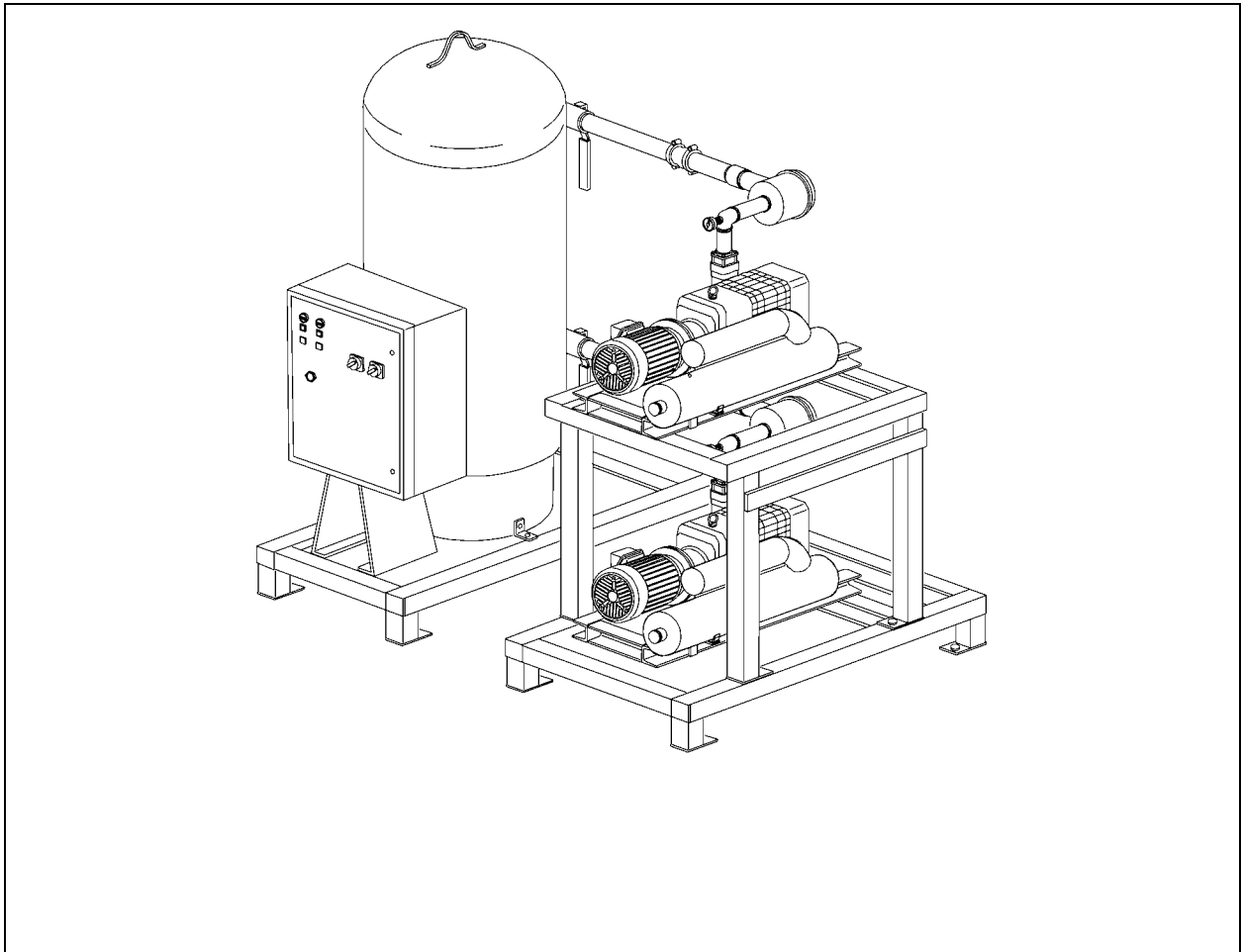


TECHNICAL DATA SHEET

MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw (Stack Mount Configurations) From Hill-Rom

Index



Product No. P6920 Series

For Parts or Technical Assistance

Technical Support: (800) 445-3720 Customer Service: (800) 445-3730

Canada: (800) 267-2337

International: Contact your distributor.

