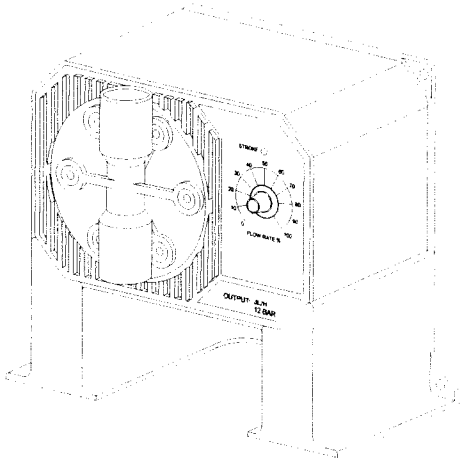
Instruction Manual

PHP-600 Series
Dosing Pumps



omega.com®
OMEGA®

CE
These Instruments are in Compliance with the CE Directives

omega.com®
OMEGA®

OMEGAnet® Online Service	Internet e-mail
www.omega.com	info@omega.com

Servicing North America:

USA: ISO 9001 Certified
One Omega Drive, Box 4047
Stamford CT 06907-0047
TEL: (203) 359-1660 FAX: (203) 359-7700
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L 5A1
TEL: (514) 856-6928 FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

USA and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®
Customer Service:1-800-622-2378 / 1-800-622-BEST®
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

Mexico: En Español: (001) 203-359-7803 / FAX: (001) 203-359-7807
e-mail: espanol@omega.com / info@omega.com.mx

Servicing Europe:

Benelux:
Postbus 8034, 1180 LA Amstelveen, The Netherlands
TEL: +31 (0)20 3472121 FAX: +31 (0)20 6434643
Toll Free in Benelux: 0800 0993344
e-mail: sales@omegaeng.nl

Czech Republic: Rudé armády 1868, 733 01 Karviná 8
TEL: +420 (0)59 6311899 FAX: +420 (0)59 6311114
Toll Free: 0800-1-66342 e-mail: info@omegashop.cz

France:
11, rue Jacques Cartier, 78280 Guyancourt, France
Tel: +33 (0)1 61 37 26 00 FAX: +33 (0)1 30 57 54 27
Toll Free in France: 0800 466 342 e-mail: sales@omega.fr

Germany/Austria: Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
Tel: + 49 (0)7056 9398-0 FAX: +49 (0)7056 9398-29
Toll Free in Germany: 0800 639 7678
e-mail: info@omega.de

United Kingdom: ISO 9002 Certified
One Omega Drive, River Bend Technology Centre
Northbank, Irlam, Manchester
M44 5BD United Kingdom
Tel: +44 (0)161 777 6611
Toll Free in United Kingdom: 0800-488-488
FAX: +44 (0)161 777 6622 e-mail: sales@omega.co.uk

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives.
OMEGA will add the CE mark to every appropriate device upon certification.

Dear Customer,

Thank you for choosing an Omega Engineering product.

Please read this instruction manual carefully before using the pump. This manual will provide you with the necessary information for a correct use of the pump, as well as a precise idea of its versatility.

These instruments are in compliance with CE directives EN 50081-1 and EN 50082-1.

TABLE OF CONTENTS

Recommendations for Users

Before using these products, make sure that they are entirely suitable for the environment in which they are used.

Operation of these instruments in residential area could cause unacceptable interferences to radio and TV equipments, requiring the operator to take all necessary steps to correct interferences.

Any variation introduced by the user to the supplied equipment may degrade the instruments' EMC performance.

PRELIMINARY EXAMINATION

Remove the pump from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any noticeable damage, notify Omega Customer Service.

Each pump is supplied complete with:

- 7 m (23') LPDE suction and discharge tubing
- Instruction manual

Note: Save all packing material until you are sure that the pump functions correctly. Any defective item must be returned in the original packaging together with the supplied accessories.

READ ATTENTIVELY THE INSTRUCTIONS BEFORE INSTALLING OR OPERATING YOUR PUMP

The PHP-600 Series electronic dosing pumps are easy to use. We recommend, however, that you read the entire manual before using the pump. Familiarity with the features and controls of the unit will give you a better idea of the dosing potential and help reduce operator errors. Please operate the pump only as directed in the instruction manual. Follow all general safety guidelines during operation.

Remember: electrical devices are potentially hazardous. Check that the voltage of the installation matches the voltage indicated on the specification label on the back of the pump. Always be sure the pump is grounded.

Note: It is the responsibility of the user to install and ground the pump properly; it is highly recommended to install an external switch.

Always store chemicals in safe, out of reach places. Follow the directions for use with each chemical. Do not assume chemicals are the same because they look alike. Omega Engineering cannot be held responsible for the misuse of chemicals or the pump.

Always wear protective clothing (gloves and safety glasses) when working near chemical dosing pumps. When pumping chemicals, make sure all tubes are securely attached to the fittings. It is recommended that tubing is shielded to prevent possible injury in case of rupture or accidental damage.

