

# The PZ5 NeuroDigitizer

System 3



**Overview.** The PZ5 is a multi-modal neurodigitizer suitable for recording a broad range of biological potentials. Its analog input boards combine the functionality of the PZ2 and PZ3 amplifiers in a single device that can be used for both high and low impedance input signals simultaneously. The PZ5 may also include digital input boards for inputting signals from an Intan RHD2000 amplifier board with up to 128 channels.

Analog input board oversample the input signals with very fast instrumentation grade converters, TDT's custom hybrid A/D circuit yields 28 bits of resolution and unparalleled dynamic range. Optional DC coupling offers zero phase distortion across the signal bandwidth. Sampling rate and down-sampling filters can be optimized on each logical amplifier for the intended input type to optimize signal fidelity. The +/-500 mV input range is large enough to accept any biological potential and most stimulus artifacts without saturating.

PZ5 neurodigitizers are available in 32, 64, 96, or 128 channel models and support sampling rates up to ~50 kHz. Recorded signals are amplified, digitized, and then transmitted to the RZ base station for further processing via a single fiber optic connection.

**Power and Communication.** Data from the PZ5 can be streamed across the fast fiber optic connection to the 'PZ' fiber optic input on an RZ2 or RZ5D base station, or directly to an RZDSP\_P card on an RZ base station. Configuration information is also sent from the RZ to the PZ5 neurodigitizer across the fiber optic connection. The PZ5 neurodigitizer features a 32 Amp-hour Lithium-ion battery pack. An external battery pack (PZ-BAT) is also available to provide longer battery life for extended recording sessions.

**PZ5 Input Compatibility.** The PZ5 can accept inputs from a variety of electrode/headstage combinations via the back-panel mini-DB26 connectors. Each connector inputs 16 recording channels (or eight differential channels) along with ground and reference. An external ground is also available.

For high impedance recordings, one or more Z-Series headstages can be used. For low impedance recordings, an S-BOX-PZ5 input splitter or LI-CONN low-impedance connector can be used. Alternately, custom connectors and a breakout box with a male mini-DB26 connector can be used (*request details from TDT*).

**PZ5 NeuroDigitizer Part Numbers:**

- PZ5-32, 32-Channel NeuroDigitizer
- PZ5-64, 64-Channel NeuroDigitizer
- PZ5-96, 96-Channel NeuroDigitizer
- PZ5-128, 128-Channel NeuroDigitizer
- PZ5-0-2, Preamp with 2 Digital Headstage Inputs
- PZ5-0-4, Preamp with 4 Digital Headstage Inputs
- PZ5-32-2, 32-Ch NeuroDigitizer with 2-Digital Inputs
- PZ5-32-4, 32-Ch NeuroDigitizer with 4-Digital Inputs
- PZ5-64-2, 64-Ch NeuroDigitizer with 2-Digital Inputs
- PZ5-64-4, 64-Ch NeuroDigitizer with 4-Digital Inputs

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**Multi-Modal Configuration.** The neurodigitizer inputs are organized into 16-channel banks. Each bank is electrically isolated, so ground and reference channels are not inherently shared between banks. Multiple banks can be grouped into a single logical amplifier that shares the same settings and ground/reference

among each bank in the logical amplifier. Each logical amplifier can use the ground as a reference, use a shared reference, use a unique reference on each bank, or implement full per-channel differential referencing. A touchscreen interface provides immediate preview of inputs, impedance checking, and real-time control and configuration options for each amplifier bank.

## Technical Specifications for the PZ5 NeuroDigitizer

**The Front Panel Display.** The front panel display is a touchscreen interface for impedance checking and waveform preview and can be used for on-the-fly device configuration.

A/D:	Up to 128 channels, hybrid	
Maximum Voltage In:	+/- 500 mV [ +/- 5 mV for IntanBoards]	
A/D Sample Rate:	Up to 48828.125 Hz [adjustable in steps of approximately 750, 1500, 3000, 6000, 12000, 25000, and 50000 Hz]	
Frequency Response:	DC coupled:	0 Hz – 0.45*Fs [Fs=sample rate]
	AC coupled:	0.4 Hz – 0.45*Fs [Fs=sample rate]
	With Intan Boards	0.1 HZ - 10 kHz
S/N [typical]:	Single Ended:	104 dB, Fs = 25 kHz, 300-7000 Hz
	Differential:	116 dB, Fs = 750 Hz, 0.4-300 Hz
DC offset:	DC Coupled:	< +/-10 $\mu$ V
Input Referred Noise:	Single Ended:	3.0 $\mu$ Vrms, Fs = 25 kHz, 300-7000 Hz
	Differential:	0.75 $\mu$ Vrms, Fs = 750 Hz, 0.4-300 Hz
Distortion [typical]:	< 1%	
Input Impedance:	1 GOhms	
Battery Capacity:	32 Amp-hour	
Battery:	8-10 hours to charge to 95% capacity, 14 hours to fully charge.	
	<i>Battery life between charges:</i>	
	32 ch ~ 50 hrs	96 ch ~ 27 hrs
	64 ch ~ 35 hrs	128 ch ~ 22 hrs
Charger:	External 12 VDC, 2.5 A power supply, center negative	
Indicator LEDs:	Up to 128 status/clip warning	
Fiber Optic Cable:	5 meters standard, cable lengths up to 20 meters	
	<i>If longer cable lengths are required, contact TDT</i>	
Ethernet Port:	100 Mbps	

