Product **Page**

Ultravac Pumps
- LV Series . . . 2
- MV Series . . . 4
- BV Series . . . 8

RR Pumps . . . 12
NM Manifolds . . . 16
Supervac Pumps . . . 20
NJ Series Pumps . . . 22
VV Series Pumps . . . 26
AA Series Pumps . . . 28
MT Series Pumps . . . 30
Accessories Selection Guide . . . 32
- Sensors, Switches . . . 33
- Vacuum Cups . . . 35
- Filters . . . 38
- Silencers . . . 39

Vacuum Pump Selection Guide . . . 40

Application Selection Chart

Application	NJ-Series	Ultravac	VV	AA	MT	Manifold	Supervac
Air Bearing				●			
Air Wiper				●	●		
Automotive	●	●	●	●	●	●	●
Bag/Box Opening	●	●	●			●	
Blowoff				●	●		
Chip Removal				●	●		
Circuit Board Testing	●	●					
Cooling of Electronics				●			
Degassing	●	●	●			●	●
Dental/Hospital Suction	●	●					
Dust Removal				●	●		
Evacuation of Molds	●	●	●			●	●
Evaporation Control	●	●	●			●	●
Fume Removal				●	●		
Labeling Machines	●	●	●				
Loading Hoppers					●		
Mandrel Collection				●	●		
Paper Feeding/Printing	●	●	●	●			
Pick & Place							
Corrugated Sheet/Boxes	●	●	●				
Electronic Components	●	●					
Fragile Items	●	●	●			●	
Glass	●	●	●				
Metals	●	●	●				
Plastics	●	●	●				
Stone, Brick, Concrete			●				
Pneumatic Conveyor	●	●	●	●	●		
Powder Transfer					●		
Replace Raw Air Lines				●			
Unload Feeders					●		
Vacuum Chuck	●	●	●				
Vacuum Clamping	●	●	●			●	●
Vacuum Filling							
Filtration of Liquids/Creams	●	●					●
Liquids	●	●	●				
Powders	●	●	●		●		
Vacuum Impregnation	●	●	●		●		
Vacuum Molding	●	●	●				
Vacuum Packaging	●	●	●			●	
Vacuum Toilets	●	●	●				
Veneering	●	●					●

LV Series Vacuum Pumps - 60H

LV160H, LV060H, LV2QR60H

- **Compact, lightweight configurations ideal for small part pick and place applications.**
- **Fast evacuation of small vessels for purging**
- **Require little installation space and can be positioned close to the vacuum point for fast response.**
- **Integral valve ensures high cycle rates, no delay due to long plumbing lines.**
- **Modular design eliminates plumbing between components and speeds installation.**
- **Individual electrical connections for precise control of vacuum creation and the duration of blow-off.**

LV160H

LV060H

Technical Data

3 Way SV Valve

Valve Type: 3/2 Normally closed solenoid operated spring return
Valve Body Material: Anodized aluminum
Seal Material: Buna
Media: Filtered (50 micron), non-lubricated air
Operating Pressure: 0-150 PSI
Operating Temperature: 15°-140°F
Average Life: 100,000,000 cycles
Power Consumption:
AC - 110 VAC, 50/60 Hz, 1 Watt (w/o LED)
DC - 24 VDC, 2 Watt (w/LED)
Response Time: 8ms open,15 ms closed
Cycle Rate: 2500 cycles per minute
Electrical Connection: DIN 40050
Manual Override: Standard with pushbutton

Venturi Specifications

Medium: Filtered (50 Micron), unlubricated air
Operating Pressure: 80 PSI
Operating Temperature: 15°-140°F
Operating Noise Level: 68 dBA
Material: Anodized aluminum, brass, and buna-N

NORVAC venturi pumps are designed to operate at peak efficiency at **80 PSI**. Systems requiring operation at **60 PSI** should be ordered with the designate **-60** at the end of the part number,i.e. LV0160H24VDC**-60**

*Specify either 24vdc or 110vac when ordering.

Ordering Information

Choose a body style based on features and accessories. Venturi size is based on vacuum level and flow requirements. If required, indicate the valve operating voltage.
Order using the following designates:

LV1 60H 24VDC

Body style
LV0
LV1
LV1QR*

Valve Voltage:
24 VDC
110 VAC

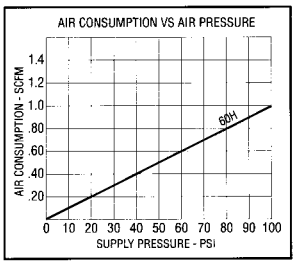
Vacuum Level:
Medium - (20" Hg.)
H-High - (28" Hg.)

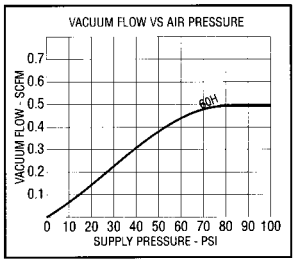
Venturi Flow Capacity:
60

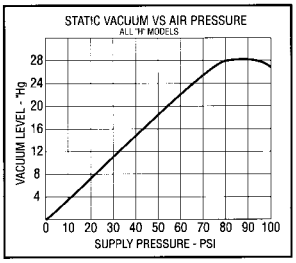
*Quick Action Blow-off

Performance Data

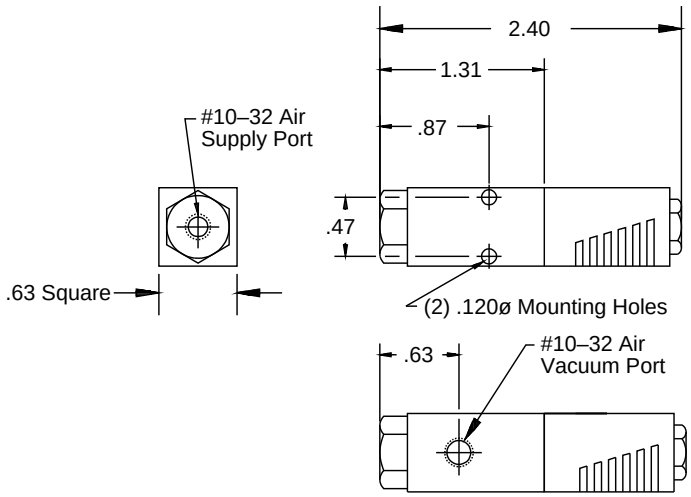
Model	Air Consump. (SCFM) @ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 PSI										
		0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
60H	0.80	0.50	0.38	0.32	0.30	0.27	0.23	0.20	0.13	0.05	0.02	0.00
		Evacuation Time (seconds) for a 1 cu. ft. volume ("Hg)										
		0.00	15.00	29.80	50.60	74.50	102.80	135.90	183.20	245.90	410.20	790.80



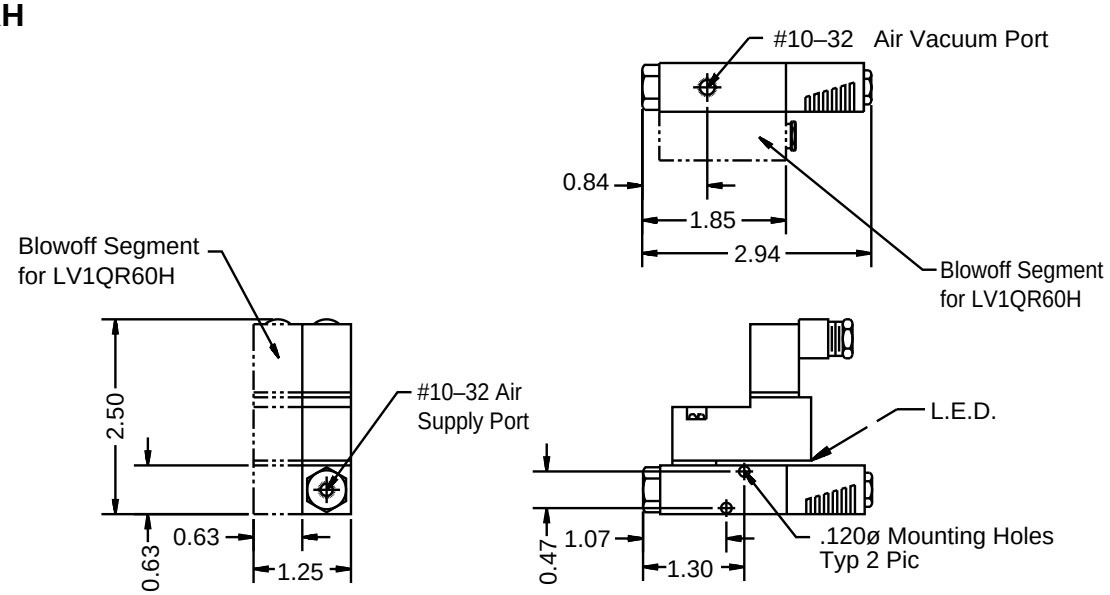




LV060H



LV160H, LV1QRH



- **Modular components allow the designer to specify only those features necessary for their specific application.**
- **Interchangeable cartridge venturies increase flexibility.**
- **Eliminates plumbing between components for faster installation.**
- **MV6 Vacuum Pump comes with integral 6 way solenoid valve and silencer as standard.**
- **Integral 6 way valve energizes venturi rapidly for high cycle rates–no loss due to plumbing lines.**
- **Optional air reservoir (P/N NQR10) can be added for even faster vacuum release (MV6-only).**

Technical Data

6-Way MV Spool Valve

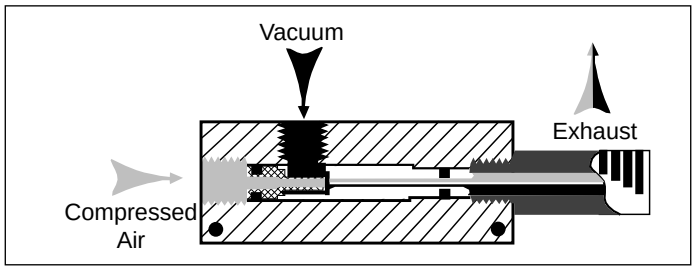
6 Way Valve Type: 6/2 pilot operated solenoid valve w/ spring return
Valve Body Material: Die cast zinc
Spool Material: Polished aluminum
Seal Material: Polyethylene
Media: Filtered (50 micron), non-lubricated air
Operating Pressure: 45-150 PSI
Operating Temperature: 15°-140°F
Average Life: 100,000,000 cycles
Power Consumption:
AC - 110 VAC, 50/60 Hz, 1 Watt (w/o LED)
DC - 24 VDC, 2 Watt (w/LED)
Response Time: 11ms open, 22 ms close
Cycle Rate: 2000 Cycles per minute
Electrical Connection: DIN 40050
Manual Override: Standard with pushbutton

Venturi Specifications

Medium: Compressed air or other gases
Operating Pressure: 80 PSI
Operating Temperature: 15°-140°F
Operating Noise Level: 72 dBA
Material: Anodized Aluminum, Brass, and Buna-N

Principles of Operation

A transducer produces a vacuum by forcing compressed air through a limiting orifice into a venturi section. As the air exits the orifice it expands, increasing in velocity to supersonic speeds before entering the venturi section. This creates a vacuum or negative pressure at the vacuum inlet port located between the orifice and venturi section. This high velocity insures efficient and effective operation.



Ordering Information

Choose a body style based on features and accessories. Venturi size is based on vacuum level and flow requirements. If required, indicate the valve operating voltage.
Order using the following designates:

MV2 100 H 24VDC*

Body style
MV1
MV2
MV6*

Valve Voltage:
24 VDC
110 VAC

Vacuum Level:
Medium - (20" Hg.)
H-High - (28" Hg.)

Venturi Flow Capacity:
60, 90, 100, 150

Select the venturi that best fits your application based on the four performance characteristics: vacuum level, vacuum flow, evacuation speed, and air consumption (see facing page). To simplify selection, venturi performance has been separated into two categories, “M” for medium and “H” for high vacuum applications.

*24 VDC or 110 AC available on MV6

NORVAC venturi pumps are designed to operate at peak efficiency at 80 PSI. Systems requiring operation at **60 PSI** should be ordered with the designate **-60** at the end of the part number, i.e. MV1100H**60**

All Dimensions in Inches (mm)

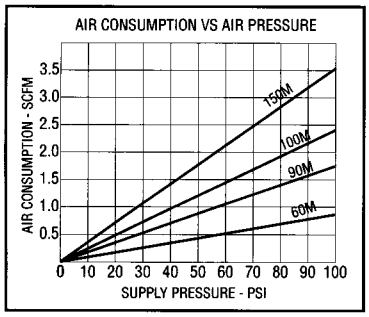
Performance Data

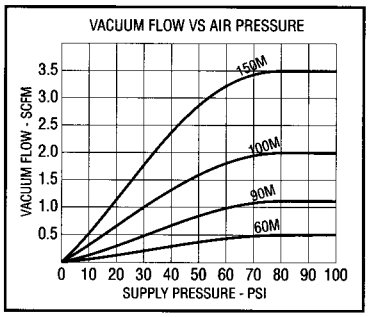
M Series Venturis Medium Vacuum Applications

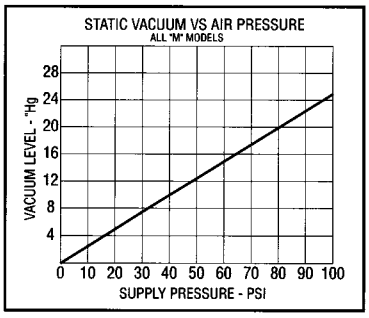
The “M” series for “Medium” vacuum levels of up to 20" Hg for applications involving porous materials (cardboard, wood, fabric, etc.)

Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 PSI							
		0"	3"	6"	9"	12"	15"	18"	20"
60M	0.50	0.50	0.40	0.30	0.22	0.15	0.08	0.03	0.00
90M	1.40	1.40	1.25	1.20	1.05	0.85	0.65	0.25	0.00
100M	1.80	2.10	2.00	1.85	1.75	1.60	1.25	0.80	0.00
150M	2.80	3.50	3.20	2.95	2.75	2.50	1.80	0.95	0.00

Model		Evacuation Time (seconds) based on 1 cu. ft. volume ("Hg)						
	0"	3"	6"	9"	12"	15"	18"	20"
60M	0.00	12.50	25.10	43.90	68.60	99.30	153.70	227.00
90M	0.00	3.75	7.20	12.40	19.10	29.90	52.00	104.00
100M	0.00	2.65	5.80	9.90	16.20	22.90	36.20	56.60
150M	0.00	1.35	3.20	5.20	7.70	11.80	23.40	52.00





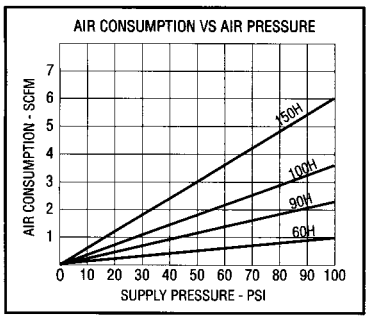


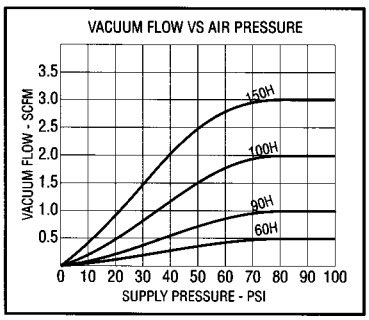
H Series Venturis High Vacuum Applications

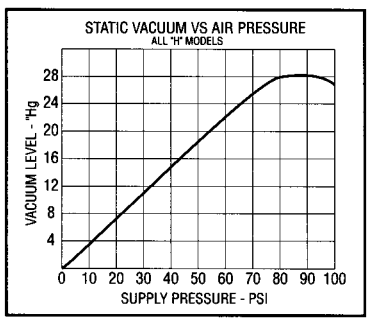
The “H” series for “High” vacuum levels of up to 28" Hg for applications involving non-porous materials (steel, plastic, glass, etc.)

Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 psi										
		0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
60H	0.80	0.50	0.38	0.32	0.30	0.27	0.23	0.20	0.13	0.05	0.02	0.00
90H	1.80	1.20	1.00	0.95	0.90	0.85	0.75	0.70	0.52	0.47	0.20	0.00
100H	2.80	2.00	1.85	1.75	1.57	1.40	1.25	1.05	0.84	0.70	0.35	0.00
150H	4.80	3.20	2.80	2.50	2.30	2.00	1.60	1.40	1.20	0.80	0.50	0.00

Model		Evacuation Time (seconds) based on 1 cu. ft. volume ("Hg)									
	0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
60H	0.00	15.00	29.80	50.60	74.50	102.80	135.90	183.20	245.90	410.20	790.80
90H	0.00	6.50	12.30	18.90	32.50	47.00	65.40	92.20	130.00	222.20	281.30
100H	0.00	2.70	6.50	11.20	17.50	25.80	38.40	55.20	79.20	166.70	251.80
150H	0.00	2.30	3.80	6.50	10.20	14.10	21.30	44.90	55.00	81.00	125.00

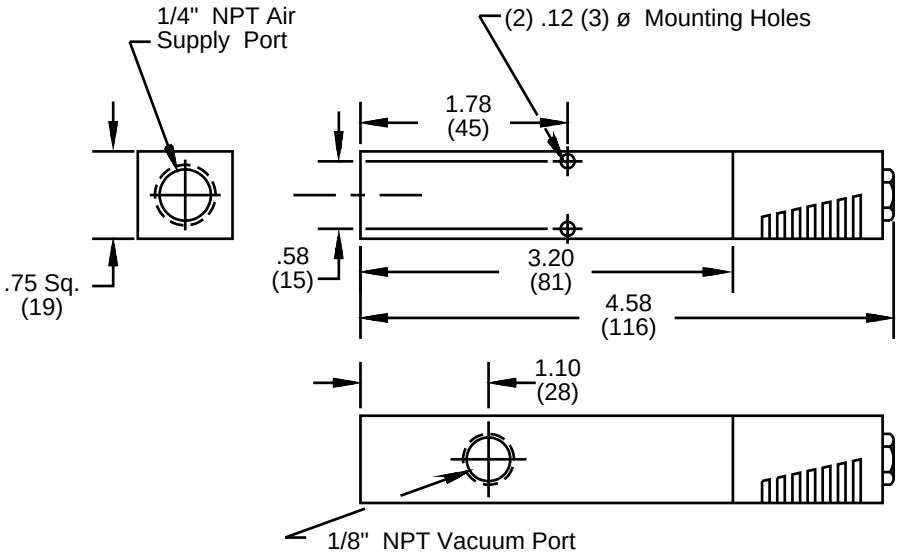




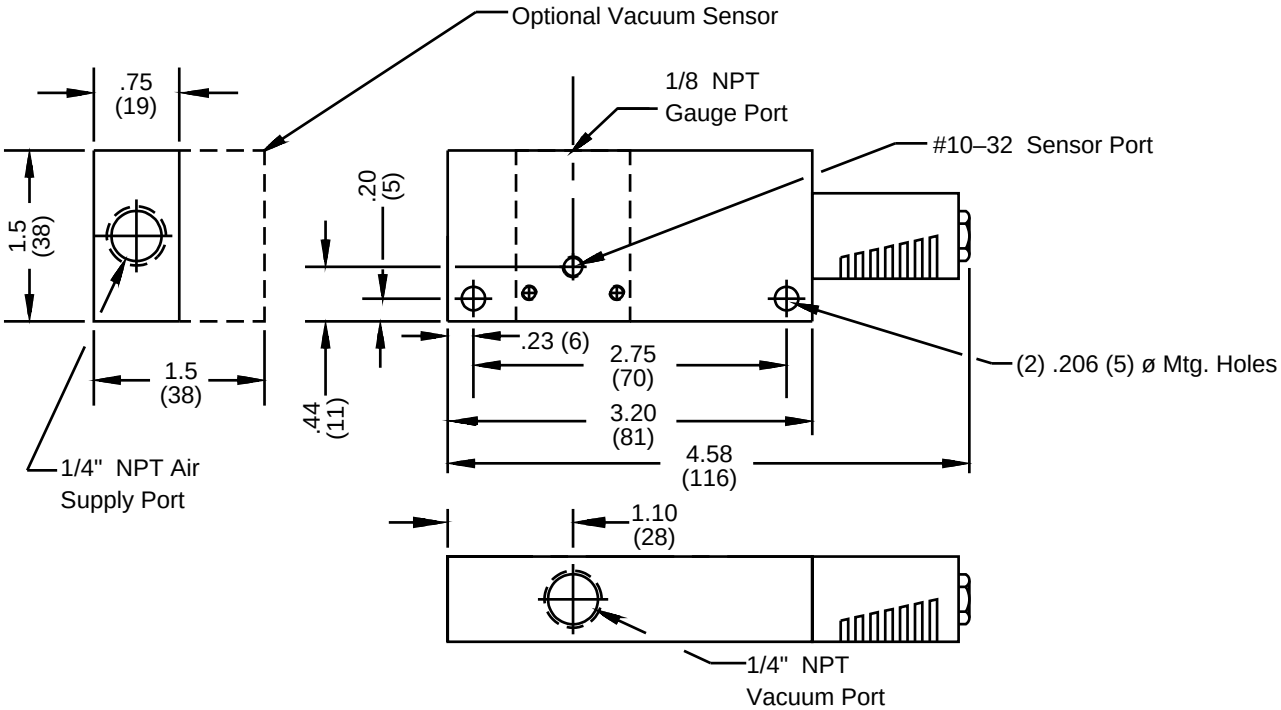


All Dimensions in Inches (mm)

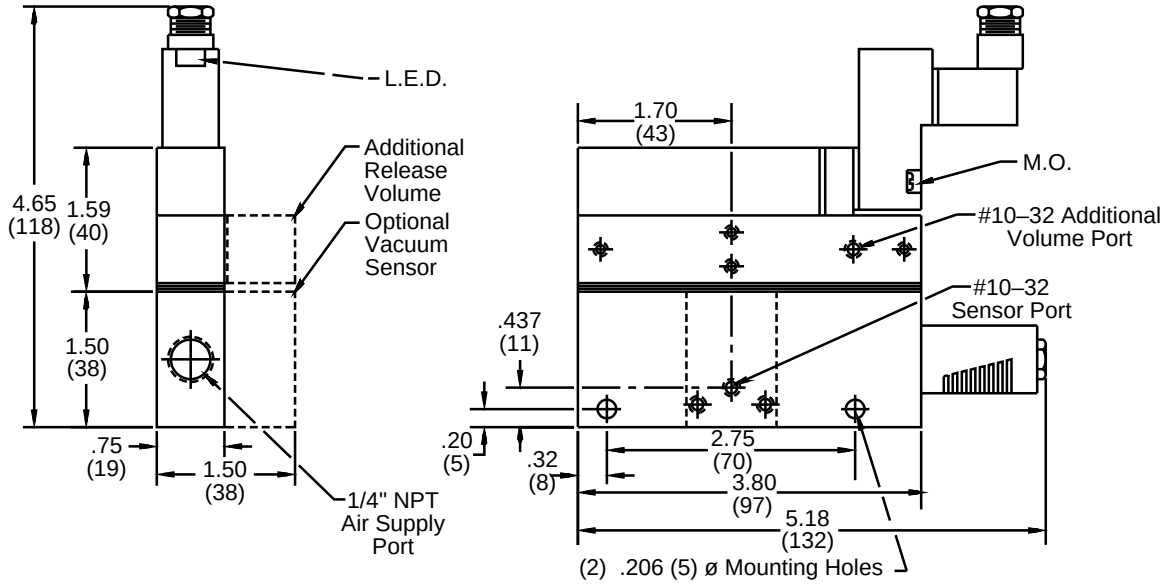
MV1



MV2



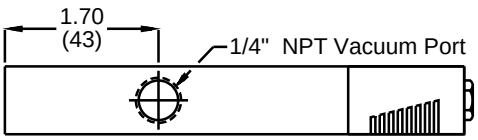
MV6



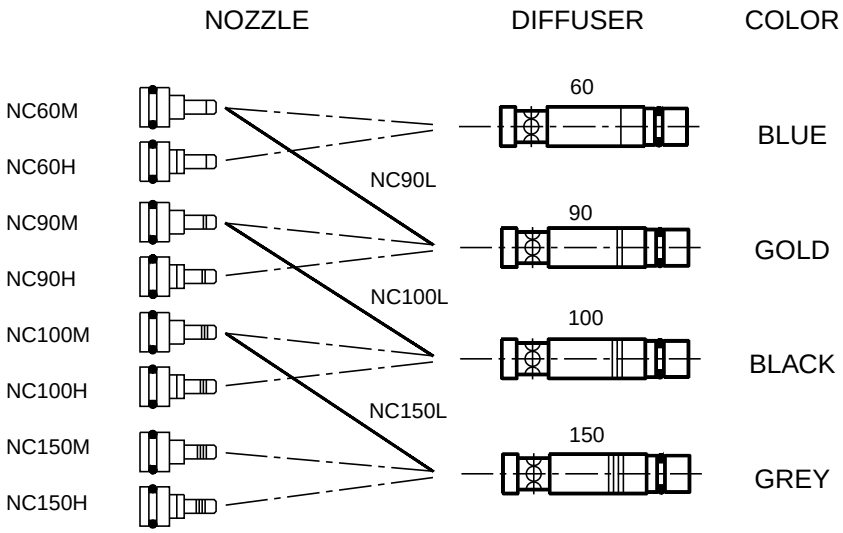
Weight - 14.8 oz.

Exhaust Port - 1/4” NPT

Silencer - NAA4



MV SERIES CARTRIDGE IDENTIFICATION CODE



"L" Series Cartridge – 10"Hg.
"M" Series Cartridge – 20"Hg.
"H" Series Cartridge – 28"Hg.

BV Series Vacuum Pumps
200, 250, 300, 350

- **The BV Series offers high vacuum flow rates for rapid evacuation of large volumes of air.**
- **Ideal for vacuum filling operations.**
- **BV8200 model will power multiple vacuum cups and can handle large vacuum cups for heavy, porous objects.**
- **BV8250 model can be used with systems having large vacuum lines or rotary vacuum valves.**
- **BV8- and BV9- models are available with optional vacuum gauge (VG150).**

Technical Data

Venturi–
Medium: Filtered (50 micron), unlubricated air
Operating Pressure: 80 PSI
Operating Temperature: 15°F-140°F
Operating Noise level: 72 dBA
Material: Anodized aluminum

Ordering Information

1. Body styles and venturi size have been combined for a total of 8 models.
2. Order using the following part numbers:

BV8 200M	BV9 300M
BV8 200H	BV9 300H
BV8 250M	BV9 350M
BV8 250H	BV9 350H

Mechanical and solid state vacuum sensors and switches can be factory installed upon request.

NORVAC venturi vacuum pumps are designed to operate at peak efficiency at 80 PSI. Systems requiring operation at **60 PSI** should be ordered with the **-60** at the end of the part number i.e., BV9350H**60**.

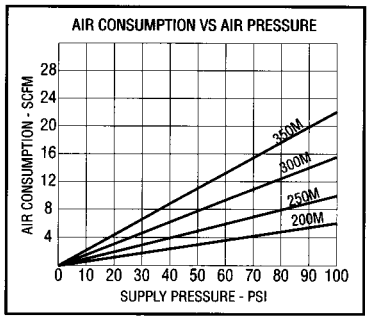
Performance Data

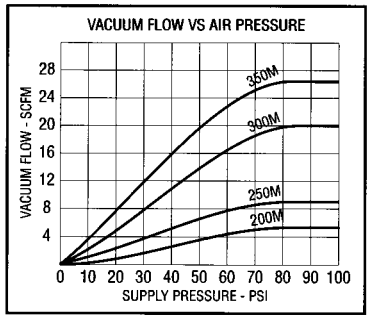
M Series Venturis Medium Vacuum Applications

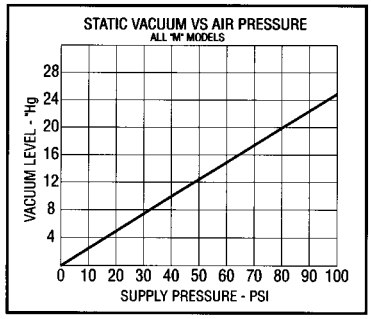
The “M” series for “Medium” vacuum levels of up to 20" Hg for applications involving porous materials (cardboard, wood, fabric, etc.) or where leakage is present.

Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 PSI							
		0"	3"	6"	9"	12"	15"	18"	20"
200M	4.80	6.00	5.30	4.90	4.00	3.50	2.50	1.10	0.00
250M	7.80	9.50	9.20	8.30	7.00	4.70	3.40	2.20	0.00
300M	12.50	20.00	19.00	16.30	13.80	8.10	5.50	3.30	0.00
350M	17.00	28.00	24.00	19.40	16.80	14.50	11.20	4.80	0.00

Model		Evacuation Time (seconds) based on 1 cu. ft. Volume ("Hg)						
	0"	3"	6"	9"	12"	15"	18"	20"
200M	0.00	0.75	1.90	3.20	5.30	8.70	17.10	42.60
250M	0.00	0.45	1.10	2.40	3.80	6.00	9.70	15.40
300M	0.00	0.00	0.00	1.10	1.80	2.70	4.60	8.70
350M	0.00	0.00	0.00	1.00	1.50	2.10	4.30	8.40





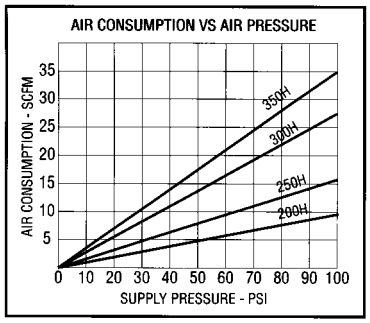


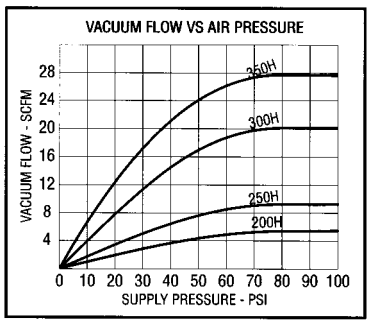
H Series Venturis High Vacuum Applications

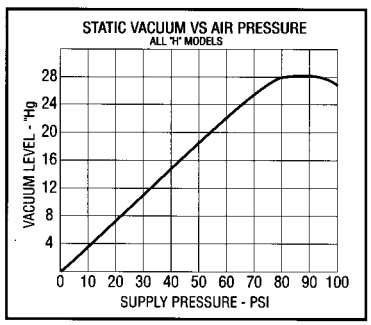
The “H” series for “High” vacuum levels of up to 28" Hg for applications involving non-porous materials (steel, plastic, glass, etc.)

Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 PSI										
		0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
200H	7.80	5.40	4.70	3.85	3.30	3.00	2.60	2.10	1.60	1.20	0.60	0.00
250H	12.50	9.00	8.50	7.85	7.00	6.50	5.30	3.90	2.50	1.80	0.90	0.00
300H	22.00	20.00	17.00	14.00	12.70	12.00	10.00	7.40	4.90	2.70	1.30	0.00
350H	28.00	28.00	22.00	18.70	15.90	14.50	11.80	8.10	5.70	4.50	2.25	0.00

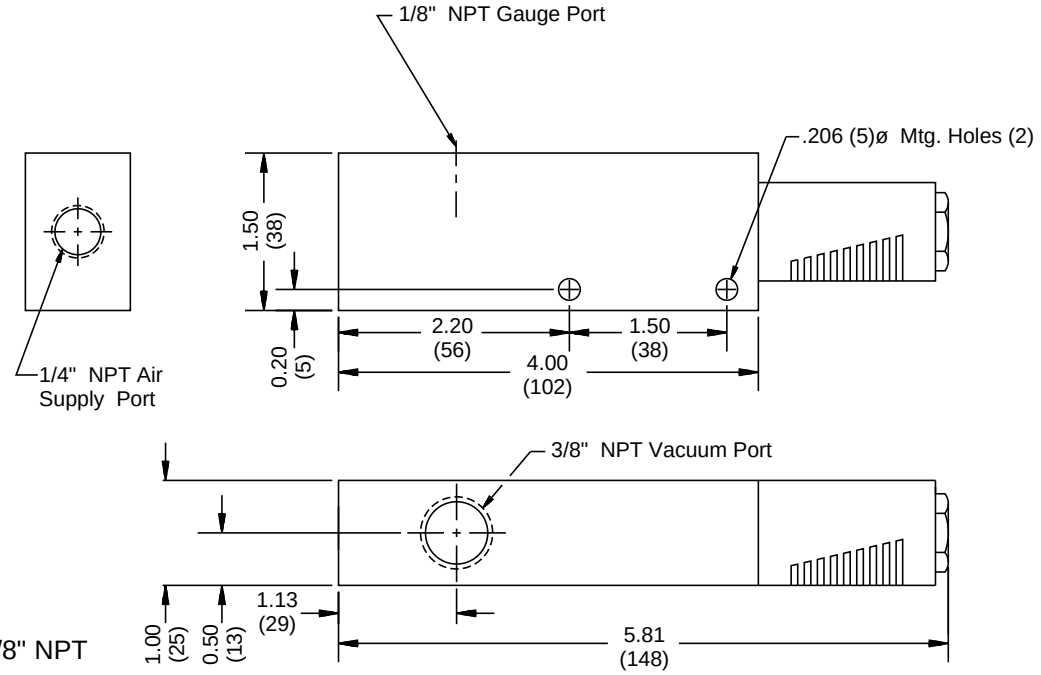
Model		Evacuation Time (seconds) based on 1 cu. ft. Volume ("Hg)									
	0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
200H	0.00	1.20	2.10	3.40	5.20	7.70	11.50	20.00	33.50	62.60	98.10
250H	0.00	0.75	1.30	2.20	3.50	5.60	9.10	17.40	30.10	56.00	76.00
300H	0.00	0.00	0.80	1.20	2.00	2.80	3.90	5.90	11.10	32.70	60.00
350H	0.00	0.00	0.00	1.20	1.90	2.30	3.40	5.30	8.80	26.00	44.00







BV8200M, H

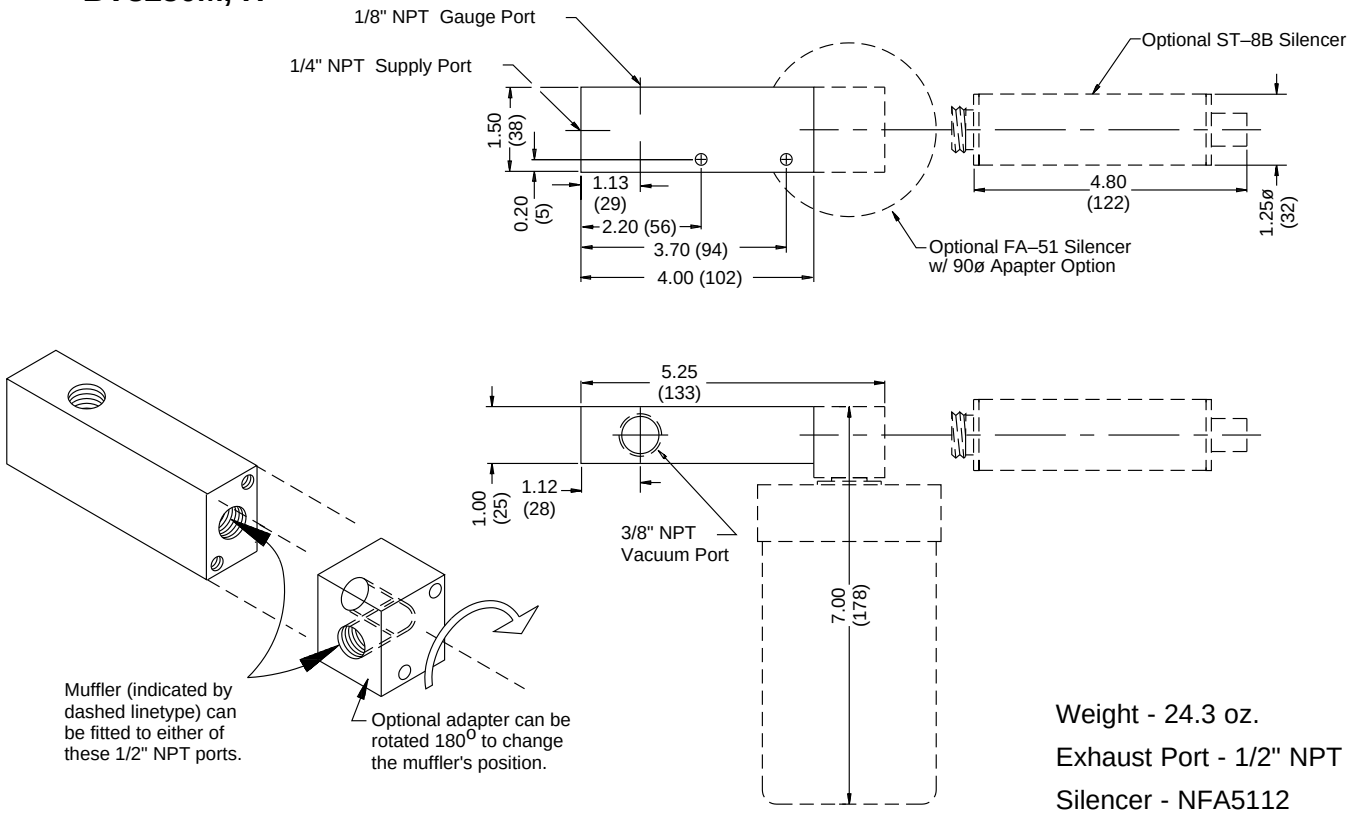


Weight - 9.4 oz.

Exhaust Port - 3/8" NPT

Silencer - NAA6

BV8250M, H

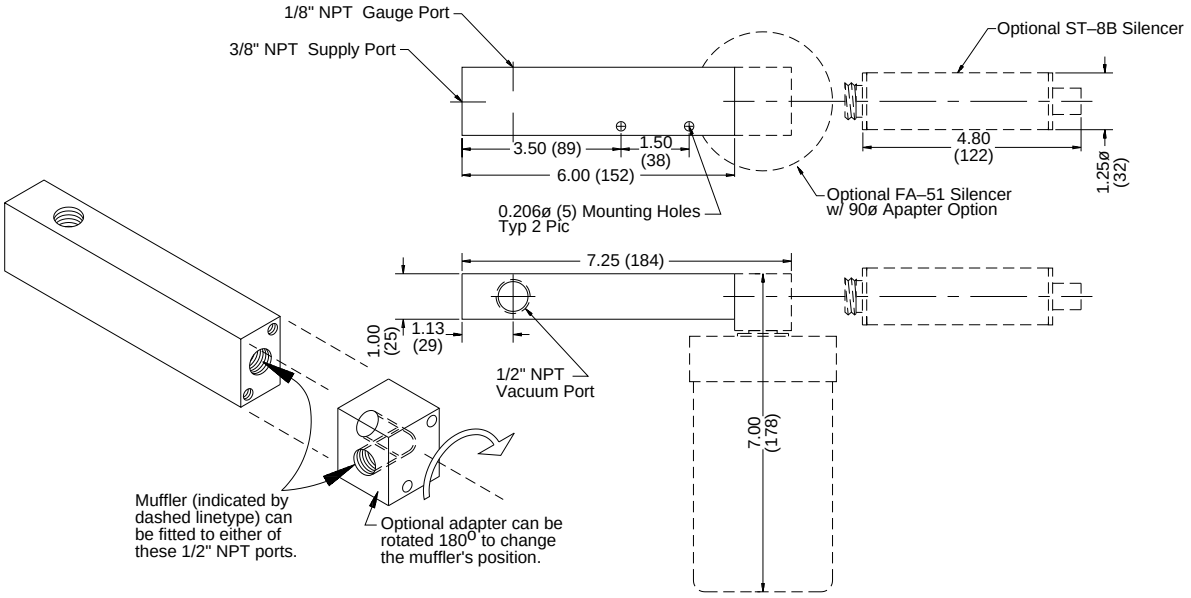


Weight - 24.3 oz.

Exhaust Port - 1/2" NPT

Silencer - NFA5112

BV9



Weight - 24.3 oz.

Exhaust Port - 1/2" NPT

Silencer - NFA5112

- **Ideally suited for pick and place applications that require accurate part placement and rapid part release.**
- **No external plumbing or on-site assembly is required.**
- **Extremely fast part release.**
- **Accurate part positioning.**
- **One converter installation.**
- **Automatically cleans vacuum lines.**
- **Adjustable blow-off rate option available.**

Technical Data

Operating Pressure range: 20 to 120 psi Optimum 80 psi
Operating Temperature range: 32° to 125°F (0° to 52°C)
Cycle rates: Up to 300/min.
Positive Release Pressure: 0 psi
Response Time: Instantaneous
Orientation: Any Position
Duration: Based on System Design
Valve disc material: vinyl
Replacement valve discs –
Series LV: 10004
Series MV: 10014

NORVAC venturi pumps are designed to operate at peak efficiency at 80 PSI. Systems requiring operation at 60 PSI should be ordered with the designate -60 at end of the part number, i.e. MVIRR100M60

Ordering Information

LV0RR-Available in the 60H Venturi size only. To order, use part number LVORR60H, MV1RR-, MV2RR-, from 60-150 “M” or “H”. Choose any one of the 8 Venturi's listed in the below charts.

i.e. BV1RR 90H, BV8RR-choose 200M or H

MV1RR 60 H

Body Style
LV0RR
MV1RR
MV2RR
BV8RR*

Vacuum Level:
H - High
M - Medium

Vacuum Flow Capacity
60, 90, 100, 150

*200 “M” or “H”

Performance data M Series Venturis Medium Vacuum Applications

The “M” series for “Medium” vacuum levels of up to 20" Hg for applications involving porous materials (cardboard, wood, fabric, etc.)

Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 PSI							
		0"	3"	6"	9"	12"	15"	18"	20"
60M	0.50	0.50	0.40	0.30	0.22	0.15	0.08	0.03	0.00
90M	1.40	1.40	1.25	1.20	1.05	0.85	0.65	0.25	0.00
100M	1.80	2.10	2.00	1.85	1.75	1.60	1.25	0.80	0.00
150M	2.80	3.50	3.20	2.95	2.75	2.50	1.80	0.95	0.00
200M	4.80	6.00	5.30	4.90	4.00	3.50	2.50	1.10	0.00

Model		Evacuation Time (seconds) based on 1 cu. ft. Volume ("Hg)						
	0"	3"	6"	9"	12"	15"	18"	20"
60M	0.00	12.50	25.10	43.90	68.60	99.30	153.70	227.00
90M	0.00	3.75	7.20	12.40	19.10	29.90	52.00	104.00
100M	0.00	2.65	5.80	9.90	16.20	22.90	36.20	56.60
150M	0.00	1.35	3.20	5.20	7.70	11.80	23.40	52.00
200M	0.00	0.75	1.90	3.20	5.30	8.70	17.10	42.60

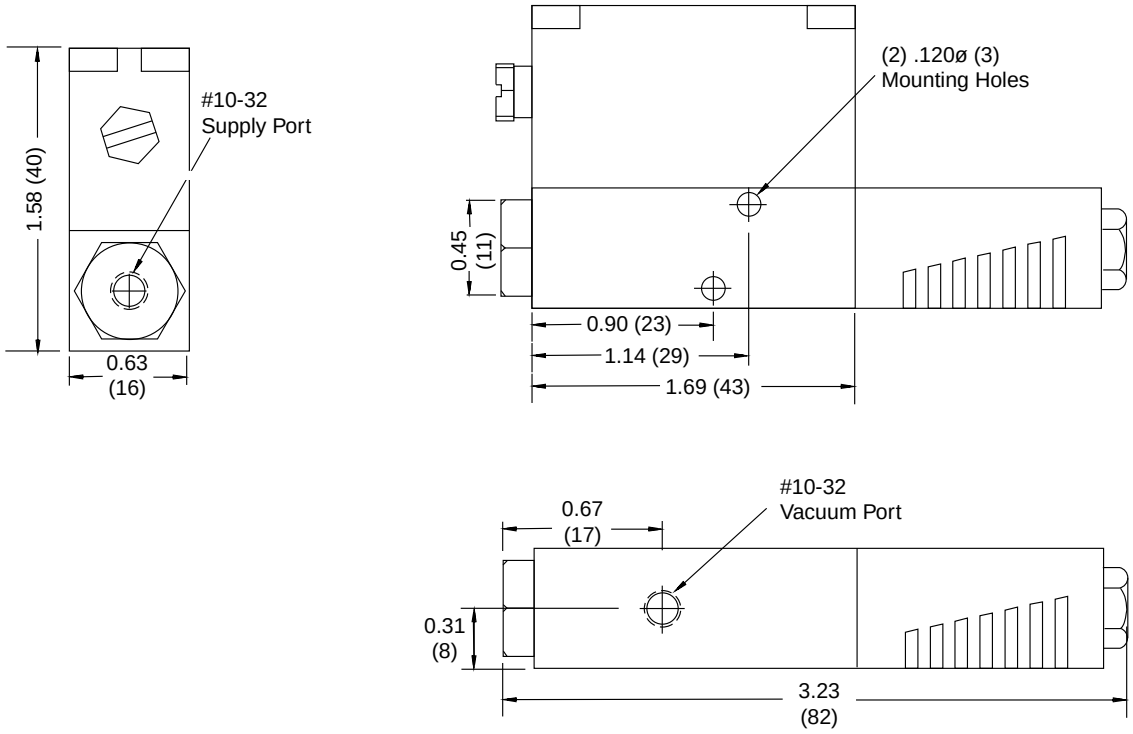
Performance Data H Series Venturis High Vacuum Applications

The “H” series for “High” vacuum levels of up to 28" Hg for applications involving non-porous materials (steel, plastic, glass, etc.)

