

Thirty-two Channel High-Speed Current Digitizer



Features

- Thirty-two parallel multi-range current to voltage converter channels
- Bipolar inputs, bandwidth DC to 250 kHz
- Dynamic range <math>< 1\text{ nA}</math> to 10 mA over four measurement ranges
- Thirty-two 14 bit 1 MHz ADCs for fully parallel sampling
- Integrated data buffering and communications
- Multiple digital filtering options
- Data acquisition can synchronize to an incoming trigger, or the F3200E can provide a trigger to external devices
- Integrated high-precision calibration test sources covering all ranges
- External calibration current input for calibration checking against accredited external current source
- Analog monitor output can track a function of one or many input channels
- Optional integrated HV supply
- Integrated digital I/O (for actuator solenoid control or similar applications)
- Ethernet, fiber-optic or serial communications interfaces
- Diagnostic control software program included
- DLL and function call library for simple integration with user software

Applications

- Faraday cup arrays
- Swept beam systems
- Multi-segment photodiode arrays

Options

- Auxiliary HV output for detector bias



Specifications

Operating principle	Multi-range I-V converters on every channel each with 250kHz low-pass filtering, individual successive approximation bipolar ADCs.
Signal inputs	2 x 16 inputs on D25F connectors
Current ranges	+/-10 mA, +/-1 mA, +/-100 µA, +/-10 µA, software selectable Current ranges can be set in groups of four channels.
Input impedance	< 40 ohm
Input protection	Back to back fast diode pair; optional current limiting series resistor
Noise (unloaded)	< 0.1% of full scale rms noise for 10 mA, 1 mA, 100 µA, 10 µA ranges, for a single shot acquisition. Improves by $1/\sqrt{N}$ where N is number of conversions averaged into each sample, to a minimum of 0.001% of full scale.
External accuracy	Readings within +/- (0.1% of nominal reading + 0.1% of full scale) after calibration, relative to a traceable external standard current source.
Analog bandwidth	Anti-aliasing filter DC to 250 kHz (-3dB) with four-pole filter.
Linearity	Deviation from best fit line of individual readings < 0.1% of full scale.
Internal calibration currents	83.33 (+/- 0.03) mA (10 mA range) 8.333 (+/- 0.003) mA (1 mA range) 833.3 (+/- 0.3) µA (100 µA range) 83.33 (+/- 0.03) µA (10 µA range) Used by automated internal calibration routine to derived gain and offset for each channel on each range.
Calibration source drift	< 3 ppm / C
Measurement drift	< 0.5% over 12 hours (environment 20 +/-2 C).
Digitization	Thirty-two ADCs , 14 bit bipolar, 1 MHz Effective digitization increased by averaging..
Simultaneity	All ADCs convert together to within 20 nsec.
Data capture	32 channels converted and transferred to local memory in < 500 nsec.
Digital filtering	Averaging 1 to 65000 ADC conversions (downsampling). Averaging counters 32 bit depth.
Local data buffer	Up to 2000 x 32 channels in burst mode Up to 1000 x 32 channels in sweep mode.



Specifications (continued)

Acquisition modes	Internal (free running and continuous transfer to host) Burst mode (on-board buffering of contiguous blocks of readings). Sweep mode (on-board buffering of triggered acquisitions, averaging across multiple sweeps. Oscilloscope style).
External Gate input	1) 0 / +5 V (TTL level), 10 kohm input impedance. 2) Fibre optic receiver, 665 nm.
External Gate output	0 / +5 V (TTL level), 120 mA maximum current.
Analog monitor output	+/-10V, 40 mA compliance. 16 bit resolution, low transition glitch energy. Maximum update rate 500 kHz.
Digital I/O (actuator control)	Two opto-coupled inputs (24 VDC nominal), one 24 V relay-switched output, one 5 V relay-switched output.
External calibration current input	Input for external calibration verification source, 0 to +/-10 mA.
HV PSU (optional)	0 to 2000 V / 1000 V / 500 V / 200 V programmable, (range and polarity factory selectable). 1 watt max. Noise and ripple < 0.1%.
Power input	+24V (+/- 2V) DC, 750 mA typ, 1200 mA max. excluding load on additional I/O port.
Controls	Two rotary switches for loop address and comms mode/ baud rate. One push button for processor reset.
Displays	Front panel: Status LEDs (power, device status, comms mode, data transmission rcv/xmit). "HV on" LED. Rear panel: Dual quad LED banks (power, device status, comms activity, comms mode)
Case	1U 19" x 250 mm deep steel chassis with Al alloy front panel, IP43. Fan cooled.
Weight	2.8 kg (6.2 lb)
Operating environment	10 to 35 C (15 to 25 C recommended to reduce drift and offset) , < 70% humidity, non-condensing, vibration < 0.1g all axes (1 to 1000 Hz)
Shipping and storage environment	-10 to 50 C, < 80% humidity, non-condensing, vibration < 2g all axes, 1 to 1000 Hz



Interfacing

Interfaces

Ethernet 10/100, UDP and TCP/IP.
Auto MDIX switching.