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MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw (Stack Mount Configurations) Technical Data Sheet

Revisions

Revision Letter	Pages Affected	Date
Original Issue		September, 1999
A	All	December, 2000
B	All	December, 2001
C	All	March, 2003

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Fourth Edition

First Printing 1999

Printed in the USA

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Introduction

The MedPlus® Medical Vacuum Plant reliably produces stable vacuum service for all types of medical facilities.

Medical vacuum is distributed to critical care areas such as operating rooms, intensive care units, patient rooms, delivery rooms, emergency rooms, nurseries, and post-operative units to provide suction.

Medical vacuum is a dry system. Liquids, solids, and aerosols are captured in collection bottles mounted at the vacuum outlets before entering the centrally piped medical vacuum system.

Standards

MedPlus® Medical Vacuum Plants fulfill all applicable codes and standards:

- National Fire Protection Association (NFPA) 99
- American Society of Mechanical Engineers (ASME)
- National Electrical Manufacturers Association (NEMA)
- Underwriters Laboratories Inc.®¹ (UL), Category NITW File E-113767
- National Electrical Code®² (NEC®³)

Plant Description

The plant has the following specifications and characteristics:

- Assembled in the USA to allow quick upgrade or service response
- Local audible and visual alarms for the lag pump, including dry contacts for the medical warning systems for the lag malfunction
- Meets all applicable NEC® requirements
- Factory-assembled, pre-piped, pre-wired, and tested

- Receiver tank constructed according to ASME standards and affixed with a National Board label indicating the number of gallons
- Receiver supplied with a three-valve by-pass
- NEMA or NEMA-rated high efficiency motors
- Check valve, isolation (shutoff) valve, vacuum relief valve, vacuum gauge, and exhaust muffler for each pump

NOTE:

The 3 and 5 horsepower (hp) systems do not require relief valves.

- Inlet particulate filter with a replaceable element for each pump

Plant Performance

- The plant requires no water for vacuum generation.
- The lag pump operates from the same control cabinet as lead pump.
- Pump motors greater than 5 hp meet NEMA classification for high efficiency.
- The plant operates on demand. (The vacuum plant can operate continuously if the medical facility demand requires it.)
- Each pump has the following components:
 - Two claw-type rotors
 - A gear drive that synchronizes the rotation of the claws
 - No touching parts in the pumping chamber
 - An inlet filter
 - An exhaust muffler

NOTE:

The 3 and 5 horsepower (hp) systems do not require relief valves.

- Vacuum relief valve
- Check valve
- Isolation (shutoff) valve
- Vacuum gauge

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2. National Electrical Code® is a registered trademark of National Fire Protection Association, Inc.
3. NEC® is a registered trademark of National Fire Protection Association, Inc.

MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw (Stack Mount Configurations)

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Specifying Your Plant

Include the following in your specification for a MedPlus® Medical Vacuum Plant. (Use “Ordering Information” on page 5 to fill in the blanks).

The medical vacuum plant shall be a Hill-Rom MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw, part number _____, consisting of _____ direct-gear driven, continuous-duty-rated, claw-type, air-cooled, vacuum pumps, a completely packaged assembly, consisting of an ASME receiver and a UL-listed (Category NITW File E-113767) (duplex, triplex, or quadraplex) electrical control system housed in a NEMA Type-12 control cabinet.

The plant shall be designed to meet NFPA 99, so that failure of a major component does not jeopardize the supply of vacuum. Individual pumps shall be serviced without shutting down the entire system.

