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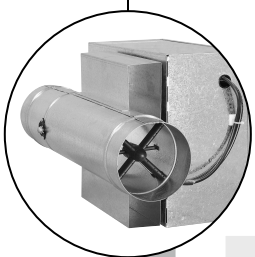
XAFT/RF-3/RF-1
Installation, Operation, and Maintenance

Supply/Exhaust Valves



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XAFT - Model Number Description

Typical String: XAFT / 08 / AL / 18 / P / 3000 / R / A / - / - / A / -

Typical String: XAFT / 10 / 16L / 20 / - / - - - - / L / XS / S7 / - / - / - / H1 / SS

Field	Field Description	Input Code	Description
1	Model	XAFT	Basic Assembly
2	Inlet Size	05	5 inch
		06	6 inch
		07	7 inch
		08	8 inch
		09	9 inch
		10	10 inch
		12	12 inch
		14	14 inch
		16	16 inch
		24	24 x 16 inch
3	Material on All	GZ	Steel, Galvanized
	Exposed Parts	AL	Aluminum, Mill
		04	304 Stainless Steel
		16L	316L Stainless Steel
4	Cylinder Gauge	20	20-gauge
		18	18-gauge
5	Control Type	-	No Controls (Field Installed)
		P	Pneumatic
		A	Electronic
		D	Direct Digital Controls
		F	DDC by Others (Factory Mounted)
6	Control Package	- - - -	None
		3000	Enter applicable 4 digit CP number
7	Control Location	R	Right Hand
		L	Left Hand
8	Inlet Sensor / Mat'l	-	None
		A	Velocity Wing (ABS-FR)
		2A	PX-2 Cross - Aluminum
		2S	PX-2 Cross - Stainless Steel
		TA	Traverse - Aluminum
		TS	Traverse - Stainless Steel
9	Orifice Plate/Range	-	None
		H	High (F2=all Sizes)
		L	Low (F2=all Sizes)
		P	High (F2=all Sizes)
		Q	Low (F2=all Sizes)
		S	Orifice Plate (F2=all sizes except 9")
		S1	Orifice Plate (F2=6)
		S2	Orifice Plate (F2=6)
		S3	Orifice Plate (F2=6)
		S4	Orifice Plate (F2=8)
		S5	Orifice Plate (F2=8)
		S6	Orifice Plate (F2=10)
		S7	Orifice Plate (F2=10)
		S8	Orifice Plate (F2=12)
		S9	Orifice Plate (F2=14)
		S10	Orifice Plate (F2=14)
		S11	Orifice Plate (F2=10)
		S12	Orifice Plate (F2=5)
		S14	Orifice Plate (F2=12)
		S15	Orifice Plate (F2=10)
		S17	Orifice Plate (F2=7)
		S18	Orifice Plate (F2=7)
		S19	Orifice Plate (F2=8)
		S20	Orifice Plate (F2=12)
		S23	Orifice Plate (F2=14)
		S24	Orifice Plate (F2=16)
		S25	Orifice Plate (F2=16)
		S27	Orifice Plate (F2=16)
		S28	Orifice Plate (F2=14)
		S29	Orifice Plate (F2=5)

Field	Field Description	Input Code	Description
10	Transformer	-	None
		1	120v - 1ph/60Hz (40va)
		2	208v - 1ph/60Hz (40va)
		3	277v - 1ph/60Hz (40va)
		4	240v - 1ph/60Hz (40va)
11	Control Enclosure	-	None
		A	Standard Enclosure (Galvzd Steel)
		B	Universal Enclosure (Galvzd Steel)
		C	Std Enclosure with Hinged Panel (Galvzd Steel)
		D	Univ Enclosure with Hinged Panel (Galvzd Steel)
12	Disconnect Switch	-	None
		B	SPST Line 120/277v 1-ph
		C	DPST Line 208/240v 1-ph
13	Optional Features & Accessories	C2	Manual Locking Damper
		DF	Duct Mounting Flanges
		H1	Heresite Coating / Contacting Parts
		O1	Old Style AFT with Elliptical Damper
		S1	Seal Inlet Cylinder Seam
		SA	Solid Aluminum Damper Shaft / Scribed End
		SS	Solid Stn Steel Damper Shaft / Scribed End
		ST	Solid Steel Damper Shaft / Scribed End
		99	Special Construction - See Notes

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RF-3 / RF-1 - Model Number Description