RS-232 / 485 8 bit binary. Selectable baud rate.

Fiber-optic loop, 10 Mbit/sec serial, 9-bit asynchronous binary. Ethernet connection to host through A300 or A500 loop controllers.

Host computer

Diagnostic host program supplied for Windows or Linux PC.
DLL and C++ RPC function library available for Windows or Linux PC.

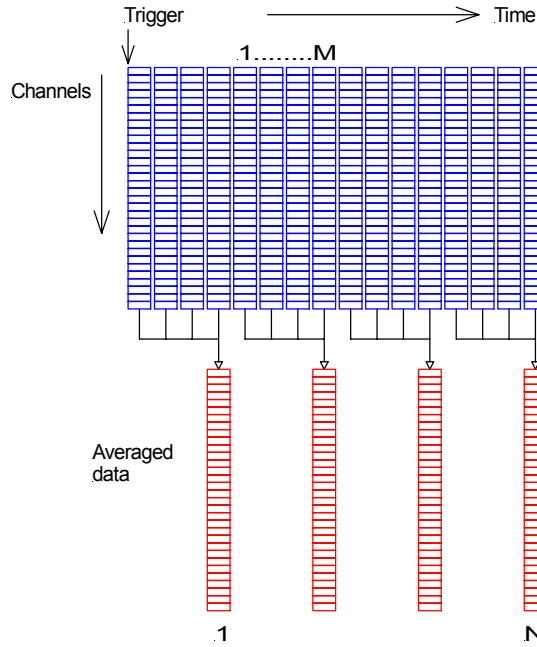


Averaging modes

Burst mode

For bandwidth reduction when non-repetitive signals are noisy. Time resolution is reduced according to the amount of averaging.

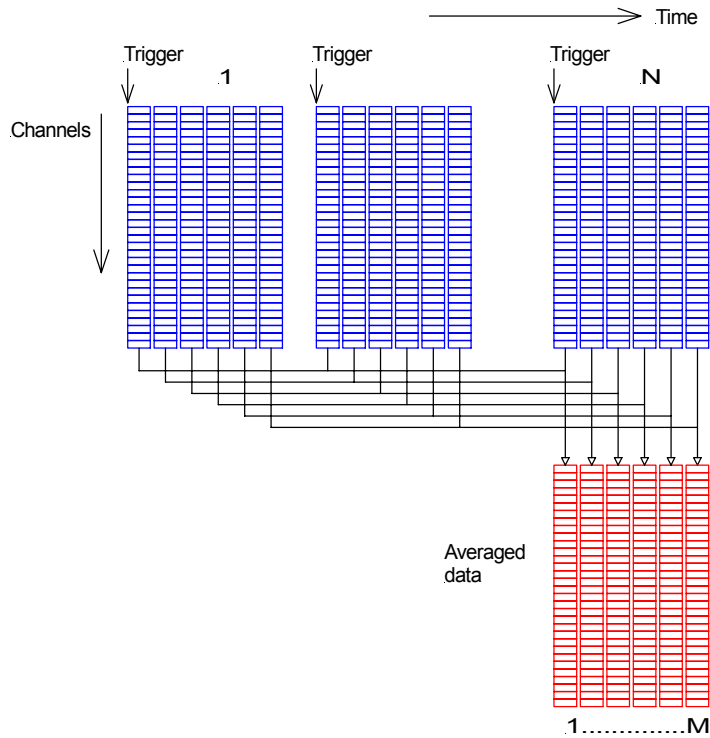
Groups of M conversions (32 channels), $1 \leq M \leq 65535$, are averaged (downsampled) to give a set of N readings (32 channels), $1 \leq N < (\text{no limit})$



Sweep mode

For bandwidth reduction where signals are repetitive. Time resolution is preserved.

Groups of M conversions (32 channels), $1 \leq M \leq 1000$, are averaged across N triggers, $1 \leq N \leq 65535$



Connectors

Signal inputs Two D25 sockets. Channels 1-16, channels 17-32.