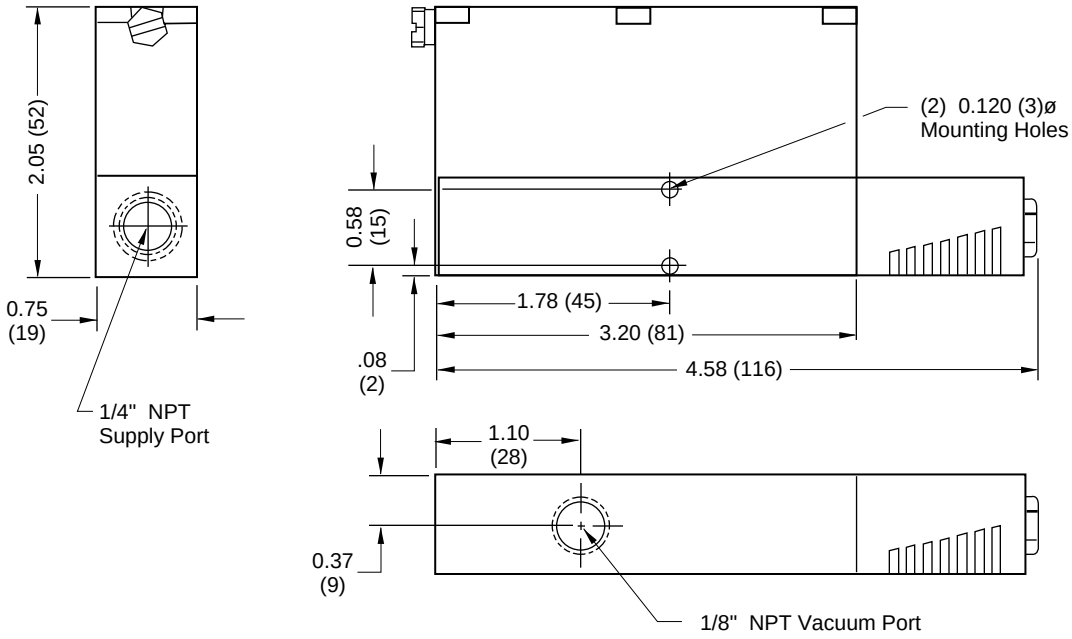
Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 PSI										
		0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
60H	0.80	0.50	0.38	0.32	0.30	0.27	0.23	0.20	0.13	0.05	0.02	0.00
90H	1.80	1.20	1.00	0.95	0.90	0.85	0.75	0.70	0.52	0.47	0.20	0.00
100H	2.80	2.00	1.85	1.75	1.57	1.40	1.25	1.05	0.84	0.70	0.35	0.00
150H	4.80	3.20	2.80	2.50	2.30	2.00	1.60	1.40	1.20	0.80	0.50	0.00
200H	7.80	5.40	4.70	3.85	3.30	3.00	2.60	2.10	1.60	1.20	0.60	0.00

Model		Evacuation Time (seconds) based on 1 cu. ft. Volume ("Hg)									
	0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
60H	0.00	15.00	29.80	50.60	74.50	102.80	135.90	183.20	245.90	410.20	790.80
90H	0.00	6.50	12.30	18.90	32.50	47.00	65.40	92.20	130.00	222.20	281.30
100H	0.00	2.70	6.50	11.20	17.50	25.80	38.40	55.20	79.20	166.70	251.80
150H	0.00	2.30	3.80	6.50	10.20	14.10	21.30	44.90	55.00	81.00	125.00
200H	0.00	1.20	2.10	3.40	5.20	7.70	11.50	20.00	35.50	62.60	98.10

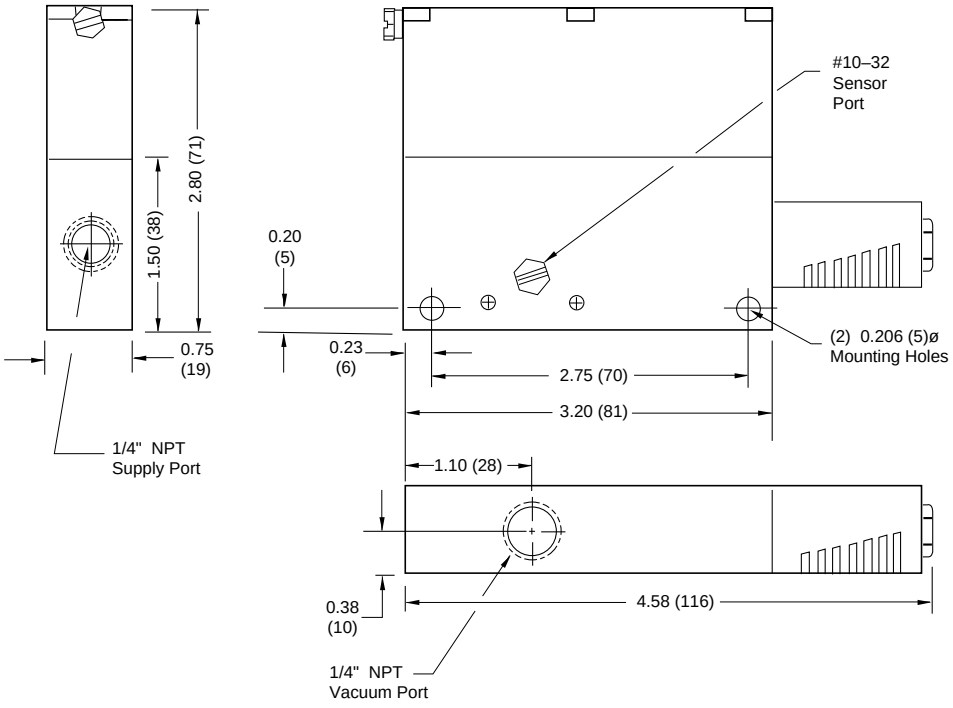
MV0RR60H



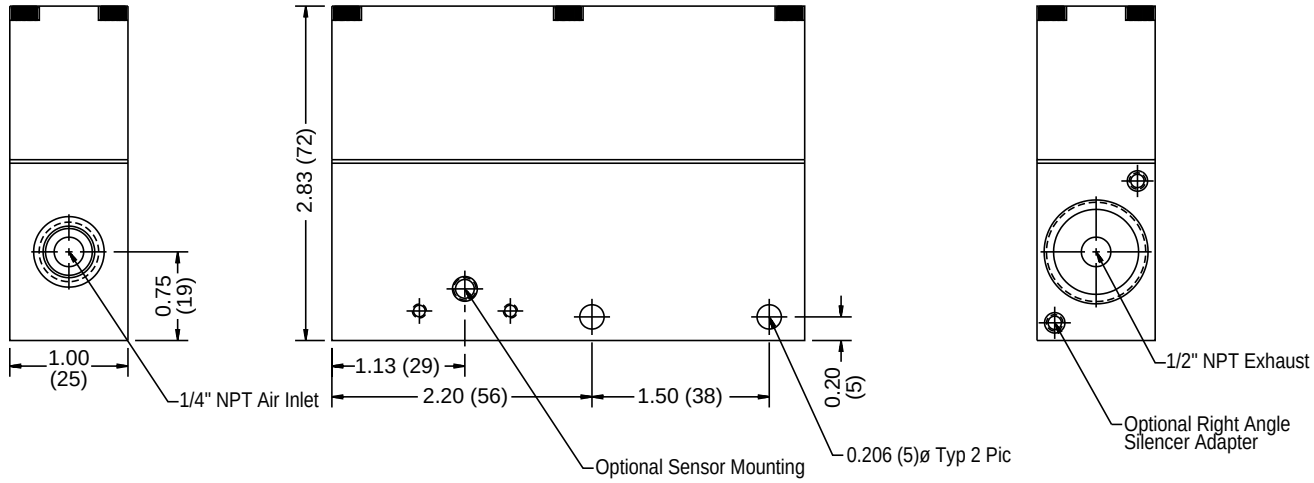
MV1RR



MV2RR


2.80 (71)
1.50 (38)
0.75
(19)
1/4" NPT
Supply Port
0.20
(5)
0.23
(6)
#10–32
Sensor
Port
(2) 0.206 (5)ø
Mounting Holes
2.75 (70)
3.20 (81)
1.10 (28)
0.38
(10)
4.58 (116)
1/4" NPT
Vacuum Port

BV8RR


0.75
(19)
1.00
(25)
1/4" NPT Air Inlet
2.83 (72)
1.13 (29)
2.20 (56)
1.50 (38)
0.20
(5)
Optional Sensor Mounting
0.206 (5)ø Typ 2 Pic
1/2" NPT Exhaust
Optional Right Angle
Silencer Adapter

- **NM Series segmented manifolds offer maximum application versatility where multiple vacuum stations are required.**
- **Modular components enable the designer to select from 8 interchangeable cartridges and specify only the features necessary for their specific application.**
- **Any of the 60M through 150H cartridges can be used in any of the vacuum stations.**
- **Precision blow-off control and rapid recovery.**

(1) NM5 **(5) B52**

NM# (Indicates NORVAC Manifold and number of stations)

Pump Options → A 2 1

Venturi cartridge Sizes and layout
A=60M E=100M
B=60H F=100H
C=90M G=150M
D=90H H=150H

Valve voltage and layout
1 = 12VDC 2 = 24VDC

Vacuum switch/sensor Configuration and layout
0= no device
1=VSXP - sourcing switch
2=VSXN - sinking switch
3=VSXL - logic switch
4=VSSA - 4-20mA sensor
5=VSSV - 0-5VDC sensor
(See pp. 33-34)

Ordering Information

1. Use specifications chart on following page to select venturi(s) based on vacuum level, vacuum flow, evacuation speed, and air consumption.
2. Select vacuum switch/sensor configuration and layout on the left.
3. Select valve voltage and layout on the left.

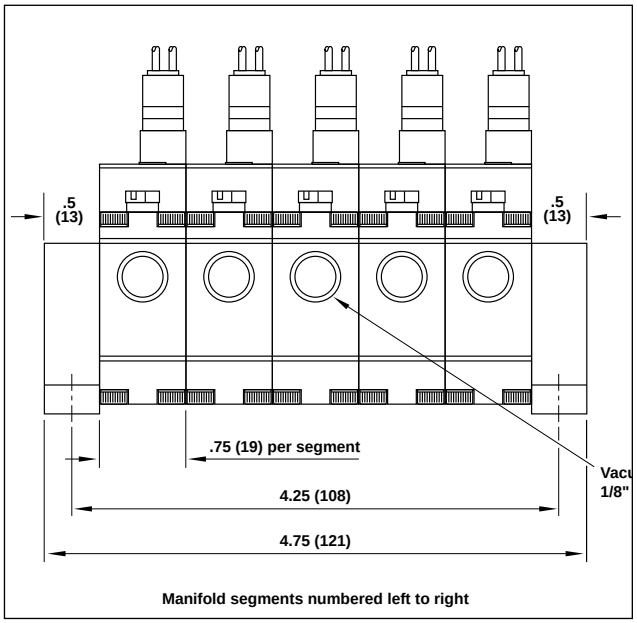
Ordering Example

The following ordering example details the information needed to order a NORVAC manifold consisting of 3 stations.

One **NM3** NORVAC manifold consisting of:

Pos.	Qty.	PN.	Desc.
1	1	C32	90M log. sw.24 VDC
2	1	D32	90H, log.sw.,24 VDC
3	1	G22	150M, sink sw., 24 VDC

Notes: Each segment must have appropriate size and cartridge designation.
Up to 20 segments available in an NM.



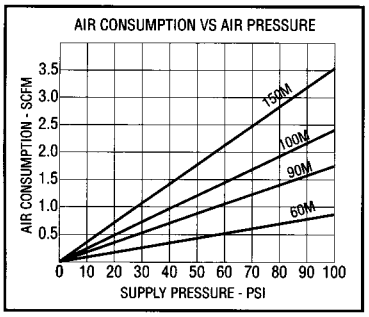
Performance Data

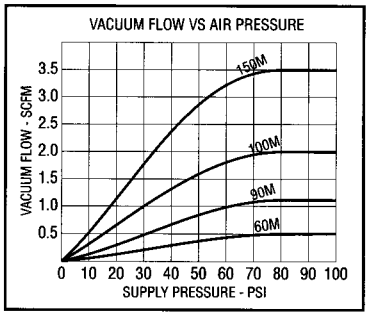
M Series Venturis Medium Vacuum Applications

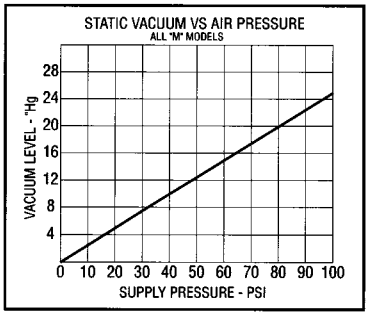
The “M” series for “Medium” vacuum levels of up to 20" Hg for applications involving porous materials (cardboard, wood, fabric, etc.)

Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 PSI							
		0"	3"	6"	9"	12"	15"	18"	20"
60M	0.50	0.50	0.40	0.30	0.22	0.15	0.08	0.03	0.00
90M	1.40	1.40	1.25	1.20	1.05	0.85	0.65	0.25	0.00
100M	1.80	2.10	2.00	1.85	1.75	1.60	1.25	0.80	0.00
150M	2.80	3.50	3.20	2.95	2.75	2.50	1.80	0.95	0.00

Model		Evacuation Time (seconds) based on 1 cu. ft. volume ("Hg)						
	0"	3"	6"	9"	12"	15"	18"	20"
60M	0.00	12.50	25.10	43.90	68.60	99.30	153.70	227.00
90M	0.00	3.75	7.20	12.40	19.10	29.90	52.00	104.00
100M	0.00	2.65	5.80	9.90	16.20	22.90	36.20	56.60
150M	0.00	1.35	3.20	5.20	7.70	11.80	23.40	52.00







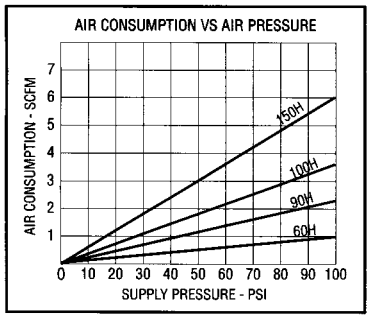
Performance Data

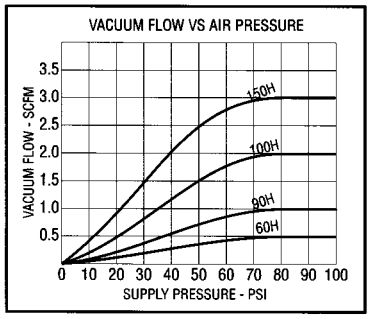
H Series VENTURIS High Vacuum Applications

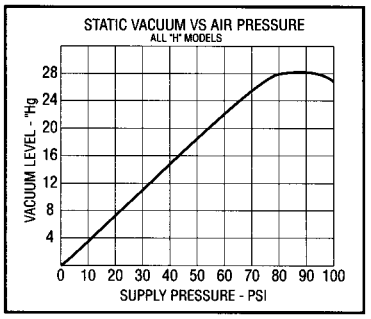
The “H” series for “High” vacuum levels of up to 28" Hg for applications involving non-porous materials (steel, plastic, glass, etc.)

Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum level ("Hg) @ 80 psi										
		0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
60H	0.80	0.50	0.38	0.32	0.30	0.27	0.23	0.20	0.13	0.05	0.02	0.00
90H	1.80	1.20	1.00	0.95	0.90	0.85	0.75	0.70	0.52	0.47	0.20	0.00
100H	2.80	2.00	1.85	1.75	1.57	1.40	1.25	1.05	0.84	0.70	0.35	0.00
150H	4.80	3.20	2.80	2.50	2.30	2.00	1.60	1.40	1.20	0.80	0.50	0.00

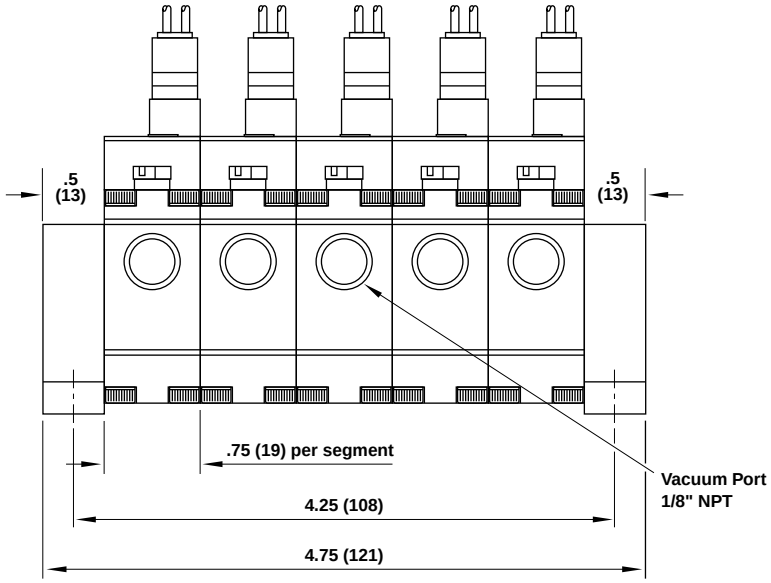
Model		Evacuation Time (seconds) based on 1 cu. ft. volume ("Hg)									
	0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
60H	0.00	15.00	29.80	50.60	74.50	102.80	135.90	183.20	245.90	410.20	790.80
90H	0.00	6.50	12.30	18.90	32.50	47.00	65.40	92.20	130.00	222.20	281.30
100H	0.00	2.70	6.50	11.20	17.50	25.80	38.40	55.20	79.20	166.70	251.80
150H	0.00	2.30	3.80	6.50	10.20	14.10	21.30	44.90	55.00	81.00	125.00



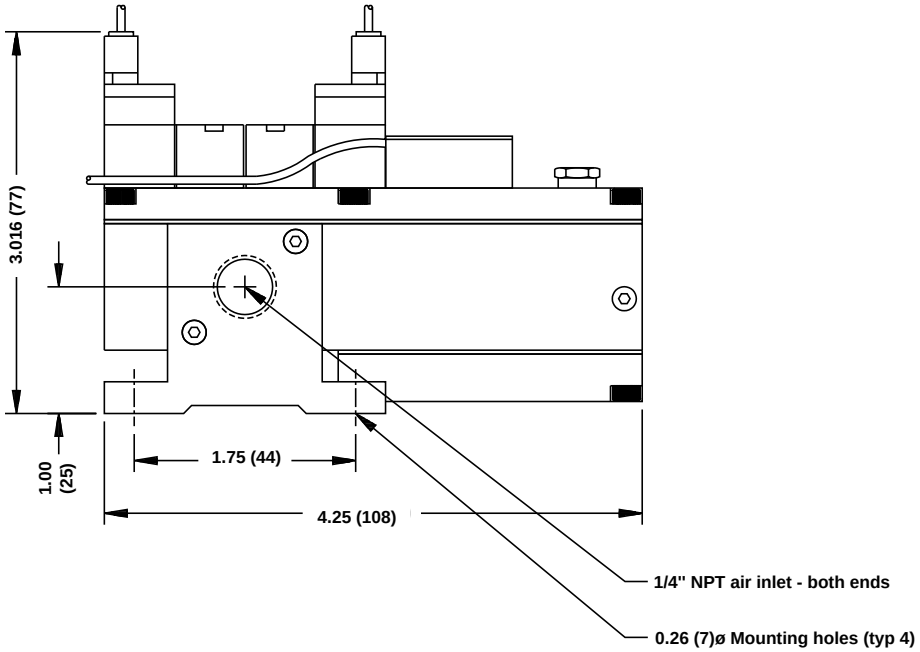




Manifold



Manifold segments numbered left to right



- **Highvac vacuum pumps achieve vacuum levels up to 29.5"Hg.**
- **Ideal for vessel evacuation, process control and HVAC applications.**
- **Cartridge assembly has no moving parts making it easy to clean.**
- **High vacuum rates, compact size, and design features allow the use of smaller, less costly components and reduces maintenance repair costs.**
- **Suited for applications where contaminants are present.**

Technical Data

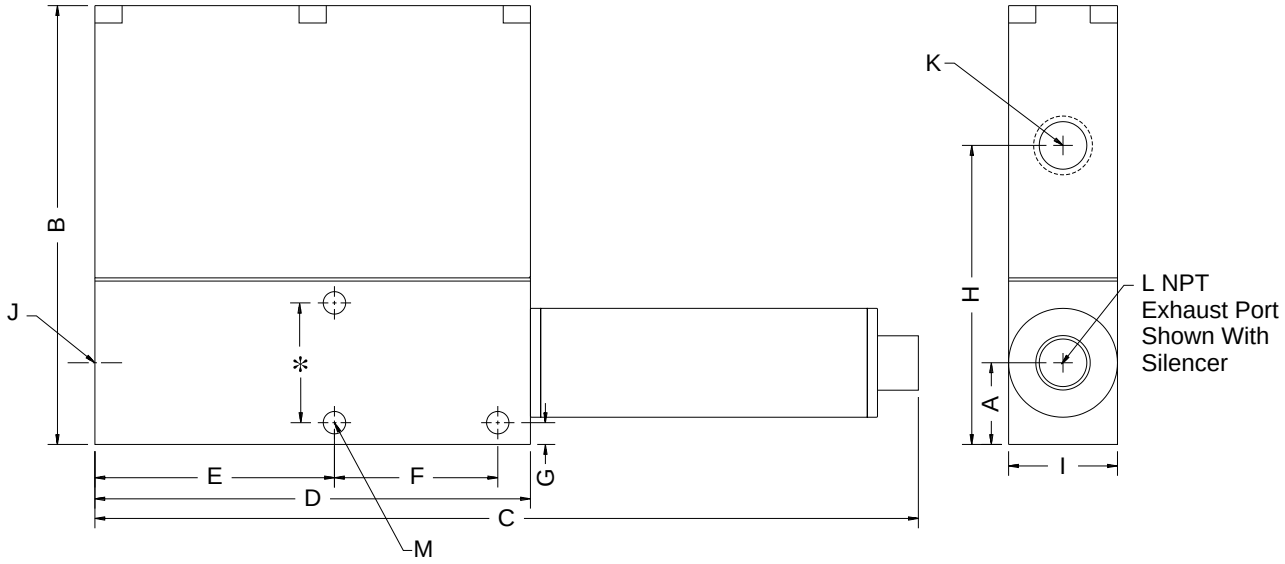
Vacuum Level: The magnitude of suction created by the vacuum pump. Vacuum level is affected by **elevation** and **barometric pressure.**

Note: For each 1000 feet of elevation, vacuum decreases by approximately 1" Hg.

Performance Data

Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) v. Vacuum Level ("Hg) @ 80 PSI								
		0"	4"	8"	12"	16"	20"	24"	28"	29.5"
SV1	4.90	3.20	2.80	2.50	2.10	1.60	1.50	1.00	0.50	0.00
SV2	8.60	5.00	3.90	3.40	2.90	2.20	1.60	1.10	0.65	0.00
SV3	22.00	16.00	12.20	10.20	9.00	7.80	5.30	2.70	0.90	0.00

Supervac



Model	Dimensions													
	A	B	C	D	E	F	G	H	I	J Air Supply Port	K Vacuum Port	L Exhaust Port	M MTG Hole Ø	Silencer
SV1	.38 (10)	2.25 (57)	4.58 (116)	3.20 (81)	1.78 (45)	*	.08 (2)	1.50 (38)	.75 (19)	1/4 NPT	1/8 NPT	1/4 NPT	.125	AA4
SV2	.758 (19)	4.00 (102)	7.56 (192)	4.00 (102)	2.20 (56)	1.50 (38)	.20 (5)	2.80 (71)	1.00 (25)	1/4 NPT	1/4 NPT	1/2 NPT	.206	ST8A
SV3	.758 (19)	4.00 (102)	9.80 (249)	5.00 (127)	2.50 (64)	1.50 (38)	.20 (5)	2.75 (70)	1.00 (25)	3/8 NPT	1/4 NPT	1/2 NPT	.206	ST8B

- **16 standard models with a full range of optional accessories for pick and place applications.**
- **NJ Series pumps operate with instantaneous response in pulsed applications or on a continuous basis.**
- **Rugged, cylindrical design.**
- **Maintenance free pumps have no moving parts or seals that require replacement.**
- **Manufactured from anodized aluminum.**
- **Stainless steel, PVC, and other materials are available for high temperature and/or caustic applications.**

NJM 350

NJM 200

NJM 60M

Ordering Information

Select a NJ Series pump with the lowest air consumption that meets the application requirements based on the following criteria: **Vacuum Level, Vacuum Flow, Vacuum Force and Cycle Times.**

Standard operating supply pressure for the NJ Series is 80psi. Specify **60psi** supply power if required by adding **-60psi** after model number.

Specify pump model: i.e. NJS250

Specify accessories and vacuum cup.

The use of NORVAC silencers is strongly recommended. They will reduce noise level up to 30 dB without back pressure.

NJ Series can also be powered by alternate medias. Consult factory.

Performance Data

NJM series for “Medium” vacuum levels of up to 20" Hg for applications involving porous materials (cardboard, wood, fabric, etc.)

Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 psi							
		0"	3"	6"	9"	12"	15"	18"	20"
NJM 60M*	0.50	0.50	0.40	0.30	0.22	0.15	0.08	0.03	0.00
NJM 90M	1.40	1.40	1.25	1.20	1.05	0.85	0.65	0.25	0.00
NJM 100M	1.80	2.10	2.00	1.85	1.75	1.60	1.25	0.80	0.00
NJM 150M	2.80	3.50	3.20	2.95	2.75	2.50	1.80	0.95	0.00
NJM 200	4.80	6.00	5.30	4.90	4.00	3.50	2.50	1.10	0.00
NJM 250	7.80	9.50	9.20	8.30	7.00	4.70	3.40	2.20	0.00
NJM 300	12.50	20.00	19.00	16.30	13.80	8.10	5.50	3.30	0.00
NJM 350	17.00	28.00	24.00	19.40	16.80	14.50	11.20	4.80	0.00

* The “M” suffix denotes miniature.

Performance Data

Model		Evacuation Time based on 1 cu. ft. volume ("Hg)						
	0"	3"	6"	9"	12"	15"	18"	20"
NJM 60M	0.00	12.50	25.10	43.90	68.60	99.30	153.70	227.00
NJM 90M	0.00	3.75	7.20	12.40	19.10	29.90	52.00	104.00
NJM 100M	0.00	2.65	5.80	9.90	16.20	22.90	36.20	56.60
NJM 150M	0.00	1.35	3.20	5.20	7.70	11.80	23.40	52.00
NJM 200	0.00	0.75	1.90	3.20	5.30	8.70	17.10	42.60
NJM 250	0.00	0.45	1.10	2.40	3.80	6.00	9.70	15.40
NJM 300	0.00	0.00	0.00	1.10	1.80	2.70	4.60	8.70
NJM 350	0.00	0.00	0.00	1.00	1.50	2.10	4.30	8.40

Performance Data

NJH series for “High” vacuum levels of up to 28" Hg for applications involving non-porous materials (steel, plastic, glass, etc.)

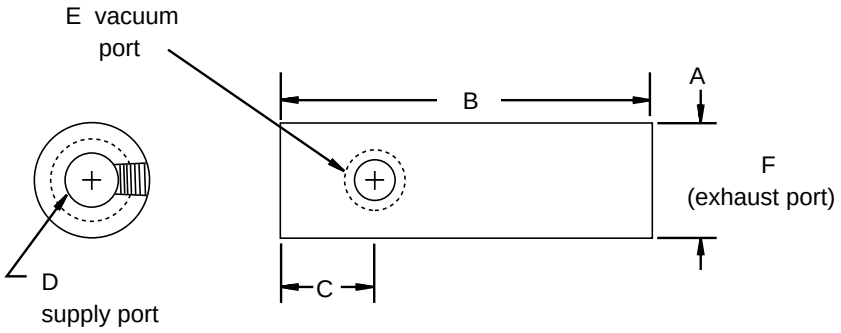
Model	Air Consumption (SCFM)@ 80 PSI	Vacuum Flow (scfm) vs. Vacuum Level ("Hg) @ 80 psi										
		0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
NJH 60M*	0.80	0.50	0.38	0.32	0.30	0.27	0.23	0.20	0.13	0.05	0.02	0.00
NJH 90M	1.80	1.20	1.00	0.95	0.90	0.85	0.75	0.70	0.52	0.47	0.20	0.00
NJH 100M	2.80	2.00	1.85	1.75	1.57	1.40	1.25	1.05	0.84	0.70	0.35	0.00
NJH 150M	4.80	3.20	2.80	2.50	2.30	2.00	1.60	1.40	1.20	0.80	0.50	0.00
NJH 200	7.80	5.40	4.70	3.85	3.30	3.00	2.60	2.10	1.60	1.20	0.60	0.00
NJH 250	12.50	9.00	8.50	7.85	7.00	6.50	5.30	3.90	2.50	1.80	0.90	0.00
NJH 300	22.00	20.00	17.00	14.00	12.70	12.00	10.00	7.40	4.90	2.70	1.30	0.00
NJH 350	28.00	28.00	22.00	18.70	15.90	14.50	11.80	8.10	5.70	4.50	2.25	0.00

* The “M” suffix denotes miniature.

Performance Data

Model		Evacuation Time (seconds) based on 1 cu. ft. volume ("Hg)									
	0"	3"	6"	9"	12"	15"	18"	21"	24"	27"	28"
NJH 60M	0.00	15.00	29.80	50.60	74.50	102.80	135.90	183.20	245.90	410.20	790.80
NJH 90M	0.00	6.50	12.30	18.90	32.50	47.00	65.40	92.20	130.00	222.20	281.30
NJH 100M	0.00	2.70	6.50	11.20	17.50	25.80	38.40	55.20	79.20	166.70	251.80
NJH 150M	0.00	2.30	3.80	6.50	10.20	14.10	21.30	44.90	55.00	81.00	125.00
NJH 200	0.00	1.20	2.10	3.40	5.20	7.70	11.50	20.00	33.50	62.60	98.10
NJH 250	0.00	0.75	1.30	2.20	3.50	5.60	9.10	17.40	30.10	56.00	76.00
NJH 300	0.00	0.00	0.80	1.20	2.00	2.80	3.90	5.90	11.10	32.70	60.00
NJH 350	0.00	0.00	0.00	1.20	1.90	2.30	3.40	5.30	8.80	26.00	44.00

NJ Series



Model	Dimensions							
	A	B	C	D NPT	E NPT	F NPT	Recommended Silencer*	Length w/Silencer
60M 90M	0.75 (19)	2.75 (70)	0.75 (19)	1/8	1/8	1/4	NAA4 NST4	4.13 (105) 4.13 (105)
100M 150M	0.75 (19)	2.75 (70)	0.75 (19)	1/8	1/8	1/4	NAA4 NST4	4.13 (105) 4.88 (124)
150	1.25 (32)	4.0 (102)	1.0 (25)	1/4	3/8	3/8	NAA6 NST6A	5.88 (149) 8.0 (203)
200	1.25 (32)	4.0 (102)	1.0 (25)	1/4	3/8	3/8	NAA6 NST6A NFA51-3/8	5.88 (149) 8.0 (203) 9.75 (248)
250	1.25 (32)	4.0 (102)	1.0 (25)	1/4	3/8	3/8	NFA51-3/8 NST6B	9.75 (248) 8.0 (203)
300	1.25 (32)	5.0 (127)	1.0 (25)	3/8	3/8	3/8	NFA51-3/8 NST6B	10.75 (273) 10.25 (260)
350	1.50 (38)	6.0 (152)	1.50 (38)	1/2	1/2	1/2	NFA51-1/2 NST8B	11.75 (298) 11.25 (286)

*Note: For ultra quiet operation the STAA4 Silencer can be used on all of the M series models. All M series w/STAA4 length = 6.00".

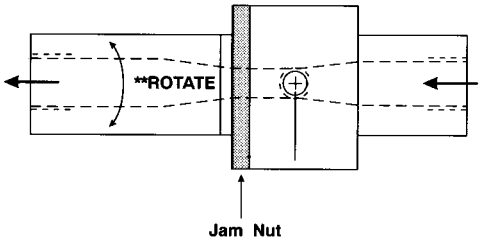
- **Vacuum flow rates of up to 120 SCFM, and vacuum levels of up to 25" Hg.**
- **Non-clogging, straight-through design.**
- **High performance to air consumption ratio.**
- **Field adjustable for your specific application.**
- **Can be used to pick and place concrete block, or packaging materials that are coated with fine powder.**
- **Commonly used in industrial air driven vacuum cleaners to remove liquid/solid mixtures from sump areas.**

VV 500

VV 200

Principles of Operation

The variable performance of the VV pump is achieved by increasing the annular gap between the venturi nozzle and the diffuser. Rotating the diffuser section counter-clockwise will increase the opening, allowing more compressed air to flow through the unit and increasing both the vacuum flow and the vacuum level. The result is a variable vacuum pump that can be adjusted to meet an application's exact requirements.



