SAV – Smart Air Valve ™

With ITAC – Intelligent Air Control ™

HVAC MANUFACTURING AND TECHNOLOGY — A BETTER WAY

A Diversified Manufacturer of Intelligent HVAC Products, Air Handling Systems, Building Technologies and Biogenic Ionization Technology.

Raising the Industry Standard!

www.hvacmfg.com

Certified SBA WOSB Woman Owned Small Business

June 29, 2021

SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

Commercial, Industrial, Laboratories, Life Sciences, Healthcare….

Introduction

The SAV™ (Smart Air Valve) is an extremely low pressure, self-balancing "true" Variable Air Volume flow measurement and flow control device. The SAV™ utilizes patented variable orifice plate technology which provides both precision air flow accuracy and flow control. Featuring high turndown throughout all air flow ranges with a single device. The SAV™ features ± 4% accuracy from 2500 fpm to 200 fpm and ± 8 fpm below 200 FPM with up to 300-1 turndown. The SAV™ can measure its own damper leakage when fully closed. The SAV™ is a simple factory pre-configured "plug and play" device with an integrated controller, sensors, and actuator. Power up the SAV™ and it will continuously self balance per the zone requirements in real time regardless of the duct pressure fluctuations. The accurate airflow performance at high turndowns and the low-pressure design, results in lower fan brake horsepower with the exact amount of air being metered into the room. High enough turndown, that one unit will do the work of many conventional terminal unit devices for all zones. Thus, mitigating costly duct transition change orders. Any future retrofit is a snap! Change the airflow setpoints and you' re done!

The SAV is certified in accordance with ASHRAE 195, 130, 135, 90.1, 62.1 standards. Because of this and the high accuracy of the units, there are no K factor adjustments required in the field such as other air flow terminal devices. The SAV™ is a true "plug and play" intelligent device with all-inclusive actuator, intelligent controller, and room peripherals. The intelligent ITAC programmable controller supports IT network with security standards and WiFib/g/n. The dual ethernet port allows for daisy chain capability. It supports BACnet IP client/server, BACnet MSTP client, and Modbus RTU slave as well as Sox, TCOM, P2P and MQTT. It also features HTML5 ready dashboards and can be programmed live via CPT. Intelligence sensor options include an Intelligent Optical Array Sensor Package that includes, CO2/VOC, temperature, humidity, occupancy, IOT, voice recognition, infrared, light levels, data logging and more!

The ITAC™ controller is part of the advanced ITAC™ system that provides total building control, with precise airflow measurement and control. The ITAC™ controller uses a proprietary advanced algorithm to get unparalleled accuracy and turndown. The controller is an open source "state of the art" controller with BACnet IOT(Internet of things) Ethernet and Wireless protocols, allowing for a seamless communication and collaboration into legacy systems or IOT platforms. Due to it' s high turndown and accuracy, a single size SAV™ can be installed at all the zones regardless of zone performance parameters. Gone are the days of tedious and laborious sizing of air terminal devices, transducers and controllers.

No longer are design engineers constrained to a small airflow performance range at high pressure drops. Originally developed for laboratory and critical environments, the SAV™ is now available for all types of commercial applications at economical price points. Get precision performance for the price of VAV terminal units! Due to it' s high turn down and flow accuracy the SAV' s™ one size fits all eliminating millions of part numbers, any size SAV™ can do the work of any size smaller unit therefore eliminating change orders due to design changes. Duct work is the same regardless of zone parameters changing. Accurate up to ± 4% down to 200 fpm, or to ± 8 fpm from less than 200 fpm to a closed damper position. Because of this, the unit is self balancing. It always knows its own airflow, from full open to full closed. No need for TAB contractors!

With operating pressure drops as low as 0.03 inH2O, all the engineer needs to take into consideration is the pressure drop of the ductwork and other airstream devices. The SAV™ keeps its minimum accuracy at all pressures. The SAV™ works in all low-pressure applications. No need for maintaining pressures of 1" or higher at the trunk or the riser! No more need for medium and high-pressure ductwork!

