CONNOLS-AIR

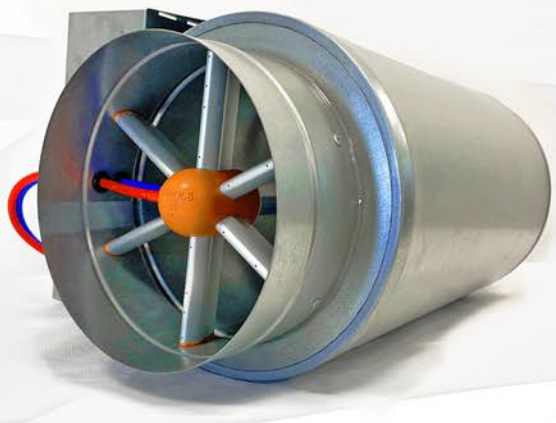
V750
EROLSTAR

VAV AIR TERMINAL

The **V750 EROLSTAR** VAV Air Terminal Unit is engineered to enable precise and energy efficient indoor climate control.

CONNOLS-AIR is proud to introduce the superior EROLSTAR sensor at the heart of a smarter generation of VAV Air Terminal Units.

Specifically designed to achieve more accurate readings for an even wider range of air flow demands, the integration of the new EROLSTAR sensor as an air measuring statiion (AMS) enables the V750 Air Terminal Unit to advantageously steer your HVAC system towards your desired needs without compromising on energy and cost efficiencies.



The V750 EROLSTAR VAV Terminal Unit

	FEATURES	BENEFITS	ACHIEVE
CONTROLLER	● BACnet compliant controller ● Mobile phone Interface ● Maintenance free transducer	● Easy access / handling ● Networking capability ● Building automation	▼ Maintenance ▲ Building Automation ▲ Energy & Cost Efficiency
CASING	● Double skin galv steel (0.7mm Inner / Outer casing) ● Fiberglass insulation (25mm) ● Sturdy collar & end rings	● Zero surface erosion ● Cleaner indoor air ● Durable construction ● Lower discharge & radiated sound	▲ Durability & Lifespan ▲ Indoor Air Quality ▼ Radiated Sound
DAMPER	● Double-skinned steel blades ● Solid silicon seal ● Closed position @ 60°	● Blade Rigidity ● Ultra low leakage < 0.5% ● Linear airflow characteristics	▲ Air distribution efficiency ● Stable & Quiet Airflow
SENSOR	● 6 Aerodynamic sensor wings ● 24 Sensing points ● Aerodynamic central reservoir ● Designed for airflow 2-12m/s ● Tested & verified by AMCA	● Greater signal amplification ● More data points ● True center average ● Airflow accuracy down to 2m/s ● Higher turndown ratio ● Lower discharge sound @ maximum airflow ● Less air turbulence	● Precise Airflow Control ● Accuracy of ±2.99% or better ● Accuracy at low airflows ● Optimum HVAC operation

Table 1. Main features of the V750 EROLSTAR VAV Terminal Unit

CONSTRUCTION & COMPONENTS

With a streamlined design and robust construction, the V750 EROLSTAR VAV Terminal Unit enables greater HVAC control accuracy and capabilities required in every modern intelligent building today. It is available from size 5 to 18, with 24 sensing points provided for *every* size (Table 2), covering an airflow range from 88 CMH (24 L/s) to 6826 CMH (1896 L/s).

The VAV Unit is capable of stand-alone operation or may be connected with networking devices and be integrated with the building's automation system.

The main components (Fig 1) of the V750 EROLSTAR are:

- Air-valve with double insulated casing
- Integrated EROLSTAR pressure differential flow sensor
- A digital thermostat
- BACnet compliant DDC controller

Size	ØD	Ød	Y	L
5	175	125	125	370
6	200	150	125	370
7	225	175	125	370
8	250	200	125	370
9	275	225	175	470
10	300	250	175	470
12	350	300	175	470
14	400	350	225	540
16	450	400	225	540
18	500	450	250	600

Table 2. Unit Dimensions (mm) VAV Size 5-18.