Avoid using a pipe wrench or pliers on plastic parts and connectors. These are best tightened with an open end or crescent wrench. Avoid overtightening these parts as this could cause damage to the seats and threads.

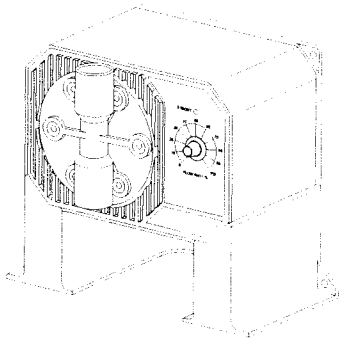
If a hose is used, it should be securely fastened to columns, walls, braces, etc. This will ensure that the hose connection will remain tight and leak free. Shield the hose from direct sunlight. Sunlight can cause an autocatalytic reaction with some chemicals and weaken the hose walls.

The arrow on the pump head indicates the direction of chemical flow and should always point upwards (vertically). Never position the pump horizontally with suction and discharge valves horizontal. Locate the pump in an area out of the reach of children and pets.

All pumps undergo stringent tests to ensure that they comply with their stated specifications and are calibrated at the maximum rated pressure.

GENERAL DESCRIPTION

DOSING PUMPS



PHP-600 Series pumps are equipped with a single control for pump output.

Flow range is continuously adjustable from 0 to 100% of the maximum capacity through a graded dial on the front of the pumps.

Seven models are available, each with a different dosing capacity:

PHP-607	18.3 lph (4.8 gph) @ 0.5 bar (7.4 psi)
PHP-606	15.2 lph (4.0 gph)@ 1 bar (14.5 psi)
PHP-605	10.8 lph (2.9 gph) @ 3 bar (43.5 psi)
PHP-604	7.6 lph (2.0 gph) @ 3 bar (43.5 psi)
PHP-603	5.0 lph (1.3 gph) @ 7 bar(101.5 psi)
PHP-602	2.9 lph (0.8 gph) @ 8 bar(116 psi)
PHP-601	1.5 lph (0.4 gph) @13 bar (188.5 psi)

COMMON FEATURES OF PHP-600 SERIES PUMPS

High quality materials

PHP-600 Series pumps incorporate Kynar® and Teflon® into their diaphragms, hose connectors and pump heads to provide maximum protection for parts in contact with aggressive chemicals.

The ball valves are constructed in glass. The body is made of fiber-reinforced polypropylene for strength and durability.

Reliability through simplicity

All PHP-600 Series pumps use the positive displacement solenoid method of pumping. This method has fewer moving parts than a standard motor-driven pump, and does not have the mechanical failures associated with conventional pumps.

The Positive Displacement design has several distinct advantages over other types of mechanical designs:

- It is more accurate. Each stroke of the piston is precisely the same as the stroke before it ... and the stroke after it.
- Positive displacement allows for easier self-priming.
- Pumping pressure is as high as 12 bar (176 psi). This allows you to install your pump in the widest variety of tank-to-tank and tank-to-in-line applications.
- High accuracy and repeatability. A wire-wound potentiometer and solid state electronics are combined to achieve greater precision and control.

Kynar® is registered Trademark of "Pennwalt Co."
Teflon® is registered Trademark of "du Pont de Nemours & Co."

Easy installation

Designed with mounting holes in the base as well as rear panel, PHP-600 Series pumps can be installed on a wall as well as directly on top of tanks and drums.

There is no need for additional hardware.

All the controls and pump assemblies are conveniently located on the front of the unit.

If the operator must access the pump head or control panel for any reason, there is no need to dismount the unit.

FLOW RATE CHART

The following charts show the relationship between their flow rate and pressure.

An increase of pressure in the system decreases the flow rate.

PHP-601	
bar (psi)	**lph (gph)**
0.5 (7.4)	8.3 (2.20)
1 (14.7)	6.8 (1.80)
2 (29.4)	5.4 (1.43)
3 (44.1)	5.2 (1.38)
4 (58.8)	4.8 (1.27)
5 (73.5)	4.5 (1.19)
6 (88.2)	4.1 (1.08)
7 (102.9)	3.2 (0.85)
8 (117.6)	2.9 (0.77)
9 (132.3)	2.1 (0.56)
10 (147)	1.8 (0.48)
11 (161.7)	1.7 (0.45)
12 (176.4)	1.6 (0.42)

PHP-602	
bar (psi)	**lph (gph)**
0.5 (7.4)	15.8 (4.18)
1 (14.7)	12.2 (3.23)
2 (29.4)	9.3 (2.46)
3 (44.1)	7.9 (2.09)
4 (58.8)	6.5 (1.71)
5 (73.5)	5.0 (1.32)
6 (88.2)	4.0 (1.06)
7 (102.9)	3.3 (0.87)
8 (117.6)	2.9 (0.77)
9 (132.3)	2.5 (0.66)
10 (147)	2.2 (0.58)
11 (161.7)	1.9 (0.50)
12 (176.4)	1.5 (0.40)

