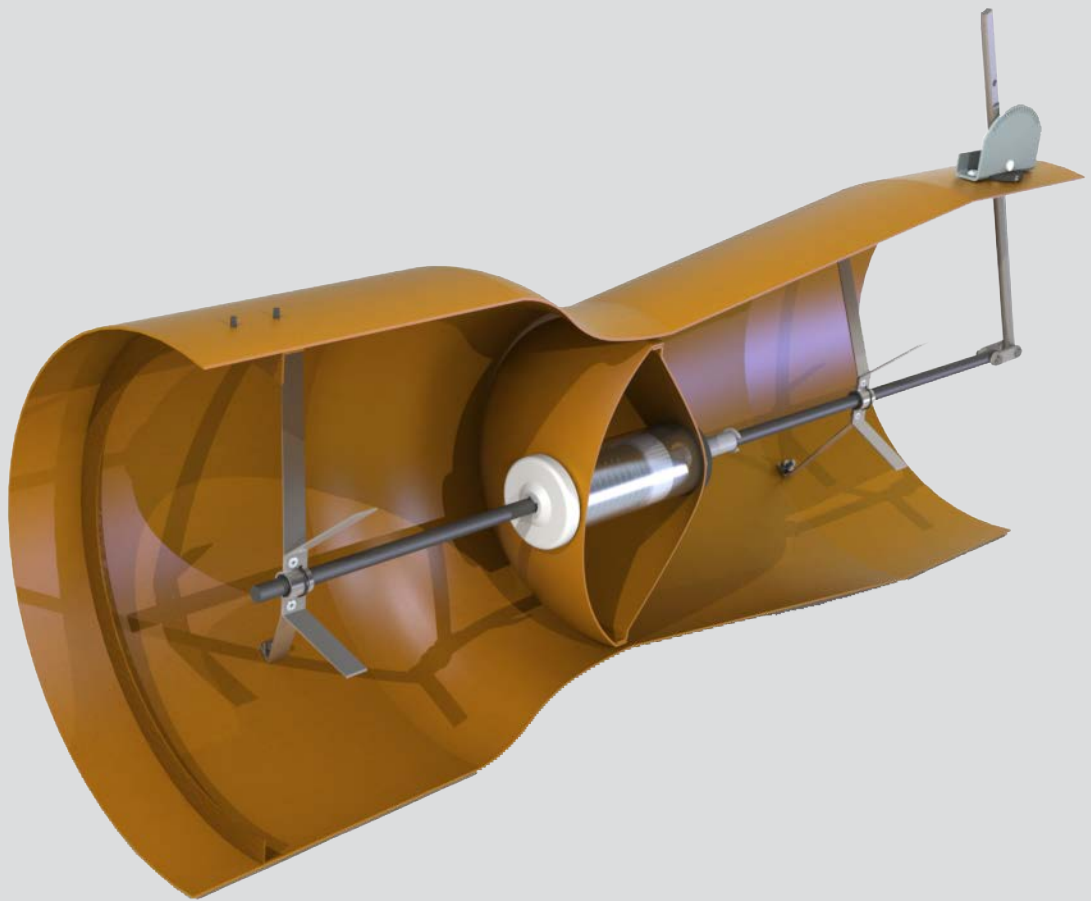


AIR TERMINAL UNIT

MARK AIR VALVES



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CONCEPT

MARK AIR VALVES represent a unique and radically different technical approach to the challenge of controlling ducted air volumes. Mark Air valves provide accurate air volume control in all low or high pressure applications and maintain required air volume independent of system pressure variations. This is achieved by having a movable cone inside a round venturi shaped housing. The spring controlled cone readjust to pressure variation before or after the valve. No external flow control device is required.

VALVE FEATURES

- Compact, lightweight permits flexibility in job applications and reduced installation costs, easily located for convenient access.
- Simplicity of design and rugged components assure consistent and maintenance free performance — Field proven.
- Factory calibrated, no costly field balancing. Future additions to system will not require rebalancing of original valves.
- External adjustment and graduated dial: no special tools or flow measuring devices required for volume change.
- Sturdy cylindrical aluminum housing for slip-in connection, fewer transitions.
- Corrosion resistant construction of aluminum and stainless steel.
- CV and VV — Selection of 5 sizes up to 1750 CFM per valve (H).
- VVS—Selection of 4 sizes up to 1500 CFM per valve (H).
- High, Medium and Low pressure ranges.

APPLICATION

- MARK AIR VALVES are used in supply or exhaust systems, for constant or variable volume, with or without reheat, in single or dual duct systems.
- CONSTANT VOLUME SYSTEMS: MA-CV MARK AIR VALVE Assures specified air flow regardless of pressure variations. Completely self contained.
- VARIABLE VOLUME SYSTEM: MA-VV MARK AIR VALVE. With pneumatic or electronic operator, offers true proportional control when connected to a zone thermostat. Maintains all thermostatic settings regardless of pressure changes before or after the valve.
- SHUT-OFF VARIABLE VOLUME SYSTEM: MA-VVS MARK AIR VALVE With the addition of the shut-off feature, valves may be used where 100% closure is required, may be used in conjunction with a smoke detector for supply and exhaust systems, and for dual duct applications. The VVS valve will provide accurate air volume control in all low or high pressure applications and maintain thermostatic settings independent of system pressure variations.

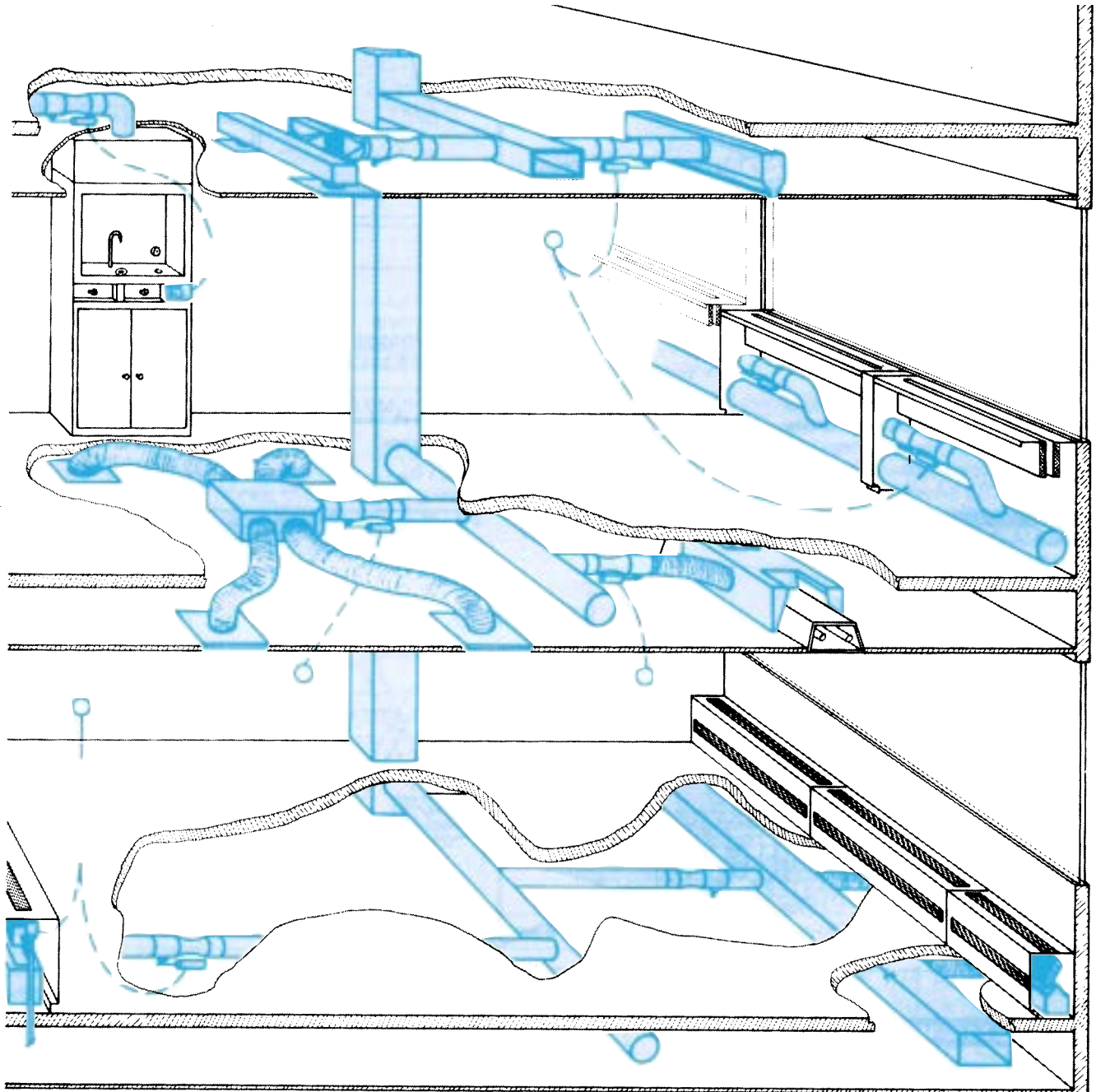
TYPICAL APPLICATIONS

1. Interior zones require cooling year round. Load variations caused mainly by shifting occupancy can be efficiently handled with MA-VV valves supplying multiple outlet boxes and light troffer diffusers.
2. Exterior zones can use MA-VV valves with reheat coils. Heating costs are reduced since thermostat controls the air valve and water valve in sequence. When room temperature is too low, MA-VV valve is throttled to minimum. Only if additional heating is required will the hot water valve open.
3. MA-CV valves can also be used to eliminate the critical balancing of primary air serving induction units. Specified air volume is maintained year round.
4. Several recent applications have taken advantage of the compact size of MARK AIR VALVES in using an all air system. The skin of the building is handled by MA-VV warm air valves supplying more or less heat at the window. Variable volume cool air is supplied year round at the ceiling by MA-VV valves. Both valves are controlled by a single thermostat so that as one closes the other opens.
5. Either low or high pressure constant volume MA-CV valves are recommended for use with absolute filters. As filter resistance increases, valve resistance decreases to maintain specified air volume. Typical applications are hospital operating rooms, laboratories and clean rooms.
6. Low pressure variable volume MAVV valves are ideal for exhaust or return systems. As illustrated a selector switch, located at the fume hood, sets the valve for minimum or maximum volume. Can also be used to control hood air volume in multiple fume hood applications.
7. MARK AIR VALVES are ideal for retro-fit applications.

