

# AS40 SERIES

## Mass Flow Sensors with Analog output



**AARON INSTRUMENTS**  
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### DESCRIPTION

AS40 features third-generation thermal flow die, benefiting from the latest innovations in microfabrication. The sensor die uses a pair of thermopiles to detect changes in temperature gradient caused by mass flow, delivering excellent signal-to-noise and repeatability. The “solid state” thermal isolation structure on the sensor die eliminates the need for surface cavity or fragile membrane used in competing technologies, making the sensor resistant to clogging and pressure shock.

The AS40 series includes the analog output AS40V and the digital I<sup>2</sup>C output AS40D.

The supported max flow rates range from 12 SLM to 300 SLM. The sensors are temperature compensated over the temperature range of 0 to 50 °C. The linearized output provides maximum flexibility and ease-of-use.

### APPLICATIONS

- Oxygen concentrators
- Respirators and ventilators
- Nebulizers
- CPAP equipment
- Anesthesia delivery
- Leak detection
- Spectroscopy
- Mass flow controller
- Fuel cell control



### FEATURES

- Unsurpassed performance in a robust and cost effective package
- “Solid state” sensing core (no surface cavity or fragile membrane) resistant to clogging and pressure shock
- Highly accurate (4% reading typ.)
- Fast response time (5 ms typ.)
- Linear output and temperature compensation
- Long-term stability with minimal null drift
- Wiring harness with pre-installed receptacle (analog version only)

### MAXIMUM RATINGS

- Operating Temperature: -25 to 85 °C
- Calibrated Temperature Range: 0 to 50 °C
- Storage Temperature: -40 to 90 °C
- Humidity: 0 to 100% RH, non-condensing
- Shock: 100 g peak (5 drops, 3 axis)
- Operating Pressure: 25 psi

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### SPECIFICATIONS

Test Conditions:  $V_{in}=10\pm 0.01VDC$ ,  $T_a=25^{\circ}C$ . Relative Humidity:  $40\%<RH<60\%$

SPECIFICATIONS	MIN	TYP	MAX	UNIT	CONDITIONS
AS40-03	0		12	SLM	
AS40-04	0		20	SLM	
AS40-05	0		35	SLM	
AS41-00	0		50	SLM	
AS41-01	0		100	SLM	
AS41-02	0		150	SLM	
AS41-03	0		200	SLM	
AS41-04	0		300	SLM	
AS41-05	0		250	SLM	
Output Voltage (V) <sup>2</sup>	1 to 5			VDC	
Null Voltage (V)	0.95	1	1.05	VDC	
Output Count (D)	256 to 16124			Count	
Null Count	156		356	Count	
Null Drift			0.2	% F.S.	Per year
Repeatability		0.1		% F.S.	
Accuracy <sup>3</sup>		1%		F.S.	0 to 25% F.S.
		4%		Reading	25 to 100% F.S.
Resolution (D)		14		Bit	
Response Time <sup>4</sup>		5		mSec	
Supply Voltage (V)	6	10	16	Vdc	
Supply Voltage (D)	4.75		16	Vdc	
Current		21	26	mA	
Wetted Materials	Silicon carbide, epoxy, PPE+PE, FR4, and silicone as static seal				

1. SLM: standard liter per minute. Standard conditions:  $0^{\circ}C$  and 1 atmosphere.
2. V refers to the analog version of AS40, and D refers to the digital I2C version.
3. Maximum deviation in output from nominal over the entire calibrated flow range and temperature range. Errors include offset, full scale span, linearity, flow hysteresis, repeatability and temperature effects over the compensated temperature range.
4. 10% to 90% rise time of the flow sensor to electrically respond to any mass flow change. May be affected by the pneumatic interface.

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## OUTPUT DESCRIPTION

### For AS40V

Flow Rate =  $[(V_{out} - 1 V) / 4 V] \times \text{Full Scale Flow Rate}$

For example, for AS41-01V full scale flow rate is 100 SLM. When  $V_{out}$  reads 3 V, the Flow Rate is:  $[(3 V - 1 V) / 4 V] \times 100 \text{ SLM} = 50 \text{ SLM}$

### For AS40D

Flow Rate =  $[(\text{Count} - 256) / 15868] \times \text{Full Scale Flow Rate}$

For example, for AS41-01D full scale rate is 100 SLM. When digital output reads 10000, the Flow Rate is:

$[(10000 - 256) / 15868] \times 100 \text{ SLM} = 61.41 \text{ SLM}$

\*Contact us for I<sup>2</sup>C Communication app note.

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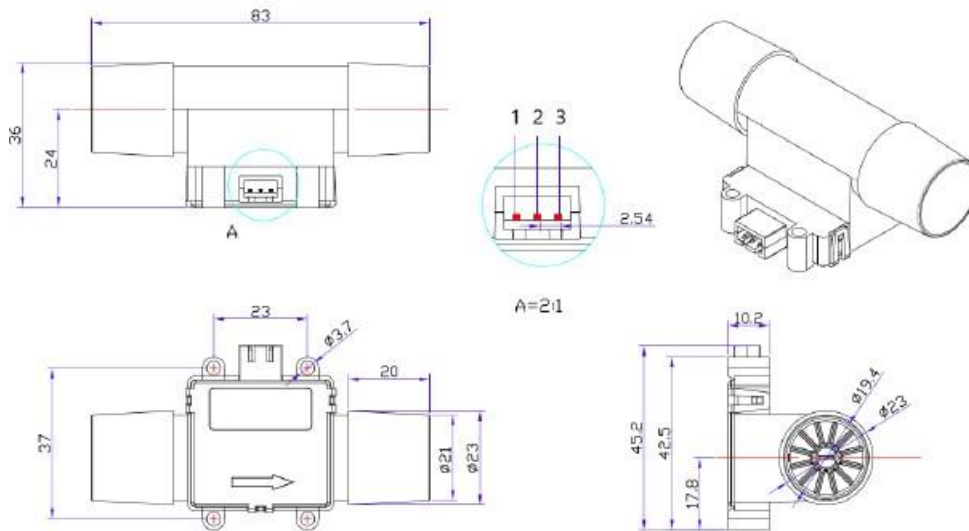
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### PACKAGE DIMENSIONS