PHP-603	
bar (psi)	**lph (gph)**
0.5 (7.4)	15.8 (4.18)
1 (14.7)	12.2 (3.23)
2 (29.4)	10.8 (2.86)
3 (44.1)	9.3 (2.46)
4 (58.8)	7.9 (2.09)
5 (73.5)	6.5 (1.72)
6 (88.2)	5.8 (1.53)
7 (102.9)	5.0 (1.32)
8 (117.6)	4.3 (1.14)
9 (132.3)	4.0 (1.06)
10 (147)	3.6 (0.95)

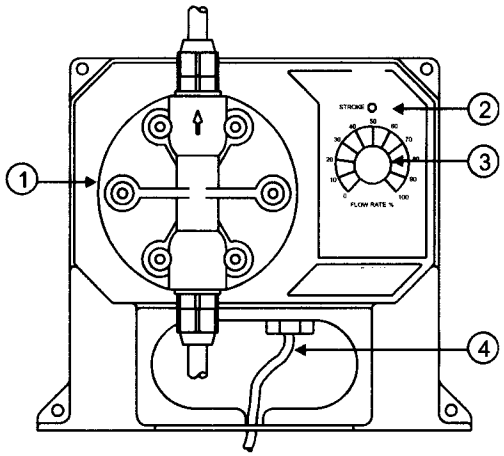
PHP-604	
bar (psi)	**lph (gph)**
0.5 (7.4)	17.2 (4.55)
1 (14.7)	13.6 (3.60)
2 (29.4)	10.8 (2.86)
3 (44.1)	7.6 (2.01)
4 (58.8)	6.0 (1.59)
5 (73.5)	5.7 (1.51)
6 (88.2)	5.4 (1.43)
7 (102.9)	4.4 (1.16)
8 (117.6)	3.6 (0.95)

PHP-605	
bar (psi)	**lph (gph)**
0.5 (7.4)	18.3 (4.84)
1 (14.7)	15.2 (4.02)
2 (29.4)	13.6 (3.60)
3 (44.1)	10.8 (2.86)
4 (58.8)	9.4 (2.49)

PHP-606	
bar (psi)	**lph (gph)**
0.5 (7.4)	18.3 (4.84)
1 (14.7)	15.2 (4.02)
2 (29.4)	13.6 (3.60)
3 (44.1)	10.8 (2.86)

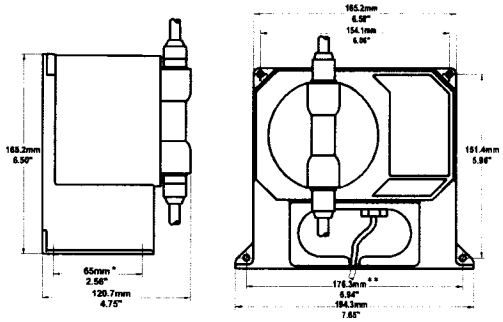
PHP-607	
bar (psi)	**lph (gph)**
0.5 (7.4)	18.3 (4.84)
1 (14.7)	15.2 (4.02)
2 (29.4)	13.6 (3.60)