AIR TERMINAL UNIT APPLICATIONS

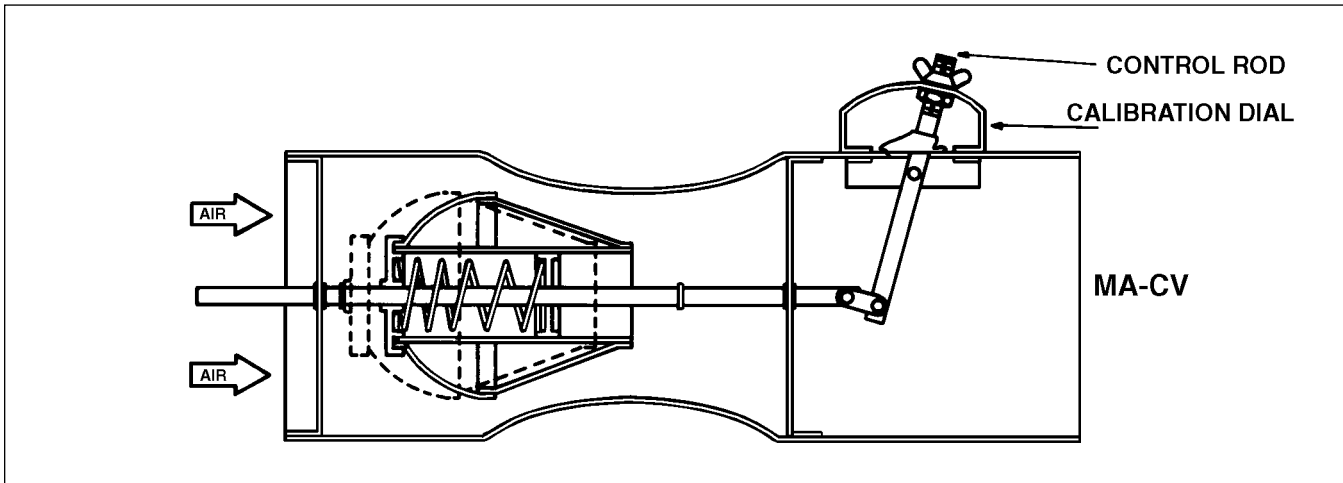
Regardless of the type of system, the Mark Air valve assures specified air volume and minimizes balancing.

FIGURE 1



For further details and special applications contact Rosemex engineering.

FIGURE 2

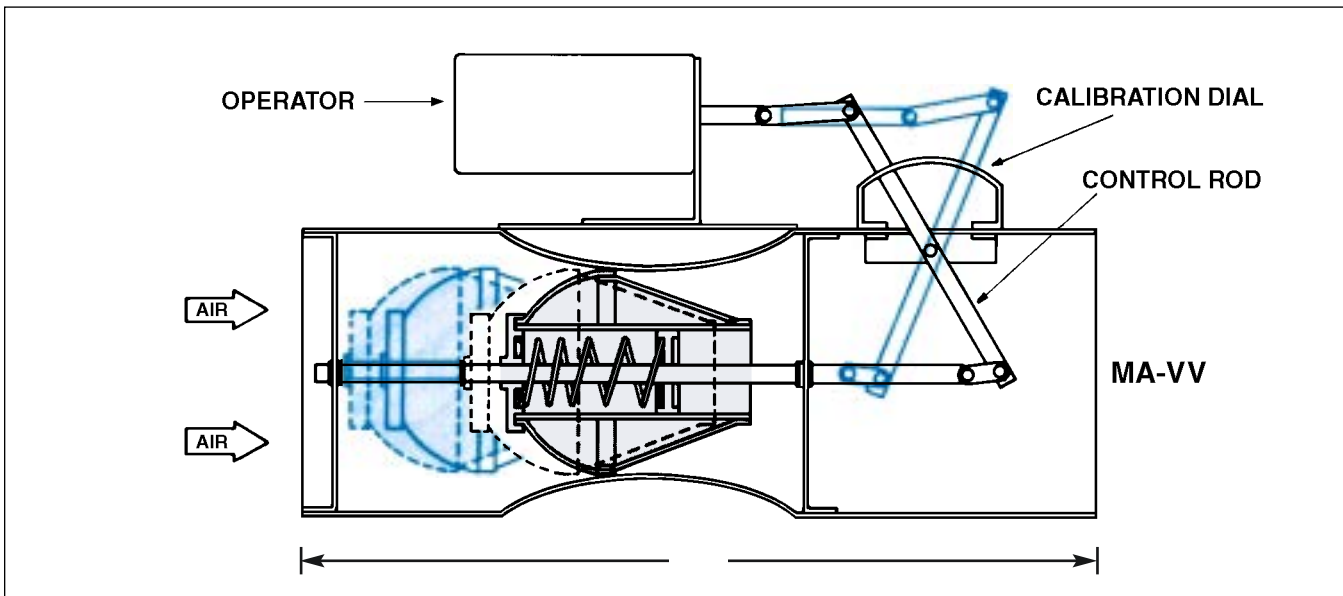


MODEL MA-CV VALVE

AUTOMATICALLY MAINTAINS A CONSTANT AIR VOLUME CORRESPONDING TO A MANUALLY SET POSITION, INDEPENDENT OF PRESSURE CHANGES.

Air volume is kept constant at a specified flow by locking the control rod in reference to the calibration dial. The cone is free to move in response to fluctuations in pressure. An increase in pressure ahead or after the valve pushes the cone deeper into the venturi, increasing the resistance so as to maintain constant volume. With a decrease in pressure, the spring pushes the cone out of the throat, reducing the resistance. For an other air volume selection, the control rod is simply set to a new dial position.

FIGURE 3



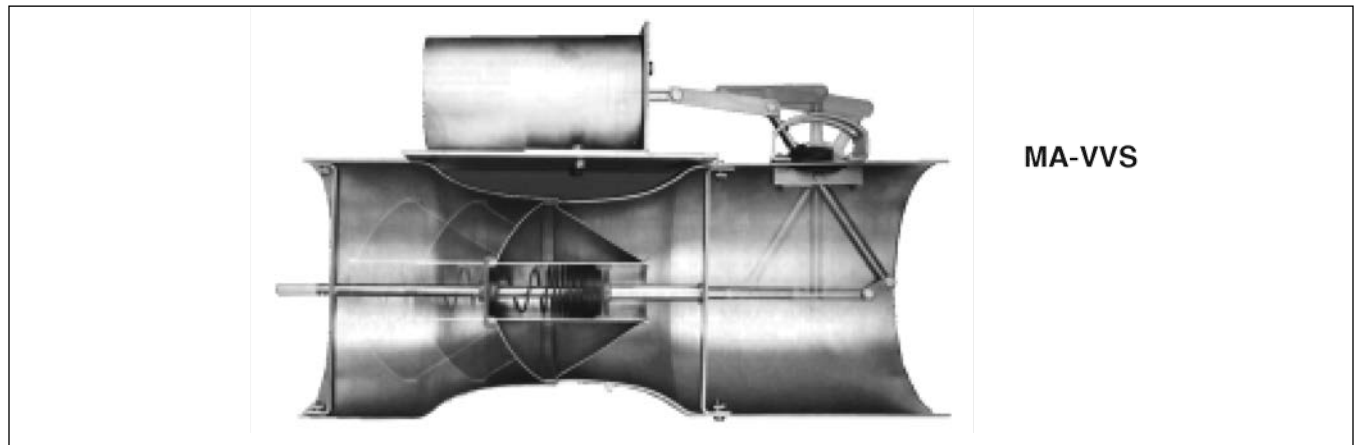
MODEL MA-VV VALVE

AUTOMATICALLY MAINTAINS A CONSTANT AIR VOLUME, AT EACH THERMOSTATICALLY SET POSITION, INDEPENDENT OF PRESSURE CHANGES.

By mounting a pneumatic or electronic operator the control rod is positioned according to thermostat demand between factory set minimum, [for VVS valve minimum is shut-off], and maximum limits. For any thermostat demand, the cone is self adjusting (same as MA-CV valve) and maintains constant air volume regardless of pressure changes.

AIR TERMINAL UNIT SELECTION

FIGURE 4



MA-VVS

TABLE 1
MA-CV AND VV VOLUME RANGE

VALVE NO.	CFM MINIMUM / MAXIMUM			*DIMENSIONS	
	LOW	MED.	HIGH	O.D.	L.
	ΔP 0.3" - 3.0"	ΔP 0.6" - 3.0"	ΔP 1.0" - 6.0"	In.	In.
5	20 - 150	30 - 175	45 - 275	4 15/16	14 1/4
6	35 - 250	50 - 300	55 - 400	5 15/16	16 5/8
8	50 - 400	60 - 500	85 - 700	7 7/8	19 1/2
10	40 - 700	60 - 900	90 - 1200	9 7/8	21 1/2
12	190 - 1200	200 - 1400	230 - 1750	11 7/8	24
210	80 - 1400	120 - 1800	180 - 2400	24 x 12	21 3/4
212	380 - 2400	400 - 2800	460 - 3500	28 x 14	24 1/4
312	570 - 3600	600 - 4200	690 - 5250	42 x 14	24 1/4
412	760 - 4800	800 - 5600	920 - 7000	56 x 14	24 1/4

* Actual dimensions are per current drawings. Future changes may be shown on approval drawings only. See page 9 for recommended selection ranges.

CV AND VV SELECTION

Determine system pressure after the fan and select valves according to capacity requirements in low, medium or high pressure columns. Low pressure valves are for systems where the ΔP across the valve is between 0.3" and 3.0" water gauge. Medium pressure valves are for system pressure between 0.6" and 3.0" water gauge. High pressure valves are for systems with ΔP across the valve of 1.0" to 6.0" water gauge. In order to allow for flexibility in cases of future changes, avoid selecting valves at either their maximum or their minimum limits. Duct diameter should match valve size to eliminate transitions.

TABLE 2
MA-VVS VOLUME RANGE

VALVE NO.	CFM MINIMUM / MAXIMUM			*DIMENSIONS	
	LOW	MED.	HIGH	O.D.	L.
	ΔP 0.4" - 3.0"	ΔP 0.6" - 3.0"	ΔP 1.25" - 6.0"	In.	In.
6	0 - 250	0 - 300	0 - 400	5 15/16	16 5/8
8	0 - 400	0 - 500	0 - 700	7 7/8	19 1/2
10	0 - 700	0 - 850	0 - 1200	9 7/8	21 1/2
12	0 - 1000	0 - 1200	0 - 1500	11 7/8	24
210	0 - 1400	0 - 1700	0 - 2400	24 x 12	21 3/4
212	0 - 2000	0 - 2400	0 - 3000	28 x 14	24 1/4
312	0 - 3000	0 - 3600	0 - 4500	42 x 14	24 1/4
412	0 - 4000	0 - 4800	0 - 6000	56 x 14	24 1/4
412	760 - 4800	800 - 5600	920 - 7000	56 x 14	24 1/4

* Actual dimensions are per current drawings. Future changes may be shown on approval drawings only. See page 9 for recommended selection ranges.