Performance Data

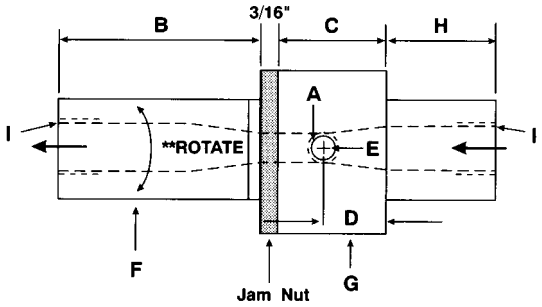
Model Number	Air Consumption vs. Vacuum Level ("Hg) @ 80 PSI					
	0"	5"	10"	15"	20"	25"
VV 100	0	.70	1.20	1.30	2.10	2.60
VV 150	0	1.30	1.70	2.40	3.20	4.50
VV 200	0	2.40	3.70	4.70	6.00	6.80
VV 250	0	4.00	6.00	8.30	9.70	12.00
VV 375	0	6.20	11.50	17.00	21.00	29.00
VV 500	0	12.00	22.00	28.00	33.00	45.00
VV 750	0	23.00	30.80	44.00	63.00	90.00

Recommended Silencer
ST4
ST4
ST4
ST4A
ST8B
ST12C
ST16C

Max Vacuum Flow SCFM*	Air Consumption SCFM*
2.60	1.30
3.20	1.50
6.00	3.00
10.00	6.00
30.00	13.00
60.00	25.00
120.00	40.00

* These values can be achieved at 15"Hg.

VV Series



Specifications

Model	Dimensions										
	A Barrel ID	B	C Collar Length	D	E Input (NPTF)	F Barrel OD	G Collar OD	H	I Thread ID NPTF	Silencer	Silencer Length
VV 100	0.10 (25)	1.50 (38)	1.50 (38)	0.75 (19)	1/8	.75 (19)	1.25 (32)	0.88 (22)	1/4	NST4	2.50
VV 150	0.15 (4)	1.50 (38)	1.50 (38)	0.75 (19)	1/8	.75 (19)	1.25 (32)	0.88 (22)	1/4	NST4	2.50
VV 200	0.20 (5)	1.50 (38)	1.50 (38)	0.75 (19)	1/8	.75 (19)	1.25 (32)	0.88 (22)	1/4	NST4	2.50
VV 250	0.25 (6)	1.50 (38)	1.50 (38)	0.75 (19)	1/8	.75 (19)	1.25 (32)	0.88 (22)	1/4	NST4A	4.00
VV 375	0.38 (10)	2.75 (70)	1.75 (44)	0.88 (22)	3/8	1.0 (25)	1.50 (38)	1.50 (38)	1/2	NST8B	5.20
VV 500	0.50 (13)	2.50 (64)	2.0 (51)	1.0 (25)	3/8	1.25 (32)	2.0 (51)	1.50 (38)	3/4	NST12C	7.50
VV 750	0.75 (19)	3.38 (86)	2.0 (51)	1.0 (25)	1/2	1.50 (38)	2.25 (57)	1.50 (38)	1	NST16C	7.50

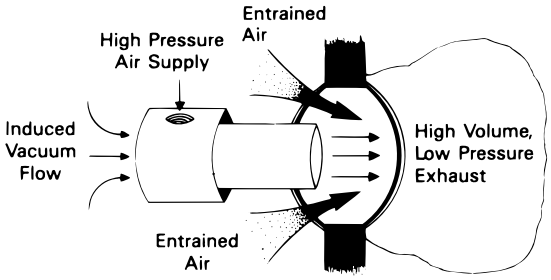
- **High, 40:1 amplification ratios.**
- **Can be used for applications requiring extremely high levels of vacuum flow to rapidly evacuate large areas.**
- **The unique design of the AA pump makes it an efficient and cost effective alternative to electric blowers or large volumes of raw compressed air.**
- **7 standard models are available with bores of 1/8" to 2".**
- **Air velocity and flow of all models are field adjustable to provide a wide range of conditions to meet individual application requirements.**

AA 750

AA 500

Principles of Operation

AA pumps operate on the “Coanda Effect” where a small volume of compressed air is converted into a large flow of ambient air. Compressed air is emitted from an annular gap and passes over a curved surface into the throat of the unit. As the air passes over this curved surface, similar to an air foil, a low pressure area is created inducing ambient air to flow into the throat with the compressed air.



Performance Data

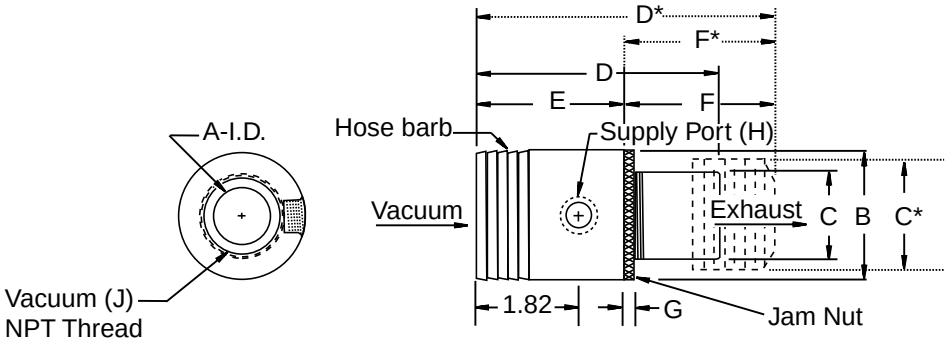
Model No.	I.D. inches	**Input scfm	Output scfm	Velocity ft/sec
AA 100*	0.13 (3)	3 2 1	12 8 6	2347 1565 1173
AA 200*	0.25 (6)	3 2 1	18 14 10	860 685 490
AA 500H†	0.50 (13)	9 5 3	75 42 22	910 530 265
AA 750H†	0.75 (19)	9 5 3	110 70 40	565 420 195
AA 1000H†	1.0 (25)	9 5 3	145 95 57	435 290 174
AA 1500H	1.50 (38)	9 5 3	240 150 86	314 198 123
AA 2000H	2.0 (51)	9 5 3	350 220 140	269 168 106

Jam nut used to secure adjustment
* 1/4" NPT male exhaust available
** Data is at 80 PSI
† See page 29 for optional threaded exhaust attachments

Typical Applications

Blow drying, fume evacuation, cooling and improved utilization of compressed air.

AA Series



Optional Threaded Exhaust Attachments for Models AA 500H, 750H 1000				
Threaded Exhaust Part No.	**Model†**	**C***	**D***	**F***
NT 100	AA 500H	1" NPT	4.63 (118)	2.00 (51)
NT 107	AA 750H	1" NPT	5.13 (130)	2.50 (64)
NT 125	AA 1000H	1-1/2" NPT	4.63 (130)	2.00 (51)

Model	Dimensions								
	I.D. A	**B**	**C**	**D**	**E**	**F**	**G**	**(NPTF) H**	**(NPTF) J**
AA 100	0.13 (3)	1.25 (32)	0.56 (14)	2.0 (51)	1.0 (25)	0.75 (19)	0.13 (3)	1/8	—
AA 200	0.25 (6)	1.25 (32)	0.56 (14)	2.0 (51)	1.0 (25)	0.75 (19)	0.13 (3)	1/8	—
AA 500H†	0.50 (13)	1.50 (38)	1.0 (25)	4.13 (105)	2.63 (67)	1.50 (38)	0.2 (5)	1/4	1/2
AA 750H†	0.75 (19)	2.0 (51)	1.25 (32)	4.13 (105)	2.63 (67)	1.50 (38)	0.2 (5)	1/4	1
AA 1000H†	1.0 (25)	2.25 (57)	1.50 (38)	4.13 (105)	2.63 (67)	1.50 (38)	0.2 (5)	1/4	1-1/4
AA 1500H	1.50 (38)	2.75 (70)	2.0 (51)	4.13 (105)	2.63 (67)	1.50 (38)	0.2 (5)	3/8	2
AA 2000H	2.0 (51)	3.25 (83)	2.50 (64)	4.13 (105)	2.63 (67)	1.50 (38)	0.2 (5)	3/8	2-1/2

Jam nut is used to secure adjustment

† See above chart for optional threaded attachment.

MT Series High Flow Vacuum Pumps

For Material Transfer

- **MT Series provides a reliable and cost effective method of in-line transfer of complex shapes and bulk materials.**
- **Creates instantaneous vacuum flow and high air velocity.**
- **Straight through, smooth bore design.**
- **Compact design facilitates placement close to the work area for maximum efficiency and ease of installation.**
- **MT pumps are available in 15 standard models with inside diameters from 1/8" to 3".**
- **Modified and custom engineered units available.**

MT 76

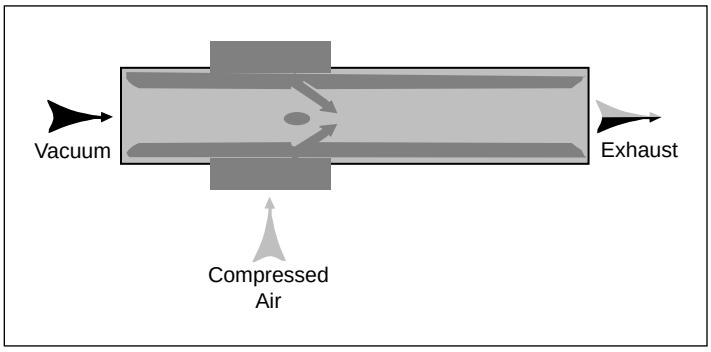
MT 56

MT 23

Principles of Operation

Compressed air is fed into an exterior annular ring that has a number of orifices leading into the main tube of a transducer. As the compressed air exits from the orifices, its velocity increases to supersonic speed. The air forced into the center of the tube rotates with a twisting motion similar to a worm screw. This cyclonic flow creates a powerful vacuum capable of drawing materials into, and through the transducer.

As a vacuum source, the MT series are capable of rapid evacuation of a large volume of air to a low vacuum level.



Ordering Information

Select an MT pump based on the following:
Inside diameter
Vacuum flow
Vacuum force
Air Consumption
Contact factory for custom pumps

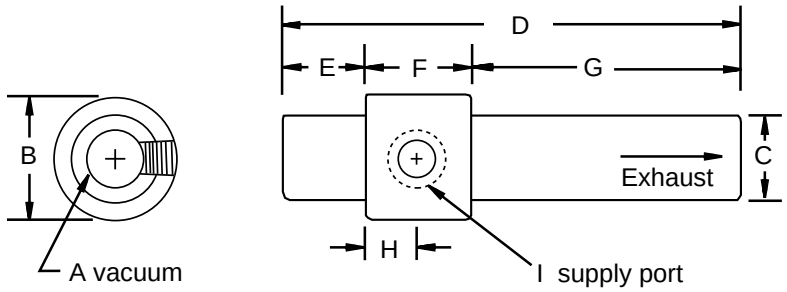
Typical Applications

Unloading vibrator feeders
Reloading hoppers with plastic regrind
Transferring of engine valves in grinding operation
Chip removal in drilling operation
Transfer power detergent and caustic chemicals
Convey peanut husks
Salvage removal in trimming operation
Mandrel collection system

Performance Data

Model No.	I.D.	Air Velocity (ft/sec)	Vacuum Flow (scfm)	Vacuum Level (" Hg)	Air Consumption @ 40 psi	@80 psi
MT 13	0.13 (3)	585	3	8	1.1	2
MT 23	0.25 (6)	490	10	8	3.1	6
MT 33	0.38 (10)	328	15	6	3.5	6
MT 36	0.38 (10)	393	18	8	5.8	10
MT 53	0.50 (13)	306	25	3	5.2	9
MT 56	0.50 (13)	362	30	10	14	24
MT 73	0.75 (14)	272	50	4.3	14	24
MT 76	0.75 (14)	326	60	8	28	48
MT 103	1.0 (25)	229	75	3	14	24
MT 106	1.0 (25)	290	95	5.8	28	48
MT 153	1.50 (38)	224	165	1.3	14	24
MT 156	1.50 (38)	272	200	2.5	28	48
MT 203	2.0 (51)	183	240	0.8	14	24
MT 206	2.0 (51)	229	300	1.5	28	48
MT 306	3.0 (76)	168	375	.7	32	60

Values for velocity, vacuum flow, and vacuum level are for 80 psi input pressure

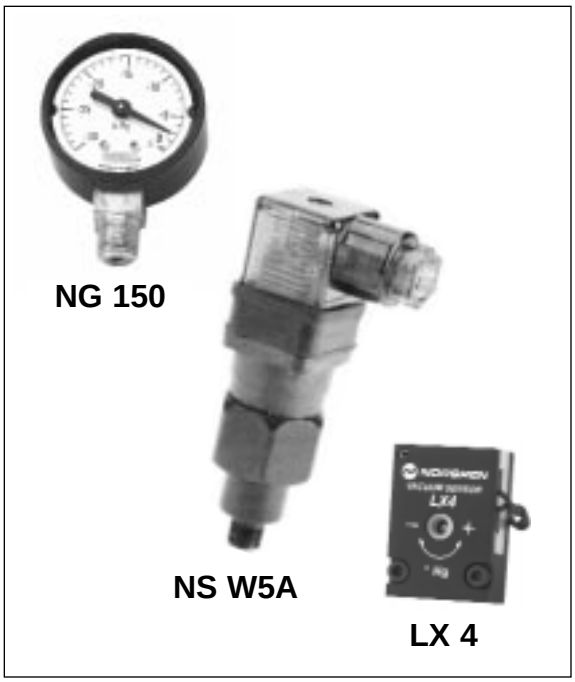


Model	Dimensions								
	I.D. A	B	C	D	E	F	G	H	(NPTF) I
MT 13	0.13 (3)	1.25 (32)	0.75 (19)	3.50 (89)	0.75 (19)	1.0 (25)	1.75 (44)	0.5 (13)	1/8
MT 23	0.25 (6)	1.25 (32)	0.75 (19)	3.50 (89)	0.75 (19)	1.0 (25)	1.75 (44)	0.5 (13)	1/8
MT 33	0.38 (10)	1.25 (32)	0.75 (19)	3.50 (89)	0.75 (19)	1.0 (25)	1.75 (44)	0.5 (13)	1/8
MT 36	0.38 (10)	1.25 (32)	0.75 (19)	3.50 (89)	0.75 (19)	1.0 (25)	1.75 (44)	0.5 (13)	1/8
MT 53	0.50 (13)	1.50 (38)	1.0 (25)	5.50 (140)	1.0 (25)	1.25 (32)	3.25 (83)	0.63 (16)	1/4
MT 56	0.50 (13)	1.50 (38)	1.0 (25)	5.50 (140)	1.0 (25)	1.25 (32)	3.25 (83)	0.63 (16)	1/4
MT 73	0.75 (19)	2.0 (51)	1.25 (32)	7.50 (191)	1.50 (38)	2.0 (51)	4.0 (102)	1.0 (25)	3/8
MT 76	0.75 (19)	2.0 (51)	1.25 (32)	7.50 (191)	1.50 (38)	2.0 (51)	4.0 (102)	1.0 (25)	3/8
MT 103	1.00 (25)	2.25 (57)	1.50 (38)	7.50 (191)	1.50 (38)	2.0 (51)	4.0 (102)	1.0 (25)	3/8
MT 106	1.00 (25)	2.25 (57)	1.50 (38)	7.50 (191)	1.50 (38)	2.0 (51)	4.0 (102)	1.0 (25)	3/8
MT 153	1.50 (38)	2.75 (70)	2.0 (51)	7.50 (191)	1.50 (38)	2.0 (51)	4.0 (102)	1.0 (25)	3/8
MT 156	1.50 (38)	2.75 (70)	2.0 (51)	7.50 (191)	1.50 (38)	2.0 (51)	4.0 (102)	1.0 (25)	3/8
MT 203	2.00 (51)	3.25 (83)	2.50 (64)	7.50 (191)	1.50 (38)	2.0 (51)	4.0 (102)	1.0 (25)	3/8
MT 206	2.00 (51)	3.25 (83)	2.50 (64)	7.50 (191)	1.50 (38)	2.0 (51)	4.0 (102)	1.0 (25)	3/8
MT 306	3.00 (76)	4.25 (108)	3.50 (89)	10.50 (267)	2.0 (51)	3.0 (76)	5.50 (140)	1.50 (38)	3/8

These products will operate with as little as 3 psi.