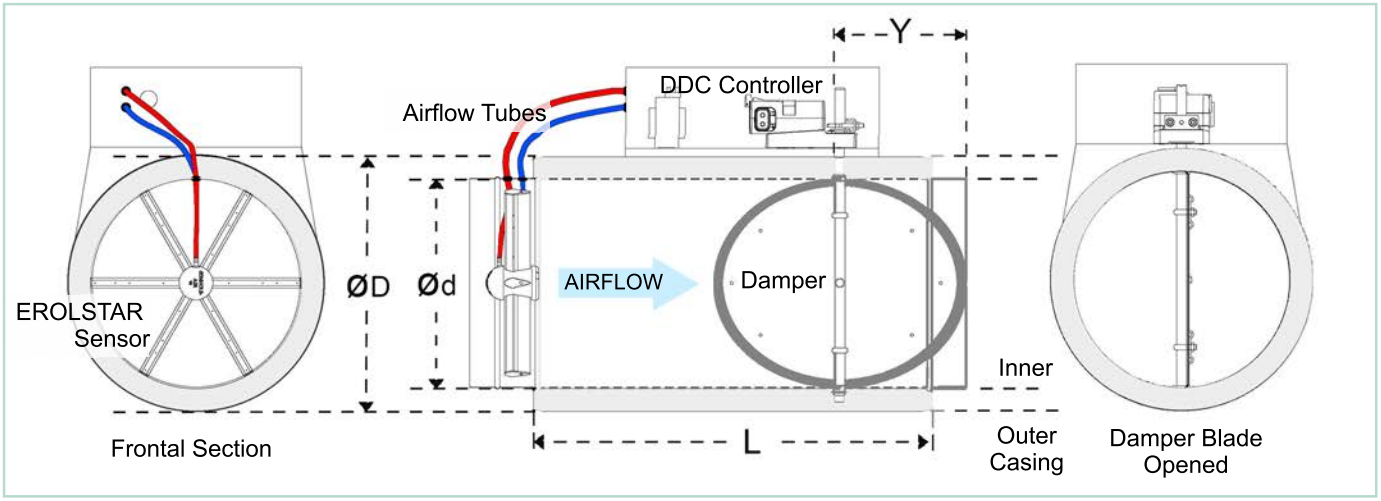
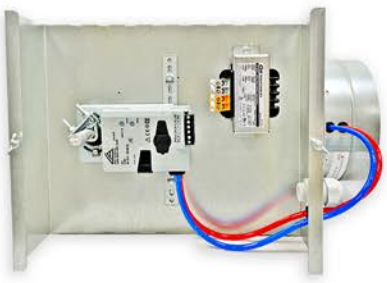


Figure 1. Schematic of V750 EROLSTAR & dimensional labels.

The Direct Digital Controller (DDC) provides rapid and precise control of desired room temperature, and may be used for stand-alone pressure independent, pressure dependent or constant air volume operation. The VAV system can provide cool air to the zone, or the controller may provide additional outputs for the control of a heating system, such as reheat coil for heat mode or morning warm-up mode operation. The heating equipment can be staged resistive heating, staged 2-position (solenoid) valve, or modulated steam hot water.



Left: DDC Controller connected to positive/ negative airflow tubes on the VAV Unit.

Our DDC controller allows the V750 EROLSTAR VAV terminal unit to form true integration in the BMS network using industry open communication protocols such as BACnet™. It provides mechanisms for computerized building automation devices to exchange information, regardless of the particular building service they perform. Detailed information of our DDC controller and networking system are available in our Engineering Data Sheet.

RESEARCH & DEVELOPEMENT

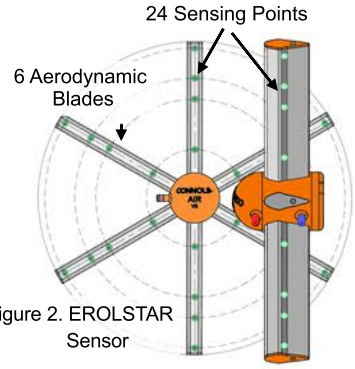
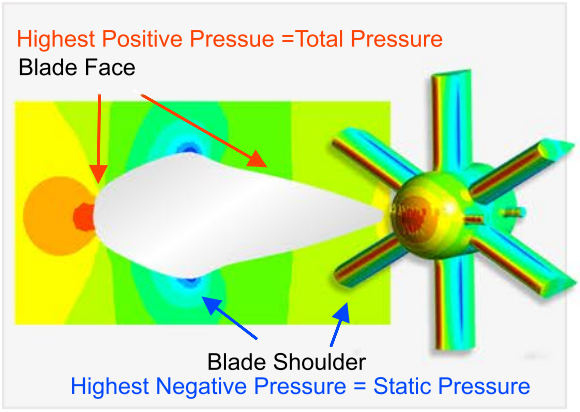


