

I404 Four-channel Digital Electrometer for Quadrant BPM Readout

Features

- Four independent integrator channels with common gate
- Dynamic range <math><1\text{ pA}</math> to 200 $\mu\text{A}</math>$
- Integrated digitization and filtering
- Fiber-optic, RS-232 and RS-485 interfaces
- Integrated calibration test source
- Full control provided of integration modes
- External trigger capability
- Four independent analog monitor outputs, configurable to show various analog parameters such as current, position
- Four independent frequency monitor outputs
- Optional high voltage output



Applications

- Quadrant photodiode readout
- Low current and charge measurement
- Beam position monitors

Options

- Auxiliary HV output up to 3000V
- Alternative feedback capacitor options

Specifications

Operating principle	Gated integrator (charge integrating amplifier)
Integration capacitor	Dual, software selectable. Default values 100 pF and 3300 pF
Input noise	<math>< 200\text{ fA rms}</math> unloaded (1 second integration, 10 pF capacitor at $\leq 25\text{ C}</math> ambient)$
Input offset	<math>< 10\text{ pA}</math>, 15 to 25 C, <math>< 3\text{ pA}</math> typical. Offset can be removed by zero subtraction
Stability	Output drift <math>< 200\text{ fA}</math> / hour at 25 $\pm 1\text{ C}</math> ambient after stabilization$
External accuracy	Better than 0.5% of full scale in use, integration time 500 μsec to 1 sec, after calibration with built-in current source
Integration time	User selectable, 100 μsec to 65 sec
External gate	TTL 10 kohm impedance
Trigger modes	Internal (autorun), external
Digitization	16 bit bipolar
Averaging modes	Multiple conversions per integration; multiple integrations per reading to increase digital resolution up to 20 bits.
Auxiliary HV PSU	(Factory option) 0 to 1000V programmable (polarity and maximum voltage factory selectable), 1mA max. Noise and ripple <math>< 0.1\%</math>
Power input	+24V ($\pm 2\text{V}</math>) DC, 350mA typ, 500mA max$

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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 or RS-485, 8-bit ASCII. Selectable baud rate up to 115 kbos. The electrical interface can be set to be RS-232 levels, or full-duplex differential RS-485. 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. Binary DLLs available for Microsoft® .net, National Instruments™ Labview™, Microsoft® C++.and Linux.

Monitor outputs

Number	Four, independent analog voltage Four, independent frequency
Signal type	Analog voltage +/- 10V into 10 kohm. Frequency 0 to 1 MHz 5V into 50 ohm
Software-selectable output parameter options	Current, four outputs active (relative to full scale for integration time and capacitor in use) Independent position, outputs A and B active $X = (INA - IND) / (INA + IND)$ $Y = (INB - INC) / (INB + INC)$ Quadrant position, outputs A and B active $X = ((IN1A + INC) - (INB + IND)) / (INA + INB + INC + IND)$ $Y = ((IN1A + INB) - (INC + IND)) / (INA + INB + INC + IND)$

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Connectors

Signal inputs	Four BNC female.
Auxiliary HV out	SHV
External gate in	BNC (isolated from case)
Monitor outputs	Four Lemo coax size 00 for analog voltage Four Lemo coax size 00 for frequency
RS-232 / RS485	Six pin mini-DIN ("PS/2")