The capacity of each pump shall be _____ Standard Cubic Feet/Minute (SCFM) at 19" Hg (64 kPa) requiring no more than _____ horsepower at any vacuum level between 0 and 22" Hg plus (0 to 74 kPa). Total capacity according to NFPA 99 requirements for medical vacuum systems, not including the backup (lag) vacuum pump, shall be _____ SCFM at 19" Hg (64 kPa) with a total system horsepower, including the backup vacuum pump, of _____ horsepower.

The power supply shall be _____ V, three phase, 60 Hz (specify 208, 230 or 460V).

Detailed Specifications

The MedPlus® Medical Vacuum Plant is a completely packaged, centralized unit that delivers medical vacuum service to the medical facility. The MedPlus® Medical Vacuum Plant is configured as a stack-mounted system (see figure 1 on page 3). The plant consists of the following parts mounted onto multiple sub-bases in a stacked configuration:

- Two, three, or four non-contacting, claw-type vacuum pumps driven by an integral vacuum pump/motor assembly
- Single-point inlet connection
- Vertical receiver
- Control cabinet
- Required valves and interconnecting piping
- Plant accessories (shipped loose for field installation)

The entire plant requires only one inlet connection to the hospital, two, three, or four exhaust connections, and one electrical connection to the control cabinet. If required, the plant may be split into smaller components for easier installation into existing space.

The vacuum pump/motor assembly consists of the pump module and the exhaust chamber. The pump module consists of two claw-shaped rotors that are synchronized to rotate in opposite directions in very close proximity to each other. The interaction of the claws, as they rotate, allows air to enter the rotating chambers, to become compressed, and then to be expelled into the exhaust chamber where the air is muffled before discharge.

The claw-shaped rotors are attached to a hardened steel shaft that is mounted to bearings on either end. One end consists of the drive gears that control the synchronous rotation of the claws. On the other end, the bearing chamber isolates the gear bearings from the vacuum chamber. The bearing chamber contains oil to lubricate the gears and bearings.

Continuous-duty, claw-type pumps produce vacuum without water for simpler operation, eliminating water and sewage costs. The pumps are direct-driven, requiring no belts to replace.

MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw (Stack Mount Configurations)

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The inter-connecting piping includes the following: a shut-off valve to the system, a three-valve by-pass of the receiver, and, for each vacuum pump, a check valve, an inlet filter, a vacuum gauge, a relief valve set for 22" Hg (74 kPa) or 27" Hg (92 kPa), and an isolation valve.

NOTE:

The 3 and 5 horsepower (hp) systems do not require relief valves.

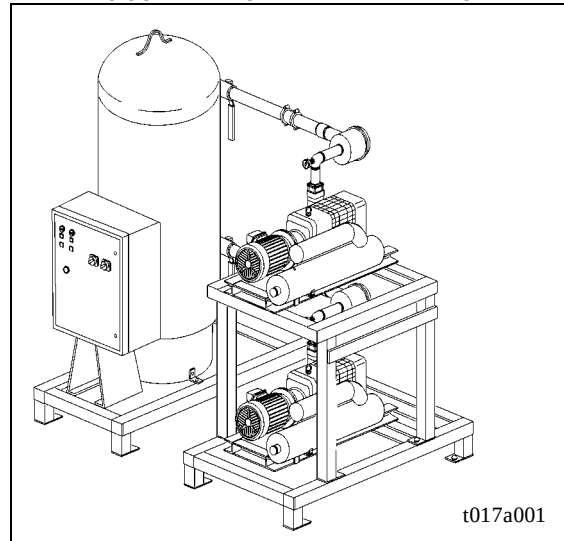
NOTE:

The 2.2 kW (3.0 hp) and 4.0 kW (5.4 hp) pumps can achieve a vacuum level of 27" Hg (92 kPa).

The receiver is ASME-rated with a National Board label affixed. The receiver contains a vacuum gauge and a manual tank drain.

Each pumping module contains an exhaust opening to connect the exhaust line to the outside. (The exhaust line is provided and sized by others.)

