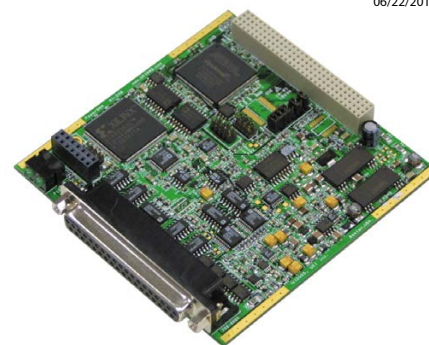


DNA/DNR-AI-208

Analog Input Strain Gage / Bridge Data Acquisition Board

- DNA-AI-208 for "Cube" chassis, DNR-AI-208 for RACKtangle™ chassis
- 8 isolated fully differential channels; 18-bit resolution
- $\pm 10V$ input range
- 8 kHz per chan max sample rate (8 kS/s maximum board throughput)
- 1.5V – 10.05V excitation voltage (software selectable)
- 2 wiring schemes (4- and 6-wire)
- Gains - 1,2,4,8,10,20,40,80,100,200,400,800
- Full-, Half- and Quarter-bridge configurations
- Onboard shunt calibration (256 steps)

10-Year
Availability
Guarantee



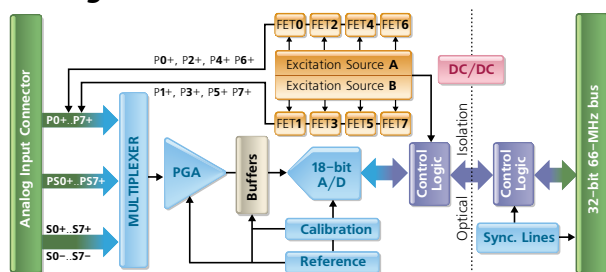
Supports UEIDAQ Framework Data Acquisition Software Library for Windows. Linux, VxWorks and QNX drivers available. Visit our website for more details.

General Description:

The DNA/DNR-AI-208 are 8 channel bridge data acquisition boards for use with UEI's popular Cube/RACKtangle chassis respectively. Each board has 8 differential input channels designed for direct measurement of full-bridge strain gauges, load cells, force sensors, torque sensors as well as any other full-bridge circuitry-based sensors. Quarter-bridge and half-bridge strain gauges are measured using customer supplied external resistors. Twelve software selectable input ranges combine with 18-bit resolution allow the user to connect various low-level signals directly to the differential inputs of the layer. The board's 8 kS/s maximum sample rate is divided among used channels. For example, you may sample one channel at 8 kS/s, two at 4 kS/s, four at 2 kS/s, etc.

There are two programmable 14-bit excitation voltage sources with voltage levels from 1.5 V to 10.05 V. The board also offers built in shunt calibration resistors allowing users to install shunt resistors in 256 unique steps ranging from 5k to 205k ohms.

Block Diagram:

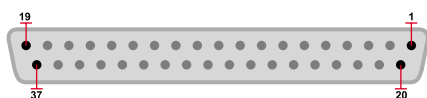


Pinout Diagram:

DB-37 (female)
37-pin connector:

P0+	37	19	P50+
S0	36	18	S0+
PS1+	35	17	AGND
S1+	34	16	P1+
PS2+	33	15	S1-
S2+	32	14	P2+
AGND	31	13	S2-
P3+	30	12	PS3+
S3	29	11	S3+
P4+	28	10	PS4+
S4	27	9	S4+
PS5+	26	8	AGND
S5+	25	7	P5+
PS6+	24	6	S5-
S6+	23	5	P6+
AGND	22	4	S6-
P7+	21	3	PS7+
S7-	20	2	S7+
1			EXT_TRIG

PS..+ Excitation Sense +
P..+ Excitation +
S..+ Signal +
S..- Signal -
AGND Excitation -



Technical Specifications:

Number of channels	8 (differential)
ADC resolution	18 bits
Sampling rate	1 S/s - 8 kS/s per channel (8 kS/s max aggregate board sample rate)
Input range	$\pm 10V$
FIFO size	512 samples
Wiring scheme	4- and 6-wire (with Kelvin connection); all channels share the same ground
Bridge configurations	Full-Bridge Half-Bridge (with ext. terminal panel) Quarter-Bridge (with ext. terminal panel)
Bridge resistance	120 Ω , 350 Ω , 1000 Ω , and custom
Input impedance	10M Ω in parallel with 50pF
Gains	1,2,4,8,10,20,40,80,100,200,400,800
Gain accuracy	See Table 2-2
Temperature drift	
Offset drift	5 $\mu V/^{\circ}C$ typ
Gain drift	30ppm/ $^{\circ}C$ @ G=1, 45ppm/ $^{\circ}C$ @ G=800
Shunt calibration	Onboard (software selectable) - 256 steps from 5K to 205K; External
Isolation	350 Vrms
Overvoltage protection	-40V..+55V
Excitation voltage	1.5V - 10.05V (software selectable)
Excitation current	85 mA, per channel
Excitation type	Pulsed. Only the excitation for the channel currently being measured and the next channel in the scan list are enabled. (for overheating protection)
Power consumption	bridge resistance/excitation dependent; 2.5W - 4.5W
Operating temp. (tested)	-40 $^{\circ}C$ to +85 $^{\circ}C$
Operating humidity	0 - 95%, non-condensing
MTBF	>600,000 hours

Connection Options:

Cable Required	Target Panel	Description
DNA-CBL-37S	DNA-STP-37	Shielded cable connects to 37-way terminal panel.
none*	DNA-STP-AI-208*	Connects to 8-channel panel designed for strain gage measurements

DNA-STP-AI-208 are direct-connect terminal panels that attach directly to the layer's connector and don't require DNA-CBL-37 cable.

Test Results:

Since **Noise vs. Gain vs. Acquisition Rate** dependence isn't linear, our engineers have conducted a series of tests to find out what are the noise values at different sampling rates and with different gains applied. The tests were performed using only 5 out of the 8 differential channels at following rates: 1600Hz/channel (8KHz total), 800Hz/channel (4KHz total), 400Hz/channel (2KHz total), 200Hz/channel

(1KHz total), 100Hz/channel (500Hz total), 80Hz/channel (400Hz total), 40Hz/channel (200Hz total), 20Hz/channel (100Hz total), 10Hz/channel (50Hz total), 5Hz/channel (25Hz total). Each series of tests was repeated using gain of 1, 8, 80, 200, 400, 800.

The table below represents the **Accuracy vs. Acquisition Rate** test results (350 Ohm strain gage was used as a signal source). As you can see, digital filtering

embedded in logic significantly improves data quality. Especially at speeds 200Hz/channel and below.

		Max channel rate (Hz)	1600	800	400	200	100	80	40	20	10	5
		Max aggregate rate (Hz)	8000	4000	2000	1000	500	400	200	100	50	25
Gain (voltage)		<i>All measurements are in microvolts</i>										
1 (±10V)	peak-peak	457.76	228.88	152.58	152.58	76.293	76.29	76.29	76.29	76.29	76.29	76.29
	RMS	70.953	48.828	34.332	27.236	31.051	17.77	28.99	28.15	36.01	28.22	
8 (±1.25V)	peak-peak	76.293	28.610	19.073	9.5367	9.5367	9.536	9.536	9.536	9.536	9.536	9.536
	RMS	12.378	5.8174	4.2915	4.6539	4.7683	4.291	4.005	4.291	4.644	4.768	
80 (±125mV)	peak-peak	30.516	9.5367	7.6294	3.6075	2.8610	1.907	1.907	1.907	0.953	1.907	
	RMS	4.0626	1.7547	1.3245	0.8487	0.6074	0.505	0.400	0.164	0.443	0.404	
200 (±50mV)	peak-peak		18.692	14.877	4.0147	5.3405	3.433	3.433	2.670	1.525	1.525	
	RMS		3.125	2.220	1.486	1.0147	0.709	0.564	0.442	0.313	0.244	
400 (±25mV)	peak-peak		22.125	8.2016	6.5894	3.2425	2.861	2.098	1.526	1.335	0.953	
	RMS		3.221	1.725	1.154	1.1552	0.525	0.438	0.285	0.963	0.721	
800 (±12.5mV)	peak-peak		13.256	6.771	4.48	2.670	2.861	1.335	2.765	0.953	0.858	
	RMS		2.283	1.235	0.621	0.448	0.452	0.228	0.218	0.184	0.179	

Table 2-1

Offset & Gain Calibration limits

Gain	At time of calibration in mV	2-year and/or ±5°C in mV
1	0.152588	1.00
2	0.076294	0.50
4	0.076294	0.25
8	0.038147	0.20
10	0.030518	0.15
20	0.015259	0.11
40	0.011444	0.052
80	0.005722	0.026
100	0.004578	0.025
200	0.002289	0.024
400	0.001907	0.020
800	0.001717	0.015

Table 2-2

Maximum noise; 8 channels @ 5mV VIn; 10Hz; Peak-Peak and RMS (uV)