The SAV™ is available with standard upright and/or high-performance low profile slanted coils for heating , cooling, and combination heating/cooling packages for latent humidification zone control. All coils ship standard with project specific factory installed piping packages and control valves. Available in "project specific" 2-way, 3-way, and 6-way piping configurations. All control valve actuators and sensors are wired to the controller. Factory installed piping packages are shipped pressurized with a pressure gauge to verify a leak free operation when arriving at the job site.

Turndown high enough that one unit will do the work of many conventional terminal unit devices. Because of this and the high accuracy of the units, any future retrofit is a snap! All that needs to be done is change the airflow setpoints and you' re done!

The specified accuracies and airflow readings are for the entire unit, not just the sensor only.

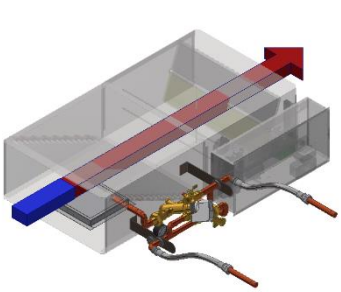
Since the SAV™ works at all operating pressures, there is nothing extra required for the ASHRAE required static pressure reset.

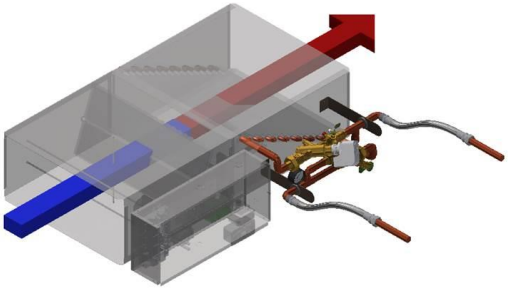
SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

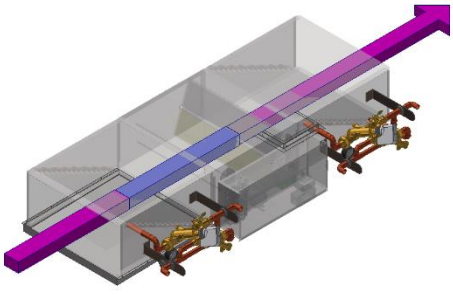
Features

- Patented Variable Orifice Plate Technology
- Precision Air Flow Measurement and Flow Control
- Flow measurement accuracies ± 4% from 2500 fpm to 200 fpm and ± 8 fpm from 200 fpm to 8 fpm.
- Extremely Low Pressure Drop
- High Turndown (300:1) one size does the job of many
- Self-Balancing in real time. No field K factor adjustments
- Commercial and Critical Environment construction
- Repeatable accuracy & open-source integration
- ASHRAE 195, 135, 90.1, & 62.1 Compliant
- The SAV™ is accurate to full closed, measures its own damper leakage!
- Mitigates change orders due to universal modular plug and play design and high turn down
- Accelerates project schedules as duct work rarely changes due to modular repeatable design
- Easy installation - Plug and Play self-balancing device
- No performance penalty for oversizing the unit Eliminates cumbersome selection tools required – worst case building zone cfm/divide by design cfm to select the required face area. Pick largest available SAV™ for all zones regardless of cfm requirement
- All-inclusive sensors, ITAC actuator and Controller
- Intelligent Sensor Array – IOT, wireless, VOC, CO2, Motion, Infrared, Temperature, Voice Recognition, Light Color, Data Logging, and much more
- Perfect for low temperature design & underfloor applications
- IAQ interior metal liner
- Solid stainless-steel damper shaft on PTFE bushings for fast acting control and maintenance free operation.
- Ideal for low-pressure applications with the ability to operate throughout a wide range of HVAC systems.
- SAV™ can be mounted in any orientation.
- Clean, sealed shipping bags available for LEED IEQ projects
- Increases the efficiency of the whole system due to increased accuracy, low pressure drop, and superior acoustics.
- Factory configured controls – set it and forget it
- Ultra-low leak construction – Welded seam body with advanced aerospace gasket blade damper design
- Very low life cycle costs
- Economic price points for all applications
- State of the art, open source, ITAC™ controller
- Optional ionization accessories
- Optimal for use in flex spaces since SAV only requires a CFM setpoint change

