



# KSC-1 HIGH PERFORMANCE INDUSTRIAL SIGNAL CONDITIONER FOR KULITE SENSOR PRODUCTS

## KULITE KSC-1 FEATURES

- Single-channel module, DIN rail mountable
- 0.1% DC accuracy
- 4-pole low-pass filters with four selectable cutoffs (BU4: 100 Hz, 5 kHz, 25 kHz and 50 kHz) (BE4: 5 kHz, 25 kHz, 50 kHz and 100 kHz)
- Multi-turn potentiometers (with defeat mode) for precise bridge suppression, gain and amplifier offset
- Constant voltage excitation with remote sense
- Selectable excitation: 0, 5, 10 V with calibration potentiometer
- Manual bridge balance/suppress
- Balanced differential input
- 10 nV/ $\sqrt{\text{Hz}}$  maximum input noise
- Pre-filter gain: x1, 2, 5, 10, 20, 50, 100
- Post-filter gain: x1, 2, 5, 10
- Variable gain for adjustment from 90 to 110% of output
- Input and output overload detection
- Input short via momentary switch or remote
- Zero excitation via momentary switch or remote
- 5<sup>th</sup> wire buffered output
- Compact, rugged design for industrial use
- DIN rail mounting option
- 3.1 x 1.2 x 5.2 inches (LxWxH)
- 11.5 oz. net
- 0° C to 70° C (operating); -40° C to 105° C (storage)
- 1 ea. 9-pin female D-Sub for transducer interface and signal input
- 1 ea. 9-pin male D-Sub for power in and signal out
- 10 – 32 V DC power input, 3 W max

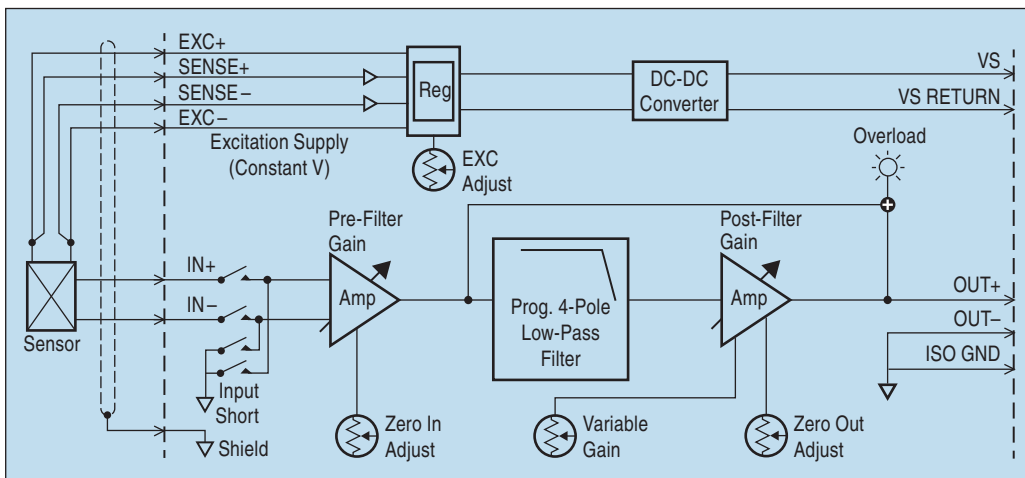


## KSC-1 DESCRIPTION

The KSC-1 is part of the Kulite signal conditioning product family optimized specifically for the Kulite sensor products. The KSC-1 is an industrial grade precision amplifier/filter with constant voltage excitation optimized for conditioning Kulite pressure sensors and microphone products in lab, test stands or industrial environments. Precise excitation with remote sense provides voltage for bridge type sensors. Excitation levels of 5 or 10 V are selectable via front panel switches. Manual balance/zero multi-turn potentiometers are provided for transducer balance and offset adjustment.

A low-noise, high common-mode rejection balanced differential input is supplied. Precision 4-pole Butterworth or Bessel low-pass filter options are available with four selectable cutoff frequency settings. Amplification is distributed as pre and postfilter gain, allowing for elimination of out-of-band energy such as transducer resonances that can cause non-linearities due to clipping of the amplifier. Overload detectors alert the user to output overloads as well as prefilter overloads that may be masked by the low-pass filter.

The KSC-1 may be mounted on a standard DIN rail with supplied clip. The module is powered using an external 10 to 32 VDC input.



**KSC-1 BLOCK DIAGRAM**

## KSC-1 CONSTANT VOLTAGE EXCITATION

### Type:

Unipolar constant voltage excitation with selectable Local/Remote sense

**Level:** 0, 5, 10 V selected by front panel switches

### Drive:

30 mA with 35 mA current limit indicated by front panel LED

### Sense Boost:

Excitation boost limited to 3 V with passive protection in the sense leads.