FUNCTIONAL DESCRIPTION OF PHP-600 SERIES



1. Pumphead
2. Stroke LED
3. Flow Rate % Knob
4. Power Cord

MECHANICAL DIMENSIONS

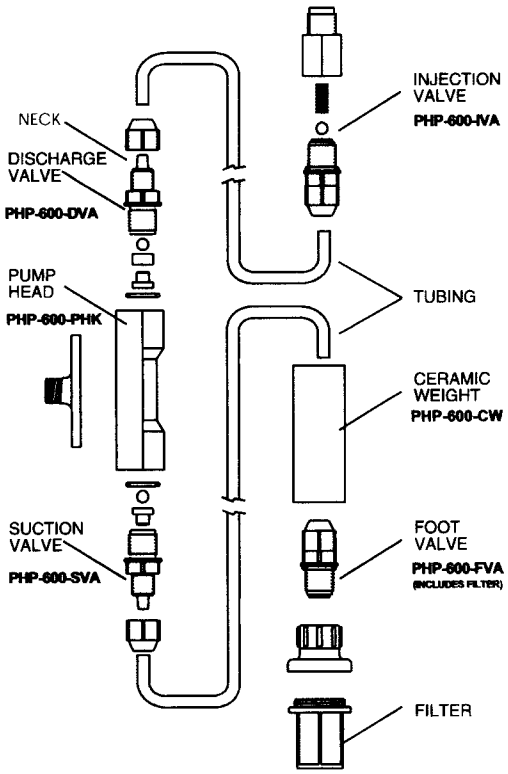


PUMP SPECIFICATIONS

FLOW RATE **PHP-601** **PHP-602** **PHP-603** **PHP-604** **PHP-605** **PHP-606** **PHP-607**	 1.5 lph (0.4 gph) @13 bar (188.5 psi) 2.9 lph (0.8 gph) @ 8 bar(116 psi) 5.0 lph (1.3 gph) @ 7 bar(101.5 psi) 7.6 lph (2.0 gph) @ 3 bar (43.5 psi) 10.8 lph (2.9 gph) @ 3 bar (43.5 psi) 15.2 lph (4.0 gph) @ 1 bar (14.5 psi) 18.3 lph (4.8 gph) @ 0.5 bar (7.4 psi) Adjustable from 0 to 100% of maximum pump capacity
POWER SUPPLY **Standard** **Optional**	 100/115V; 50-60Hz 220/240; 50-60Hz
SELF PRIMING	Max.self-priming height 1.5 m (5')
ENVIRONMENT	0 to 50°C (32 to 122°F) 95% R.H. max
PROTECTION	IP65
WEIGHT	3 Kg (6.6 lb.)
DIMENSIONS	194 x 165 x 121 mm (WxHxD) (7.6 x 6.5 x 4.8")
MATERIAL	BODY: Polypropylene with reinforced fiberglass VALVES: glass balls PUMPHEAD: Kynar® DIAPHRAGM: Teflon®

Kynar® is registered Trademark of "Pennwalt Co."
Teflon® is registered Trademark of "du Pont de Nemours & Co."

VALVE / HOSE ASSEMBLY DIAGRAM



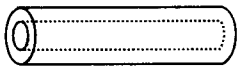
INSTALLATION

Materials Needed

- Tubing (7 meter/22 feet) (**included**) or other type of tubings (Teflon®, for example) more suitable for a specific application (optional)

Optional Accessories

- 4 each, ceramic weights (**PHP-600-CW**)



- 1 each, foot valve assembly (**PHP-600-FVA**)

- 1 each, injection valve assembly (**PHP-600-IVA**)

Location

A suitable location should:

- be near to a power source
- be conveniently close to the injection point
- allow easy access to the flow rate control and pipe or hose connections
- be no more than 1.5 meters (5 feet) above the operating position of the suction valve assembly.

Dimensions for Installation

PHP-600 Series Pumps are designed for permanent installation.

The pump can be mounted directly on a wall or tank (see pages 12-17 for the specific mounting dimensions).

Power Requirements

The PHP-600 Series pumps are designed to operate to specifications within the following voltage ranges:

100 - 130 Volts for 115V models

200 - 240 Volts for 220V models

To ensure maximum performance, check the voltage at the point of supply to verify that it is sufficient. It is recommended that you install a 1 Amp circuit breaker between the pump and the power supply. This will give additional protection to the internal circuit and provide a convenient way to disconnect the power supply prior to servicing the pump, if needed.

Injection Point

- Choose an injection point that allows you to mount the injection valve assembly vertically.
- The spring in the injection valve assembly adds approximately 1.5 bar of back pressure. If pumping into a high back pressure, the spring should be removed.

Other Considerations

- If you are mounting the system to a wall, column, etc., be sure it is strong enough to support the weight of the entire system.
- The ambient temperature of the pump, when in operation, should be between 0 and 50°C (32 to 122°F) and should be protected from direct exposure to outdoor elements (direct sunlight, rain, extreme temperatures, high humidity, etc.).

- Generally speaking, the shorter the suction distance, the more efficient the pump operates.
- The pump should be placed in a conventional location that will allow easy access to the control and connections. It should be placed so that regular visual inspections of the connections and hoses are facilitated.

Vertical Surface Mounting

Once you have selected the best installation site, simply screw or bolt the unit into a wall or mounting panel above the chemical feed tank.

The 4 mounting screw holes on the pump will accommodate up to a 5 mm (3/16") screw or bolt (remember to use heavy screws or bolts to secure the system).

Be sure you do not over tighten and cause excessive stress on the mounting holes.

For safety of the users, the pump has to be grounded.

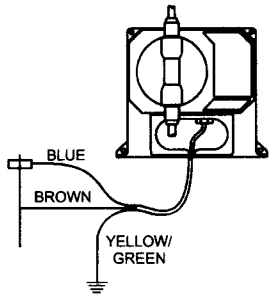
The pump should be connected to a single phase power source.

Color coding for wires:

Blue - Live

Brown - Neutral

Yellow/Green - Ground (earth)



It is recommended that the system be connected to a power line/leg equipped with a circuit breaker of 1 Amp.

Permanent Connection using 3/8"PVC pipe

All piping for the pump feed and discharge should be plumbed to the location of the pump.

The threads on both valve assemblies allow the use of standard 3/8" (European) pipe fittings for permanent pipe connections.

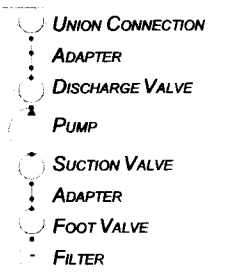
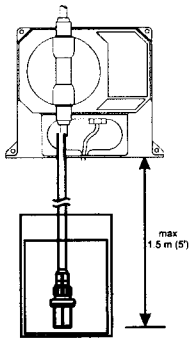


Diagram for Rigid Pipe Hose

The foot valve assembly should always hang vertically and not lay horizontal on the bottom of the tank or drum.

