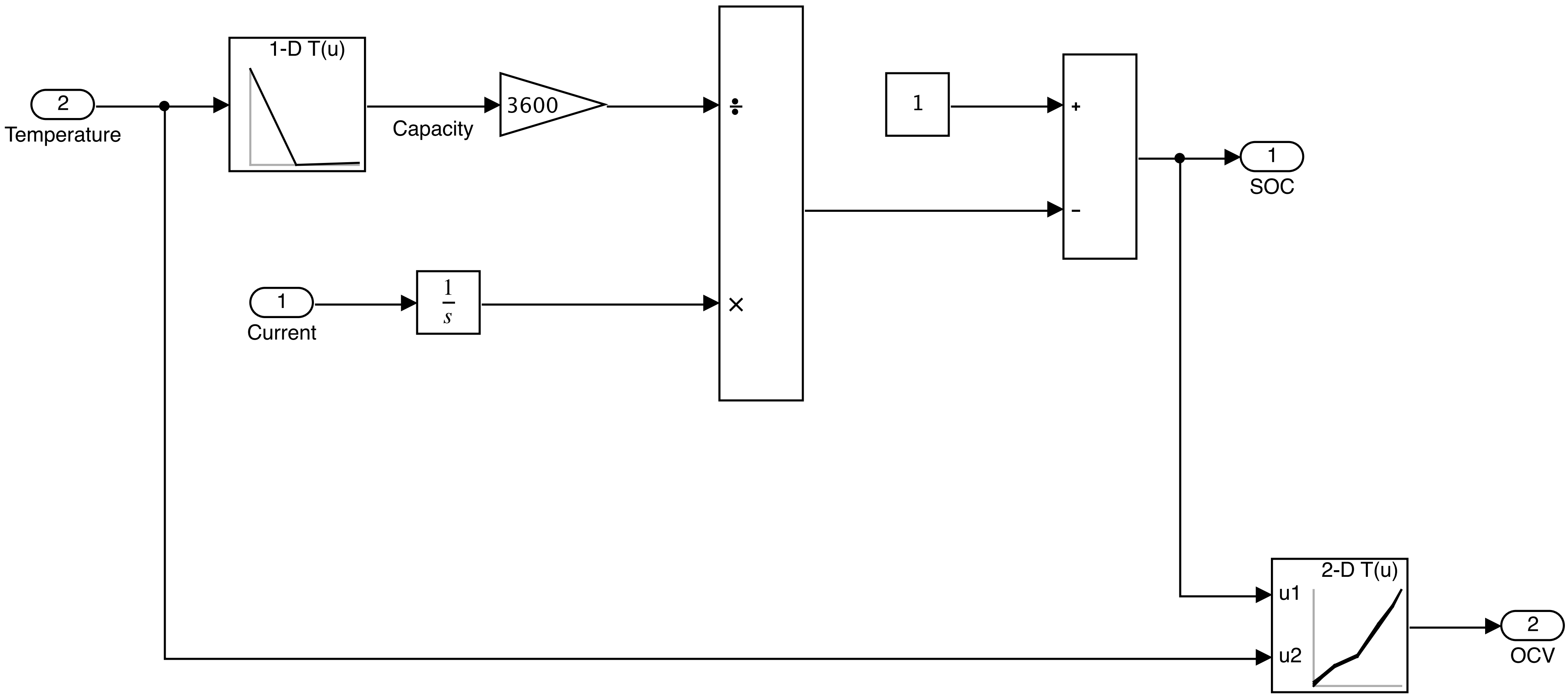


R1=R1(SOC,T)
Vd at R1 = I at R1 * R1(SOC,T)
P1 due to R1 = Vd*(I at R1)



SoC(T)=SoC(T-1) +/- int(Idt/C*3600)

OCV=Em(SOC,T)



mCpdT/dt = P_loss + h*A(Tamb-T)

