Table of Contents

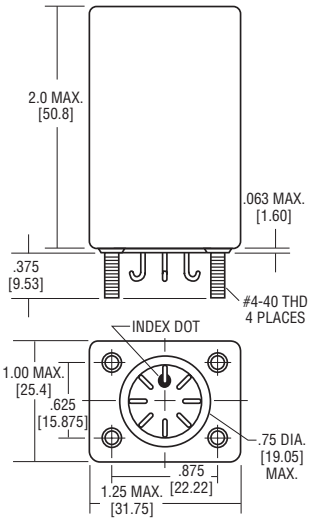
1310 Series DC Voltage Level Sensor, Relay Output

Product Facts

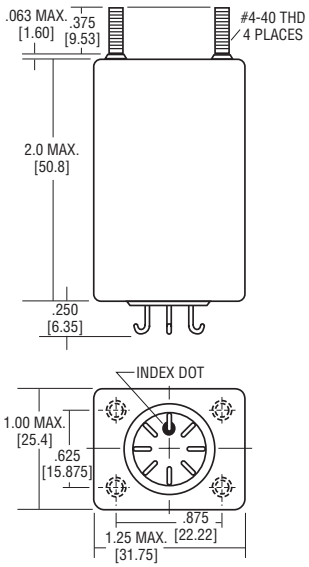
- Standard models combine DC voltage-sensing circuit with 2A DPDT output relay
- Various applications
  - Battery protection
  - Computer protection
  - Low or high voltage alarms
- Many customizing options
  - Solid state output
  - Two-stage sensing (voltage band)
  - Up to 10A relay output
  - Controlled dropout differential
  - Operate with auxiliary control voltage
  - Time delay on trip point
  - Tighter accuracy
  - Different package, mounting, header

The KILOVAC 1310 series DC voltage sensor is essentially a voltage monitoring device operating a snap-action transistor circuit with low drift and inherent temperature compensation. This device will either open or close a circuit when a predetermined voltage is present at the input. By using a KILOVAC electromechanical relay as the output of the voltage sensor, a positive switching action can be achieved with very close differential between pull-in and drop-out voltages. The unit is potted and hermetically sealed and is designed to meet the environmental requirements of MIL-R-83726.

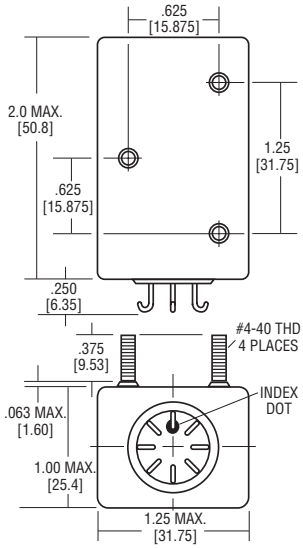
Outline Dimensions



Mounting Option A



Mounting Option B



Mounting Option C

Electrical Specifications

Pull-In Voltage — Any voltage level between 10 to 150Vdc

Drop-Out Voltage — 0 to 0.5V below pull-in voltage

Current Drain — 15mA max @ 25°C

Accuracy — ±2.5% of set point over temperature range

Max. Allowable Applied Voltage — 150% of specified pull-in voltage

Auxiliary Voltage — None required

Operate and Release Times — 50ms max. over the temperature range

Contact Arrangement — 2 Form C (DPDT)

Contact Rating —
2 amps resistive @ 30Vdc
300mA resistive @ 115 Vrms, 400 Hz

Environmental Specifications

Temperature Range —
-55°C to +125°C

Vibration — 20 G's, 10 - 2,000 Hz

Shock — 50 G's, 11 ± 1ms duration

Insulation Resistance — 1,000 megohms, min., at 500Vdc, all terminals to case

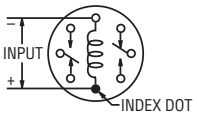
Dielectric Strength — 1,000Vrms, 60 Hz., at sea level, all terminals to case

Sealing — Hermetic, 1.3 in. (33.0mm) of mercury

Life — 100,000 operations, min.

