

Two-channel Digital Electrometer with Servo Control Option



Features

- Two independent gated integrator channels
- Dynamic range 0.1pA to 100uA
- Integrated digitization and communications
- Integrated calibration test source
- Selection of current and charge integration modes
- External trigger capability
- Optional high-precision analog output for servo control applications
- Auxiliary I/O port

Applications

- Ionization chambers
- Two electrode beam position monitors
- Photodiodes
- Ultra-low current and charge measurement

- With servo control option:
 Stabilization of double crystal monochromators for synchrotron beam-line experiments by control of the crystal cage piezo motor amplifier
 Stabilization of beam position in charged particle or photon beamlines

Options

- Auxiliary HV output 0 to 1000V
- Alternative feedback capacitor options
- Servo control options
- Triaxial signal input connectors

Specifications

Operating principle	Gated integrator (charge integrating amplifier)
Integration capacitor	Dual, software selectable in real time
Input noise	< 10 fA rms + 1 fA rms per pF input load up to 100 pF (1 second integration, 10 pF capacitor)
Input offset	< 1 pA , 15 to 25 C. Offset can be removed by zero subtraction.
Stability	Output drift < 100 fA / C / hour



Specifications (continued)

External accuracy	Better than 0.5% of full scale in use, integration time 100 usec to 1 sec, after calibration with built-in current source
Integration time	User selectable, 20 µsec to 65 sec.
Integration modes	Continuous charge/current, charge accumulation, triggered burst
External gate	TTL 10 kohm impedance or fiber-optic receiver, software-selectable.
Trigger modes	Internal (autorun), external start, external start/stop, external start/hold, message.
Digitization	16 bit bipolar, 250kHz
Auxiliary HV PSU	(Factory option) 0 to 1000V programmable (polarity and maximum voltage factory selectable), 1mA max. Noise and ripple < 0.1%
Power input	+24V (+/- 2V) DC, 350mA typ, 500mA max.
Controls	Two rotary switches for loop address and comms mode/ baud rate.
Displays	Status LEDs (power, device status, comms mode, data RX/TX). "HV on" LED.
Case material	Stainless steel sheet
Weight	1.64kg (3.6 lb).
Operating environment	10 to 35C (15 to 25 C recommended to reduce drift and offset) , < 70% humidity, non-condensing, vibration < 0.1g all axes (1 to 1000Hz) Vibration must be as low as possible to measure at the lower limit of the dynamic range.
Shipping and storage environment	-10 to 50C, < 80% humidity, non-condensing, vibration < 2g all axes, 1 to 1000Hz

Interfacing

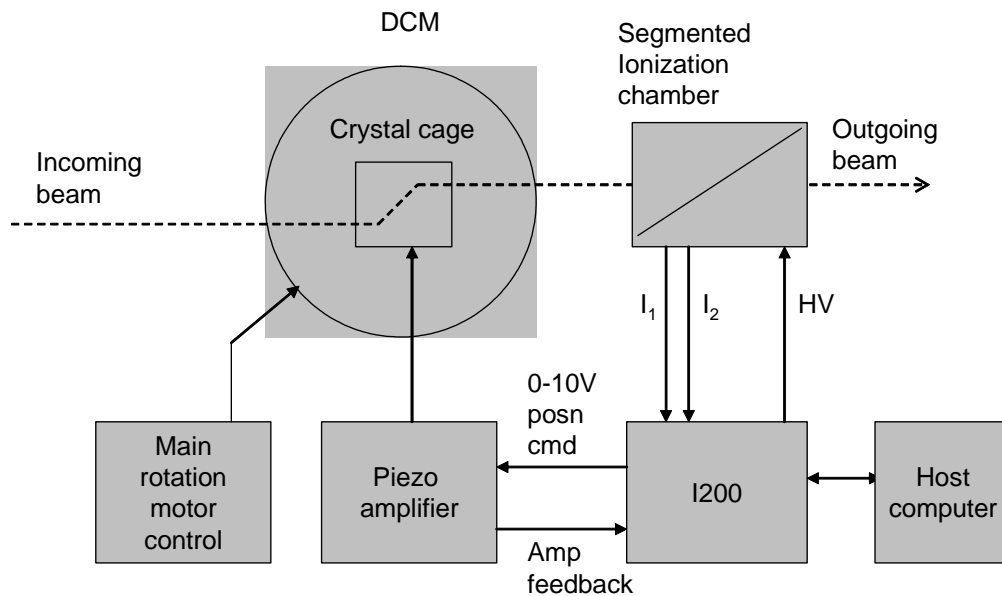
Interfaces	RS-232, 8-bit ASCII. Selectable baud rate.
	USB, 8-bit ASCII 3 Mbit/sec
	Fiber-optic loop, 10 Mbit/sec serial, 9-bit asynchronous binary. Ethernet connection to host through A300 or A500 loop controllers.
Host computer	ASCII communications based on SCPI. Diagnostic host program supplied for Microsoft® .net framework. DLLs available for Microsoft® .net, National Instruments™ Labview™ and Microsoft® C++.



