

Four-channel Fast Current Measurement Device



Features

- Four independent fully parallel three-range I-V converters
- Dynamic range 0.1 nA to 1mA
- Integrated digitization and filtering
- On-board data buffer
- Fiber-optic, RS-232 / RS-485 and Ethernet interfaces.
- Integrated calibration test source
- Independent channel control
- External trigger capability
- Dual servo controllers.
- Four independent frequency monitor outputs.
- Optional high voltage output

Applications

- Quadrant photodiode readout
- Beam position monitors
- Segmented Faraday collectors
- Current and charge measurement

Options

- Auxiliary HV output options up to +/- 3000V
- Dual servo controller option

Specifications

Operating principle	Transconductance amplifier (I-V converter)
Current ranges	Four, independently selectable for each channel. Range 1: +/-1 μ A full scale; Range 2: +/-10 μ A full scale Range 3: +/-100 μ A full scale; Range 4: +/-1 mA full scale
Input impedance	\leq 40 ohm
Input protection	Back to back diodes and spark gaps
Noise	$<$ 0.01% of full scale rms noise (with 1 msec averaging)
Absolute accuracy	Readings within +/- 0.05% full scale relative to a traceable external standard current source.



Specifications (continued)

Stability	Output drift < 5 ppm C-1 hr-1
Analog bandwidth	DC to 50 kHz (- 3dB)
Current sources	Two internal precision calibration sources, 833 nA and 45.455 μ A.
Digitization	16 bit successive approximation bipolar, 250 kHz, fully parallel.
Digital filtering	Block averaging of successive conversions for each reading, 1 to 250000 samples.
Data buffering	On-board buffering of up to 50000 contiguous samples at any data rate up to maximum.
Triggering	External trigger line can start, pause and stop acquisition.
HV bias supply	(Factory option) 0 to 200/500/1000/2000/3000V programmable (polarity and maximum voltage factory selectable), 1 watt max output. Noise and ripple < 0.1% (up to 2000V), <0.2% (3000V)
Analog inputs	Two, 16-bit +/- 10 V
Analog outputs	Four, 16 bit +/- 10V (used for servo and monitor outputs)
Power input	+24V (+/- 2V) DC, 350mA typ, 500mA max.
Controls	Two rotary switches for loop address and comms mode/ baud rate.
Displays	Four status LEDs, "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 kbps. 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 10/100/1000BaseT, auto MDIX . TCP/IP protocol. Average continuous data rate to host up to 1 kHz typical; higher in lightly-loaded systems.



Interfacing (continued)

Host computer	ASCII serial communications based on SCPI. C++ function libraries available for Windows and Linux systems. Enquire for EPICS, TANGO and SPECS support. Enquire for Labview ® VI availability PSI Diagnostic host software supplied with each F460.
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Monitor outputs

Number	Four, independent analog voltage Four, independent frequency TTL levels
Signal type	Analog voltage +/- 10V into 10 kohm, 16 bit. Frequency 0 to 1 MHz 5V square wave, 20 mA max, .
Software-selectable output parameter options	Current, (relative to selected full scale for relevant input) all outputs active Independent position, two outputs $X = (INA - IND) / (INA + IND)$ $Y = (INB - INC) / (INB + INC)$ Quadrant position, two outputs active $X = ((IN1A + INC) - (INB + IND)) / (INA + INB + INC + IND)$ $Y = ((IN1A + INB) - (INC + IND)) / (INA + INB + INC + IND)$ Servo command, two analog outputs active

Connectors

Signal inputs	Four BNC.
HV bias out	SHV
External gate in	BNC
Monitor outputs (TTL)	Four Lemo coax size 00
Analog signals	DSub female 9 pin

1	Analog gnd	6	Analog out 1 (servo 1)
2	Analog in 2	7	Analog in 1
3	+24 V, 200 mA out	8	0V
4	Analog out 2	9	Analog out 3
5	Analog out 4		