Accessory Selection Guide										
Product	Vacuum Cups	Filter	Gauge	Sensor	Silencer AA	Silencer ST	Solenoid Valve	Switch (Mech)	Switch Solid State	Sensor Solid State
LV Series	●	●	●	●	●	●	●	●	●	●
MV Series	●	●	●	●	●	●	●	●	●	●
BV Series	●	●	●	●		●		●	●	●
RR	●	●	●	●	●	●		●	●	●
Supervac	●	●	●							●
NJ Series	●	●	●	●	●	●		1	1	1
VV Series	●		●							

1 Remote applications only



- **Ideal for use in automated systems to generate a low current electrical signal for input to a PLC or other logic controller.**
- **Usually open, diaphragm operated**
- **Utilize low-stressing deflecting contacts instead of sliding or pivoting parts.**
- **High reliability and long life**

LX 4, LX 5
To reduce plumbing and ease installation, the vacuum sensors may be fastened directly to the MV 2, MV 3 and the MV 6 series of vacuum pumps.

LX 4SB, LX 5SB
For remote mounting, choose the LX 4SB or LX5SB subbase mounted versions.

NS 4, NS 5
Adjustable vacuum sensors.

NS W5A
Nema 6 enclosure (IP67)
Adjustable, 4" to 28" Hg.
Electrical connection– DIN 46350A
UL and CSA approved

Compact, sealed vacuum switch for automation and process control applications. Especially suited for hazardous applications including wash down and dust laden air.

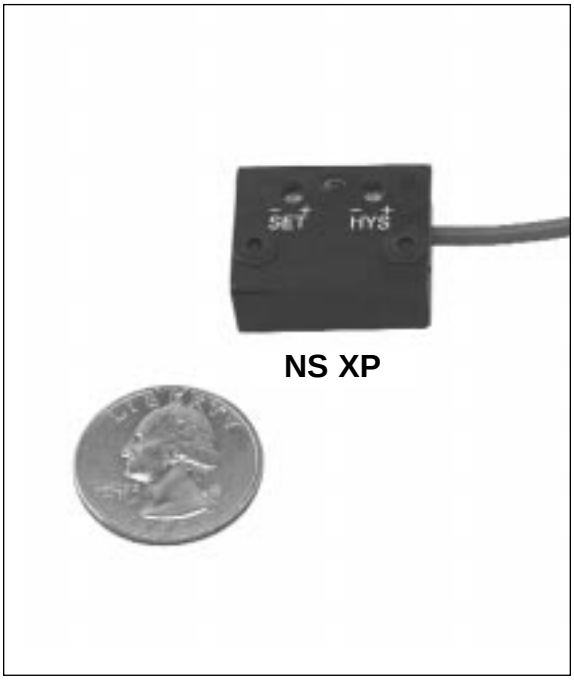
Switch is field adjustable between 4" and 28"Hg. Adjusting screw is easily accessed below the DIN connector. Wiring can be either Normally Open or Normally Closed.

Vacuum Gauge
NG 150
The NG 150 is a 0-30" Hg. vacuum with a 1-1/2" face and an 1/8" NPTM bottom mount connection.

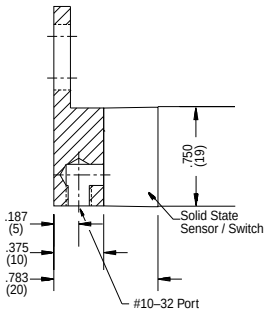
Specifications

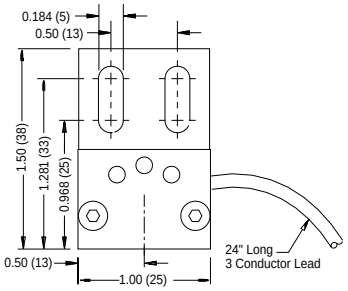
Part No	Size (inches)	Range	Hysteresis/ Deadband	Input Voltage	Max. Current	Output	Operating Temp.	Port	Indi-cator	Electrical Connection
MECHANICAL SWITCHES										
NS 4	1x1x3/8 w/ 3/8x3/16⌀barb	2-14.8"Hg.	1/2 % max value	500 VAC/ 24 VDC	10-20 mA	Sourcing	-40°-250°F	n/a	None	12" flying leads
NS 5	1x1x3/8 w/ 3/8x3/16⌀barb	7.4-30"Hg.	1/2 % max value	500 VAC/ 24 VDC	10-20 mA	Sourcing	-40°-250°F	n/a	None	12" flying leads
LX 4	1x1.5x.75 thk	2-14.8"Hg.	1/2 % max value	500 VAC/ 24 VDC	10-20 mA	Sourcing	-40°-250°F	Optional Sub Base w/10-32	None	12" flying leads
LX 5	1x1.5x.75 thk	7.4-30"Hg.	1/2 % max value	500 VAC/ 24 VDC	10-20 mA	Sourcing	-40°-250°F	Optional Sub Base w/10-32	None	12" flying leads
NS W5A	1.84x4.26	4-28"Hg.	~ 20%	125-250 VAC 12 VDC 24 VDC	5 amp 7 amp 5 amp	Sourcing N/O or N/C	-40°-176°F	1/8" NPTM	None	DIN 43650A

- **Ultra miniature electronic vacuum and pressure sensing and switching devices utilize the latest electronic technology available.**
- **Provide precision control for feedback mechanisms or system monitoring**
- **Can be incorporated directly onto NORVAC's Fastvac vacuum pumps.**
- **Available for manifold applications where multiple sensing points for vacuum or pressure are required.**
- **For applications requiring feedback for batch or process control, the sensors are available as a 0-5Vdc or 4-20mA volt transducer device.**
- **Vacuum or pressure setpoints, and hysteresis are adjustable on all switches.**



NS XP





Ordering Information

Note 1: All solid state devices, *sold individually*, are mounted to a 1/8" thick base with a #10-32 female port. Optional male port adapters are available in 10-32 and 1/8" NPT.

Note 2: All solid state devices, *sold individually*, can be optionally mounted to a 3/8" thick remote mounting base with a #10-32 port. Adapters are not available.

Solid State Option Suffix:

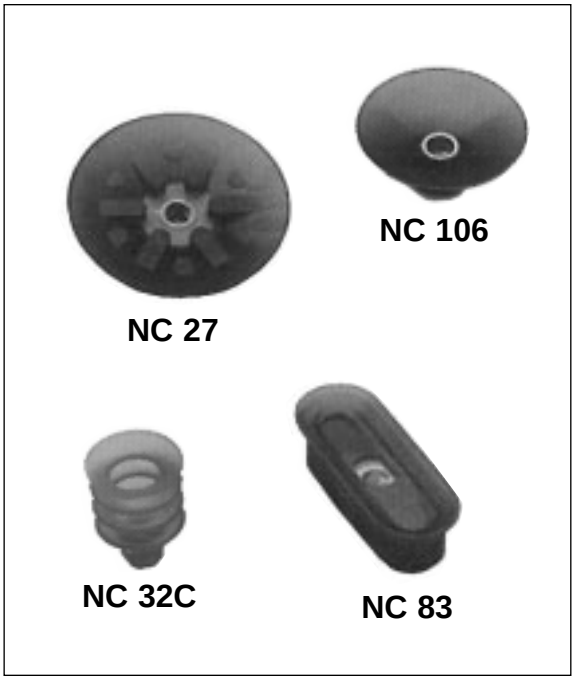
32N	#10-32 Adapter
18N	1/8" NPTM Adapter
RMN	Remote Mount Base

Specifications

Part No	Size (inches)	Range	Hysteresis/ Deadband	Input Voltage	Max. Current	Output	Operating Temp.	Port	Indi-cator	Electrical Connection
SOLID STATE SWITCHES										
NS XP	1x.75x.41 thk	0.5-30" Hg.	~ 0-15%	24 VDC	100mA	Sourcing	-40°-250°F	See notes 1&2	LED	3 conductor/24"
NS XN	1x.75x.41 thk	0.5-30" Hg.	~ 0-15%	24 VDC	100mA	Sinking	-40°-250°F	See notes 1&2	LED	3 conductor/24"
NS XL	1x.75x.41 thk	0.5-30" Hg.	~ 0-15%	24 VDC	100mA	Sinking w/pullup resistor	-40°-250°F	See notes 1&2	LED	3 conductor/24"
RS XP	1x.75x.41 thk	0-150 psi	~ 0-15%	24 VDC	100mA	Sourcing	-40°-250°F	See notes 1&2	LED	3 conductor/24"
RS XN	1x.75x.41 thk	0-150 psi	~ 0-15%	24 VDC	100mA	Sinking	-40°-250°F	See notes 1&2	LED	3 conductor/24"
RS XL	1x.75x.41 thk	0-150 psi	~ 0-15%	24 VDC	100mA	Sinking w/pullup resistor	-40°-250°F	See notes 1&2	LED	3 conductor/24"
SOLID STATE SENSORS										
NS SA	1x.75x.41 thk	0.5-30" Hg.	n/a	24 VDC	n/a	4-20mA	-40°-250°F	See notes 1&2	n/a	2 conductor/24"
NS SV	1x.75x.41 thk	0.5-30" Hg.	n/a	24 VDC	n/a	0-5 VDC	-40°-250°F	See notes 1&2	n/a	3 conductor/24"
RS SA	1x.75x.41 thk	0-150 psi	n/a	24 VDC	n/a	4-20mA	-40°-250°F	See notes 1&2	n/a	2 conductor/24"
RS SV	1x.75x.41 thk	0-150 psi	n/a	24 VDC	n/a	0-5 VDC	-40°-250°F	See notes 1&2	n/a	3 conductor/24"

NORVAC Vacuum Cups

Standard, Cleated, Bellows, and Oval vacuum cups



- **Norgren NORVAC vacuum cups are available in four designs: standard, cleated, bellows, and oval.**
- **Available in vinyl, silicon, or polyurethane.**
- **Four mounting methods are available: flange, snap on or bolt, push on or clamp, and bellows mount.**

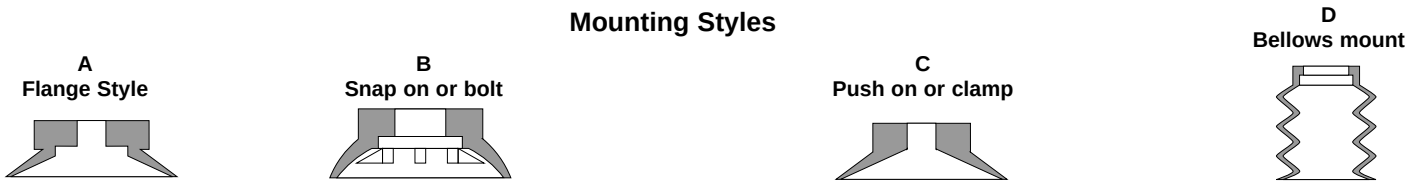
Equation for calculating vacuum lifting force using vacuum cups:
Note: To covert ("Hg) vacuum level into PSI divide by 2.

Vacuum Force (lbs.) x Safety Factor =
Vacuum Level (PSI) x Surface Area (in.^{2})

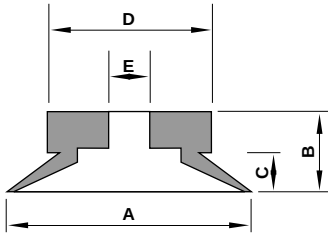
Specifications

Vinyl (excellent wear resistance): 32° to 125°F (0° to 50°C)
Silicon (good wear resistance, FDA approved): -50° to 400°F (-45 to 200°C)
Polyurethane (chemically resistant): 32° to 125°F (0° to 50°C)

Mounting Styles



Standard Vacuum Cup
Standard cups are flexible and work well in applications that do not require lifting heavy loads. In food packaging for example, a standard cup can be used to apply a label to an uneven surface such as a package of chicken.



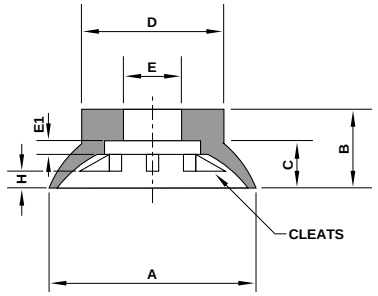
Standard Vacuum Cup Specifications

Standard Model No.	Effective Cup Area (in^2)	A (O.D.)	B	C	D	E	Style
NC 1	.01	.200	.225	.045	.225	.057	A
NC 165A	.05	.37	.25	.25	.37	.22	B
NC 25	.02	.61	.62	.10	.50	.19	B
NC 10	.30	1.00	.50	.28	.62	1/8 NPTF	B
NC 11	.40	1.19	.50	.28	.75	1/4 NPTF	B
NC 12	.60	1.44	.50	.50	.75	1/4 NPTF	B
NC 8	.44	1.50	.56	.38	.62	.23	B
NC 37A	.50	1.56	.81	.50	.87	1/4 NPTF	B
NC 168	.70	2.00	.69	.50	1.12	1/4 NPTF	B
NC 106	.80	2.50	.81	.50	1.12	1/4 NPTF	B
NC 30	1.10	3.09	1.44	.62	1.12	1/4 NPTF	C

All Dimensions in Inches (mm)

Cleated Cup

Cleated cups have a rigid, low profile, and are designed to lift heavy loads. These cups perform well when gripping smooth, flat heavy objects such as sheet steel, glass (television picture tubes), and coated corrugated.



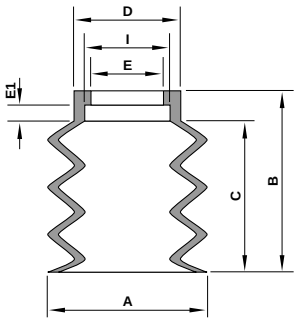
Cleated Vacuum Cup Specifications

Cleated Model No.	Effective Cup Area (in²)	A (O.D.)	B	C	D	E	Style
NC 36B	.30	1.00	.36	.25	.56	.25	A
NC 2E	.37	1.37	1.06	.31	.62	.38	C
NC 59	1.30	2.00	.62	.25	1.56	1/4 NPTF	B
NC 49	2.10	2.44	1.94	.81	1.04	1/4 NPTF	C
NC 27A	2.40	3.25	1.06	.44	2.25	1/4 NPTF	B
NC 27	3.40	4.25	1.00	.50	3.00	1/4 NPTF	B
NC 63	5.60	4.75	1.18	1.00	1.62	3/8 NPTF	B
NC 34	10.40	6.25	1.18	.81	5.00	3/8 NPTF	B

All dimensions shown in inches

Bellows Cup– with 1, 2, 3, or 4 convolutions

Bellows cups have a pliable outer rim that will conform to curved or uneven surfaces while the bellows sections compensate for inconsistent stack heights. Under vacuum, the accordion-style bellows cup will collapse on contact. The collapsing action simulates a short cylinder stroke lifting the product for a short distance, possibly saving the need for a separate lifting mechanism.