SAV™ Rectangular units with high-capacity slanted coils







SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

Market Technology Comparison

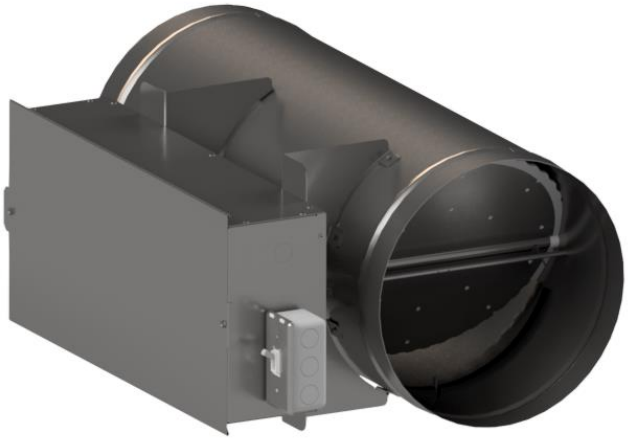
	SAV ™ Gold	SAV ™ Silver	SAV ™ Bronze	Venturi Valves	Lab Terminal VAV units	Commercial VAV Terminal Units
Price	$$$	$$	$	$$$$	$$$	$$
± 4% (or better) accuracy from 2500 fpm to 200 fpm ± 8 fpm (or better) accuracy from 200 from to 8 fpm	√			X	X	X
± 6% accuracy (or better) from 2500 fpm to 200 fpm ± 12 fpm accuracy (or better) from 200 fpm to 12 fpm	√	√		X	X	X
± 8% accuracy (or better) from 2500 fpm to 200 fpm ± 16 fpm accuracy (or better) from 200 fpm to 16 fpm	√	√	√	X	X	X
300:1 turndown (or better)	√			Limited to less than 12:1 turndown based on size and flow points	Limited to less than 10:1 turndown based on size and flow points	Limited to less than 4:1 turndown based on size and flow points
100:1 turndown (or better)	√	√				
30:1 turndown (or better)	√	√	√			
Operates at less than 0.1" inlet pressure	√	√	√	X	X	X
Multiple sizes required	**No**	**No**	**No**	Yes	Yes	Yes

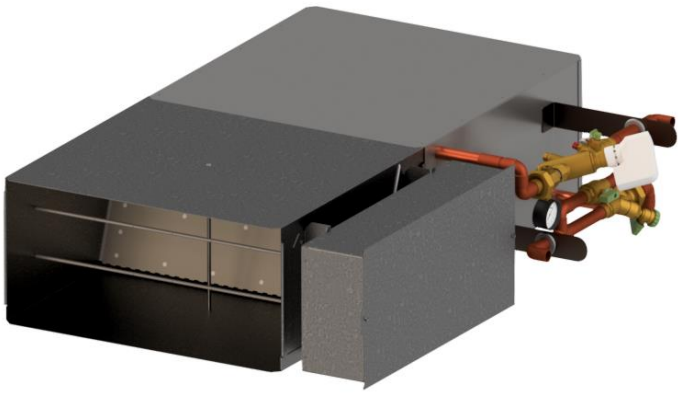
SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

SAV™ Tracking Pairs

With guaranteed accuracy from 2500 fpm to 8 fpm, the SAV gold is the ideal solution for tracking pair applications.

The units are self-balancing and plug-and-play, so all the contractor must do is install the units and turn them over to the Building Automation System (BAS). If the building doesn' t have a BAS, the controls will work as stand-alone units with only a standard BACnet interface.





SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

SAV™ Product Information

Unit Sizes

- 12" & 16" diameter round
- 10" x15" & 10" x21" rectangular
  - Optional Ultra Quiet version available for all rectangular units
- Optional job specific transitions and casing material available

Controls

- Factory installed controls
- All controls are pre-calibrated at the factory. No field adjustment is necessary.
- BACnet, TCOM, and Sox Protocol
- BACnet IP Server over WiFi or Ethernet
- HTML5 compatible interface
- BACnet MSTP Client and BACnet IP Client
- Modbus RTU Master
- Built in web server, HTML5 compatible and SSL certificate support
- WiFi Access Point, Repeater or Client Mode
- Standard slide access control enclosure with optional Universal, 3–in–1 access.

