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V213

32 or 64-channel Scanning ADC

The V213 is a single-width, C-size, register-based, VXIbus module that can digitize as many as 64 analog voltage channels.

The resulting digital data is stored in a block of memory that can be read over the VXIbus.



All in one module: Data acquisition and control

APPLICATIONS

Powertrain/engine testing

Temperature measurements

General-purpose data acquisition

Data acquisition and control (with DAC option)

Automatic Test Equipment (ATE)

FEATURES

- 16-bit resolution
- 32 channels of analog input on the base card
- I/O expansion cards available for:

  32 RTD current sources (the 32 base-card channels measure the RTD voltages)

  32 analog input channels

  32 analog output channels

  64 TTL I/O channels, or

  32 TTL I/O plus 16 analog output channels.
- Differential inputs
- Programmable gain per channel
- Dual-ported buffer memory
- Programmable limit checking and triggering (ADC sampling rate < 20 ksamples/s)
- 10 Hz to 1 kHz low-pass filter options
- Precision on-board reference for end-to-end calibration
- Optional 4 megabyte multibuffer memory

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GENERAL DESCRIPTION

The V213 is a single-width, C-size, register-based, VXIbus module that can digitize as many as 64 analog voltage channels. The resulting digital data is stored in a block of memory that can be read over the VXIbus. The 16-bit ADC scans each channel at a scan rate chosen by the user. The number of channels and the scan rate are software selectable. Scans may be triggered from either an internal clock, one of the eight backplane TTL trigger lines, an external SMB connector on the front panel, or as a single scan. The internal scan rate is divided into one part in 65,536, providing scan rates of 0.76 s/s through 20 ks/s (50 ks/s at lower gains). If single-scan operation is chosen, an interrupt may be generated at the end of the scan.

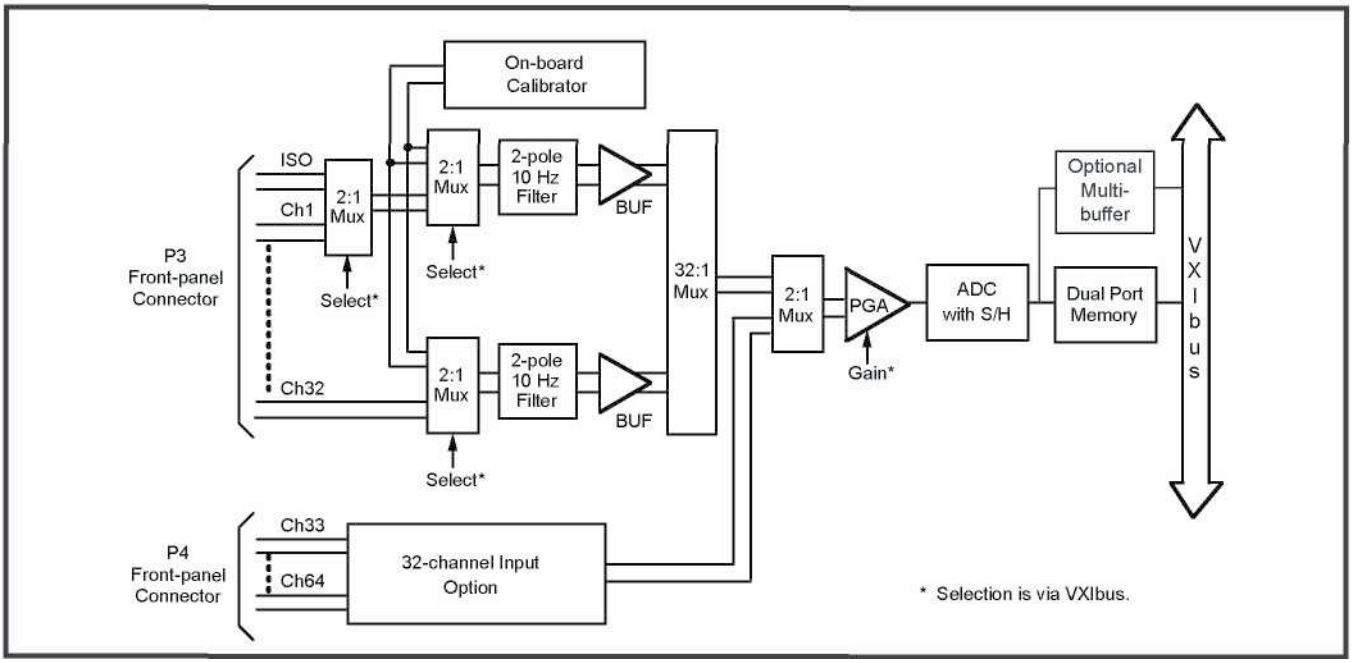
The V213 has programmable gain which can be set on a channel-by-channel basis. Gains of 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, and 2000 are available. On-board calibration is available on each channel for end-to-end calibration. A block of dual-ported memory is used to receive data from the ADC. The memory is divided into two blocks: "ping" and "pong". The ADC fills one memory block while VXIbus has access to the other. Using a ping/pong scheme provides random access to each channel's data. A 4 Mbyte multibuffer memory option is available for higher data transfer rates.

