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BS / BSA Series

Multichannel Precision Voltage Source

Datasheet

5-year warranty

Main Features

- reliable and highly stable DC source
- 1, 2, 4, 8, 10, 12 or 16 channels
- +/-0.1V to +/-14V ranges
- rear/front side outputs
- simple plug-and-play USB-connectivity

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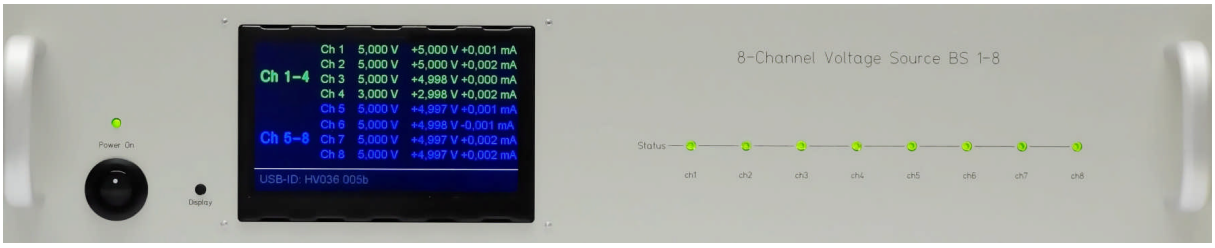
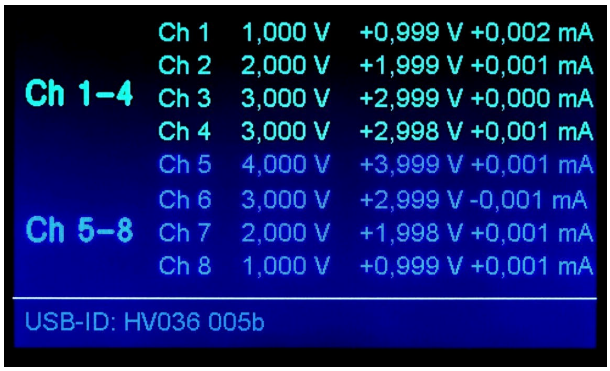
Multi-Purpose Precision DC Sources

The BS/BSA series devices provide precision DC voltages up to +/- 14V (true bipolar, 4-quadrant outputs) for applications like Nanoelectronics, Thin Film Technology, Ion Traps and Precision Experiments. Unlike DC *power* supplies, the output currents are limited to about 10mA, and the outputs are optimized for high short and long term stability, low noise and low temperature drift. The devices are housed in standard 19-inch rack-mount cases. User control of the device can be easily accomplished by PC control programs, utilizing a standard USB connection (USB 2.0 compatible) as hardware link. A LabVIEW™ control program is provided by the manufacturer for this purpose, source code is freely available. Alternatively the simple ASCII command set can be used by other software like external scripts or high-level programming languages.



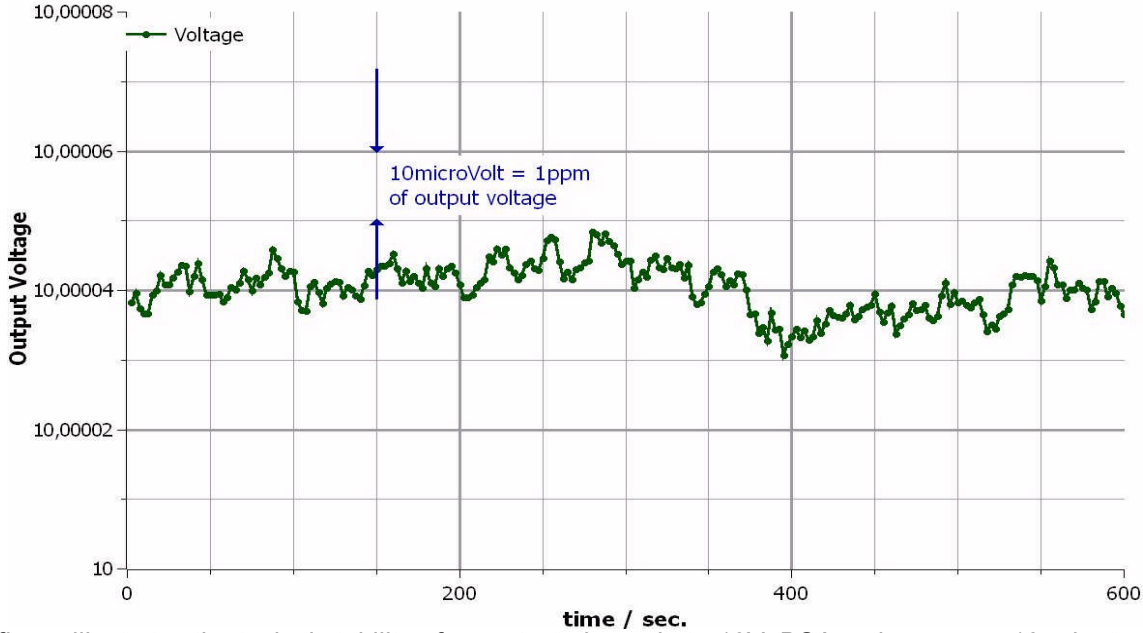
front plate containing LCD display and LED status indicators (outputs on rear side)

The **LCD display** on the front side shows information about received commands and voltage settings for the output channels. The actual output voltages, being read from every individual channel, are also displayed. Measured output currents appear in the outer right row, thus a Source-Meter functionality is provided.
Voltages are programmed with **16 Bits** (BS) or **19 Bits** (BSA) of resolution, reading of voltages and currents features **4½ digits**.



