SENSOR DATA SHEET

KD-2440

Noncontact
high-precision
proximity
measuring
system



KAMAN
PRECISION PRODUCTS

SENSOR DATA SHEET

KD-2440

FEATURES

- > Outstanding precision: static resolution to 12 microinches
- > Easy to calibrate
- > Low cost
- > Excellent performance with ferrous targets
- > Variable voltage input from 12 to 24 volts DC
- > Compact rugged electronics, sensors
- > Adjustable gain for up to 22 volts output (with 24 Vdc input)
- > Temperature tolerant sensors (to 400°F)
- > High speed for process control, 10HKz analog output, 3.3KHz switched output
- > Drop in replacement to Kaman's KD-2400 (with accessories kit)
- > Very low switching hysteresis, < 1% on ferrous targets



Kaman Precision Products' displacement measuring system Model KD-2440 is a noncontact proximity measuring system. This low-cost, easy-to-use system makes precision static and dynamic measurements of metal targets, and thickness measurements of non-conductive material backed by metal. Its switching output will track RPM measurement to 10 KHz.

THEORY OF OPERATION

The KD-2440 system operates on a traditional Colpitts oscillator circuit where the sensor acts as the resonating coil for the oscillator. The proximity of the target to the sensor face pulls the oscillator, changing its frequency and amplitude of modulation, and controlling a variable gain oscillator section within the electronic circuit.

The signal is half-wave rectified and filtered to obtain an analog voltage proportional to the target position or displacement. The analog voltage output can be varied by adjustment of the gain. The input power is diode protected and regulated to provide a clean low-noise signal. The output is short-circuit current protected.

APPLICATIONS

The KD-2440 may be used in a variety of applications using target materials such as ferrous or stainless steel or aluminum. Good sensitivity to small diameter targets lends itself to applications such as gear teeth counting or RPM measurement. The opto-isolated switched output makes the KD-2440 ideal for interfacing to PLC inputs, counters, timers or alarm circuits.

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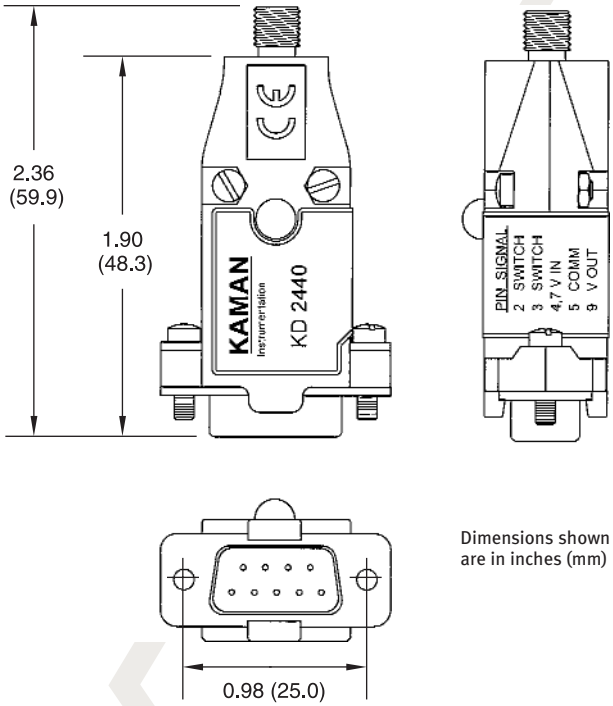
KD-2440 SYSTEM

The KD-2440 system consists of three sub-assemblies: the sensor, with integral cable, a power and output cable, and the signal conditioning or electronics module. The KD-2440 electronics use a standard DB-9 connector to bring +12 Vdc to +24 Vdc into the electronics and provide outputs for the variable voltage and switch functions. Kaman offers either the P-3410 or P-3450 power supplies. The system comes standard with one of two production sensor configurations — the 9C or the 5CM. Both of these sensors are rated to moderate temperatures and can withstand temperatures to 400° F (205° C).