Weight — 3.5 oz (99.2g) max.

Wiring Diagram



Part Numbering System

Typical Part Number	1310	- 2	A	- 24.5

Series:
1310 = DC Voltage Level Sensor, Relay Output

Contact Form:
2 = 2 Form C (DPDT)

Mounting (see outline dimension drawings):
A = Studs on bottom B = Studs on top C = Studs on side

Pull-In Voltage:
Specify any level between 10 and 150Vdc

1350 Series AC Voltage Level Sensor, Relay Output

Product Facts

- Standard models combine AC (400 Hz.) voltage-sensing circuit with 2A DPDT output relay
- Various applications
  - Motor protection
  - Ground support equipment
  - Low or high line alarms
  - Computer protection
- Many customizing options
  - Solid state output
  - Two-stage sensing (voltage band)
  - Up to 10A relay output
  - 3 phase version
  - Controlled dropout differential
  - Operate with auxiliary control voltage
  - Under and over voltage trip
  - Time delay on trip point
  - Tighter accuracy
  - Lower trip points
  - Different package, mounting, header
  - 60 Hz. versions

Electrical Specifications

Pull-In Voltage — Any voltage level between 50 to 150Vac, 400 Hz., in 1.0 volt increments

Drop-Out Voltage — 0 to 3.0V max, (1.5V nom.) below pull-in voltage

Current Drain — 100mA max @ 25°C

Accuracy — ±2.5% of set point over temperature range

Max. Allowable Applied Voltage — 150% of specified pull-in voltage

Auxiliary Voltage — None required

Operate and Release Times — 50ms max. over the temperature range

Contact Arrangement — 2 Form C (DPDT)

Contact Rating — 2 amps resistive @30Vdc
300mA resistive @ 115 Vrms, 400 Hz

Environmental Specifications

Temperature Range — -55°C to +125°C

Vibration — 20'G,s, 10 - 2,000 Hz

Shock — 50 G's, 11 ± 1ms duration

Insulation Resistance — 1,000 megohms, min., at 500Vdc, all terminals to case

Dielectric Strength — 1,000Vrms, 60 Hz., at sea level, all terminals to case

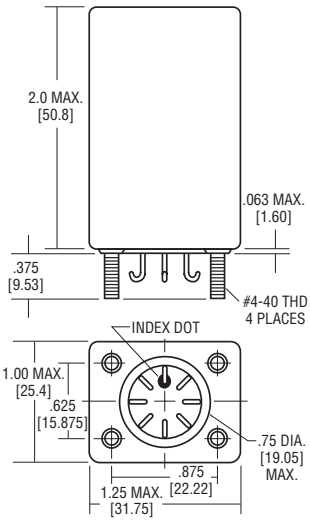
Sealing — Hermetic, 1.3 in. (33.0mm) of mercury

Life — 100,000 operations, min.

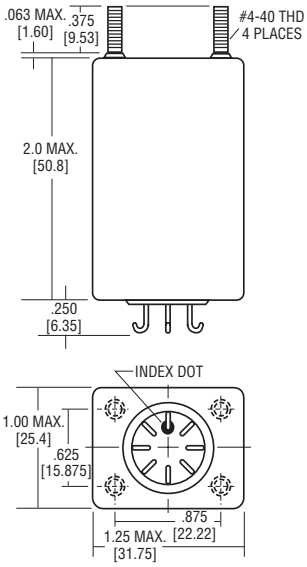
Weight: 3.5 oz (99.2g) max.

The KILOVAC 1350 series AC voltage sensor energizes a relay when the monitored power line voltage reaches a predetermined level. This rugged unit with reliable solid-state design provides precise, repeatable operation over a wide temperature range. The input voltage is fed into a temperature compensated comparator circuit. When the input reaches the preset level, transistor amplifiers switch the output relay. This output may control any external devices, process or warning system to protect expensive equipment. The unit is potted and hermetically sealed and is designed to meet the environmental requirements of MIL-R-83726.