**Figure 1. MedPlus® Medical Vacuum Plant
(Typical Duplex Stack Mount)**



Electrical Control System

The electrical control cabinet is UL-listed and contains the electrical controls for operating the medical vacuum plant. The following are the key components:

- Disconnect/circuit breaker switches for each motor
- NEMA-rated motor starters for each motor
- Control circuit transformers
- Vacuum switch for each pumping module
- Alternator for sequencing of pumps based on time (duplex configurations only)
- Microprocessor alternator to control the operation of the plant (triplex and quadraplex configurations only)
- Visual and audible alarm for lag unit operation
- Hour meters for each pump
- Hand/Off/Automatic switch for each pump
- NEMA Type-12 enclosure

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Detailed Electrical Control System

The electrical control system consists of a molded-case circuit breaker, magnetic starter with overload, and a Hand/Off/Automatic selector switch for each pump motor. In hand (manual) position, the motor runs regardless of vacuum level. In automatic position, individual motors run, depending on the vacuum level sensed by the vacuum switch. Included in the electrical control system is the run-time meter and running light. There are local audible and visual alarms for the lag pump, including dry contacts for the medical warning systems for the lag malfunction. The rest of the electrical control system depends on whether a duplex, triplex, or quadraplex configuration is selected.

The duplex has a lead/lag configuration. The lead pump comes on at 18" Hg (61 kPa) and turns off at 20" Hg (68 kPa). The lag pump comes on at 17" Hg (57 kPa) and turns off at 19" Hg (64 kPa). The audible and visual lag alarm signals an alarm condition when the vacuum level reaches 17" Hg (57 kPa). The lead pump has a minimum run time of 10 minutes.

The triplex has a lead pump #1/lag pump #2/lag pump #3 configuration. Lead pump #1 comes on at 18" Hg (61 kPa) and turns off at 20" Hg (68 kPa). Lag pump #2 comes on at 17" Hg (57 kPa) and turns off at 19" Hg (64 kPa). Lag pump #3 comes on at 16" Hg (54 kPa) and turns off at 18" Hg (61 kPa). The audible and visual lag alarm signals an alarm condition when the vacuum level reaches 16" Hg (54 kPa). The lead pump has a minimum run time of 10 minutes.

The quadraplex has a lead pump #1/lag pump #2/lag pump #3/lag pump #4 configuration. Lead pump #1 comes on at 18" Hg (61 kPa) and turns off at 20" Hg (68 kPa). Lag pump #2 comes on at 17" Hg (57 kPa) and turns off at 19" Hg (64 kPa). Lag pump #3 comes on at 16" Hg (54 kPa) and turns off at 18" Hg (61 kPa). Lag pump #4 comes on at 15" Hg (51 kPa) and turns off at 17" Hg (57 kPa). The audible and visual lag alarm signals an alarm condition when the vacuum level reaches 15" Hg (51 kPa). The lead pump has a minimum run time of 10 minutes.

Duplex configurations have dual disconnect switches to the control system. Triplex and quadraplex

configurations have a single disconnect switch to the control system.

Duplex configurations use a cam-timed mechanism that forces alternation of the pumps to ensure even pump usage. Triplex and quadraplex configurations use a microprocessor alternator to ensure even pump usage.

Redundant control circuit transformers power the system. A control relay activates a redundant transformer if the control circuit transformer fails.

MedPlus® Medical Vacuum Plant Accessories

Hill-Rom accessories are supplied with each vacuum plant. The following accessories are shipped loose and installed by others:

- Exhaust flexible connectors
- Intake flexible connector
- Vibration dampeners

Warranty

Please refer to the service manual for the warranty.

**MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw
(Stack Mount Configurations)**

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Ordering Information

The tables below detail the stack mount duplex, triplex, and quadraplex vacuum plants.

