



Laser Systems

Electronics

Wavelength Meters

Bipolar Current Sources

## Precision Current Sources for Cold Atoms Physics

- Extremely low-noise bipolar transistor technology
- Ultra-fast response time
- Precise control
- From milliamps up to 200 A
- High impedance or galvanically isolated inputs (option)
- Battery supply (option)



**HighFinesse**  
Laser and Electronic Systems

# Precision Current Sources

The current sources of the series BCS (bipolar current source), UCS (unipolar current source) and CCS (constant current source) from HighFinesse have been developed for precision experiments in the areas of quantum optics and ultracold atoms. They are especially suitable for generating extremely low noise source currents and for controlling magnetic fields with highest precision.

Power Features		
Types	BCS-series	analog controlled, bipolar current generator with continuous sweep through zero (Bipolar transistor technology)
	UCS-series	analog controlled, unipolar current generator with continuous sweep to zero (Bipolar transistor technology)
	CCS-series	constant current generator (Bipolar transistor technology)
Current Range	Up to 200 A	Supply: one/three phase mains voltage. Cooling: air/water cooling
	Up to 20 mA	Supply: battery incl. recharge unit
Specification		Current- /voltage range individually as required
Current Outputs		Floating or grounded (adjustable)
Control	Analog	with $\pm 10$ V control voltage
	Manual (option)	10-turn-potentiometer
Trigger Characteristics		Trigger sets the current to zero. Configuration to interlock is possible. Trigger changes between two current values (alternative option)
Response Time		Adjustable between 100 $\mu$ s und 100 ms
Waviness of the Current		$< 10^{-5}$ (characteristic multiplication factor)
Current Noise		$\frac{I_{\text{nois}} (\text{RMS}) \cdot R_{\text{max}}}{I_{\text{max}} \cdot R_{\text{max}}} < -90$ dB (typically between -95 and -110 dB) due to careful electronic design for noise protection
Adjustment Accuracy		0.1% (of total amplitude)
		1 % (of total amplitude) with galvanic isolation
Long-term Stability		Better than 0.01 % in 120 h (standard error referring to the total amplitude after reaching steady state operational conditions without galvanic isolation)
Temperature Coefficient		25 ppm/K / 150 ppm/K with galvanic isolation
Monitor (option)		Calibrated monitor output for the measurement of the source current LCD current display
Case		Standard 19" rack system
Galvanic Isolation (option)		For the analog control port, monitor and trigger
Battery connection Set (option)		For operation from batteries (up to 20 A)
Guarantee		12 months guarantee by manufacturer, extended service options



