Application Note – Brake Chopper

meerstetter engineering

Member of Berndorf Group

Developed, assembled, and tested in Switzerland

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Meerstetter Engineering GmbH
Schulhausgasse 12
CH-3113 Rubigen
Switzerland

Phone: +41 31 529 21 00
Email: contact@meerstetter.ch

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1 Introduction

In high power applications with Peltier elements, switching from cooling to heating or vice versa generates electrical energy. This energy is fed back through the TEC Controller and can cause the DC voltage at the power supply to increase.

To prevent errors or damage to the TEC Controller and/or the power supply, it may be necessary to dissipate the excess energy in the form of heat. This can be achieved with a Break Chopper.

2 Brake Chopper

2.1 Measurement Setup

- Power Supply: Elektro-Automatik EA-PS 9150-19
- TEC Controller: Meerstetter TEC-1167, S/N 542
- Brake Chopper: Nanotec BC72-50
- TEC: TEC1-12705

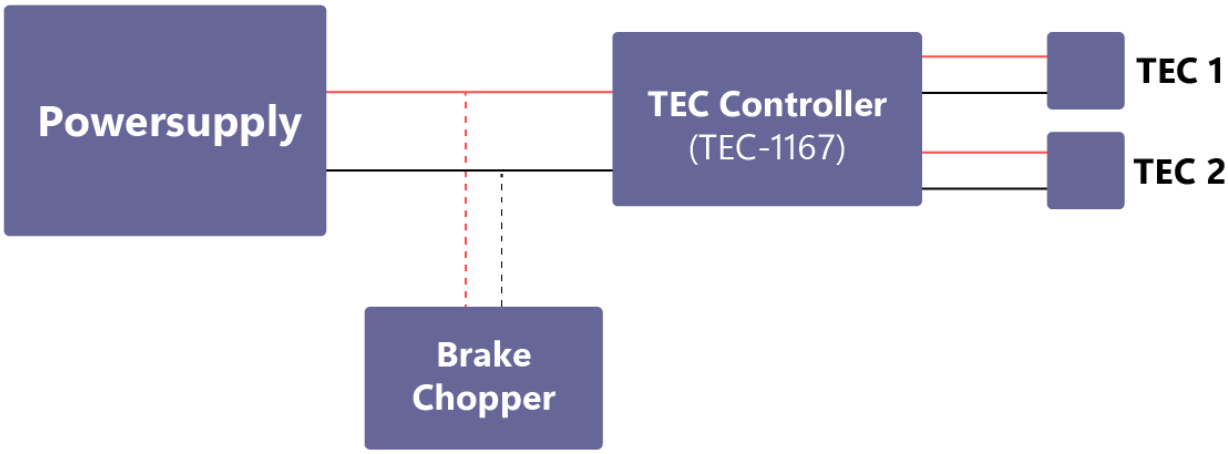

Figure 1: Measurement Setup, simplified

The DC power supply delivers a nominal 24 V input to the TEC Controller. A brake chopper circuit is connected in parallel with the TEC Controller input. The activation voltage is set to 24V.
The TEC Controller output drives four thermoelectric coolers (TECs) arranged as two modules in parallel per channel.
The input voltage of the TEC Controller is monitored using an oscilloscope.

For the measurement, the TECs are supplied with 6A to heat the “object” to 65°C. Once the temperature is reached, the TEC Controller is switched to cooling with 1A.