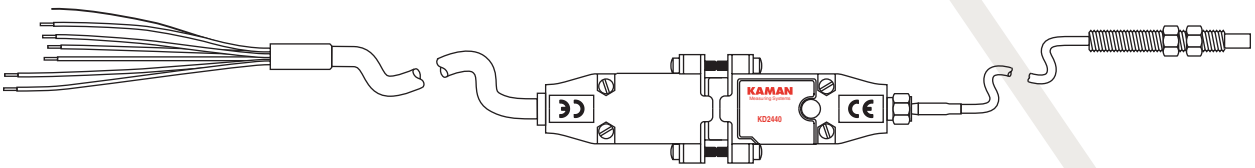
EMI PERFORMANCE

The KD-2440 conforms with the applicable standards of Council Directive for *Generic for Light Industrial and Commercial Use*. Under some EMI environments, at specific frequencies, the KD-2440 unit may experience a change in output voltage. In general, when exposed to those environments covered by the EMC directive, the user can expect less than 5% deviation of output. As always, contact Kaman Precision Products for specific data or for recommended solutions to problems you are having with the KD-2440.

KD-2440 PROXIMITY MEASURING ELECTRONICS



Dimensions shown are in inches (mm)



ORDERING INFORMATION

KD-2440-9C	Complete system, 9C sensor, electronics and power/output cable	P/N 854979-002
KD-2440-9C-DIN	Complete system, 9C sensor, electronics and DIN interface module	P/N 854979-003
KD-2440-5CM	Complete system, 5CM sensor, electronics and power/output cable	P/N 854980-002
KD-2440-5CM-DIN	Complete system, 5CM sensor, electronics and DIN interface module	P/N 854980-003

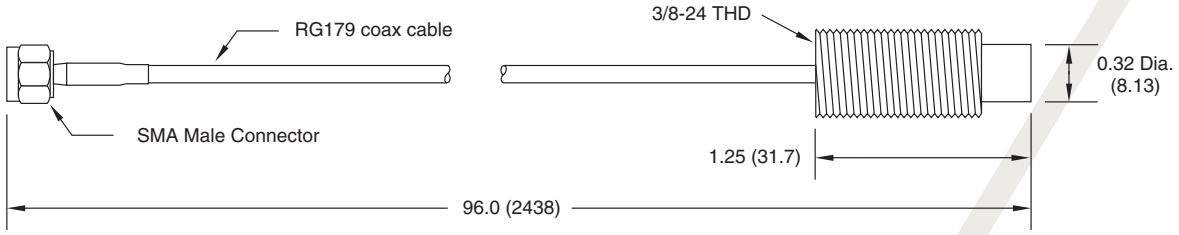
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KD-2440 SENSORS

9C SENSOR

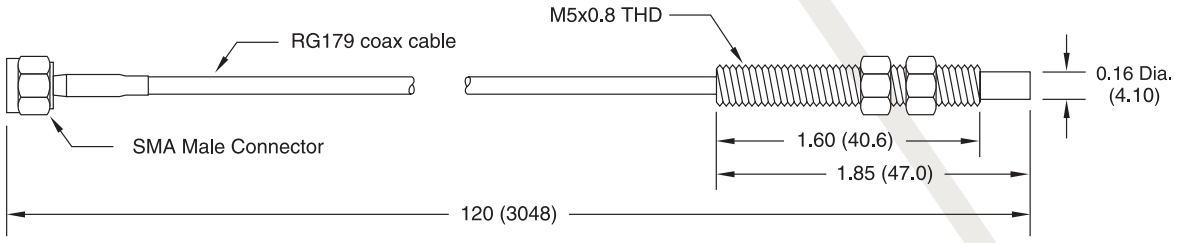


Dimensions shown
are in inches (mm)

ORDERING INFORMATION

9C sensor	P/N 851166-008
Electronics only	P/N 854975-000

5CM SENSOR



Dimensions shown
are in inches (mm)