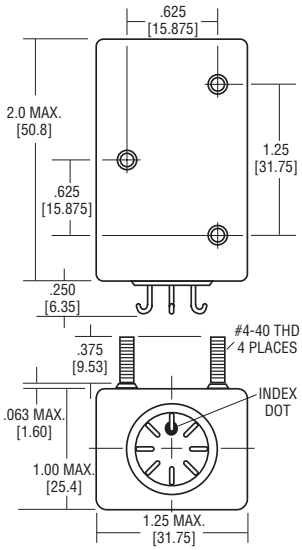
Outline Dimensions



Mounting Option A

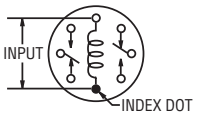


Mounting Option B



Mounting Option C

Wiring Diagram



Part Numbering System

Typical Part Number	1350	- 2	A	- 100.0

Series:
1350 = AC Voltage Level Sensor, Relay Output

Contact Form:
2 = 2 Form C (DPDT)

Mounting (see outline dimension drawings):
A = Studs on bottom B = Studs on top C = Studs on side

Pull-In Voltage:
Specify any level between 50 and 150Vac in 1.0 volt increments

1400 Series Phase Sensor 115 or 208Vac, 60 or 400 Hz., Relay Output

Product Facts

- Phase sensor for 115 or 208Vac, 60 or 400 Hz
- Up to 2A loads
- Static and motor load types
- Hermetic package
- Built to MIL-R-83726 environmentals
- Various applications
  - Motor protection
  - Brown-out protection
  - Power supply sequencing
  - Air conditioner protection
  - Ground support equipment protection
- Many customizing options
  - 50 Hz. input types
  - Contact ratings to 10A
  - Higher voltages
  - Different packages, headers and mounting

Electrical Specifications

Input Data —
Voltage — 115 or 208Vac
Frequency — 60 or 400 Hz

Operate Time (Max.) — 75 ms

Release Time (Max.) — 100 ms

Contact Arrangement — 1 Form C (SPDT)

Contact Ratings —
2A resistive @ 30Vdc
0.5A inductive @ 30Vdc
0.25A resistive or inductive @ 115 Vrms, 60 or 400 Hz

Environmental Specifications

Temperature Range —
-55°C to +85°C

Vibration — 20 G's, 10 - 2,000 Hz

Shock — 50 G's, 11 ± 1ms duration

Insulation Resistance — 1,000 megohms, min., at 500Vdc

Dielectric Strength — 1,000Vrms, 60 Hz., at sea level, all terminals to case

Sealing — Hermetic, 1.3 in. (33.0mm) of mercury

Life — 100,000 operations, min.

Weight — 12 oz (340g) max.

KILOVAC 1400 series phase sensors combine solid state sensing circuits with electromechanical output relays in robust hermetically sealed enclosures.

P-Type models are for static loads. With the line voltage and frequency are within operating limits, P-Type units will energize only when input phases are in sequence A-B-C. They will de-energize only when power is removed. The P-Type unit is best suited to applications where static loads are used and where regenerated voltage will not be present if a phase opens.

Q-Type units perform the same function as the P-Type since they will energize only when input phases are in sequence A-B-C. In addition, the Q-Type unit will de-energize when any phase is disconnected or grounded, provided the voltage input to the unit is below 50% of the nominal phase-to-phase voltage input. Q-Type units are suitable for motor loads where regenerated voltage is produced.

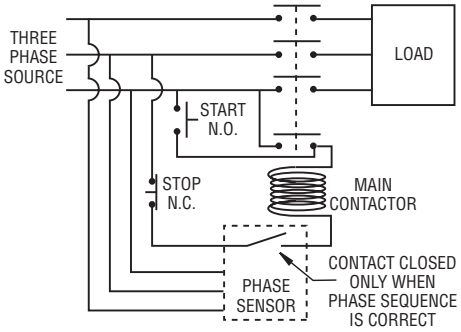
Neither P-Type nor Q-Type units require connection to the neutral leg.

