



## C<sup>4</sup>D Amp (Model EA120) Contactless Conductivity Detector

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- Plug and play installation
- Compatible with **e-corder** or PowerChrom 281 units
- Compatible with Agilent, Beckmann, and Prince CE systems
- Standard with ET120 C4D Head for CE. Compatible with 365  $\mu\text{m}$  OD capillary tubing
- Can be supplied with alternative ET121 Microfluidic Platform headstage for microchannel electrophoresis.

### Description

Capacitively-coupled contactless conductivity detection (C<sup>4</sup>D) systems apply a high voltage AC waveform to a transmitter electrode adjacent to a tube or channel in which electrophoretic (or chromatographic) flow is occurring. The AC signal capacitively couples into the sample, which conducts the signal to a second receiver electrode. The received, much attenuated, AC signal is demodulated to provide a DC signal which is dependent on the conductivity of the sample between the electrodes. This process occurs inside a headstage, which outputs a signal to the C<sup>4</sup>D Amp. The C<sup>4</sup>D Amp removes signal offset, amplifies and filters the signal, and also generates the excitation waveform that is sent to the headstage.

The CE or IC capillary tube is passed through the C<sup>4</sup>D Head where the AC signal is applied and received.

### Specifications

Connector:	8 pin DIN socket
Headstage gain:	0.2 or 1.0 mV/nA
C <sup>4</sup> D Amp signal gain:	$\times 1$ , $\times 10$ , $\times 100$
Signal resolution:	16 bits, 0.0015% of range (Chart software) up to 24 bits (PowerChrom software)
Maximum input signal:	3 V
Excitation frequency:	50 – 1200 kHz
Excitation amplitude:	1 – 100 V AC pp, sinusoidal
Offset resolution:	20 bit
Low pass filters:	10 Hz with PowerChrom software 10, 5, 2, 1 Hz, with Chart software
Output signals:	$K_{\text{raw}}$ 0 – 2 V; $\Delta K$ 0 to $\pm 2$ V

### Compatibility

Supplied ready for use with **e-corder**, or model ER281 Powerchrom, with either Chart or PowerChrom software. Windows 2000, XP, VISTA, or Macintosh OS X computer, with USB interface required. The C<sup>4</sup>D Head will fit capillary tubing with an outside diameter of 360 – 365  $\mu\text{m}$ .

### Applications

The C<sup>4</sup>D Amp can be used with CE or microchannel electrophoresis or with ion chromatography systems. Order with ET121 C<sup>4</sup>D Microfluidic Platform for microchannel electrophoresis.

For a list of chemical applications see over.

I <sup>2</sup> C input and output:	Male and female DB-9 pin connectors. Provides control and power.
Power requirements: (supplied by <b>e-corder</b> or PowerChrom 281 unit)	$\pm 17$ V DC, $\sim 20$ mA $+8$ V DC, $\sim 20$ mA $\sim 3$ W
Dimensions (h x w x d):	60 x 150 mm x 200 mm (2.4 x 5.9 x 7.9")
Weight:	0.8 kg (1.8 lb)
C <sup>4</sup> D Head Dimensions (h x w x d):	28.5 x 25.2 x 10.0 mm (1.1 x 1.0 x 0.39")
Operating temperature:	0 to 35 °C 0 to 90% humidity (non-condensing)
<i>eDAQ reserves the right to alter these specifications at any time.</i>	

WARRANTY: eDAQ Hardware units are supported by a one year warranty

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## Applications cont'd

Contactless conductivity detection can be used for virtually all charged species: inorganic anions and cations, as well as organic ions, such as carboxylic acids, amines, amino acids, peptides, proteins, DNA fragments, antibiotics and many other pharmaceutical compounds. Tagging or other modification of the analytes is usually NOT required, while limits of detection are often comparable to, or sometimes even better, than UV-visible absorption techniques.

The C<sup>4</sup>D Amp is based on a design originally conceived by Professor Peter Hauser and co-workers at the University of Basel. Application areas are described in the research papers below:

Determination of different classes of amines with capillary zone electrophoresis and contactless conductivity detection. Xiao Yang Gong, Peter C. Hauser, *Electrophoresis*, **27**, 468–473, 2006.

Determination of chlorhexidine digluconate and polyhexamethylene biguanide in eye drops by capillary electrophoresis with contactless conductivity detection. Eva M Abad-Villar, Susanne F. Etter, Michael A. Thiel, and Peter C. Hauser, *Analytica Chimica Acta*, **561**, 133–137, 2006

Evaluation of the detection of biomolecules in capillary electrophoresis by contactless conductivity measurement. Eva M. Abad-Villar, Pavel Kubán, Peter C. Hauser, *Journal of Separation Science*, **29**, 1031–1037, 2006.

Analysis of electroplating baths by capillary electrophoresis with high voltage contactless conductivity detection. Ling Zhang, Shokoo S Khaloo, Pavel Kubán, and Peter C Hauser, *Measurement Science and Technology*, **17**, 3317–3322, 2006.

Enantiomeric separation of underivatized small amines in conventional and on-chip capillary electrophoresis with contactless conductivity detection. Xiao Yang Gong, and Peter C. Hauser, *Electrophoresis*, **27**, 4375–4382, 2006.

Rapid electrophoretic separations in short capillaries using contactless conductivity detection and a sequential injection analysis manifold for hydrodynamic sample loading. Andreas Wuersig, Pavel Kubá, Shokoo S. Khaloo and Peter C. Hauser, *The Analyst*, **131**, 944–949, 2006.

Detection of Human Immunoglobulin in Microchip and Conventional Capillary Electrophoresis with Contactless Conductivity Measurements. Eva M. Abad-Villar, Jatisai Tanyanyiwa, M. Teresa Fernández-Abedul, Agustín Costa-Garcí, and Peter C. Hauser, *Analytical Chemistry*, **76**, 1282–1288, 2004.

Determination of major inorganic ions in blood serum and urine by capillary electrophoresis with contactless conductivity detection. Qi Jin Wan, Pavel Kubán, Jatisai Tanyanyiwa, Andrea Rainelli, and Peter C. Hauser, *Analytica Chimica Acta*, **525**, 11–16, 2004.

Contactless conductivity detection of selected organic ions in on-chip electrophoresis. Jatisai Tanyanyiwa, Eva M. Abad-Villar, Peter C. Hauser, *Electrophoresis*, **25**, 903–908, 2004.

Application of a contactless conductivity detector to the determination of inorganic ions in ion chromatography. Pavel Kubán, Marcel A. Müri and Peter C. Hauser, *The Analyst*, **129**, 82–86, 2004.

On-site simultaneous determination of anions and cations in drainage water using a flow injection-capillary electrophoresis system with contactless conductivity detection. Pavel Kubán, Miriam Reinhardt, Beat Müller and Peter C. Hauser, *Journal of Environmental Monitoring*, **6**, 169–174, 2004.

High-voltage contactless conductivity detection of underivatized amino acids in capillary electrophoresis. Jatisai Tanyanyiwa, Karin Schweizer, and Peter C. Hauser, *Electrophoresis*, **24**, 2119–2124, 2003.

Improved capacitively coupled conductivity detector for capillary electrophoresis. Jatisai Tanyanyiwa, Benedikt Galliker, Maria A. Schwarz and Peter C. Hauser, *The Analyst*, **127**, 214–218, 2002.

High-voltage contactless conductivity detection of metal ions in capillary electrophoresis. Jatisai Tanyanyiwa, and Peter C. Hauser, *Electrophoresis*, **23**, 3781–3786, 2002.