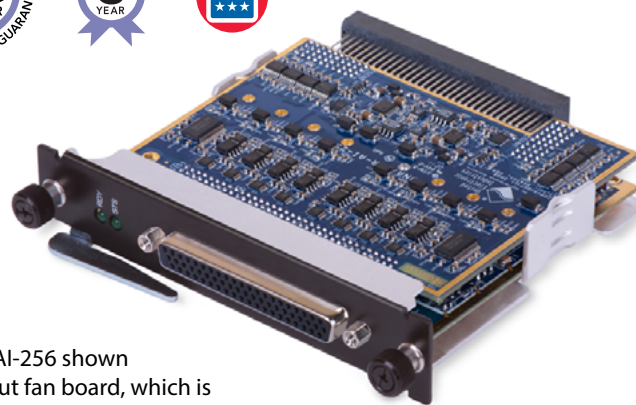# DNx-AI-256
2-Channel Synchro/Resolver/LVDT/RVDT Interface

- DNA-/DNR-/DNF-AI-256 for use with Cube / RACKtangle™ /FLATRACK™ I/O chassis
- 2 input / output channels
- 16-bit resolution
- 3-wire (synchro) and 4-wire (resolver) inputs
- 4, 5 and 6-wire LVDT/RVDT support
- Reference output per channel
- Up to 19.8 Vrms programmable reference
- 50 Hz to 10 kHz
- Up to 2.4 VA without external buffer
- Fully Isolated (channel to channel and channel to chassis)

DNR-AI-256 shown without fan board, which is installed in adjacent slot.

General Description

The DNx-AI-256 are high performance, two channel synchro/resolver input and output boards compatible with UEI's powerful Cube, RACKtangle and FLATRACK I/O chassis. The 256 series boards are functionally similar to the DNx-AI-255, but provide significantly more output drive for applications that require it. The DNx-AI-256 series is also an ideal solution for LVDT/RVDTs. The board may be configured as two inputs, two outputs or one input and one output.

The board provides 2 input channels that will monitor either 3-wire synchros or 4-wire resolvers. The board's high precision circuitry, combined with each channel's independent 16-bit A/D converter, allows measurement accuracies up to ± 2.6 arc-minute. The inputs may be read at rates up to the excitation frequency (10 kHz max).

Each channel provides its own programmable reference, with outputs independently programmable up to 19.8 Vrms at frequencies from 50 to 10 kHz and up to 2.4 VA. When using external references, the DNR-AI-256 automatically adjusts simulated outputs for variable amplitude and frequency references in one reference cycle.

The DNx-AI-256 also provides two channels of synchro/resolver/RVDT/LVDT interface that are ideal for use with items such as attitude indicators or as a test source for a wide variety of synchro or resolver input devices. The outputs each accept an independent reference signal and offer 16-bit output resolution. Each channel will drive up to 19.8 Vrms at 3.0 VA (total board output must be less than or equal to 5 VA) without external buffering. The current consumed by each output channel may be monitored to confirm the wiring is correct and the coils of the synchro/resolver or RVDT/LVDT are as expected.

The board offers 350 Vrms of isolation between channels, as well as between the I/O connections and the chassis. Like all PowerDNA/UEILogger I/O boards, the DNx-AI-256 offers operation in harsh environments and has been tested to 3g vibration, 50g shock, -40 to +70 °C temperatures and altitudes up to 70,000 feet.

Software is included, providing a comprehensive, yet easy-to-use API that supports all popular operating systems, including Windows, Linux, and most real-time operating systems—such as QNX, Intime, VXworks, and more. Additionally, the UEIDAQ Framework—an even higher level Windows driver—supplies complete support for those creating applications in many popular Windows programming languages, as well as data acquisition software packages such as LabVIEW and MATLAB/Simulink.

With the high power output of the DNR-AI-256, a fan unit should be placed in the slot next to it to prevent overheating. The fan unit, DNR-FAN-925, is included with the DNR-AI-256.