T =integral (P_loss + h*A(Tamb-T)/mCp)

m= mass of cell

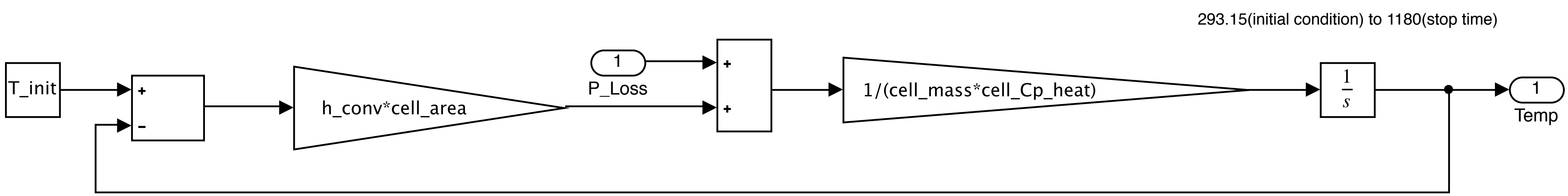
Cp= Cell heat capacity

P_Loss = Total power loss

h = heat exchange coefficient

A = Area of cell

Tamb = Ambient temp in K



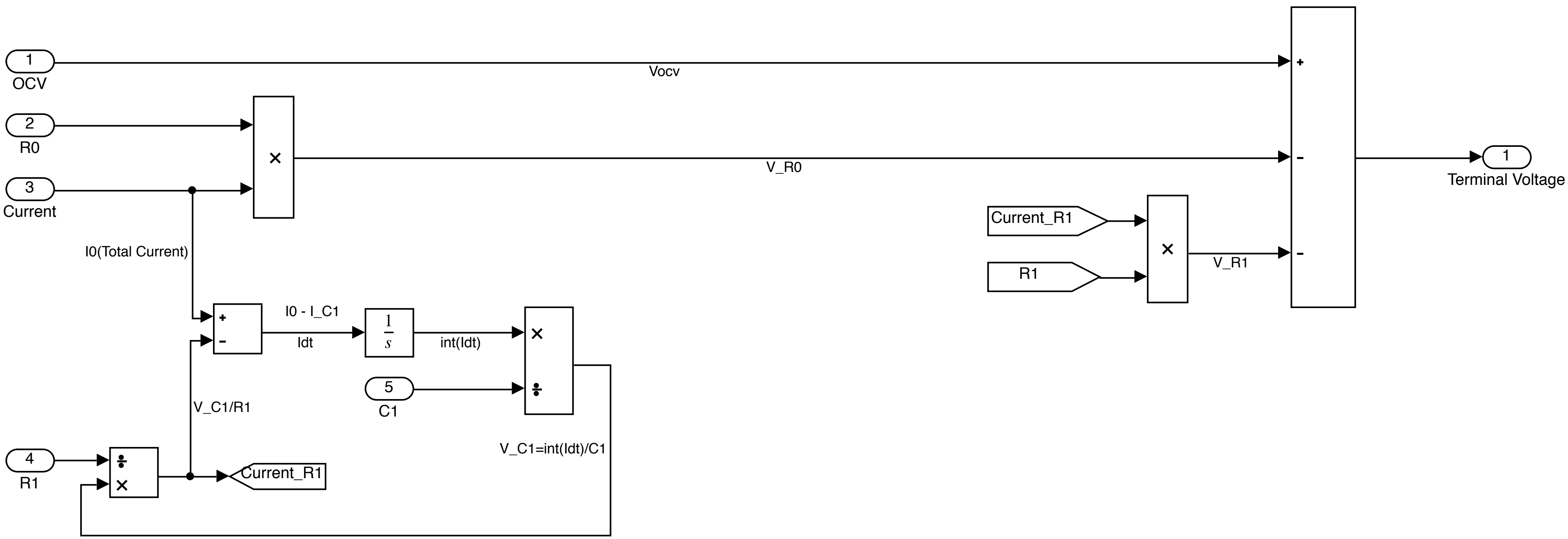
Vt = Vocv - V_R0 - V_R1

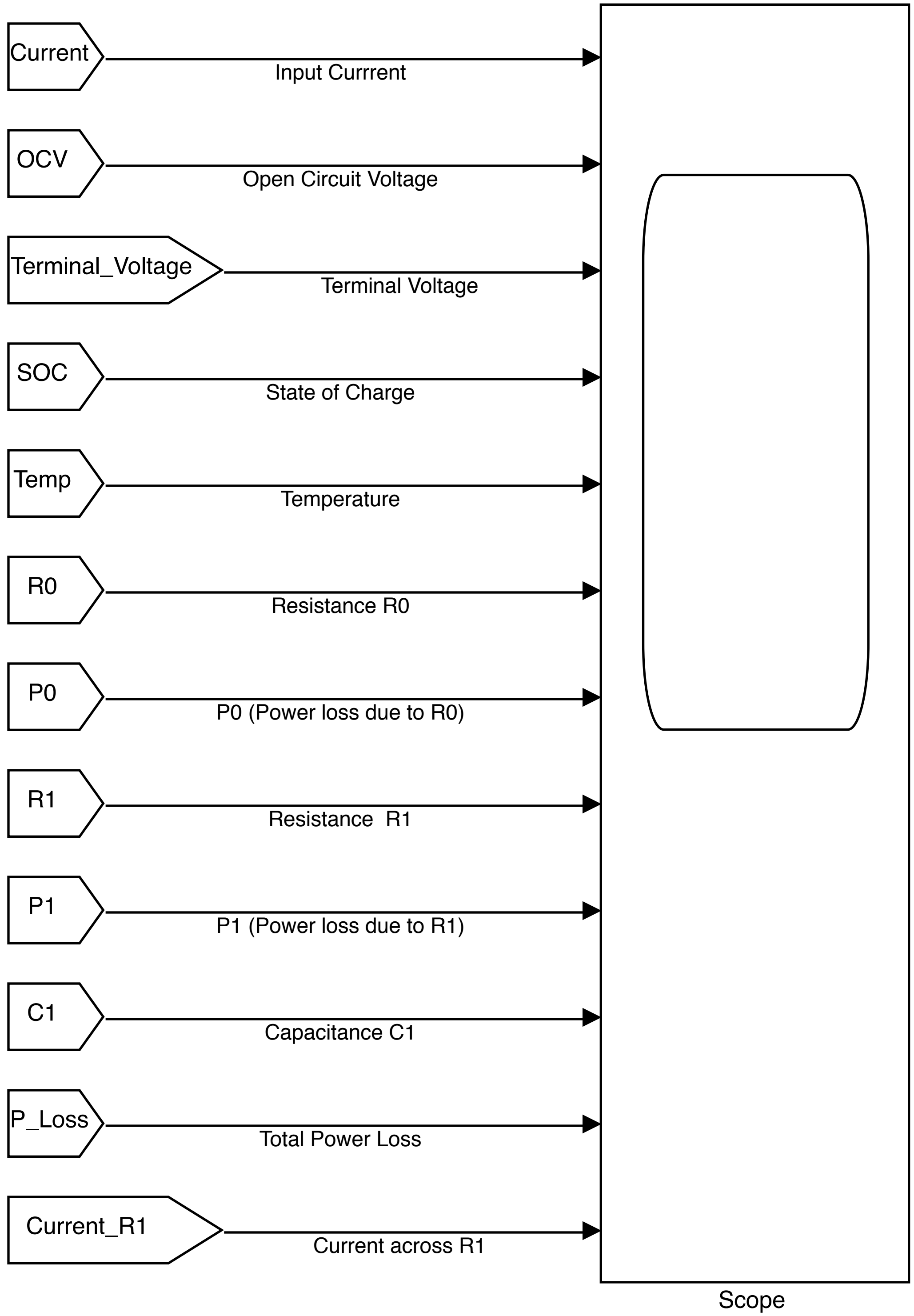
V_R0 = R0*I_R0

V_R1 = R1*I_R1

V_C1 = (1/C1)*int(Idt)

Idt = I_R1 + I_C1




Current
Input Currrent
OCV
Open Circuit Voltage
Terminal_Voltage
Terminal Voltage
SOC
State of Charge
Temp
Temperature
R0
Resistance R0
P0
P0 (Power loss due to R0)
R1
Resistance  R1
P1
P1 (Power loss due to R1)
C1
Capacitance C1
P_Loss
Total Power Loss
Current_R1
Current across R1
Scope