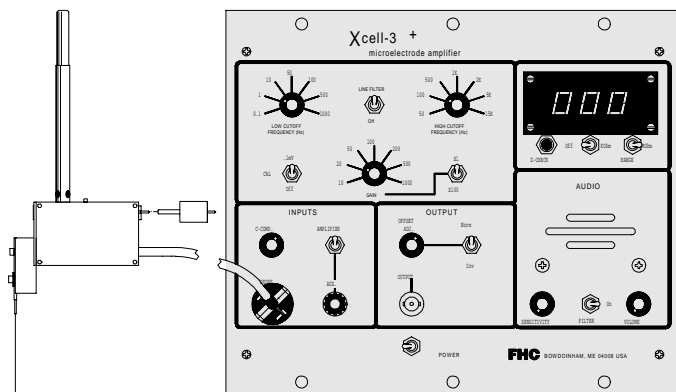


Xcell 3+ Microelectrode Amplifier



- PROBE DESIGN PUTS FIRST STAGE OF AMPLIFICATION AT MICROELECTRODE INTERFACE
- WIDE GAIN RANGE (10-100,000)
- PUSHBUTTON IMPEDANCE CHECK WITH DIGITAL READOUT, TWO CONVENIENT RANGES
- SHARP (-12DB/OCTAVE) HIGH AND LOW CUTOFF FILTERS
- INPUT DISCONNECT FOR CURRENT INJECTION
- AUDIO MONITOR WITH NOISE FILTER
- MAINS LINE FILTER, SPECIFY 50 OR 60 Hz
- BUILT-IN CAL SIGNAL (100mV)
- CONVENIENT MICROELECTRODE CARRIER PROVIDED
- DIFFERENTIAL INPUT PROBE EASY TO USE WITH EEG, EMG AND OTHER GROSS MACROELECTRODES
- 40-43-1-01 VERSION PROVIDES ISOLATION (TO UL544) FROM POWER LINE GROUND XCELL 3+ MICROELECTRODE

The 40-43-1 Microelectrode Amplifier represents a new standard of low noise, high impedance amplification versatility for extracellular applications. State-of-the-art integrated circuits have enabled us to lower noise while increasing bandwidth, while, at the same time, adding features that make microelectrode recording more convenient. By connecting a high impedance, low noise, differential preamplifier directly to the electrode carrier, external noise pickup is minimized.

A convenient, plug-in holder for metal microelectrodes is included with the system. The probe has been designed to be used with other physiological electrodes as well.

A wide range of low and high cut-off filters allows the investigator to reject signals outside the bandwidth of interest. Additionally, a sharp notch filter can be introduced to virtually eliminate interference from power lines. With a voltage gain adjustable from 10 to 100,000 in thirteen calibrated steps and a wide dynamic output range of $\pm 10V$, the Xcell 3+ can be interfaced with any data collection or storage system.

Isolation (40-43-1-01 only): Leakage current <100mA (per UL544), typically <10mA

An internal 100 microvolt calibrator is included.

Several features on the front panel give the investigator an exceptional degree of "remote-control" away from the preparation.

- Impedance Check: When activated, this circuit passes a 10nA, 1000Hz current through the electrodes at the positive input. The impedance of the electrode is displayed on a 3-digit readout.
- A switch which electrically disconnects the microelectrode from the preamplifier input and connects it instead to a front panel connector (AUX), permitting the investigator to apply stimulation or lesion currents through the electrode.
- Audio monitoring of activity with a built-in speaker. A noise filter eliminates baseline noise from the audio output.
- Offset and polarity controls are provided for the output.
- Capacitance neutralization control.

The Xcell 3+ is packaged in a modular cabinet which occupies only 8 1/4"x7" (21x18cm) when mounted in a standard rack or it can stand alone on the bench top. The probe is connected to the module by an 8' (2.5 meter) cable (other lengths can be specified).

The 40-43-1-01 version is functionally identical except that the amplifier and impedance check circuitry are isolated from power line ground. This isolation is provided by a separate isolation transformer meeting the current requirements of UL544. This transformer is also VDE certified to IEC 950 specifications. The isolated circuitry is coupled to the ground-referenced output stage through optical isolation amplifiers.

SPECIFICATIONS

AMPLIFIER:

- Input:** Differential
- Input Impedance :** 10
- Input Bias Current:** <4pA
- Common Mode Rejection:** 95dB at 60Hz
- Gain:** x10 to x100,000 in 13 calibrated steps (includes x10 gain from probe preamplifier)
- Frequency Response:** .1Hz - 15Hz (-3db)
- Filter Cutoff Slopes:** -12dB/Octave
- High Cutoff Ranges (Hz) (-3db):** 50,100, 500,1K,2K,5K,15K
- Low Cutoff Ranges (Hz) (-3dB):** .1, 1, 10, 50, 100, 500, 1000
- Input Dynamic Range:** $\pm 1V$
- Output Dynamic Range:** $\pm 10V$
- Output Offset:** Adjustable from -1.5 to +1.5 Volts
- Cal Signal:** 100Hz square wave provided equivalent to 100 mV at probe input.
- Line Filter:** 50/60Hz (specify) -40dB attenuation (cont'd next page)

