

NEW!

INTERMEDIATE CABLE SOLUTION PROVIDES MOST COMPACT AND STABLE PATCH CLAMP RECORDING SYSTEM

Stable pipette positioning is critical for the success in patch clamp experiments. Premature loss of recording often stems from thermal drift or pipette tip vibration deriving from the head-stage cable and/or suction tubing movements. We have designed an intermediate cable solution that tackles these stability compromising issues:

- Strain from the head-stage cable and/or suction tubing is mechanically decoupled from the pipette holder
- Ultra compact recording system minimizes length of the mechanical lever arms to reduce thermal drift and sensitivity to environmental vibrations

Low noise cable design

- Custom coaxial cable design with high quality RF connectors
- Excellent noise shielding, a small diameter and high flexibility
- Minimal capacitance: 3 pF for 200 mm long intermediate cable



Plug-and-play solution

All accessories are included for a plug-and-play installation:

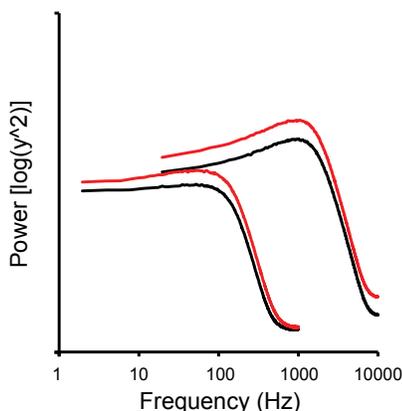
- Intermediate cable with BNC connector at head-stage and SMB connector at the pipette holder end
- A customized HEKA pipette holder with SMB connector
- Adapter with integrated bolt and magnet mounting options; a dove tail mechanism holds the headstage and the adapter also includes fixtures for the suction tubing

We have validated with HEKA team that the intermediate cable does not lead to significant increase in the noise in patch-clamp experiments (see backside).

INTERMEDIATE CABLE PERFORMANCE TEST

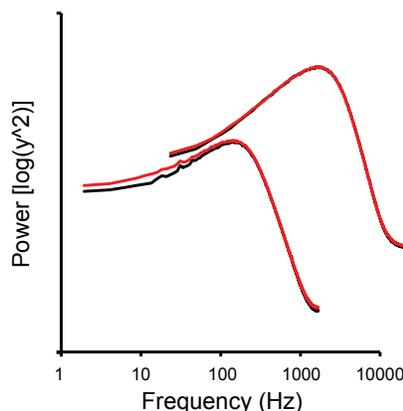
Noise measurements were done in co-operation with HEKA to determine if using the intermediate cable will introduce additional noise to the patch-clamp experiments. Noise was measured using a HEKA EPC 10 USB patch clamp amplifier with and without the Sensapex intermediate cable between the head-stage and model cell.

A) Shielded headstage



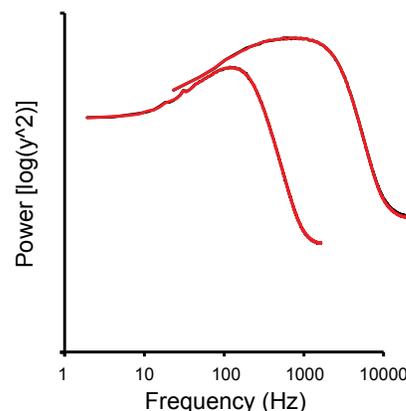
| Bandwidth | No cable | With cable |
|-----------|----------|------------|
| 1 kHz | 32 fA | 49 fA |
| 10 kHz | 252 fA | 416 fA |

B) Model cell: cell-attached



| No cable | With cable |
|----------|------------|
| 117 fA | 122 fA |
| 1.6 pA | 2.7 pA |

C) Model cell: whole-cell



| No cable | With cable |
|----------|------------|
| 802 fA | 802 fA |
| 5.6 pA | 5.6 pA |

Noise power spectra are shown in logarithmic scale for the 1 kHz and 10 kHz bandwidths in black (without) and red (with the intermediate cable.) Table shows corresponding RMS current noise. A) Amplifier gain 200 mV/pA; $C_{fast} = 0.9$ pF. Increase in the noise is observed; note that the data reflects amplifier instrumentation noise level that is not achievable in practical experiments. B) Amplifier gain 200 mV/pA; $C_{fast} = 5.8$ pF. Minor increase in the noise is observed with the intermediate cable; note the extremely small total noise level. C) Amplifier gain 50 mV/pA; $R_m = 500$ M Ω and $C_{slow} = 22$ pF. No measurable difference in the noise.

The results show that the intermediate cable does not add any significant noise to the whole cell patch-clamp recordings. Because of the expected improvements in the recording stability, we recommend testing the intermediate cable solution as an alternative for direct head-stage mounting also in the single channel recordings.

Micromanipulator demonstration systems with both the intermediate cable and direct mounting options are readily available for test use. Please contact us at info@sensapex.com to schedule a test use in your laboratory.



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