

- Rugged Construction, Low Maintenance - Designed and built for many years of dependable service
- Smoke-free Exhaust - No internal lubrication or sealing oils, exhaust is free of oil smoke and fumes
- Vapor and Liquid can be easily handled
- Quick Recovery Time - Easily handles surge loads caused by abnormal operating conditions
- Non-Pulsating Suction - Smooth steady vacuum without equalizing or accumulator tanks
- Vertical Horizontal Storage tanks available



Domestic[®] Pump Series MJ[™] and MJS Clinical & Industrial Vacuum Units

Design Simplicity and Reliability

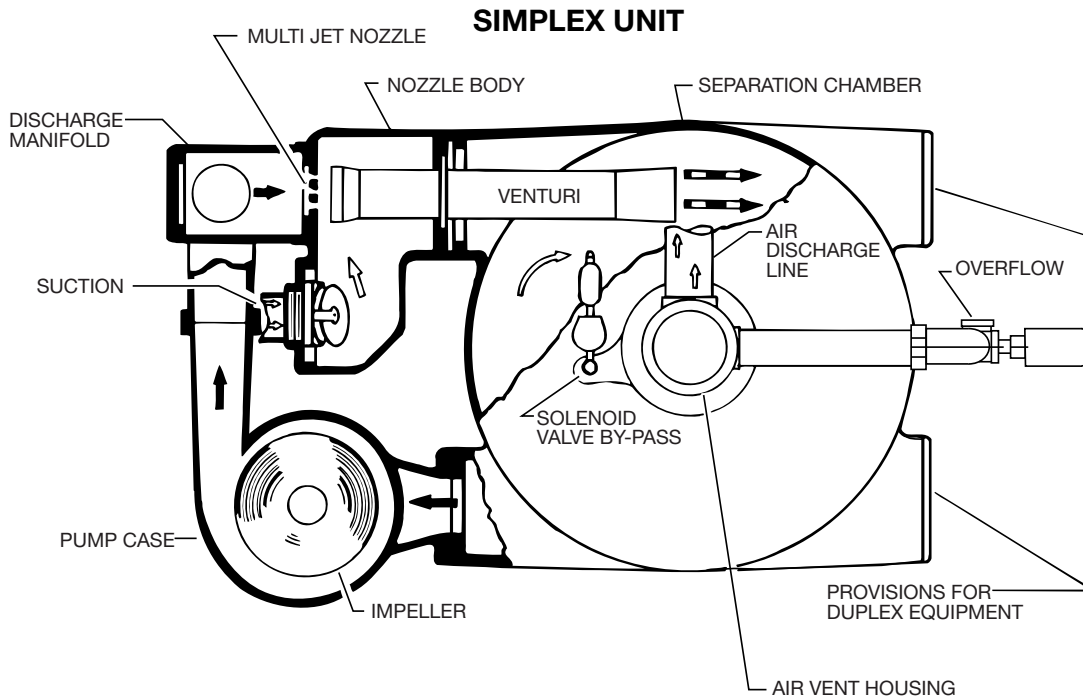
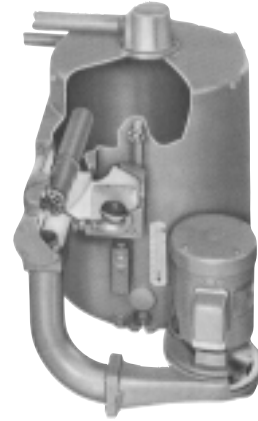
The heart of the MJ is the dependable multi-jet vacuum producer. It is a simple yet effective device designed to give years of trouble-free service.

The Centrifugal Pump circulates water (the usual hurling medium) through the multi-jet nozzle, venturi and returns it to the separation chamber. The water, forced at high velocity across the gap between nozzle and venturi entrains air and gases in multiple jet streams, creating a smooth, steady vacuum in the air suction line and vacuum system. The mixture is discharged through the venturi tangentially into the separation chamber. This causes the water in the separation chamber to rotate, resulting in a centrifugal action which forces the water to the periphery of the chamber while the lighter air flows to the center and is discharged. Besides effectively separating the air and gases from the water, the centrifugal motion in the same direction as the discharge from the venturi reduces the resistance pressure at the outlet of the venturi and simultaneously increases the pressure at the centrifugal pump suction, promoting high efficiency.

Replacement of the hurling water evaporated from the unit is controlled by a solenoid valve actuated by a probe controller. When hot gases or vapors are handled, the heat transfer to the

hurling water may make it necessary to add cooling water. A temperature limit switch can be supplied for this purpose which will also actuate the solenoid valve if the hurling water temperature rises above a predetermined level. Any excess water will overflow to a drain.

The operation is similar for hurling media other than water, except that other cooling methods are employed.



Centrifugal Pump Impeller

Simplicity . . . one moving part, the centrifugal pump impeller directly coupled to motor shaft . . . no close tolerances . . . no wear adjustments . . . no pistons . . . no belts to wear or adjust . . . no internal lubrication.



MJ units also solve industrial wet vacuum application problems

Generally, vacuum systems can be classified as handling:

- A. Dry or noncondensable gases, for example, vacuum lifting.
- B. A mixture of gases and condensable vapors; for example, vacuum heating systems.
- C. Principally condensable vapors; for example, removal of liquid from materials.
- D. A mixture of gases and liquid; for example, priming pumps.

The versatility of the MJ is inherent in its design, which makes it universally adaptable for any of these systems, but the MJ is especially valuable where condensable vapors or even slugs of liquid are present in the air handled.

Dry gases, at low or high temperatures, can be handled effectively. The MJ is, however, particularly practical where a dust condition exists, which can present a serious contamination problem with other type pumps which use oil as the sealing medium.

The MJ has a decided advantage when vacuum systems liberate appreciable quantities of WATER VAPORS or even slugs of water. The MJ Unit depends on a liquid (hurling medium), usually water, for its vacuum producing cycle. When vapors are entrained in the jet stream between nozzle and venturi outlet a condensing action can take place. The MJ then performs the

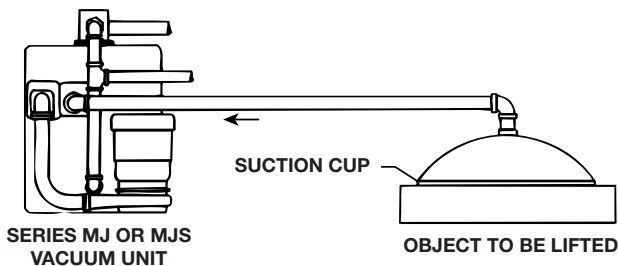
function of a direct contact (jet) condenser, without appreciably impairing its air handling capacity. This exclusive design feature offers functional as well as economic advantages in contrast to other type pumps which have to depend on special equipment, water cooled condensers or refrigerated traps to maintain their operating efficiency. With the MJ its frequently possible to eliminate expensive supplementary equipment.