Typical String: RF1 / 08 / GZ / 20 / P / 0003 / R / - / - / - / -

Typical String: RF3 / 08 / GZ / 20 / A / 5000 / L / A / 1 / A / B

Typical String: RF6 / 08 / GZ / 20 / P / 7200 / L / A / - / - / -

Field	Field Description	Input Code	Description
1	Model	RF1	Damper Only Assembly
		RF3	Damper-Sensor Assembly
		RF6	Flow sensing station with control enclosure - No damper
2	Inlet Size	05	5 inch
		06	6 inch
		07	7 inch
		08	8 inch
		09	9 inch
		10	10 inch
		12	12 inch
		14	14 inch
		16	16 inch
3	Material on All	GZ	Steel, Galvanized
	Exposed Parts	AL	Aluminum, Mill
		04	304 Stainless Steel
		16L	316L Stainless Steel
4	Material Gauge	20	20-gauge
		18	18-gauge
5	Control Type	-	No Controls (Field Installed)
		P	Pneumatic
		A	Electronic Analog
		D	Direct Digital Controls
		F	DDC by Others (Factory Mounted)
6	Control Package	- - - -	None
	(Ex: R-P-3000)	3000	Enter applicable 4 digit CP number
7	Control Location	R	Right Hand
		L	Left Hand
8	Inlet Sensor	-	None
		A	Velocity Wing
9	Transformer	-	None
		1	120v - 1ph/60Hz
		2	208v - 1ph/60Hz
		3	277v - 1ph/60Hz
		4	240v - 1ph/60Hz
10	Control Enclosure	-	None
		A	Standard Enclosure (Galvzd Steel)
		B	Universal Enclosure (Galvzd Steel)
		C	Std Enclosure with Hinged Panel (Galvzd Steel)
		D	Univ Enclosure with Hinged Panel (Galvzd Steel)
11	Disconnect Switch	-	None
		B	SPST Line 120/277v 1-ph
		C	DPST Line 208/240v 1-ph
12	Optional Features	C2	Manual Locking Damper
	& Accessories	99	Special Construction - See Notes

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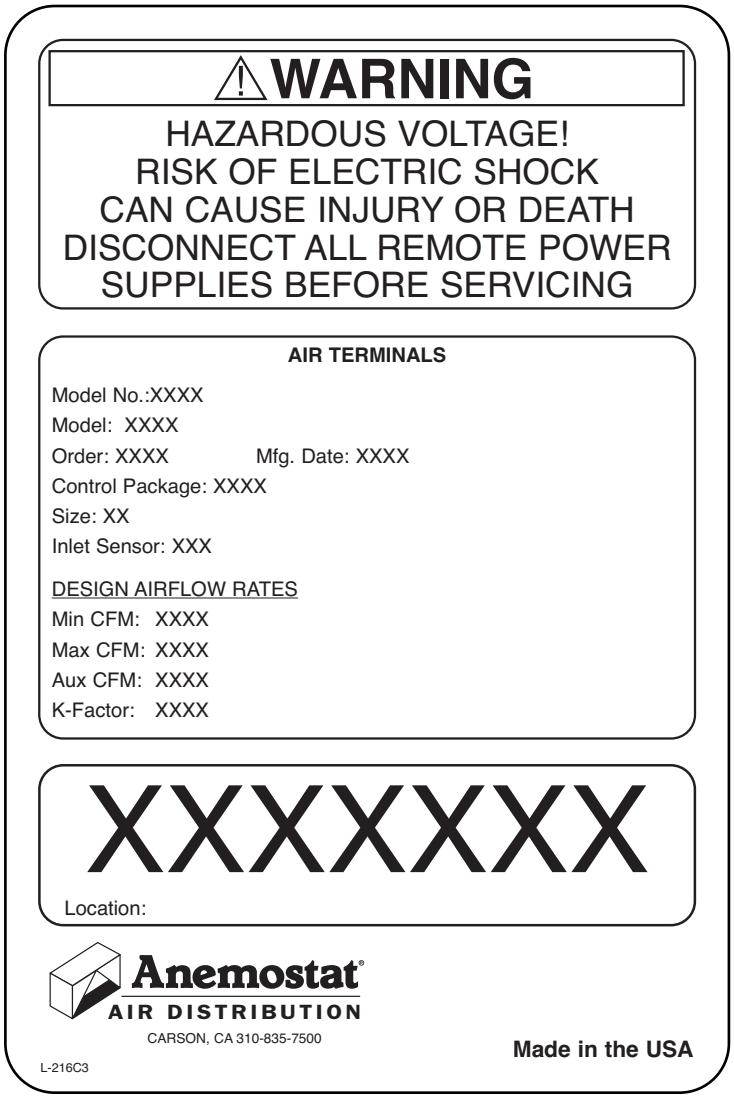
Unit Labeling