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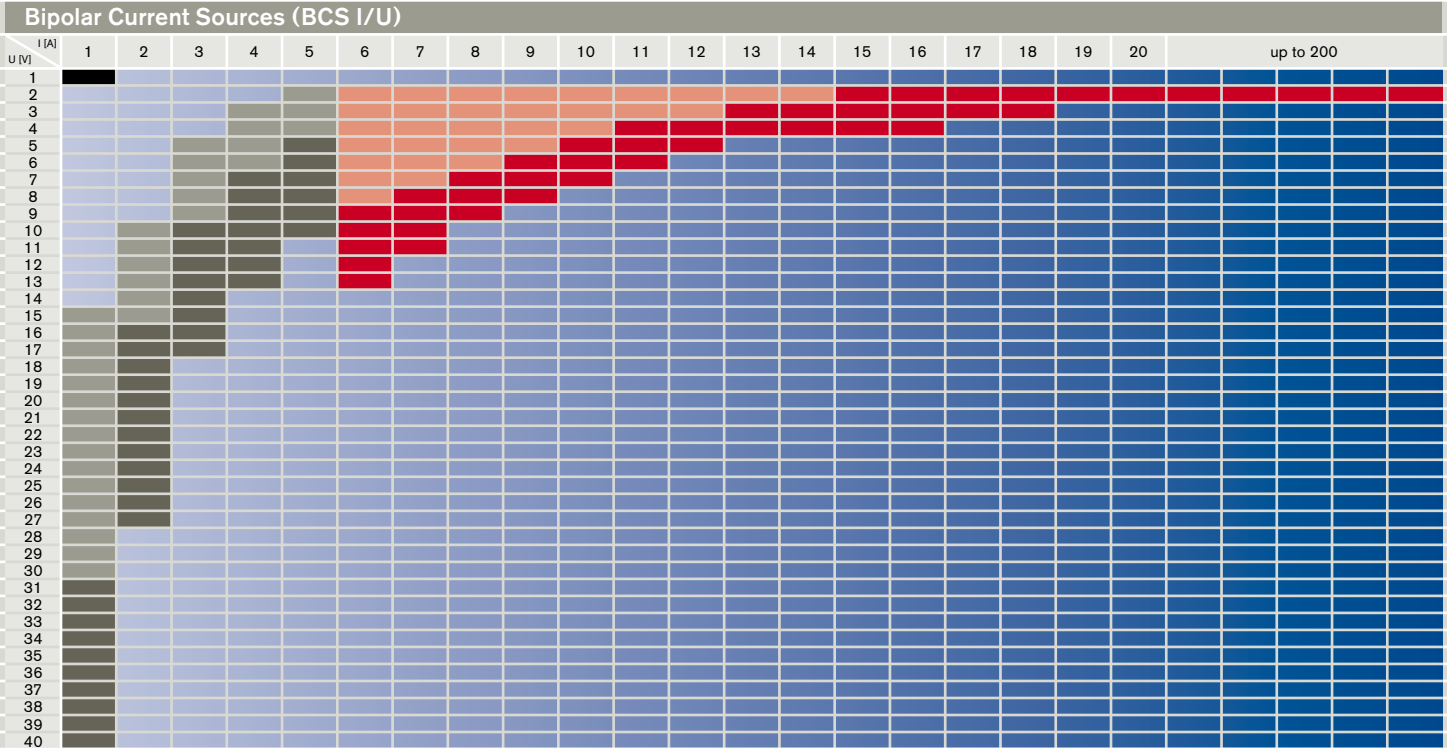
Additional information  
and distributors:  
[www.highfinesse.com](http://www.highfinesse.com)

# Power Categories

## Current- and Voltage-Characteristics

High Finesse offers precision current sources of the BCS-, UCS- and CCS-series in several power categories, within which the requested current- and voltage characteristics may be tuned individually (survey). The modular construction permits the individual control of the current and voltage ranges as well as

response times and inductive load capacity, and thus enables an accurate adjustment to the requirements. On request, we offer current sources with maximum current and voltage values beyond the standard power range listed below and with customer specified control options.



higher voltages on request

### Power Category

### Design



- 1 One phase mains voltage supply, air cooling, small modul
- 2 One phase mains voltage supply, air cooling, large modul
- 3 Three phase mains voltage supply, air cooling
- 4 Three phase mains voltage supply, ventilator cooling
- S Water cooled model
- B For battery models up to 10 mA, please see our separate data sheet.