2.1.1 Measurement without Brake Chopper

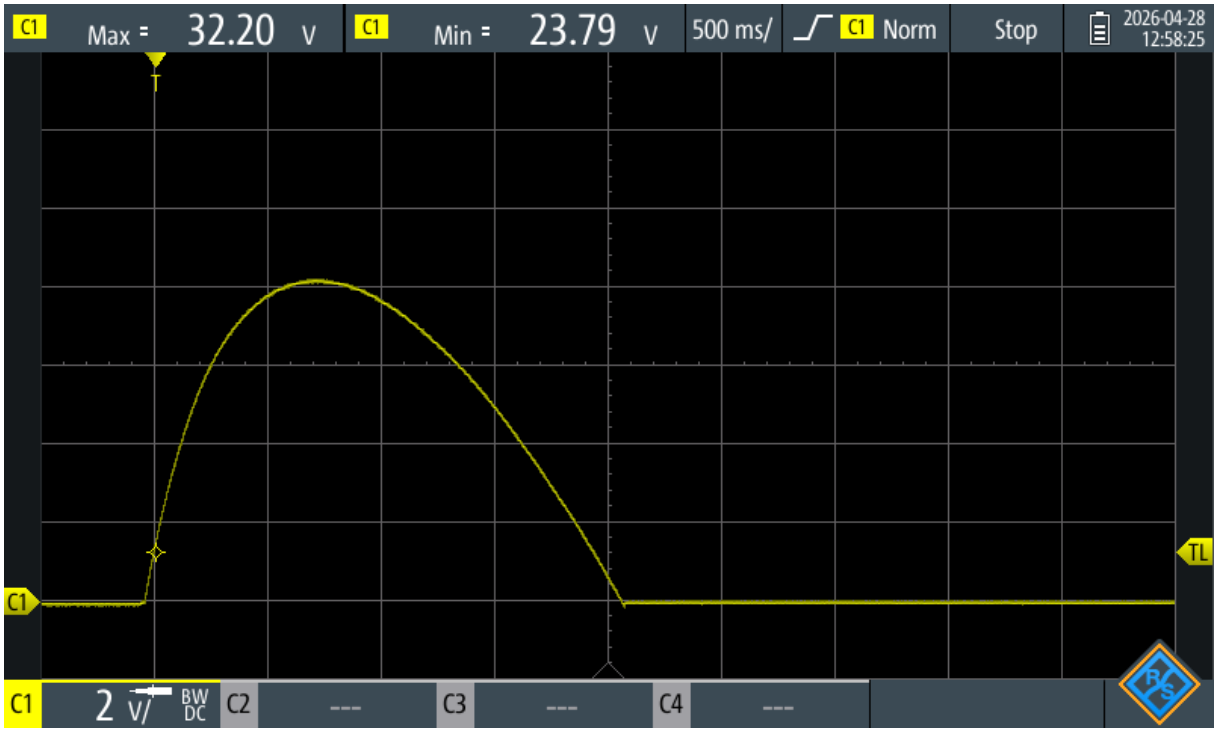

Figure 2: Measurement without Brake Chopper

Without a brake chopper, the voltage at the input of the TEC Controller rises to 32V when switching from heating to cooling. This increase in voltage can cause power supplies to shut down due to overvoltage or even damage them.

2.1.2 Measurement with Brake Chopper

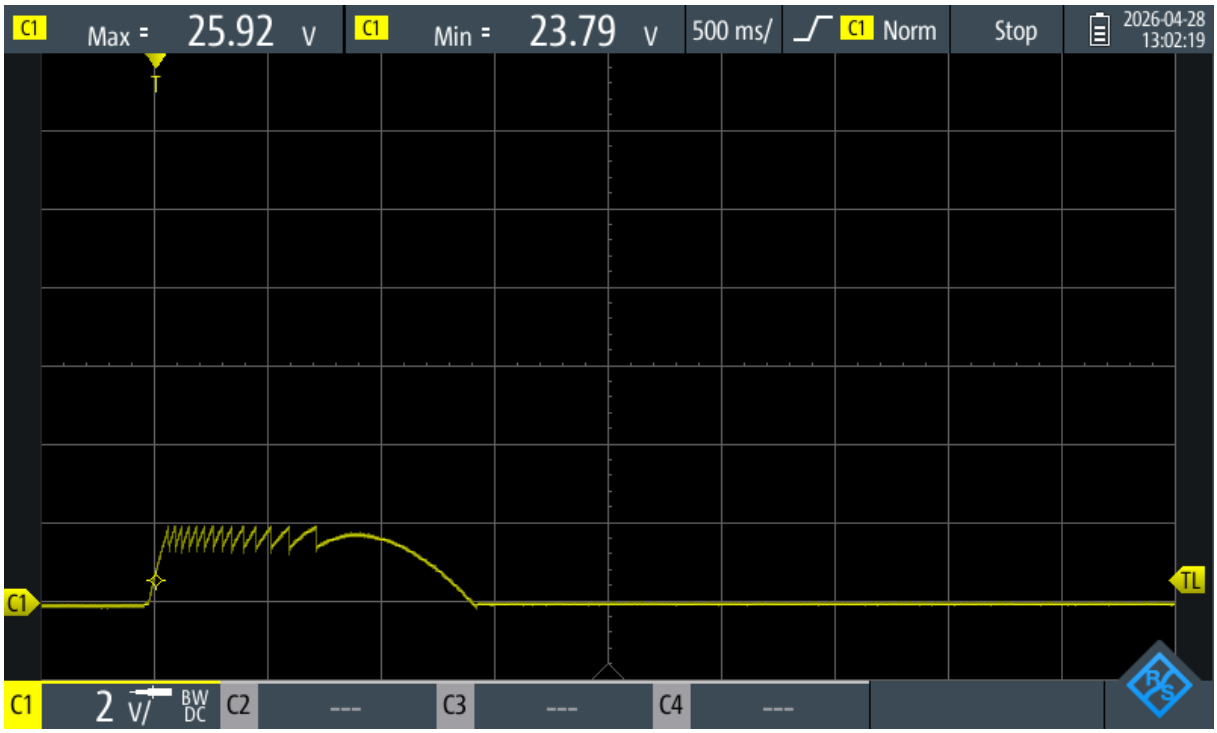

Figure 3: Measurement with Brake Chopper

When the brake chopper is connected, the energy of this voltage spike is dissipated as heat. Because of this, the voltage only rises to 26V.

A Change History

Date of change	Doc/Version	Changed/ Approved	Change / Reason
22.05.2026	A	SR / HS	• Create Document