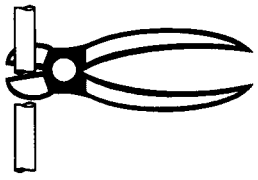
A vertical assembly will ensure that the valve is positioned properly and prevent loss of prime.



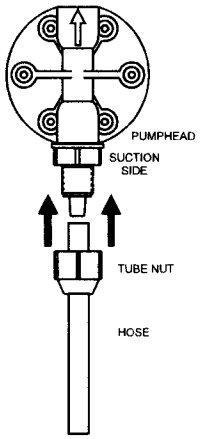
For the U.S. standard installations, use PVC adapters to connect the suction and discharge valves to the PVC pipe.

Hose Connections

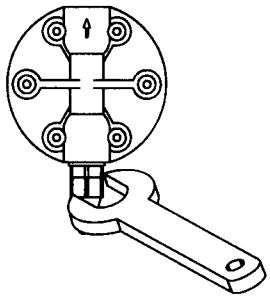
- Cut a long enough section of the hose to reach the suction valve of the pumphead from the feed tank. Allow some slack in the hose and be sure it is not kinked or twisted.

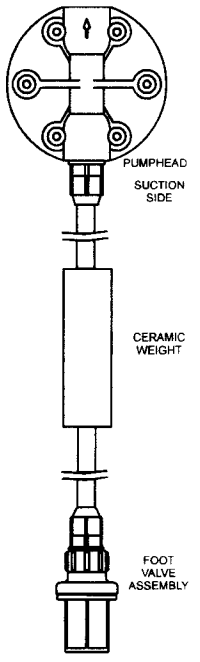


• Slip a hose connector onto the hose over the head valve and up to the bottom of the threads ensuring it is fully seated.



• Slide the connector up to the threads and tighten to form a seal.

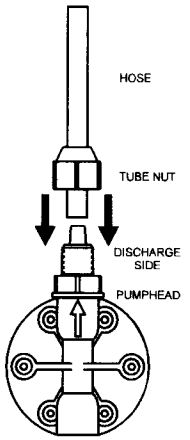


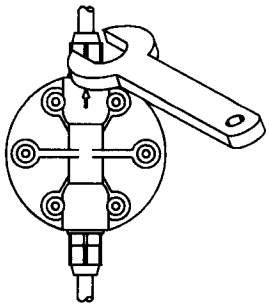


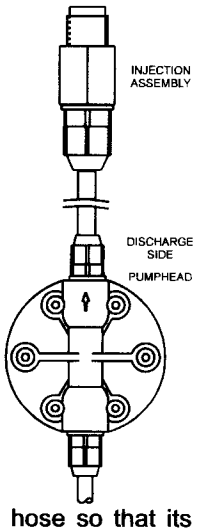
• Slip the ceramic weight and a connector over the other end of the hose.

• Attach the foot valve assembly to the hose and slide the connector up to the threads and tighten to form a seal.

• Repeat the same installation procedure for the hose connections on the discharge end with the injection assembly.





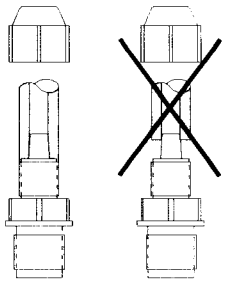


• Secure the hose so that its movement is minimized when the pump is operating. Excessive hose movement could cause the connectors to loosen and result in leakage.

Assembling the Hose to the Valve

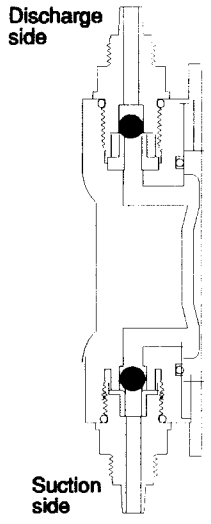
The end of the valve is specially tapered to form a leak free seal when the hose is properly installed.

Be sure to seat the hose completely so that there is no gap. Push the hose until it covers the end of the valve completely.

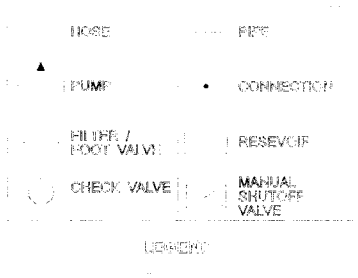


Suction and Discharge Valves

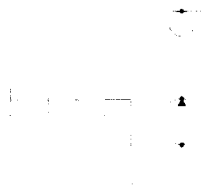
The suction and discharge valves located on the pumphead should not be interchanged as they are different internally. The discharge valve is fitted with a valve guide and will not function properly if used on the suction side.



EXAMPLE OF TYPICAL INSTALLATIONS



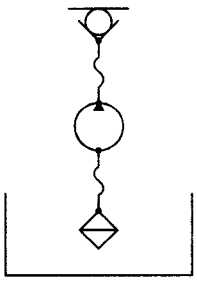
Flooded Suction Installation



Suggested Installation for consistent output when using a low stroke rate. Also suggested for highly viscous chemicals.

A slight suction pressure avoids self-priming problems, especially with high viscosity liquids.