VVS SELECTION

Determine system pressure after the fan and select valves according to capacity requirements. Low pressure valves are for systems where the static pressure drop across the valve can range between 0.4" and 3.0" water gauge. Medium pressure valves are for systems between 0.6" and 3.0" water gauge. High pressure valves are for systems where the static pressure is between 1.25" and 6.0" water gauge across the valve.

SELECTION 1: VALVE MODELS

Rosemex offers three kinds of air valve:

1. for constant volume systems (MACV).
2. for variable volume systems (MAVV) where air volume rates range between a specified minimum and maximum.
3. for variable volume systems (MAVVS shut-off) where air flow ranges from zero to a specified maximum.

All three models assure controlled air flow for either supply or exhaust systems.

MA-CV, CONSTANT VOLUME VALVES do not require pneumatic or electrical operators. They are manually set at the factory to a specified CFM and maintain that CFM independent of static pressure variations occurring ahead of or after the valve.

MA-VV, VARIABLE VOLUME VALVES require auxiliary pneumatic or electronic operators to reset air flow in response to signals from zone thermostats. However, for any constant signal, where a given thermostat is satisfied, the CFM remains constant independent of pressure variations caused by valve adjustments in other zones. This pressure independent feature assures system stability and longer operator life.

MA-VVS, VARIABLE VOLUME/SHUTOFF VALVES are similar to MA-VV units except that they have a stepped housing permitting air flow shut-off. In the closed position there is a metal to metal contact between the cone and housing seat.

MA-VVS valves are not pressure independent below 30% of their maximum catalogued capacity, at which point they are controlled by the thermostat.

SELECTION 2: CONTROL MODES

As mentioned, either electronic or pneumatic operators may be used to control Mark Air valves. However, electronic operators require a more complex linkage and mounting base and the valve units are thus slightly more expensive.

Both MA-VV and MA-VVS models are available for either normally closed (NC) or normally open (NO) applications. N.C. means a minimum or closed valve setting with a zero control signal to the pneumatic or electronic operator.

Conversely, N.O. requires the maximum or open position with a zero control signal.

All MA-VV & MA-VVS models are shipped normally closed unless otherwise specified.

There is a small additional charge for N.O. pneumatic system applications because an additional reversing linkage must be provided. There is no additional charge for N.O. electronic operators since operation in either control mode is a matter of the wiring contacts used.

SELECTION 3: SYSTEM STATIC PRESSURE

All Mark Air valves are designed to operate over a wide range of system static pressure variations. They will maintain a given air flow, whether manually set (CV models) or thermostatically set (VV & VVS models), independent of pressure variations ahead of or after the valve within a specific range as indicated in the following table.

SYSTEM	ΔSP ACROSS VALVE INCHES WATER GAUGE		
	MIN.	MAX.	
LOW PRESSURE	0.3	3.0	MA-CV-L MA-VV-L
	0.4	3.0	MA-VVS-L
MEDIUM PRESSURE	0.6	3.0	MA-CV-M MA-VV-M MA-VVS-M
HIGH PRESSURE	1.0	6.0	MA-CV-H MA-VV-H
	1.25	6.0	MA-VVS-H

A specified air flow, which corresponds to a particular dial setting, (a calibration label is affixed to each valve) is achieved when the static pressure drop across the valve reaches the minimum required for the valve model selected. With the dial setting fixed, this same CFM will be maintained at all higher static pressure differentials up to the maximum indicated.

The principal advantages of low pressure units are:

1. require less fan hp
2. less acoustic treatment
3. lighter gauge ductwork

The advantages of high pressure units are:

1. generally valves are one size smaller for the same CFM capacity as low pressure valves,
2. smaller supply ducts and/or
3. a more extensive duct system per air handling unit

An intermediate pressure range of MA valves is also available, covering a ΔSP from 0.6 to 3.0 inches. Valves in this range are designated by the suffix letter M, as MA-CV-10M, MA-VV-12M or MAVVS- 8M. These may be used in conjunction with low pressure units if higher CFM capacities are required nearer the fan where a ΔSP of 0.6 or higher is available.

SELECTION 4: CFM RANGE

MA-CV and MA-VV models are available in five standard sizes identified by their nominal diameters of 5", 6", 8", 10" and 12". All sizes except the 5" are also available as MA-VVS models.

The CFM range of a particular valve size depends upon the pressure range selected. For example, a MA-CV-10L has a maximum capacity of 700 CFM; the maximum for a MA-CV-10M (the same size valve, but medium pressure) is 900 CFM and for a MA-CV-10H (again the same size valve, but high pressure) is 1200 CFM.

Occasionally, a project may have a CFM requirement greater than the capacity of our largest standard valve. For such applications, Rosemex furnishes an arrangement of two or more valves. These modular units are available for size 10 and 12 valves. Modular MA-VV valves require one operator per two valves, thus a MA-VV-212 will need one operator, a MA-VV-312 will need two as will a MA-VV-412. However, 10" and 12" MA-VVS modular units must have an operator for each valve.

In addition to the larger space requirements, high CFMs incur a penalty in terms of noise generation. Two valves generate twice the sound power of a single valve. This means adding 3 db to the catalogued sound power data for every doubling of valve modules.

In selecting MA-VV valves, consideration must be given, not only to the maximum CFM needed but also, to the minimum CFM. For example, suppose a maximum of 260 CFM is required for a low pressure variable volume application

From our catalogued capacity ranges either a No. 8, 10 or 12 valve could be chosen. However, with the No. 12, the minimum CFM possible is 150 or 58% of the maximum. Choosing a No. 8 valve would permit a variation down to 50 CFM or about 19% of the maximum.

SELECTION 5: CONTROL SENSITIVITY

In regard to VAV systems there is another reason to avoid oversizing, which has to do with the thermostatic control of the valve. In order to vary the CFM the thermostat sends a proportional control signal to the valve operator e.g.: with a minimum signal, the valve is at minimum and with a maximum signal, the valve is at maximum. When the CFM variation is small (such as in the case of the No. 12 valve varying from 250 to 300 CFM), then, the operator stroke must be severely limited. Instead of a broad control range, the thermostat becomes essentially an on-off switch and would be over sensitive causing the valve to continually cycle, reducing the operator life span.

The minimum CFM setting should be as low as possible and never higher than 50% of the maximum specified.

SELECTION 6: CAPACITY SAFETY MARGIN

One of the attractive features of the Mark Air Valve is its broad capacity range. In many cases, it will be possible to size a unit at approximately 75% of its maximum rating. This is an optimum selection since it permits increases to meet possible future higher load demands without requiring a new valve.

SELECTION 7: ACOUSTIC CONSIDERATIONS

MA-CV and MA-VV models are available in five standard sizes identified by their nominal diameters of 5", 6", 8", 10" and 12". All sizes except the 5" are also available as MA-VVS models.

The CFM range of a particular valve size depends upon the pressure range selected. For example, a MA-CV-10L has a maximum capacity of 700 CFM; the maximum for a MA-CV-10M (the same size valve, but medium pressure) is 900 CFM and for a MA-CV-10H (again the same size valve, but high pressure) is 1200 CFM.

Occasionally, a project may have a CFM requirement greater than the capacity

of our largest standard valve. For such applications, Rosemex furnishes an arrangement of two or more valves. These modular units are available for size 10 and 12 valves. Modular MA-VV valves require one operator per two valves, thus a MA-VV-212 will need one operator, a MA-VV-312 will need two as will a MA-VV-412. However, 10" and 12" MA-VVS modular units must have an operator for each valve.

In addition to the larger space requirements, high CFMs incur a penalty in terms of noise generation. Two valves generate twice the sound power of a single valve. This means adding 3 db to the catalogued sound power data for every doubling of valve modules.

In selecting MA-VV valves, consideration must be given, not only to the maximum CFM needed but also, to the minimum CFM. For example, suppose a maximum of 260 CFM is required for a low pressure variable volume application.

SELECTION 8: SPECIAL APPLICATIONS

Because of its compact size relative to capacity, the Mark Air valve is ideally suited for a variety of special applications.

Custom cabinets may be fitted with valves to regulate air flow at exterior zones or they may be added to fume hoods, either as a constant volume balancing device or with variable volume control, for either or both hood supply and exhaust.

Problems of limited space, especially common in renovation work, are minimized by the use of Mark Air valves. The conversion of existing constant volume systems to variable volume may require no more than removing a section of duct and replacing it with a valve.

Although valves are designed for horizontal installation they may be specified for vertical duct applications. In such cases, air flow direction (up or down) must be indicated to assure proper calibration i.e., will air pressure work against the gravitational force of the cone assembly or will it work in the same direction as the gravitational force. CFM range for vertical installations will vary from the catalogue depending on valve size and air flow direction.

The following is a list of commonly specified options:

1. MA-VV or VVS valve complete with pneumatic or electronic operator.

2. MA-CV, MA-VV or MA-VVS valves with acoustically treated multiple outlet boxes.
3. MA-CV, MA-VV or MA-VVS valves with flanged housings (1" flanges on either or both ends of valve).
4. MA-CV or MA-VV valves with electric or hot water duct coils.
5. Stainless steel valves (for horizontal installations only).
6. Polyester or other spray coatings (for horizontal installations only).

SELECTION 9: SELECTION CHARTS

Chart I is for selecting MA-CV and VV valves and Chart II is for MA-VVS valves.

The CFM capacity range of each valve size is indicated by a horizontal bar. The left-hand limit of each horizontal bar designates the minimum possible CFM and the right-hand limit, the maximum.

The selection of a particular size valve should be determined by the maximum CFM required. Each bar is divided into areas that qualify any size selection relative to a maximum CFM setting.