### EXC Off:

Momentary front-panel push button to set excitation to 0 VDC for sensor self-generated noise measurement.

**Initial Accuracy:** Factory set to  $\pm 0.1\%$  of setting  $\pm 5$  mV

**Calibration:** 25T potentiometer for field calibration

**Noise:** 25  $\mu$ Vrms, 3 Hz to 25 kHz

**Drift:**  $\pm 0.0025\%/^{\circ}$  C of setting or  $\pm 150$   $\mu$ V/ $^{\circ}$  C

**Stability:**  $\pm 0.005\%$  of setting or  $\pm 250$   $\mu$ V for 8 hours

## KSC-1 INPUT CHARACTERISTICS

**Type:** DC-Coupled balanced differential input

**Common Mode Voltage:**  $\pm 10$  V operating

**Input Level:**  $\pm 10$  Vpk

**Input Protection:** 24 VDC continuous

**Input Impedance:** 10 M $\Omega$  per side

**Drift:** 1  $\mu$ V/ $^{\circ}$  C, RTI

**CMRR (input gain  $\geq 10$ ):**

90 dB, DC to 1000 Hz

**Spectral Noise:** 10 nV/ $\sqrt{\text{Hz}}$  at 1 kHz RTI

**Balance/Zero (ZERO IN):**

25T pot at front panel to provide Zero/Balance RTI adjustment.

**Voltage Suppression:**

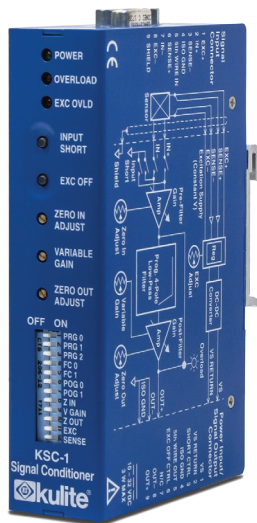
$\pm 20$  mV for pre-filter gains  $\geq 10$

$\pm 200$  mV for pre-filter gains  $\leq 10$

**Input Short:**

Momentary pushbutton input short for measuring amplifier offset and noise.

**5<sup>th</sup> Wire Input:** Buffered, unity gain



## KSC-1 AMPLIFIER CHARACTERISTICS

### Pre-Filter Gain:

x1, 2, 5, 10, 20, 50, 100 with overload detection

**Post-Filter Gain:** x1, 2, 5, 10 with output overload detection

**Overload Level:** 10.2 V,  $\pm 2\%$

### Variable Gain:

25T pot at front panel for continuous adjustments of 90 – 110% of full-scale output

### Overall DC Accuracy:

$\pm 0.1\%$  at any gain setting. Includes filter.

**Temperature Coefficient:**  $\pm 0.004\%$  / C

### DC Linearity:

0.005% re: full scale output, best-fit straight line

## KSC-1 FILTER CHARACTERISTICS

### Type:

4-Pole Low-Pass Butterworth (BU4) or Bessel (BE4) selected at time of order

### Cutoff Frequencies:

(BU4): 100 Hz, 5 kHz, 25 kHz and 50 kHz,

(BE4): 5 kHz, 25 kHz, 50 kHz and 100 kHz,

Selectable via front panel switches. Custom cutoff frequencies available. Consult factory.

**Cutoff Frequency Amplitude:**  $-3.01$  dB

**Pass-Band Accuracy:**  $\pm 0.2$  dB maximum to  $0.8 F_C$

**Amplitude Match:**  $\pm 0.2$  dB maximum to  $0.8 F_C$

**Phase Match:**  $\pm 2^{\circ}$  max to  $0.8 F_C$

## KSC-1 OUTPUT CHARACTERISTICS

**Type:** DC coupled, single-ended output

**Impedance:** 10  $\Omega$

**Max Output:**  $\pm 10$  Vpk,  $\pm 10$  mA pk

**Offset:** 50  $\mu$ V RTI + 5 mV RTO adjustable to zero

### Zero Out:

25T potentiometer at front panel to provide  $\pm 2.5$  V of offset adjustment at the channel output

**Offset Drift:** 1  $\mu$ V/ $^{\circ}$ C, RTI + 150  $\mu$ V/ $^{\circ}$ C RTO, typical

**Noise:** 1.5  $\mu$ V rms RTI + 30  $\mu$ V rms RTO, 3 Hz to 25 kHz

**Crosstalk:**  $-90$  dB, DC to 25 kHz

## KSC-1 ORDERING INFORMATION

KSC-1-<Filter Type>

Filter Type: BU4 or BE4

KSC-1 Industrial Grade Signal Conditioner