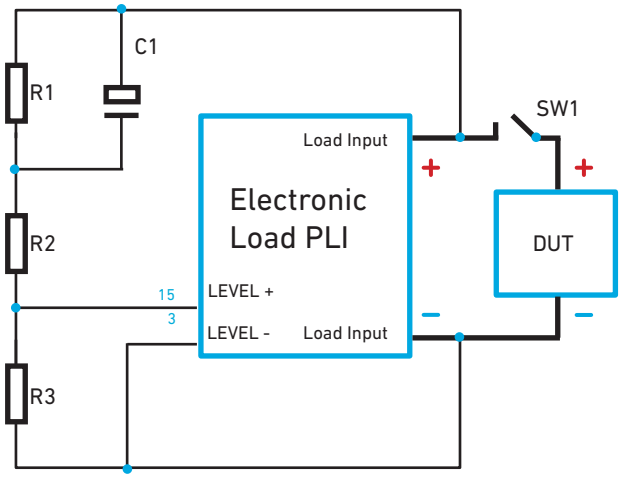
Höcherl & Hackl
The electronic load

Application Note #3

Simulation of Exponential Inrush Currents

With a few external passive components a control signal can be generated which simulates the current consumption of loads with exponential decreasing inrush current when it is connected to the analog control input of an H&H electronic load.

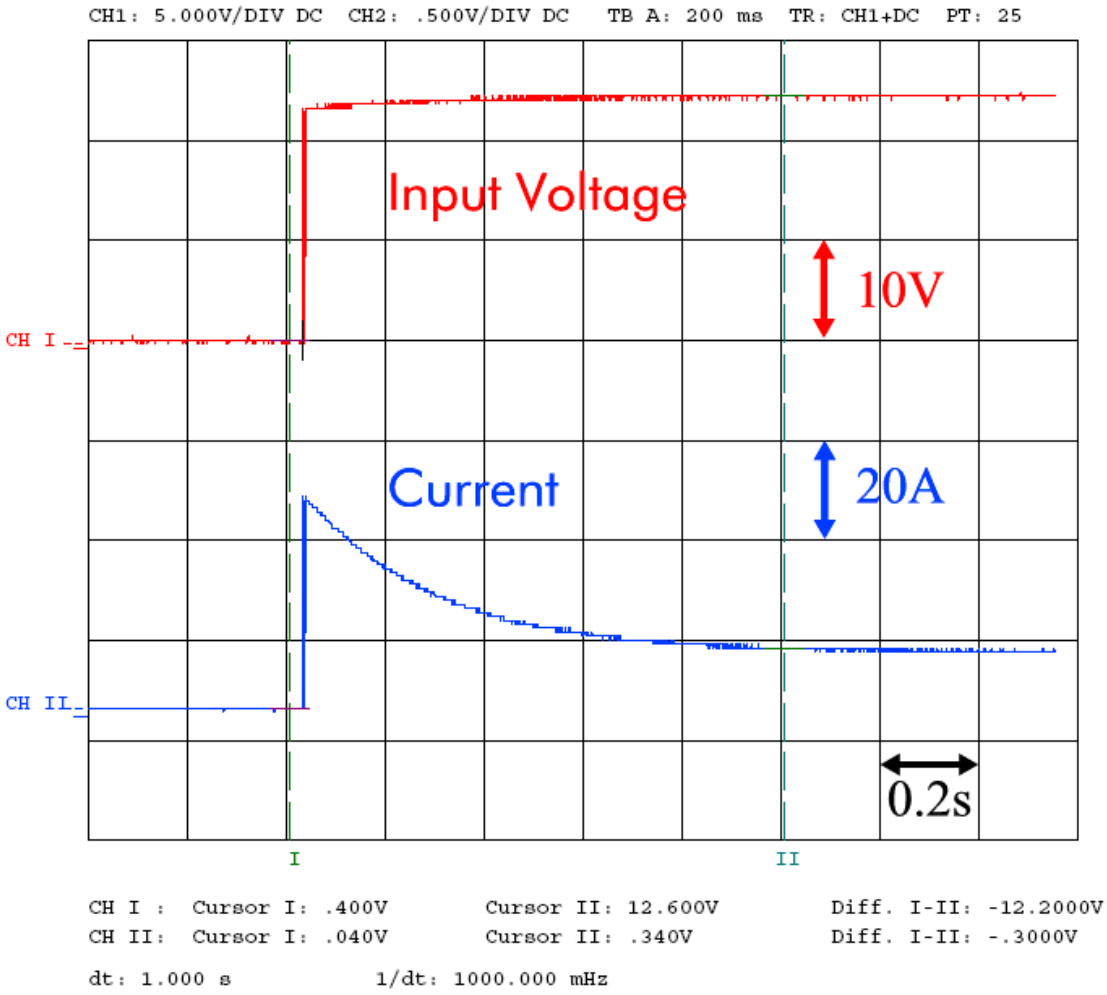


Applications

- simulation of the current consumption of light bulbs or electric motors at switching on

Schematic

Our example uses an electronic load of the PLI series, in general the application is possible with any other H&H load. Like shown in the schematic the switched input voltage is connected by a RC network to the analog control input of the electronic load.
When switch SW1 is closed the RC network generates a fast rising voltage peak at the control input LEVEL+ with a following exponential decrease.
The level of the peak current is determined by resistor R2 and R3. R1 is to generate the continuous current after the inrush current.
The levels of the currents can be calculated from the voltages at the resistors R1, R2 and R3 and the technical data of the electronic load.
The full current of the electronic load will flow at 10 V control voltage.
The time constant is calculated from the resistors R2 and R3 with capacitor C1.
The calculation has also to consider the 20 kΩ input impedance of the analog control input.
The electronic load must be set to constant current mode and external control.



Important

The level of the load current depends on the input voltage. Interferences on the input voltage will be coupled by capacitor C1 to the control signal. The resistors have to be chosen in a way that the voltage at the analog control input does not exceed 10 V. Otherwise the electronic load could be damaged.

Example: Turn-on characteristic of electro-mechanical relay with contact bounce

R1: 10 kΩ
R2: 1 kΩ
R3: 1 kΩ
C1: 100 µF
Input voltage: 12 V
Electronic load:
PLI4806

The current follows the input voltage also during the time of contact bounce.