

# Models 415-215 and 425-252 Voltsensors

## Description

For process control systems and manufacturing test equipment, here is a complete Voltsensor system in a single package—no external components needed, just connect it to 115 VAC for power. These modules contain a DC power supply, reference voltage, adjustable setpoint, and the output is a DPDT relay. A LED indicator shows output status. The relay changes state as the DC input voltage varies around the set point. Because the unit has its own built-in power supply and the output is a set of relay contacts, you can apply floating inputs with voltages of up to 1500V above the AC line neutral. This isolation makes it feasible to connect ungrounded thermocouples directly to the amplifier inputs.

The modules are epoxy potted for ruggedness and they can operate over a temperature range of 0° to 50°C. The inputs are protected against damage due to overvoltage. When you need an alarm or control circuit in a rugged industrial environment where  $\pm 15\text{VDC}$  power is not readily available, then these Voltsensors are an excellent choice. Small process control systems involving temperature control, weighing, and monitoring can easily be designed using these reliable, low-cost modules. No complicated wiring, simply connect input and output with a screwdriver and the control system is ready to operate.

## Model 425-252

Model 425-252 has a trip range of  $-14\text{VDC}$  to  $+14\text{VDC}$  relative to the module common. Hysteresis is adjustable from 50 mV to 1 Volt, and sensitivity is 1 mV, so this module should be used on signals with several volts of amplitude. The input signal can be floating and the isolation from AC neutral is 500 megohm paralleled by 250 pF. With the latching jumper removed, the module will latch when the relay goes to the energized state. The latching state is broken by interrupting the AC line voltage to the module or momentarily reconnecting the latch jumper.

Turning the set point adjustment potentiometer clockwise makes the set point more positive. Turning the hysteresis adjustment potentiometer clockwise increases the voltage difference between pull in and drop out.

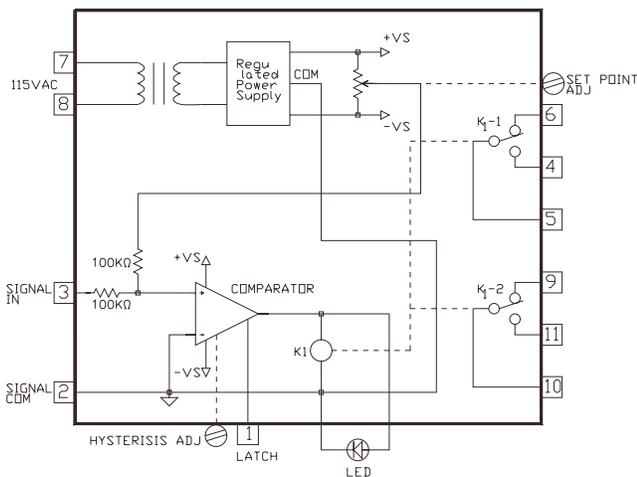


FIGURE 1-a. Simplified Block Diagram, Model 425-252

Turning the set point adjustment potentiometer clockwise makes the set point more positive. Turning the hysteresis adjustment potentiometer clockwise increases the voltage difference between pull in and drop out.

## Model 415-215

Model 415-215 is designed to accept low-level signals, such as strain-gage bridge outputs and floating thermocouple signals. Trip point range is  $\pm 100\text{mV}$  relative to the module common. The input signal can have up to  $\pm 6\text{V}$  common-mode voltage relative to module common, and all three input leads are isolated from ground (500 megohm in parallel with 200 pF). Floating inputs with voltages up to 1500V above the AC line neutral can be accommodated by this module. Latching and adjustable hysteresis from 50  $\mu\text{V}$  to 1 mV operate in the same manner as the 425-252.