For high-current applications, phase sensors are used with slave relays having heavy duty contact ratings.

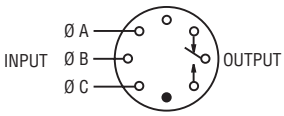
Specifications by Model Number

Fixed Timer Model Number	Load Type	Line to Line Voltage ±10%	Frequency ±10%	Max. Power Required	Mounting Style Figure
1407	P	115V	60 Hz.	4 Watts	3
1408	P	115V	400 Hz.	4 Watts	1 or 3
1409	P	208V	60 Hz.	6 Watts	3
1410	P	208V	400 Hz.	6 Watts	3
1437	Q	115V	60 Hz.	6 Watts	2
1438	Q	115V	400 Hz.	6 Watts	3
1439	Q	208V	60 Hz.	9 Watts	4
1440	Q	208V	400 Hz.	9 Watts	4

Typical Applications Connections



Wiring Diagram



Part Numbering System

Typical Part Number	1408	–1	A

Model Number:
Four digit code from table above.

Output:
1 = 1 Form C (SPDT)

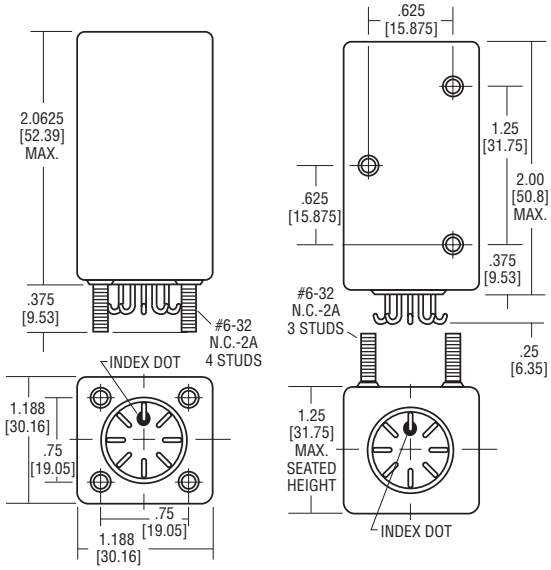
Mounting (see outline dimension drawings):
A = Studs on bottom B = Studs on top, except bracket on bottom for 1439 and 1440 C = Studs on side

A typical part number would be 1408–1A. This is a 115Vac, 400 Hz., "P" type phase sensor with a 1 form C (SPDT) contact arrangement in a style "A" mounting.