## Technical Specifications (Synchro/Resolver mode):

Inputs	
Number of channels	2
Configuration	Synchro (3-wire) or resolver (4-wire) may be selected via software
Resolution	16-bit
Accuracy	± 2.6 arc-minute
Frequency	50 Hz to 10 kHz
Maximum Input Voltage	28 Vrms
Input Impedance	478 kΩ ±10 kΩ
Acceleration	300 rps/s @ 60 Hz, 450 rps/s @ 400 Hz 1000 rps/s @ 4000 Hz
Step response	800 mS - 179° @ 60 Hz, 150 mS - 179° @ 2500 Hz
Update rate	Max. rate is equal to the excitation frequency.
Reference output	
Number of channels	2 (one per input channel)
Output voltage	Up to19.8 Vrms at 3.0 VA (see table on following page for other output voltages)
Voltage resolution	16 bits
Reference Frequency	50 Hz to 10 kHz (±0.1%)
Synchro / resolver outputs	
Number of channels	2 (total number of synchro/resolver inputs and simulated outputs is limited to 2)
Configuration	Synchro (3-wire) or Resolver (4-wire)
Resolution	16-bit
Output Voltage	Up to 19.8 Vrms up to 2.4 VA. (see table)
Output Accuracy	±4 arc-minutes
Output readback and protection	
Output protection	Automatic shut down on overload
Voltage output monitoring	±70 mV, monitored at 1.3 Hz
Current output monitoring	±1.0 mA, monitored at 1.3 Hz
General specifications	
Operating temperature	Tested -40 °C to +85 °C
Vibration IEC 60068-2-6 IEC 60068-2-64	5 g, 10-500 Hz, sinusoidal 5 g (rms), 10-500 Hz, broad-band random
Shock IEC 60068-2-27	100 g, 3 ms half sine, 18 shocks @ 6 orientations 30 g, 11 ms half sine, 18 shocks @ 6 orientations
Humidity	5 to 95%, non-condensing
Altitude	120,000 ft
MTBF	275,000 hours
Power consumption	6 Watt with no load 12 Watt maximum

Output Drive Specifications (Synchro/Resolver):

Vrms	Vpp	Idcmax	Irms	VA max	Rlmin
2.0	5.7	0.20	0.141	0.6	14.1
3.0	8.5	0.20	0.141	0.9	21.2
4.0	11.3	0.20	0.141	1.1	28.3
5.0	14.1	0.20	0.141	1.4	35.4
6.0	17.0	0.20	0.141	1.7	42.4
7.0	19.8	0.20	0.141	2.0	49.5
8.0	22.6	0.20	0.141	2.3	56.6
9.0	25.5	0.20	0.133	2.4	67.5
10.0	28.3	0.20	0.120	3.0	83.3
11.0	31.1	0.20	0.109	3.0	100.8
12.0	33.9	0.10	0.100	3.0	120.0
13.0	36.8	0.10	0.092	3.0	140.8
14.0	39.6	0.10	0.086	3.0	163.3
15.0	42.4	0.10	0.080	3.0	187.5
16.0	45.3	0.10	0.075	3.0	213.3
17.0	48.1	0.10	0.071	3.0	240.8
18.0	50.9	0.10	0.067	3.0	270.0

Specifications above are for a single output channel. Total output power for all channels combined may not exceed 5.0 VA