Ionization Accessories

- Optional ionization accessories available for superior IAQ & IEQ

Insulation

- Optional factory installed external insulation

Lighting Integration

- Factory installed and pre-configured lighting controls available
- UL 508A control panels

Electrical Accessories

- Optional factory supplied wired stepdown transformer
- Optional factory wired disconnect

Labels

- Each unit includes project specific labels

Coils

- Factory installed project specific coil & piping packages
- Optional high-performance coils available for chilled water, hot water, and combination applications
- Low Profile, High Performance Low Energy Slanted Re-Heat or Cooling
- Upright Re-heat Coil
- Combo Heating and Cooling Coils For Humidity Controls
- Factory Installed Project Specific Piping Structures

Room Sensors

- Option 1 – None
- Option 2 – Thermostat Only
- Option 3 – Thermostat + CO_2
- Option 4 – Thermostat + Humidity
- Option 5 – Thermostat + CO_2 + Humidity
- Option 6 – Intelligent Sensor Array (temperature, humidity, occupancy, light levels, sound levels, voice recognition)
- Option 7 – Full Intelligent Sensor Array (all the performance of option 6. plus VOC/CO_2)

SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

SAV™ Product Information

Table 1. Flow Range

Unit Size		Maximum Flow				Minimum Flow				Flow Sensor Inlet Area	
		CFM	FPM	Lps	m/s	CFM	FPM	Lps	m/s	SQ.FT	M^2
12″	Gold	1965	2500	927	12.7	6	8	2.83	0.041	0.785	0.073
	Silver	1965	2500	927	12.7	9	12	4.25	0.061	0.785	0.073
	Bronze	1965	2500	927	12.7	12	16	5.66	0.081	0.785	0.073
16″	Gold	3490	2500	1647	12.7	11	8	5.19	0.041	1.396	0.130
	Silver	3490	2500	1647	12.7	16	12	7.55	0.061	1.396	0.130
	Bronze	3490	2500	1647	12.7	22	16	10.38	0.081	1.396	0.130
10"x15"	Gold	2600	2500	1229	12.7	8	8	3.78	0.041	1.042	0.097
	Silver	2600	2500	1229	12.7	12	12	5.66	0.061	1.042	0.097
	Bronze	2600	2500	1229	12.7	16	16	7.55	0.081	1.042	0.097
10"x21"	Gold	3650	2500	1722	12.7	11	8	5.19	0.041	1.460	0.136
	Silver	3650	2500	1722	12.7	17	12	8.02	0.061	1.460	0.136
	Bronze	3650	2500	1722	12.7	23	16	10.85	0.081	1.460	0.136

SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

SAV™ Specifications

Materials (within air stream)

- Construction A - Standard
  - 22-gauge galvanized steel casing
  - 18-gauge galvanized steel damper
  - 20-gauge galvanized steel orifice (optional)
  - Stainless steel pitot tubes
  - Advanced low-leak aerospace damper gasket
- Damper Shaft
  - PTFE shaft bushings
  - ½" (12.7mm) diameter stainless steel shaft
- Construction B – Optional Stainless Steel (Gold Only)
  - 20-gauge stainless steel casing
  - 18-gauge stainless steel damper
  - 20-gauge stainless steel orifice (optional)
  - Stainless steel pitot tubes
  - Advanced low-leak aerospace damper gasket
- Flanges
  - Complies with SMACNA specifications
  - Stainless steel only

Materials (outside air stream)

- Control Enclosure (Optional 3-in-1)
  - 22-gauge galvanized steel
- Pneumatic Tubing
  - UL 94 rated
- Pneumatic fittings
  - Brass or Plastic

Airflow measurement

- Factory installed and calibrated patented airflow sensing system
- Patented variable orifice plate technology
- Sensor Type A
  - Pitot
- Sensor Type B
  - Orifice (Gold Only)

Accuracy

- Flow Measurement*
  - Gold
    - ± 4% of actual flow from 2500 fpm to 200 fpm
    - ± 8 fpm from 200 fpm to 8 fpm
  - Silver
    - ± 6% of actual flow from 2500 fpm to 200 fpm
    - ± 12 fpm from 200 fpm to 12 fpm
  - Bronze
    - ± 8% of actual flow from 2500 fpm to 200 fpm
    - ± 16 fpm from 200 fpm to 16 fpm

Airflow Control

- Damper Blade
  - Single blade matching unit size and shape

Environmental

- Operating Temperature
  - 40°F to 120°F
- Relative Humidity
  - 0% to 95% non-condensing

Dimensions

- Sizes
  - See page 19-32
- Weight
  - See page 19-32

Installation Requirements

- Rigid straight duct of the same size
  - 3x equivalent duct diameters upstream of the unit
  - 3x equivalent duct diameters downstream of the unit

*Accuracy statements are based on tests of typical units on a Flowstand that is certified by a third party with NIST traceable equipment. Results may vary under field conditions.

SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

ITAC™ Controllers

Simply Connect Controller To IOT Platform and Room Peripherals "Plug And Play" - No More Programming Of Controller, Setting K Factors BTL BacNet Objects List Can Be Set From IOT Platform or Controller

Several High End BTL BacNet Controllers Available With High Processing Power and 14 -16 Bit Resolution
Saves Money -No Programing Or Configuration Required
Room Peripherals Include IOT Sensor HUB, Wall Stats, VOC, CO2 Sensors, Lighting Interface
"Plug And Play" Operation - Factory Configured Economical Price Points– Electrical Contractor Connects – System Integrator

Custom Controller Design Available

ITAC Controllers

- 580 MGHZ – 1.8 GHZ 14 Bit Resolution
- BACnet, Modbus, TCOM and Sox protocol
- BACnet IP Server over WiFi or Ethernet
- ITAC Peer to Peer Protocol, compatible with FS, FG+, FW and FT Series
- Built in web server, HTML5 compatible and SSL certificate support
- MQTT, RESTful API and other web services
- Built in dashboard
- WiFi Access Point, Repeater or Client Mode
- 2 Ethernet ports act as a normal network switch and support Ethernet daisy chain up to 9 units
- Network Time Protocol (NTP) Client
- SMTP protocol (outgoing email) with SSL authentication
- SQL Lite up to 6,000 records

ITAC™ Controller's support IT network and security standards and WiFi b/g/n. These can be used as part of an existing network or as an isolated BMS WiFi network. The dual Ethernet port capability allows for daisy chain capability within the recommended IT standards. ITAC™ Controllers support BACnet IP client/server, BACnet MSTP client, and Modbus RTU slave as well as Sox, TCOM, P2P and MQTT.

SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

SAV™ Product Comparison

	SAV™ Gold	SAV™ Silver	SAV™ Bronze
	300:1 Turndown	100:1 Turndown	30:1 Turndown
	Healthcare/ Critical Environment	Commercial	Commercial
	$$$	$$	$
Airflow Range/ Accuracy			
2500 fpm - 200 fpm, ± 4%, 200 fpm - 25 fpm, ± 8 fpm	√		
2500 fpm - 200 fpm, ± 6%, 200 fpm - 50 fpm, ± 12 fpm		√	
2500 fpm - 200 fpm, ± 8%, 200 fpm - 100 fpm, ± 16 fpm			√
Unit Size			
12" diameter	√	√	√
16" diameter	√	√	√
10"x15"	√	√	√
10"x21"	√	√	√
Casing Material			
Galvanized	√	√	√
Stainless Steel	√		
Job Specific Optional Coating	√		
Duct Connections			
Slip	√	√	√
Flanged	√		
Flow Sensor			
Pitot	√	√	√
Orifice	√		
Controller			
DDC controls with enclosure (includes WiFib/g/n, BACnet IP, BACnet MSTP, Modbus RTU, Sox, TCOM, P2P, MQTT, and HTML5)	√	√	√
Room Sensor			
Option 1. None	√	√	√
Option 2. Thermostat only	√	√	√
Option 3. Thermostat + CO_2	√	√	√
Option 4. Thermostat + Humidity	√	√	√
Option 5. Thermostat + CO_2 + Humidity	√	√	√
Option 6. Intelligent Sensor Array (temperature, humidity, occupancy, light, sound level, voice recognition)	√	√	
Option 7. Full Intelligent Sensor Array (all of the performance of option 6. plus VOC/Co2)	√	√	
Heating Coils (Rectangular Units Only)			
Standard Capacity	√	√	√
High Capacity (Slant)	√	√	√
Cooling Coils (Rectangular Units Only)			
Standard Capacity	√		
High Capacity (Slant)	√		
Combination Coils (Rectangular Units Only)			
Cooling and Heating coils with multiple job specific configurations for multiple requirements including dehumidification	√		
Accessories			
Project specific retrofit transitions	√	√	√
Ionization accessories	√	√	√
Operation			
Ultra-low inlet pressure design	√	√	√
Applications			
Commercial	√	√	√
Healthcare	√	√ (noncritical applications)	
Critical Environment	√		
Lab	√		
Industrial	√	√	

SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

Table 2. Minimum Pressure Drop at Listed Airflow

Unit Size	Flow		Minimum Operating Pressure Drop	
	CFM	Lps	IN WG	Pa
12"	25	11.80	0.030	7.47
	500	235.97	0.030	7.47
	1000	471.95	0.030	7.47
	2000	943.89	0.070	17.44
	2500	1179.87	0.100	24.91
16″	34	16.05	0.030	7.47
	698	329.42	0.030	7.47
	1396	658.84	0.030	7.47
	2791	1317.21	0.070	17.44
	3489	1646.62	0.100	24.91
10″ x15″	26	12.27	0.030	7.47
	520	245.41	0.030	7.47
	1041	491.30	0.030	7.47
	2083	983.07	0.070	17.44
	2604	1228.95	0.100	24.91
10"x21"	36	17.1	0.030	7.47
	725	342.1	0.030	7.47
	1450	684.3	0.030	7.47
	2900	1368.5	0.070	17.44
	3625	1710.6	0.100	24.91

Performance Notes: 1. Test data obtained in accordance with AHRI Standard 880-2017 and ASHRAE Standard 130-2016.

SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

Table 3. Terminal Casing Leakage

SAV Casing Leakage (Per ASHRAE 130-1996)							
Imperial Units (CFM, Inches Water)							
Unit Size	**1" WC**	**2" WC**	**3" WC**	**Unit Size**	**1.0" WC**	**2" WC**	**3" WC**
12"	<2.36*	<2.36	<2.36	10"x21"	<2.36	<2.36	<2.36
Metric Units (LPS, Pascals)							
Unit Size	**250 Pa**	**500 Pa**	**750 Pa**	**Unit Size**	**250 Pa**	**500 Pa**	**750 Pa**
12"	<1.11	<1.11	<1.11	10"x21"	<1.11	<1.11	<1.11

*3rd Party measurement unable to accurately measure below this level

Table 4. Terminal Damper Leakage

SAV Blade Seal Leakage (Per ASHRAE 130-1996)							
Imperial Units (CFM, Inches Water)							
Unit Size	**1" WC**	**2" WC**	**3" WC**	**Unit Size**	**1" WC**	**2" WC**	**3" WC**
12"	4.41	5.78	7.14	10"x21"	12.8	14.4	16
Metric Units (Lps, Pascals)							
Unit Size	**250 Pa**	**500 Pa**	**750 Pa**	**Unit Size**	**250 Pa**	**500 Pa**	**750 Pa**
12"	2.08	2.73	3.37	10"x21"	6.04	6.80	7.55

SAV – Smart Air Valve™ with ITAC – Intelligent Air Control™

Table 5. Radiated Sound Data for Terminal. Sound Power Levels, Lw dB, re 10^-12 Watts.