Table 1. Duplex Stack Mount

	Motor hp		SCFM at 15" Hg (51 kPa)		SCFM at 19" Hg (64 kPa)				
Product Number ¹	Each Pump	Total Plant ²	Each Pump	Plant (per NFPA) ³	Each Pump	Plant (per NFPA) ³	Receiver Size (Gal)	dBa ⁴	Weight (lb)
P6920-9040-200	3 (2.2 kW)	6	25.5	25.5	18	18	120	78	1172
P6920-9040-201	5.4 (4.0 kW)	10	48.5	48.5	35	35	120	84	1197
P6920-9040-202	7.5	15	76	76	54	54	200	81	2520
P6920-9040-203	10	20	104	104	74	74	200	85	2585
P6920-9040-204	20	40	157.5	157.5	108	108	200	85	3050

Table 2. Triplex Stack Mount

	Motor hp		SCFM at 15" Hg (51 kPa)		SCFM at 19" Hg (64 kPa)				
Product Number ¹	Each Pump	Total Plant ²	Each Pump	Plant (per NFPA) ³	Each Pump	Plant (per NFPA) ³	Receiver Size (Gal)	dBa ⁴	Weight (lb)
P6920-9040-302	7.5	22.5	76	152	54	108	200	81	3330
P6920-9040-303	10	30	104	208	74	148	200	85	3430
P6920-9040-304	20	60	157.5	315	108	216	200	85	3925

Table 3. Quadraplex Stack Mount

	Motor hp		SCFM at 15" Hg (51 kPa)		SCFM at 19" Hg (64 kPa)				
Product Number ¹	Each Pump	Total Plant ²	Each Pump	Plant (per NFPA) ³	Each Pump	Plant (per NFPA) ³	Receiver Size (Gal)	dBa ⁴	Weight (lb)
P6920-9040-402	7.5	30	76	228	54	162	200	81	4250
P6920-9040-403	10	40	104	312	74	222	200	85	4385
P6920-9040-404	20	80	157.5	472.5	108	324	200	85	5010

¹ To specify voltage, add a suffix to the product number: A for 208V, B for 230V, and C for 460V.

² Total Plant hp, including lag pump.

³ Plant Capacity per NFPA, not including the lag pump.

⁴ Sound level of one pump at distance of one meter.

NOTE:

To convert SCFM to Actual Cubic Feet/Minute (ACFM) at 19" Hg (64 kPa), multiply SCFM by a factor of 2.74. To convert SCFM to ACFM at 15" Hg (51 kPa), multiply SCFM by a factor of 2.00.

MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw (Stack Mount Configurations)

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Space Requirements

When choosing the appropriate MedPlus® Medical Vacuum Plant, check the space requirements for the stack mounted unit. See table 4 on page 6, table 5 on page 6, and table 6 on page 6. Use the measurements from the appropriate table for the dimensions in the figure (see figure 2 on page 7). To compare space requirements for the base-mounted and tank-mounted units, see the corresponding technical data sheets.

NOTE:

To aid maintenance, Hill-Rom recommends that a minimum clearance of 4' (122 cm) around the entire unit be added to the space requirements listed below.

For detailed dimensional drawings and electrical schematics specific to your facility's MedPlus® Medical Vacuum Plant, contact your Hill-Rom Account Executive or Customer Service at (800) 445-3730.

Table 4. Duplex Stack Mount

Product Number	Length	Height	Width	Connections National Pipe Thread (NPT)	
				Exhaust (2)	Inlet
P6920-9040-200	61" (155 cm)	84.375" (214.313 cm)	52.875" (134.303 cm)	1"	2"
P6920-9040-201	61" (155 cm)	84.375" (214.313 cm)	54.125" (137.478 cm)	1"	2"
P6920-9040-202	93.3" (236.9 cm)	89" (226 cm)	60.4" (153.4 cm)	2"	3"
P6920-9040-203	93.3" (236.9 cm)	89" (226 cm)	60.4" (153.4 cm)	2"	3"
P6920-9040-204	93.8" (238.2 cm)	89" (226 cm)	65" (165 cm)	3"	4"

