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Data Sheet

RA1216
REMOTE DATA ACQUISITION POD

FEATURES

- Remote Intelligent Analog and Digital I/O Unit with Opto-Isolated RS-485 Serial Interface to Host Computer.
- Eight Differential or Sixteen Single-ended Analog Inputs, Programmable Gain and Offset on a Channel-by-Channel Basis, 12-Bit Resolution A/D Converter.
- Optional Signal Conditioning for Use with Thermocouples, RTD's, 4-20 mA Current Inputs, and Resistors for Strain Gage Bridge Completion.
- Three 12-Bit D/A Converters with Both Voltage and Current Outputs.
- Seven Bits of Digital I/O Configured on a Bit-by-Bit Basis as Either Inputs or High-Current Outputs.
- Onboard 16 Bit, 8031-Compatible Microcontroller with 32K x 8 bits RAM and 32K x 8 bits EEPROM.
- All Programming and Calibration in Software, No Switches to Set. Jumpers Available to By-Pass Opto-Isolators if Desired.
- Protective NEMA4 Enclosure for Harsh Atmospheric and Marine Environments.

DESCRIPTION

The RA1216 is an intelligent sixteen channel analog-to-digital converter. It also contains three digital-to-analog converters, and parallel digital input/output ports. RA1216 communicates with a host computer via asynchronous EIA RS-485 half-duplex, serial communications.

A built-in watchdog timer resets the unit if, for some unexpected reason, its microcontroller "hangs up" or, if the power supply voltage drops below 4.75 VDC. The microcontroller may also be reset by an external input. Data collected by the pod is stored in local RAM for later access through the host computer's serial port. This feature facilitates a stand alone mode of operation.

The following paragraphs describe the major functional parts of RA1216.

Analog Inputs

RA1216 uses a 12-bit successive approximation analog-to-digital converter (A/D). A/D conversions may be initiated either by software command, or by an external input. The pod accepts up to sixteen single-ended analog inputs (or eight differential). Solid-state multiplexers are used and, to prevent crosstalk and improve stability between channels, the multiplexer input is shorted to ground before each channel selection. That short is maintained for a time period sufficient to discharge the multiplexer's output capacitance.

The RA1216 pod can be configured to accept inputs from a variety of sensor types. Inputs are overvoltage protected up to 200VDC. Model **RA1216** accepts voltage inputs and has 15 voltage ranges. The voltage range used can be programmed on a channel-by-channel basis. Model **RA1216T/C** accepts up to seven thermocouple inputs from the most commonly used thermocouple types. This model includes an on-board temperature sensor used for cold junction compensation, and break detect resistors are available. Model **RA1216R** can accept inputs from up to eight three-wire RTD's. Model **RA1216I** accepts up to eight 4-20 mA current transmitter inputs. Model **RA1216B/C** also provides eight bridge completion circuits for quarter-bridge strain gage applications.

Each input can be programmed with an **offset** of up to 5V generated by an integral digital-to-analog converter. This allows easy scaling and shifting of an input signal to take advantage of the Pod's full input ranges.

Analog Outputs

Three 12-bit digital-to-analog converters provide simultaneous voltage and current outputs. Voltage outputs are independently programmable in two ranges: 0-5V, and 0-10V. Simultaneously, each D/A can provide 4-20 mA outputs. These current outputs are derived from user-supplied compliance voltages from 5.5V to 30V.

Digital I/O

Seven bits of digital I/O are provided. These can be software configured on a bit-by-bit basis as either inputs or outputs. Digital inputs are sensed at TTL levels and higher up to 50V. There is also one interrupt input (TTL levels). Each digital output provides compliance with user-supplied voltages up to 50 VDC and the maximum sink current per output bit is 350mA. For the seven bits, maximum cumulative sink current is 650mA.