When Condensable Vapors Other Than Water Vapors or slugs of liquid are present in the system, process material (solvents) can frequently be used as hurling medium. The MJ can again function as a direct contact condenser or, if used in conjunction with a water cooled condenser, carry-over vapors are condensed in the separation chamber. Therefore, vapor loss is negligible and process material can be recovered. Again the separation chamber can be used as a direct contact condenser, although the method of cooling will be more complex. For instance, a refrigeration coil might be installed in the separation chamber to provide heat transfer, or some of the liquid pumped by the MJ can be diverted to a heat exchanger.

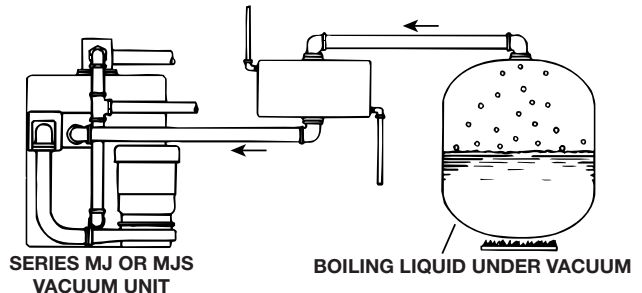
Other practical and economical uses for the MJ include its application as combination vacuum-condenser, as a fluid or slurry "pump" without direct pumping, as a liquid scavenger, or as a "gas scrubber". Consult factory for application.

Industrial Vacuum Pump Systems

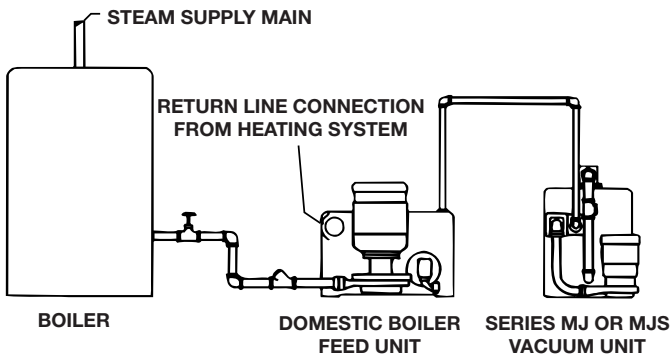
A - "DRY" OR NONCONDENSABLE GASES



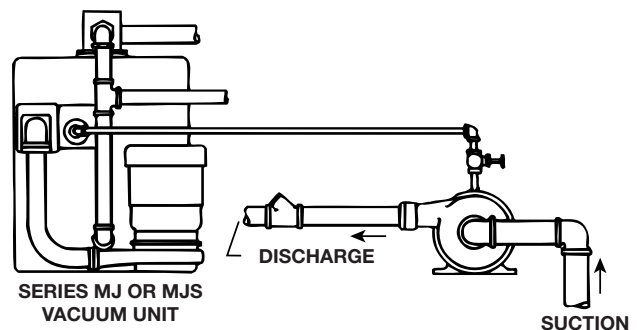
C - PRINCIPALLY CONDENSABLE VAPORS



B - MIXTURE OF GASES AND CONDENSABLE VAPORS



D - MIXTURE OF GASES AND LIQUID



Domestic Series MJ or MJS Clinical/Laboratory Vacuum Units

For hospital central vacuum systems . . .

where dependable performance is a “must”

Quiet operation

Domestic MJ Vacuum Units are so silent in operation you can install them next to an operating room. No soundproofing or vibration isolators needed. This makes them ideal for hospital expansion/modification programs, and eliminates long and costly vacuum piping system.

Clean operation

MJ Multi-jet Vacuum Units satisfy continuous need of drainage throughout hospitals, clinics, and laboratories. They provide scrubbing of system carry-over before discharging exhaust air to atmosphere. Disinfectant may be added to hurling water if desired. Vertical storage tank design offers option of adding disinfectant solution to carry-over for pre-scrubbing before entering vacuum unit. Exhaust is completely free of oil and smoke.

Reliable operation

Domestic MJ Multi-Jet Units have only one moving part: the impeller. Since there are no close clearances, no wear adjustments, no pistons, no belts to adjust or replace – MJ Units maintain original rated capacities for years.

Minimum servicing

Single moving part, lack of close tolerances, plus balanced vibration-free design are features that combine to eliminate need for major maintenance. Functional parts – centrifugal pump, multi-jet nozzle plate and venturi tube – are easy to remove for inspection.

Your choice of vertical or horizontal storage tank. All vacuum storage tanks are hot-dipped galvanized after fabrication.