The V213-AAA1 option provides a fixed, 2-pole, passive, 10 Hz filter at the input of every channel. Other filter options are available in a 1, 2, 5 progression from 10 Hz to 1 kHz. Under software control, channels 1 and 33 may be configured as isothermal reference channels for use with the KineticSystems Model V792 Isothermal Termination Panel. The base option of the V213 provides 32 channels of analog input. Optional I/O expansion cards are available to provide an additional 32 channels of analog input, 32 channels of analog output, 64 channels of TTL I/O, and a combination of 16 channels of analog output and 32 channels of TTL I/O.

The RTD option provides 32 fixed current sources to be used with RTDs. A monitor channel is available to measure each current source. These monitor channels are in addition to the 32 channels on the base module and are configured as channels 33 through 64. The 32 channels on the base module are used to measure the voltages across the RTDs. This combination provides 32 RTD channels.

The V213 supports both static and dynamic configuration. It may be accessed using A32/A16, D32/D16 data transfers.

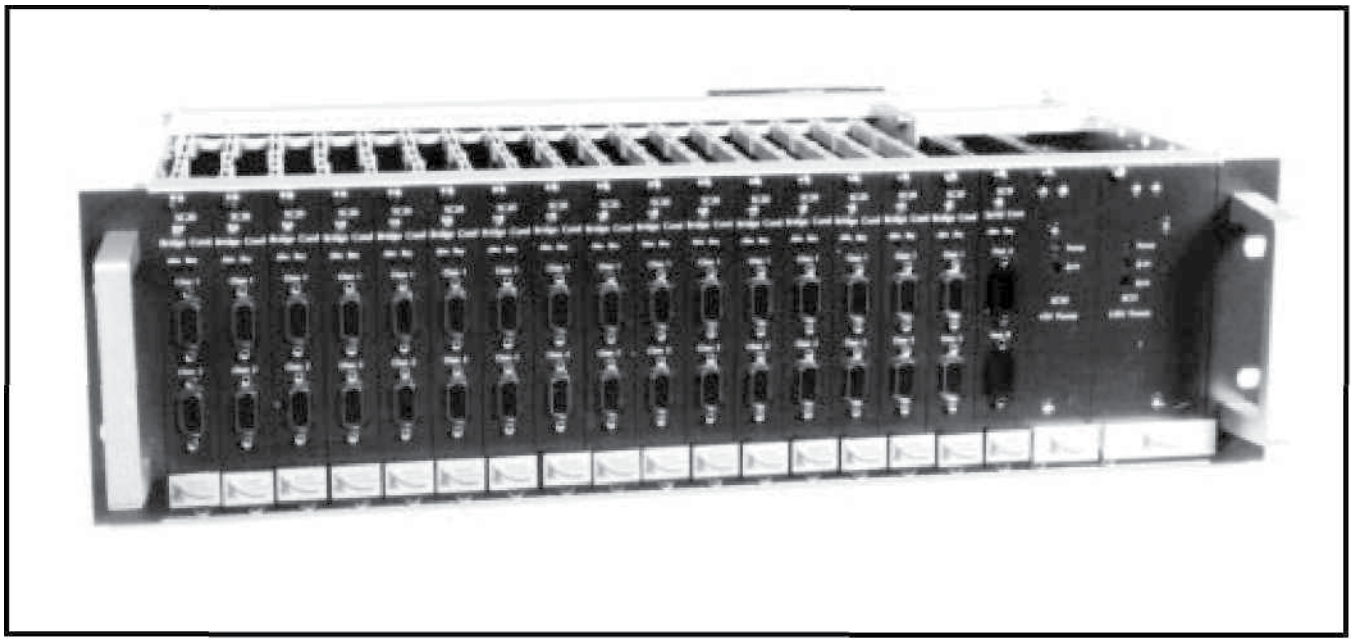
Block Diagram (showing 32-channel input option)



The V710 is an active termination panel that provides additional signal conditioning for ADC modules such as the V200 Sigma-Delta ADC and the V213 Scanning ADC. This termination panel is 3U (5.25") high and is arranged for 19" rack mounting. The V710 chassis accommodates up to 16 signal conditioning modules, a serial controller module, a +5 V power supply and a ±15 V power supply.

