

## Programming Sure-Aire™

Venco's Sure-Aire™ Differential Pressure Controller provides either a 2-10 Vdc or 4-20 mA electrical output signal. The output signal is linearly proportional to the pressure range of differential pressure controller. The ranges for Venco's Sure-Aire controllers are listed in the table.

Venco Part Number		Controller ΔP Range (inches W.C.)	P <sub>max</sub> (inches W.C.)
100-240 VAC	24 VAC / VDC		
384799	384986	0-8.30	8.30
384800	384987	0-22.14	22.14
384801	384988	0-41.52	41.52
384802	384989	0-83.04	83.04
384803	384990	0-138.40	138.40

## Calculating Flow from Differential Pressure

The volumetric flow through the fan (cfm) can be calculated from the equation:

$$CFM = K \sqrt{\frac{\Delta P}{\rho}}$$

where K is the K-factor for the specific fan model and size, ΔP is the measured differential pressure across the inlet cone (inches W.C.), and ρ is the air density (lb/ft<sup>3</sup>). K-factors for Venco models are found on the back of this document.

## Calculating Flow from Voltage Signal

If using a 2-10 Vdc output signal from a differential pressure controller, this equation can be used to calculate the flow:

$$CFM = K \sqrt{\frac{(V - 2) P_{max}}{8\rho}}$$

where V is the output voltage of a 2-10 Vdc transmitter and P<sub>max</sub> is the maximum pressure range of the controller being used (inches W.C.).

## Calculating Flow from Current Signal

If using a 4-20 mA output signal from a differential pressure controller, this equation can be used to calculate the flow:

$$CFM = K \sqrt{\frac{(mA - 4) P_{max}}{16\rho}}$$

where mA is the output current of a 4-20 mA transmitter and P<sub>max</sub> is the maximum pressure range of the controller being used (inches W.C.).

## Density Corrections

Air density, ρ, is affected by elevation and temperature. The Sure-Aire Differential Pressure Controllers allow the user to input the elevation for the application. This elevation input automatically updates the density used for the flow calculation.

The Remote Temperature Sensor will adjust the air density value in the controller based on the sensor measurement when Temperature Compensation is set to 'Yes'. This density compensation will affect the flow rate displayed on the controller. If Temperature Compensation is set to 'No', the air density value will be a function of standard air (70°F/21°C).

The density being used by the Sure-Aire controller can be viewed on the main menu by scrolling up or down through the settings.

## K-Factors

Size	VCSW VUSF-400	VJHP	VQEI / VQEID
7	179	259	not applicable
8	179	252	not applicable
9	179	248	408
10	179	202	not applicable
12	244	296	408
13	296	351	not applicable
15	366	431	603
16	443	531	724
18	542		897
20	651		1088
22	805		1321
24	976		1631
27	1186		1962
30	1464		2400
33	1771		2923
36	2167		3576
40	2635		4331
44	3220		5318
49	3905		6525
54	4786		7891
60	5855		9648
66	7084		not applicable
73	8667		not applicable

## Our Commitment

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*As a result of our commitment to continuous improvement, Venco reserves the right to change specifications without notice.*