Figure 2. EROLSTAR Sensor

EROLSTAR was designed using digital simulations. The new airflow sensor is the result of rigorous R&D by OLS Manufacturing Co. with the aim of producing an AMS that measures airflow accurately and efficiently at extreme airflow conditions. 24 sensing points measure the pressure difference from the face to shoulder of the blade (Fig 2,3).



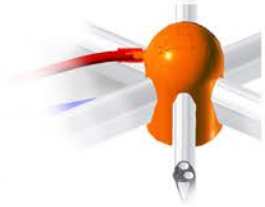
Figrure 3: Digital simulations to product design

SIGNAL AMPLIFICATION

Digital simulations ran Fluid Flow analyses (Fig 3) at velocities of 2-12m/s, testing various aerodynamic blade profiles. The end-goal was to determine the profile required to produce the greatest pressure differential across each blade.

An equally balanced aerodynamic blade profile emerged, allowing the new EROLSTAR sensor to achieve signal amplification of up to to 3.4 times, ensuring more accurate airflow measurements at extremely low air velocities.

Figure 4. Aerodynamic Center Reservoir



TRUE CENTER AVERAGING: Pressure signals are center averaged in an aerodynamic reservoir. Total pressures (red) are averaged in the upper chamber while static pressures (blue) are averaged in a seperate, lower chamber of the reservoir. The aerodynamic curves of both face and body of the reservoir ensures stable airflow.

PERFORMANCE

The V750 EROLSTAR VAV Unit was tested in accordance with AMCA Standard 610 and certified to AMCA Publication 611. The VAV unit was tested within air velocities of 2m/s - 12m/s, and its performance is AMCA verified to an accuracy of ±2.99% or better.

The resultant airflow ranges for each unit size are tabulated in Table 3.

SELECTION

The controllable airflow range selected for each VAV terminal unit must be within the airflow range indicated in Table 2.

Note that the controllable airflow range depends on the electronic controller used and its transducer range. **Strongly recommended**: factory acceptance test for each size be tested for controllability before ordering.

Contact us for further assistance in sizing the VAV box and electronic controller selection.

Unit Size	AIR FLOW RANGE					
	Cubic m/Hr		Liters/Sec		Cubic Ft/Min	
	Min	Max	Min	Max	Min	Max
5	88	527	24	146	52	310
6	127	760	35	211	75	447
7	173	1037	48	288	102	610
8	223	1339	62	372	131	788
9	281	1685	78	468	165	991
10	353	2117	98	588	207	1245
12	504	3024	140	840	296	1778
14	691	4147	192	1152	406	2439
16	900	5400	250	1500	529	3176
18	1138	6826	316	1896	669	4014

Table 3. Minimum to Maximum Air Flow Range 2-12 m/s

VERIFICATION TESTNG

EROLSTAR was tested in assembly with the CONNOLS-AIR V750 damper according to AMCA Standard 610 - Laboratory Methods of Testing Airlfow Measurement Stations for Performance Rating.

SIZE	K	Applicable Model No.	
		Pressure Independent	Constant Air Volume
5	31	V750E05I	V750E05C
6	48	V750E06I	V750E06C
7	69	V750E07I	V750E07C
8	96	V750E08I	V750E08C
9	126	V750E09I	V750E09C
10	155	V750E10I	V750E10C
12	234	V750E12I	V750E12C
14	318	V750E14I	V750E14C
16	405	V750E16I	V750E16C
18	515	V750E18I	V750E18C

Table 4. Calculated K factor for certified sizes.