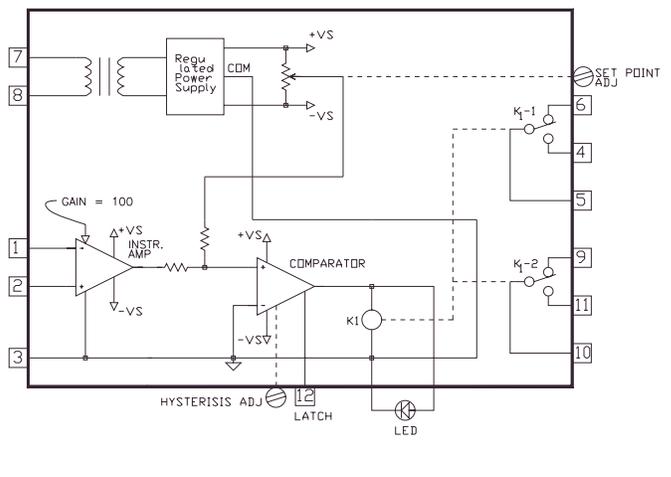


FIGURE 1-b. Simplified Block Diagram, Model 415-215

# Models 415-215 and 425-252 Voltsensors

## Specifications

Model	425-252	415-215
<b>Input</b>		
Trip Point Range	-14V to +14V	-100 mV to +100mV [1]
Trip Point Stability	$\pm 100 \mu\text{V}/^\circ\text{C}$	$\pm 5 \mu\text{V}/^\circ\text{C}$
Sensitivity & Repeatability	1 mV	20 $\mu\text{V}$
ON/OFF Differential (Hysteresis or dead band) Adjustable	50 mV to 1V	50 $\mu\text{V}$ to 1 mV
<b>Input Impedance</b>		
Differential	100 kohm	10 megohm
Common-Mode (Relative to AC In)	500M 250 pF	500M 250 pF
<b>Max. Input Voltage</b>		
Relative to Module Common	$\pm 200\text{V}$	$\pm 25\text{V}$
Relative to AC Input Neutral	$\pm 1500\text{V}$	$\pm 1500\text{V}$
<b>Output Rating</b>		
Relay Contacts (DPDT) (Resistive Load)	5A @ 26 VDC 3A @ 115 VAC 2A @ 220 VAC	
<b>Response Time</b>		
Relay Pull-in Time	30 ms	
Relay Relax Time	10 ms	
<b>Power Requirements</b>		
	100,115,220,230, or 240 VAC, 50 - 440 Hz (3 Watts) Add voltage to model # (ex. 425-252-230)	
<b>Temperature Range</b>		
	0° - 50°C	
<b>Size</b>		
Inches	3.75" x 2.0" x 2.87"	
Centimeters	9.53 x 5.1 x 7.62	
<b>Weight</b>		
	18 oz. (510gm)	

[1] Differential input range of -100 mV range with common-mode voltage of up to +6V relative to the module common.

## Operation

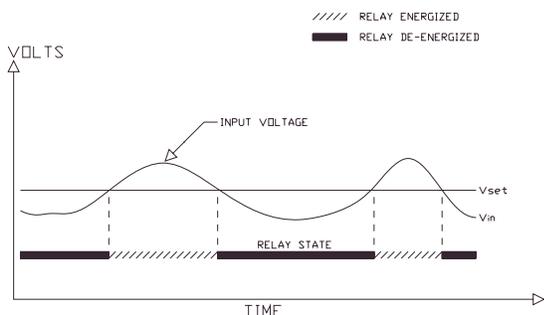
The Industrial Voltsensors consist of a DC power supply, reference voltage, adjustable set-point comparator, and DPDT relay-all in a rugged epoxy-potted module. As shown in Figures 1-a and 1-b, 115VAC is rectified to power the comparator and provide a reference voltage for the set point. This set point is adjustable by means of a multi-turn, high-resolution cermet pot located next to the barrier strip. The comparator consists of a differential amplifier (415-215 only), summing network, buffer amplifier, DC amplifier, trigger circuit and an emitter follower which provides the necessary output to drive the DPDT relay. An LED indicates when the relay is energized. Output logic of the Models 425-252 and 415-215 is shown in Figure 2. The relay is energized in both units when the input voltage is more positive than the set voltage. Fail-safe operation is achieved by operating the unit with the relay normally energized. This way a change in relay state will occur if the input voltage drops below the set voltage or if

115VAC power is suddenly lost. By exchanging the input signal leads, the output logic can be reversed on the 425-252. The relay would then be energized when the input voltage is more negative than the set voltage. The module common is isolated from ground so either signal input can be designated as the system common.

## Latching

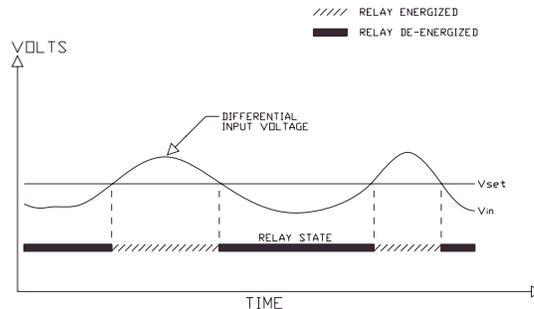
Both models can be operated as latching units. When the input voltage is more positive than the set voltage for no less than 10msec the relay will latch in the energized state. The relay will remain latched even if the output voltage becomes more negative than the set voltage. To unlatch the relay, the AC line voltage to the unit must be interrupted for at least 100msec or the jumper reconnected, and the input voltage must be more negative than the set voltage. An external switch can be used in place of the latch jumper for ease of resetting.

**Model 425-252 Operation**



NOTE: With latching option, relay latched in energized state.