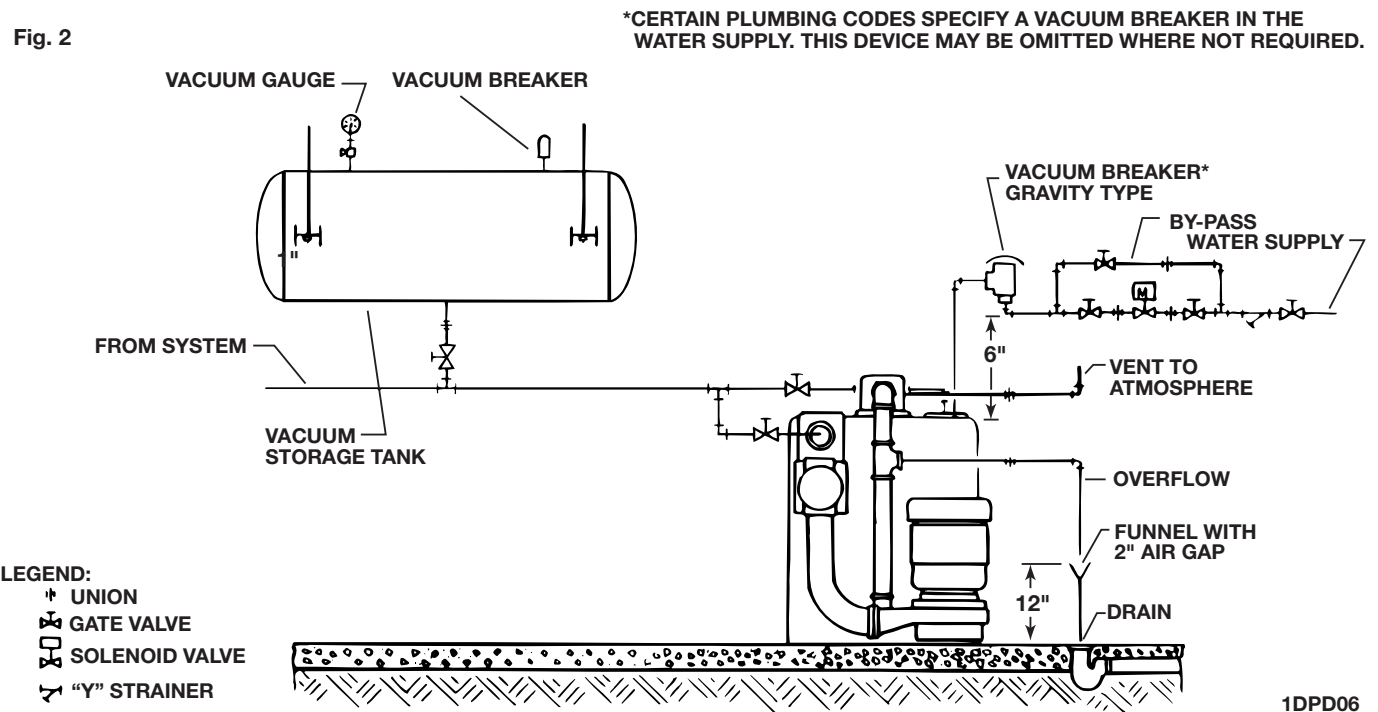
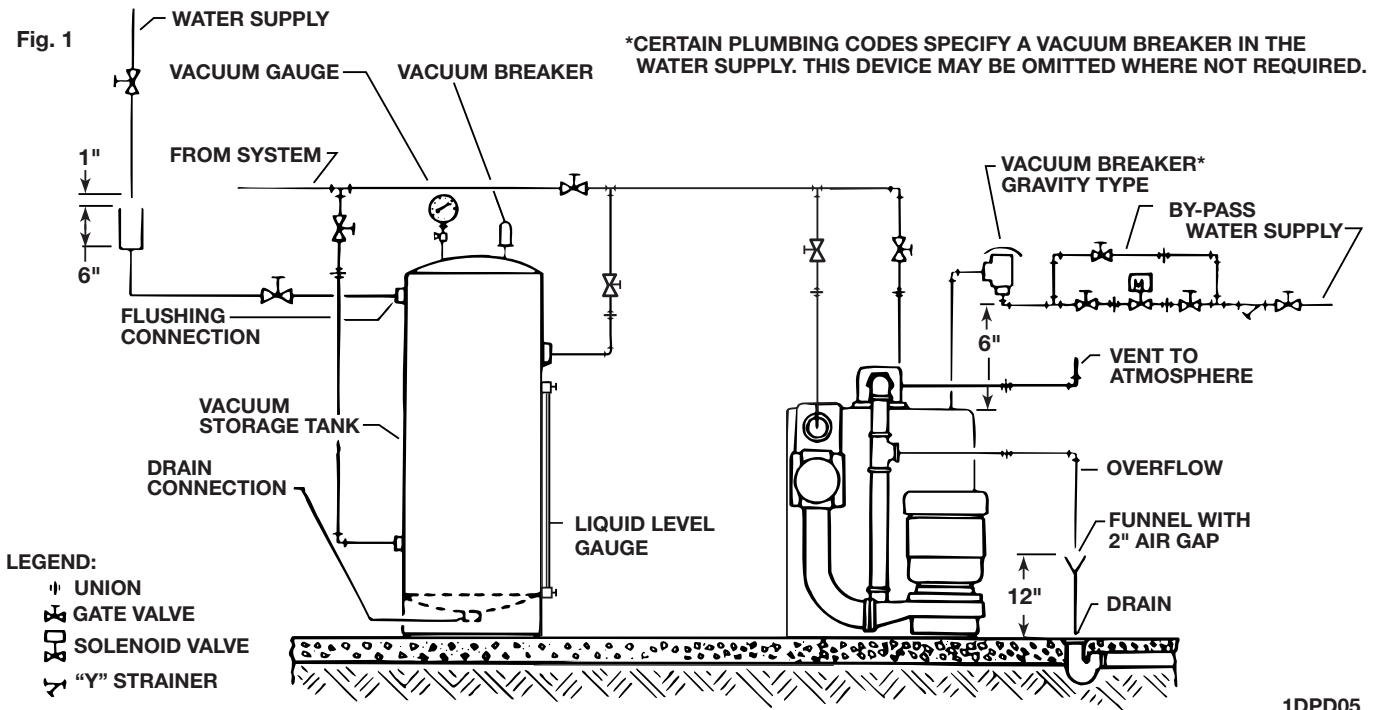


Fig. 1 and 2 above show piping arrangements for both vertical and horizontal vacuum storage tanks. As shown in Fig. 1, with a vertical storage tank, the supply line from the system enters the bottom of the storage tank. The vacuum line from the tank to the MJ unit is near the top. This arrangement allows solids and fluids to collect in the storage tank. Drain and flushing connections are provided in the storage tank for periodic cleaning of the vessel.

The piping arrangements in Fig. 2 shows the horizontal storage tank conveniently suspended from overhead. This arrangement eliminates occasional flushing since condensation from the piping system drains directly into the pump section, by-passing the tank. The pump uses water as hurling medium. Any liquid entering the pump is quickly disposed of through the automatic overflow.

Capacities

Capacities at a Higher Vacuum Than Cataloged can be obtained. With oil as hurling medium, the MJ will produce a shut-off vacuum to within 4 mm of barometer. A vacuum pump cannot create a lower absolute pressure than the vapor pressure of its hurling or sealing medium. When water is used as hurling medium at a water temperature of 70°F and a 30" barometer, the shut-off vacuum will equal barometric less vapor pressure (within .2" Hg) or 30 - .739 - .2 = 29.061"Hg. Capacities cataloged are based on air. Simultaneously, Considerable Amounts Of Vapor can be handled without appreciably impairing the air pumping ability. Data will be furnished on request.