IMPEDANCE CHECK:

Impedance: 3 digit red LED display

Measurement Ranges: 1-999 KOhm; 0.1-9.99 MOhm (1-99 MOhm optional)

Measurement Current: 10mA, peak-to-peak

Frequency: 1000Hz

AUDIO:

Noise filter: provided, on/off switch included

Sensitivity (gain before noise filter): adjustable with single turn potentiometer

Volume (gain after noise filter): adjustable with single turn potentiometer

DIMENSIONS, POWER:

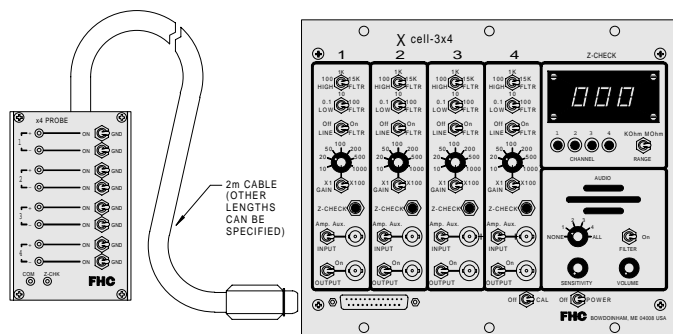
Module: 7"h x 8 1/4"w x 9"d (18 x 21 x 23cm); 6.5 lbs. (3kg)

Probe: 1.90" x 1.2 x .62" (5 x 2.9 x 1.5cm) with 8' (2.5m) cable (other lengths optional)

Power Requirements : 115V/230V, 50-60Hz

Xcell-3x4 4-Channel Microelectrode Amplifier

Note: See our 8 Channel Amplifier on page 46.



- **FOUR DIFFERENTIAL, HIGH INPUT IMPEDANCE AMPLIFIERS EACH WITH:**
 - **WIDE GAIN RANGE (10-100,000)**
 - **SHARP (-12DB/OCTAVE) HIGH AND LOW CUTOFF FILTERS**
 - **INPUT DISCONNECT FOR CURRENT INJECTION**
 - **MAINS LINE FILTER, SPECIFY 50 OR 60 Hz**
 - **BUILT-IN CAL SIGNAL (100mV)**
- **AUDIO MONITOR WITH NOISE FILTER**
- **PUSHBUTTON IMPEDANCE CHECK WITH DIGITAL READOUT, TWO CONVENIENT RANGES**
- **COMPACT SIZE / BUILT-IN POWER SUPPLY WITH SHIELDED POWER CABLE AND FILTERED MAINS POWER ENTRY (115/230V, 50-60 Hz)**

We've added 3 additional channels to the Xcell-3+ Microelectrode Amplifier and fit it in the same size package. The result is an inexpensive instrument perfect for multi-electrode recording and compact enough to mount two 4-channel units across a 7" vertical rack mount space.

Principal design consideration was given to reducing the complexity of multi-microelectrode recording. Each recording electrode can be accessed for impedance check and current injection at anytime.

SPECIFICATIONS

AMPLIFIERS (4 channels):

Inputs: Differential

Input Impedance: 10¹² Ohms

Input Bias current: <4pA

Common Mode Rejection: 95db at 60Hz

Gain: x10 to x100,000 in 13 calibrated steps

Frequency Response: .1Hz - 15KHz (-3dB)

Filter Cutoff Slopes: -12dB/Octave

High Cutoff Frequencies (Hz) (-3dB): 100, 1K, 15K

Low Cutoff Frequencies (Hz) (-3dB): .1, 10, 100

Input Dynamic Range: ±1V

Output Dynamic Range: ±10V

Cal Signal: 100mV, 1000 Hz square wave

Line Filter: 50 or 60Hz (specify), -40dB attenuation

IMPEDANCE CHECK:

Impedance: 3 digit red LED display

Measurement Ranges: 1-999 KOhm; 0.01-9.99 MOhm

Measurement Current: 10nA, peak-to-peak

Frequency: 1000 Hz

AUDIO (switch selectable to each of 4 channels or combined):

Noise filter: provided, switch selectable

Sensitivity (gain before noise filter): adjustable with single turn potentiometer

Power Requirements: 115/230V, selectable, 50-60Hz, 1A

Dimensions, module: 7"h x 8 1/4"w x 9"d (18 x 21 x 23cm). 6.5 lbs. (3kg) **probe:** 2 3/4"w x 4 1/4" x 2"d (7 x 11 x 5cm), 2 lbs (.9 kg) with 6' (2m) cable (other lengths optional)

Note: On 4-Channel Probe & Adaptor see also 8 Channel on Pages 46 or 47

ORDERING INFORMATION

40-43-1	Xcell-3+ Microelectrode Amplifier
40-43-1-01	Xcell-3+ Isolated Microelectrode Amplifier
40-40-8	Xcell-3x4 4-Channel Amplifier
40-40-8B-01	Xcell 3x4 Isolated 4-Channel Amplifier