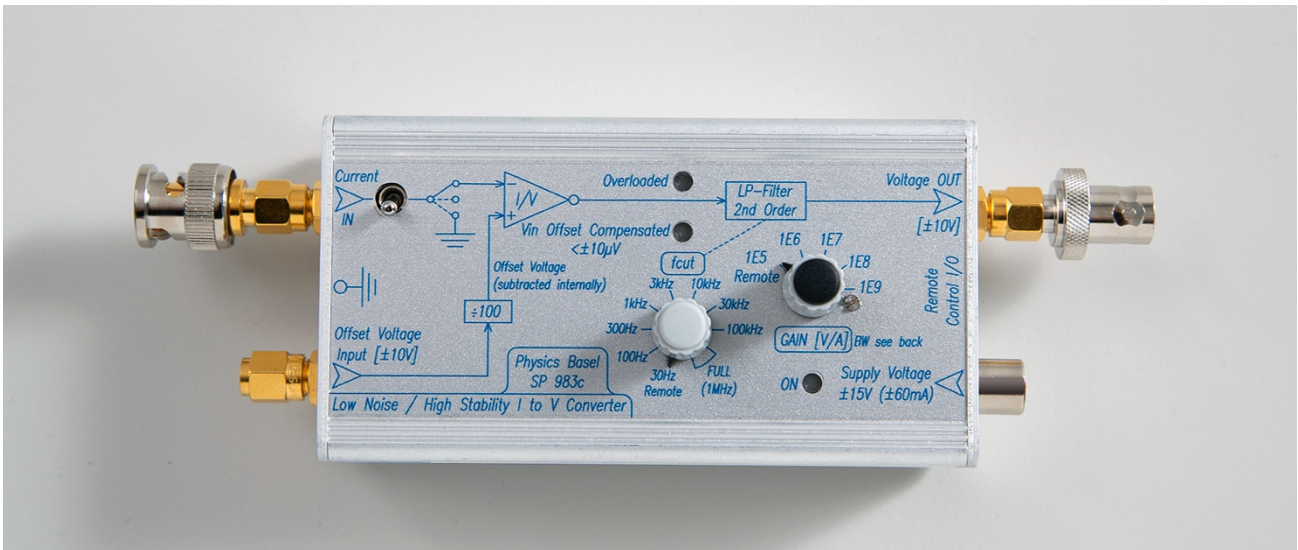




Basel Precision Instruments



# Low Noise High Stability I to V Converter

low-noise, floating, input bias voltage, feedback stabilized

Model	SP983c	-IF	01-IF	-LSK	01-LSK	02-LSK
Input J-FET		IF3602, best for R < 1 MΩ or C > 1 nF		LSK389A, best for R > 1 MΩ and C < 1 nF		
Stable, low-noise and overload protected input current						
Current noise @10 Hz & 10 <sup>9</sup> V/A (fA/√Hz)	6	6.5	5	5	5	5.3
leakage current magnitude (pA)	40	50 *	3	3 *	3 *	3 *
Stable, low-drift and low-noise input voltage (low voltage noise relevant for R < 1 MΩ)						
Input voltage noise @ 10 Hz (nV/√Hz)	2.0	2.6 *	4.5	4.7 *	4.7 *	5.0 *
Input voltage noise @ 1 kHz (nV/√Hz)	1.2	2.0 *	1.9	2.3 *	2.3 *	2.7 *
Input voltage drift	0.15 μV/K @25°C - feedback stabilized					
Input bias voltage (internally subtracted at output)	±100 mV	±1 V <b>NEW!</b>	±100 mV	±1 V <b>NEW!</b>	±1 V <b>NEW!</b>	±2 V <b>NEW!</b>

**Table shows typical specs; for details, please visit <http://baspi.ch>**

\* Noise and leakage current values are measured at zero bias and may change with bias voltage. The noise of the externally applied voltage (divided by 10) adds to the input voltage noise. Therefore, it's important to use a very low-noise voltage source, such as BASPI's LNHR DAC



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Gain	five decades $10^5$ to $10^9$ V/A - remote controllable	
Integrated low-pass filter	30 Hz to 100 kHz - remote controllable	
Bandwidth	24 kHz @ $10^8$ V/A	
DC input impedance	$33 \Omega - 46 \Omega$	
GBWP	600 MHz	68 MHz
Dimensions and weight	small size, low weight, mountable directly on the breakout box 122 x 55 x 35 mm, 165 gr	

## Applications

Low-noise and low-drift current measurements

- low-temperature experiments, e.g., quantum transport in dilution refrigerators  
optimized for filtered lines up to nF capacitances (IF models)  
optimized for high impedance loads, e.g., spin-blockade readout of a qubit (LSK models)
- scanning tunneling microscopes preamplifier  
can apply a bias voltage and simultaneously measure the current on the same lead
- sensitive current measurements with high bias voltage stability  
input voltage is actively stabilized to ensure negligible drift
- low-level light detection with photodiodes or photomultipliers





### Rise/Fall Time and Bandwidth

Gain (V/A)	Rise/Fall Time (10%, 90%) ( $\mu$ s) Typical   Maximum	Bandwidth (-3dB) @ 1V (kHz) Typical   Minimum
$10^9$	192   270	1.7   1.2
$10^8$	13   15	24   20
$10^7$	3.5   3.7	94   90
$10^6$	1.1   1.2	315   300
$10^5$	0.59   0.62	580   500

### Typical input Voltage Noise (Independent of Gain)

	@ 10 Hz	@ 30 Hz	@ 100 Hz	@ 1 kHz
SP983c-IF	2 nV/ $\sqrt$ Hz	1.6 nV/ $\sqrt$ Hz	1.5 nV/ $\sqrt$ Hz	1.2 nV/ $\sqrt$ Hz
SP983c01-IF	2.6 nV/ $\sqrt$ Hz	2.1 nV/ $\sqrt$ Hz	2.0 nV/ $\sqrt$ Hz	1.8 nV/ $\sqrt$ Hz
SP983c-LSK	4.5 nV/ $\sqrt$ Hz	2.7 nV/ $\sqrt$ Hz	2.2 nV/ $\sqrt$ Hz	1.9 nV/ $\sqrt$ Hz
SP983c02-LSK	5.0 nV/ $\sqrt$ Hz	4.4 nV/ $\sqrt$ Hz	3.1 nV/ $\sqrt$ Hz	2.7 nV/ $\sqrt$ Hz

### Typical input Current Noise

Gain (V/A)	@ 10 Hz (fA/ $\sqrt$ Hz) IF   LSK	@ 1 kHz (fA/ $\sqrt$ Hz) IF   LSK	Theoretical Limit (fA/ $\sqrt$ Hz)
$10^9$	6   5	9   8	4.1
$10^8$	14.0   13.7	16   15	13
$10^7$	42   42	43.0   42.5	41
$10^6$	135   139	140   139	130
$10^5$	576   590	582   580	410