Arrangements

Simplex units have 1 pump and motor assembly and 1 vacuum producer. Duplex units have 2 pump and motor assemblies and 2 vacuum producers, mounted on 1 separation chamber.

Both pumps of a duplex unit can be operated in parallel to deliver Double The Capacity of a Simplex unit. Controls are available to provide automatic alternation of operating and simultaneous operation under peak load or abnormal demand conditions. This control arrangement is often used where pump down time is a factor. Both pumps function to reach the design condition rapidly, while only one pump maintains the operating pressure.

Standard Construction – Modifications

Cast iron separation chambers are standard construction features on MJ units. Steel separation chambers are furnished on MJS units. Direct coupled centrifugal pumps are bronze fitted having one piece, enclosed bronze impellers and removable case ring (wear ring). The venturi is of cast iron construction; the nozzle is made of bronze.

DUPLEX UNITS DELIVER DOUBLE THE LISTED CAPACITIES

SELECTION DATA-AIR REMOVAL RATE IN CFM* SIMPLEX UNITS													
At Vacuum in Hg								Motor		Model No.			
										Cast Iron		Steel	
5	10	15	20	22	24	26	28	HP	RPM	Simplex	Duplex	Simplex	Duplex
4.6	3.9	3.4	2.1	1.5	1.3	.9	–	1/2	3500	MJ-20S1/2-35	MJ-20D1/2-35	MJS-20S1/2-35	MJS-20D1/2-35
6	5.2	4	2.9	2.5	2	1.5	.2	3/4	3500	MJ-20S3/4-35	MJ-20D3/4-35	MJS-20D3/4-35	MJS-20D3/4-35
9	7.6	6.2	5.2	5	4.4	3.5	2	1	3500	MJ-20S1-35	MJ-20-D1-35	MJS-20S1-35	MJS-20D1-35
14	12	9	8	7	6.6	6.4	5	1 1/2	3500	MJ-50S1-1/2-35	MJ-50D1-1/2-35	MJS-50S1-1/2-35	MJS-50D1-1/2-35
22.5	18	15.5	12	11.5	9	8.5	7.5	2	3500	MJ-50S2-35	MJ-50D2-35	MJS-50S2-35	MJS-50D2-35
31	26	20	18	18	18	17.5	13.8	3	3500	MJ-50S3-35	MJ-50D3-35	MJS-50S3-35	MJS-50D3-35
38	29.4	22.5	22.2	22	22	20	17	3	1750	MJ-50S3-17	MJ-50D3-17	MJS-50S3-17	MJS-50D3-17
64	52	44	40	36	32	29	23.5	5	1750	MJ-100S5-17	MJ-100D5-17	MJS-100S5-17	MJS-100D5-17
89	74	62	58	57	55	45	35	7 1/2	1750	MJ-100S7-1/2-17	MJ-100D7-1/2-17	MJS-100S7-1/2-17	MJS-100D7-1/2-17
121	103	85	79	79	75	70	55	10	1750	–	–	MJS-160S10-17	MJD-160S10-17
172	149	134	121	114	108	101	84	15	1750	–	–	MJS-160S15-17	MJD-160S15-17

10 and 15 Hp units are available with quadraplex separation chamber for higher capacities. Four pumps deliver twice the listed capacities.

SELECTION DATA-AIR REMOVAL RATE IN CFM* FOR 2 PUMPS OPERATING PARALLEL													
At Vacuum in Hg								Motor		Model No.			
										Steel			
5	10	15	20	22	24	26	28	HP	RPM	Simplex	Duplex	Simplex	Duplex
242	206	170	158	158	150	140	110	10+10	1750	MJS-680Q2-10-17	MJS-680Q4-10-17		
344	298	268	242	228	216	202	168	15+15	1750	MJS-680Q2-15-17	MJS-680Q4-15-17		

*The air removal rates (pumping speed) are expressed in cubic feet per minute (cfm) of expanded air at the vacuum. Air removal rates are based on 70°F hurling water temperature, referred to a barometric pressure of 30"Hg.

Storage Tanks:

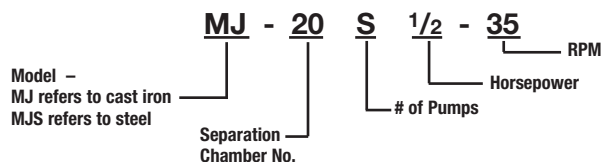
Tank sizes are based on approximately 1 gallon storage per cfm of pump capacity. Proportionately larger tank may be selected if desired. The full range of tank sizes in gallons is listed below.

45	86	170	340
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Ordering Instructions:

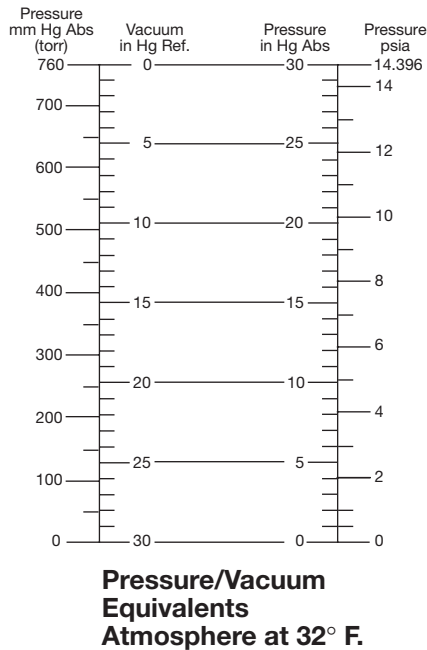
Specify Unit Catalog No., Vacuum Operating Range in inches of Hg., Actual Operating Phase and Voltage. Specify all Optional Accessories including Vacuum Storage Tank Size & horizontal or vertical construction. Specify Control Panel Components to be supplied.

Model Designation



Calculating the Degree of Vacuum

The degree of vacuum is usually measured in terms of inches of mercury (HG) below atmospheric. This is the rating shown in the MJ capacity tables. When deep vacuums are used, the term may be expressed in inches of mercury absolute with 0" HG, indicating a total absence of pressure or perfect vacuum.



