

DYNAPAK

Six Degree-of-Freedom Arrays



The Dynapak Six Degree-of-Freedom Arrays offer a compact rugged design for measurement of 3 axes of angular rates and 3 axes of linear acceleration with an internal temperature sensor for compensation of data. These products are ideal for complete motion analysis and for use in instrument platforms, line-of-sight stabilization and imaging platforms. Outputs are analog and supplied through a 25 pin connector configuration or with wire leads for integration into systems.

Three configurations of Dynapak sensor arrays are offered: The basic Dynapak 5 utilizes the ARS-09 angular rate sensors in a triaxial array with frequency response from 1 to 1000 Hz. The Dynapak 10 utilizes the ARS-01 angular rate sensors to achieve a frequency response from less than 1 to greater than 1000 Hz with the ability to operate in high vibration and shock environments. Digital filtering can extend the frequency response of Dynapak 5 and Dynapak 10 products to below 0.1 Hz (see application

note AN-01). The Dynapak 20 is based on versions of the ARS-20 angular rate sensor which achieves a frequency response from 0 (DC) to >250 Hz. These angular rate sensors are not affected by static g loads, have low sensitivity to linear g forces, and can operate over a broad range of temperatures. All sensors are hermetically sealed with environmental epoxies; rate sensors have stainless steel cases and Dynapak modules have aluminum enclosures to withstand the harshest environments. Both the Dynapak 10 and Dynapak 20 products are rugged enough to withstand linear shock and vibration of 1000 g's operating and 3,000 g's non-operating.

Linear accelerometers used in the Dynapak can be supplied with ranges of 2, 10, or 20 g's as standard products. Standard sensitivities and scale factors are shown for the angular rate sensors, but custom ranges and scale factors can be supplied to meet your specific application. Accelerometers are insensitive to thermal transients and transverse acceleration.

Dynapak modules also incorporate an Analog Devices AD590 temperature sensor which can be used to provide compensation for any changes in rate sensor or accelerometer output over the operating temperature range.

Dynapak motion measurement arrays may be purchased with sensor full scale range options mixed or matched in selected axis positions or may be purchased with less than six sensors. Custom options, angular rate ranges and scale factors are available at extra cost.

Automobile Motion Testing

Platform Stabilization

Crash Testing

Aircraft Ejection Testing

Modal Analysis

Aerospace Controls

Machinery Monitoring

ATA  Sensors

"Sensing ways to make the world better."

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Specifications

ATA Sensors' patented MHD angular motion sensors utilize the finest materials and workmanship combined in durable packages that feature:

- No moving parts
- Dynamic range > 100dB
- Hermetically sealed units
- Low power consumption
- Low cross axis angular sensitivity
- High linear acceleration sensitivity
- Integral electronics / low noise
- High survivable shock limits
- Superior applications support
- One-year warranty against defects in materials and workmanship on sensors, 90 days on cables.

All data is believed correct at time of publication. Specifications are subject to change without notice. Dynapakds/8.98

Notes:

1. Peak-to-peak @ ±15Vdc input
2. Measured @ 10 Hz
3. Power spectral density flat to angular velocity over specified bandwidth.
4. Percent change in Scale Factor per °C @ 100 Hz
5. Peak, 100Hz half sine

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Specifications

PARAMETER	Dynapak 5	Dynapak 10	Dynapak 20
Power Requirements - Voltage	± 15 Vdc	± 15 Vdc	± 15 Vdc
Power Requirements - Input Current	<100mA each supply	<100mA each supply	<250mA each supply
Start-up Time	<1.0 sec	<1.0 sec	<1.0 sec
Operating Life, Typical	10 years	10 years	10 years
Operating Temperature - angular rate	-38 °C to + 65 °C	-38 °C to + 65 °C	-38 °C to + 65 °C
Angular Sensors	.ARS-09	.ARS-01	.ARS-20
Standard Ranges - Angular rate	± 0 to 100, 200 or 500 °/sec	± 0 to 1000, 5000 or 11,000 °/sec	± 0 to 200 °/sec
Full Range Rate Output (Nominal)	± 10 Vdc	± 10 Vdc	± 4.5 Vdc
Threshold Resolution - angular rate		0.02 °/sec	
Temperature sensitivity	<0.1 %/°C	<0.03 %/°C	<0.1 %/°C
Non-linearity Angular Rate	>0.1% F.R.	>0.1% F.R.	>0.1% F.R.
Bias Variation over Temperature range (Max. Dev. from 22 °C)	<1 °/sec from 22 °C	<1 °/sec from 22 °C	<1 °/sec from 22 °C
G Sensitivity (static linear) of angular rate	<0.05 °/sec/g	<0.002 °/sec/g	<0.002 °/sec/g
G Sensitivity (linear shock) of angular rate	<0.5 °/sec/g	<0.3 °/sec/g	<0.3 °/sec/g
Shock- angular rate, 200 μ sec, half sine	200g operating, 200g max	1000g operating, 3000g max	1000g operating, 3000g max
Vibration Survival- angular rate	200g operating, 200g max	1000g operating, 3000g max	1000g operating, 3000g max

Linear Accelerometers	Kistler 8304B	Kistler 8304B	Kistler 8304B
Standard Ranges - Linear Acceleration	.2, 5, 10 or 20 g	.2, 5, 10 or 20 g	.2, 5, 10 or 20 g
Full Range Acceleration Output (Nominal)	± 2 Vdc	± 2 Vdc	± 2 Vdc
Calibration at 22 °C	0.5% of value	0.2% of value	0.2% of value
Bias Factory Set @ 0 g,	nom 2.5 V	nom 2.5 V	nom 2.5 V
Bias Variation over Temperature range (Max.Dev. from 22 °C)	>100 μg/°C	>100 μg/°C	>100 μg/°C
Long Term Bias Stability (1 year)	>1000 μg	>1000 μg	>1000 μg
Transverse Sensitivity max (%) in linear axes	2 %	2 %	2 %
Bandwidth (-90°)	>1KHz angular > Hz linear	>1KHz angular > Hz linear	>1KHz angular > Hz linear
Non-linearity Acceleration	± 2 %	± 2 %	± 2 %
Threshold Resolution - acceleration	≥ 10 μg	≥ 10 μg	≥ 10 μg
Output noise (DC to 100 Hz) acceleration			

Physical Characteristics

Storage Temperature	-60°C to +100 °C	-60 °C to + 100°C	-60°C to + 100°C
Operating Temperature	-38°C to + 65°C	-38°C to + 65 °C	-38°C to + 65°C
Shock- accelerometers, 200 μ sec, half sine	2,000 g	2,000 g	2,000 g
Weight total	.475 grams (17 oz.)	.500 grams (18 oz)	.650 grams (23 oz)
Dimensions (LxWxH) not incl. mounting flange	.4.25 x 2.64 x 1.71 inches	.4.25 x 2.64 x 1.71 inches	.4.25 x 2.64 x 1.71 inches

Connector: 25 pin (Sub D-25)

Connector Pin	Assignment
1	+ Vdc
2	- Vdc
3	Power Ground
4	Case Ground
5	Rate X Output
6	Rate X Return
7	Rate Y Output
8	Rate Y Return
9	Rate Z Output
10	Rate Z Return
11	Acceleration X output
12	Acceleration X Return
14	Acceleration Y output
15	Acceleration Y Return
16	Acceleration Z output
17	Acceleration Z Return
23	Temperature Sensor Output (AD590)
All other pins are "No Connection"	