1	In 02 (In 18)	14	In 01 (In 17)
2	In 03 (In 19)	15	+5V switched
3	In 04 (In 20)	16	AGND
4	In 05 (In 21)	17	AGND
5	In 06 (In 22)	18	AGND
6	In 07 (In 23)	19	AGND
7	In 08 (In 24)	20	AGND
8	In 09 (In 25)	21	AGND
9	In 10 (In 26)	22	AGND
10	In 11 (In 27)	23	AGND
11	In 12 (In 28)	24	In 16 (In 32)
12	In 13 (In 29)	25	In 15 (In 31)
13	In 14 (In 30)		

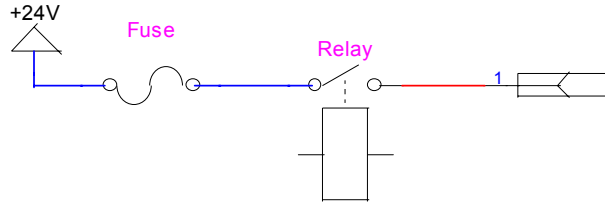
Digital I/O (Actuator) D9 socket.

1	+24V relay switched	6	+5V FET switched
2	24V return	7	Opto In B
3	+5V relay switched	8	n/c
4	+24 VDC out	9	DGnd
5	Opto in A		

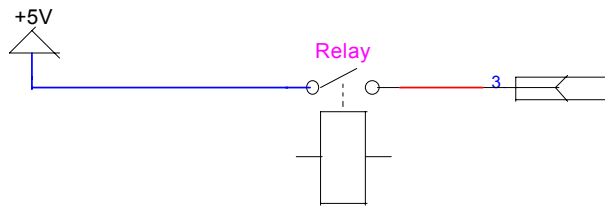


Digital I/O configurations (actuator control port)

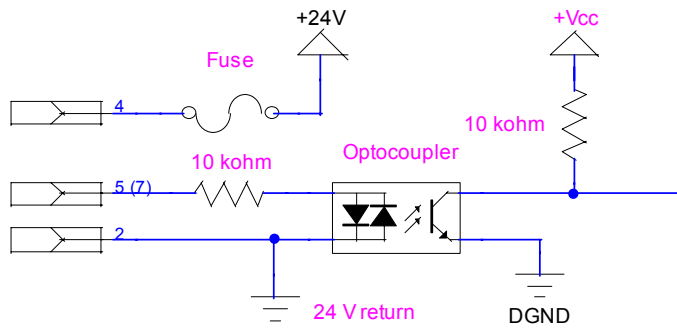
+24 VDC relay switched



+5 VDC relay switched



Opto inputs



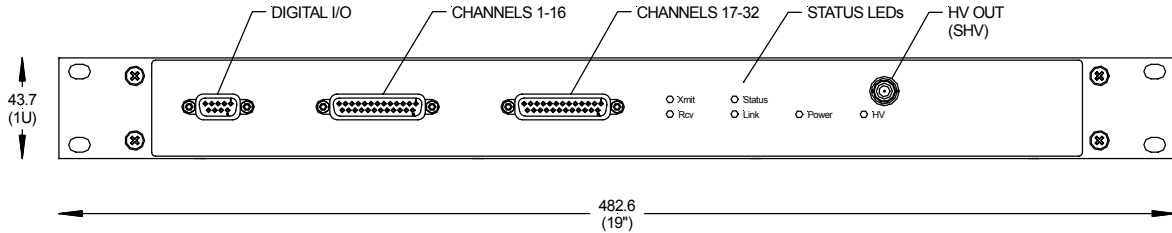
Connectors (continued)

HV out	SHV		
Synch in	BNC (isolated from case) TTL levels		
Synch out	BNC (isolated from case) TTL levels		
Analog out	BNC (isolated from case)		
Calibration current in	BNC (isolated from case)		
RS-232 / 485	Six pin mini-DIN ("PS/2")		
		1 Tx / RS-485 Tx-	4 Mode select (future option)
		2 Rx / RS-485 Rx+	5 RS-485 Tx+
		3 Gnd	6 RS-485 Rx-
Fiber optics	Two Avago HFBR ST bayonet (compatible with 1 mm POF and 200 μm HCS fiber) for communications		
Ethernet	RJ-45 jack		
Power in	2.1mm threaded jack. Mates with Switchcraft S761K or equivalent.		
Ground	M4 threaded stud		

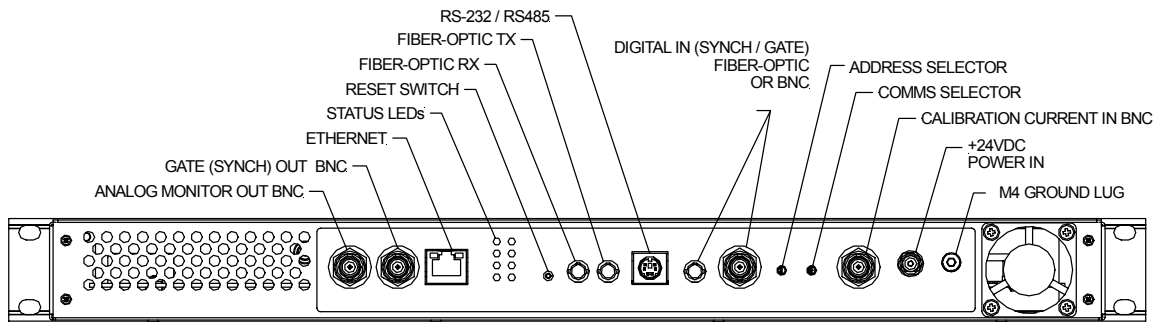
Ordering information

F3200	I3200 thirty-two channel electrometer with user manuals, software drivers, calibration data.
-XP20/10/5/2	Add HV supply positive 2000/1000/500/200 volts
-XN20/10/5/2	Add HV supply negative 2000/1000/500/200 volts
-RINx	Add current limiting series input resistor x ohm