Thus high vacuum is low pressure and vice versa. A more precise measurement used in industry states pressure in millimeters of mercury absolute. The term has been shortened to use the word torr. Thus, a perfect vacuum is 0 torr and atmospheric pressure is equal to 760 torr 760 millimeters of mercury absolute.

It is important to clarify the degree of vacuum specified. For example **5" Hg Vacuum** is the std means of rating used in the MJ selection tables. However **5" Hg pressure abs** is equivalent to 25" Hg Vacuum in the MJ selection tables.

The pumping speed or air removal rate is generally expressed in cubic feet per minute (CFM). However, this may be expressed as (ACFM) – actual cubic feet per minute which is expanded air at the vacuum being pulled or (SCFM) – air at standard conditions and pressure at 70°F and atmospheric pressure of 14.696 PSIA. The tables for the MJ are based on ACFM. When the requirement is expressed in SCFM, you must convert to ACFM.

ACFM = Actual Cubic Ft. Per Minute

SCFM = Standard air at 70°F & 14.696 PSIA

$$\text{ACFM} = \frac{\text{Barometer} \times \text{SCFM}}{\text{Barometer} - \text{Vacuum}}$$

For example, a capacity requirement of 10 SCFM and a vacuum of 20" HG would convert:

$$\text{ACFM} = \frac{30 \times 10}{30 - 20} = \frac{300}{10} = 30 \text{ ACFM}$$

Standard Unit Features:

- Separation chambers are available in cast iron or steel.
- Vertical air pump(s) with open drip proof motor(s).
- Automatic hurling water level probe controller and solenoid valve.
- Air suction check valve, thermometer, overflow and gauge glass.
- Hurling water temperature limit switch.
- Vacuum switch(es) (4" HG min. diff. required).

Optional Features when Specified:

- NEMA 2 UL listed control panels.
- TEFC or explosion proof motors.
- Vacuum Storage Tanks.
- Temperature Limit Switches.

Optional Electric Controls (NEMA 2 UL LISTED PANELS ARE AVAILABLE WHEN SPECIFIED)

Control Cabinets are available to comply with NEMA specifications. Panels may be factory mounted and wired or furnished separately for wall mounting.

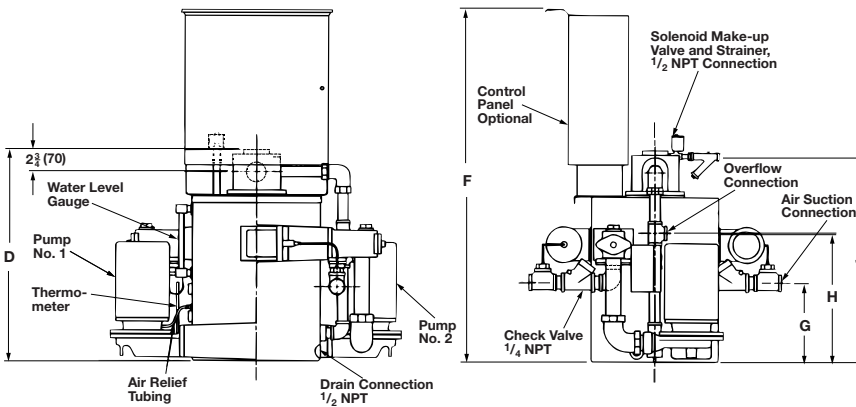
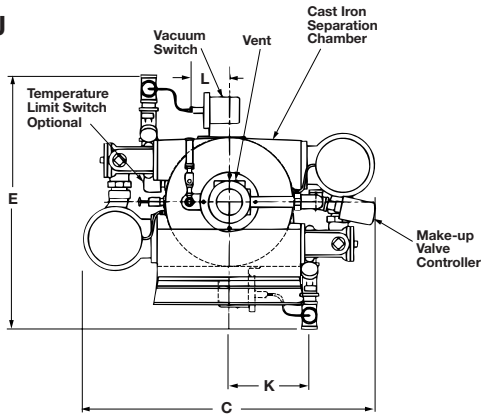
Description of Optional Panel Components:

- **Magnetic Starters** must be used on all 3 phase motors and single phase motors 3 HP and larger.
- **Fused Disconnect Switches or Circuit Breakers.** Either fuses or circuit breaker with door interlocks is required ahead of the starters to protect against short circuits and provide a means of shutting off power for service.
- **Selector Switches.** "Automatic-Off-Continuous" Selector Switches provide a means of shutting off pumps and a means of testing. "Off-Hand-Lead-Lag" Selector Switches may be furnished on duplex units with 2 vacuum switches to provide manual alteration. Use only when magnetic starters are provided. MJ Units without vacuum storage tanks may be provided with "On-Off" Selector Switches.

- **Electric Alternator** may be furnished on duplex units to provide automatic sequencing of lead pump. Use only when magnetic starters are provided. Use only with 2 vacuum switches.
- **Transformers** are required to reduce control voltage when power supply exceed 115 volts.
- **Control Power Switching Relay** should be supplied in Duplex units when individual pump disconnect switches are specified. This relay is recommended in order to maintain control power to the water makeup system in the event pump #1 disconnect switch is turned off or pump #1 fails. In this event the control power will be automatically supplied by pump #2.
- **Pilot Lights.** Pump running pilot lights are available to indicate pump operation.
- **Alarm.** An alarm to indicate high or low vacuum, an additional vacuum switch is required for each alarm signal.