Pinout Diagram
(Synchro/resolver):
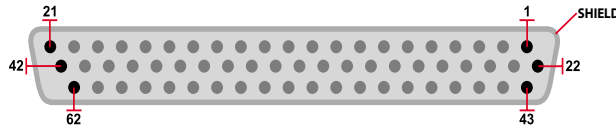
Pin	Signal	Pin	Signal	Pin	Signal
1	Rsvd	22	Gnd	43	Out A-
2	Out B+	23	Out B-	44	Out A+
3	Rsvd	24	n/c	45	Gnd
4	In A+	25	In A-	46	Rsvd
5	In B+	26	In B-	47	n/c
6	Gnd	27	Rsvd	48	Rsvd
7	Out C+	28	Out C-	49	Rsvd
8	Out D+	29	Out D-	50	Rsvd
9	In C+	30	In C-	51	Gnd
10	In D+	31	In D-	52	Rsvd
11	Rsvd	32	n/c	53	Out A-
12	Out B+	33	Out B-	54	Out A+
13	Rsvd	34	Gnd	55	Gnd
14	In A+	35	In A-	56	Rsvd
15	In B+	36	In B-	57	n/c
16	Gnd	37	Rsvd	58	Rsvd
17	Out C+	38	Out C-	59	n/c
18	Out D+	39	Out D-	60	Rsvd
19	Rsvd	40	Gnd	61	In C-
20	In D+	41	In D-	62	In C+
21	Rsvd	42	n/c		

Chan 0 = Pins 1–10 (above dashed line)
Chan 1 = Pins 11–21 (below dashed line)

Dashed Line represents the isolation barrier between channels

Connection Notes:

The DNx-AI-256 may be used with synchros or resolvers, with internally provided excitation, or with external excitation, and may be used in input (to measure the output of a synchro or resolver) or simulated synchro/resolver output modes. The following connection guide depicts typical connections in each of the 8 ways the DNx-AI-256 is commonly utilized. The tables map each channels "in" and "out" terminals as shown on the pinout diagram above to standard designations used in synchro and sesolver applications.

Input mode, internally generated excitation

Inputs	Synchro	Resolver
In A+	S1	S1
In A-	C	S3
In B+	S2	S2
In B-	C	S4
In C+	S3	NC
In C-	C	NC
In D+	NC	NC
In D-	NC	NC

Outputs	Synchro	Resolver
Out A+	NC	NC
Out A-	NC	NC
Out B+	NC	NC
Out B-	NC	NC
Out C+	NC	NC
Out C-	NC	NC
Out D+	R1	R1
Out D-	R2	R3

Input mode, external excitation

Inputs	Synchro	Resolver
In A+	S1	S1
In A-	C	S3
In B+	S2	S2
In B-	C	S4
In C+	S3	NC
In C-	C	NC
In D+	Exc+	Exc+
In D-	Exc-	Exc-

Outputs	Synchro	Resolver
Out A+	NC	NC
Out A-	NC	NC
Out B+	NC	NC
Out B-	NC	NC
Out C+	NC	NC
Out C-	NC	NC
Out D+	NC	NC
Out D-	NC	NC

Simulator mode, internal excitation

Inputs	Synchro	Resolver
In A+	NC	NC
In A-	NC	NC
In B+	NC	NC
In B-	NC	NC
In C+	NC	NC
In C-	NC	NC
In D+	NC	NC
In D-	NC	NC

Outputs	Synchro	Resolver
Out A+	S1	S1
Out A-	C	S3
Out B+	S2	S2
Out B-	C	S4
Out C+	S3	Opt+
Out C-	C	Opt-
Out D+	Exc+	Exc+
Out D-	Exc-	Exc-

Simulator mode, external excitation

Inputs	Synchro	Resolver
In A+	NC	NC
In A-	NC	NC
In B+	NC	NC
In B-	NC	NC
In C+	NC	NC
In C-	NC	NC
In D+	Exc+	Exc+
In D-	Exc-	Exc-

Outputs	Synchro	Resolver
Out A+	S1	S1
Out A-	C	S3
Out B+	S2	S2
Out B-	C	S4
Out C+	S3	NC
Out C-	C	NC
Out D+	NC	NC
Out D-	NC	NC

Ordering Guide

Part Number	Description
DNx-AI-256	High performance dual channel synchro / resolver board for RACKtangle I/O chassis
DNA-STP-62	62 conductor screw terminal panel
DNA-CBL-62	62 conductor shielded cable
DNR-FAN-925	Spare/replacement cooling fan for the DNR-AI-256
Extended Warranty	Option to purchase UEI's extended 5 year warranty is available