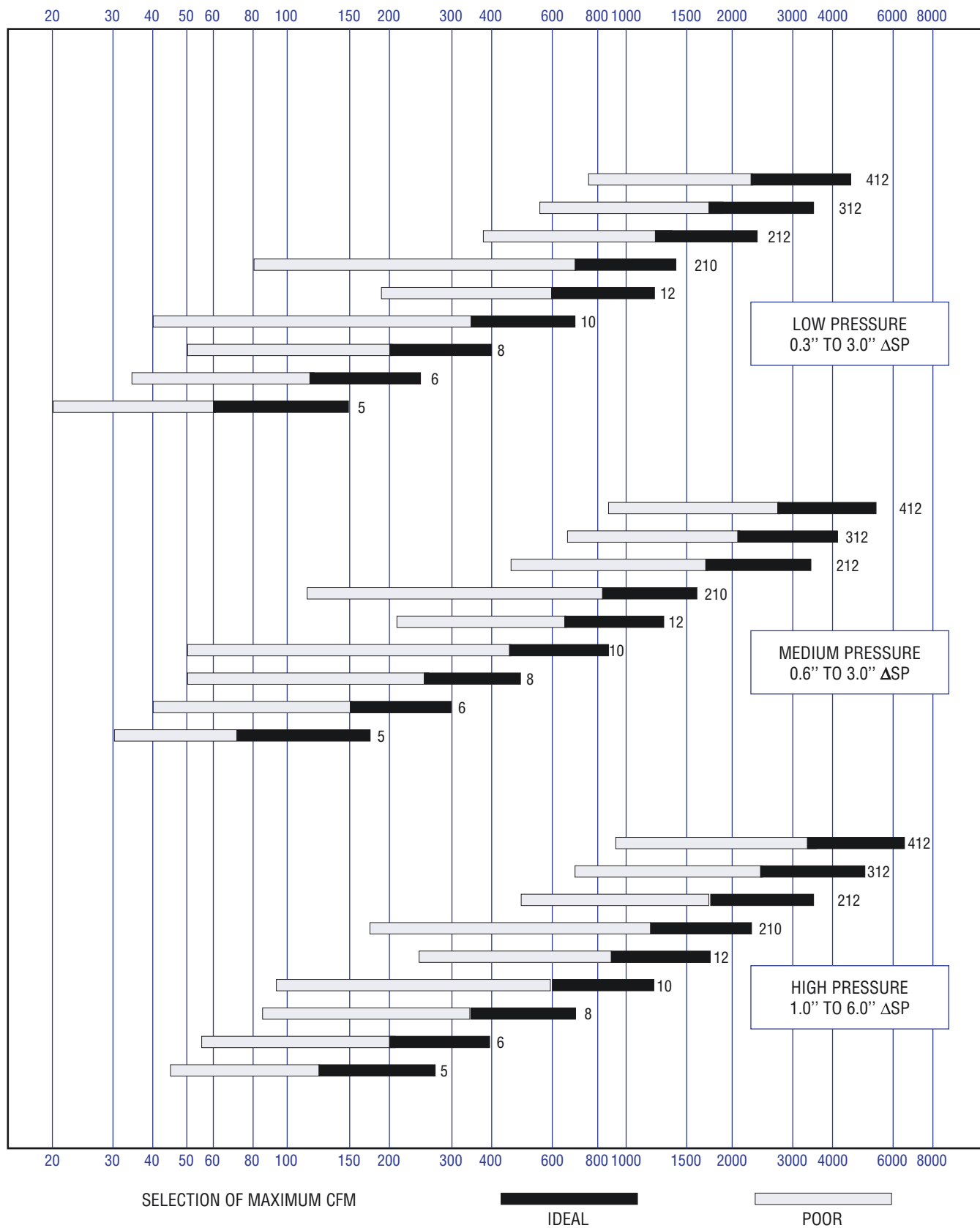
In the case of MA-VV valves the minimum may be selected at the left hand limit or at any CFM below 50% of the maximum setting. The shaded areas qualifying size selection refer to the maximum setting only. For example, assume a low pressure, variable volume application (MA-VVL) where a maximum of 520 and a minimum of 130 CFM are required, then a no. 10 valve would be an ideal selection.

The following steps will assure optimum valve sizing.

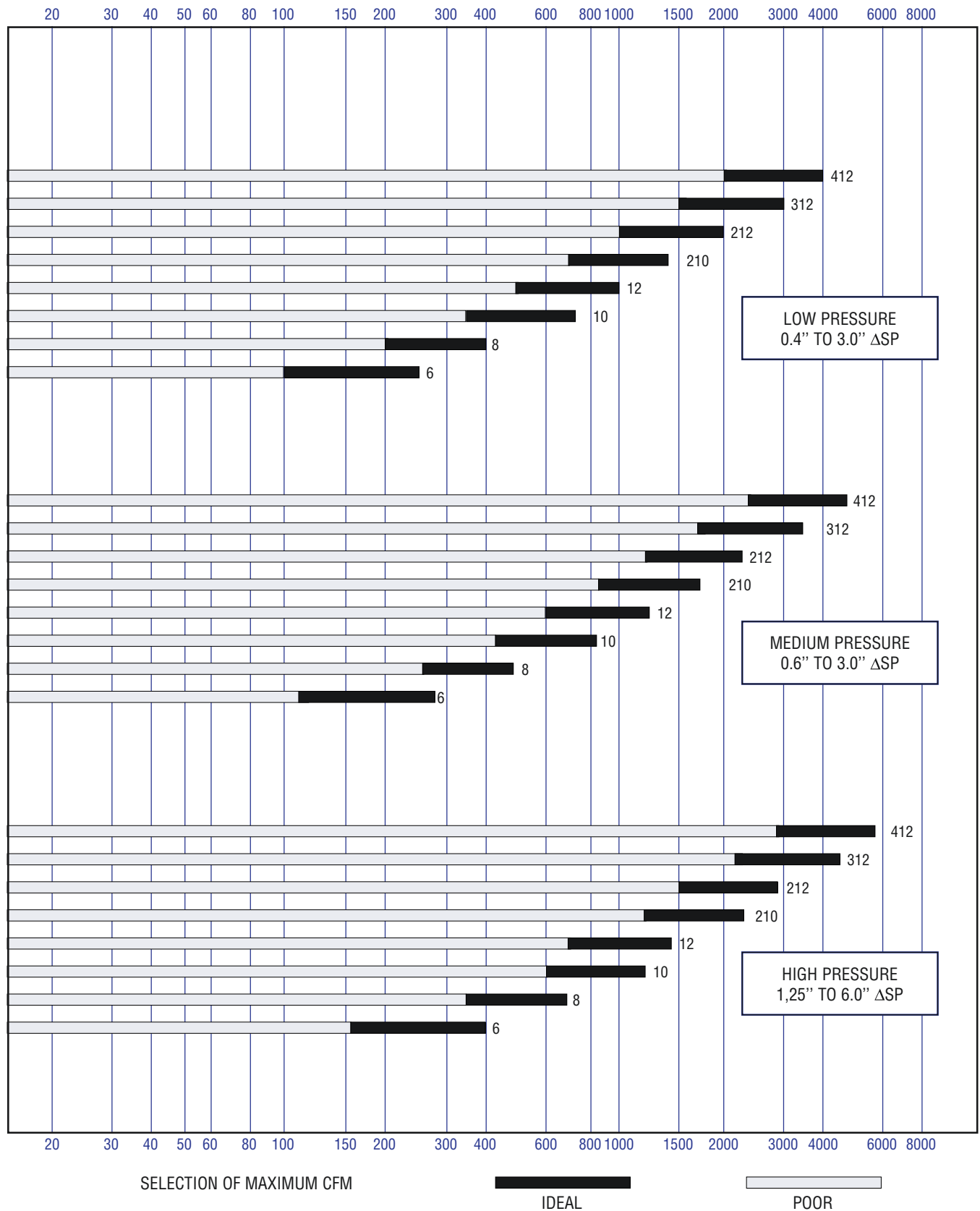
1. Determine type valve required and refer to Chart I (MA-CV and MA-VV) or Chart II (MA-VVS).
2. Choose the pressure range require (Low, Medium or High).
3. Descend along the vertical line, corresponding to the maximum CFM required, until the appropriate pressure range group of horizontal bars is reached.

The intersection of the vertical CFM line with a horizontal bar, where the point of intersection is nearest the unshaded portion of the bar and furthest from the solid portion of the bar identifies that bar as the best size selection.

SELECTION CHART I FOR CONSTANT AND VARIABLE VOLUME VALVES — MA-CV, MA-VV



SELECTION CHART I FOR CONSTANT AND VARIABLE VOLUME VALVES — MA-CV, MA-VV



The information contained herein is intended to improve estimates of room sound levels resulting from Mark Air valves and typical duct system arrangements. It should also serve as a guide for determining the most efficient and economical acoustic treatment to achieve a desired sound level. Data is provided for types MA-CV, MA-VV and MA-VVS valves covering all pressure ranges.

Naturally, the sound level values given do not include extraneous noise sources; such as adjoining mechanical rooms, pipe chases, outside traffic, etc. Nor has sound generation by diffusers been considered, since sound levels vary with diffuser types and sizes, and should be determined in accordance with the manufacturer's literature. Further, it has not been possible to evaluate the directivity of sound propagation because this too varies with diffuser geometry.

It is important to note that the sound level values shown are based on sound pressure levels for a valve and **a specific duct system** as tested in our laboratory in accordance with ASHRAE Standard 36-72. Variations in duct sizing and arrangement will result in different system characteristics and influence sound transmission properties. Reference can be made to Mark Air valve data to obtain the sound power values of the valve alone and to these, appropriate correction factors may be applied.

The sound propagated at the Mark Air valve is directly related to:

1. The air volume/air (CFM) through the valve
2. The pressure drop (Δ SP) across the valve
3. The size of the valve
4. The geometry of the valve, i.e., whether it is a model VV or VVS

For a given valve, the higher the CFM and/or Δ SP the higher the sound level. This is true for all types of duct constructions causing air stream flow losses. These losses are transformed into increased turbulence and sound energy. Typically, this sound is broad band and is generated over a frequency range between 125 and 4000 Hz.

For convenience of application, generated noise data has been given in two forms:

1. "ducted sound"; i.e., the noise at the air valve outlet which is, channelled with the air into a room and
2. "radiated sound"; i.e., the noise that radiates from the valve housing and duct elements and passes through the suspended ceiling into a room.

Ducted noise must be attenuated by the elements downstream of the valve and the acoustic treatment required depends upon the particular system design and the specified acceptable sound level for a given space.

In most valve installations, radiated noise is attenuated by the ceiling plenum, by the suspended ceiling and by room absorption.

Valves should be located as remote as practical from terminal diffusers to provide as much attenuating length as possible after the valve. Where there is a choice, valves should be located over non critical areas, e.g., corridors, storage facilities, etc., in order to minimize the addition of radiated noise to the occupied space. Valves may be located at take-offs from main or branch ducts. Take-offs should be standard high pressure design to minimize excessive pressure losses.