Brand	CONNOLS-AIR	Operational Type	Differential Pressure
Base Model	V750	Appurtenance	V750 VAV Damper
Air Measuring Station	V750 EROLSTAR	Tested Sizes	Size 6, 10, 14

Conversion Formula	$Q = K \times \sqrt{P}$	
	where Q = Airflow in CMH	P = AMS pressure signal (Pa)
	K = Flow constant	(Pressure diff between red & blue tubes)

OLS Manufacturing Co. Pte. Ltd. certifies that the V750 EROLSTAR shown herein is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 611 and comply with the requirements of the AMCA Certified Ratings Program.

Notes: EROLSTAR performance ratings include the effect of VAV dampers in the air stream. The performance of the V750 EROLSTAR is AMCA certified to accuracy of ±2.99% or better in the velocity range of 2m/s -12m/s.

Table 5. Airflow Resistance Test Results at Standard Air

SIZE 6

Det No	Q (m^3/s)	V (m/s)	ΔP_{DS} (Pa)	ΔP_S (Pa)	ΔP_D (Pa)
1	0.212	12	117.7	67.9	49.8
2	0.177	10	83	47.2	35.7
3	0.141	8	53.4	31.2	22.2
4	0.105	6	31.1	18.8	12.3
5	0.071	4	14.5	9.5	5.1
6	0.034	2	4	2.9	1.1

SIZE 10

Det No	Q (m^3/s)	V (m/s)	ΔP_{DS} (Pa)	ΔP_S (Pa)	ΔP_D (Pa)
1	0.601	12	115.4	88.6	26.8
2	0.501	10	81.2	61.7	19.4
3	0.403	8	52.5	39.4	13.1
4	0.302	6	30.2	22.7	7.5
5	0.202	4	14.5	11	3.5
6	0.101	2	3.9	3	0.8

SIZE 14

Det No	Q (m^3/s)	V (m/s)	ΔP_{DS} (Pa)	ΔP_S (Pa)	ΔP D (Pa)
1	1.158	12	93.8	72.5	21.3
2	0.965	10	66.4	51.5	14.9
3	0.774	8	42	32.2	9.8
4	0.581	6	23	17.1	5.9
5	0.385	4	9.8	7.1	2.5
6	0.196	2	2.4	1.7	0.6

Table 6. Airflow Measurement Test Results

SIZE 6

Det No	Q_{REF} (m^3/s)	Q_{AMS} (m^3/s)	Diff (m^3/s)	Diff (%)
1	0.212	0.212	-0.0001	-0.04
2	0.177	0.177	-0.0004	-0.23
3	0.141	0.14	-0.0014	-0.99
4	0.105	0.105	-0.0002	-0.23
5	0.071	0.07	-0.001	-1.45
6	0.035	0.034	-0.0005	-1.44

SIZE 10

Det No	Q_{REF} (m^3/s)	Q_{AMS} (m^3/s)	Diff (m^3/s)	Diff (%)
1	0.601	0.613	0.01	1.92
2	0.501	0.511	0.01	1.89
3	0.403	0.404	0.00	0.17
4	0.302	0.305	0.00	1.12
5	0.202	0.207	0.00	2.2
6	0.101	0.104	0.00	2.99

SIZE 14

Det No	Q_{REF} (m^3/s)	Q_{AMS} (m^3/s)	Diff (m^3/s)	Diff (%)
1	1.158	1.169	0.01	0.92
2	0.965	0.974	0.01	1.00
3	0.774	0.774	0.00	-0.05
4	0.581	0.565	-0.02	-2.76
5	0.386	0.379	-0.01	-1.71
6	0.196	0.191	-0.01	-2.88

Refer to page 7 for standard notations.