Pressure Drop			0.2" W.G. (50 Pa) (Recommended Operating Pressure)									0.5" W.G. (125 Pa)									1.0" W.G. (250 Pa)								
Unit Size	Airflow CFM	Lps	Octave Band 1 63 Hz	2 125 Hz	3 250 Hz	4 500 Hz	5 1000 Hz	6 2000 Hz	7 4000 Hz	8 8000 Hz	NC	Octave Band 1 63 Hz	2 125 Hz	3 250 Hz	4 500 Hz	5 1000 Hz	6 2000 Hz	7 4000 Hz	8 8000 Hz	NC	Octave Band 1 63 Hz	2 125 Hz	3 250 Hz	4 500 Hz	5 1000 Hz	6 2000 Hz	7 4000 Hz	8 8000 Hz	NC
	393	185	46.7*	36.1*	30.2*	24.7*	27.0*	16.0*	16.7*	20.3*	25	46.8*	36.8*	32.2*	30.9	29.4*	24.4	19.2*	20.5*	30	47.9*	40.9	38.5	39.2	36.9	33.5	28.7	23.4*	35
	786	371	47.6	39.2	33.8	29.7	28.3	18.2	17.1	20.4	30	50	41.5	36.2	35.3	32	26.7	21.7	20.9	35	53.1	46.4	41.2	41.1	38.2	34.2	29.4	24.1	40
12	1178	556	48.5*	42.2	37.3	34.7	29.5*	20.3*	17.5*	20.4*	30	53.2*	46.1	40.1	39.6	34.6	29	24.2	21.2*	35	58.2*	51.8	43.9	43	39.5	34.8	30.1	24.7*	40
	1571	741	51.1	45.2	41.9	40.2	34.8	27	22.7	21.8	35	56.7	50.2	44.2	43.5	38.4	32.5	27	22.1	40	61	55.4	47.5	46.4	42.5	37.4	32.4	26.4	45
	1964	927	53.7*	48.1	46.5	45.6	40.1	33.6	27.9	23.2*	40	60.2*	54.3	48.2	47.4	42.1	36	29.7	22.9*	45	63.7	58.9	51.1	49.7	45.4	39.9	34.6	28.1	45
	730	345	47.1	44.6	44.2	36.5	37.0	20.8	21.4	24.6	35	46.2	45.5	43.7	44.0	43.8	37.5	31.6	31.6	45	48.4	47.7	44.6	44.0	43.8	37.5	31.6	31.6	45
10x21	1090	514	48.7	47.7	46.0	38.9	35.6	25.3	22.0	23.1	35	53.7	54.0	48.1	45.8	41.9	36.2	30.3	28.4	45	56.8	57.5	50.2	47.8	44.7	38.9	33.9	32.2	45
	2190	1034	50.3	50.9	47.9	41.3	34.2	29.7	22.6	21.5	40	61.1	62.4	52.5	47.6	40.0	34.9	29.1	25.2	50	65.3	67.3	55.8	51.5	45.6	40.2	36.2	32.8	55
	3645	1720	64.2	59.6	55.5	54.3	45.0	39.5	32.1	25.1	50	72.8	68.9	60.4	58.8	49.7	45.6	38.3	31.7	60	78.6	76.8	65.2	61.7	55.1	51.9	45.0	38.5	70
10x21	730	345	51.0	43.4	35.8	31.7	37.0	21.8	22.9	21.1	35	48.5	42.1	36.3	37.7	38.3	31.7	25.0	20.3	40	51.1	45.3	38.8	43.6	45.3	39.8	34.0	31.4	45
Ultra	1090	514	51.9	46.2	39.7	34.8	35.6	25.1	22.3	20.4	35	57.1	51.9	43.4	42.0	41.0	36.2	29.7	24.1	40	61.0	56.4	46.5	46.8	47.2	42.6	37.3	33.7	50
Quiet	2190	1034	52.9	48.9	43.6	37.9	34.3	28.3	21.6	19.7	35	65.7	61.7	50.5	46.3	43.7	40.7	34.4	27.8	50	70.8	67.4	54.2	50.1	49.2	45.4	40.6	35.9	55
	3645	1720	64.5	59.1	54.1	54.4	44.0	38.2	31.4	23.9	50	71.6	67.6	56.9	56.4	47.0	42.2	36.6	30.6	55	79.0	74.7	59.9	58.0	52.3	48.0	43.4	38.4	65

* Lower than room ambient

Table 6. Discharge Sound Data for Terminal. Sound Power Levels, Lw dB, re 10^-12 Watts.