ORDERING INFORMATION

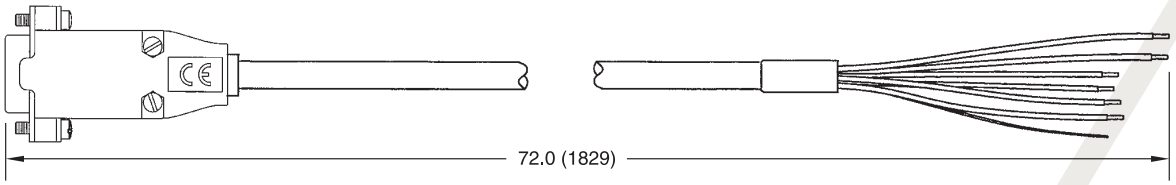
5CM sensor	P/N 851520-004
Electronics only	P/N 854975-000

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POWER/OUTPUT CABLE



Dimensions shown
are in inches (mm)

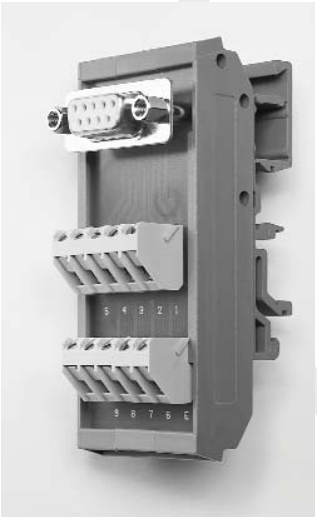
ORDERING INFORMATION

Power/output cable P/N 854981-072

MOUNTING OPTION: DIN MOUNT INTERFACE MODULE

FEATURES

- Easy retrofit into existing equipment and electronics enclosures
- DB9 connector mates directly to the KD-2440
- Terminal strip connections for power input, analog voltage output and switched output



ORDERING INFORMATION

DIN interface module P/N 826721-005

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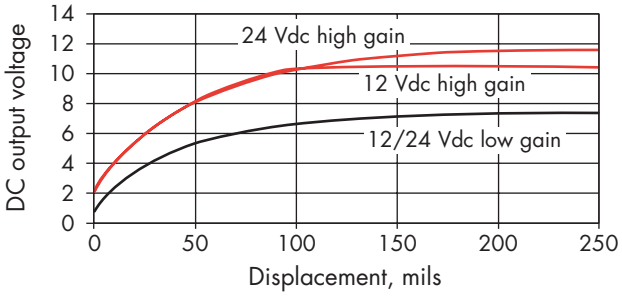
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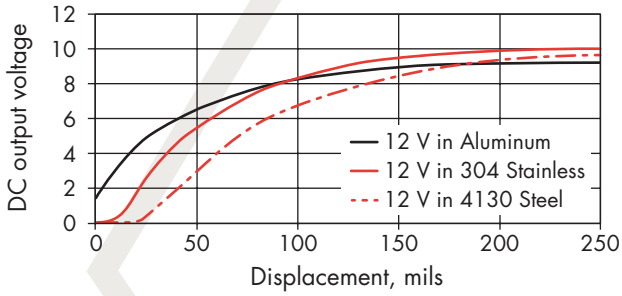
9C SENSOR SPECIFICATIONS AND RESPONSE DATA

TARGET MATERIAL	9C SENSOR MEASURING RANGE
Non-ferrous (aluminum)	0 - 0.175 in. (0 - 4.45 mm)
Non-magnetic steels (304 stainless)	0.025 - 0.200 in. (0.64 - 5.08 mm)
Magnetic steels (4130)	0.040 - 0.275 in. (1.02 - 6.99 mm)

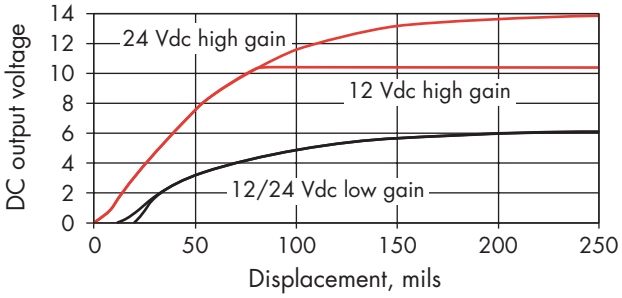
Aluminum output for 12 and 24 volt inputs