#### AS40V

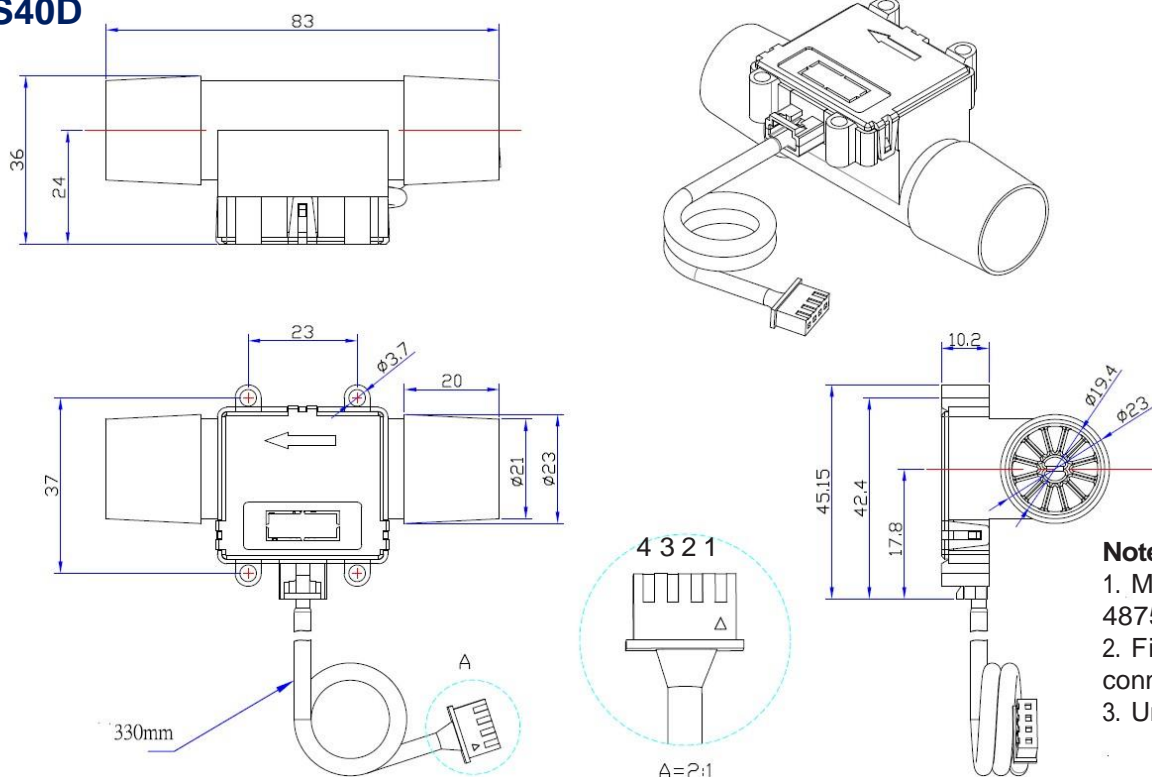


#### Notes:

1. Mating connector with 30 cm pigtail is provided
2. Colorscheme: Vout - white, Vin - red, GND - black
3. Mating connector: JST XHP-3 or Equivalent
4. Fitting: 22 mm medical connector per ISO 5356
5. Unit: mm

Please contact us for sensor CAD model

#### AS40D



#### Notes:

1. Mating connector: AMP 487545-2 or Equivalent
2. Fitting: 22 mm medical connector per ISO 5356
3. Unit: mm

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### ORDERING INFORMATION

PART NUMBER	SPECIFICATIONS
AS40-03D	12 SLM, I <sup>2</sup> C, Linear
AS40-04D	20 SLM, I <sup>2</sup> C, Linear
AS40-05D	35 SLM, I <sup>2</sup> C, Linear
AS41-00D	50 SLM, I <sup>2</sup> C, Linear
AS41-01D	100 SLM, I <sup>2</sup> C, Linear
AS41-02D	150 SLM, I <sup>2</sup> C, Linear
AS41-03D	200 SLM, I <sup>2</sup> C, Linear
AS41-04D	300 SLM, I <sup>2</sup> C, Linear
AS41-05D	250 SLM, I <sup>2</sup> C, Linear

Order 1 to 5V Analog output models by specifying “V” instead of “D” in p/n’s above. Please contact us or your local distributor to place an order.

### CUSTOMIZATION OPTIONS

If the standard product described in this datasheet does not completely meet your needs, please contact us to discuss other options. Help us understand your application and sensor requirements and we can work together to find the best overall solution.