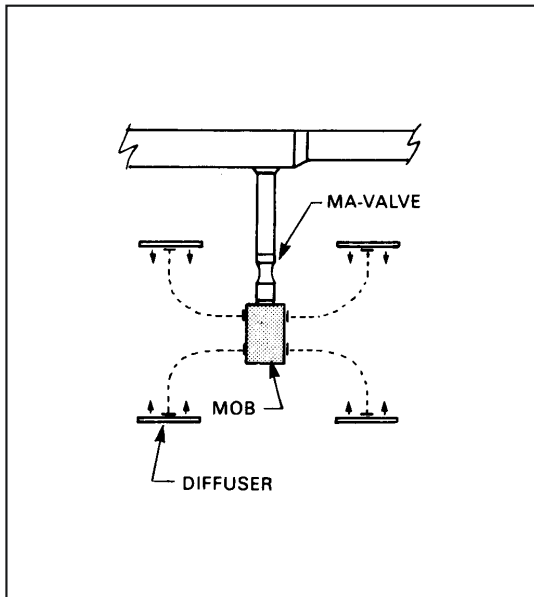
Concerning radiated sound, our catalogues give only the sound power data for noise radiating directly from the valve housing. Our laboratory tests meticulously avoided contaminating noise from duct work immediately before and after the valve by insulating and wrapping these elements with lead sheeting.

Naturally, this treatment will not be found on the job. Consideration then must be given to the noise generated by the valve which may be radiated, not only from the housing, but from duct elements immediately before and after the valve. Flexible duct, even the typical acoustic flexible duct, is very poor in preventing the transmission of radiated sound; i.e., the sound escaping through the duct walls as opposed to the sound directed downstream or upstream within the duct. For this reason, **flexible connections directly to the valve should be avoided where static pressures are over 1" WG** and flexible take-offs to diffusers should be? after sufficient acoustic treatment and as far downstream from the valve as practical.

AIR TERMINAL UNIT

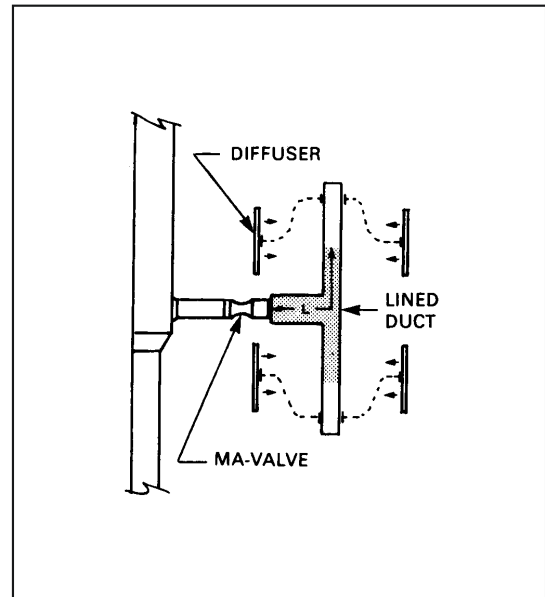
MARK AIR VALVES AND TYPICAL DISTRIBUTION SYSTEMS – ACOUSTIC TREATMENT

FIGURE 5



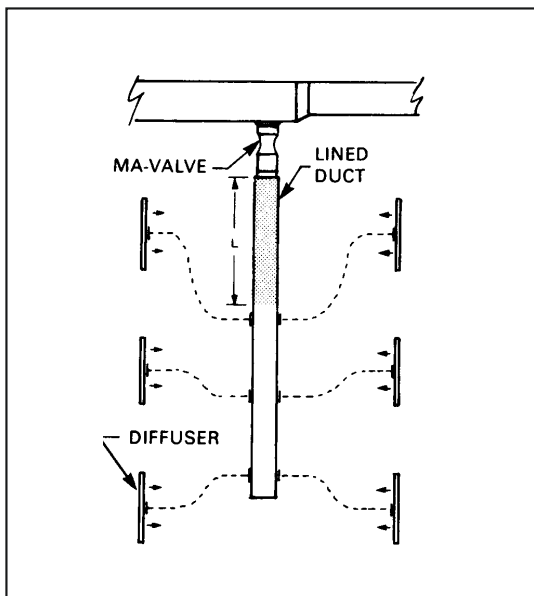
Metal or acoustic lined multi-outlet box (MOB)

FIGURE 6



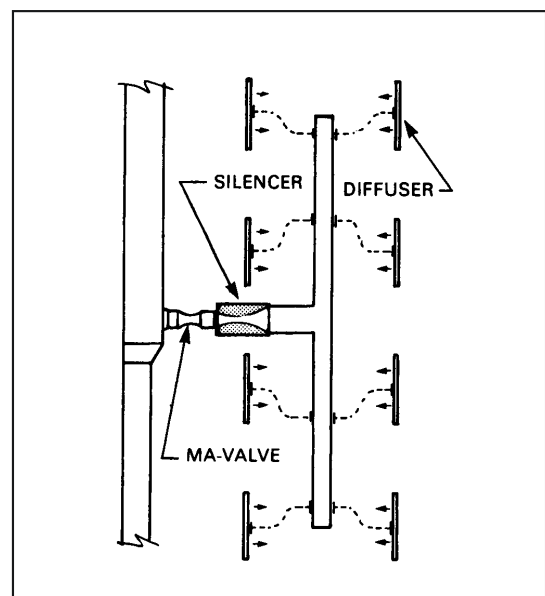
Acoustically lined distribution duct «T» arrangement,
L = Specified length.

FIGURE 7



Distribution duct acoustically treated for specified length
before take-offs to diffusers.

FIGURE 8



Silencer with untreated distribution duct, either straight or as
per «T» arrangement shown.

DUCTED SOUND POWER LEVELS

The NC values can be calculated by referring to the tables in Chapter 35 of the 1973 ASHRAE SYSTEM HANDBOOK.

TABLE 3
DUCTED PWL RE 10⁻¹² WATT

VALVE NO.	CFM	ΔP 0.3"						ΔP 1.0"						ΔP 2.0"						ΔP 3.0"						ΔP 4.0"					
		OCTAVE PWL						OCTAVE PWL						OCTAVE PWL						OCTAVE PWL						OCTAVE PWL					
		2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
5	100	45	44	44	44	31	24	55	53	52	53	42	37	57	55	56	57	49	45	58	56	59	60	53	49	58	58	61	62	56	52
	150	49	47	47	49	37	30	59	57	57	59	49	43	64	62	62	65	56	50	66	64	66	68	60	54	67	66	68	71	62	58
	200							61	59	60	64	53	47	66	65	67	70	60	54	70	68	70	74	64	59	72	72	73	76	67	62
	250							62	60	63	67	57	50	67	68	70	74	63	57	72	70	74	77	67	62	74	73	77	80	71	65
6	200	48	51	47	42	39	30	54	57	57	55	50	44	58	61	64	63	57	52	60	63	67	67	60	57	62	64	70	69	63	60
	250	49	53	49	45	42	32	56	59	60	58	53	46	61	64	66	65	60	54	63	66	70	69	63	59	65	67	72	72	66	63
	300							57	61	62	60	56	48	62	65	68	67	62	56	65	68	72	71	66	61	67	69	74	74	69	65
	400							59	64	65	63	60	51	65	69	71	70	66	59	68	71	75	74	70	64	70	73	77	77	72	68
8	300	53	43	44	37	32	30	58	53	56	51	46	42	61	58	63	59	54	49	63	62	67	63	59	53	64	64	70	66	62	56
	400	53	45	47	40	36	33	60	56	59	53	49	45	64	62	66	61	57	53	66	65	70	66	62	57	67	68	72	69	65	60
	550							61	59	62	57	53	50	66	65	69	65	61	57	69	69	73	69	65	61	71	72	76	72	68	64
	700							62	61	64	59	56	53	68	68	71	67	63	60	72	72	75	71	67	64	74	75	78	74	70	67
10	550	55	47	50	47	39	35	62	59	62	58	53	48	66	66	69	64	60	56	69	70	73	68	65	60	70	72	75	71	68	63
	700	56	48	52	50	41	37	64	61	64	61	54	50	69	68	71	68	63	58	71	72	75	71	67	62	73	75	78	74	70	65
	900							66	62	66	64	57	52	71	70	73	71	65	60	74	75	77	75	69	64	76	78	80	77	73	67
	1200							68	64	68	68	59	54	74	72	75	74	67	62	77	78	79	78	71	66	79	81	83	81	75	70
12	700	59	49	50	43	39	34	64	60	61	56	53	48	68	66	68	64	61	56	70	70	71	69	66	60	71	72	74	72	69	64
	1000	61	52	52	47	42	37	68	64	64	59	56	51	71	70	71	67	65	59	74	74	75	72	69	64	75	76	78	75	73	67
	1500							71	67	67	63	60	55	76	74	75	71	68	63	79	78	78	75	73	68	80	81	82	78	76	71
	1750							72	69	69	65	62	57	78	76	76	73	70	65	81	80	80	77	74	69	83	82	83	80	78	73

NOTES:
 ΔP — Static pressure drop across valve
 OCTAVE — Center band frequencies as per USA1 S1-6-1967
 PWL — Valve sound power level re10⁻¹² watt