Labels are applied to each terminal as follows:

- Unit specific nameplate showing model number, manufactured date, and information regarding controls provided as appropriate.
- The appropriate airflow calibration chart indicating the airflow at varying airflow sensor signals as shown on pages 10, 11, and 12.
- The appropriate wiring/piping diagram for controls provided by Anemostat. Refer to controls manual CM-1 for controls adjustment and troubleshooting procedures.
- Up arrow indicating the proper orientation of the unit for installation.
- Airflow direction arrow indicating the proper orientation of the duct connections.
- AHRI logo indicating the units performance is AHRI certified.
- Sheet Metal Workers Union logo indicating unit produced by members of The Sheet Metal Workers Union.



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Receiving and Inspection Instructions

- Check the bill of lading to verify receipt of all listed items (including any loose accessory items). Notify the carrier and the local ANEMOSTAT representative of any shortages or items shipped in error.
- Thoroughly examine all units for transportation damage (dents, punctures, etc). If damage is found, immediately notify and file a claim with the carrier. Note details of any damage on the bill of lading before signing for the shipment.
- Each terminal has a nameplate indicating the model number. When requested, the unit may also be mark with job-specific information (tagging). Locate the nameplate and verify that the correct units with options (controls, heating coils, etc) where received as ordered.
- Store units in a secure, dry location in the original packing, and do not stack any higher than as shipped.

Warning – Electrical Shock, Burn, and other Hazards

- All fastening straps or hangers must mechanically lock the terminal in place and withstand typical vibration and/or disturbances during use.
- Use caution during rigging such that all equipment remains adequately secured until it is affixed and secured in its final location.
- All supports must be designed to meet applicable local codes and ordinances. Before rigging and installation, check equipment weights such to ensure temporary and permanent supports are safely maintained.
- Make certain all power sources are disconnected prior to installation or servicing this equipment. Make certain if there are multiple power connections, that all are securely disconnected to avoid electrocution or shock injuries.
- Disconnect control circuits or pneumatic control systems to avoid injury when working on dampers or actuators, which may respond automatically to a remote control source.
- Guard against flame hazards when soldering or brazing water coil connections to avoid personal injury or property damage. Prior to using any open flame, keep a fire extinguisher nearby.
- All insulated units (except closed-cell) contain fiberglass wool. Disturbing the insulation could expose the installer to airborne particles of glass wool fibers and ceramic fibers. Certain jurisdictions feel that exposure to these fibers through inhalation can cause cancer. Glass wool fibers may also cause respiratory, skin or eye irritation.

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Unit Placement and Installation

- **THE FLOW SENSOR, PNEUMATIC TUBING AND DAMPER SHAFT ARE NOT TO BE USED FOR LIFTING OR SUPPORT. THEY ARE CRITICAL TO THE PROPER OPERATION OF THE UNIT.**
- To avoid product damage, only lift or handle the XAFT by fully supporting the unit from more than one location.
- Locate unit as per construction drawings, and be careful not to conflict with articles of other trades such as plumbing and electrical conduit.
- Consult SMACNA guidelines for proper transitioning and good workmanship practices.
- Using the support method from the construction plans and specification, suspend unit in a level horizontal plane noting direction of airflow. When utilizing sheet metal straps, up to 1" long screws may be utilized to penetrate the main casing. Do not secure hanging straps to unit appurtenances such as (but not limited to) electric heater cabinets, hot water coils, and control enclosures.

  For units equipped with optional hanging brackets, rods up to 3/8" diameter may be used with ANEMOSTAT brackets. Hanger rod locations are approximately 1" to 3" from the corner of the unit for most terminal configurations.
- Make certain not to obstruct service access to any electrical enclosures or access panels for access to the interior of the unit.
- Units can be flipped from left hand to right hand side and vice versa as long as the damper shaft remains horizontal. However, check control components' specifications as some can be position sensitive.