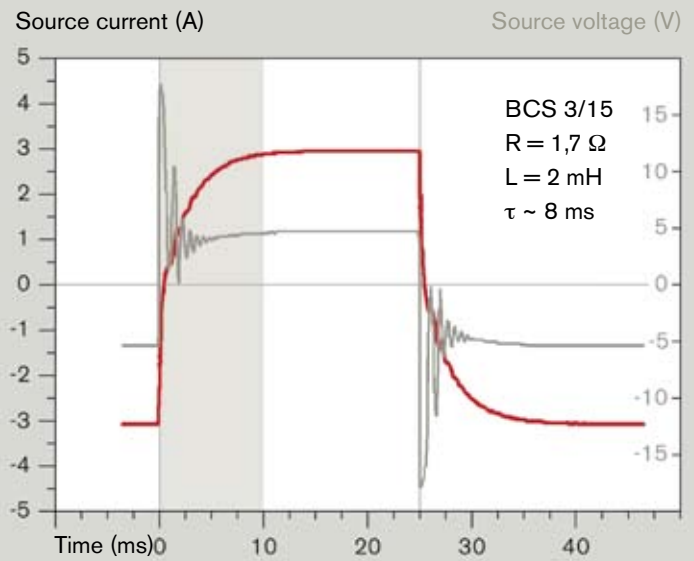
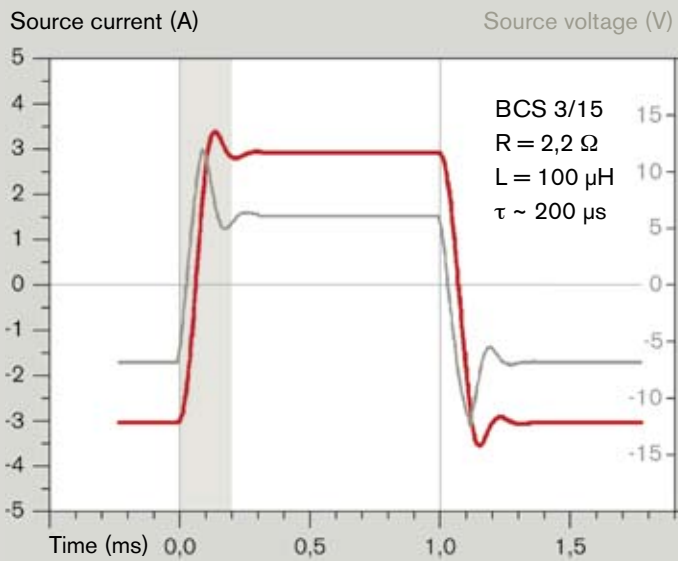
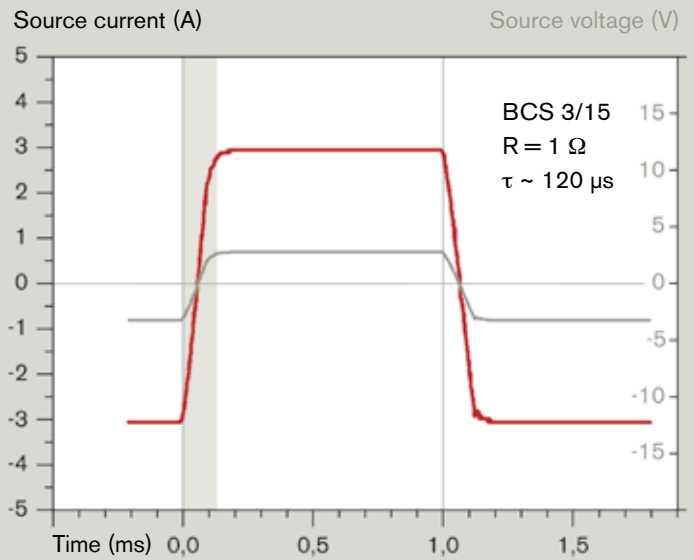
Standard BCS current source.  
(Exact size depends on the power category.)



Battery supplied bipolar precision current with integrated recharge unit (up to 10mA).  
Please request for separate data sheet.

## Response Time

A fundamental requirement for current sources in scientific research is the short and controllable response time. The precision current sources of HighFinesse feature extremely short response times which are conveniently adjusted to the experimental conditions. The diagrams show the typical behaviour measured at different loads and settings.



## Noise Spectrum

The use of current sources in precision-applications requires high accuracy, stability and low-noise currents. Current sources by HighFinesse were designed to meet these requirements. The diagram shows the FFT-spectrum of the BCS 3/15 current source between 0 and 2500 Hz. The spectrum shows a noise level below -108 dB  $V_{RMS}$ .

The measurement was taken at 3A and an ohmic load of 1 Ω Trigger: AC line; Average: 128.  
Voltage noise < 4 μV<sub>RMS</sub>.

Each current source is tested carefully before delivery, so the switching time and noise characteristics are included in the manual.



We are pleased to accommodate your individual requirements concerning special features, response time, and accuracy. Furthermore, we offer current sources beyond our standard power ranges on request. We look forward to receiving your inquiry.



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