Pressure Drop			0.2" W.G. (50 Pa) (Recommended Operating Pressure)									0.5" W.G. (125 Pa)									1.0" W.G. (250 Pa)								
Unit Size	Airflow CFM	Lps	Octave Band 1 63 Hz	2 125 Hz	3 250 Hz	4 500 Hz	5 1000 Hz	6 2000 Hz	7 4000 Hz	8 8000 Hz	NC	Octave Band 1 63 Hz	2 125 Hz	3 250 Hz	4 500 Hz	5 1000 Hz	6 2000 Hz	7 4000 Hz	8 8000 Hz	NC	Octave Band 1 63 Hz	2 125 Hz	3 250 Hz	4 500 Hz	5 1000 Hz	6 2000 Hz	7 4000 Hz	8 8000 Hz	NC
	393	185	61.0*	47.1*	43.3	37.5	33.3*	30.7	25.9	21.3	35	62.0*	52.8*	49.6	45.4	44.3	43.4	40.7	37.2	45	64.9*	59.5	55.5	53.4	53.9	54.6	50.9	48.9	55
	786	371	63.9	54.5	48.9	44.8	40.3	37.1	32.6	27.4	40	67.7	60	54.6	50.9	48.4	46.5	44.2	41.1	50	71	65.9	59.4	56.4	55.4	54.4	51.9	50	55
12	1178	556	66.7	61.8	54.4	52	47.3	43.5	39.3	33.4	50	73.3	67.2	59.5	56.3	52.5	49.5	47.7	44.9	55	77.1	72.2	63.2	59.3	56.8	54.2	52.8	51	60
	1571	741	69.3	64.9	57.9	55.7	52	50.2	47.2	43.8	55	77.2	71.2	63.5	60	56.3	53.3	50.7	47.4	60	80.7	76	67	63	59.8	57.2	55.3	53.3	65
	1964	927	71.9	68	61.4	59.4	56.7	56.9	55.1	54.2	60	81.1	75.1	67.4	63.6	60	57	53.7	49.9	65	84.3	79.7	70.7	66.6	62.8	60.2	57.8	55.5	70
	730	345	56.9	45.6	46.0	40.7	41.9	43.6	35.2	26.6	45	58.0	51.7	53.0	50.2	52.6	55.7	51.3	45.5	60	63.8	57.4	54.7	55.5	58.6	61.9	58.2	56.2	65
10x21	1090	514	68.3	54.1	52.4	48.1	47.1	46.7	40.0	33.4	50	69.7	61.2	59.2	55.7	54.9	56.4	52.1	48.5	60	72.4	66.6	61.3	59.5	60.5	62.2	59.8	57.3	65
	2190	1034	79.8	62.5	58.9	55.5	52.2	49.7	44.8	40.2	65	81.4	70.7	65.4	61.2	57.3	57.1	52.9	51.4	70	81.0	75.8	67.9	63.4	62.4	62.4	61.5	58.3	70
	3645	1720	84.2	69.6	61.9	56.1	54.7	47.9	40.5	36.7	70	86.3	77.1	72.9	70.5	63.7	62.8	57.5	55.7	70	90.2	83.1	77.3	72.7	67.8	67.2	65.1	62.6	70
10x21	730	345	59.0	46.6	42.7	40.0	37.8	39.4	36.1	29.3	40	56.7	49.9	51.8	49.6	48.1	51.4	48.4	44.6	55	60.5	53.1	53.2	54.5	52.4	56.8	54.3	50.4	60
Ultra	1090	514	62.0	53.6	50.2	46.7	41.9	42.2	38.0	32.3	45	64.5	59.0	57.9	54.7	50.5	53.1	49.8	46.9	55	69.4	63.9	60.4	59.1	55.8	58.6	57.1	54.5	60
Quiet	2190	1034	65.1	60.5	57.7	53.3	46.1	45.0	39.8	35.3	50	72.3	68.1	64.0	59.9	53.0	54.7	51.2	49.1	60	78.3	74.7	67.7	63.8	59.2	60.5	59.9	58.6	65
	3645	1720	80.6	76.6	72.0	66.1	57.2	54.4	48.4	43.4	70	82.4	78.3	74.2	69.6	59.1	59.2	54.5	52.4	70	87.5	83.0	76.2	71.5	63.5	64.5	62.9	61.5	70

* Lower than room ambient

Performance Notes:

1. Test data obtained in accordance with AHRI Standard 880-2017 and ASHRAE Standard 130-2016.
2. Sound power levels include duct end corrections per AHRI Standard 880-2017.
3. Airflow given in liters/seconds (L/s); and in cubic feet per minute (cfm).
4. Pressure given in Pascal (Pa) and inches of water gauge (in W.G.).