The rear side (8-channel device with rear outputs is shown) features a row of output channels (BNC) and a reference floating ground input, in case this option is installed. The galvanically isolated USB interface connects to a control PC.

Short Term Stability



This figure illustrates the typical stability of an output channel at +10V, BSA series, over a 10-minute interval. Further information see below in specifications table.

Control Software

The LabVIEW™ based application program can be operated in a mostly intuitive style. In case several devices are connected, the user may select the device in a window at the left hand side. The complete source code is openly accessible for quick and easy implementation into own programs.

Specifications

Output Specifications				
Output Voltage Range	Versions: +/-100mV +/-1V +/-5V +/-10V +/-14V	depending on version: single fixed range +/-100mV to +/-14V, bipolar Note, that approx. 1V of overrange is provided in some devices, e.g. a +/-14V device actually delivers (at low output current) up to +/-15V		
Number of Outputs		1, 2, 4, 8, 10, 12 or 16 output lines, depending on device configuration		
Output Connectors		BNC sockets (standard), SubD 25pole female, others on request		
Output Current	per output	approx. +/-10mA (4-quadrant operation, $\lvert U_{OUT} \rvert$ < 10mA) Overload-indication above +/-8.6mA		
Output Reference Ground		All outputs share a common GND, which can be floated up to +/-100V vs. case ground.		
Output resistance		50 Ohm +/-3% , at I < 2mA, versions +/-5V to +/-14V 2 Ohm +/-15% , at I < 6mA, version +/-100mV		
Programming Resolution		BS series: 16 Bits BSA series: 19 Bits		
Accuracy				
		typical error	maximum error	typical drift
% of Setting		0.014%	0.02%	0.001% per day
Offset error Version +/-5V to +/-14V +/-1V +/-100mV		 ±0.9mV ±0.45mV ±15µV	 ±1.8mV ±0.9mV ±50µV	 ±0.05mV per day ±0.01mV per day ±4µV per day
Temperature drift Version +/-1V to +/-14V related to Span related to Offset Version +/-100mV related to Span related to Offset		 BS: 5ppm/K BSA: 2.5ppm/K 15µV/K 20ppm/K 4µV/K		
Output Fluctuations				
		typical	maximum	conditions
Ripple (50Hz, 100Hz) Version +/-5V to +/-14V Version +/-100mV		 BS: < 28µV rms BSA: < 8µV rms < 2.4µV rms	 36µV rms 17µV rms 7µV rms	 no output current no output current no output current
Noise, 10kHz…10MHz Version +/-5V to +/-14V Version +/-100mV		 ≤ 0.5mV rms ≤ 0.06mV rms		
Short/Mid Term Fluctuations @ output voltage 10V, any channel vs. GND, Version ±10V Short Term 1 day Version ±100mV Output at 100mV, Short Term 1 day Offset 1 day		 BS: 21µV pp BSA: 8µV pp 80µV pp 0.9µV pp 20µV pp 4µV pp	 BS: 45µV pp BSA: 20µV pp 150µV pp	-sampling interval 1s- observation period 100s observation period 100s observation period 24h observation period 100s observation period 24h observation period 24h

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Channel separation Version +/-5V to +/-14V Version +/-100mV	typ. BS: 1.2ppm BSA: 0.6ppm 250ppm	max. BS: 2ppm BSA: 1.5ppm 350ppm	static channel crosstalk, no output current drawn
Front Plate LCD Screen, Digital Amperemeter and Voltmeter (Voltage Check)			
Range	+/-100mV or +/-20V, depending on device version and +/-10mA Full Scale		
Accuracy:	typical	maximum	
Scale error	0.5%	1%	
Offset error Version +/-5V to +/-14V Version +/-100mV	50mV or 1µA 50µV or 1µA	75mV or 4µA 90µV or 4µA	
Fluctuations	0.2%	0.3%	observation interval ΔT = 10s
Remote Control / Communication			
Remote Connection	USB 2.0 compatible connection to PCs, fully galvanic isolation provided. The device acts as RS232-controlled device, communicating with standard settings (9600 Baud, 8N1 protocol, no handshake) or in fast-mode (factory ordering option) with parameters 115200 Baud, 8N1 protocol, no handshake. Remark: '8N1' = **8** data bits, **n**o parity check, **1** stop bit.		
USB Isolation Rating	max. +/-300V on USB socket vs. case GND		
Command Language	clear ASCII code command codes see Appendix		
Device Response Time	see Appendix		
Software Support	USB drivers are required. Free LabVIEW™ 8.2 based user surface and executable program is provided		
Power Supply			
AC Supply Rating (Mains)	Either $230V_{AC}$ at 50Hz, EMI/RFI-filtered. (Fuse: 1A) or: $115V_{AC}$ at 60Hz, EMI/RFI-filtered (Fuse: 2A) Power Consumption typ. 15.6W		
Environmental Conditions			
Magnetic Field	max. 10 mT admissible		
Operating Humidity & Temperature	non-condensing humidity, temperatures between +10°C and +40°C		
Weight	approximately 3.0 kg, configuration dependent		

Device variants

- BS-Series: fixed output ranges of ±0.1 to ±14V, 2 to 16 channels
- BSA-Series: fixed output ranges of ±0.1 to ±14V, 1 or 2 channels
- Floating GND (Offset feature) available for all variants;
- Manual control on front plate for max. 10 channels (option)

Further Information: *www.Stahl-Electronics.com*

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