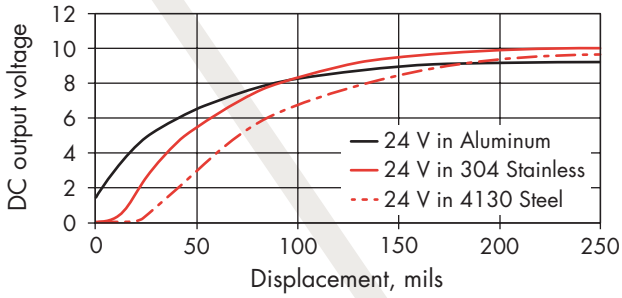
Outputs at medium gain and 12 volt input



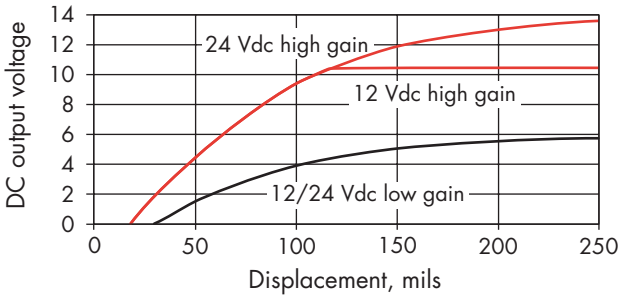
304 SS output for 12 and 24 volt inputs



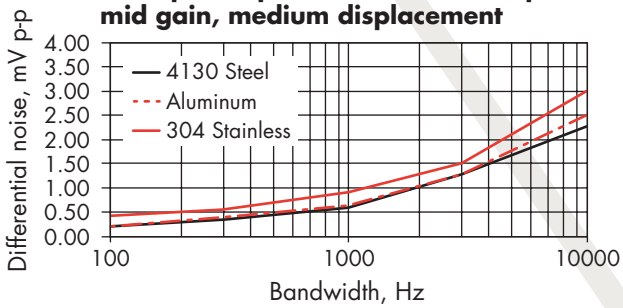
Outputs at medium gain and 24 volt input



4130 steel output for 12 and 24 volt inputs



Example output noise @ 12 Vdc input, mid gain, medium displacement



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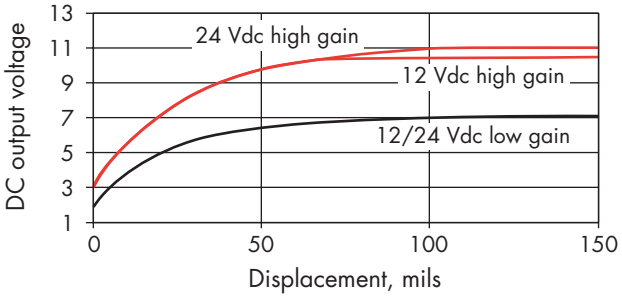
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KD-2440 SENSORS

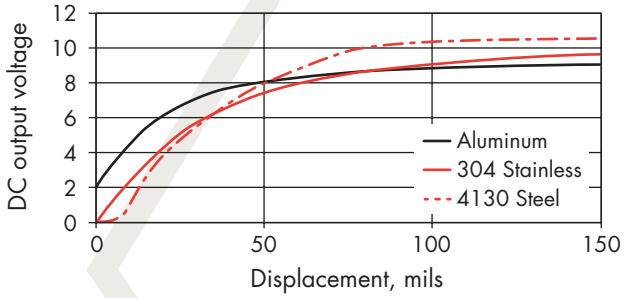
5CM SENSOR SPECIFICATIONS AND RESPONSE DATA

TARGET MATERIAL	5CM SENSOR MEASURING RANGE
Non-ferrous (aluminum)	0 - 0.100 in. (0 - 2.54 mm)
Non-magnetic steels (304 stainless)	0.010 - 0.125 in. (0.254 - 3.18 mm)
Magnetic steels (4130)	0.015 - 0.150 in. (0.38 - 3.81 mm)

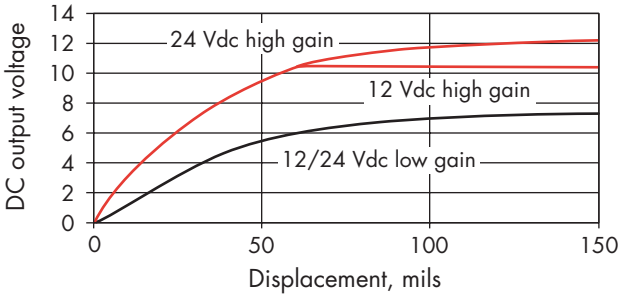
Aluminum output for 12 and 24 volt inputs