Table 5. Triplex Stack Mount

Product Number	Length	Height	Width	Connections (NPT)	
				Exhaust (3)	Inlet
P6920-9040-302	136.5" (346.7 cm)	89" (226 cm)	60.4" (153.4 cm)	2"	3"
P6920-9040-303	136.5" (346.7 cm)	89" (226 cm)	60.4" (153.4 cm)	2"	3"
P6920-9040-304	136.5" (346.7 cm)	89" (226 cm)	65" (165 cm)	3"	4"

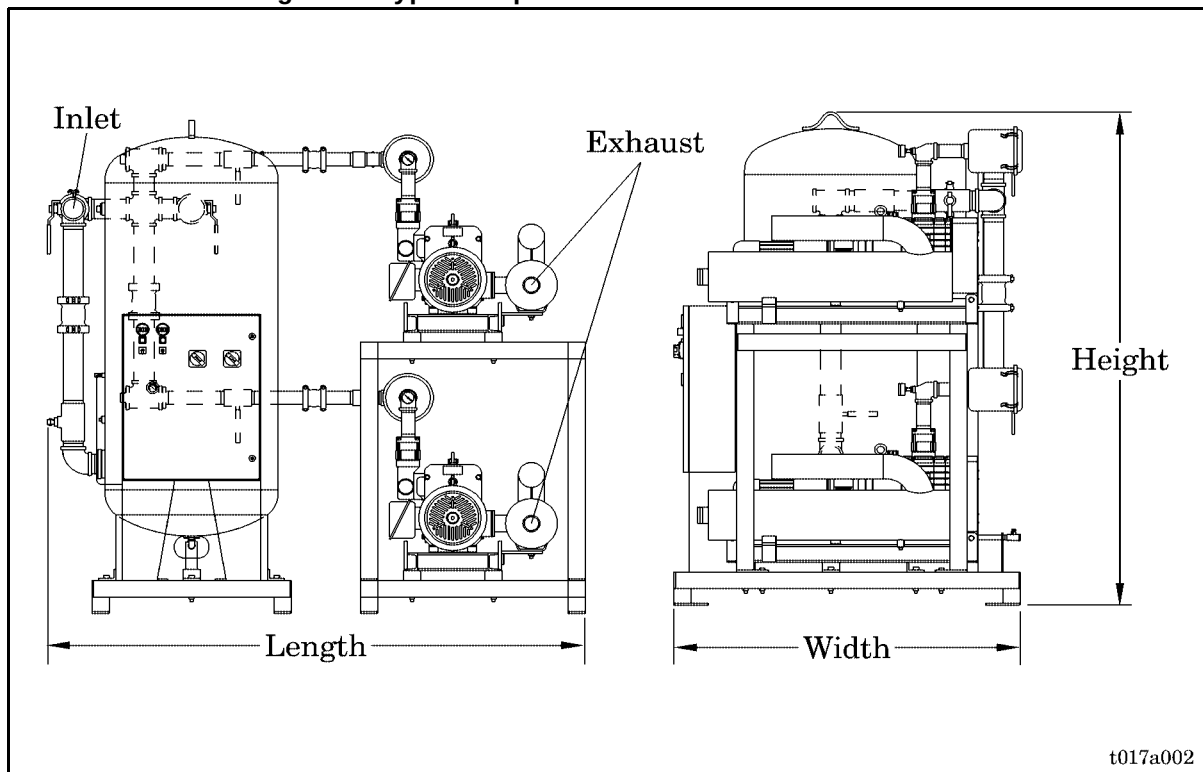
Table 6. Quadraplex Stack Mount

Product Number	Length	Height	Width	Connections (NPT)	
				Exhaust (4)	Inlet
P6920-9040-402	136.5" (346.7 cm)	89" (226 cm)	60.4" (153.4 cm)	2"	3"
P6920-9040-403	136.5" (346.7 cm)	89" (226 cm)	60.4" (153.4 cm)	2"	3"
P6920-9040-404	136.5" (346.7 cm)	89" (226 cm)	65" (165 cm)	3"	4"

MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw (Stack Mount Configurations)

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Figure 2. Typical Duplex Stack Mount Plant Dimensions



Installation



CAUTION:

The unit must be installed properly and started by a Hill-Rom representative. Failure to do so may void the warranty.