PERFORMANCE DATA

TABLE 7. DISCHARGE SOUND OF THE V750 EROLSTAR VAV TERMINAL UNIT

Unit Size	Airflow			Min Pa Loss (Pa)	Discharge Sound Power Level Lw, dB re 10^{-12} Watts													
					at 125 Pa							at 250 Pa						
					Octave Band Centre Frequencies, Hz							Octave Band Centre Frequencies, Hz						
	(CHM)	(L/S)	(CFM)		125	250	500	1K	2K	4K	NC	125	250	500	1K	2K	4K	NC
5	88	24	52	1	41	29	36	32	26	17	20	43	35	30	40	35	28	29
	176	49	103	6	45	33	40	36	30	21	24	46	39	34	44	39	31	34
	264	73	155	14	48	37	42	38	33	24	26	50	42	38	46	40	34	35
	351	98	207	26	51	43	46	42	36	27	30	56	47	43	48	43	37	37
	439	122	258	40	54	47	50	46	41	33	34	59	51	47	51	45	39	40
	527	146	310	57	58	52	54	51	46	39	40	62	54	51	53	48	42	42
6	127	35	75	1	38	32	31	32	25	17	20	38	36	36	38	35	28	26
	253	70	149	5	41	35	34	35	28	20	23	41	39	39	41	38	31	29
	380	106	224	12	45	41	40	41	33	26	29	50	46	43	45	42	35	33
	507	141	298	22	46	45	43	43	35	28	32	52	50	47	47	44	37	36
	634	176	373	36	47	48	46	47	40	33	36	54	54	51	51	45	39	40
	760	211	447	50	47	49	49	50	44	37	38	56	55	54	54	47	41	43
7	173	48	102	1	40	38	35	34	28	20	25	44	43	38	38	38	30	29
	346	96	203	5	43	41	38	37	31	23	25	47	46	41	41	41	33	32
	518	144	305	11	45	46	42	41	35	27	29	51	50	46	45	43	36	34
	691	192	406	19	47	48	46	44	39	31	30	52	53	50	48	45	39	35
	864	240	508	36	49	51	49	47	42	35	37	56	56	55	52	47	42	41
	1037	288	610	43	51	54	52	50	45	38	41	59	59	59	55	49	44	44
8	223	62	131	0	39	39	34	32	28	21	19	40	43	39	36	37	30	27
	446	124	263	4	42	42	37	35	31	24	22	43	46	42	39	40	33	30
	670	186	394	9	46	46	42	38	34	27	26	50	51	46	43	43	36	33
	893	248	525	17	48	50	48	41	38	30	31	54	55	50	47	45	38	34
	1116	310	656	26	50	54	50	45	41	33	35	57	58	54	51	48	40	39
	1339	372	788	37	50	56	53	48	44	36	38	58	60	57	53	50	42	42
9	281	78	165	0	38	38	36	34	31	28	23	42	43	41	39	39	38	32
	562	156	330	4	41	41	40	37	34	31	26	46	46	44	43	43	41	35
	842	234	495	8	44	44	44	40	37	34	29	50	50	47	45	44	43	37
	1123	312	661	14	46	48	49	43	39	36	33	53	53	51	49	46	44	38
	1404	390	826	22	49	52	52	47	42	38	36	56	57	55	52	49	46	41
	1685	468	991	32	49	53	55	50	44	39	39	58	58	58	55	51	47	44
10	353	98	207	1	37	36	38	35	34	35	26	44	42	42	42	41	45	36
	706	196	415	4	40	40	42	38	37	38	30	48	46	46	46	45	49	40
	1058	294	622	8	42	42	45	41	39	40	31	50	48	48	47	45	49	41
	1411	392	830	13	44	45	49	44	40	41	35	52	51	52	50	47	50	42
	1764	490	1037	19	47	49	53	48	42	42	37	55	55	56	53	49	52	43
	2117	588	1245	27	48	49	56	51	44	42	40	57	56	58	56	51	52	45
12	504	140	296	0	35	34	36	37	38	28	27	42	42	40	42	41	43	35
	1008	280	593	3	38	37	39	40	39	31	30	45	45	43	45	44	46	38
	1512	420	889	6	42	42	44	44	42	34	32	51	48	47	49	47	46	39
	2016	560	1186	11	45	46	49	46	43	35	36	53	51	51	52	49	47	41
	2520	700	1482	17	48	50	53	49	44	37	39	55	55	55	54	51	47	44
	3024	840	1778	24	51	54	58	51	45	38	43	57	58	59	57	53	48	46
14	691	192	406	1	35	33	36	33	32	26	24	40	39	40	38	40	36	32
	1382	384	813	3	38	36	39	36	35	28	26	43	42	43	41	43	39	36
	2074	576	1219	6	42	42	44	40	39	32	29	50	47	48	46	47	43	38
	2765	768	1626	10	45	45	46	43	42	36	32	52	50	51	49	49	45	39
	3456	960	2032	15	47	50	51	46	44	38	35	53	55	55	53	51	48	42
	4147	1152	2439	21	48	53	54	50	46	39	39	55	57	58	55	52	49	44
16	900	250	529	0	35	37	36	36	36	29	27	47	47	41	43	44	41	35
	1800	500	1059	2	38	40	39	39	39	32	30	50	50	44	46	47	44	38
	2700	750	1588	5	48	49	44	43	43	36	33	53	54	49	50	50	47	40
	3600	1000	2117	8	51	51	48	46	45	38	35	56	56	52	53	52	49	42
	4500	1250	2646	12	53	55	51	49	47	41	38	59	60	55	56	54	51	45
	5400	1500	3176	18	53	56	54	54	49	44	42	61	62	62	59	55	52	48
18	1138	316	669	0	43	44	40	40	43	35	33	49	49	44	48	53	46	46
	2275	632	1338	2	46	47	43	43	46	38	36	52	52	47	51	59	49	49
	3413	948	2007	4	50	51	47	47	50	41	40	55	55	52	53	59	51	50
	4550	1264	2676	7	54	55	52	50	52	45	43	59	60	56	56	60	53	51
	5688	1580	3345	11	56	59	58	53	53	47	44	61	63	61	59	60	55	51
	6826	1896	4014	16	58	62	64	56	54	48	49	63	66	66	61	60	56	51