**Model 415-215 Operation**



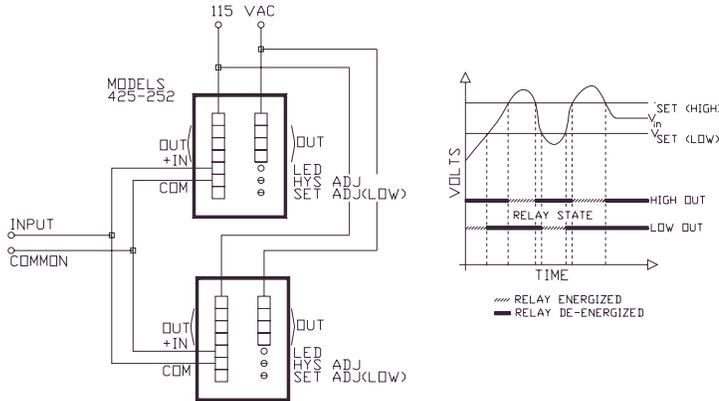
**FIGURE 2. Output Logic**

# Models 415-215 and 425-252 Voltensors

## ON/OFF Differential (Hysteresis)

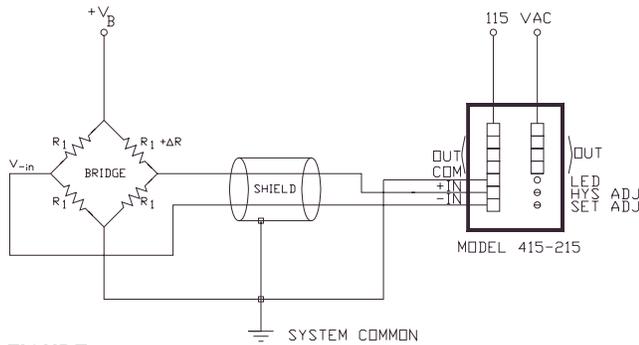
Both units have adjustable ON/OFF differential (hysteresis or dead band). This is the difference between the voltage at which the unit switches on with a positive going signal and the voltage at which the unit switches off with the same signal going in the opposite direction back through the set point. The hysteresis is adjustable from 50 mV to 1 V on the Model 425-252 and 50  $\mu$ V to 1 mV on the Model 415-215. Increasing the hysteresis (turning the pot clockwise) will provide improved noise immunity at the expense of lesser sensitivity.

## Applications



Inputs are exchanged to obtain reverse output logic.

**FIGURE 3.**  
Two Models, 425-252, Connected as a Single Input, Dual Set Point, Dual Output Window Comparator.



**FIGURE 4.**  
Model 415-215 Connected as a Bridge Amplifier and Comparator.

## Installation

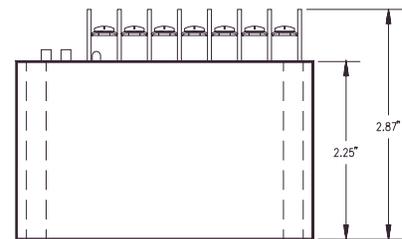
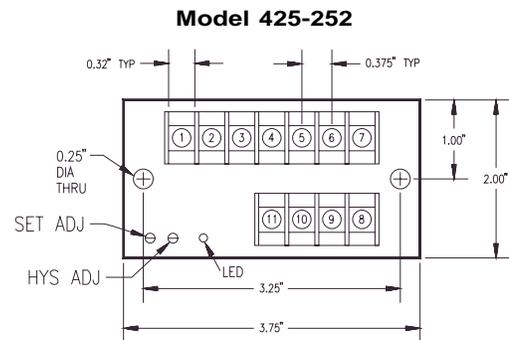
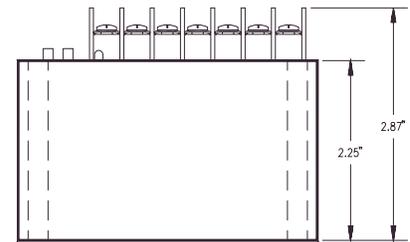
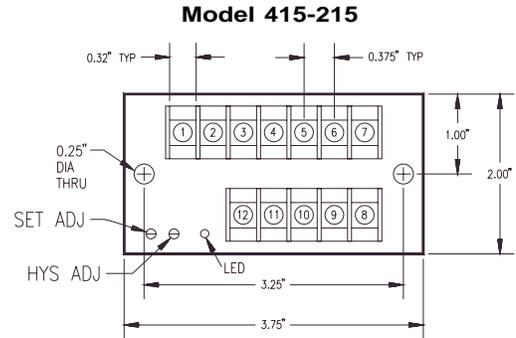
All connections can be made to the terminal strips with a screwdriver. Mounting hardware is supplied with each unit. This hardware consists of two #10-32, 3-inch long screws and mating #10-32 nuts and washers.

To adjust the set point, an input signal is connected to the Voltensor. The input is then adjusted to the desired set point voltage and the Voltensor pot is turned until the relay changes state (LED goes on or off).

## Input Impedance

Differential Input Impedance is defined as the impedance between the two input terminals. Common-Mode Input Impedance, in the case of the Industrial Voltensors, is defined as the impedance between the shorted input terminals and AC input neutral. This impedance is essentially the power transformer impedance, as shown in Figure 1. Because of the built-in power supply and relay output, floating inputs with voltages up to 1500V above or below the AC line neutral can be accommodated by this module.

## Mechanical Specifications



Mounting hardware and latch jumpers are supplied with each module.