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Clearance Requirements

- Line voltage and low voltage electrical enclosures must have adequate clearances to meet requirements of NFPA 70 (NEC). This is typically 36" minimum. Note that additional clearance requirements may be required by local codes or building construction specifications.
- When provided with optional bottom or side casing access plate/panel, provide sufficient clearance to allow access.
- Unit should hang freely, and not make contact with any structure above.
- There are no internally replaceable components in the XAFT/RF-3/RF-1 terminal units. All controls are externally accessible.

Duct Connections and Insulation

- Connecting duct should be configured and installed in accordance with SMACNA guidelines, local code requirements, and/or as specified for the project.
- Inlet duct should be the same size as unit inlet. Straight, solid (non-flexible) duct will yield the best airflow and acoustical performance. Duct should be slid over the round inlet of the terminal and fastened and sealed appropriately. Do not install the supply duct INSIDE the round inlet. Supply inlets are typically undersized -1/8" to allow duct to slip OVER the inlet. Provide insulation over the entire inlet collar, while allowing clearance for the air flow sensor tubing.
- Use caution when installing duct near inlet or discharge sensors. Damage to these devices will yield an non-functioning air terminal.
- The terminal should be installed with straightest possible supply duct practical for job conditions. Generally, a minimum of (3 x Diameter of the inlet size) of straight duct yields best performance.
- Provide 48" after the discharge prior to any transition for optimum flow control. Where space is limited, these dimensions may be reduced but an increase in minimum operating pressure and sound may occur.
- After all duct connections are made and sealed, check that the entire ductwork system is airtight.

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Electrical Connections

NOTE: This manual was written with the understanding that the line power and control wiring drawings submitted for the specific project have been acquired and are available during installation.

- Electrical wiring, connections, fusing and installation must conform to the local building codes and the NATIONAL ELECTRIC CODE (ANSI / NFPA 70).
- Connect the electronically actuated XAFT/RF-3/RF-1 per wiring diagram supplied with the unit.
- Field installed electrical components must be mounted and wired per factory supplied wiring diagram. Factory wiring must not be altered without written approval from ANEMOSTAT; violation of this will void warranty.
- UL standards dictate that the power source must be within 10% of nameplate voltage, for safety and longevity. If incoming voltage is 10% above or below nameplate voltage, contact Power Company to correct before operating terminal.

Start-up Procedures

WARNING: Failure to adhere to these instructions, unauthorized installation, adjustment, alterations, modifications or maintenance can void the manufacturer's warranty, cause property damage, personal injury or death. For assistance or additional information, consult a qualified contractor or an ANEMOSTAT representative.

- Verify all electrical wire terminations are tightened prior to energizing terminal. Some loosening may have occurred during shipment and installation.
- Prior to start-up, the project specific control sequence / wiring diagram should be read and understood. A copy of this schematic is located on the interior of the electrical enclosure. If factory supplied analog or DDC controls are supplied, contact the project control contractor for specific start-up and balancing information.

Maintenance

- The XAFT/RF-3/RF-1 VAV terminal unit has been designed and constructed for years of reliable use.
- If installed, inspect hot water coil periodically and clean fins via the access panel upstream of the water coil. Components should be replaced with ANEMOSTAT authorized parts to avoid conflict with ETL listing.

Factory Mounted DDC Controls

Anemostat will factory mount DDC controls of all types. Refer to the wiring diagrams provided by the temperature control manufacturer for proper wiring of these controls. The maximum and minimum CFM range is determined by the controls.