AIR TERMINAL UNIT

RADIATED SOUND CV AND VV



SOUND POWER LEVELS

TABLE 4
RADIATED PWL RE 10⁻¹² WATT

VALVE NO.	CFM	ΔP 0.3"						ΔP 1.0"						ΔP 2.0"						ΔP 3.0"						ΔP 4.0"					
		OCTAVE PWL						OCTAVE PWL						OCTAVE PWL						OCTAVE PWL						OCTAVE PWL					
		2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
5	100	36	39	34	33	29	26	42	45	42	41	39	37	45	48	46	46	44	42	45	50	49	49	47	47	46	52	51	51	49	49
	150	37	43	39	38	32	26	46	50	48	47	42	38	52	54	53	53	48	43	53	56	56	56	52	49	54	57	58	58	54	51
	200							48	52	52	51	45	39	54	57	58	58	51	46	58	60	61	62	55	50	60	63	63	65	57	53
	250							49	53	53	52	47	39	56	60	59	60	54	47	60	63	62	64	58	51	63	66	65	67	60	54
6	200	38	37	35	31	31	20	46	46	43	41	41	32	50	51	48	47	47	40	53	54	51	52	50	44	55	56	53	54	52	47
	250	40	39	38	34	34	17	48	48	46	44	44	35	53	53	51	50	50	42	56	56	54	54	53	46	58	58	56	57	55	49
	300							50	50	49	47	46	37	56	55	54	53	52	44	59	58	57	57	56	48	61	60	59	59	58	51
	400							54	53	53	51	50	40	60	57	58	57	56	47	63	60	61	61	60	51	66	62	63	63	62	54
8	300	38	30	31	27	26	21	46	41	43	39	38	32	51	47	49	46	45	39	53	51	53	50	49	43	55	53	56	53	54	46
	400	42	33	34	30	30	24	50	44	46	42	42	36	54	51	52	49	48	43	57	54	56	53	53	47	58	57	59	56	57	50
	550							53	48	49	45	46	40	57	55	55	52	53	46	60	58	59	56	57	51	62	62	62	59	59	53
	700							56	51	51	47	49	43	60	58	58	55	55	50	63	62	62	58	60	54	65	64	65	61	63	57
10	550	38	26	25	24	21	18	45	37	37	36	34	31	50	43	42	41	38	36	53	47	46	47	45	42	54	49	49	51	48	45
	700	41	29	27	26	23	21	48	39	39	38	36	33	52	46	45	46	43	40	55	50	49	50	48	44	56	52	51	53	51	48
	900							51	43	42	41	39	36	55	49	48	49	46	43	58	53	51	53	50	47	59	55	54	56	53	50
	1200							55	46	45	44	42	39	59	53	51	52	49	46	61	56	55	56	54	50	63	59	57	59	57	53
12	700	40	26	32	25	20	17	46	39	44	38	34	31	49	46	51	46	42	38	52	50	55	50	46	43	52	52	57	53	50	46
	1000	43	30	36	29	24	21	50	43	48	42	38	35	54	50	55	49	46	42	56	54	58	54	51	47	57	57	61	57	54	50
	1500							54	48	52	46	43	39	58	55	59	54	50	46	61	58	63	58	55	51	62	62	66	61	59	54
	1750							56	50	54	48	45	41	61	57	61	56	53	49	64	61	65	60	57	53	65	63	68	63	61	56

NOTES:
 ΔP — Static pressure drop across valve
 OCTAVE — Center band frequencies as per USA1 S1-6-1967
 PWL — Valve sound power level re10⁻¹² watt

TABLE 5
DUCTED SOUND WVS

VALVE NO.	CFM	0.4" ΔP						1.25" ΔP						2.0" ΔP						3.0" ΔP						4.0" ΔP					
		OCTAVE PWL						OCTAVE PWL						OCTAVE PWL						OCTAVE PWL						OCTAVE PWL					
		2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
6	200	50	47	48	47	43	36	61	59	60	59	55	50	63	62	64	63	60	55	66	64	68	67	63	59	67	66	70	70	66	62
	250	51	48	50	49	45	38	62	60	62	60	58	52	65	64	66	65	62	56	68	66	70	69	66	61	69	68	72	72	68	64
	300							63	61	63	62	60	53	67	65	67	67	64	58	70	68	71	71	68	62	71	71	73	74	71	65
	400							64	62	66	64	63	55	69	67	70	69	67	60	73	71	74	73	71	64	75	74	76	77	74	67
8	300	52	40	51	41	41	31	60	51	59	54	53	45	62	55	63	58	58	51	64	59	66	63	62	55	66	61	69	66	65	59
	400	54	42	54	43	44	34	62	54	61	56	56	48	65	58	66	61	60	53	68	62	70	66	65	58	70	65	73	69	68	62
	550							65	56	64	59	59	51	69	62	69	64	63	57	72	66	73	69	68	62	74	69	77	73	71	65
	700							67	59	67	61	61	54	71	65	72	67	65	59	75	68	76	72	70	65	77	71	80	75	73	68
10	550	55	50	51	47	47	38	67	61	63	58	57	52	69	65	68	64	63	57	72	68	72	68	67	62	73	70	75	71	70	65
	700	56	51	53	49	49	41	68	63	65	60	60	54	72	67	70	66	65	59	74	71	74	70	69	64	76	73	77	73	72	67
	900							70	65	67	63	62	56	74	69	72	68	67	61	77	73	76	72	71	66	79	76	79	75	74	69
	1200							73	67	69	65	64	59	77	72	74	70	69	64	80	76	78	75	74	69	82	79	81	78	77	72
12	700	52	49	50	49	42	39	62	61	63	60	57	53	66	66	69	67	63	59	69	70	73	73	68	63	72	73	76	77	72	68
	1000	56	53	53	51	47	45	66	64	66	63	60	57	70	69	71	69	66	62	74	73	76	74	70	66	77	76	79	78	74	70
	1500							71	67	69	67	64	62	76	72	74	72	69	66	79	76	78	76	73	69	82	79	81	79	76	72

NOTES:

ΔP — Static pressure drop across valve

OCTAVE — Center band frequencies as per USA1 S1-6-1967

PWL — Valve sound power level re10-12 watt

TABLE 6
RADIATED SOUND WVS

VALVE NO.	CFM	0.4" ΔP						1.25" ΔP						2.0" ΔP						3.0" ΔP						4.0" ΔP					
		OCTAVE PWL						OCTAVE PWL						OCTAVE PWL						OCTAVE PWL						OCTAVE PWL					
		2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
6	200	38	29	26	23	22	17	43	41	35	34	32	28	45	44	38	38	36	32	47	47	42	42	40	36	50	48	44	44	42	39
	250	39	31	28	25	24	19	47	42	37	36	35	30	49	46	41	40	40	35	51	49	45	44	43	39	53	51	47	46	45	42
	300							48	43	39	38	38	32	50	48	44	42	42	37	53	51	47	46	45	41	55	53	50	48	48	44
	400							51	45	42	40	42	35	53	50	47	45	46	40	56	53	51	49	50	44	58	56	54	51	52	47
8	300	36	26	24	23	17	15	45	34	34	32	29	27	48	38	38	37	34	32	50	42	41	40	37	36	52	44	43	43	40	40
	400	39	28	26	26	21	17	47	37	37	36	32	30	50	41	41	40	37	35	53	45	44	44	40	39	55	47	47	46	43	42
	550							49	41	40	39	36	33	52	45	44	44	40	38	55	49	48	48	44	42	57	51	50	50	47	46
	700							50	43	42	42	39	35	54	48	47	46	43	40	58	52	51	51	47	44	60	54	53	53	50	48
10	550	36	28	29	32	24	21	45	38	41	43	36	34	49	42	45	47	41	39	52	45	49	51	45	44	53	48	52	54	48	47
	700	40	31	32	35	26	23	49	41	43	46	39	36	52	45	48	50	44	42	55	48	52	54	48	46	57	51	54	57	50	49
	900							52	44	46	49	41	38	56	48	50	54	46	44	59	52	54	57	50	48	60	55	57	60	53	52
	1200							56	48	49	53	45	41	60	52	54	57	49	46	63	55	57	61	53	51	65	58	60	64	56	54
12	700	38	31	35	28	25	28	46	40	45	39	39	34	50	45	50	44	43	39	53	49	54	49	48	45	56	52	56	51	51	48
	1000	43	34	38	32	33	33	52	43	49	44	43	38	55	48	54	48	47	44	59	52	57	52	51	48	61	55	60	55	54	52
	1200							58	47	53	49	47	44	62	52	57	53	51	49	65	55	61	57	55	53	68	57	63	59	58	56

AIR TERMINAL UNIT

DUCTED AND RADIATED NC LEVELS

DISCHARGE AND RADIATED NC LEVELS

The following tables, one for each of the Mark Air valve sizes, give NC values for different valve and duct arrangements as illustrated on page 11.

The columns headed with a "D" are anticipated NC levels resulting from the valve noise **ducted** into the occupied space. It does not include noise which may be generated by the diffuser. The columns headed with an "R" give the NC levels resulting from **radiated** sound and include sound radiating from both the valve and the duct elements in the immediate vicinity of the valve. The final NC level estimate for a given zone is the logarithmic sum of the ducted and radiated NC values for the valve systems serving the occupied space. (See table 16 on page 20 for adding NC levels).

TABLE 7
MA-CV AND MA-VV — CONSTANT AND VARIABLE VOLUME VALVES

VALVE NO. 5		MOB-M*		MOB-F†		DUCT LINING						SILENCER	
CFM	ΔSP	D	R	D	R	6'		8'		12'		36"	
		D	R	D	R	D	R	D	R	D	R	D	R
100	0.3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.0	16	<10	14	<10	15	<10	13	<10	<10	<10	<10	<10
	2.0	9	<10	16	<10	17	<10	15	<10	13	<10	13	<10
	3.0	20	11	17	12	19	10	16	10	14	10	14	10
150	0.3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.0	21	12	19	13	20	11	17	11	15	11	15	11
	2.0	27	18	25	19	27	17	24	17	21	17	21	17
	3.0	30	21	27	22	29	20	26	20	24	20	24	20
200	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	24	15	21	16	22	14	20	14	17	14	17	14
	2.0	30	21	27	22	29	20	26	20	24	20	24	20
	3.0	35	26	32	27	34	25	31	25	29	25	29	25
250	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	25	16	22	17	24	15	21	15	19	15	19	15
	2.0	31	22	29	23	30	21	27	21	25	21	25	21
	3.0	37	28	35	29	36	27	34	27	31	27	31	27

* **MOB-M**: A multiple outlet box in 22 ga. galvanized steel lined with 1/2" thick, 1 1/2 lb density fiberglass. Dimensions are as per MOB Data Sheet. Data based on flexible duct take-offs equal to AL-U-FLEX type S (single ply aluminum).

† **MOB-F**: A multiple outlet box constructed of 1" solid fiberglass duct board covered with aluminum foil. Dimensions are as per MOB Data Sheet. Data based on flexible duct take-offs equal to AL-U-FLEX type S (single ply aluminum).