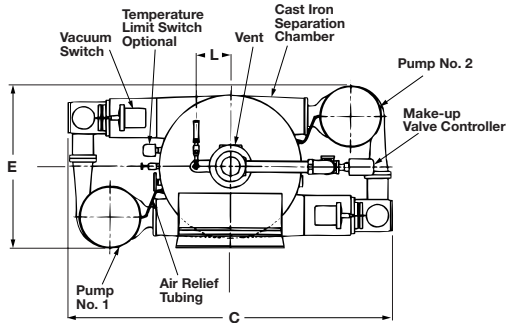
DOMESTIC SERIES MJ CLINICAL & LABORATORY VACUUM UNITS

20MJ



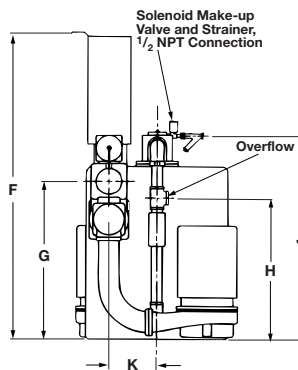
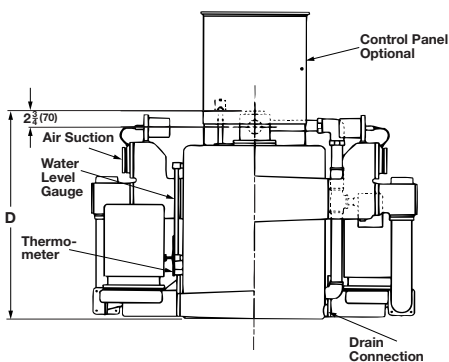
3DMJ01

50MJ and 100MJ



SERIES MJ CAST IRON RECEIVER VACUUM UNITS INCHES (mm)

Motor HP	1/2 - 1	1 1/2 - 2	3	5	7 1/2
Motor RPM	3500	3500	1750	1750	1750
Sep. Chamber No.	20	50	50	100	100
Air Suction	1 1/4 (32)	2 (51)	2 (50.8)	2 1/2 (64)	2 1/2 (64)
Air Vent	1 1/2 (38)	2 (51)	2 (50.8)	2 1/2 (64)	2 1/2 (64)
Overflow	1 (25)	1 1/2 (38)	1 1/2 (38)	2 (51)	2 (50.8)
Drain	1/2 (13)	1 (25)	1 (25)	1 (25)	1 (25)
C	36 1/2 (927)	56 1/2 (1435)	56 1/2 (1435)	60 1/8 (1527)	64 1/8 (1629)
D	26 7/16 (672)	36 (914)	36 (914)	45 7/8 (1165)	45 7/8 (1165)
E	31 3/4 (806)	27 1/16 (687)	28 3/16 (716)	29 7/16 (748)	29 7/16 (748)
F	44 1/8 (1120)	53 1/2 (1359)	53 1/2 (1359)	63 1/4 (1607)	63 1/4 (1607)
G	9 5/16 (252)	27 3/8 (695)	27 3/8 (695)	30 9/16 (776)	30 9/16 (776)
H	16 1/8 (410)	24 1/2 (622)	24 1/2 (622)	30 3/4 (781)	30 3/4 (781)
J	25 3/4 (654)	35 1/2 (902)	35 1/2 (902)	45 3/8 (1153)	45 3/8 (1153)
K	10 1/8 (257)	8 3/8 (213)	8 3/8 (213)	10 7/16 (265)	10 7/16 (265)
L	5 (127)	6 (152)	6 (152)	6 (152)	6 (152)



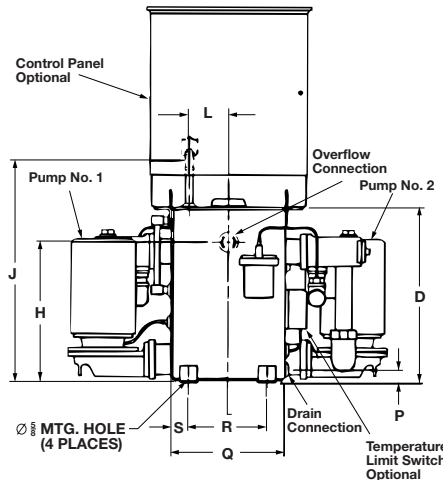
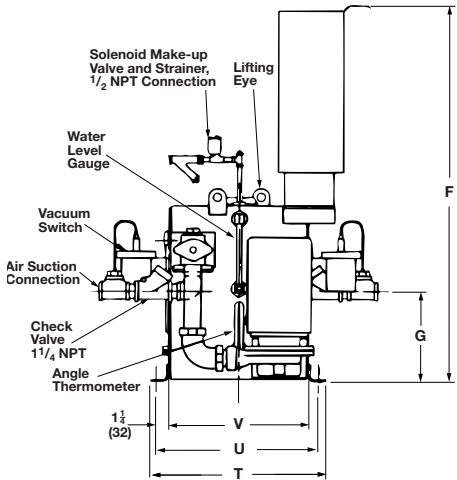
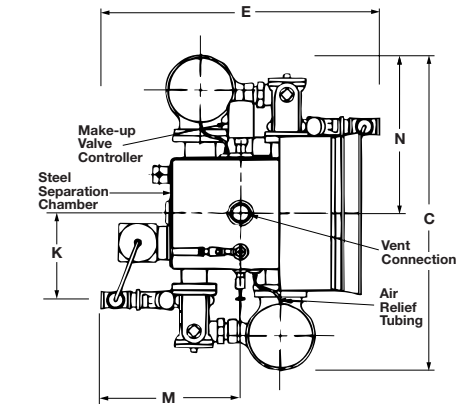
3DMJ02
3DMJ03
3DMJ04

DOMESTIC SERIES MJS CLINICAL & LABORATORY VACUUM UNITS

SERIES MJS STEEL RECEIVER VACUUM UNITS INCHES (mm)

