



OVERVIEW

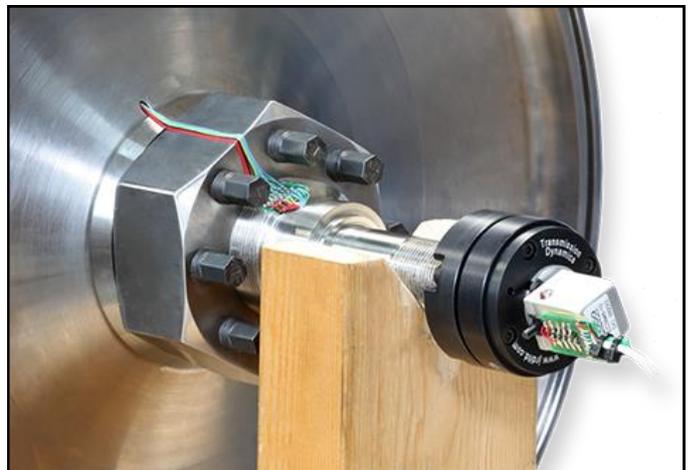
This 5-channel strain gauge amplifier, AMP-R10KE-5, is specifically designed for signal conditioning on rotating machinery. The AMP-R10KE is also available as a 1-4 channel variant (higher channel counts can be manufactured bespoke to specification), and is typically used with slip ring assemblies, allowing substantial increase of signal-to-noise ratio in measurements on rotating shafts.

Slip ring generated noise depends on slip ring design, sliding contact material/finish and sliding speed. With quality instrumentation slip ring capsules, contact noise due to sliding can vary between 20 μ V and 100 μ V, and it can substantially increase with slip ring operational life. With small signal levels associated with strain gauge instrumentation (with a full bridge configuration 1mV bridge output corresponds to 100 μ ϵ with 5V bridge excitation) slip ring generated noise can substantially degrade measurement quality. By amplifying the signal on the rotating component, the influence of electrical noise due to brush sliding contact is virtually eliminated.

The amplifier can typically operate at rotational speeds of up to 15,000 RPM. In most practical applications, this is limited by the slip ring operational speed.

Applications of the AMP-10KE include:

- Measurements of shaft torsion and bending stress;
- Gear/blade stress measurements;
- Troubleshooting rotating machinery;
- Condition monitoring.



OPERATION

The AMP-R10KE requires a dual supply voltage of $\pm 7V$ to $\pm 18V$. The unit is powered via slip rings from an external power supply or batteries. To increase signal integrity in more demanding applications, particularly when the slip ring is subjected to high vibration levels, it is recommended that power supply GND (COM) connection is made through two separate slip ring channels.



- machine dynamics, NVH, failure analysis, fatigue/accelerated life testing
- specialised instrumentation, data acquisition and analysis
- rotating machinery design and troubleshooting:
gearboxes, shafts, bearings, couplings, belts and chains

Company registered in England No. 3284935 VAT Reg No. GB 660 2407 64

JR Dynamics Ltd

Unit 4, Arcot Court,
Nelson Ind. Estate, Cramlington,
Northumberland, NE23 1BB, UK

T +44 (0) 191 58 000 58

E support@jrdltd.com

www.jrdltd.com

STRAIN GAUGE AMPLIFIER

Strain gauge amplifiers are permanently encapsulated in the aluminium enclosure and provide a high bandwidth (10 kHz at a fixed Gain of $G=1000$). Total power consumption with a ± 12 power supply is less than 1.5 mA (excluding strain gauges). The standard amplifier gain is 1000:1, other gains supplied on request.

Other combinations of the rotary amplifier are available, including multi-channel strain gauge amplifiers.

BALANCING

AMP-R10KE is laser trimmed for low offset voltage (40 μV) and low temperature drifts (0.5 $\mu\text{V}/^\circ\text{C}$). Therefore it is expected that any out-of-balance experience in practical strain gauge installations will be caused by bridge installation.

The strain gauge amplifier section of AMP-R10KE has no provision for adjusting bridge out-of-balance. This is typically handled by offsetting the initial DC output voltage from within the data collection/recording devices. Should the need arise to electronically zero the bridge, a balancing resistor of between 50k Ω and 20M Ω can be soldered between the input pins, marked +IN or -IN and the COM pin. For the best performance use high stability, 0.125W metal film resistors.

INPUT PROTECTION

Both input pins +IN and -IN are internally protected against voltage transients of up to $\pm 40\text{V}$ by using an internal current limiting device.

SPECIFICATION

Common Specification

Temperature range:	-20°C to +85°C
Weight:	28 grams
Power supply:	Dual ± 7 to $\pm 18\text{V}$
Current consumption:	1.5 mA

Strain Gauge Amplifier (each section):

Bridge supply:	+5V nom.
Gain:	Standard 1000 or as required
Dynamic response:	DC-10kHz (-3dB)
Non-linearity:	$\pm 0.02\%$ of FSR
CMR:	100 dB (min)
Gain vs. temperature:	± 25 ppm/ $^\circ\text{C}$ typ.

Pinout

COM: zero supply from the slip ring (for low noise connect electrically to the shaft via exposed GND pin).

-12V: negative power supply provided by slip ring. Typical voltage range from -7V to -18V.

+12V: positive power supply provided by slip ring. Typical voltage range from +7V to +18V.

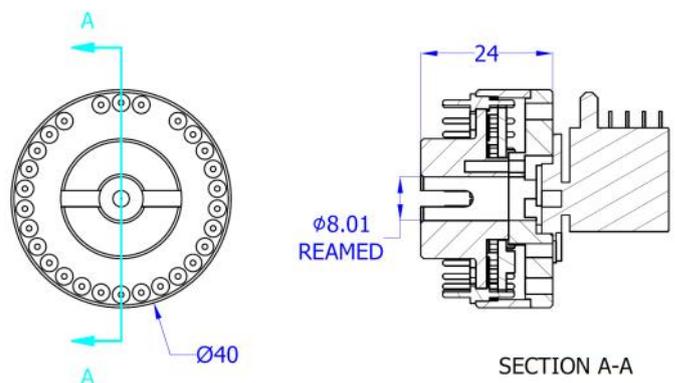


Fig.1: AMP R10KE-5 dimensions

Note: The inner diameter can be increased to a maximum of $D = 12\text{mm}$ to suit specific shaft diameter. All dimensions in mm



- machine dynamics, NVH, failure analysis, fatigue/accelerated life testing
- specialised instrumentation, data acquisition and analysis
- rotating machinery design and troubleshooting:
gearboxes, shafts, bearings, couplings, belts and chains

Company registered in England No. 3284935 VAT Reg No. GB 660 2407 64

JR Dynamics Ltd

Unit 4, Arcot Court,
Nelson Ind. Estate, Cramlington,
Northumberland, NE23 1BB, UK

T +44 (0) 191 58 000 58

E support@jrdltd.com

www.jrdltd.com