SUTTER INSTRUMENT Amplifier Systems Comparison

	IPA®	Double IPA®	dPatch®	dPatch®-2
Whole-cell recordings	✓		✓	
Single-channel recordings			✓	
Field potential recordings	✓		✓	
Extracellular recordings	✓		✓	
Intracellular sharp-electrode recordings	✓		✓	
Lipid-bilayer recordings	✓		✓	
Ultra-fast signals (e.g., auditory research)			✓	
# Headstages	1	2	1	2
Upgradable from 1 to 2 headstages		N/A	✓	N/A
Multi-amplifier mode	✓			
AD-DA converter included	✓		✓	
SutterPatch® software included	✓		✓	
Feedback elements	500 MΩ		50 MΩ	500 MΩ / Capacitive
RMS noise (0.1 – 10 kHz)	1.4 pA		<2.3 pA	<0.7 pA / <0.22 pA
Current range	±20 nA		±200 nA	±20 nA / ±20 nA
Digital compensation circuitry			✓	
Analog bandwidth (max)	20 kHz		>500 kHz	
Sampling rate (max, per channel)	50 kHz		5 MHz	
Resolution	16-bit		Up to 22-bit*	
Auxiliary analog inputs	4		8	
Auxiliary analog outputs	2		4	
Digital outputs	8		16	
Output filter	4-pole Bessel		8-pole Bessel	
Computer connection	USB 2.0 (High-speed)		USB 3.0 (SuperSpeed)	
FastFollower™ current clamp circuitry	✓		✓	
Current clamp rise time / bandwidth (Rs = 10 MΩ)	29 µs / 12 kHz		<10 µs / >35 kHz (Rf = 500 MΩ)	
Dynamic clamp			✓	
Lock-in Amplifier base frequency	up to 1 kHz		up to 20.8 kHz	
Field-upgradeable firmware			✓	
Analog signal outputs and command inputs	✓			

* At 1 kHz bandwidth

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