1400 Series Phase Sensor 115 or 208Vac, 60 or 400 Hz., Relay Output (Continued)

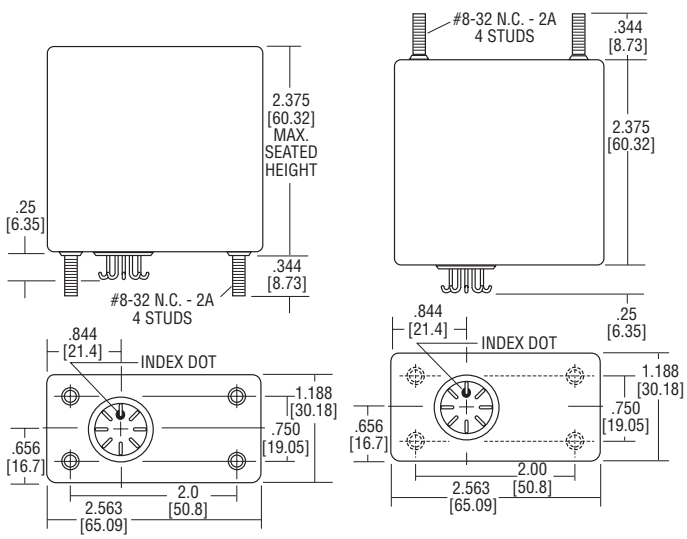
Outline Dimensions

Figure 1
Applicable to 1408



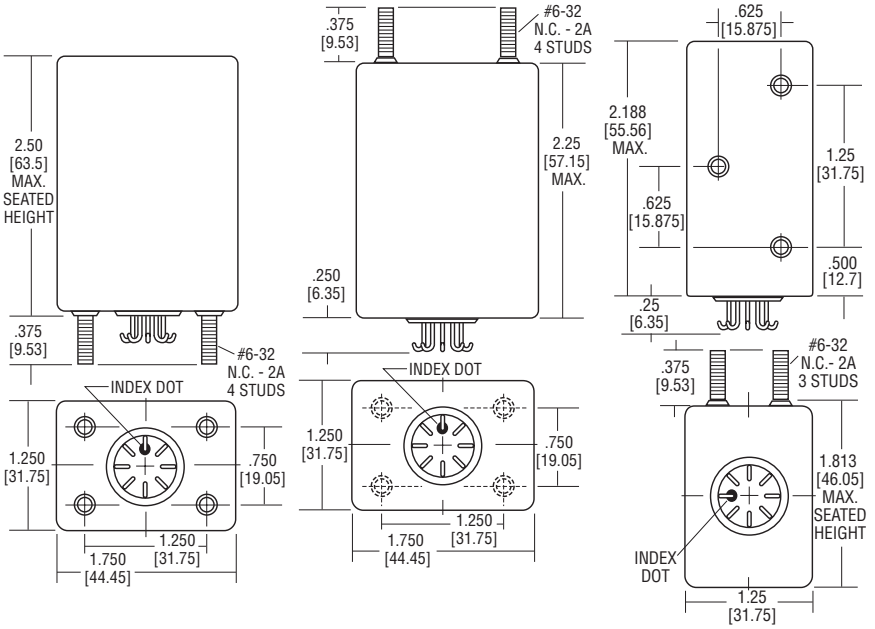
Mounting Option A | Mounting Option C

Figure 2
Applicable to 1437



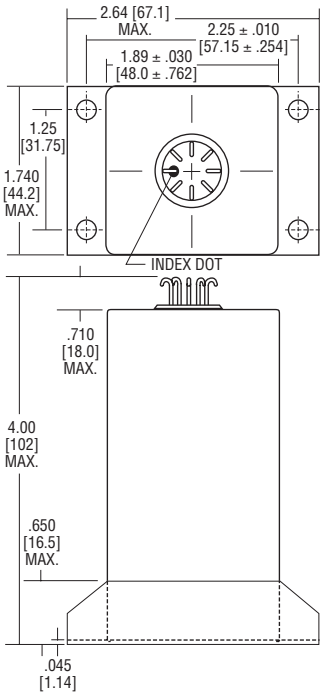
Mounting Option A | Mounting Option B

Figure 3
Applicable to 1407, 1409, 1410, 1438 and 1408 "B" revision only



Mounting Option A | Mounting Option B | Mounting Option C

Figure 4
Applicable to 1439 and 1440



Mounting Option B

7000 Series Frequency Sensor

Product Facts

- 320 to 480 Hz. frequency sensor
- 1 or 2 Form C (SPDT or DPDT) contacts
- Hermetic package
- Many customizing options
  - 50 or 60 Hz. Sensing
  - Dual trip points
  - Tighter accuracy
  - Enclosures
  - Higher temperature range
  - Up to 4 Form C (4PDT)
  - 10A contacts

KILOVAC 7000 series frequency sensor utilizes an integrated circuit digital logic design to determine, cycle by cycle, whether a given input signal is within a predetermined frequency pass band. Typical application is in monitoring MIL-STD-704 power systems.

Part Numbering System

Typical Part Number	7000	–2	B	– 380

Model Number:
7000 - Frequency Sensor.