Servo control option

Principle The I200 measures one or two currents, from devices such as ionisation chambers, photodiodes, or secondary electron emission electrodes. The value of an arithmetic function of the measured currents is maintained by adjusting a 0 to 10 V control output using a PID control algorithm.

Typical applications Beam intensity stabilization for Double Crystal Monochromators
Beam position control in charged particle or photon beamlines.



Sample application— double crystal monochromator stabilization

Servo type	PID controller implemented in firmware; servo parameters software configurable.
Process variable choices	I_1 , (I_1 / I_2) , $(I_1 + I_2)$, $(I_1 - I_2)$, $((I_1 - I_2) / (I_1 + I_2))$
Analog output	16 bit DAC, 0 to +10 VDC
Analog input	10 bit ADC, 0 to +10 VDC
Servo frequency	200 Hz maximum
Automated functions	Open loop direct control of the DAC output Peak scan Peak spectrum upload Servo suspension if process variable bad



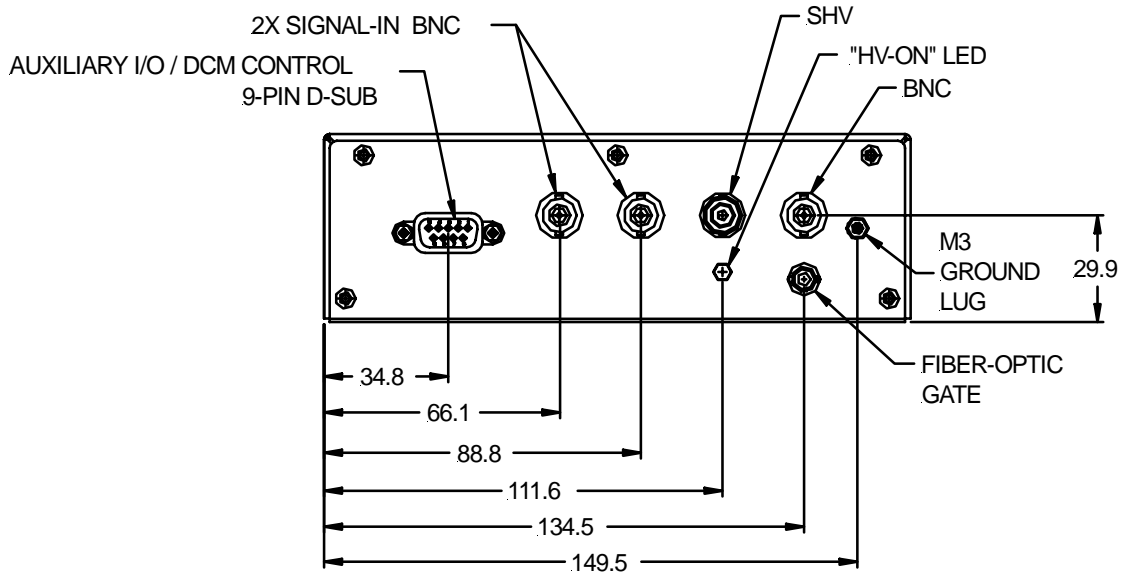
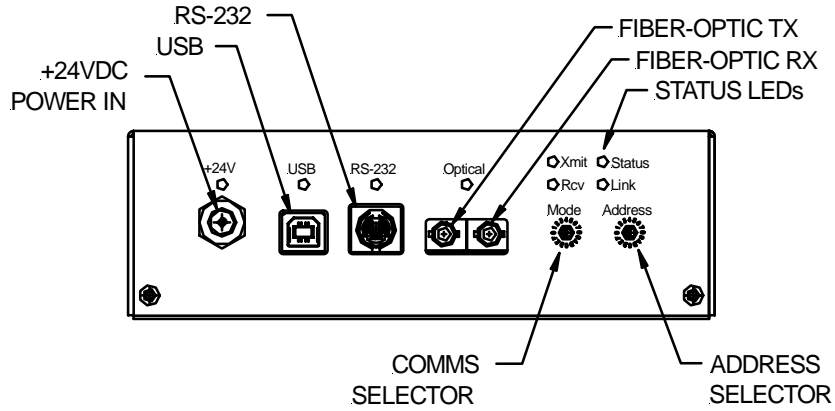
Connectors