FRONT VIEW



REAR VIEW

Dims mm

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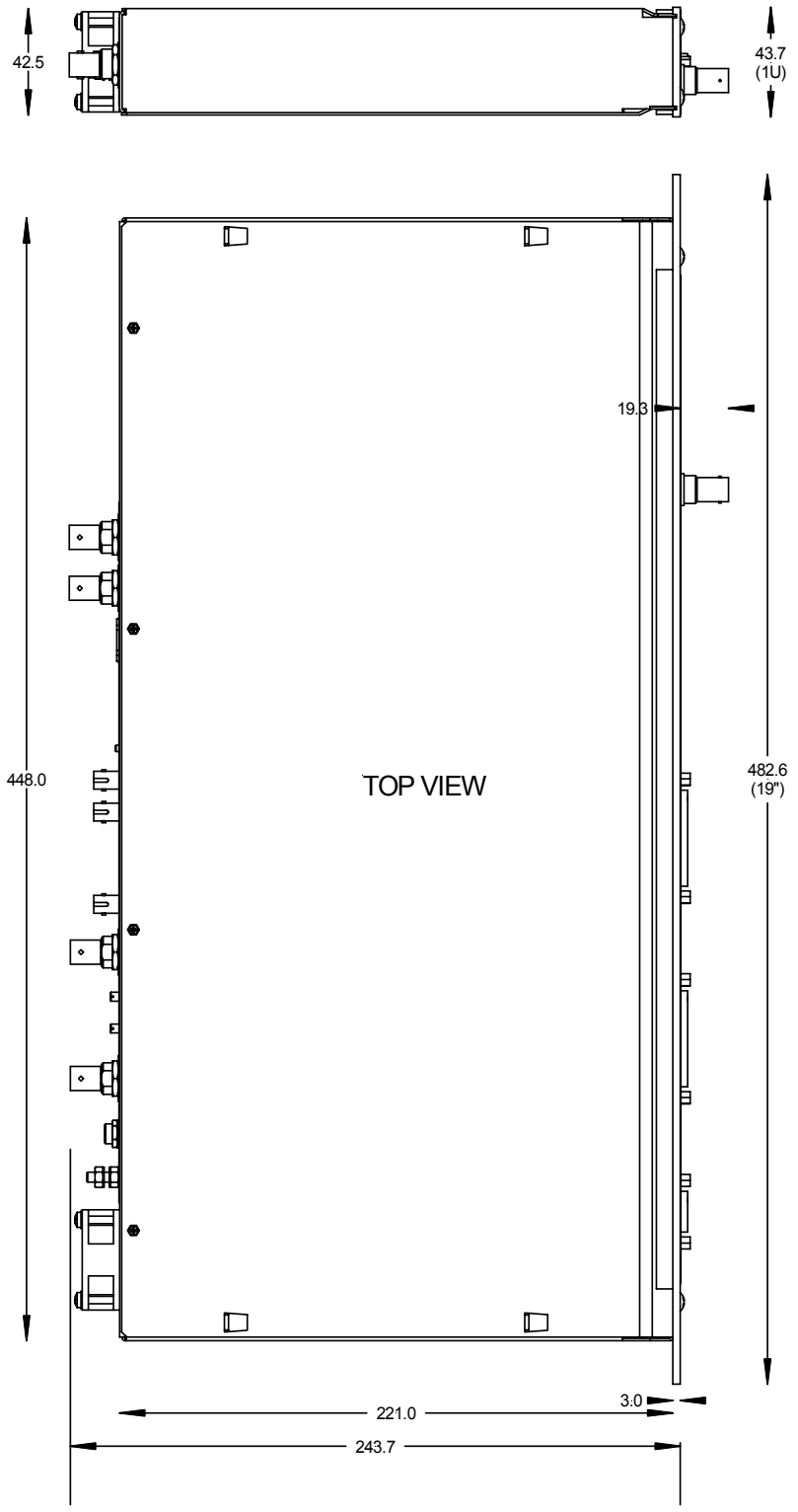
www.ptcusa.com

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F3200E_DS_100505





Dims mm