The two-channel SC20 Wideband Bridge Signal Conditioner module can achieve up to 90 kHz signal bandwidth when used with the V200. The SC15 Serial Controller accepts ASCII commands from a standard computer serial port to control and monitor the signal conditioning modules in the V710 chassis.

V710 Active Termination Panel (shown with 16 SC20 bridge conditioning modules)



Item	Specification
General Number of channels Gain ranges	 32, expandable to 64 with I/O expansion cards 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, and 2000
Input Input range Common mode: Differential: Input protection Input impedance	 ±10.48 V ±10.48 V ±35 V continuous 100 MΩ
Resolution & Data Format	16-bit, monotonic over operating range / Two's complement
Scan Rate (Per channel) Internal frequency choices External sources (see note) Duty cycle Backplane source	 0.76 Hz to 50 kHz (65,536 steps) Front-panel SMB, TTL to 50 kHz 50% 1 of 8 TTL trigger lines on VXIbus P2 connector
ADC Rate (Aggregate)	50 kHz Gain = 1 to 20 20 kHz Gain = 1 to 2000 2 kHz Gain = 1 to 2000 (low noise)
Trigger Sources External Backplace	 Front panel SMB, Negative-going TTL signal 1 of 8 TTL trigger lines on VXIbus P2 connector

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Transfer Characteristics	
Integral non-linearity	0.003% FSR
Differential non-linearity	0.001% FSR
Initial accuracy, RTI	After automatic calibration
Gain = 1	±(1.2 mV + 0.01% of reading)
Gain = 10	±(120 µV + 0.01% of reading)
Gain = 100	±(13 µV + 0.015% of reading)
Gain = 2000	±(5 µV + 0.05% of reading)
Offset stability, RTI	4 µV°C, gain >1000
Gain stability	20 ppm/°C
Bandwidth	1 kHz, V213-GAA1 option
Common mode rejection	-100 dB typical at gain ≥100
Noise, RTI	5 µV rms at gain ≥ 1000, ADC rate = 2 kHz 14 µV rms at gain ≥1000, ADC rate = 20 kHz
Channel-to-channel crosstalk	-90 dB
I/O Connector Types (see note)	Two 68P High Density, two SMB, one 2-pin LEMO
Power Requirements	
+5V	3.75 Amps
+24 V	300 mA
-24 V	300 mA
Environmental and Mechanical	
Temperature range	
Operational	0°C to +50°C
Storage	-25°C to +75°C
Relative humidity	0 to 85%, non-condensing to 40°C
Cooling requirements	10 CFM
Dimensions	340 mm x 233.35 mm x 30.48 mm (C-size VXIbus)
Front-panel potential	Chassis ground

Additional 32-channel ADC Option

Item	Specifications
Power Requirements (in addition to main card)	
+5V	925 mA
+24V	230 mA
-24V	240 mA
All other specifications	Same as the main card

RTD Current Source Expansion Option

Item	Specifications
General	
Number of channels	32 current sources (used with 32 channels on base module)
Current Source	
Compliance	+5 to 10.48 V
Nominal Value	400 µA
Accuracy	1%
Stability	20 ppm/°C
Noise	30 nA rms
Monitor Channel (not including main card)	
Accuracy	0.05%
Stability	5 ppm/°C
Power Requirements (in addition to main card)	
+5V	700 mA
+24V	240 mA
-24V	230 mA

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Additional 32 Channel Input Option
All other specifications are identical to main card.

Power Requirements (in addition to main card)	
+5V	925 mA
+24V	230 mA
-24V	240 mA

Note: The two SMB connectors and the 2-pin LEMO connector on the front panel are not accessible when using the V750-ZC11 Termination Assembly. If access to these connectors is required, use the V765 or V792 Termination Panels

32-channel DAC Option

Item	Specification
DAC Specifications	
Number of channels	32 differential
Output signal range	±10V
Output current	10 mA
Resolution	16 bits
Linearity error	±2LSB
Monotonicity	15 bits
Absolute accuracy, 25°C	
Factory cal	750 µV max
DSP cal	1 mV typical
Output impedance	0.1Ω
Output protection	Can withstand an indefinite short to ground
Settling time	3.5 ms
Channel latency	1.0 ms
Total drift	15 ppm/°C
Voltage ripple	350 µV RMS
On-board memory	32 16-bit words
Power Requirements (in addition to main card)	
+5V	450 mA
+24 V	490 mA
-24 V	490 mA

64-channel TTL Option

Item	Specification
TTL Specifications	
Number of channels	64, single-ended plus 1 input strobe
Input current	1 mA
Input threshold	
"0" level	0.8 V
"1" level	2.0 V
Output voltage	
"0" level	0.55 V
"1" level	2.7 V (I_{OH} = -3 mA) 2.0 V (I_{OH} = -15 mA)
Low-level output current	64 mA
High-level output current	-15 mA
Max input voltage	-0.5 to+7.0 V
Debounce, software selectable	Bypass, 1 µS, 10 ms, or 100 ms
Power Requirements (in addition to main card)	
+5V	750 mA