Signal inputs	Two BNC. Three-lug triax connectors available as an option.																							
Auxiliary HV out	SHV																							
External gate in	a) BNC (isolated from case) b) Fiber-optic ST bayonet																							
Auxiliary I/O and servo control	9 pin D female	<table border="1"> <tr> <td>1</td> <td>Analog Gnd</td> <td>6</td> <td>Analog output</td> </tr> <tr> <td>2</td> <td>Analog Gnd</td> <td>7</td> <td>Analog input</td> </tr> <tr> <td>3</td> <td>+24 VDC out</td> <td>8</td> <td>PSU Gnd</td> </tr> <tr> <td>4</td> <td>Opto common</td> <td>9</td> <td>Opto in B</td> </tr> <tr> <td>5</td> <td>Opto in A</td> <td></td> <td></td> </tr> </table>			1	Analog Gnd	6	Analog output	2	Analog Gnd	7	Analog input	3	+24 VDC out	8	PSU Gnd	4	Opto common	9	Opto in B	5	Opto in A		
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USB	USB B type female.																							
RS-232	Six pin mini-DIN ("PS/2")																							
	<table border="1"> <tr> <td>1</td> <td>Tx</td> <td>4</td> <td>n/c</td> </tr> <tr> <td>2</td> <td>Rx</td> <td>5</td> <td>n/c</td> </tr> <tr> <td>3</td> <td>Gnd</td> <td>6</td> <td>n/c</td> </tr> </table>			1	Tx	4	n/c	2	Rx	5	n/c	3	Gnd	6	n/c									
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Fiber optics	TX & RX ST bayonet, suitable for 1mm plastic fiber or 200 um ACS fiber.																							
Power in	2.1mm threaded jack. Mates with Switchcraft S761K or equivalent.																							
Ground	M3 threaded stud																							

Ordering information

I200	I200 two channel electrometer with user manuals, software drivers, calibration data.
-XP1000/500/200 (-XN)	Add auxiliary HV supply positive 1000 V / 500 V / 200 V (negative)
-C1/x/y	Specify channel 1 feedback capacitors x pF, y pF. (Default is 10pF, 1000pF.)
-C2/x/y	Specify channel 2 feedback capacitors x pF, y pF. (Default is 10pF, 1000pF.)
-S1	Add multimode servo control option
-TRIAX	Change signal input connectors to three-lug triaxial. (Default is BNC)





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