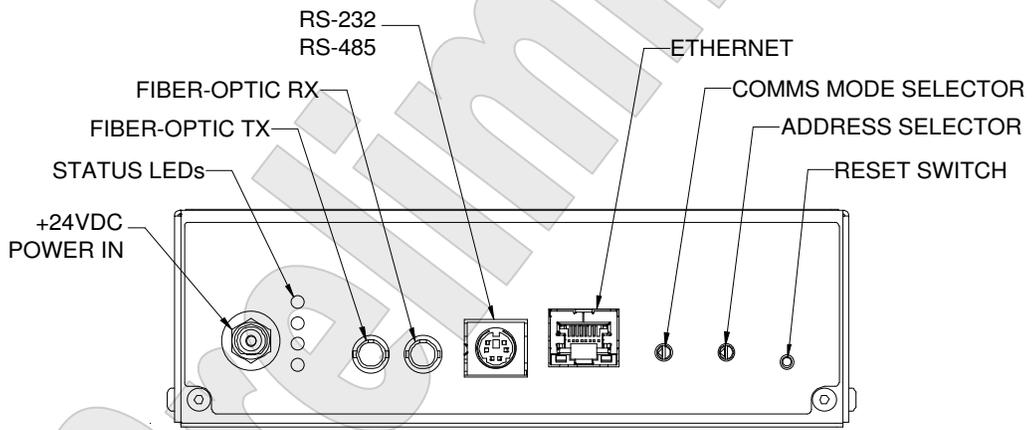
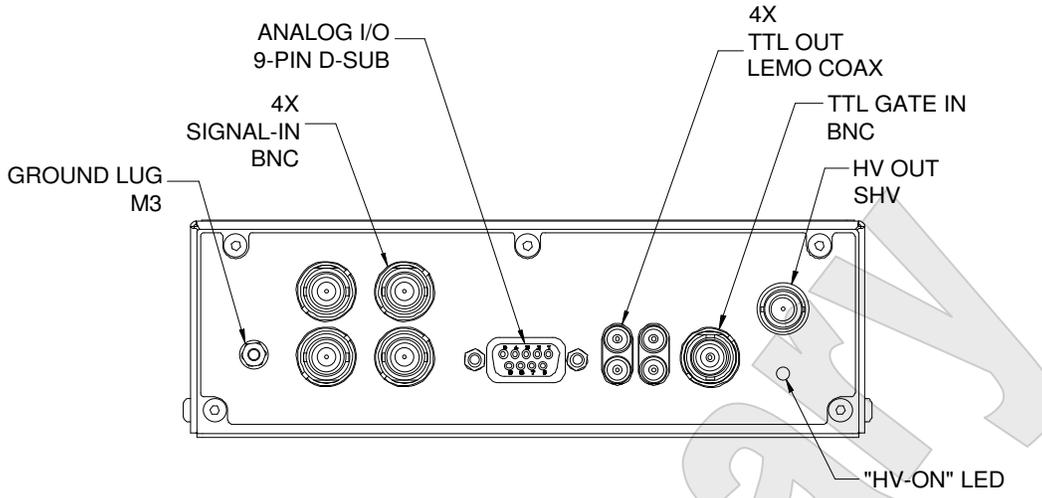
Connectors (continued)

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 μm HCS fiber.			
Ethernet	RJ-45 jack			
Power in	2.1mm threaded jack. Mates with Switchcraft S761K or equivalent.			
Ground	M3 threaded stud			

Servo control feature

Principle	The F460 measures four currents, from devices such as ionisation chambers, photodiodes, or secondary electron emission electrodes. The value of a process variable formed as an arithmetic function of the measured currents is maintained by adjusting a +/- 10 V control output using a PI control algorithm.
Typical applications	Beam intensity stabilization for Double Crystal Monochromators Beam position control in charged particle or photon beamlines.
Number of controllers	The F460 can run two independent PID controllers, each using a process variable comprising an arithmetic combination of the measured currents.
Process variable options	Individual currents, sums or differences of currents, ratios of currents, ratios of sums and differences of currents. These options allow position functions to be defined as process control variables.
Servo frequency	200 Hz maximum
Automated functions	Peak scan Suspend on defined control output limits Suspend on low input signal(s) Input signals ratio to value sent by host system (for example synchrotron ring current).