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16-channel DAC / 32-channel TTL Option

Item	Specifications
TTL Specifications	
Number of channels	32, single-ended plus 1 input strobe
Input current	1 mA
Input threshold	
"0" level	0.8 V
"1" level	2.0 V
Output voltage	
"0" level	0.55 V
"1" level	2.7 V (I_{OH} = -3mA) 2.0 V (I_{OH}=-15 mA)
Low-level output current	64 mA
High-level output current	-15 mA
Mass input voltage	-0.5 to +7.0 V
Debounce, software selectable	Bypass, 1 µS, 10 ms, or 100 ms
DAC Specifications	
Number of channels	16 differential
Output signal range	±10V
Output current	10 mA
Resolution	16 bits
Linearity error	±2 LSB
Monotonicity	15 bits
Absolute accuracy, 25°C	
Factory cal	750 µV max
DSP cal	1 mV typical
Output impedance	0.1Ω
Output protection	Can withstand an indefinite short to ground
Settling time	3.5 ms
Channel latency	1.0 ms
Total drift	15 ppm/°C
Voltage ripple	350 µV RMS
On-board memory	16 16-bit words
Power Requirements (in addition to main card)	
+5V	850 mA
+24 V	290 mA
-24 V	290 mA

RELATED PRODUCTS

Model 5868-B001	Shorting Connector for V213
Model 5868-Bxyz	Cable: 68S High Density to Unterminated
Model 5868-Dxyz	Cable: 68S High Density to 68P High Density
Model 5868-Exyz	Cable: 68S High Density to 68S high Density
Model 5857-Cxyz	Cable: 2-contact LEMO to Unterminated
Model 5857-Dxyz	Cable: 2-contact LEMO to 2-contact LEMO
Model 5857-Gxyz	Cable: 2-contact LEMO to BNC; shielded
Model T910-Axyz	Cable: SMB to SMB; shielded
Model T910-Bxyz	Cable: SMB to BNC; shielded
Model T910-Cxyz	Cable: SMB to Unterminated
Model V750-ZC11	Isothermal Termination Assembly for V213 (See note on previous page.)
Model V765-ZA11	Rack-mount Termination Panel
Model V792-ZA11	Rack-mount Isothermal Termination Panel

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ORDERING INFORMATION

MODEL	DESCRIPTION
32-channel Base Module	
V213-AAA2	32-channel Scanning ADC with 10 Hz 2-pole RC Filter*, 4MB Multibuffer
V213-BAA2	32-channel Scanning ADC with 20 Hz 2-pole RC Filter*, 4MB Multibuffer
V213-CAA2	32-channel Scanning ADC with 50 Hz 2-pole RC Filter*, 4MB Multibuffer
V213-DAA2	32-channel Scanning ADC with 100 Hz 2-pole RC Filter*, 4MB Multibuffer
V213-EAA2	32-channel Scanning ADC with 2000 Hz 2-pole RC Filter*, 4MB Multibuffer
V213-FAA2	32-channel Scanning ADC with 500 Hz 2-pole RC Filter*, 4MB Multibuffer
V213-GAA2	32-channel Scanning ADC with 1 kHz 2-pole RC Filter*, 4MB Multibuffer
V213-T000	Factory Upgrade-additional for testing
Product Upgrade (Each V213 can accommodate 1 upgrade option.)	
V213-A100	Additional 32 channels, 10 Hz 2-pole filter*
V213-A101	Additional 32 channels, 20 Hz 2-pole RC filter*
V213-A102	Additional 32 channels, 50 Hz 2-pole RC filter*
V213-A103	Additional 32 channels, 100 Hz 2-pole RC filter*
V213-A104	Additional 32 channels, 200 Hz 2-pole RC filter*
V213-A105	Additional 32 channels, 500 Hz 2-pole RC filter*
V213-A106	Additional 32 channels, 1 kHz 2-pole RC filter*
V213-A140	32-channel RTD Signal Conditioning Card
V213-A160	32-channel DAC output
V213-A180	16-channel DAC, 32-channel TTL Digital I/O
V213-A200	64-channel TTL Digital I/O
w: Upgrade Type A = Factory-integrated (Order a base card plus an upgrade option.) F = Field upgrade	
* The 10 Hz 2-pole RC filter option is recommended for most low-frequency applications (thermocouples, etc.). The 1 kHz option is recommended for most transient applications (dynamic strain, etc.).	

Updated October 24, 2005

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