Hill-Rom recommends that the MedPlus® Medical Vacuum Plant be installed according to relevant building codes, adopted sections of NFPA 99 and the following steps (see figure 3 on page 9) and (see figure 4 on page 10).

For electrical and dimensional system schematics specific to your facility's vacuum plant, contact your Hill-Rom Account Executive or Customer Service at (800) 445-3730.

1. Install the MedPlus® Medical Vacuum Plant in a well ventilated room. The temperature of the area should be 70°F (21°C) with a minimum ambient temperature of 40°F (4°C) and a maximum ambient temperature of 100°F (38°C). Provide adequate cross air circulation to remove heat generated by the pumps. Verify ventilation needed for the maximum British Thermal Unit (BTU) output with your heating, ventilation, and air conditioning (HVAC) personnel.

NOTE:

If the maximum ambient temperature exceeds 100°F (38°C), call your Hill-Rom Account Executive or Customer Service at (800) 445-3730 for recommendations.

MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw (Stack Mount Configurations)

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CAUTION:

The unit must be installed properly and started by a Hill-Rom representative. Failure to do so may void the warranty.

2. Hill-Rom recommends a minimum clearance of 4' (122 cm) around the entire unit to aid maintenance. If this space is not available, call your Hill-Rom Account Executive or Customer Service at (800) 445-3730.
3. Check the actual voltage at the intended vacuum plant site. Your facility's distribution system may influence the line voltage. If the voltage is below 208V, call your Hill-Rom Account Executive or Customer Service at (800) 445-3730.
4. Bolt the plant securely to a 4" (10 cm) high concrete base supplied by the installing contractor. Level the plant to 1/16" (1.59 mm), and shim the frame to prevent any bowing. If the unit is not mounted on the ground floor, the engineer may wish to consider an inertia pad, even though vibration transmission is minimal with the MedPlus® Medical Vacuum Plant.
5. The electrical contractor furnishes and installs the proper wiring size and type to the pre-wired control cabinet according to NEC®¹. Some larger plants may be broken down to smaller components for shipment and require some additional control wiring and plumbing connections.
6. Size the exhaust line to minimize back pressure to less than 1 psi. For a duplex configuration, the size of the common exhaust line should be at least one pipe size larger than the individual vacuum pump exhaust line. For triplex and quadraplex configurations, the exhaust line size should be upsized for **each** vacuum pump exhaust. The size of the common exhaust line is a function of the length of the run, elbows, connections, valves, and the capacity of the pump. Refer to the *Piped Medical Gas Systems Design Guide* (ds035) for complete information on proper sizing of the exhaust line.
7. Install the supplied flexible connectors on each exhaust line, with the combined exhaust line continuing to a point of termination outdoors. Turn down and screen the end of the exhaust line. Ensure that the exhaust line meets requirements set by NFPA 99.
8. Use the flexible connector supplied with the vacuum plant to connect the piping from the vacuum distribution line to the vacuum plant. Hang all piping according to NFPA 99 building codes.
9. The vacuum switches are preset at the factory. Due to vibration during shipping, the switches may have to be adjusted. The vacuum switches are set at sea level unless noted otherwise in the specifications or on the drawings to compensate for altitude.
10. Hill-Rom will furnish the following system accessories with each MedPlus® Medical Vacuum Plant: exhaust flexible connectors (one per pump), intake flexible connector, and vibration pads. All accessories are shipped loose for field installation by others. For details, see NFPA 99 and specific plant installation schematics.
11. To schedule an appointment, the contractor should notify the Hill-Rom service location two weeks prior to the start-up date.
12. Installation accessories are provided by Hill-Rom as specified.
13. Hill-Rom shall make available to the owner of the medical facility an optional system preventive maintenance contract.