TABLE 8
MA-CV AND MA-VV — CONSTANT AND VARIABLE VOLUME VALVES

VALVE NO. 6		MOB-M*		MOB-F†		DUCT LINING						SILENCER	
CFM	ΔSP	D	R	D	R	6'		8'		12'		36"	
		D	R	D	R	D	R	D	R	D	R	D	R
200	0.3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.0	15	<10	13	<10	14	<10	11	<10	<10	<10	<10	<10
	2.0	20	11	17	12	19	10	16	10	14	10	14	10
	3.0	22	13	20	14	21	12	19	12	16	12	16	12
250	0.3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.0	17	<10	15	10	16	<10	14	<10	11	<10	11	<10
	2.0	24	15	21	16	22	14	20	14	17	14	17	14
	3.0	26	17	24	18	25	17	22	16	20	16	20	16
300	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	19	10	16	11	17	<10	15	<10	13	<10	13	<10
	2.0	25	16	22	17	24	15	21	15	19	15	19	15
	3.0	29	20	26	21	27	19	25	19	22	19	22	19
400	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	21	12	19	13	20	11	17	11	15	11	15	11
	2.0	29	20	26	21	27	19	25	19	22	19	22	19
	3.0	32	23	30	24	31	22	29	22	26	22	26	22

TABLE 9
MA-CV AND MA-VV — CONSTANT AND VARIABLE VOLUME VALVES

VALVE NO. 8		MOB-M*		MOB-F†		DUCT LINING						SILENCER	
CFM	ΔSP	D	R	D	R	6'		8'		12'		36"	
		D	R	D	R	D	R	D	R	D	R	D	R
300	0.3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.0	16	11	14	12	15	10	13	10	10	10	10	10
	2.0	20	15	17	16	19	14	16	14	14	14	14	14
	3.0	22	17	20	18	21	16	19	16	16	16	16	16
400	0.3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.0	19	13	16	14	17	12	15	12	12	12	12	12
	2.0	24	18	21	19	22	17	20	17	17	17	17	17
	3.0	26	21	24	22	25	20	22	20	20	20	20	20
550	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	20	15	17	16	19	14	16	14	14	14	14	14
	2.0	26	21	24	22	25	20	22	20	20	20	20	20
	3.0	30	25	27	26	29	24	26	24	24	24	24	24
700	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	21	16	19	17	20	15	17	15	15	15	15	15
	2.0	29	23	26	24	27	22	25	22	22	22	22	22
	3.0	34	28	31	29	32	27	30	27	27	27	27	27

AIR TERMINAL UNIT

DUCTED AND RADIATED NC LEVELS

TABLE 10
MA-CV AND MA-VV — CONSTANT AND VARIABLE VOLUME VALVES

VALVE NO.10		MOB-M*		MOB-F†		DUCT LINING						SILENCER	
CFM	ΔSP	D	R	D	R	6'		8'		12'		36"	
		D	R	D	R	D	R	D	R	D	R	D	R
550	0.3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.0	17	15	15	16	16	14	14	14	11	14	11	14
	2.0	22	20	20	21	21	19	19	19	16	19	16	19
	3.0	26	23	24	24	25	22	22	22	20	22	20	22
700	0.3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.0	20	17	17	18	18	16	16	16	14	16	14	16
	2.0	26	23	24	24	25	22	22	22	20	22	20	22
	3.0	29	26	26	27	27	25	25	25	22	25	22	25
900	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	22	20	20	21	21	19	19	19	16	19	16	19
	2.0	29	26	26	27	27	25	25	25	22	25	22	25
	3.0	32	30	30	31	31	29	29	29	26	29	26	29
1200	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	25	22	22	23	24	21	21	21	19	21	19	21
	2.0	32	30	30	31	31	29	29	29	26	29	26	29
	3.0	36	33	34	34	35	32	32	32	30	32	30	32

TABLE 11
MA-CV AND MA-VV — CONSTANT AND VARIABLE VOLUME VALVES

VALVE NO.12		MOB-M*		MOB-F†		DUCT LINING						SILENCER	
CFM	ΔSP	D	R	D	R	6'		8'		12'		36"	
		D	R	D	R	D	R	D	R	D	R	D	R
700	0.3	12	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.0	19	15	16	16	17	14	15	14	12	14	12	14
	2.0	24	20	21	21	22	19	20	19	17	19	17	19
	3.0	26	22	24	23	25	21	22	21	20	21	20	21
1000	0.3	15	11	12	12	14	10	11	10	<10	10	<10	10
	1.0	24	20	21	21	22	19	20	19	17	19	17	19
	2.0	27	23	25	24	26	22	24	22	21	22	21	22
	3.0	31	27	29	28	30	26	27	26	25	26	25	26
1500	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	27	23	25	24	26	22	24	22	21	22	21	22
	2.0	34	30	31	31	32	29	30	29	27	29	27	29
	3.0	37	33	35	34	36	32	34	32	31	32	31	32
1750	0.3	—	—	—	—	—	—	—	—	—	—	—	—
	1.0	29	25	26	26	27	24	25	24	22	24	22	24
	2.0	36	32	34	33	35	31	32	31	30	31	30	31
	3.0	40	36	37	37	39	35	36	35	34	35	34	35

TABLE 12
MA-VVS — VARIABLE VOLUME / SHUT-OFF VALVES

VALVE NO.6		MOB-M*		MOB-F†		DUCT LINING						SILENCER	
CFM	ΔSP	D	R	D	R	6'		8'		12'		36"	
		D	R	D	R	D	R	D	R	D	R	D	R
200	0.4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.25	24	15	21	16	22	14	20	14	17	14	17	14
	2.0	26	17	24	18	25	16	22	16	20	16	20	16
	3.0	30	21	27	22	30	20	26	20	24	20	24	20
250	0.4	11	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.25	25	16	22	17	23	15	21	15	19	15	19	15
	2.0	29	20	26	21	27	19	25	19	22	19	22	19
	3.0	32	23	30	24	31	22	29	22	26	22	26	22
300	0.4	—	—	—	—	—	—	—	—	—	—	—	—
	1.25	26	17	24	18	25	16	22	16	20	16	20	16
	2.0	31	22	29	23	30	21	27	21	25	21	25	21
	3.0	35	26	32	27	34	25	31	25	29	25	29	25
400	0.4	—	—	—	—	—	—	—	—	—	—	—	—
	1.25	27	18	25	19	26	17	24	17	21	17	21	17
	2.0	34	25	31	26	32	24	30	24	27	24	27	24
	3.0	39	30	36	31	37	29	35	29	32	29	32	29

TABLE 13
MA-VVS — VARIABLE VOLUME / SHUT-OFF VALVES

VALVE NO.8		MOB-M*		MOB-F†		DUCT LINING						SILENCER	
CFM	ΔSP	D	R	D	R	6'		8'		12'		36"	
		D	R	D	R	D	R	D	R	D	R	D	R
300	0.4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.25	19	13	16	14	17	12	15	12	12	12	12	12
	2.0	21	16	19	17	20	15	17	15	15	15	15	15
	3.0	24	18	21	19	22	17	20	17	17	17	17	17
400	0.4	11	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.25	21	16	19	17	29	15	17	15	15	15	15	15
	2.0	25	20	22	21	24	19	21	19	19	19	19	19
	3.0	29	23	26	24	27	22	25	22	22	22	22	22
550	0.4	—	—	—	—	—	—	—	—	—	—	—	—
	1.25	25	20	22	21	24	19	21	19	19	19	19	19
	2.0	30	25	27	26	29	24	26	24	24	24	24	24
	3.0	34	28	31	29	32	27	30	27	27	27	27	27
700	0.4	—	—	—	—	—	—	—	—	—	—	—	—
	1.25	27	22	25	23	26	21	24	21	24	21	21	21
	2.0	32	27	30	28	31	26	29	26	26	26	26	26
	3.0	37	32	35	33	36	31	34	31	31	31	31	31

AIR TERMINAL UNIT

DUCTED AND RADIATED NC LEVELS

TABLE 14
MA-VVS — VARIABLE VOLUME / SHUT-OFF VALVES

VALVE NO.10		MOB-M*		MOB-F†		DUCT LINING						SILENCER	
CFM	ΔSP	D	R	D	R	6'		8'		12'		36"	
		D	R	D	R	D	R	D	R	D	R	D	R
550	0.4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.25	24	21	21	22	22	20	20	20	17	20	17	20
	2.0	26	23	24	24	25	22	22	22	20	22	20	22
	3.0	30	27	27	28	29	26	26	26	24	26	24	26
700	0.4	10	10	<10	11	<10	<10	<10	<10	<10	<10	<10	<10
	1.25	25	22	22	23	24	21	21	21	19	21	19	21
	2.0	30	27	27	28	29	26	26	26	24	26	24	26
	3.0	32	30	30	31	31	29	29	29	26	29	26	29
900	0.4	—	—	—	—	—	—	—	—	—	—	—	—
	1.25	27	25	25	26	26	24	24	24	21	24	21	24
	2.0	32	30	30	31	31	29	29	29	26	29	26	29
	3.0	36	33	34	34	35	32	32	32	30	32	30	32
1200	0.4	—	—	—	—	—	—	—	—	—	—	—	—
	1.25	31	28	29	29	30	27	27	27	25	27	25	27
	2.0	36	33	34	34	35	32	32	32	30	32	30	32
	3.0	40	37	37	38	39	36	36	36	34	36	34	36

TABLE 15
MA-VVS — VARIABLE VOLUME / SHUT-OFF VALVES

VALVE NO.12		MOB-M*		MOB-F†		DUCT LINING						SILENCER	
CFM	ΔSP	D	R	D	R	6'		8'		12'		36"	
		D	R	D	R	D	R	D	R	D	R	D	R
700	0.4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.25	16	13	14	14	15	12	12	12	10	12	10	12
	2.0	21	18	19	19	20	17	17	17	15	17	15	17
	3.0	25	22	23	23	24	21	21	21	19	21	19	21
1000	0.4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	1.25	21	18	19	19	20	17	17	17	15	17	15	17
	2.0	27	23	24	24	25	22	22	22	20	22	20	22
	3.0	31	28	29	29	30	27	27	27	25	27	25	27
1500	0.4	—	—	—	—	—	—	—	—	—	—	—	—
	1.25	27	25	25	26	26	24	24	24	21	24	21	24
	2.0	34	31	31	32	32	30	30	30	27	30	27	30
	3.0	37	35	35	36	36	34	34	34	31	34	31	34

1. VALVE

Data provided is based on laboratory tests of Mark Air valves in each of the sizes indicated, and covers models MACV, MA-VV and MA-VVS for all pressure ranges.

2. CFM

Air volume rates in cubic feet per minute are given for each size valve to cover all pressure ranges. NC values for other air flows may be interpolated with sufficient accuracy.

3. ΔSP

The static pressure drop across the valve in inches water gauge, i.e. the static pressure immediately ahead of the valve less the static pressure immediately after the valve.

4. MOB – M

A multiple outlet box in 22 ga. galvanized steel lined with 1/2" thick, 1 1/2 lb density fibreglass.

Dimensions are as per MOB Data Sheet. Data based on flexible duct takeoffs equal to AL-U-FLEX type S (single ply aluminum).

5. MOB – F

A multiple outlet box constructed of 1" solid fibreglass duct board covered with aluminum foil.

Dimensions are as per MOB Data Sheet. Data based on flexible duct takeoffs equal to AL-U-FLEX type S (single ply aluminum).