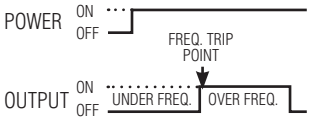
Contact Arrangement:
1 = 1 Form C (SPDT) 2 = 2 Form C (DPDT)

Mounting (see outline dimension drawings):
A = Studs on bottom B = Studs on top C = Studs on side

Frequency Trip Point:
Three-digit code for any value between 320 Hz. and 480 Hz.

A typical part number would be 7000-2B-380. This would be a sensor with a 2 form C (DPDT) contact arrangement in a style "C" mounting, with a 380 Hz. trip point for -55°C to +85°C temperature range .

Function Diagram



Electrical Specifications

Input Voltage — 95 to 135Vac, 400 Hz

Frequency Range — 320 to 480 Hz

Accuracy — ± 2%

Contact Arrangement — 1 Form C (SPDT) or 2 Form C (DPDT)

Contact Ratings — 4A resistive @ 30Vdc
2A resistive @ 115 Vrms, 400 Hz

Current Drain — 150mA maximum

Hysteresis — 0.5% from trip point

Environmental Specifications

Temperature Range — -55°C to +85°C

Vibration — 20 G's, 10 - 2,000 Hz

Shock — 50 G's, 11 ± 1ms duration

Insulation Resistance — 1,000 megohms, min., at 500Vdc, all terminals to case

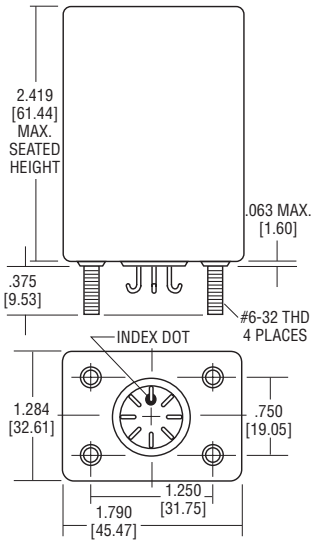
Dielectric Strength — 1,000Vrms, 60 Hz., at sea level, all terminals to case

Sealing — Hermetic, 1.3 in. (33.0mm) of mercury

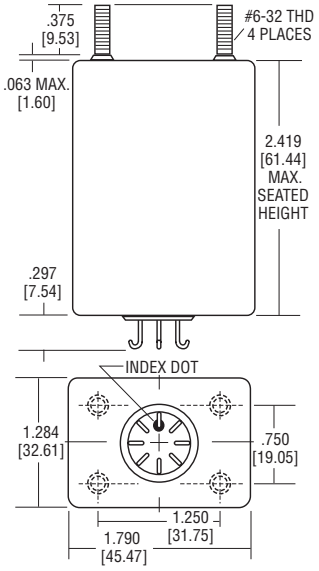
Life — 100,000 operations, min.

Weight — 8.5 oz (240g) max.

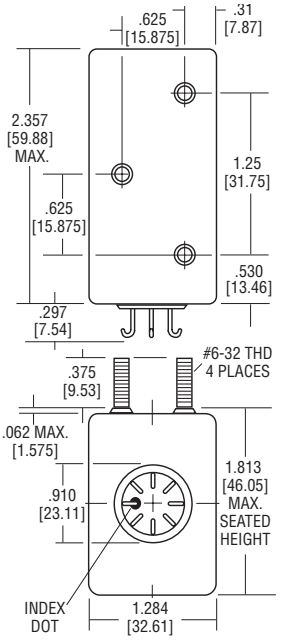
Outline Dimensions



Mounting Option A

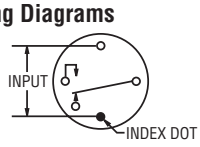


Mounting Option B

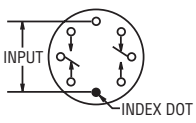


Mounting Option C

Wiring Diagrams



1 Form C



2 Form C