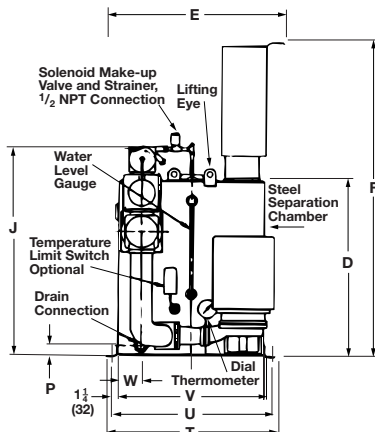
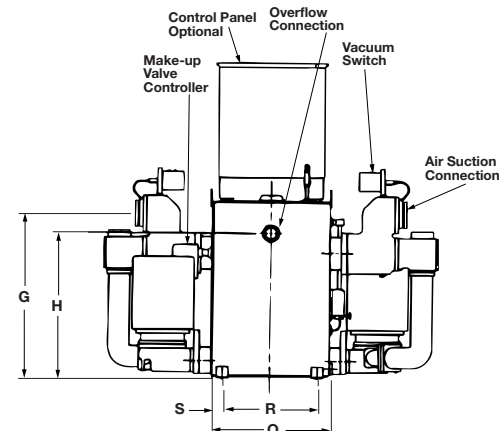
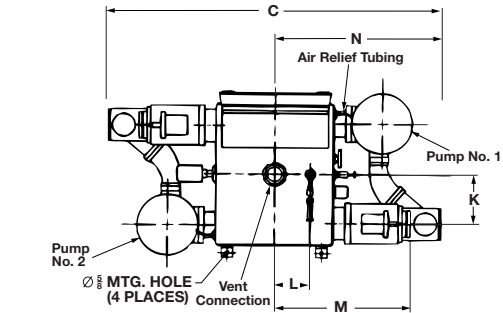
Motor HP	1/2 - 1	1 1/2 - 2	3	5	7 1/2
Motor RPM	3500	3500	1750	1750	1750
Sep. Chamber No.	20	50	50	100	100
Air Suction	1 1/4 (32)	2 (51)	2 (50.8)	2 1/2 (64)	2 1/2 (64)
Air Vent	1 1/2 (38)	2 (51)	2 (50.8)	2 1/2 (64)	2 1/2 (64)
Overflow	1 (25)	1 1/2 (38)	1 1/2 (38)	2 (51)	2 (50.8)
Drain	1/2 (13)	1 (25)	1 (25)	1 (25)	1 (25)
C	36 1/2 (927)	56 1/2 (1435)	56 1/2 (1435)	60 1/8 (1527)	64 1/8 (1629)
D	20 1/4 (514)	30 1/4 (768)	30 1/4 (768)	40 1/4 (1022)	40 1/4 (1022)
E	31 7/8 (810)	29 5/8 (752)	29 5/8 (752)	-	-
F	43 1/2 (1105)	53 7/8 (1369)	53 7/8 (1369)	53 7/8 (1369)	53 7/8 (1369)
G	10 7/16 (265)	28 1/32 (712)	28 1/32 (712)	37 15/16 (964)	37 15/16 (964)
H	16 1/4 (413)	24 3/4 (629)	24 3/4 (629)	31 (787)	31 (787)
J	25 11/16 (652)	35 11/16 (906)	35 11/16 (906)	45 11/16 (1160)	45 11/16 (1160)
K	10 1/8 (257)	8 3/8 (213)	8 3/8 (213)	10 7/16 (265)	10 7/16 (265)
L	4 1/2 (114)	6 (152)	6 (152)	6 (152)	6 (152)
M	15 15/16 (405)	23 (584)	23 (584)	25 1/16 (637)	25 1/16 (637)
N	4 1/4 (210)	28 1/4 (718)	28 1/4 (718)	30 1/16 (764)	32 1/16 (814)
P	1 1/2 (38)	1 15/16 (49)	1 15/16 (49)	1 15/16 (49)	1 15/16 (49)
Q	13 (330)	20 (508)	20 (508)	23 7/8 (606)	23 7/8 (606)
R	9 (229)	16 (406)	16 (406)	19 7/8 (505)	19 7/8 (505)
S	2 (51)	2 (51)	2 (51)	2 (51)	2 (51)
T	20 (508)	28 1/2 (724)	28 1/2 (724)	32 7/8 (835)	32 7/8 (835)
U	18 1/2 (470)	27 (686)	27 (686)	31 3/8 (797)	31 3/8 (797)
V	16 (406)	24 1/2 (622)	24 1/2 (622)	28 7/8 (733)	28 7/8 (733)
W	-	3 7/8 (98)	3 7/8 (98)	4 (102)	4 (102)

20MJS



3DMJS1

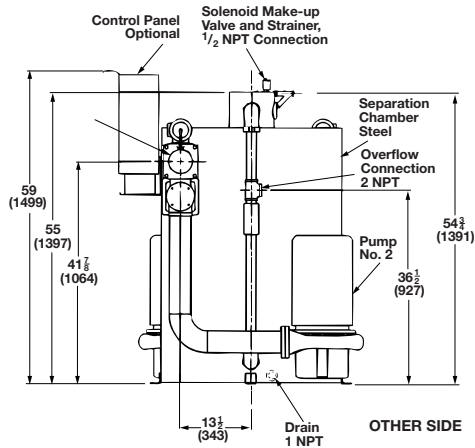
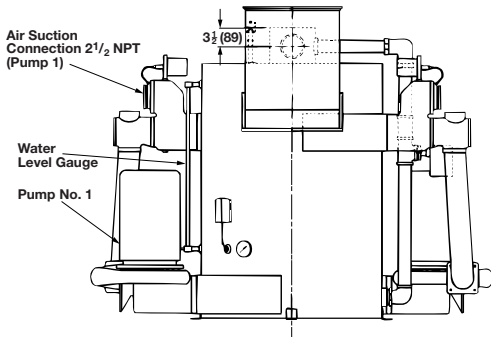
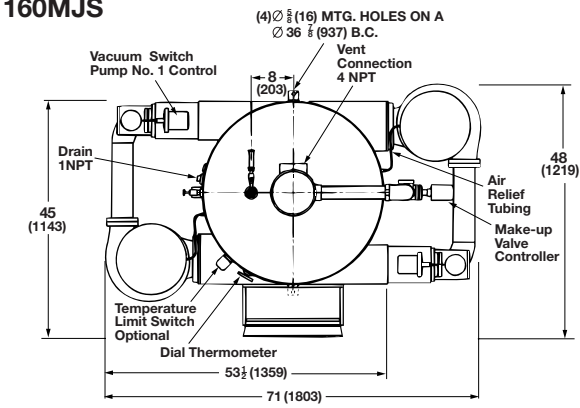
50MJS and 100MJS