Pyramid Technical Consultants, Inc.,
1050 Waltham, Street Suite 200
Lexington, MA 02421 USA
Tel: +1 781 402 1700 (USA),
+44 1273 492001(UK)

Email: support@ptcusa.com

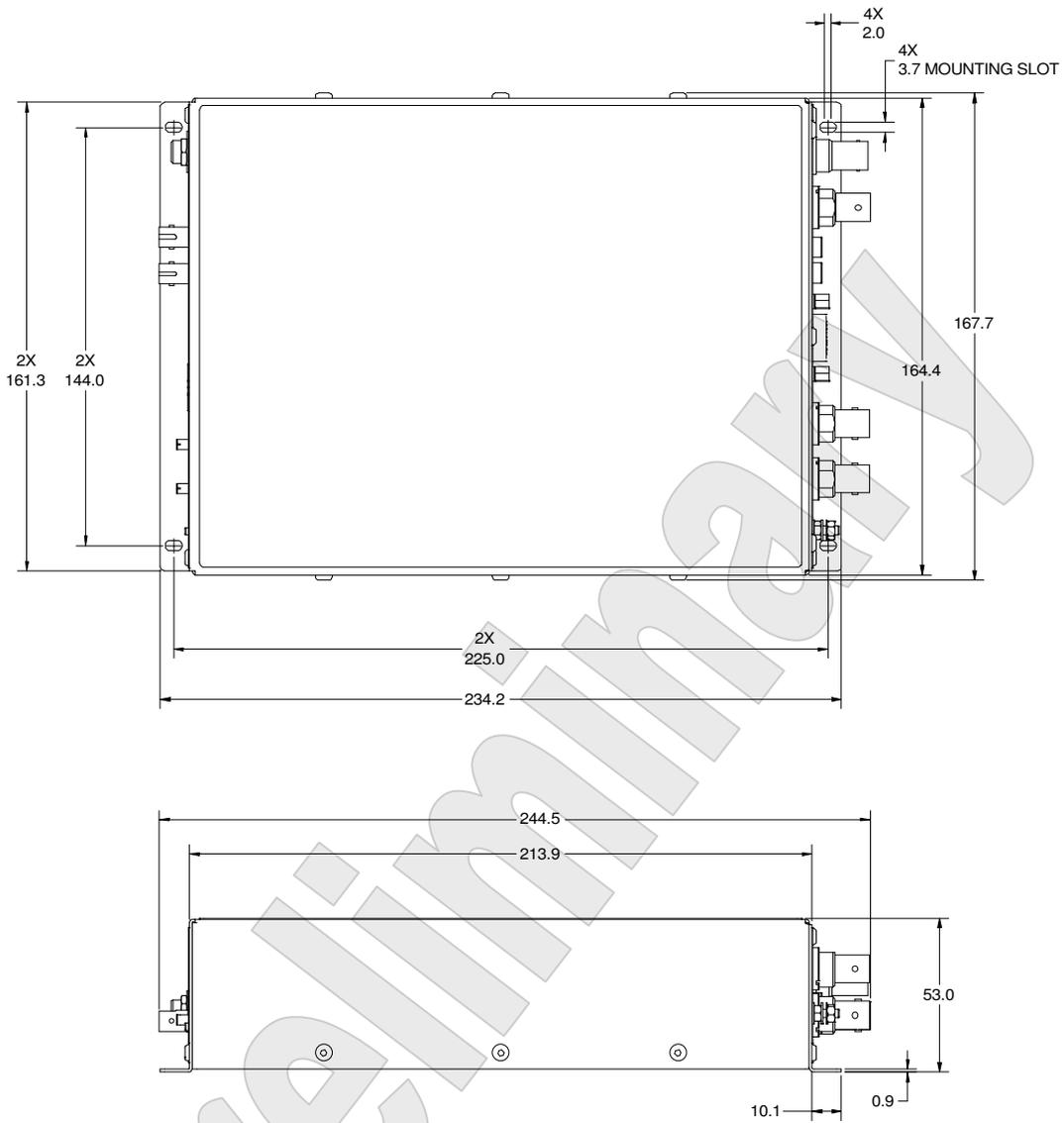
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The information herein is believed accurate at time of publication, but no specific warranty is given regarding its use. All specifications are subject to change.

All trademarks acknowledged

F460_DS_121015





Dims mm

Ordering information

F460	F460 four channel electrometer, user manuals, software drivers, calibration data.
-XP30/20/10/05//02 (-XN)	Add auxiliary HV bias supply positive 3000 / 2000 / 1000 / 500 / 200 V (negative)
-S1	Add PID controller function