Notes:

i. Test data obtained generally in accordance to BS EN ISO 3741 : 2010, BS EN ISO 5135:1999 and related standards.

ii. NC Valuues are based on 10 dB room absorption in all octave bands.

iii. All pressure indicated are differential pressure measured across the VAV terminal box.

iv. " - " represnts noise levels below 20 dB.

v. " + " represents pressure loss below 10 Pa.

PERFORMANCE DATA

TABLE 8. RADIATED SOUND OF THE V750 EROLSTAR VAV TERMINAL UNIT

Unit Size	Airflow			Min Pa Loss (Pa)	Radiated Sound Power Level Lw, dB re 10^{-12} Watts													
					at 125 Pa							at 250 Pa						
					Octave Band Centre Frequencies, Hz							Octave Band Centre Frequencies, Hz						
	(CHM)	(L/S)	(CFM)		125	250	500	1K	2K	4K	NC	125	250	500	1K	2K	4K	NC
5	88	24	52	1	36	21	17	-	-	-	-	37	27	11	11	-	-	-
	176	49	103	6	39	26	22	8	-	-	-	40	31	16	16	2	-	-
	264	73	155	14	42	29	23	9	-	-	-	44	34	19	17	3	-	-
	351	98	207	26	45	35	27	13	-	-	-	50	39	24	19	6	-	20
	439	122	258	40	48	39	31	17	-	-	18	53	43	28	22	8	-	24
	527	146	310	57	52	44	35	22	9	-	23	56	46	32	24	11	-	28
6	127	35	75	1	32	24	11	-	-	-	-	32	29	16	8	-	-	-
	253	70	149	5	35	27	14	5	-	-	-	35	31	19	11	-	-	-
	380	106	224	12	39	33	20	11	-	-	-	44	38	23	15	4	-	-
	507	141	298	22	40	37	23	13	-	-	-	46	42	27	17	6	-	19
	634	176	373	36	41	40	26	17	-	-	16	48	46	31	21	7	-	24
	760	211	447	50	41	41	29	20	6	-	18	50	47	34	24	9	-	25
7	173	48	102	1	34	28	13	-	-	-	-	38	33	16	6	-	-	-
	346	96	203	5	37	31	16	5	-	-	-	41	36	19	9	1	-	-
	518	144	305	11	39	36	20	9	-	-	-	45	40	24	13	3	-	16
	691	192	406	19	41	37	22	11	-	-	-	46	43	27	15	4	-	20
	864	240	508	36	43	41	27	15	-	-	18	50	46	33	20	7	-	24
	1037	288	610	43	45	44	30	18	5	-	21	53	49	37	23	9	-	28
8	223	62	131	0	33	29	12			-	-	34	33	17	-	-	-	-
	446	124	263	4	36	32	15			-	-	37	36	20	7	-	-	-
	670	186	394	9	40	36	20	6		-	-	44	41	24	11	3	-	18
	893	248	525	17	42	39	24	8		-	-	47	44	28	14	5	-	21
	1116	310	656	26	44	44	28	13	1	-	21	51	48	32	19	8	-	26
	1339	372	788	37	44	46	31	16	4	-	24	52	50	35	21	10	-	29
9	281	78	165	0	31	26	12		0	-		35	30	16				
	562	156	330	4	34	28	15	0	0	-		38	33	19	8			
	842	234	495	8	39	34	22	8	0	-		45	40	26	14	4		
	1123	312	661	14	41	37	25	10	0	-		47	42	29	16	6		19