NOTE:

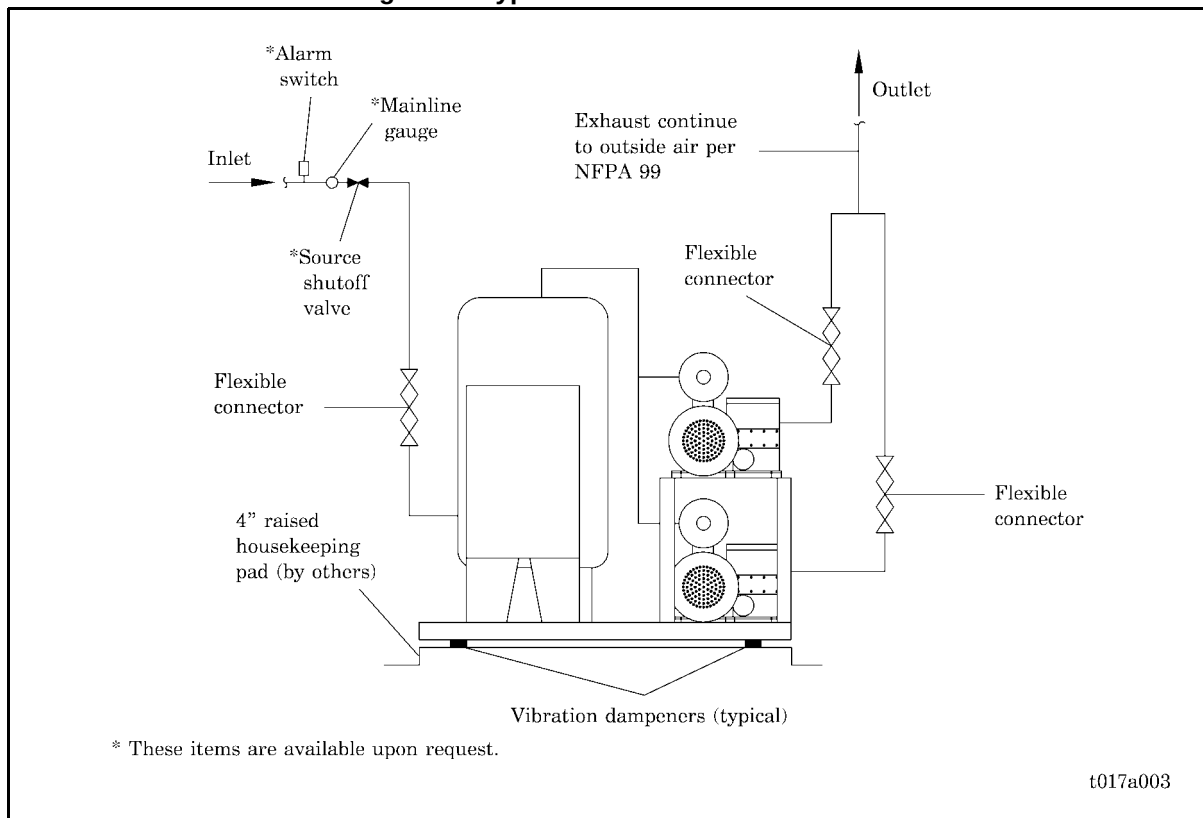
The vacuum plant price includes a factory-trained representative who reviews the installation and starts the vacuum plant.

1. NEC® is a registered trademark of National Fire Protection Association, Inc.

MedPlus® Medical Vacuum Plant—Dry Non-Contacting Claw (Stack Mount Configurations)

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Figure 3. Typical Installation Schematic



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Figure 4. Typical Medical Vacuum System Component and Flow Diagram