Suction Lift Installation

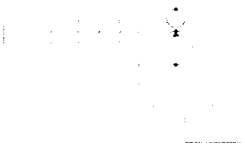


Suggested installation for most in-line applications with nominal output and pressures.

The maximum self-priming height is 1.5 m (5 ft.). It is advisable to install a level controller in order to stop the pump when feed tank liquid level is low.

Uphill Installation

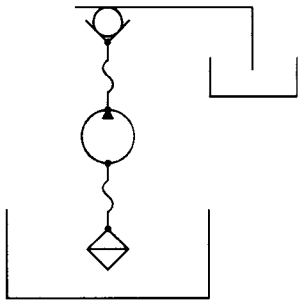
Suggested installation whenever the supply is located higher than the discharge point; typically a waste water application.



It is important to install the Injection valve to prevent siphoning.

Downhill Installation

Suggested installation when pumping from one container to another, each at different levels and with only nominal pressure.



OPERATIONAL GUIDE

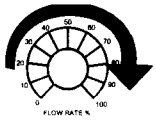
STARTUP

At startup, purge all chemical gases and air from the suction tubing, valves and pump head. Start the pump.

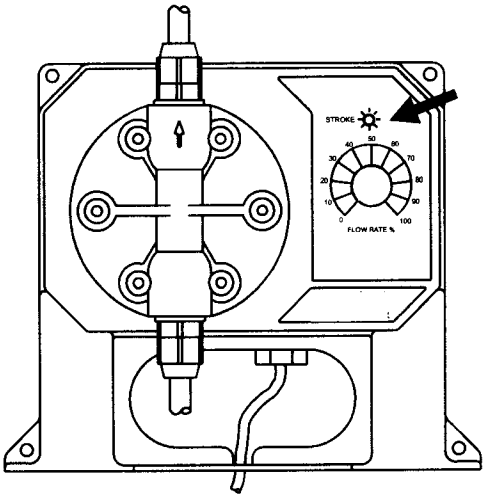
When all the air or gas is vented, the solution being metered will appear in the output line.

Note: only when operating under pressure, the pump must be started unloaded.

An external Flow Rate Control (potentiometer) on the face of the pump allows to adjust the flow up to 100% of the pump's rated capacity.



An LED indicator will light up each time a stroke begins.



Operating Pressure and Back Pressure

Operating pressure is a combination of back pressure plus all of the other resistances to flow present in your system.

Pumps are designed to dose their rated output at the operating (*rated*) pressure.

Therefore, *rated* pressure of the pump you install should be close to operating pressure present in the system.

Too little back pressure can cause the pump to overdose.

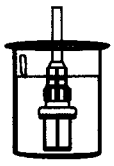
To prevent this from happening on a low back pressure installation, a spring has been added to the discharge/anti-siphon valve assembly.

When pumping into a high back pressure, the spring should be removed.

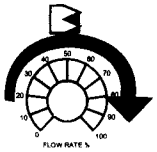
Actual Flow Rate

The actual flow rate depends upon the operating pressure which includes resistance at the injection fittings, hose and piping, the chemical viscosity and suction lift. The Flow Rate Control adjusts the flow up to 100% of the *rated* output. Less back pressure will increase the output, more will decrease it. To determine the correct setting for your application, use the following procedure.

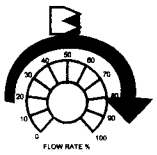
1. Be sure that the pump is primed and that the output connections are completed at the injection point.
2. Place the foot valve assembly in a graduated container with 500 mL of the solution to be dosed.



3. Switch the pump from OFF to the 100% setting and run until the system has been fully reprimed. Switch OFF and refill the container to the 500 mL level.



4. Switch the pump ON to the estimated setting and run for a specific amount of time (e.g.1 minute). Count the number of strokes, length of time, and volume pumped.



Note: It is suggested that you run the test for as long as possible to maximize the accuracy.

For example, if at the maximum setting of 100% you find you pumped 200 mL in one minute, your hourly output would be 12 liters/hour (200 mL x 60 min. = 12000 mL/hr). If your application called for 9 liters/hour, turn the Flow Rate Control to 7 (9/12). Run the test again to verify the results.

TROUBLESHOOTING GUIDE

Electrical

The pump does not operate when turned ON:

- Check the power supply and connections. Voltage should be between 100 - 130 VAC for 115 V models and between 200 - 240 VAC for 220 V models.
- Check wiring color scheme. See Installation section on page 19 or call for technical assistance.

Liquid

The pump operates but does not prime:

- Check for a clogged or loose filter on the suction valve assembly. Retighten if necessary.
- Check to see if the pump is too high above the foot valve assembly in the feed tank. This vertical distance should not exceed 1.5 meters (5 feet). Either lower the pump or raise the feed tank.
- Check the pumphead, suction and discharge valves for blockage.

Pump flow rate is reduced:

- Check the pumphead, discharge and injection valve assembly for any clogging. Clean and reassemble.
- Check for any additional back pressure created since the last flow rate was conducted.
- Check for any changes in the viscosity of

the chemicals being used. Increase the % flow by adjusting the Flow Rate control to a higher setting and run a Flow Rate test.