Bellows Vacuum Cup Specifications

Bellows Model No.	Effective Cup Area (in²)	A (O.D.)	B	C	D	E	Style
NCB 6	.01	.25	.43	.15	.15	.06	D-1
NCB 105	.04	.42	.62	.21	.32	.15	D-1
NCB 3	.05	.50	.56	.38	.31	.15	D-1
NCB 15	.07	.62	.81	.40	.35	.14	D-1
NCB 2	.11	.75	.68	.50	.51	.25	D-1
NCB 20P	.15	.87	.75	.50	.57	.20	D-1
NC 33A5	.16	.75	1.00	.75	.69	.44	D-3
NC 33A3	.20	.90	1.02	.62	.69	.44	D-2
NCB 1	.25	1.20	.85	.77	.56	1/8 NPTF	D-1
NC 33A2	.25	1.27	1.00	.87	.69	1/4 NPTF	D-2
NC 33A	.40	1.37	1.50	1.00	.65	1/4 NPTF	D-3
NC 32C	.78	2.00	1.68	.81	.75	1/4 NPTF	D-1
NC 32	6.70	3.5 x 5.0	1.75	1.25	2.0x3.5	3/8 NPTF	D-1
NC 124	.24	1.00	1.37	.62	.62	.37	D-1
NC 32D	1.00	2.00	1.86	1.12	.75	1/4 NPTF	D-2
NC 32B	2.00	2.75	2.00	1.28	1.00	1/4 NPTF	D-1
NC 130	4.90	3.31	2.38	2.18	2.38	3/4 NPTF	D-4

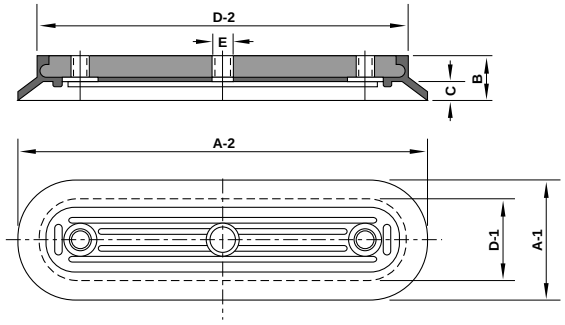
All dimensions shown in inches

Many other cup sizes available on request.

All Dimensions in Inches (mm)

Oval Cup

Like cleated cups, oval cups have heavy load handling capacity due to their rigid design and large vacuum work area. Oval cups have the largest lifting force because they provide the most surface area for a given cup footprint.



Oval Vacuum Cup Specifications

Oval Model No.	Effective Cup Area (in^2)	A1 x A2	B	C	D1 x D2	E	Style
NC 89	1.75	1.12 x 2.75	.87	.70	.78	1/4 NPTF	B
NC 83	4.50	1.56 x 4.09	.94	.50	1.1 5x 3.6	1/4 NPTF	B
NC 87BL	.44	1.70 x 1.50	.50	.20	.62	1/8 NPTF	A
NC 183	6.00	2.0 x 6.0	1.00	.39	1.25 x 5.2	1/4 (2 Ports)	B
NC 90	12.00	3.0 x 8.0	1.12	.53	2.12 x 7.1	3/8 (2 Ports)	B

Ultraminiature Vacuum Cup Specifications

Ultraminiature Model No.	Effective Cup Area (in^2)	A (O.D.)	B	C	D	E	Options
NCVI 062	.003	.063	.126	.006	.055	.025	B/ESD/V
NCVI 125	.02	.125	.120	.020	.070	.030	B/ESD/R/U/V
NCVI 250	.05	.250	.200	.040	.100	.045	B/ESD/R/U/V
NCVI 375	.11	.375	.250	.070	.130	.060	B/ESD/R/U/V
NCVI 500	.19	.500	.300	.110	.160	.060	B/ESD/R/U/V
NCVI 625	.30	.625	.310	.110	.160	.060	B/ESD/R/U/V
NCVI 750	.44	.750	.320	.130	.160	.060	B/ESD/R/U/V

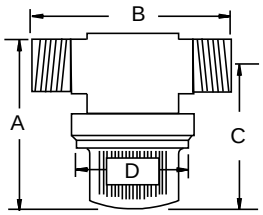
Options

B = Non-Marking Static Dissipative. Temperature range: -4°F to 248°F (-20°C to 120°C)
ESD = ESD Safe High Temperature. Temperature range: -67°F to 446°F (-55°C to 250°C)
R = Red Silicone High Temperature. Temperature range: -67°F to 482°F (-55°C to 350°C)
U = Blue Silicon High Temperature. Temperature range: -67°F to 482°F (-55°C to 350°C)
V = Probe (cup holders) available.

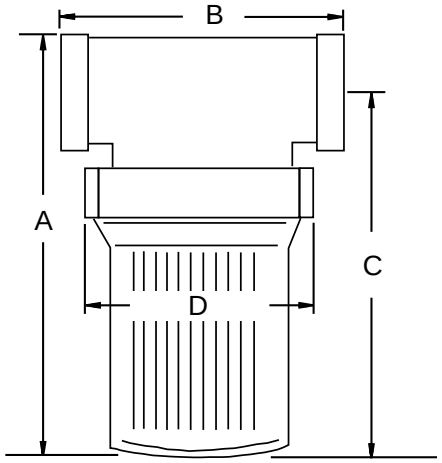
Many other cup sizes available on request.

All Dimensions in Inches (mm)

Compact in-line filters for adverse conditions provide the added protection of 10 micron filtration and have a 150 psi pressure rating. Filters are constructed from rugged injection molded nylon and plastic. NORVAC offers eight different design configurations for maximum placement versatility and easy installation.



NF125LPM (1.9 OZ)
NF250LPM (2 OZ)
NF375LPM (2 OZ)



NF500F (5.6 OZ)
NF750F (5.6 OZ)
NF1000F (7.8 OZ)

Specifications

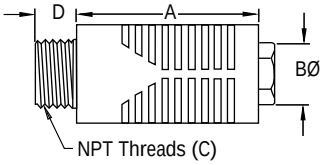
Part Number	Description	Ports	A	B	C	D	Replacement Element
NF 125LPM	1/8" Male Low Profile	1/8"NPTM	2.4	3.1	2.0	1.9	NE1
NF 250LPM	1/4" Male Low Profile	1/4"NPTM					
NF 375LPM	3/8" Male Low Profile	3/8"NPTM					
NF 250F	1/4" Female Filter	1/4"NPTF	3.7	3.0	3.25	1.9	NE1L
N3 75F	3/8" Female Filter	3/8"NPTF	3.7	3.0	3.25	1.9	
NF 500F	1/2" Female Filter	1/2"NPTF	5.35	3.6	4.8	2.95	NE2
NF 750F	3/4" Female Filter	3/4"NPTF	5.35	3.6	4.8	2.95	
NF 1000F	1" Female Filter	1"NPTF	6.35	5.0	5.6	4.1	NE3

NORVAC's unique single stage vacuum pumps do not require filters for maximum operating efficiency. Filters are recommended for use in only the most adverse operating conditions to provide additional, in-line protection and user satisfaction.

NORVAC silencers are extremely effective in reducing air exhaust noise from venturi pumps and other pneumatic devices. The NAA, NST, and NFA51 Series reduce noise levels by up to 30 dB while allowing high flow rates with minimal back pressure.

NAA Series

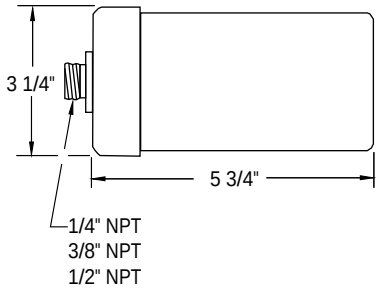
The NAA Series silencers are compact, lightweight and have excellent noise reduction characteristics with minimal resistance to air flow. NAA Series silencers are almost one third smaller than comparable products providing considerable space savings. The large surface of the felt element resists contamination far more than other materials such as sintered bronze, steel mesh, or porous polyethylene.



NFA51 Series

The NFA51 Series silencers offer remarkable noise reduction for high volume exhaust applications without causing back pressure. Silencers are ideal for quieting large air valves that must exhaust quickly to maintain high cycle rates. NORVAC uses the NFA51 silencers on their high flow venturi vacuum pumps where even small amount of back pressure would decrease performance.

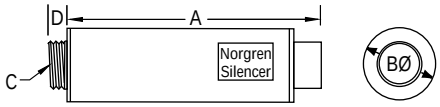
A threaded connection provides easy installation for replacement element, P/N RF51



NST Series

The NST-Series' straight-through design eliminates clogging by allowing contaminants to pass directly through the silencer. Each silencer is tuned in proportion to its exhaust flow to minimize noise and reduce frequency vibration. As air passes through the silencer, noise is absorbed by the dense felt liner. This reduces high pitch exhaust noise to a gentle, low frequency flow of air.

Even in the most adverse conditions, contaminants pass through the silencer making the NST- Series ideal for silencing venturi pumps that are continuously ingesting dirt and debris.



Specifications

Silencer	Dimensions				Construction Pressure				Max. Op. Media		Noise Level measured 4.5 ft. from silencer	
	A	B Ø	C	D	Body	Baffle	Screen	Filter				
NA A2	1.052	.604	1/8" NPT	.234	Nylon	Nylon	Nylon	Felt	150 psig	air	68dBA	Noise levels are based on the silencer being attached to a Norvac venturi pump.
NA A4	1.265	.706	1/4" NPT	.326	Nylon	Nylon	Nylon	Felt	150 psig	air	68dBA	
NA A6	1.833	.955	3/8" NPT	.429	Nylon	Nylon	Nylon	Felt	150 psig	air	72dBA	
NF A5114	5.75	3.25	1/4" NPT	.5	Steel	Foam	Steel	Paper	150 psig	air	72dBA	
NF A5138	5.75	3.25	3/8" NPT	.5	Steel	Foam	Steel	Paper	150 psig	air	72dBA	
NF A5112	5.75	3.25	1/2" NPT	.5	Steel	Foam	Steel	Paper	150 psig	air	72dBA	
NS T4A	3.95	1.00	1/4" NPT	.40	Alum.	—	—	Felt	150 psig	air	68dBA	
NS TAA4	3.00	.75	1/4" NPT	.40	Alum / Nylon	Felt / Nylon	Nylon	Felt	150 psig	air	68dBA	
NS T4	2.35	.75	1/4" NPT	.4	Alum	—	—	Felt	150 psig	air	68dBA	
NS T6A	3.95	1.00	3/8" NPT	.4	Alum.	—	—	Felt	150 psig	air	68dBA	
NN ST8A	3.95	1.00	1/2" NPT	.4	Alum.	—	—	Felt	150 psig	air	68dBA	
NS T6B	5.20	1.25	3/8" NPT	.4	Alum.	—	—	Felt	150 psig	air	68dBA	
NS T8B	5.20	1.25	1/2" NPT	.4	Alum.	—	—	Felt	150 psig	air	76dBA	
NS T12C	7.44	2.00	3/4" NPT	.5	Alum.	—	—	Felt	150 psig	air	76dBA	
NS T16C	7.44	2.00	1" NPT	.5	Alum.	—	—	Felt	150 psig	air	76dBA	

There are two types of vacuum applications

Pick and Place – Material Handling

Referred to here as the lifting, gripping, rotating and positioning of an object through the use of a vacuum pump and vacuum cup

Use the Equation: **Force = Pressure x Area**

to Determine:

1. Lifting capacity of the pump and cup,
2. Required vacuum area, i.e. diameter of cup,
3. Required vacuum level of vacuum pump.

WHERE:

F is the weight of the object in pounds (lbs) multiplied by a safety factor (See page 12)

P is the expected vacuum level in PSI, remember to convert "Hg" to PSI by dividing by 2

A is the area of the vacuum cup in sq. inches. Use the equation, Area = $\frac{\pi d^2}{4}$

2 Vacuum Level Ranges - "H" for High Vacuum and "M" for Medium Vacuum.

- "H" - Series (28" Hg) for non-porous material to generate maximum holding force.

  Hint: Try P = 12.5 PSI (25" Hg) as a starting value when using equation, F = P x A.

- "M" - Series (20" Hg) for porous material to generate medium holding force while overcoming leakage and saving compressed air.

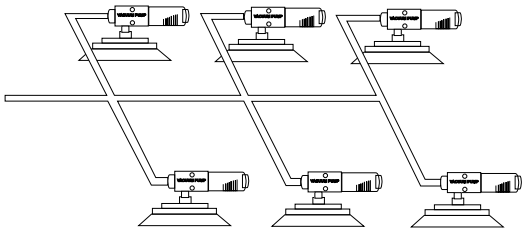
  Hint: Try P = 8 PSI (16" Hg) as a starting value using equation, F = P x A.

Systems Speed:
Cycle rate of the pump and cup system is determined by the evacuation speed of the venturi, see "Vessel Evacuation" below.

Inexact Science

When handling porous materials such as corrugated or heavy fabric it is hard to choose the exact pump required because the leakage rate is not normally known. Therefore, it is best to run a benchtop trial to test the ability of the pump to overcome the leakage. For existing systems, consult NORVAC for the equivalent pump size. In new applications, take advantage of NORVAC's free 30 day trial to ensure proper pump selection.

Increase safety, reliability and speed by using one small Fastvac pump at each cup location. Should one cup fail the others will not be affected.



Vessel Evacuation

In many process applications it is necessary to evacuate a vessel for the purpose of purging gases, leak testing, degassing viscous fluids or the vessel may simply be the length of tubing between the pump and cup. Knowing the evacuation speed will help determine process completion time or the production rate of a pick and place system.

Evacuation speed is directly related to the vacuum flow of the pump. To use the chart of evacuation speed listed for each venturi identify operating conditions;

Notice that the charts are based on a one cubic foot volume. Evacuation speed is linear with volume, therefore a 2 cu. ft. volume will take twice as long to evacuate.

1. **Volume to be evacuated (Cu. Ft.), 1728 cu, in. = 1 cu. ft.**
2. **Desired vacuum level ("Hg),**
3. **Time to reach vacuum level (seconds).**

Warning

These products are intended for use in industrial compressed air systems only. Do not use these products where pressures and temperatures can exceed those listed under **Specifications.**

Before using these products with fluids other than those specified, for non-industrial applications, life-support systems, or other applications not within published specifications, consult NORGREN.

Through misuse, age, or malfunction, components used in fluid power systems can fail in various modes. The system designer is warned to consider the failure modes of all component parts used in fluid power systems and to provide adequate safeguards to prevent personal injury or damage to equipment in the event of such failure modes. **System designers must provide a warning to end users in the system instructional manual if protection against a failure mode cannot be adequately provided.**

System designers and end users are cautioned to review specific warnings found in instruction sheets packed and shipped with these products. System designers should also provide for all OSHA requirements including Title 29 CFR 1910.147 Lockout/Tagout.

It should be recognized that warnings are valid for any product, regardless of manufacturer, and are not restricted to products manufactured by NORGREN. NORGREN's reputation for product quality and performance is well established. We feel we have the additional obligation to provide information or warnings to customers to assist them in applying our products in a reasonable and safe manner.

Warranty

Limited Warranty, Disclaimer & Limitation of Remedies

NORGREN NORVAC Products are warranted unconditionally for a period of two years from the date of purchase from NORGREN, provided said items are used according to NORGREN's recommended usages and within NORGREN's specifications. NORGREN's liability is limited to the repair of, or replacement in kind of, at NORGREN's sole option, any items proved defective, provided these items are returned to NORGREN prepaid. To confirm date of purchase, invoice date or invoice number must be furnished; otherwise, date code on product will be used to determine eligibility for warranty coverage. The warranties expressed above are in lieu of and exclusive of all other warranties.

There are no other warranties, expressed or implied, except as stated herein. There are no implied warranties of merchantability or fitness for a particular purpose, which are specifically disclaimed. NORGREN's liability for breach of warranty as herein stated is the exclusive remedy, and in no event shall NORGREN be liable or responsible for incidental or consequential damages, even if the possibility of such incidental or consequential damages has been made known to NORGREN.

NORGREN reserves the right to discontinue manufacture of any product or change product materials, design, or specifications without notice.