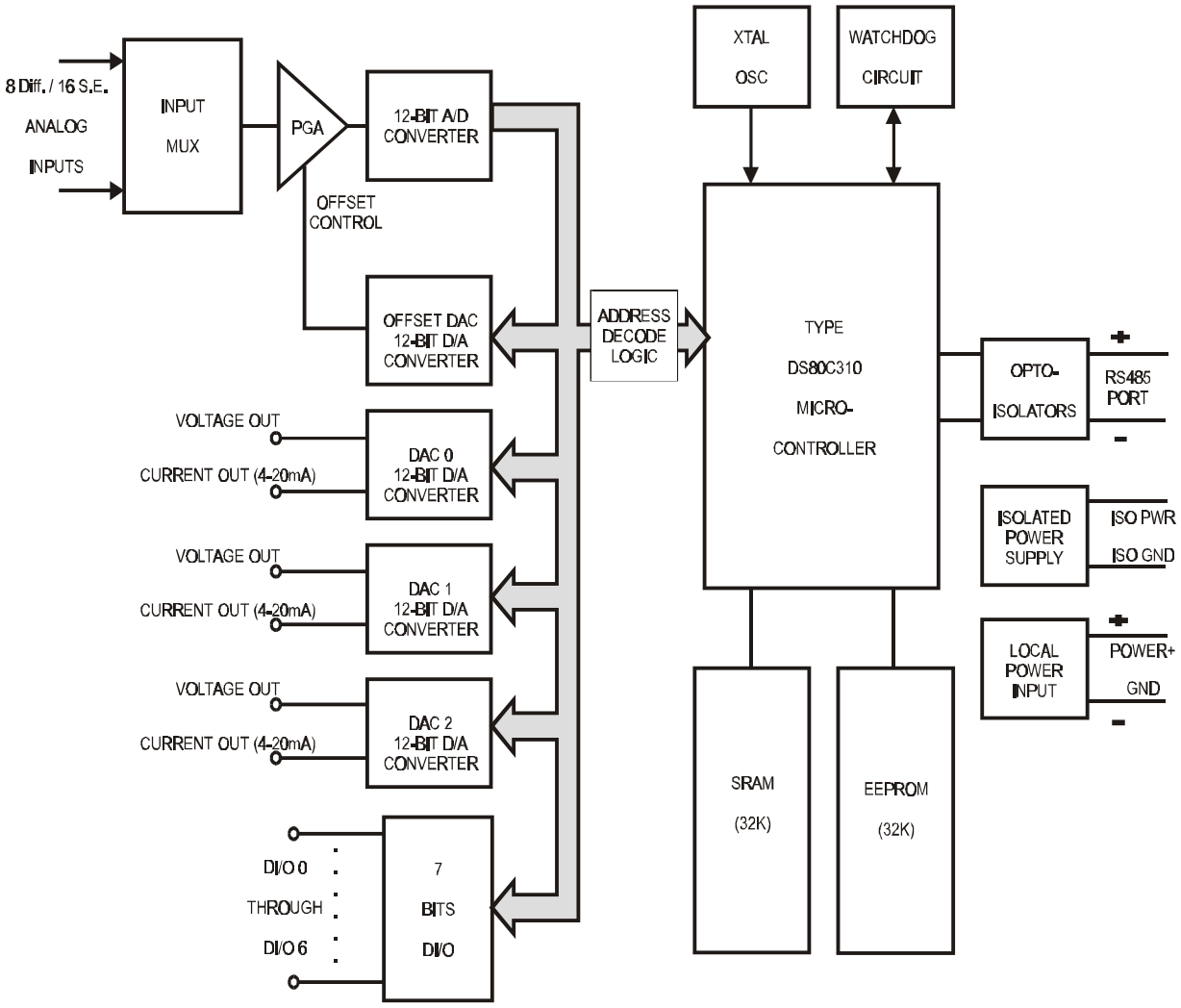
Power Supplies

RA1216 requires two power sources to maintain opto-isolation. A small amount of +7.5V to +24V power (50 mA) is required by the opto-isolated section and that can be supplied by the host computer if a four wire connection is made to the computer. Alternatively, you can use a separate power supply. The remainder of the pod is powered by an external, local power supply of +12V to +24V.

Utility Software

Software provided with the pod is on CD or 3 ½" Diskette. A setup program is provided to guide you in setting up the POD. It will auto-detect the POD and has a calibration routine. Sample programs are provided in C and Pascal.