6. LINED DUCT

A sheet metal distribution duct lined on all sides with 1" thick, 1 1/2 lb density fibreglass for a length as indicated in the tables. Data for sizes 5,6 and 8 are based on inside duct dimensions where the height equals the valve diameter and the width is sized for an air velocity not exceeding 800 feet per minute. Ducts for sizes 10 and 12 also have a height equal to the valve diameter but the width is sized for a duct friction loss not exceeding 0.25 inches WG per 100 ft.

7. SILENCER

A rectangular commercial attenuating module of specified length with a minimum height equal to the valve diameter and a width sized for a static pressure drop not exceeding 0.15 inches WG. Perforated sheet metal protects the acoustic attenuating media and forms a single, straight through air passage with an aerodynamic entrance and exit.

8. NC LEVEL

The Noise Criteria curve tangent to the highest point on the sound pressure level curve at any of the center frequencies in octave bands 2 through 7.

Both ducted and radiated sound pressure levels include a 10 db room attenuation factor plus applicable deductions for end terminal loss. See table 19 for NC corrections when using other room attenuation factors.

No deductions have been taken for sound power division, in other words, all diffusers fed by a given valve are assumed to be in the same occupied space. See table 17 for NC reduction due to power divisions.

NC values for radiated noise are based on an average lay-in type ceiling with an STC 35-40 rating. See table 18 for NC corrections when using ceilings with different STC ratings.

TABLE 16
ADDING NC VALUES

DIFFERENCE BETWEEN TWO NC VALVES TO BE COMBINED	0	2	4	6	8	10
CORRECTIONS TO BE ADDED TO HIGHEST VALUE	4	3	2	1	1	0

TABLE 17
NC REDUCTION FOR POWER DIVISION

CFM DIVISION	1/2	1/4	1/8
NC CORRECTION	- 3	- 6	- 9

TABLE 18
RADIATED NC CORRECTIONS FOR LAY-IN CEILINGS

STC RATING	25-35	35-40	40-50
NC CORRECTION	+ 3	0	- 5

TABLE 19
NC CORRECTIONS AS PER ROOM ATTENUATION

DIFFERENCE BETWEEN TWO NC VALVES TO BE COMBINED	6	8	10	12	14
CORRECTIONS TO BE ADDED TO HIGHEST VALUE	+5	+2	0	-2	-5

AIR TERMINAL UNIT

LINEAR OUTPUT MODULE (LOM)

DESCRIPTIONS

A factory installed mechanism, connected to the valve shaft, provides potentiometer resistance values for every actuator position.

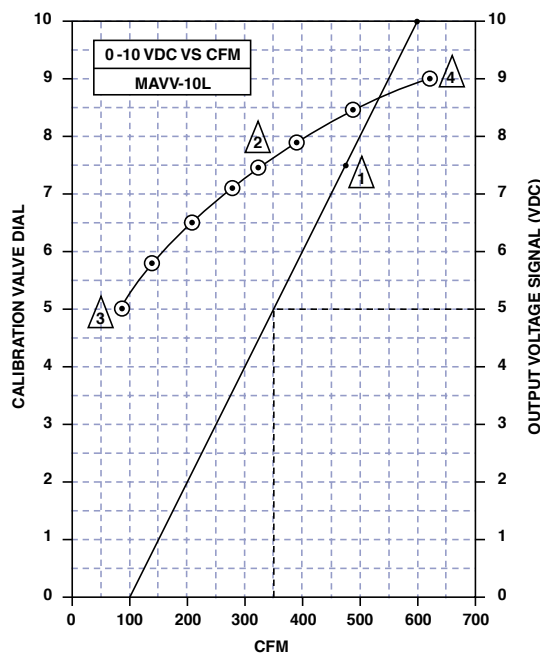
Eight valve positions are precisely factory calibrated and corresponding CFM values are registered in the LOM using an IBM compatible computer. The LOM calculates and produces a linear output 0-10 V DC signal proportional to all CFM values between the specified minimum and maximum.

The LOM output signal can be used by the room pressure control system for precise and stable regulation.

APPLICATIONS

- Room static pressure control in laboratories, hospitals, clean rooms...
- Fresh air or exhaust air control.
- Stable variable volume control. • Constant CFM Hepa filter

GRAPH EXAMPLE FOR MAVV-10L



- 1 LOM SIGNAL OUTPUT VDC VS CFM
- 2 CALIBRATION VALVE DIAL VS CFM
- 3 SPECIFIED MINIMUM CFM (EX.: 100) = 0 VDC
- 4 SPECIFIED MAXIMUM CFM (EX.: 600) = 10 VDC

MARK H.FAB.INC.
ROSEMEX
1560 MARIE VICTORIN,
ST-BRUNO, QC H3V 6B9
TEL.: (514) 653-1002
FAX: (514) 461-1750

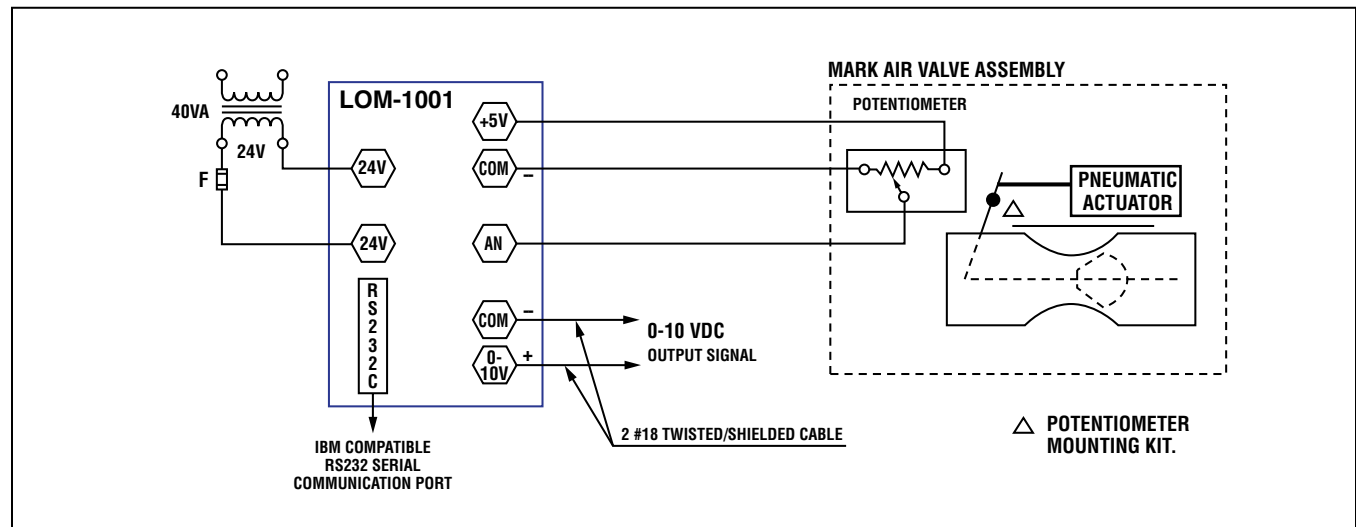
MARK AIR VALVE

AIR →

CAT. NO. : VV-10-L
PCM : 100/600
REF. : ABC LABORATORY
LOC. : LOCAL 6C

9 1/4	700
9	620
8	420
7	260
6	160
5	90
4	55
3 1/4	40
2	—
1	—

LINEAR OUTPUT MODULE



SPECIFICATION GUIDE

- The air volume (cfm) will be regulated using variable air volume units with linear characteristics.
- Inlet and outlet connections will be circular and of similar dimensions.
 - The aluminium valve housing will incorporate a complete venturi containing an aluminium aerodynamic moving cone.
 - The cone rod will be made of stainless steel.
- In order to prevent dust accumulation and bacterial development, interior acoustic insulation will not be permitted.
 - Sound power levels will be as shown in tables 3 @ 7 measured in a semi-reverberant room in accordance with ASHREA standard 36-72. (see Rosemex Mark Air Valve catalog)
- The controlled air volume will be **mechanically Independent of static pressure variation at all actuator positions**.
 - Following a pressure variation, cfm correction will be achieved through the springloaded moving cone within one second.
 - To increase actuator life and speed of response, the pressure variation corrective action (new cone position) will be independent of the actuator
 - External air speed sensors are not acceptable.
- The air volume will be proportional to the valve cone position and have near-linear characteristics.
- The mechanical valve dial will permit direct reading of air volume at all time
 - Specified **minimum cfm** and **maximum cfm** will be factory calibrated. Future modifications will not require special calibrating tools and will be easily completed on job site.
- The valve actuator will be supplied and installed by Rosemex at the factory.
 - ☐ Electronic actuator ☐ Pneumatic actuator
- The **Air Valve** will be manufactured by **Rosemex**, models MACV, MAVV or MAVVS.

MARK AIR VALVE MODEL

☐ MACV ☐ MAVV ☐ MAVVS

OPTIONS

- ☐ Reverse-acting linkage for normally-open valve
- ☐ Thermal/acoustic insulation with aluminum sheet metal protective jacket. Improves attenuation of radiated sound through valve walls.
- ☐ Flanged housing for quick installation and ease of removal.
- ☐ Teflon shaft bushings (2).
- ☐ Protective coatings for added resistance to acid and alkali fumes.
 - Eisenheiss
 - Heresite phenolic
- ☐ Stainless steel connecting rod and inside bracket.
- ☐ Stainless steel casing and cone (horizontal mounting only).
- ☐ Electric, hydronic or steam booster heating coil.
- ☐ Noise attenuating in-line units (silencer).
- ☐ Microprocessor linearisation output module (LOM).
 - Valve CFM directly proportional to 0-10 VDC linear output control signal.
- ☐ Housing stainless steel screws.

CV AND WV

ORDERING INSTRUCTIONS VALVE IDENTIFICATION

MARK AIR VALVES should be ordered as per the following combination of letters and numerals.

Example: MA-VV-6-H-150-300

MA	MARK AIR VALVE
VV	Variable volume (CV for constant volume)
6	Valve size (Diameter, 5-6-8-10 or 12)
H	High pressure (L for Low pressure, M for Medium pressure)
150-300	Minimum and maximum air volume required.

VVS ORDERING INSTRUCTIONS

MARK AIR VALVES should be ordered as per the following identification:

Example: MA-VVS-6-H-300

MA	MARK AIR VALVE
VVS	Variable volume shut-off unit
6	Valve no. (Diameter, 6-8-10 or 12)
H	High pressure (L for Low pressure, M for Medium pressure)
300	Maximum air volume required