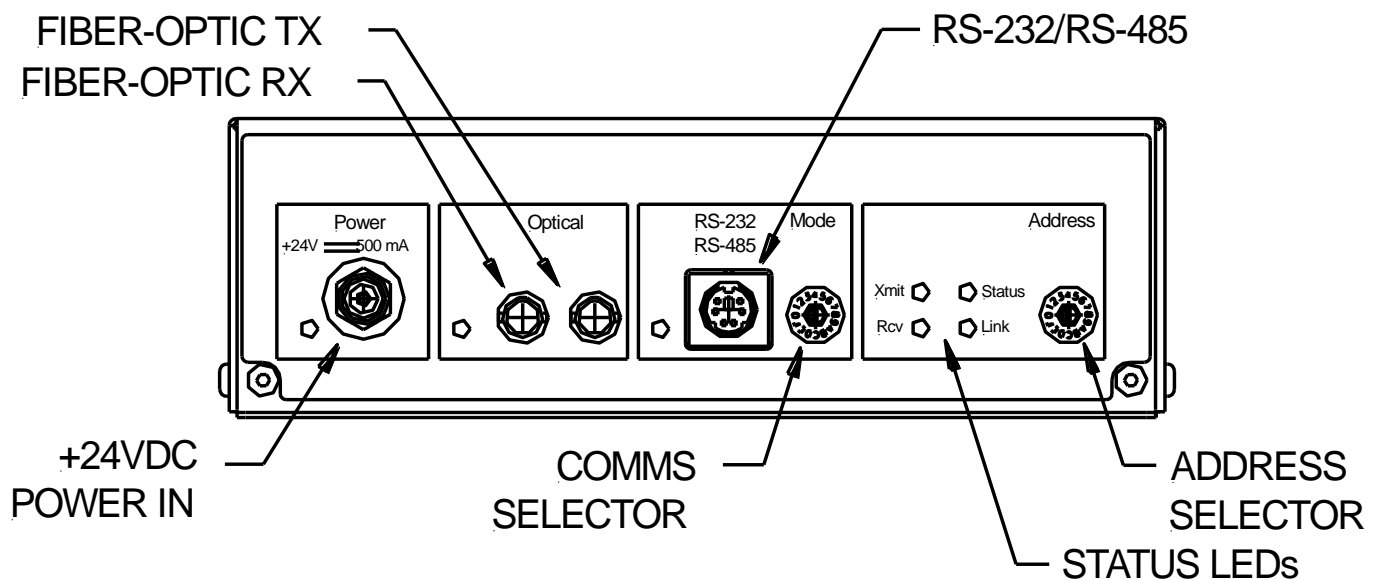
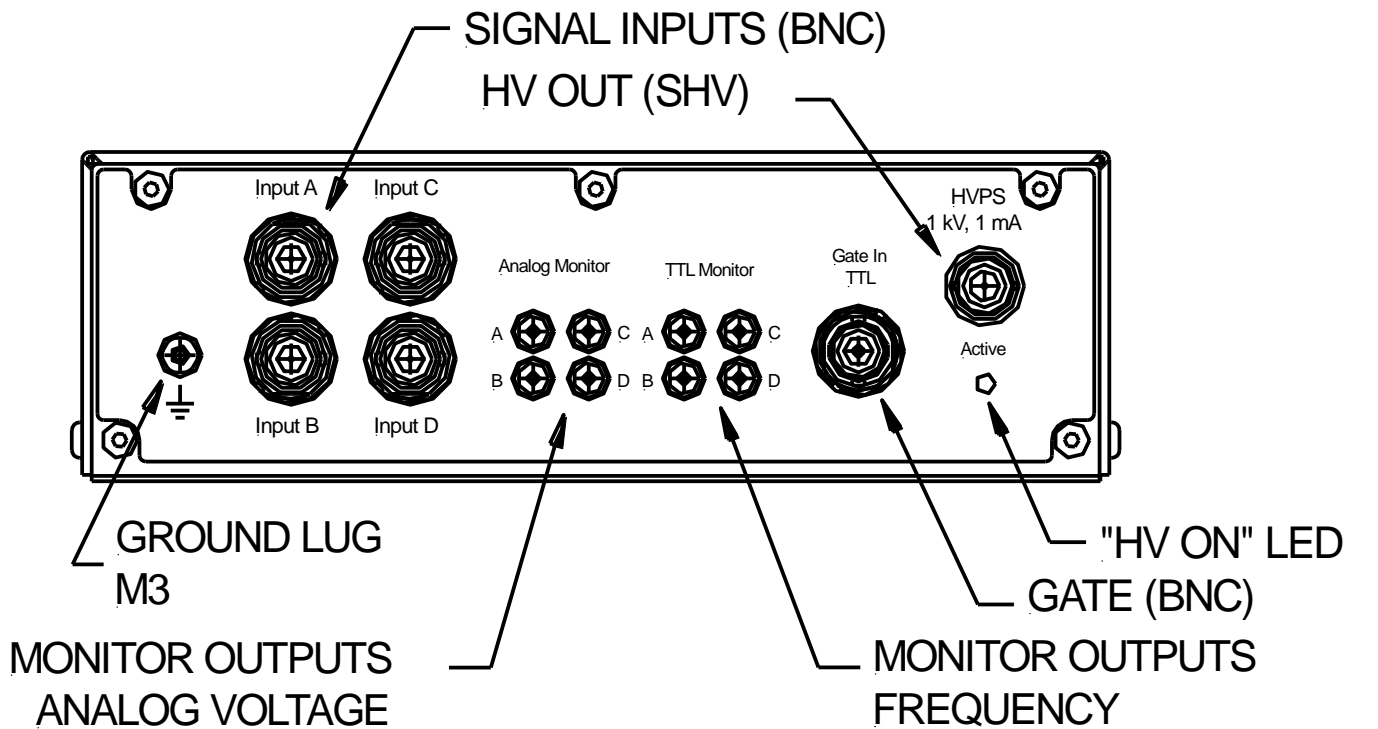
1	Tx / RS-485 Tx-	4	n/c
2	Rx / RS-485 Rx+	5	RS-485 Tx+
3	Gnd	6	RS-485 Rx-