3DMJS2 3DMJS3 3DMJS4

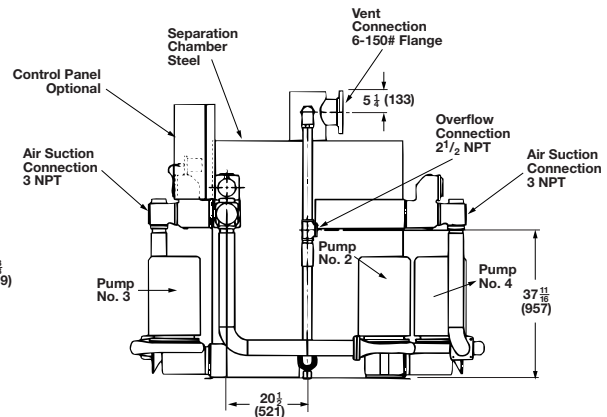
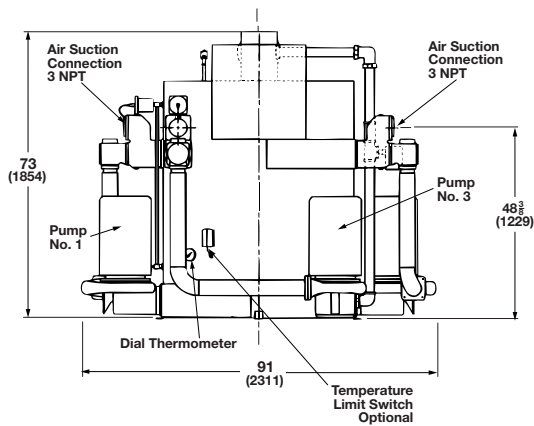
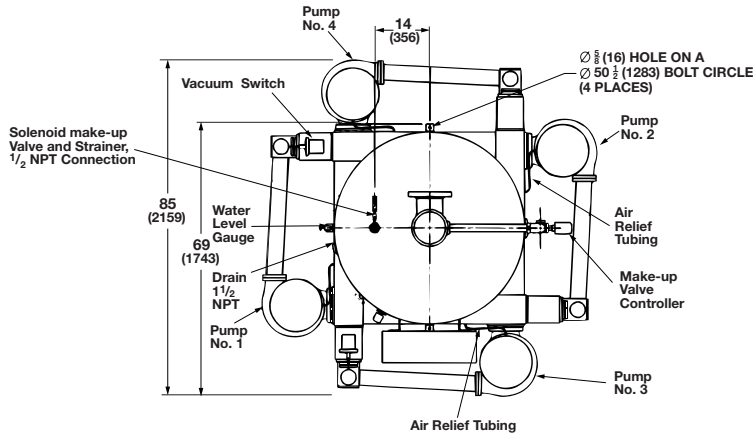
DOMESTIC SERIES MJS CLINICAL & LABORATORY VACUUM UNITS

160MJS



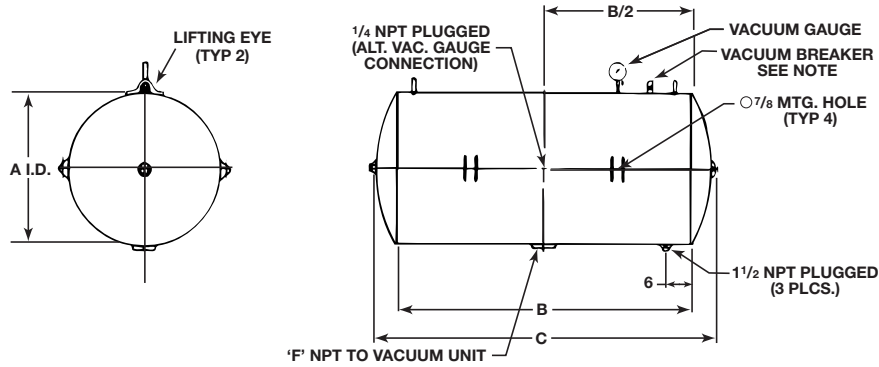
3DMJ05

680MJS



3DMJ06

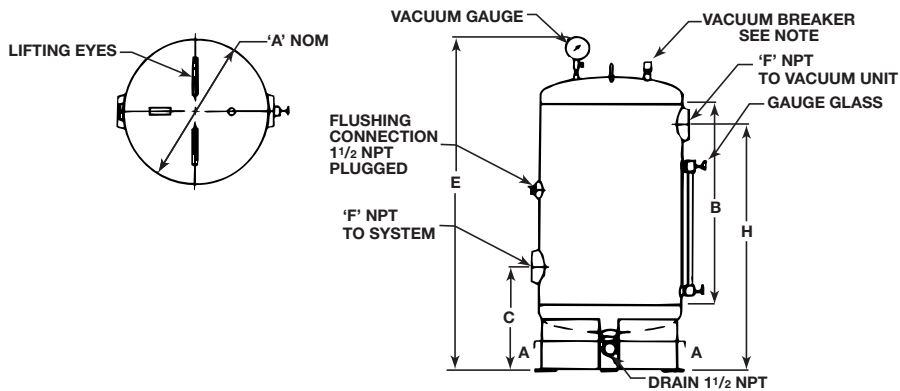
STORAGE TANKS



NOTE:
VACUUM BREAKER NOT USED ON UNITS
WITH 20" OR HIGHER HG VACUUM.

1DVSO2

HORIZONTAL STORAGE TANKS IN (MM)				
Part No.	DA0709	DA0710	DA0711	DA0712
Rec. Size	18 (457) x 28 (711)	24 (609) x 35 (889)	30 (762) x 48 (1219)	36 (914) x 72 (1828)
Rec. Gal. (L)	40 (151)	86 (326)	170 (643)	340 (1287)
A	18 (451)	24 (609)	30 (762)	36 (914)
B	28 (711)	35 (889)	48 (1219)	72 (1829)
C	39 ³ / ₈ (1000)	50 ¹ / ₈ (1273)	58 ¹ / ₈ (1476)	85 ¹ / ₂ (2172)
F	3 (76)	4 (102)	4 (102)	4 (102)



NOTE:
VACUUM BREAKER NOT USED ON UNITS
WITH 20" OR HIGHER HG VACUUM.

1DVSO1

VERTICAL STORAGE TANKS IN (MM)				
Part No.	DA0705	DA0706	DA0707	DA0708
Rec. Gal. (L)	40 (151)	86 (326)	170 (643)	340 (1287)
A	18 (457)	24 (609)	30 (262)	36 (914)
B	28 (711)	35 (889)	48 (1219)	72 (1829)
C	16 ³ / ₄ (425)	18 ⁵ / ₈ (473)	17 ³ / ₄ (451)	19 ⁷ / ₈ (505)
E	49 ⁷ / ₈ (1267)	61 ⁷ / ₈ (1572)	69 ³ / ₈ (1762)	96 ⁵ / ₈ (2454)
F	3 (76)	4 (102)	4 (102)	4 (102)
H	33 ³ / ₄ (857)	42 ⁵ / ₈ (1083)	54 ³ / ₄ (1391)	80 ⁷ / ₈ (2054)

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- 2) a leading global water technology company.

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