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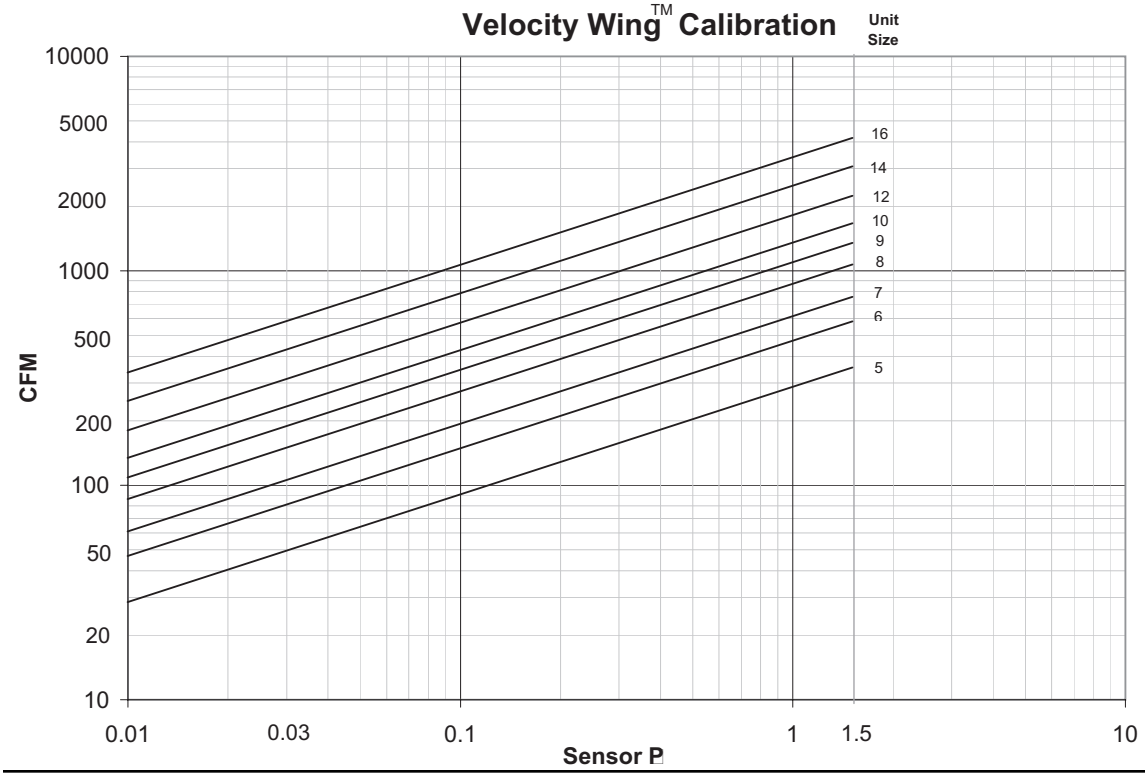
Airflow Sensor ΔP Versus Airflow

C23 / C24 / C31 Series Pneumatic Controls & DDC Controls*

	CFM								
ΔP	5	6	7	8	9	10	12	14	16
0.03	50	81	106	150	190	234	312	428	583
0.04	57	94	122	173	220	271	360	494	673
0.06	70	115	150	212	269	331	441	605	824
0.1	91	148	194	274	347	428	570	781	1064
0.2	128	210	274	388	491	605	806	1104	1505
0.3	157	257	335	475	601	741	987	1352	1844
0.4	182	297	387	548	694	856	1140	1562	2129
0.5	203	332	433	613	776	957	1274	1746	2380
0.6	222	363	474	672	851	1048	1396	1912	2607
0.7	240	392	512	725	919	1132	1508	2066	2816
0.8	257	419	547	775	982	1210	1612	2208	3011
0.9	272	445	581	823	1042	1284	1710	2342	3193
1 (K-factor)	287	469	612	867	1098	1353	1802	2469	3366
1.5	352	574	750	1062	1345	1657	2207	3024	4122

* DDC Controls vary by design and may require corrections to these curves.

	CFM								
	5	6	7	8	9	10	12	14	16
	K-Factor	287	469	612	867	1098	1353	1802	2469
3366									
	Area (sq. ft)	0.130	0.188	0.258	0.338	0.430	0.532	0.769	1.050
1.375									



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Minimum and Maximum Airflow Settings

Control Type	Inlet Size	Min Airflow (CFM)	Max Airflow[1] (CFM)
Model 51 Electronic Analog Controller	5	22	305
	6	45	470
	7	70	635
	8	90	835
	9	115	1100
	10	145	1355
	12	155	1740
	14	250	2300
	16	447	3390
Model 31 Pneumatic Controller	5	50	287
	6	81	469
	7	106	612
	8	150	867
	9	190	1098
	10	234	1353
	12	312	1802
	14	428	2469
	16	583	3366
Models 23, 24 Pneumatic Controllers	5	57	287
	6	94	469
	7	122	612
	8	173	867
	9	220	1098
	10	271	1353
	12	360	1802
	14	494	2469
	16	673	3366

Notes:

1. Minimum and maximum airflow with pressure independent controls based on the following
   flow sensor signals:
   Model 51 Controller - 1 VDC – 10 VDC
   Model 31 Controller - 0.03" w.g. – 1.0" w.g.
   Models 23, 24 Controllers - 0.04" w.g. – 1.0" w.g.
2. Settings below the minimum are not recommended for accurate control when using pressure independent controls. Minimum airflow for pressure dependent applications is 0 cfm.
3. Pressure independent controls may be set for 0 CFM, at or above the minimum airflow shown in table 4, but not between.
4. Model 23 controller available as direct acting for normally open or model 24 controller available as reverse acting for normally closed damper positions. Factory set non-field adjustable start point and reset span.
5. Model 31 controller can be used either as direct or reverse acting for normally open or normally closed damper positions. Field adjustable start point and reset span.
6. Models 23, 24, 31 controllers equipped with separate adjustable knobs for maximum and minimum airflow settings.
7. Model 51 electronic analog controller maximum and minimum airflow settings field adjustable at the thermostat.

REFER TO THE CONTROLS MANUAL CM-1 FOR THE PROPER FIELD ADJUSTMENT OF THE MINIMUM AND MAXIMUM AIRFLOW SETTINGS ON TERMINALS PROVIDED WITH PRESSURE INDEPENDENT CONTROLS.

Some adjusting tips:

1. Allow sufficient time for the controller to respond to adjustments.
2. Cycling of the thermostat to check maximum and minimum airflow settings is often required.
3. On units with pneumatic controls, do not turn the adjustment knobs excessively.

[1] Airflow rates above maximum shown are available. Contact your Anemostat representative for application assistance.

Altitude Correction Factors

Barometric Pressure (in h.g.)	Altitude (feet)	Density lb/ft^3	Correction Factor
29.92	0	.075	1.03
20.28	500	.074	1.01
28.85	1000	.072	0.99
28.33	1500	.071	0.98
27.82	2000	.070	0.96
27.32	2500	.068	0.95
26.81	3000	.067	0.93
26.33	3500	.066	0.91
25.84	4000	.065	0.89
25.37	4500	.064	0.88
24.89	5000	.062	0.86
24.44	5500	.061	0.85
23.98	6000	.060	0.83
23.54	6500	.059	0.82
23.09	7000	.058	0.80

Example: Determine the airflow sensor signal of a 6" unit at 500 CFM located at an elevation of 5000 ft., for a 3000 series pneumatic controller.

To use the correction factor:
Correction factor X CFM at unit location = .86 x 500 = 430 CFM

Referencing the 6" flow curve, shown on page 10, find 430 CFM @ .80" w.c. sensor signal pressure. The velocity controller set at .80" signal pressure will result in 500 CFM at 5000 ft. elevation.