Fiber optics	TX & RX ST bayonet, suitable for 1mm plastic fiber or 200 μ m HCS fiber
Power in	2.1mm threaded jack. Mates with Switchcraft S761K or equivalent
Ground	M3 threaded stud

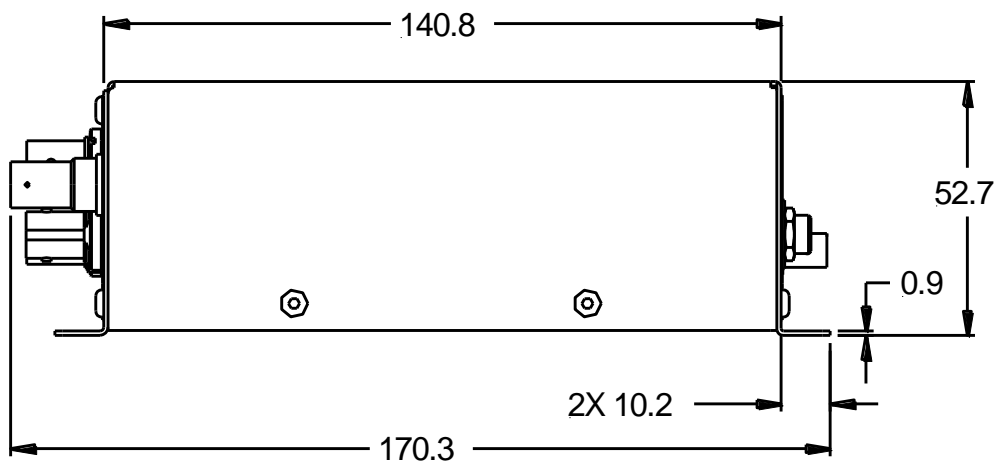
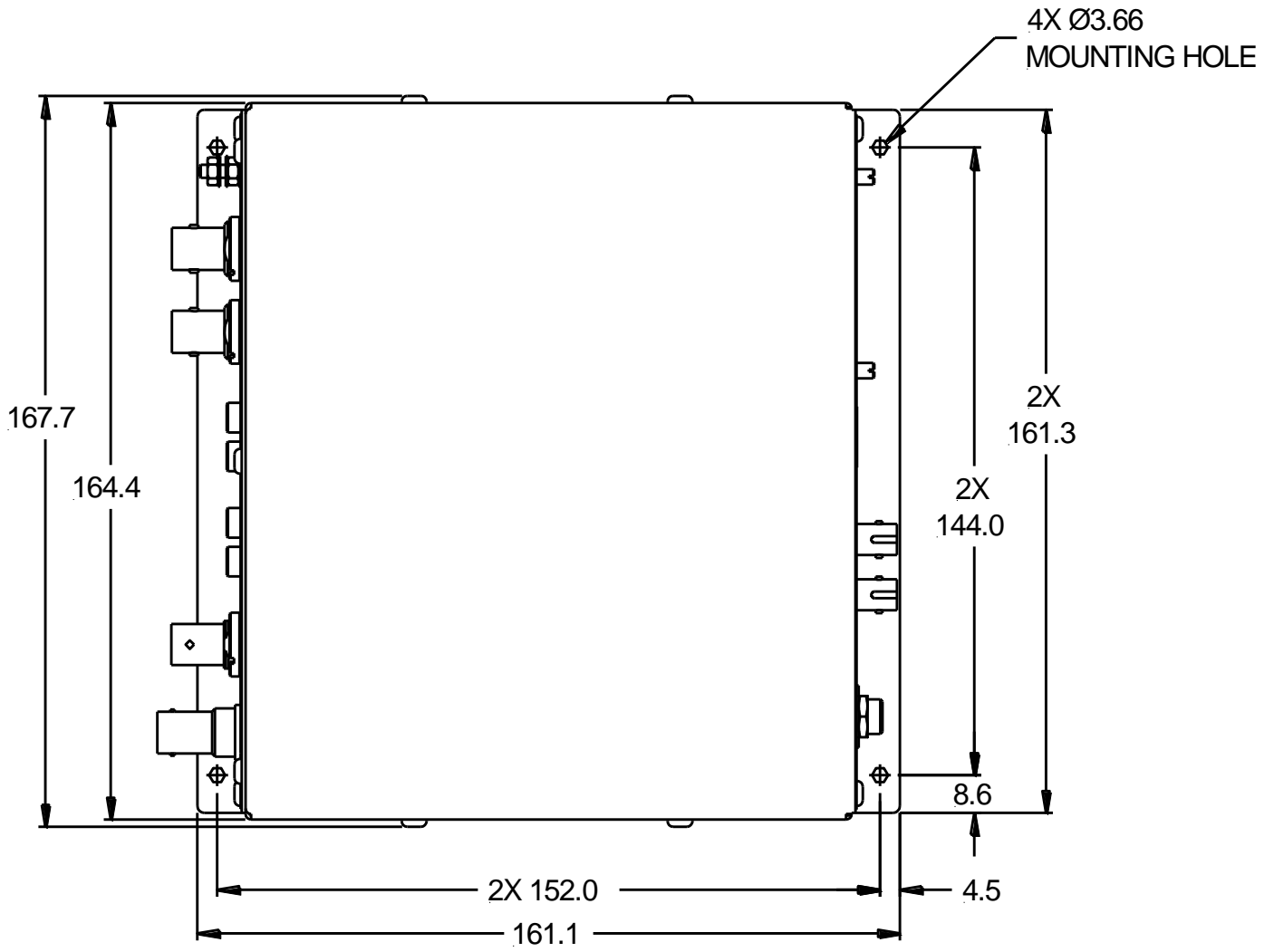
Ordering Information

I404	I404 four channel electrometer with user manuals, software drivers, calibration data.
-XP1000/500/200 (-XN)	Add auxiliary HV supply positive 3000 V / 2000 V / 1000 V / 500 V / 200 V (negative)
-C/x/y	Specify feedback capacitors x pF, y pF. (Default is 100pF, 3300pF)

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Dims mm