BLOCK DIAGRAM



SPECIFICATIONS

Analog Inputs

Channels: Sixteen single-ended with a common ground or eight differential inputs.
Voltage Ranges: Software selectable, *dependent on programmed offset of up to 5V*.
Unipolar: 0-5V, 0-2.5V, 0-1V, 0-500 mV, 0-250 mV, 0-125 mV, 0-50 mV, and 0-25 mV.
Bipolar: ±2.5V, ±1.25V, ±500 mV, ±250 mV, ±62.5 mV, ±25 mV, and ±12.5 mV.
Current Range: 4-20 mA across 200Ω (0.8 - 4V).
Input Overvoltage Protection: 200 VDC.
Input Filter: Low-pass (10KΩ/0.001µF).
Input Impedance: 10 Megohms.
Resolution: 12 binary bits.
Accuracy: 0.025% ±1 LSB.
Gain Drift: ±5 PPM/ºC
Coding: True binary for unipolar inputs and offset binary for bipolar inputs.
Throughput: Up to 50,000 conversions per second in foreground mode, 6.67K conversions per second in background mode.
A/D Type: Successive Approximation.
Trigger Source: Software command or external command via the interrupt input.

Analog Outputs

Channels:	Three independent.
Type:	12-bit, double-buffered.
Non-Linearity:	±0.9 LSB maximum.
Monotonicity:	±½ bit.
Output Ranges:	0-5V, 0-10V.
Current output:	4-20mA (User Supplied 5.5V-30V)
Output Drive:	5 mA maximum..
Output Resistance:	0.5 ohms
Settling Time:	15 µsec to ± ½ LSB

Digital I/O

Seven bits configured as input or output on an individual basis.

Digital Inputs	Logic High:	+2.0V to +50V (5mA max at 50V in) Protected to 200 VDC (20mA max at 200VDC).
	Logic Low:	-0.5V to +0.8V at -0.4 mA max. Protected to 140 VDC.
Digital Outputs	Logic-Low Sink Current: 350 mA maximum. (See note below.) Inductive kick suppression diode is included.	

NOTE
Maximum allowable current per output bit is 350 mA. When all seven bits are used, maximum *cumulative* total of 650 mA.

Logic-High Output Voltage: Open Collector, compliance with up to 50VDC user-supplied voltage. If no user supplied voltage exists, outputs pulled up to +5VDC via 10 KΩ resistors (0.5mA).

Interrupt Input (for use with development kit)

Input Low: -0.3V - +0.8V
Input High: 2V to 5V
Input Low current at 0.45V: -55uA

Environmental

Operating Temperature Range: 0°C to 65°C (Optional -40˚ to +80˚C).
Temperature De-rating: Based on the power applied, maximum operating temperature may need to be de-rated because internal power regulators dissipate some heat. See Temperature De-Rating Formula in the REMOTE ACCES Catalog
Storage Temperature Range: -20˚ to +120˚C.
Humidity: 5% to 95% RH non-condensing.
Size: NEMA4 Enclosure 8.75" long by 5.75" wide by 2" high. (222 mm x 147 mm x 51 mm)

Power Required

Opto-Isolated Section: 7.5 to 24 VDC @ 50 mA. (Note: Due to the small amount of current required, voltage drop in long cables is not significant and 12V power from the host computer can be used.)

Local Power: +12 to +24 VDC @ 250 mA (typical).

REGULATORY COMPLIANCE

Certification not completed at print time. Please contact us for certification status.

PRICE

RA1216	Multiplexed-Input (16 S.E. or 8 Diff'l.), Programmable-Gain A/D Converter plus three DAC's plus 7-bit Digital I/O Ports.	540.00
RA1216T/C	As above except for use w/eight Thermocouple Inputs. Includes Reference Junction Sensor and Break-Detect Resistors.	565.00
RA1216R	As above except for use with eight 3-wire RTD's.	570.00
RA1216I	As above except for use with 4-20 mA Current Inputs.	570.00
RA1216B/C	As above except for use w'Quarter-Bridge Strain Gage Inputs. (Specify if for use w/ 150 or 350 Ohm gages)	570.00