- Be sure that valves have been properly installed in the pumphead.

Leakage at the connections:

- Be sure that the hose is fully seated and hose connectors are tight.
- Be sure that valves are tight and o-rings are in place.

Leakage around the pumphead:

- Be sure that the valves are tight and o-rings are in place and the head screws (hex bolts) are tight.

MAINTENANCE

Your pump is designed to give you years of trouble-free service. Maintenance should be the preventative type, that is, periodic cleaning and inspecting for any damage or leakage.

Cleaning the Suction, Discharge and Injection Valves

Remove the valves from the pumphead, the injection fitting and the feed.

Keep the suction and discharge valves separated as they are not interchangeable.

Disassemble each valve and clean it with a neutral liquid. Inspect the Kynar® springs.

After cleaning the glass balls, inspect them for any excessive wear due to abrasion from the chemical. Replace if necessary with parts.

When reinstalling the valves into the pumphead, tighten by hand first and then with a wrench ¼ to ½ turn.

Inspecting the hose (if used as supplied with the pump)

Inspect to see if the hose has worn out or weakened due to the chemicals. Pay particular attention for any signs of abrasion or discoloration. Also check the connectors to ensure they are tight.

Replace if necessary with parts.

Kynar® is registered Trademark of "Pennwalt Co."

Cleaning the Pumphead

The pumphead should be cleaned at regular intervals and at least once a year. Remove the deposits that form in the cavities with a solution that is neutral to the chemical the pump has been dosing. Inspect the head for any cracks or worn areas.

Replace if necessary with parts from the pumphead spare part.

SCHEDULED MAINTENANCE

After 50 hours

Tight the pumphead screws with a torque force of 2.5 Nm (22" lbf).

After 12 months

It is recommended to replace suction and discharge valves assemblies as well as the o-rings. The LDPE hose can also deteriorate over time and, for safety reasons, should also be changed.

After 24 months

It is recommended to replace discharge valve, suction valve, tubing and 4x Kynar® springs.

CHEMICAL COMPATIBILITY GUIDE

Partial Listing of Chemicals that can be used with PHP-600 Series Pumps

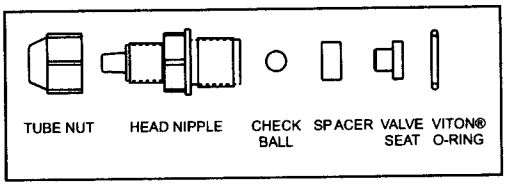
Adipic Acid
Alcohol Amyl
Alcohol, Diacetone
Alcohol, Isoproyl
Alcohol, Methyl
Aluminium, Ammonium Sulfate
Aluminium Chloride
Aluminium Sulfate
Alums
Ammonium Carbonate
Ammonium Chloride
Ammonium Fluoride
Ammonium Hydroxide
Ammonium Nitrate
Ammonium Phosphate
Ammonium Sulfate
Aqua Ammonia
Arsenic Acid
Barium Carbonate
Barium Chloride
Barium Hydroxide
Barium Sulfate
Beer
Beet Sugar Liquors
Bismuth Carbonate
Back Liquor
Bleach
Borax
Boric Acid
Bromic Acid
Butyric Acid
Calcium Bisulfite
Calcium Carbonate
Calcium Chlorate
Calcium Chloride
Calcium Hydroxide
Calcium Hypochlorite
Calcium Nitrate
Calcium Sulfate
Carbonic Acid
Castor Oil
Caustic Soda
Chloral Hydrate
Chromic Acid 50%
Citric Acid
Copper Chloride
Copper Cyanide
Copper Nitrate
Copper Sulfate
Corn Oil
Cottonseed Oil
Cresylic Acid
Crude Oil
Dextrose
Detergents (general)
Diesel Fuel
Dictyl Phthalate
Disodium Phosphate
Ethanol (1-95%)
Ethylene Dichloride
Ethylene Glycol
Fatty Acids
Ferric Chloride
Ferric Nitrate
Ferric Sulfate
Ferrous Chloride
Ferrous Sulfate
Fluoboric Acid
Fluosilicic Acid
Formaldehyde
Fruit Juice Pulp
Fuel Oil
Gallic Acid
Gasoline, Refined
Glucose
Glycerine or Glycerol
Glycolic Acid 30%
Hexane
Hydrazine
Hydrobromic Acid 20%
Hydrochloric Acid (Concentrated)