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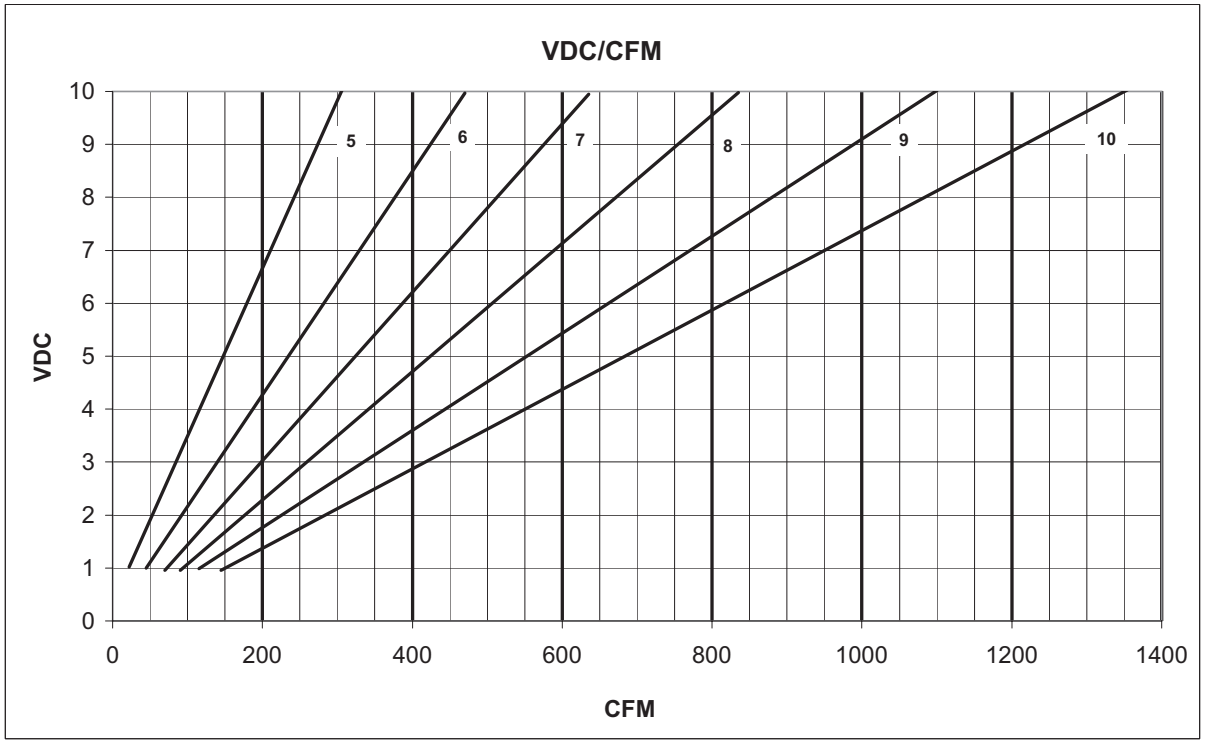
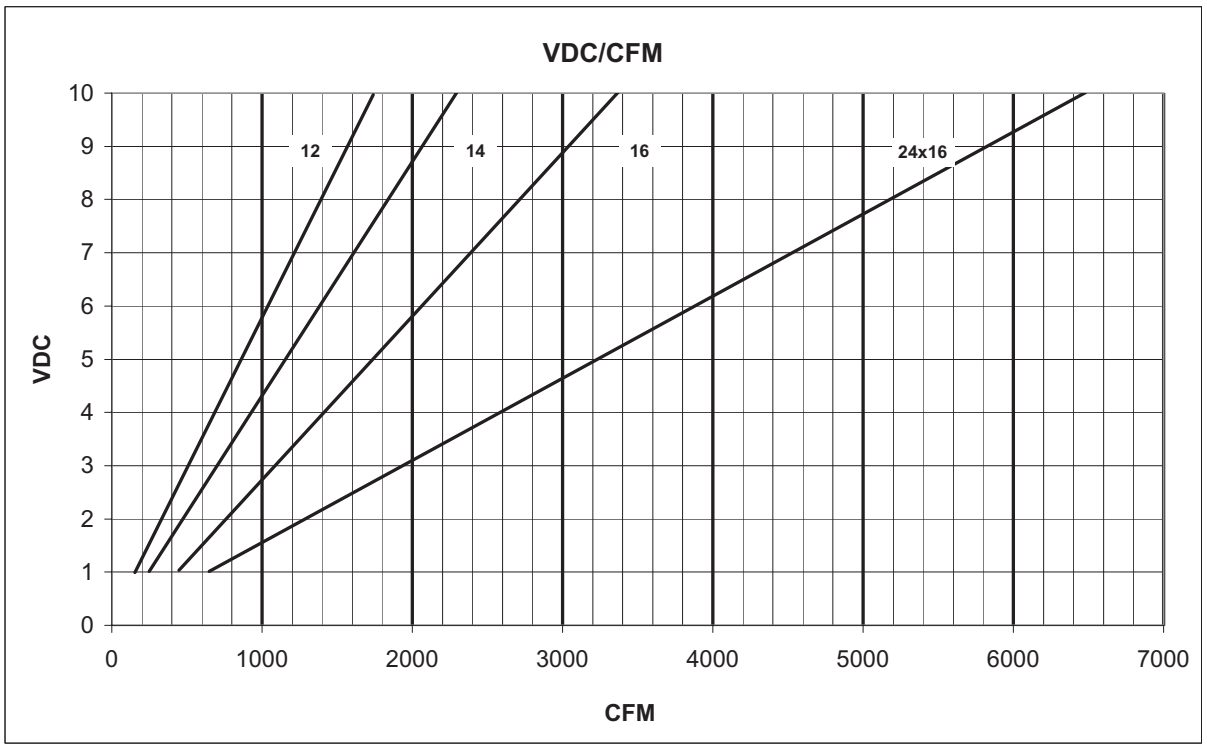
VDC Signal Versus Airflow

C51 Series Electronic Analog Controls





Note: This data is valid for the specific airflow sensor tubing size and lengths as shown on the wiring diagram. Readings will vary if different tubing size and lengths are used.