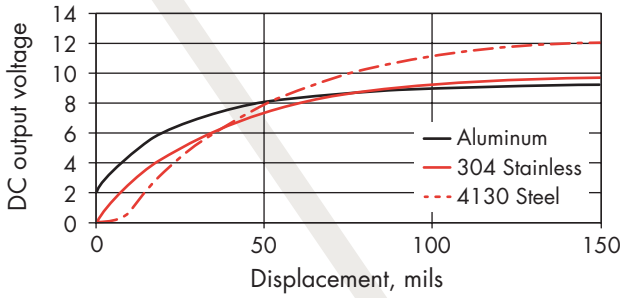
Outputs at medium gain and 12 volt input



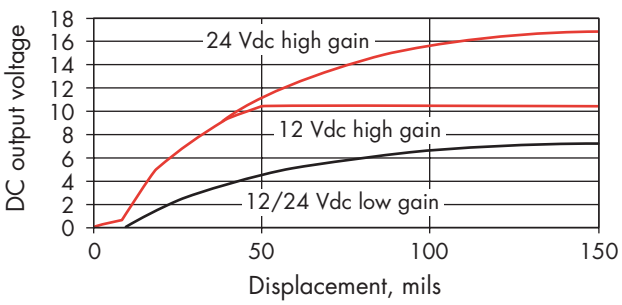
304 SS output for 12 and 24 volt inputs



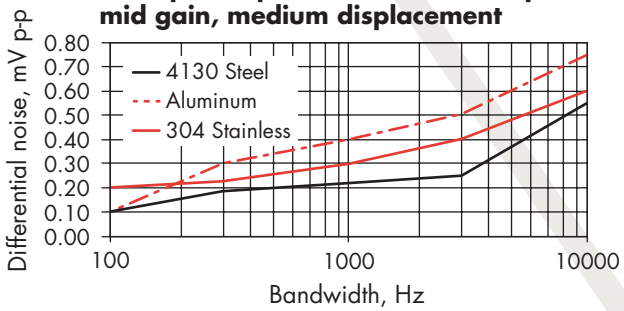
Outputs at medium gain and 24 volt input



4130 steel output for 12 and 24 volt inputs



Example output noise @ 12 Vdc input, mid gain, medium displacement



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SPECIFICATIONS

ELECTRICAL

INPUT

Voltage	Regulated 12 Vdc to 24 Vdc
Current	Fuse limit input current from power source to 11 mA, 0.28W maximum at full load

ANALOG OUTPUT

Current (full load)	4.2 mA maximum
Impedance	50 ohms
Voltage	0-22 Vdc minimum with 24 Vdc input; 0-10 Vdc minimum with 12 Vdc input
Frequency response	0-10 KHz (± 3db)

SWITCHED OUTPUT

Load current	100 mA maximum AC or DC
Load voltage	30 V r.m.s., 42.4 V peak, or 60 Vdc
On resistance	30 ohms minimum / 50 ohms maximum
Switch point hysteresis	0.56% of full scale for 9C sensor, and 0.97% of full scale for 5CM sensor using 24 Vdc input on 4130 steel
Frequency response	3.3 KHz

RESOLUTION

Less than .008% of measuring range using a 5CM sensor on a 4130 steel target at mid scale, mid gain, and 12 Vdc input

ENVIRONMENTAL

OPERATING TEMPERATURE RANGE

Sensor and cable	0°F to +400°F (-18°C to +205°C)
Electronics	+32°F to +150°F (0°C to +66°C)

STORAGE TEMPERATURE RANGE

Sensor and cable	-60°F to +400°F (-52°C to +205°C)
Electronics	-58°F to +212°F (-50°C to +100°C)

THERMAL DRIFT

Less than 0.22% per °C of full scale for sensor, electronics or system

IP RATING

Sensor	IP67
Electronics	IP40

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