Hydrochloric Acid (Diluted)
Hydrofluoric Acid 60%
Hydrogen Sulfide Aqueous Solution
Hypochlorous Acid
Kerosene
Lactic Acid
Lard Oil
Lauric Acid
Lead Acetate
Linoleic Acid
Linseed Oil
Lithium Salts
Magnesium Carbonate
Magnesium Chloride
Magnesium Hydroxide
Magnesium Nitrate
Magnesium Oxide
Magnesium Sulfate
Maleic Acid
Malic Acid
Mercuric Chloride
Methanol
Methyl Sulfate
Milk
Mineral Oils
Noptha Petroleum
Nickel Chloride
Nickel Sulfate
Nitric Acid 50%
Oils and Fats
Oleic Acid
Olive Oil
Oxalic Acid
Palmitric Acid
Perchloric Acid 70%
Perchloroethylene
Petroleum Oils (sour)
Phenol
Phosphoric Acid
Photographic Solutions
Plating Solutions
Potassium Carbonate
Potassium Bromide
Potassium Chlorate
Potassium Chloride
Potassium Cyanide
Potassium Ferrocyanide
Potassium Hydroxide
Potassium Nitrate
Potassium Permanganate10%
Potassium Phosphate
Potassium Sulfate
Propyl Alcohol
Propylene Dichloride
Sea Water
Silver Nitrate
Silver Plating Solutions
Soaps
Sodium Acetate
Sodium Bicarbonate
Sodium Bisulfate
Sodium Bisulfite
Sodium Borate
Sodium Chlorate
Sodium Chloride
Sodium Cyanide
Sodium Fluoride
Sodium Hexametaphosphate
Sodium Hydroxide 50%
Sodium Hypochlorite 18%
Sodium Metaphosphate
Sodium Nitrate
Sodium Peroxide
Sodium Phosphate
Sodium Silicate
Sodium Sulfate
Sodium Sulfide
Sodium Sulfite
Sodium Thiosulfate
Sour Crude Oil
Stannic Chloride
Stannous Chloride
Stearic Acid
Sulfur
Sulfuric Acid Concentration
Sulfurous Acid
Tannic Acid
Tanning Liquors
Tartaric Acid
Tetrachlorethane
Tetraethyl Lead
Tetralin
Tin Salts
Vegetable Oils
Vinegar
Water Acid, Mine
Water, Fresh
Water, Distilled
Water, Salt
Whiskey
Wines
Zinc Chloride
Zinc Sulfate

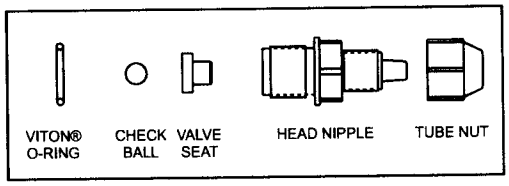
ACCESSORIES

SPARE PARTS

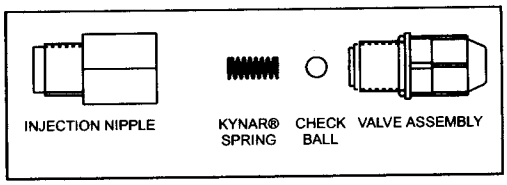
PHP-600-DVA Discharge Valve(Glass Ball, Valve O-Ring, Hose Connector)



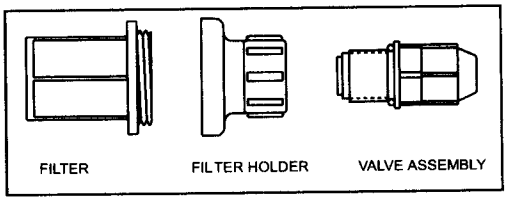
PHP-600-SVA Suction Valve (Glass Ball, Valve O-Ring, Hose Connector)



PHP-600-IVA Injection Valve Assembly



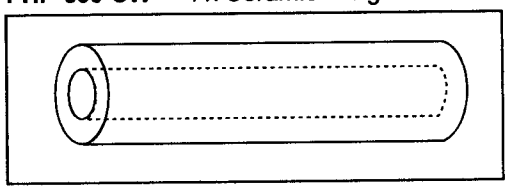
PHP-600-FVA Foot Valve Assembly



PHP-600-KS 4 x Kynar® Springs

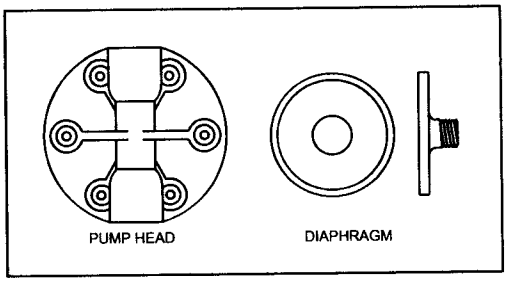
Kynar® is registered Trademark of "Pennwalt Co."

PHP-600-CW 4 x Ceramic Weights



PHP-600-PHK Pumphead, O-Ring, 6 screws and washers

PHP-600-LK (kit) (for PHP-604, PHP-605, PHP-606, PHP-607)
Pumphead
Large Teflon® Diaphragm
Aluminum Piston
Aluminum Disk



PHP-600-SK (for PHP-601 and PHP-602)
Pump-head
Small Teflon® Diaphragm
Aluminum Piston

PHP-600-LD Large Teflon® Diaphragm

PHP-600-SD Small Teflon® Diaphragm

WARRANTY

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's **WARRANTY** adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's **WARRANTY** does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This **WARRANTY** is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KID WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic **WARRANTY/DISCLAIMER** language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.