	1404	390	826	22	43	41	29	14	1	-		50	46	32	19	8		23
	1685	468	991	32	43	42	32	17	3	-		52	47	35	22	10		25
10	353	98	207	1	28	23	11			-	-	35	27	15				
	706	196	415	4	31	24	14			-	-	38	30	18	8	-	-	-
	1058	294	622	8	38	32	24	10		-	-	46	38	27	16	5	-	-
	1411	392	830	13	39	34	26	11		-	-	47	40	29	17	6	1	16
	1764	490	1037	19	41	37	29	14		-	-	49	43	32	19	7	2	20
	2117	588	1245	27	42	37	32	17	2	-	-	51	44	34	22	9	2	21
12	504	140	296	0	29	22	12	-	-	-	-	36	30	16	8	-	-	-
	1008	280	593	3	32	25	15	6	-	-	-	39	33	19	11	2	-	-
	1512	420	889	6	37	31	22	10	-	-	-	45	36	24	15	5	-	-
	2016	560	1186	11	40	34	26	11	1	-	-	47	39	28	18	8	-	16
	2520	700	1482	17	43	39	31	14	1	-	-	50	44	33	22	10	-	21
	3024	840	1778	24	45	42	34	17	3	-	19	51	46	35	23	11	-	24
14	691	192	406	1	30	22	13			-		36	29	18	6			
	1382	384	813	3	33	25	16	3	-	-	-	39	32	21	9	3	-	-
	2074	576	1219	6	36	30	20	6	-	-	-	44	35	24	12	5	-	-
	2765	768	1626	10	39	33	22	9	-	-	-	46	38	27	15	7	-	-
	3456	960	2032	15	41	38	27	12	2	-	-	47	43	31	19	9	-	20
	4147	1152	2439	21	42	41	30	16	4	-	18	49	45	34	21	10	-	23
16	900	250	529	0	29	24	11			-		41	34	16	8			
	1800	500	1059	2	32	27	14	4	-	-	-	44	37	19	11	4	-	-
	2700	750	1588	5	42	36	19	8	-	-	-	47	41	24	15	7	-	18
	3600	1000	2117	8	45	38	23	11	2	-	-	50	43	27	18	9	-	20
	4500	1250	2646	12	47	42	26	14	4	-	19	53	47	30	21	11	-	25
	5400	1500	3176	18	48	44	30	18	7	-	21	56	50	37	25	13	1	29
18	1138	316	669	0	37	31	15	5		-		43	36	19	13	13		
	2275	632	1338	2	40	34	18	8	3	-	-	46	39	22	16	16	-	-
	3413	948	2007	4	43	37	21	11	6	-	-	48	41	26	17	15	-	18
	4550	1264	2676	7	47	41	26	14	8	-	18	52	46	30	20	16	2	24
	5688	1580	3345	11	50	46	33	18	10	-	24	55	50	36	24	17	4	29
	6826	1896	4014	16	52	49	39	21	11	-	28	57	53	41	26	17	5	33

Q Volumetric flow rate

V Velocity

P_{DS} Pressure differential (device + system) at standard air

P_S Pressure differential (system only) at standard air

P_D Pressure differential (device only) at standard air

Q_{ams} The airflow rate of unit under test

Q_{ref} AMCA airflow rate at test condition in chamber test

Diff (%) % Error vs Reference Airflow: $\frac{Q_{ams} - Q_{ref}}{Q_{ref}} \times 100\%$

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